

D4.1 CLUSTERS DEVELOPMENT AND INNOVATION STRATEGY



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SMART4NZEB D4.1 Clusters Development and Innovation Strategy

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Reviewers	PRO-NZEB, SGG, PSDiK, Dundjer
Abstract	This document includes five comprehensive development and innovation strategies of clusters participating in the SMART4NZEB project. The overarching aim of each strategy is to support the growth and the competitiveness of cluster members by building up synergies and value chains between the 3 key sectors: construction, energy efficiency (EE) and renewable energy sources (RES), to facilitate the effective implementation of nearly Zero Energy Buildings (nZEB) concept through cross-sectoral and transnational cooperation & transversal training. Strategies include action plans that indicate activities required for reaching the strategies objectives.
Keywords	development and innovation strategy, cluster development, nZEB

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Executive Publishable Summary

The SMART4NZEB project aims at creating an environment supporting the transition of five clusters from Central and Eastern Europe towards innovative and modern organizations being able to address cross-sectoral and cross-border challenges related to the implementation of the climate policy of the EU, with a focus on the energy efficiency of buildings and the wider deployment of the nearly-zero energy building standard (nZEB). The objective of the project is to create a sustainable collaboration, co-learning, and capacity building between the involved partners - cluster managers and cluster members, supporting the interregional partnerships to facilitate the development of competitive products and technological solutions intended for new and existing buildings. This will lead to market penetration of nearly zero-energy buildings, and new products/services related to their production, use, and reuse. To this end, new cluster development strategies are needed, to set a clear vision and the development direction for cluster managers, allowing them to stronger and better support their cluster members.

This document presents individual development and innovation strategies for five clusters implementing the SMART4NZEB project:

- Cluster for Promoting Nearly Zero Energy Buildings - Pro-nZEB,
- Construction Cluster of Slovenia – SGG,
- Polish Construction Cluster (coordinated by the Polish Advisory and Consulting Association - PSDiK),
- 'Bioenergy for the Region' Cluster Poland (coordinated by the Research and Innovation Centre Pro-Akademia - RIC),
- Construction Cluster Dundjer Serbia.

The overarching objective of each strategy is to support the growth and the competitiveness of cluster members by building up synergies and value chains between the 3 key sectors: construction, energy efficiency (EE), and renewable energy sources (RES), to facilitate the effective implementation of nearly Zero Energy Buildings (nZEB) concept through cross-sectoral and transnational cooperation & transversal training. The strategies will assist 577 SMEs being members of five clusters or associated organisations, to make the most out of business opportunities brought about by new cross-cutting technologies, creativity, and all forms of innovation and by addressing the nZEB specific industry trends and sustainability aspects towards a sustained development over time. To ensure proper implementation of strategies, they are assisted with action plans that indicate activities required for reaching the strategies objectives, as well as define needed resources and monitoring procedures.

I. Introduction

A. SMART4NZEB project

The aim of the SMART4NZEB project is to boost competitiveness and support the scaling-up of 577 SMEs active in construction, energy efficiency, and renewable energy sectors through strengthening capacity-building of 5 representative clusters as drivers of innovation in Central and Eastern Europe (Poland, Romania, Serbia, and Slovenia) and facilitate trans-national exchanges and strategic partnerships with a focus on sharing experience between different practices, skills gaps, policies, target goals and level of engagement related to nearly Zero Energy Buildings (nZEB).

The main objective of SMART4NZEB is to create a sustainable collaboration, co-learning, and capacity building between the involved partners - cluster managers and cluster members and relevant stakeholders representative for the nZEB market in the selected Central and East-European countries, with a view to develop the involved clusters management excellence and to support interregional partnerships to facilitate the development of competitive products and technological solutions intended for new and existing buildings, which will lead to market penetration of nearly zero-energy buildings, and new products/services related to their production, use and reuse. The overall objective of the action is to drive the partnering clusters towards innovative and modern clusters being able to address cross-sectoral and cross border

B. Context of the document

This document is developed within *WP4 Clusters' development and innovation strategies*. The main objective of this WP is to create transnational collaboration-based clusters' development strategies to boost competitiveness and support the scaling-up of SMEs active in construction, energy efficiency, and renewable sectors through improved and tailored services offered by the clusters based on the specific needs of the involved SMEs. As a supplementary document, action plans for the participating clusters are developed, to ensure that the collaboration strategies in the field of nZEB are operational, functional and allow for progress monitoring. WP4 utilizes the results of other technical work packages (Figure 1). In particular, it uses results of the SWOT analysis from WP2, survey conducted among clusters members, and feedback from those who participate in the ClusterXchange scheme: (<https://clustercollaboration.eu/tags/clusterxchange>).

The aim of this document is to provide individual development and innovation strategies for five clusters implementing the SMART4NZEB project:

- Cluster for Promoting Nearly Zero Energy Buildings - Pro-nZEB,
- Construction Cluster of Slovenia – SGG,
- Polish Construction Cluster (coordinated by the Polish Advisory and Consulting Association - PSDiK),
- 'Bioenergy for the Region' Cluster Poland (coordinated by the Research and Innovation Centre Pro-Akademia - RIC),
- Construction Cluster Dundjer Serbia.

The overarching objective of each strategy is to support the growth and the competitiveness of cluster members by building up synergies and value chains between the 3 key sectors: construction, energy

efficiency (EE), and renewable energy sources (RES), to facilitate the effective implementation of nearly Zero Energy Buildings (nZEB) concept through cross-sectoral and transnational cooperation & transversal training. The strategies will assist 577 SMEs being members of five clusters or associated organisations, to make the most out of business opportunities brought about by new cross-cutting technologies, creativity, and all forms of innovation and by addressing the nZEB specific industry trends and sustainability aspects towards a sustained development over time. To ensure proper implementation of strategies, they are assisted with action plans that indicate activities required for reaching the strategies objectives, as well as define needed resources and monitoring procedures.

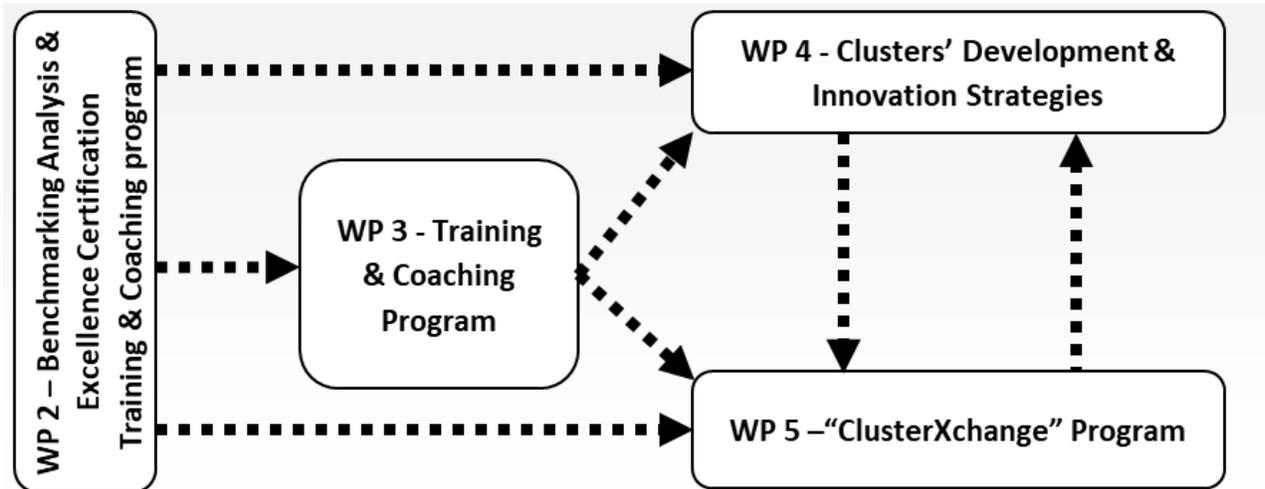


Figure 1 Workflow of SMART4NZEB project

C. Methodology

In the first step, a common structure of the Development and Innovation Strategy has been developed, to guarantee the uniform approach in the elaboration of strategies and action plans for each cluster. It was assisted with the general guidelines and suggestions for authors on what information should be included and what questions should be answered. To ensure the high quality of each of the strategies, a 3-step peer review process has been established (Table 1). 1st draft strategies has been prepared in October 2020 and distributed to reviewers. Each strategy was sent to one reviewer, i.e. each cluster received one strategy for the review. Feedback from reviewers was used to update strategies in February 2021. Then, strategies were distributed again – however to other reviewers in the first round. This process was repeated also in July 2021. In November 2021, clusters provided final versions of their strategies. During the process, each cluster received three reviews from different project partners. This document presents the final versions from November 2021.

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

Table 1 Peer review schedule

Cluster Innovation and Development Strategy	Partner responsible for peer review		
	1st draft - October 2020	2nd draft - February 2021	3rd draft - July 2021
PRO-NZEB	SGG	PSDIK	B4R
Construction Cluster of Slovenia (SGG)	PSDIK	B4R	DUNDJER
Polish Construction Cluster (PSDIK)	B4R	DUNDJER	PRO-NZEB
Bioenergy for the region (B4R)	DUNDJER	PRO-NZEB	SGG
DUNDJER	PRO-NZEB	SGG	PSDIK

II. Development and Innovation Strategy of the Cluster for Promoting Nearly Zero Energy Buildings (Pro-nZEB Cluster)

DEVELOPMENT AND INNOVATION STRATEGY (2022-2024) CLUSTER pRO-nZEB



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Authors	Andrei POPESCU, Ciprian NANU, Horia PETRAN
Reviewers	PRO-AKADEMIA, SGG, PSDik, Dundjer
Abstract	This document presents the development and innovation strategy of the Polish Construction Cluster. Section 1 presents the context of the document, which was developed within the SMART4NZEB project framework. Section 2 describes the global environment of the cluster – relevant policy instruments, as well as market and technological trends. Section 3 presents the cluster – its history, coordinator, members, and current position. Section 4 presents the cluster strategy, setting strategic and operational objectives, alongside the cluster mission and vision. Finally, section 5 consists of the action plan, which supports the implementation of the strategy.
Keywords	Strategy development, guidelines

History of Changes

Version	Author(s)	Date	Summary of Changes
0.0	Katarzyna KORCZAK	9 May 2020	First draft of table of content
0.1	Maksymilian KOCHAŃSKI	25 May 2020	Comments and suggestion added
0.2	Katarzyna KORCZAK	27 May 2020	Improvement according to Maksymilian's suggestions
0.3	Katarzyna KORCZAK	28 May 2020	"Action plan" section (table of contents) has been added
0.4	Ciprian NANU	1.07.2020	Romanian information filled in
0.5	Andrei POPESCU	16.07.2020	Additional information and content added
0.6	Horia PETRAN	28.07.2020	Draft revision and content added
0.7	Andrei POPESCU	04.02.2021	Updated based on input received from SGG

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0.8	Horia PETRAN	08.02.2021	Additional update based on comments from the review made by SGG
0.9	Andrei POPESCU	06.07.2021	Updated Objectives & Action Plan + additional update based on comments from PSDiK.
1.0	Andrei POPESCU / Horia PETRAN	30.11.2021	Updating History, List of Members, Action Plan.

Review & Comments History

Reviewed by	Date	Summary of comments
Andro Goblon	19. 11. 2020	<p>The document is very well prepared. Some minor changes are suggested:</p> <ul style="list-style-type: none"> • Section 2.4 to be added. • In the section 4.1 maybe just a more detailed description about “Whose needs and what needs it should satisfy?”. • In the section 4.3 find the connections between strategic objectives. • In the section 5.3 be just more specific.
Adam Krajewski	23. 02. 2021	<p>Strategy is almost complete, few small changes/additional information.</p> <p>Remarks / comments made regarding sections 2.4, 3.4 and 4.3; metrics, captions, figures & tables.</p>

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1. Introduction

1.1. SMART4NZEB project

The aim of the SMART4NZEB project is to boost competitiveness and support the scaling-up of 577 SMEs active in construction, energy efficiency and renewable energy sectors through strengthening capacity-building of 5 representative clusters as drivers of innovation in Central and Eastern Europe (Poland, Romania, Serbia and Slovenia) and facilitating trans-national exchanges and strategic partnerships with a focus on sharing experience between different practices, skills gaps, policies, target goals and level of engagement related to nearly Zero Energy Buildings (nZEB).

The main objective of SMART4NZEB is to create a sustainable collaboration, co-learning and capacity building between the involved partners - cluster managers and cluster members and relevant stakeholders representative for the nZEB market in the selected Central and East-European countries, with a view to develop the involved clusters management excellence and to support interregional partnerships to facilitate the development of competitive products and technological solutions intended for new and existing buildings, which will lead to market penetration of nearly zero energy buildings, related to their production, use and reuse. The objective is to drive clusters towards innovative and modern clusters being able to address cross-sectoral and cross border challenges.

1.2. Context of the Work Program

This document is developed within the Work Package (WP) 4 *Clusters' development and innovation strategies*. The main objective of this WP is to create transnational collaboration-based clusters' development strategies to boost competitiveness and support the scaling-up of SMEs active in construction, energy efficiency and renewable sectors through improved and tailored services offered by the clusters based on the specific needs of the involved SMEs. As a supplementary document, action plans for the participating clusters will be also developed, to ensure that the collaboration strategies in the field of nZEB are operational, functional and allow for progress monitoring. WP4 utilizes results of other technical work packages (Figure 1). In particular, it uses results of the SWOT analysis from WP2, survey conducted among clusters members in WP3, and feedback from ClusterXchange study visits participants.

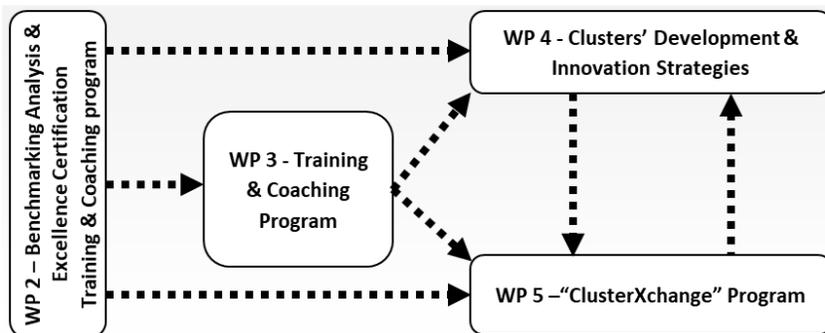


Figure 1 Workflow of SMART4NZEB project

1.3. Aim of the document

The aim of this document is to provide the Development and innovation strategy for pRO-nZEB Cluster, considering a time horizon of 3 years, from 2022 to 2024. The Strategy is a comprehensive guidance for directing the clusters efforts towards helping local stakeholders in developing the nZEB concept through active engagement, cross-sectoral and transnational collaboration. The Strategy and Action Plan will support the scaling-up of more than 191 SMEs in Romania (members of the Cluster or members of Professional / Business Associations that are members of the Cluster).

2. Global environment of the cluster

Developed communities around the world extensively embrace the view that reducing greenhouse gas emissions and achieving energy independency are fundamental prerequisites for sustainable societies and essential in fighting the consequences of Climate Change. Among other, this leads to a worldwide common effort to assure the right framework is in place for developing a sustainable built environment, a process in which the new emerging concepts for high-performance buildings play an important role. This endeavour brings challenges but many opportunities as well. The need for

- specialised workforce and staff,
- an increased level of innovative approach in businesses,
- new technologies and business models,
- a prepared market at local, regional, and international level
- setting common value chains / shared value
- circular economy
- and many more

has to be addressed through effective actions, in a multidisciplinary setup. This calls for an extensive contribution from all relevant stakeholders, which are stimulated in their activity through new financing opportunities.

At European level, the European Green Deal proposes an ambitious package of measures ranging from ambitiously cutting greenhouse gas emissions, to investing in cutting-edge research and innovation, to preserving Europe's natural environment. First climate action initiatives under the Green Deal include:

- European Climate Law to enshrine the 2050 climate-neutrality objective into EU law,
- European Climate Pact to engage citizens and all parts of society in climate action.

Effectively, for now, the EU is foreseeing its next big research and innovation framework programme for 2021 – 2028, under its Horizon Europe (an ambitious €100 billion research and innovation programme to succeed Horizon 2020).

In this new context, the pRO-nZEB cluster reaffirms its endeavour to take advantage of the new opportunities, while continuing to contribute in the tackling of problems related to the implementation of nearly zero energy buildings (at the moment, the highest legally binding “energy efficiency” requirement for high performance buildings) in the Romanian market, in accordance with its mission and objectives.

2.1. National context and policy framework

Background

From a legal perspective, the nearly zero energy buildings (nZEB) concept was introduced in 2010 through the EU Energy Performance of Buildings Directive (2010/31/EU). This directive was part of a package of legal acts referred to as the Europe 2020 strategy (2020 Climate and Energy Package) meant to actively help the EU meet its targets for reducing the greenhouse gas emissions by 2020 (i.e. 20% cut in greenhouse gas emissions - from 1990 levels; 20% of EU energy from renewables; 20% improvement in energy efficiency). Such targets were already agreed and set by EU leaders in 2007 and enacted in legislation in 2009.

The 2030 climate and energy framework includes EU-wide targets and policy objectives for the period from 2021 to 2030, including key targets for 2030: at least 40% cuts in greenhouse gas emissions (from 1990 levels), at least 32% share for renewable energy and at least 32.5% improvement in energy efficiency. The framework was adopted by the European Council in October 2014. The targets for renewables and energy efficiency were revised upwards in 2018, while in December 2020 the European Council agreed to raise the goal to cut greenhouse gas emissions by at least 55% by the year 2030 compared with 1990 levels.

The outcome was that all member states had to elaborate strategic documents meant to allow for an organised and coordinated approach towards achieving the envisaged goals and agreed targets and enforce legal and technical provisions in line with the new directives.

The 2010/31/EU Directive (modified through the 2018/844 Directive of May 30 2018, which also includes reference to the new 2030 targets) required that all new buildings in the EU be nearly zero-energy buildings by the end of 2020 and all new public buildings be nearly zero-energy by 2018.

Local Context in Romania

To respond to such requirements, Romania developed several documents, such as the: (1) “2013-2020 national strategy regarding climate change”, which was first published in July 2013 as government decision – G.D. (i.e. G.D 529/2013 which refers to the interval 2013-2020, later revised and updated through G.D. 739/2016 for 2016-2020); (2) “National sustainable development strategy 2013 – 2020 – 2030”, in 2008 (GD 1460/2008); (3) “Climate change national action plan for 2016-2020”, which was a result of the Technical Assistance Services Program signed between the Romanian Environmental Ministry and the European Bank for Reconstruction and Development (EBRD); (4) “PLAN FOR INCREASING THE NUMBER OF NEARLY ZERO ENERGY BUILDINGS”.

On 9th of November 2018, Romania’s National Sustainable Development Strategy 2030 was adopted by the Romanian Government through Government Decision 877/2018.

In April 2020, the latest version of the “Integrated National Energy and Climate Change Plan for 2021 – 2030” was released by the Ministry of Economy, Energy, and the Business Environment for public consultation.

Such documents provide general guidelines and effective actions with extensive impact, reflected intrinsically in the construction, energy efficiency and “renewables” sectors.

The requirements for energy efficiency with application in the buildings sector take root in the 372/2005 law regarding energy performance of buildings, which was updated to define and set exact threshold values for the new nZEB concept.

Also, the 121/2014 Law regarding energy efficiency (updated through Law 160/2016 and Minister Order OUG 1/2020) was enforced by the Parliament to create the legal framework for elaborating and applying the national policy in the field of energy efficiency, in accordance with Directive 2012/27/UE.

Although legal obligations are provided in the National legal framework by transposing the provisions of the 2010/31/EU Directive, the Nearly Zero Energy Building (nZEB) concept does not seem to be easily applicable yet in Romania. The main barriers for this consist in the ineffective mobilization of required investments, the fragmented approach for optimal integration of the technologies suitable for the construction and/or renovation of buildings at nZEB levels and the skills gaps experienced by the building sector, the current qualification courses and training schemes being generally not satisfactory and underdeveloped to face the challenge of effective nZEB implementation.

The spending power of the population in Romania remains low (in comparison with countries in Western Europe) which leads to limited investment capacity of the private sector and of the citizens, while the public sector struggles with more targets than the financial capacity to solve them with frequently changing priorities at Government level and fragmented national strategies.

In this context, investments in energy efficiency in buildings (and consequently in nZEB) are largely dependent on public support programmes, mostly co-financed by the European Union, thus leaving less opportunities for market-driven initiatives.

The relevant programmes implemented at national level (short and medium term) are implemented by the Ministry of Public Works, Development and Administration (MLPDA), framed by the Regional Operational Program, National Building Renovation Programs (mainly for condominiums) and centralised energy supply systems, while the Environment Fund Administration (AFM) develops and run programs for PV installation, electric mobility and for increasing energy efficiency of individual houses. Some of the cities in Romania also started to provide local financial incentives for investing in energy efficiency in buildings. The impact of all those instruments is not fully assessed at this stage. However, it can be estimated that the number of new and renovated buildings as result of current programmes is low. Therefore, the market demand for energy efficiency in buildings in Romania does not stimulate the demand for training on nZEB solutions (as the framework for such investment projects is not yet set to nZEB standards, the required competencies for project development and implementation remain generally on a business-as-usual level).

It is expected that the market for Passive House standard or NZE buildings will be driven by individual (house) projects of interested private investors or a limited number of municipal projects. Issues such as the profitability of considering nZEB standards for the project development of a new building and/or building renovation as well as the (bureaucratic) access to public sources remain also relevant.

For now, in Romania the nZEB solutions cannot be considered affordable by majority of stakeholders because of the incipient approach of this concept. The various political changes and shifts in power in Romania during the last 5-7 years had no positive impact on the local nZEB market. In addition, the whole construction sector was also impacted by the health crisis in the beginning of year 2020.

In this context, gaining the confidence of building industry and building owners in the real nZEB energy performance and the related benefits, development of flexible financing instruments and deployment of well-developed training courses for the construction value chain appear to be strategic issues that could facilitate the up-taking of investments required in the process of increasing energy efficiency of existing building stock.

The Methodology for calculation of energy performance of buildings is under final revision process and will provide (after approval) the tools for nZEB certification, while technical guidelines for designers/specialists, execution professionals and decision makers are needed in order to facilitate the sound application in practice of existing legal framework. The draft Long Term Renovation Strategy (developed by MLPDA with assistance from the World Bank and NIRD URBAN-INCERC) was approved and published at the end of 2020 and provides strategic orientation, governance body and financial mechanisms (to be developed further as financial instruments/programs) to achieve rather ambitious targets for 2030 (in the long term path to 2050).

2.2. Technology development trends in the construction / energy efficiency / RES industry

Global Context

Developments in new and modern technologies and materials, such as IT – Specialised Software & Data ecosystems for monitoring and controlling processes, modular construction (shifting execution to off-site for better quality and cheaper & faster completion of projects), robotics (including 3D printing), advanced materials, wearable technology, high-tech energy distribution infrastructure (smart grid), production (e.g. building-integrated photovoltaics, solar skins or fabric) and storage (e.g. new performant batteries, hydrogen energy storage) will provide new future opportunities for high performance buildings and integrated & connected cities.

European Union

The 2019 “Study on impacts of EU actions supporting the development of renewable energy technologies PP-05441-2017” key findings are:

- The EU has world-leading public R&D budgets, in particular for bioenergy, solar thermal, wind and ocean energy.
- EU R&D funding has been effective in establishing academic leadership while losing ground in patent applications.
- Cost reductions in renewable energy technologies are most pronounced for solar PV, wind energy and CSP (concentrated solar power).
- Mixed success in industry development with overall EU renewable energy industry turnover at a constant level since 2008.
- R&D funding levels do not show a clear relation with the expected role of the technologies in the energy mix.

Such approach, together with the new requirements for energy efficiency appliances and high-performance buildings led to new products, innovation and new perspectives in the construction, energy efficiency and renewables sectors.

Romania

Local production and trade / distribution of construction systems and technologies has increased in the last couple of years (e.g. photovoltaic panels, heating equipment, construction materials). However, in the private sector, technology trends are very much dependent on international developments, as the capabilities for R&D activities can be very limited for local companies.

On the other hand, several National Institutes for Research & Development (e.g. INCD URBAN- INCERC, ICEMENERG) have been playing a certain role in projects related to research and innovation in construction, energy efficiency and / or renewables fields. This brought and continue to bring new prospects for improved R&D activities, while also supporting the development and implementation of training programs (e.g. the Building Knowledge Hub Romania developed within INCD URBAN-INCERC).

Some of the biggest projects that bring and implement advanced technologies in Romania are mainly financed by foreign capital. For example, WPD Germany is investing massively in developing combined wind and photovoltaic energy farms that also include nearby cogeneration power plants. Companies such as Enel Green Power, Elawan Energy, Verbund, IWE or Siemens-Gamesa are also investing in solar and / or wind production of energy, including in storage capacities. (Source: <https://www.economica.net/exclusiv-lista-proiectelor-in-energie-regenerabila-din-romania-pe-care-investitorii-vor-sa-le-deruleze-prin-fonduri-europene-mecanismul-10-d-179106.html>).

2.3. Market trends in the construction / energy efficiency / RES industry

Energy Production

Programmes, such as the “Green PV home” scheme allows households to get access to funding (up to 90% of actual costs) for photovoltaic panels. Romania’s Environment Fund Administration (AFM), the state funding body for environmental protection, has revealed that it has approved 12,718 subsidy applications for the “Green PV home” scheme to support residential solar installations under the country’s net metering regime. (Source: <https://www.pv-magazine.com/2020/06/16/romania-allocates-e52-million-for-solar-rebates/>).

“The Romania solar energy market is expected to grow at a CAGR (Compound annual growth rate) of 10% in the forecast period of 2020-2025. The cost of solar power has come down in recent years, majorly due to initiatives taken on an international level by governments and private organizations to promote research and development in this field. This cost reduction has made solar technology, especially solar PV technology, more accessible. The growing demand for electricity is another major factor driving the growth of the market. However, the initial high cost of investment in the projects and long investment return period is expected to restrain the Romania solar energy market in the forecast period.

- The solar photovoltaic (PV) held a significant market share in 2018, and it is likely to dominate the market during the forecast period.
- In 2019, the government of Romania commits before the European commission to generate 30.5% of their energy from renewable energy sources by 2030. This is likely to create opportunities for Romania solar energy market in the future.
- Increasing solar energy installation capacity and upcoming projects in the country is likely to drive the Romania solar energy market in the forecast period.

Solar Photovoltaic (PV) to Dominate the Market

- In 2018, approximately 13% of the total renewable energy generation capacity was from solar photovoltaic (PV), 1,377 megawatt (MW) of electricity.
- In 2019, Romanian government announced a rebate scheme according to which homeowners and businesses may file applications for rebates that could cover up to 90% of the cost of rooftop arrays, provided the grant does not exceed USD 4,830. Through the scheme, the Romanian government aims to support the deployment of PV systems of more than 3 kW in size that are installed under net metering rules.
- In 2020, Complexul Energetic Oltenia, a Romanian coal-fired power producer, plans to build 310 MW of PV capacity across four sites at one of its facilities. The projects are part of the company's restructuring efforts and decarbonization plan.
- Therefore, from the above projects, the solar photovoltaic (PV) segment is likely to dominate the market in the forecast period.

Increasing Solar Energy Installations to Drive the Market

- In 2018, approximately 27% of the energy generated in the country was from renewable energy sources. The government of Romania committed to the European Council (EC) to increase its renewable generation to 30.5% by 2030. In 2018, the total capacity of renewable energy sources was 11,206 megawatts (MW).
- In 2018, the solar energy plant installed capacity was 1,377 megawatt (MW), which was higher than the installation capacity of 2013, which was 761 megawatts (MW).
- Romania's solar potential is widespread throughout the country. Romania benefits from about 210 sunny days per year. The south-eastern region of Romania, the west, the center, and the east of the country are the best places to place a solar park.
- Hence, the above points indicate that increasing solar energy installed capacity is expected to drive the Romania solar energy market in the forecast period."

(Source: <https://www.mordorintelligence.com/industry-reports/romania-solar-energy-market>).

The "National Institute of Statistics" provides a preliminary electrical energy balance sheet, as follows:

	1.I -31.V.2020	1.I. – 31.V.2020 compared to 1.I. – 31.V.2019	
		Difference (±)	%
	Million kWh	- million kWh -	
Resources – total	26537,0	-1060,4	96,2
- Production	23372,6	-2630,9	89,9
- Classic power plants	8245,6	-1990,3	80,6
- hydro	5644,0	-1603,2	77,9
- nuclear	5143,0	+629,5	113,9
- wind	3602,2	+300,8	109,1
- solar	737,8	+32,3	104,6
- Import	3164,4	+1570,5	198,5
Destination – total	26537,0	-1060,4	96,2
- Final consumption	21798,8	-1580,0	93,2
- economy	16067,3	-1713,2	90,4

- public lighting	242,3	-23,9	91,0
- population	5489,2	+157,1	102,9
- Own consumption in networks / grids and stations	2503,8	-115,0	95,6
- Export	2234,4	+634,6	139,7

Table 1 Energy Balance Sheet – Comparison between 1st trimester of 2020 and 1st trimester of 2019

(Source: https://insse.ro/cms/sites/default/files/com_presa/com_pdf/energie05r20.pdf)

A certain increase in wind and solar energy production can be observed.

Overview on market trends for nZEBs, through the ZEBRA2020 project results

“The key objective of ZEBRA2020 was to monitor the market uptake of nZEBs across Europe and to provide data and as well as recommendations on how to reach the nZEB standard. Data and strategies were made accessible via online tools for nZEB data, market tracking and scenarios until 2050.

Some important findings of the project, expressed through the ZEBRA2020 – Nearly Zero-Energy Building Strategy 2020 (issued in September 2016), were that Romania’s construction rate is below 0.6 percent, which is very low (although, not lowest in Europe). The construction rate was considered to be low because of migration of young and medium aged people. In the context of the European economic and financial crisis (which has led to significant job losses in Romania’s construction industry at the time), consumers prefer to focus on short-term benefits while investments in housing are perceived as long-term despite the immediate impact on comfort/quality of life. The crisis left many dwellings unsold, hampering new constructions. Romania has the highest portion of single-family dwellings. These buildings are built by young people who have relative high income and have intention to build a home. In Romania, more than 42 % of the people have trouble to pay utilities for their homes. Because people are poor, buildings are being built according to the minimum energy performance requirements. The nZEB definition was implemented in February, 2016, so there will be improvements in the regard.”

The ZEBRA2020 project included surveys with real estate agents from several countries, including Romania.

Among other, the survey concluded that in the opinion of the Romanian real estate agents

- “the main factors taken into account whilst selecting, purchasing or leasing real estate are mainly the price, location, the size of the real estate, various "nuisance" e.g.: a busy road, landing airplanes, landfill, a high-voltage line - The cost of energy is indicated as very important factor by 30% and as important by 37% of real estate agents in Romania.”;
- “the main obstacles in improving the energy performance of buildings were indicated by real estate agents in Romania to be the following: financial matters (additional costs for owners), low social awareness in this subject, the practice of issuing unreliable certificates and additional bureaucracy”;
- “the most expected support that would influence the improvement of the energy performance of buildings, according to the respondents from Romania, is economic support directed to real estate owners, sufficient information about the benefits financial activity and economic incentives for those that undertake such actions”;

Also, the surveys concluded that “the level of awareness and information about wording, requirements and settlements of the 2002/91/EC or 2010/31/EU Directive among the real estate agents in Romania is below average.”

(Source: https://www.zebra2020.eu/website/wp-content/uploads/2014/08/D6.2-Strategies_nZEB_transition_Member_States_v15_small_EN.pdf)

Construction Industry Tendencies

According to the “National Institute of Statistics”, in the first trimester of 2020, there was a certain increase in new households in urban areas (i.e. 9753 new buildings) compared to the first trimester of 2019 (i.e. 7532 new households). In the rural areas there was a very slight difference as in the first trimester of 2020, 5166 new households were built, compared to 5182 new households built in the first trimester of 2019. Overall, 2205 more new households were built in the first trimester of 2020, compared to the previous year. 98.4 % of these new households were built from private funds, while 1.6 % from public funds. Among the new households built in the first trimester of 2020, 66.5 % of them were built in the urban area.

(Source: https://insse.ro/cms/sites/default/files/com_presa/com_pdf/constr_loc_tr1r_20_0.pdf)

2.4. External resources available for the cluster development

The European Green Deal

The EU will also provide financial support and technical assistance to help those that are most affected by the move towards the green economy. This is called the Just Transition Mechanism. It will help mobilise at least €100 billion over the period 2021-2027 in the most affected regions.

https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

Europe’s green research and innovation investments

Horizon Europe is the EU's next research and innovation programme starting in 2021.

Its powerful instruments and innovative governance will drive the necessary systemic changes to reach climate neutrality and ensure an inclusive ecological and economic transition.

Horizon Europe, in synergy with other EU programmes, will be key to leveraging national public and private investment. Together they will foster new technologies, sustainable solutions and disruptive innovation and spread successful new solutions across Europe and the world.

Over 35% of Horizon Europe spending will contribute to climate objectives.

A renovation wave for Europe

To pursue this ambition of energy gains and economic growth, the Commission published on 14 October 2020¹ a new strategy to boost renovation called "A Renovation Wave for Europe – Greening our buildings, creating jobs, improving lives" (COM(2020)662). It aims to double annual energy renovation rates in the next ten years. These renovations will enhance the quality of life for people living in and using the buildings, reduce Europe's greenhouse gas emissions, and create up to 160,000 additional green jobs in the construction sector.

European Climate Initiative (EUKI)

The EUKI is based on two pillars: As part of the annual EU-wide selection procedure, organisations are selected that put forward promising ideas for climate action in Europe. In addition, projects that pursue predefined climate objectives, are commissioned directly by the Federal Environment Ministry.

<https://www.euki.de/>

European Structural Funds (ESIF)

The multiannual financial framework for 2021-2027 could provide external resources for the cluster development, but the programs and key actions are under definition, so it is difficult to identify specific resources at this time.

The Recovery and Resilience Plan in Romania (PNRR)

The measures in the plan have the potential to accelerate the green transition and protect the environment. They are expected to support Romania's decarbonisation and energy transition objectives, as set out in its 2030 national energy and climate plan, and are a step forward in achieving climate neutrality by 2050. The plan includes reforms on the phase out of coal and lignite power production, which is crucial for the decarbonisation of the energy sector and to unlock the potential for renewables deployment. The plan also commits to promote sustainable transport by decarbonisation of road transport, green taxation, incentives for zero-emission vehicles, modal shift to railways and water transport, and measures to promote road safety. The plan also has a strong focus on energy efficiency of private and public buildings. The introduction of green budgetary planning, digitalisation of road and rail transport and the deployment of electric charging infrastructures, climate change adaptation and circular economy, is expected to also facilitate the green transition in all sectors of the economy.

3. Cluster overview

3.1. History of the cluster

The "Cluster for Promoting Nearly Zero Energy Buildings" Association – pRO-nZEB has been established in January 2016 as a non-profit organisation aiming to bring together key players from the building materials market, research and development institutions, educational representative organizations, public authorities, professional associations and other organizations having a catalyst role, in order to create and

¹ https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1835

improve collaborative relationships for developing and implementing in Romania the concept of nearly zero energy building (nZEB).

The vision of the Cluster for promoting nearly zero energy buildings is represented by the reduction up to eliminate greenhouse gas emissions generated by using buildings, aiming to develop the research regarding the market of energy efficient buildings in Romania.

The Cluster currently comprise of thirty-eight committed members among which one research organisation; four universities active in education, research and innovation; eight professional / business associations having more than 500 SMEs as members; 19 SMEs, 5 freelancers, and one municipality.

Starting with July 2021, the pRO-nZEB Moldova branch was created as a territorial structure without juridical identity, with its headquarters in Iași. This branch will take over the Cluster activities, act in its scope and facilitate the implementation of its objectives based on the actions driven by the associations statute within the region of Moldova (Iași, Vaslui, Galați, Botoșani, Bacău, Vrancea and Suceava counties), and therefore will:

- deliver professional trainings and consultancy for nZEB projects, for construction workers, specialists and decision makers.
- organize specialized events for promoting the nZEB concept.
- continuously promote and communicate with all interested parties, contributing thus to the dissemination of new technologic solutions, best practice exchanges, removing barriers that are preventing a robust implementation of high energy efficiency in buildings.
- promote trainings and programmes for the development of professionals in the field of nZEB.

3.2. Cluster coordinator

The overall cluster management body is the General Assembly (meeting at least once per year).

The executive cluster management body is the Managing Council (Board), formed by 5 members (including the President) elected every 2 years by the General Assembly. The Managing Council sets the agenda of the cluster activities and initiates and maintains the cooperation between participants.

The Managing Council complies with the general Statute (set of rules for the organisation of the Cluster) and the Managing Council Regulation (approved in 2016 by the General Assembly and providing also the rules for initiation and running of departments / working groups / direct cooperation between participants). The current Managing Council composition shows 40% R&D and 60% industry, with a gender balance of 40% F and 60% M.

Cooperation of Cluster members is stimulated both by direct involvement in current projects or development of project proposals and by providing relevant information about open calls for projects within financing programs in order to facilitate their participation in the respective calls.

3.3. Cluster activity and technology background

The Cluster currently comprise 24 committed members representing one national research institute, 8 umbrella organisations (professionals, producers and builders), 3 universities, 9 individual companies (of which 4 SMEs and 1 start –up SME), 3 individual experts and one municipality.

(Source: www.clustercollaborationplatform.eu)

Economy branches covered

Sectorial industries	Construction Products and Services Environmental Services
Technology fields	Low, zero and plus energy rating Thermal insulation
S3 ² EU Priority Areas	Civil engineering Construction of buildings
Emerging Industries	Environmental Industries

Table 2 Workflow of SMART4NZEB project (Classification Source: European Cluster Collaboration Platform)

- The technology background of the cluster

The specialisation of most members, staff and certain parties involved in the Cluster activities, bring knowledge and know-how in several technological sectors, such as high-performance buildings, energy efficiency & auditing of buildings, products and systems for buildings.

- The main R&D&I players in the cluster

1. National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development “URBAN-INCERC” - www.incd.ro

The National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development “URBAN-INCERC” is a public owned institute, under the coordination of the Ministry of National Education and Research. NIRD URBAN-INCERC contributes to Romania's European integration policy, coordinated by the Ministry of Regional Development and Public Administration (MDRAP). The main scope is to deliver theoretical and experimental research in the field of products, processes and technologies in construction. NIRD URBAN-INCERC is developing technical codes and regulations, case studies and technical surveys, performing specific regulatory activities, namely documentation, testing, documentation in the fields of activity, technical audit, prototypes, analyses, syntheses, pilot programs, functional models and physical models, as well as experimentation in situ of new products and technologies; creation of specialized databases. Other services are related to communication and dissemination of specific information, continuous training / training of specialists working in the fields of construction, urbanization, sustainable spatial development and housing, activities resulting from the quality of construction products certification body, certification body management systems and factory inspection body.

2. VALAHIA University (Târgoviște) - www.valahia.ro

² These sectors are included in the Research and Innovation Strategy for the South East Region (Bucharest Ilfov is the area where pRO-nZEB Cluster is registered), available at: https://www.adrbi.ro/media/2169/ris3-bi_varianta_02nov.pdf

The University VALAHIA is involved in R&D activities through a special body active at the University level. The Scientific and Technological Multidisciplinary Research Institute (ICSTM-UVT) is an independent, apolitical and non-governmental professional organization, under the aegis of Valahia University of Târgoviște, created for the participation of the university academics and of other collaborators both to the realization of research-development projects within national or international programs and to development programs through a direct collaboration with different beneficiaries. It aims to bring together the university personnel and experts from different fields for accomplishment and implementation of national and international research and development projects and partnerships with different possible beneficiaries.

ICSTM is hosted in a new facility built especially for its use and purpose. The building is a result of a project founded by European Structural Funds won in competition. (More details on the projects site: <http://916.icstm.ro>)

Governing Board of ICSTM-UVT is subordinated to Valahia University Senate. ICSTM –UVT brochure services is presented at: <https://www.icstm.ro/ICSTM-equipment.pdf>.

(Source: valahia.ro)

3. Technical University of Civil Engineering of Bucharest (UTCB) www.utcb.ro

UTCB is a public university in Bucharest, Romania, founded in 1948. It was formerly known as the Institute of Civil Engineering of Bucharest. UTCB is a member of the Romanian Alliance of Technical Universities (ARUT).

The University comprises of seven faculties:

- Faculty of Civil, Industrial and Agricultural Buildings,
- Faculty of Hydro-technics,
- Faculty of Railways, Roads and Bridges,
- Faculty of Building Services Engineering,
- Faculty of Technological Equipment,
- Faculty of Geodesy,
- Faculty of Engineering in Foreign Languages.

Currently, UTCB is part of the EU-CONEXUS consortium, as part of the European University for Smart Urban Coastal Sustainability, which will result in new Bachelor modules of study, a specialized Masters programme and the development of related doctoral studies. (<https://www.eu-conexus.eu/en/home/about-us/who-we-are/>)

Through its staff, facilities and capabilities, UTCB can be seen as a very important vectors of research & development in the region.

4. Technical University of Cluj-Napoca (UTCN) www.utcluj.ro

The Technical University of Cluj-Napoca, an “Advanced Research and Education University” as awarded with the Order of the Ministry of National Education no 5262/September 5th 2011, is today a tertiary educational institution having both tradition and national and international recognition.

The Technical University of Cluj-Napoca comprises twelve faculties in the two academic centres, Cluj-Napoca and Baia Mare, as well as in locations, such as Alba-Iulia, Bistrita, Satu Mare and Zalau. The educational offer, aligned to the Bologna system, includes bachelor's, master's and doctoral programs, as well as continuous training programs.

The fields of study have a wide range, from engineering to architecture, fundamental sciences, socio-human sciences and arts. Also, within the Technical University, the Department for Continuing Education, Distance Learning and with Reduced Frequency organizes and conducts continuous education activities and programs, postgraduate courses, continuous professional development programs or courses or based on occupational standards.

The Technical University of Cluj-Napoca is concerned with the international exchange of scientific values, and this trend is found in the over 400 inter-university collaboration agreements or in the large number of student mobilities. Opening up towards the European and world space of education and research through a steady process of internationalization is one of the major objectives of the university.

Research is, along with education, the main priority of the Technical University of Cluj-Napoca. In all faculties of the university there are research structures, from collectives, groups and laboratories, to research centers and platforms. The performance anchored in the socio-economic environment, the international visibility and cooperation as well as the scientific novelty and interdisciplinarity are some of the characteristics of the research environment of the Technical University of Cluj-Napoca.

Open research directions are oriented towards global priorities and perspectives: from the Information and communications technology to Renewable Energy and Ecology; from superconductivity, spintronics and nanomaterials, to management and robotics; from mechatronics and electrical engineering, to the automobile and the home of the future, or to urbanism and society.

Source: <https://www.utcluj.ro/en/university/about/today/>

5. "Ion Mincu" University of Architecture and Urban Planning (UAUIM) www.uauim.ro

"Ion Mincu" University of Architecture and Urban Planning enjoys a high level of academic, scientific and professional prestige, both nationally and internationally, being an emblematic centre of education, research and innovation in the field of architecture, in Romania.

Among others, UAUIM includes:

Three faculties

- Faculty of Architecture
- Faculty of Urbanism
- Faculty of Interior Architecture

Research centres

- Center for Research, Design, Expertise and Consulting - CCPEC
- Center for Architectural and Urban Studies - CSAU
- Study Centre for Vernacular Architecture - Dealu Frumos - Schönberg (CSAV)
- "Mac Popescu" Experimental Workshop - MAC

Doctoral Schools

- Doctoral School of Architecture (SDA)
- Doctoral School of Urban Planning (SDU)

- *Relevant projects implemented by the cluster*

Train-to-nZEB (www.train-to-nzeb.com), 2016-2018

The “**Train-to-NZEB**” project aims to provide world-class training on energy efficiency and RES in buildings, based on new training programmes, business plans and up-to-date training equipment for a set of training and consultation centers around Europe.

Its goal is to improve the knowledge and skills in the construction sector and to provide **practical trainings, demonstrations and comprehensive consulting services** for design and construction of Nearly Zero-Energy Buildings (NZEB) supported by RES, based on the Passive House concept. The training centers (or Building Knowledge Hubs) form an international network, providing training courses on the curricula developed under the European BUILD UP Skills initiative and by project partners, as well as continuous opportunities for exchange, updating and improving of the existing training programmes. The modern training facilities will enable the conduction of practical exercises in addition to the theoretical programmes already available in the focus countries.

FIT-to-nZEB (www.fit-to-nzeb.com) 2017-2019

A Horizon 2020 project dedicated to improving the knowledge and skills of the building professionals to deliver quality renovations works with significant energy saving impact. **The FIT-TO-NZEB project** aimed to increase the competence and skills of the building professionals in all participating countries - Czech Republic, Romania, Bulgaria, Italy, Croatia, Ireland, Austria and Greece - through **unique educational programmes and pilot training courses**, which will contribute to both the quality and the scale of the deep energy building renovations. The project will produce all necessary requisites for the introduction of educational content on deep energy retrofit in the curricula **at all levels of the vocational training and education system** - universities, professional high schools and colleges, vocational training centers. The project will use the training and communication infrastructure of its predecessor Train-to-NZEB (www.train-to-nzeb.com), which already operates 5 training centers in Eastern and Southern Europe: in Bulgaria, Romania, the Czech Republic, Turkey and Ukraine. To this, it will add the capacity of 4 universities, 1 professional college and 4 training centers in the current composition of the team.

SMART4nZEB, COSME financed project, 2019-2021

SMART4NZEB aims at boosting competitiveness and supporting the scaling-up of 577 SMEs active in construction, energy efficiency and renewables sectors through strengthening the capacity-building of 5 representative clusters as drivers of innovation in Central and Eastern Europe (Poland, Romania, Serbia and Slovenia) and facilitating trans-national exchanges and strategic partnerships with a focus on sharing experience between different practices, skills gaps, policies, target goals and level of engagement related to nearly Zero Energy Buildings (nZEB).

The nZEB Roadshow, HORIZON 2020 financed project, 2020-2023

The nZEB Roadshow project (www.nzebroadshow.eu) will organize national-scale marketing and communication campaigns in 5 European countries, focused around nZEB weeks organized in 3 to 5 selected cities in each involved country. The nZEB weeks will consist of a multitude of events: construction products and real estate fairs, practical demonstrations and real-time nZEB construction, training courses for designers and construction workers (with inclusion of BIM-enabled VR and AR solutions), information sessions and free consultations for citizens active on the real estate market, on-site training at public

building renovation sites, and most importantly – career orientation centers and construction job fairs with focus on the local construction sector SMEs. As a focal point of the events, the BKHs will get on wheels – through the design and construction of prefabricated modular mobile buildings that will serve as information and demonstration centres for raising awareness of the benefits and specificities of nZEB and will create the necessary prerequisites for effective communication between stakeholders. With very careful attention to exterior and interior design, the centres will offer real-life experience of quality nZEB and will be equipped with all necessary technologies to provide full information of the processes with relevance to the building’s performance in terms of comfort, internal air quality parameters, and energy consumption. In addition, the nZEB Roadshow will add to the current efforts to promote nZEB –related two very important but unfortunately still largely missing components: professional marketing and sales services and strong media partnerships.

nZEB Ready, HORIZON 2020 financed project, 2021-2024

Although legal obligations are provided at National level by transposing the provisions of the 2010/31/EU Directive, the Nearly Zero Energy Building (nZEB) concept does not seem to be easily applicable yet in many countries. Previous research showed that defining the cost-feasible optimal integration of the technologies suitable for nZEB and the skills gaps experienced by the building sector are among the most important barriers. Current qualification courses and training schemes are still not satisfactory and underdeveloped to face the challenge of effective nZEB implementation, while the recourse to skilled professionals for renovations and new constructions of buildings is not usual practice. Despite strong political push towards nZEB and deep energy renovation, the traditionally conservative real estate market is still slow in the uptake of the new building standards and practices, especially in the residential sector. To respond to the challenge and use the emerging opportunities, the nZEB Ready project aims to act at market level in order to stimulate the demand for energy-related skills of construction workers and specialists in the involved countries and beyond and to increase the market readiness for an effective nZEB implementation: (1) by addressing the key identified barriers of nZEB implementation in focused markets, (2) by supporting the enhancement of skills framework by new market driven mutual recognition training and certification scheme for nZEB deployment that will facilitate the necessary legislative changes and (3) through development and communication of toolboxes, tailored guidance and practical support to engage home owners and public authorities to reach the nZEB benefits. The project will address the challenges in Bulgaria, Croatia, Portugal, Poland and Romania in order to exploit synergies related to common climatic zones, traditions and opportunities to use the benefit of a larger and easily accessible regional market.

#	Name	Type	Field of expertise	Website
1.	National Institute of Research and Development in Construction, Urban Planning and Sustainable Territorial Development «URBAN - INCERC»	R&D	Buildings, urban planning, R&D, performance testing, certification	www.incd.ro
2.	Romanian Association of Energy Auditors for Buildings – AAECR	Professional association	Energy audit for buildings	www.aaecr.ro
3.	New Energy Sources Patronal Association – SUNE	Professional association	Renewable energy sources	www.sune.ro

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

#	Name	Type	Field of expertise	Website
4.	Romanian Association of Construction Entrepreneurs – ARACO	Professional association	Construction companies	www.araco.ro
5.	Employers' Associations for Construction Companies – PSC	Professional association	Construction companies	www.psc.ro
6.	The Ownership for Producers of Thermo- Insulating Carpentry – PPTT	Professional association	Windows & doors producers	www.pptt.ro
7.	The Group for Quality Thermo Insulating Systems “ETICS” – QETICS	Professional association	ETICS producers	www.qetics.ro
8.	WIENERBERGER Sisteme de Caramizi SRL	Company	Rick systems producer	www.wienerberger.ro
9.	SAINT-GOBAIN GLASS ROMANIA SRL	Company	Glass & insulation materials	www.saint-gobain.ro/saint_gobain_glass/
10.	Business Development Group SRL	SME	Business consultancy	www.bdggroup.ro
11.	The House of Builders Foundation	Education	Training supplier	www.cmc.org.ro
12.	Municipality of Brasov	Municipality	Local authority	www.brasovcity.ro
13.	XELLA Romania	SME	Construction products	www.xella.ro
14.	Eng. Dumitru Calina	Individual Expert	Energy auditor for buildings	
15.	Asociația profesională pentru EXCELENȚĂ și EFICIENȚĂ energetică în construcții din România	Networking association	Energy efficiency in buildings, builders	
16.	ROCKWOOL România SRL	Company	Insulation materials producer	www.rockwool.ro
17.	Valahia University of Targoviste	Education + R&D	Education, RDI in renewable energy sources	www.valahia.ro
18.	Dr. arch. Sonia RAETCHI	Individual Expert	Architectural design, Passive House, nZEB	
19.	Geta Energeta SRL	SME	Energy efficiency, consultancy	www.getaenergeta.ro
20.	SMART & PASSIVE HOUSE	SME	Passive House design and build, consultancy	www.smartpassivehouse.ro
21.	Technical University of Civil Engineering Bucharest	Education + R&D	Education, RDI in energy efficiency and indoor environment	www.utcb.ro
22.	Arch. Radu ANDONE	Individual Expert	Architectural design, Passive House, nZEB	

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

#	Name	Type	Field of expertise	Website
23	BEIA Consult International	SME	R&D, Consultancy, provider of ICT solutions and services for cloud communications and IoT telemetry	www.beia.ro
24	Meesenburg Romania SRL	Company	Hardware distributor for windows and doors	www.meesenburg.com
25	RT IZOLAȚII SRL (RenoVATA)	SME	Construction, energy efficiency	www.renovata.ro
26	Technical University Cluj-Napoca	Education + R&D	Education, research, development and innovation in the fields of buildings, building services, energy efficiency and outdoor environment	www.utcluj.ro
27	B.I.A. GEORGIANA BALTAG	SME	Design, individual bureau of architecture	
28	BALTAG ARCHITECTS SRL	SME	Design, architecture	
29	Dan NENU	Expert	Design, buildings energy auditing	
30	ARB CONSTRUCȚII IAȘI SRL	SME	Construction	
31	AIR-PROJECTS SRL	SME	HVAC systems	www.air-projects.ro
32	CLASS MEISTER SRL	SME	Wood construction	www.classmeister.ro
33	MANDER FOREST (MIRADEx)	SME	Wood construction	www.miradex.ro
34	Ștefan Munteanu / Civilis	Expert	Consultancy in Construction and Energy Efficiency	www.civilis.ro
35	ALESONOR	Company	Real Estate	www.alesonor.com
36	PROINSTAL	SME	Construction and building services	
37	“Ion Mincu” University of Architecture and Urban Planning	Education + R&D	Architecture and Urbanism	www.uauim.ro
38	Delphi Electric SRL	SME	Electric heating systems	www.del.ro

Table 3 Current pRO-nZEB Cluster Members (November 2021)

3.4. International orientation and positioning of the cluster

The historical and cultural market conditions of the Romanian cluster members allowed the pRO-nZEB cluster management to identify (even in the legal cluster early registration procedure) several barriers to the internationalization of the members activities.

It is a major barrier to the pRO-nZEB Cluster members *the identification of (European / International) counterparts / partners in their respective fields of activity*, due to the relative low market development conditions but also in relation with domestic weak entrepreneurial skills. As the pRO-nZEB market exposure was limited to a small Romanian market for nZEB buildings, it was obvious that internationalization of activities through specific actions has been considered a “must”.

From initial stages of cluster development, various team members achieved certain recognition on regional market through applications and (later) development of European financed projects (such as Train-to-nZEB, FIT-to-nZEB etc).

In the short history of the PRO-NZEB Cluster, the members achieved a certain international exposure to other business networks, using all facilities offered by European HORIZON 2020 or COSME projects implemented or during implementation.

Another “internationalisation” barrier identified in early stages was *the lack of market knowledge on the nZEB or energy efficiency (construction) sector*. An opportunity to cover this barrier has been developed during the implementation of TRAIN-to-nZEB project (www.train-to-nzeb.com), when a network of “Building Knowledge HUBS (BKHS) have been set up (and got maturity during the next active years). The BKHS network consists now in more than 4 European Training and consultancy centres, offering to special target groups training courses on various identified nZEB topics.

The European funded projects implemented by the pRO-nZEB Cluster offered to the members the opportunity to meet and talk with other organizations mainly from more developed markets, building up opportunities for cooperation in those markets.

In other projects (SMART4nZEB, under implementation, facilitating this current deliverable) the regional market in Eastern Europe has been tackled by common activities with similar or close to similar clusters in countries like Poland, Serbia and Slovenia, strengthening in this way potential future partnerships.

3.5. Cluster members’ needs

pRO-nZEB surveyed members and other stakeholders in June-July 2020, to better understand their needs and interests, using Google Forms as instrument for inquiry. There was a total of 15 Cluster Members who replied to the questionnaire. 66.7% of the respondents were representing companies (SMEs or enterprises) and 33.3% Non-Governmental Organisations, with the following specifics:

Annual turnover	46.6% - less than 250.000 EUR 26.7% - 250.000 EUR -> 2.000.000 EUR 6.7% - 10.000.000 EUR -> 50.000.000 EUR 6.7% - above 50.000.000 EUR
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	13.3% - did not answer
Primary activity	20% - Energy Auditing of Buildings 20% - Producing & Selling Systems for Buildings Envelope 13.3% - Buildings Design 13.2% - Business Network (Construction) 6.7% - Curtain Walls & Ventilated Facades (Design & Build) 6.7% - Civil Engineering (incl. RES installations) 6.7% - Construction Works 6.7% - Consultation 6.7% - Production & Delivery of Energy from Renewable Sources
Personnel / Employees	60% - less than 10 persons 20% - between 10 and 50 persons 6.7% - 150 -> 250 persons 6.7% - more than 250 persons 6.6% - did not reply

The responses regarded matters as further underlined:

Needs for Training & Coaching of staff members (top three topics were selected by each participant)



Figure 2 Training needs for Cluster Members

Most members expressed their interest in trainings related to “High Energy Performant Buildings” (61.5% of the respondents included this option in the top three) and believe this would be most beneficial in their activity and relevant for growing their capacity. The second top interest in terms of topic for training was “New Technologies” (53.8% of the respondents included this option in the top three), while the third top interest and identified topic was “Green Buildings” (30.8% of the respondents included this option in the top three).

Needs and Interests for Services / Activities that an Association (i.e. the pRO-nZEB Cluster) should provide / organize (top three services / activities in which members would be most interested)

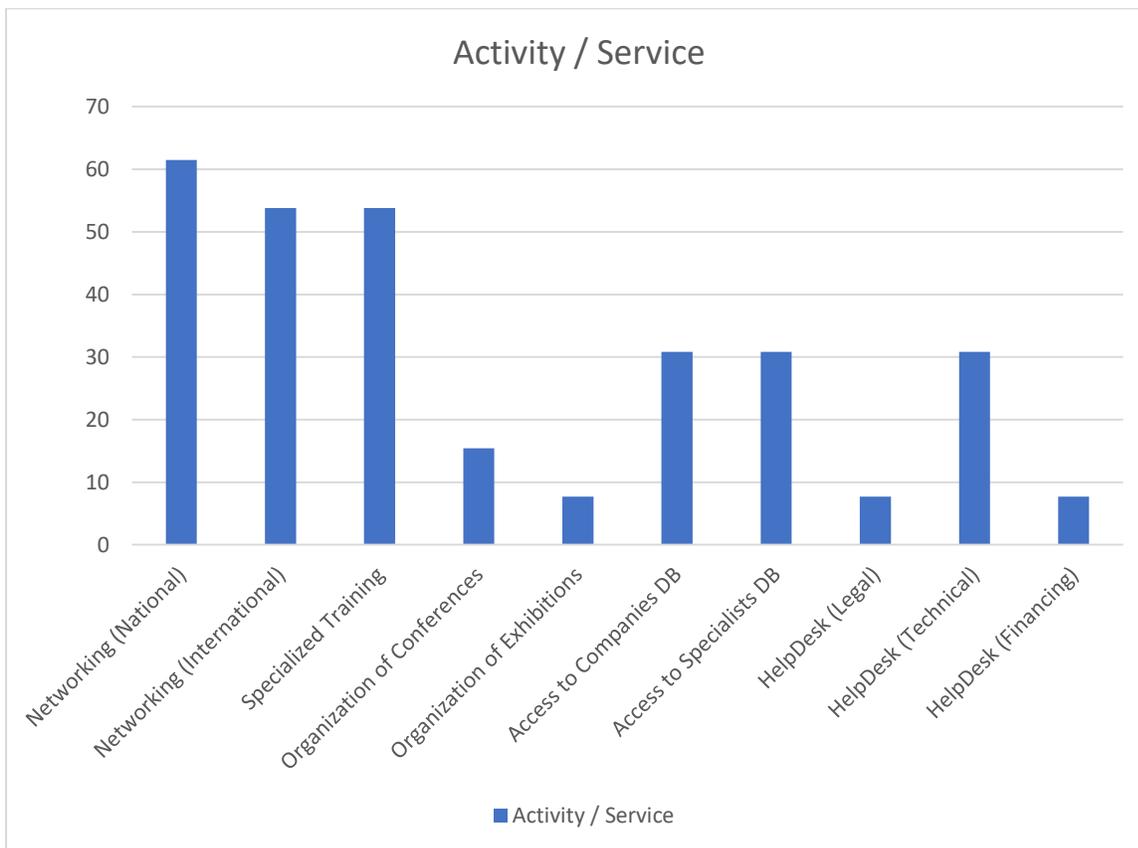


Figure 3 Services / Activities needs for Cluster Members

The highest interest was expressed for “Networking Opportunities at National Level” (61.5% of the respondents included this option in the top three). Second top interests were related to “Networking Opportunities at International Level” and “Specialized Training Opportunities” (53.8% of the respondents included these two options in the top three). The third place, in terms of percentage of choices expressed, included “Access to Companies Databases (DB)”, “Access to Specialists DB” and “Helpdesk for technical issues”, with 30.8% of the respondents including these three choices in the top three interests.

Issues encountered by members (top three issues selected by each respondent)

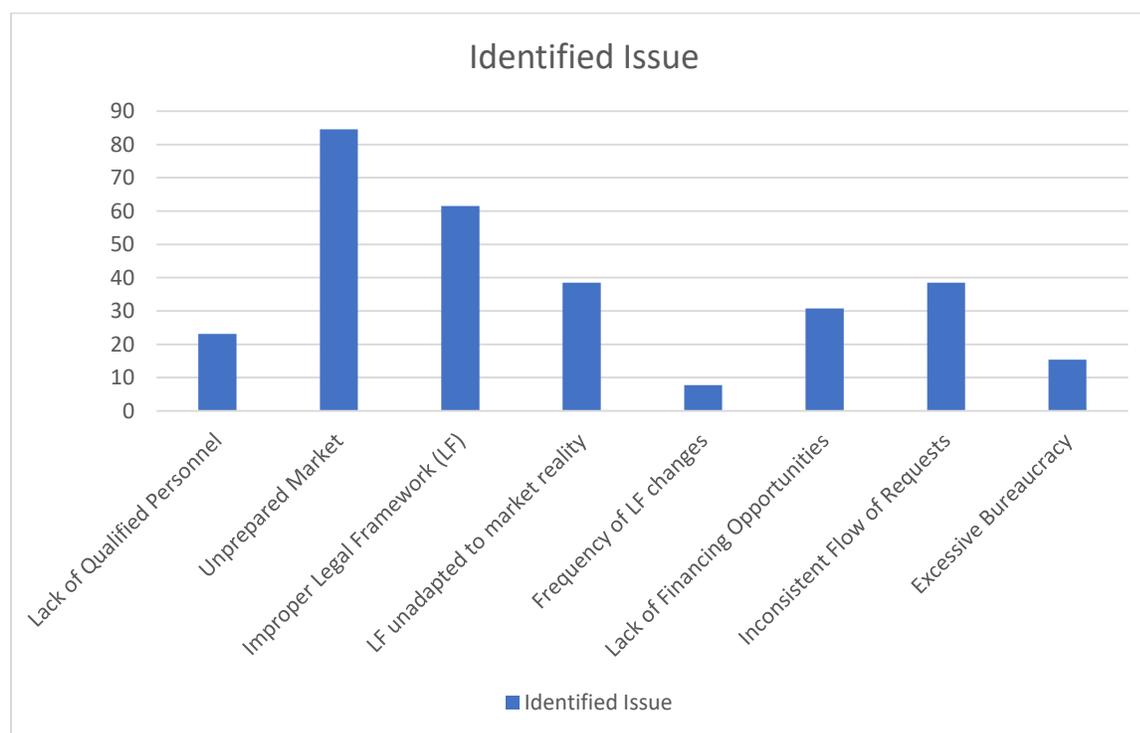


Figure 4 Main Issues Identified by Cluster Members

84.6% of the respondents identified as main issue in their activity the fact that the local market is not prepared for the services / products / systems they provide (e.g. low level of quality requested by beneficiaries). Also, many of the respondents considered that the existing Legal Framework is improper (61.5%) or not properly adapted to the market reality (38.5%).

Some key findings related to the local experience of members and issues they encounter are that

- customers / beneficiaries do not understand the need for high energy efficient buildings and see any legal provisions as a bureaucratic requirement and not as something beneficial in terms of comfort, savings, or environmental protection (lack of public awareness),
- there is an inconsistent and insufficient dialogue between authorities and stakeholders,
- the extensive lack of responsibility in development at national / local level prevents consistent actions and improvements of the buildings stock.

3.6. SWOT analysis

Summary of findings from WP2's SWOT analysis

Strengths

1. Projects related to nZEB already Implemented (e.g. Fit-to-nZEB, Train-to-nZEB) in Romania
2. Existing & increasing number of professionals in the field of energy performant buildings

3. Community already formed around pRO-nZEB (including Public Authorities, Research & Innovation Institutes, University, Businesses)
4. Existing potential for a direct transfer of technical solutions into the market to support the implementation of nZEB
5. New legislation for nZEB at national level
6. Requirements for Energy Performance Certification of Buildings

Weaknesses

1. Not enough qualified workforce to face the current construction works (including renovation) and the nZEB challenge
2. Extensive private ownership of residential dwellings prevents investments in buildings stock refurbishment (incl. to nZEB standards).
3. Apparently high interest rates & unattractive bank loans for private individuals.
4. General public interest in “low-cost” against quality.
5. Political inconsistency and discontinuity in the definition and implementation of relevant strategies
6. Competition between stakeholders may prevent them from putting efforts in promoting their common interests related to high performance buildings stock development.
7. Lack of a more coherent and organized cross-sectorial initiative (that should include research institutions and high-level authorities) for medium- and long-term impact.
8. General negligence of Quality Control within the Construction Sector & particularly some negligence of some aspects related to Control Phases of important constructive elements (e.g. thermal insulation) that are not perceived as determinant by construction companies.
9. No clear and engaged Policy to encourage research & innovation within businesses.

Opportunities

1. New stakeholders on the market (e.g. design companies for passive houses; Passive House Association of Romania etc.).
2. New financing opportunities that may be used for buying a “green house” (Transilvania Bank provides “Green Credit” for “buying Green Buildings”) or to start a new business which may indirectly help develop new local businesses dealing with high performance buildings (e.g. Startup Nation – a 200.000 RON~45000 EUR grant from the government for new businesses funded after 2017; Diaspora Start-up ~45000 EUR for expats returning to start a new business;).
3. State Funded Programme “Casa Verde” (Green House) – 20000 RON (~4500 EUR) for buying & installing photovoltaic panels (up to 90% of the actual costs).
4. Growing interest on the matter of sustainability & circular economy.
5. Vast offer for quality materials.
6. Roundtables on financing energy efficiency in Romania (e.g. 2nd National Roundtable on Financing Energy Efficiency in Romania 6 June 2019, Bucharest, Romania).
7. Existing National Strategy & National Integrated Climate and Energy Action Plan (2020-2030) will be supported by the financial package within the New EU Green Deal.
8. EU legislation that may influence change (e.g. revision of EU 2010/31 Directive).
9. New Long-term Renovation Strategy – draft Strategy framework for 2030-2040-2050.

Threats

1. Limited political action for finding ways to encourage the development of high-performance buildings due to political instability and apparently different priorities in the political agenda.
2. Most state funded refurbishments of residential dwellings are currently being done all much lower performance than nZEB levels. This means money are spent without reaching a satisfactory level of high energy efficiency in the residential buildings stock and buildings are considered as “renovated” (leading to lock-in effects).
3. Attractive funding / financing opportunities for private individuals (to help them retrofitting buildings) are inexistent and the financial crises expected in the current context (i.e. covid-19 outbreak) may prevent any short-term / medium-term changes.
4. Lack of interest for funding research and innovation activities at national level & within the industry.
5. Improper energy certification of buildings provided by “low-cost” service providers (corruption).
6. Frequent policy changes and coherent approach may scare off investors.
7. The spread of the general idea that high performance buildings are expensive – may decrease any form of interest in the matter.

4. Cluster strategy

4.1. Mission

The **aim of the association** for established pRO-nZEB cluster is to bring together key players from the building materials market, research and development institutions, educational representative organizations, public authorities (at central and local level), professional associations and other organizations having a catalyst role, in order to create and improve collaborative relationships for developing and implementing in Romania the concept of nearly Zero Energy Building (nZEB). The Cluster (like legal entity) and the cluster members are developing activities for reduction up to eliminate greenhouse gas emissions generated by using buildings, aiming to build the “research to market bridge” of energy efficient buildings in Romania.

4.2. Vision

The pRO-nZEB Cluster has been the first organization at the regional level in Romania(south-east) which took the lead in promoting the nZEB concept and the concept implementation in a broad range of industries (construction, environment, building materials etc). Offering various services to different target groups (from architects to constructors) Cluster pRO-nZEB is on its way for developing the Bucharest Building Knowledge HUB like the most important node for all other regional potential members to market innovative products and services at their regional levels.

4.3. Strategic objectives

To better define objectives and future actions, the members of the pRO-nZEB Cluster have been consulted in a survey meant to better understand their interests, the market context and general requirements and expectations related to the pRO-nZEB activity. For this, they were asked to select the top three expectations of future activities / actions to be performed by pRO-nZEB. It has been unequivocally &

unanimously expressed by Cluster members that there is a burning need for the general public to be extensively made aware on the requirements and benefits of nZEB (100% of respondents included this in the top three expected actions / objectives). Also, it is expected that the pRO-nZEB cluster will favour networking opportunities between cluster members and / or potential new members in both national (46.2% of respondents included this in the top three expected actions / objectives) and international events (30.8 %). Also, pRO-nZEB members expect that the cluster will - better promote their products / services (46.2%), - organize more frequently training & coaching events, - identify and join relevant international organizations (15.4%). Additionally, specific requests and interests have been expressed and are to be included in the cluster objectives and actions.

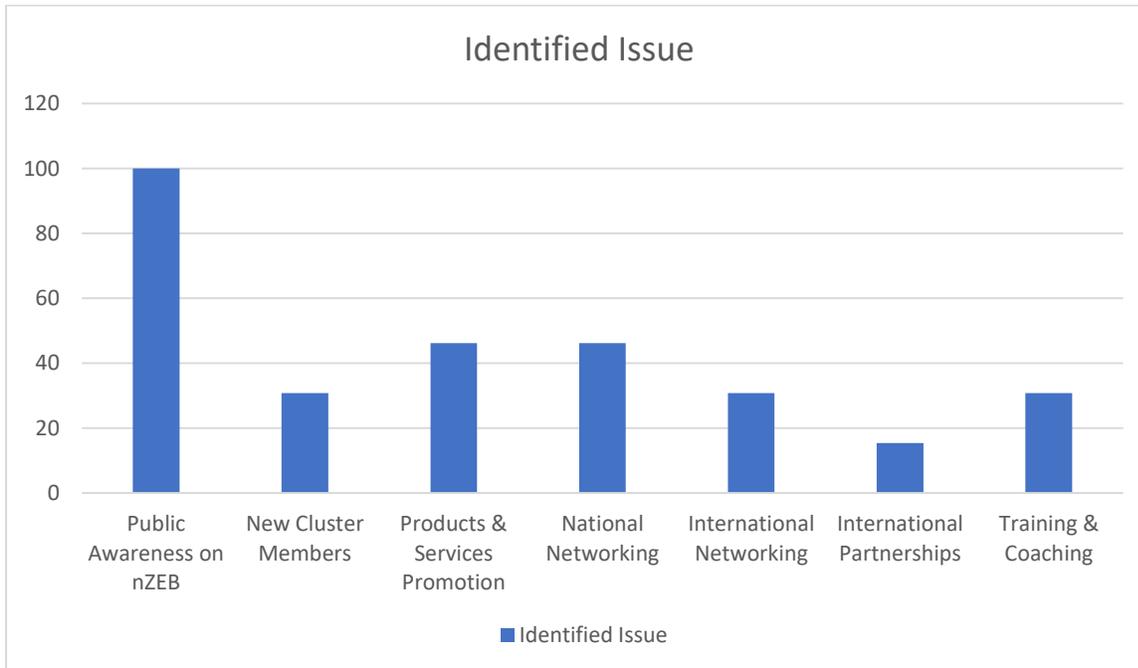


Figure 5 Cluster Members Expectations related to the activity of pRO-nZEB Cluster

Having in mind the opinion expressed by Cluster Members and the view of the Cluster Management, the strategic objectives of the cluster are:

- ⇒ Strategic Objective 1: Improvement of cluster management excellence.
- ⇒ Strategic Objective 2: Improvement of innovation level, marketing, and sales skills of cluster members.
- ⇒ Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.
- ⇒ Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.
- ⇒ Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.
- ⇒ Strategic Objective 6: Increasing the recognition of the cluster.

4.4. Operational objectives

⇒ **Strategic Objective 1: Improvement of cluster management excellence.**

- Operational Objective 1.1 – Improve Cluster Management Excellence based on the results of the ESCA (The European Secretariat for Cluster Analysis) certification – Bronze Label.
- Operational Objective 1.2 – Organize specialized training sessions for the Cluster Management team.
- Operational Objective 1.3 – Implementation of the best management practice and systems in the field of cluster management (e.g. ISO 9001:2015).

⇒ **Strategic Objective 2: Improvement of innovation level, marketing, and sales skills of cluster members.**

- Operational Objective 2.1 – Facilitate the interaction between local and international stakeholders activating in nZEB related sectors.
- Operational Objective 2.2 – Support and boost the competitiveness of cluster members at national and European levels.
- Operational Objective 2.3 – Drive innovation in local and regional markets.

⇒ **Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.**

- Operational Objective 3.1 – Improve the professional skills (e.g. designing and building nZEBs; marketing & sales, management, and planning) of cluster members' staff and, in general, of professionals activating in the construction sector.
- Operational Objective 3.2 – Develop the local knowledge base and promote technical principles and management solutions required to support a substantial market penetration of the nZEB concept in Romania.

⇒ **Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.**

- Operational Objective 4.1 – Facilitate the participation of cluster members in strategic and sustainable partnerships at EU level.
- Operational Objective 4.2 – Facilitate the interaction between cluster members and key stakeholders (nZEB related) at national and international levels.

⇒ **Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.**

- Operational Objective 5.1 – Build-up cross-sectoral and trans-national synergies and develop new value chains between construction, energy efficiency and renewable energy sources industries.
- Operational Objective 5.2 – Develop and support economic relations, transfer of knowledge, best practices and exchange of experiences at national and international level.
- Operational Objective 5.3 – Support local industries and technologies by favouring the creation of local and / or regional supply chain schemes for specialized products and services related to the nZEB market.

- Operational Objective 5.4 – Increase economic competitiveness of local markets at regional level through tangible or intangible investments, financed from own resources or from national or European funds.
- Operational Objective 5.5 – Support and stimulate the development of a strong local and regional industry of products used for high energy efficiency in buildings and the use of renewable sources.
- Operational Objective 5.6 – Support and stimulate the development of new finance and financing opportunities / possibilities for projects related to high performance buildings.
- Operational Objective 5.7 – Stimulate local research, development, and innovation (RDI) and relevant stakeholders to develop new innovative materials and technologies for energy efficient buildings.
- Operational Objective 5.8 – Stimulate the participation of research organizations and higher education institutions in RDI activities in the field of construction / building materials / energy efficiency.
- Operational Objective 5.9 – Disseminate and stimulate the implementation of relevant outcomes of RDI projects.

⇒ **Strategic Objective 6: Increasing the recognition of the cluster.**

- Operational Objective 6.1 – Increase the awareness of the general public (on a local scale) with regard to the needs and benefits related to nZEB, energy efficiency and sustainability in general.
- Operational Objective 6.2 – Establish and continuously improve the communication between local businesses, RDI centres and public authorities responsible with the creation or management of legal and / or technical provisions in the fields of construction, energy efficiency and energy from renewable sources.
- Operational Objective 6.3 – Increase the recognition of clusters.
- Operational Objective 6.4 – Promote and disseminate pRO-nZEB identity (e.g. mission, values, services).
- Operational Objective 6.5 – Increase the recognition of pRO-nZEB at international level.
- Operational Objective 6.6 – Increase the number of cluster members.

4.5. Key Performance Indicators

No.	Objective	KPI	Baseline		Target	
			Value	Year (start)	Value	Year (end)
1	Operational Objective 6.1 – Increase the awareness of the general public (on a local scale) with regard to the needs and benefits related to nZEB, energy efficiency and sustainability in general.	Facebook page followers	Approx. 500	2022	5000	2024
2		LinkedIn page followers	Approx. 200	2022	1000	2024
3		Twitter page followers	Approx. 70	2022	250	2024
4		Press releases related to the benefits of nZEB	0	2022	9 (3 / year)	2024

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

No.	Objective	KPI	Baseline		Target	
			Value	Year (start)	Value	Year (end)
5		Posts or press releases related to the requirements for nZEB (legal and / or technical framework)	0	2022	9 (3 / year)	2024
6	Operational Objective 6.2 – Establish and continuously improve the communication between local businesses, RDI centres and public authorities responsible with the creation or management of legal and / or technical provisions in the fields of construction, energy efficiency and energy from renewable sources.	Organization of local Workshops related to the existing legal framework (construction / energy efficiency / renewables) followed by a press release	0	2022	3 (1 / year)	2024
7	Operational Objective 5.9 – Disseminate and stimulate the implementation of relevant outcomes of RDI projects.	Press releases related to RDI project results	0	2022	6 (2 / year)	2024
8	Operational Objective 6.3 – Increase the recognition of clusters.	Press releases related to clusters' activities, importance & role	0	2022	6 (2 / year)	2024
9	Operational Objective 6.4 – Promote and disseminate pRO-nZEB identity (e.g. mission, values, services).	An info pack with mission, values, and services to be made available on https://www.pRO-nZEB.ro/	0	2022	1	2024
10	Operational Objective 6.5 – Increase the recognition of pRO-nZEB at international level.	Organisation of at least one international event each year to disseminate cluster activities and results.	0	2022	3 (1 / year)	2024
11	Operational Objective 1.1 – Improve Cluster Management Excellence based on the results of the ESCA (The European Secretariat for Cluster Analysis) certification – Bronze Label.	Obtain an ESCA Evaluation Report and the ESCA Silver label	0	2022	1	30 Nov 2022
12	Operational Objective 1.3 – Implementation of the best management practice and systems in the field of cluster management (e.g. ISO 9001:2015).	A set of procedures related to the functioning of the Cluster to be elaborated and approved by Cluster management	0	2022	1	2024

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

No.	Objective	KPI	Baseline		Target	
			Value	Year (start)	Value	Year (end)
13	<p>Operational Objective 1.2 – Organize specialized training sessions for the Cluster Management team.</p> <p>Operational Objective 2.1 – Facilitate the interaction between local and international stakeholders activating in nZEB related sectors.</p> <p>Operational Objective 2.2 – Support and boost the competitiveness of cluster members at national and European levels.</p> <p>Operational Objective 2.3 – Drive innovation in local and regional markets.</p> <p>Operational Objective 3.1 – Improve the professional skills (e.g. designing and building nZEBs; marketing & sales, management, and planning) of cluster members’ staff and, in general, of professionals activating in the construction sector.</p> <p>Operational Objective 3.2 – Develop the local knowledge base and promote technical principles and management solutions required to support a substantial market penetration of the nZEB concept in Romania.</p>	Organization of Training & Coaching Events on relevant topics – face-to-face or on-line	0	2022	6 (2 / year)	2024
14	<p>Operational Objective 5.2 – Develop and support economic relations, transfer of knowledge, best practices and exchange of experiences at national and international level.</p> <p>Operational Objective 4.1 – Facilitate the participation of cluster members in strategic</p>	Organization of workshops for networking and exchange of experience between national and international stakeholders that are representative for the construction,	0	2022	3 (1 / year)	2024

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

No.	Objective	KPI	Baseline		Target	
			Value	Year (start)	Value	Year (end)
	<p>and sustainable partnerships at EU level.</p> <p>Operational Objective 4.2 – Facilitate the interaction between cluster members and key stakeholders (nZEB related) at national and international levels.</p> <p>Operational Objective 5.1 – Build-up cross-sectoral and trans-national synergies and develop new value chains between construction, energy efficiency and renewable energy sources industries.</p>	energy efficiency and energy from renewable sources sectors				
15	<p>Operational Objective 5.3 – Support local industries and technologies by favouring the creation of local and / or regional supply chain schemes for specialized products and services related to the nZEB market.</p> <p>Operational Objective 5.4 – Increase economic competitiveness of local markets at regional level through tangible or intangible investments, financed from own resources or from national or European funds.</p> <p>Operational Objective 5.5 – Support and stimulate the development of a strong local and regional industry of products used for high energy efficiency in buildings and the use of renewable sources.</p> <p>Operational Objective 5.6 – Support and stimulate the development of new finance and financing opportunities / possibilities for projects related to high performance buildings.</p>	Organization of networking workshops related specifically to supply chains creation, RDI and funding & financing opportunities (with various stakeholders active in sectors such as construction, energy efficiency, energy from renewable sources, finance and financing, etc.)	0	2022	3 (1 / year)	2024

No.	Objective	KPI	Baseline		Target	
			Value	Year (start)	Value	Year (end)
	Operational Objective 5.7 – Stimulate local research, development, and innovation (RDI) and relevant stakeholders to develop new innovative materials and technologies for energy efficient buildings. Operational Objective 5.8 – Stimulate the participation of research organizations and higher education institutions in RDI activities in the field of construction / building materials / energy efficiency.					
16	Operational Objective 6.6 – Increase the number of cluster members.	New cluster members	0	2022	15 (5 / year)	2024

Table 4 Key Performance Indicators (KPIs) of the strategy implementation CLUSTER pRO-nZEB

5. Action plan

5.1. Aim of the action plan

The aim of the action plan is to support implementation of the cluster’s strategy and provide operational guidelines for the cluster managers for reaching strategic and operational objectives.

5.2. Actions

Following the consultation of cluster members and based on the current market conditions, pRO-nZEB elaborated an action plan for the timeframe 2020 – 2030. This considers the findings expressed in Chapters 2 and 4 of the current Development and Innovation Strategy.

Action 1 Elaborating and implementing a Communication & Dissemination Strategy

- **Description:** pRO-nZEB will create a short and comprehensive Communication and Dissemination strategy. Whenever applicable, (potential) resources will be indicated for envisaged activities.
- **Related operational objectives:** 2.3, 3.2, 5.2, 5.9, 6.1, 6.3, 6.4, 6.5, 6.6;
- **Responsible person / body for the implementation:** Ciprian Nanu; Lucian Nica (Moldova Branch)
- **Start:** Q1 2022, **End:** Q2 2024;
- **Key Performance Indicators:** 1 – 5, 7 – 9; 10, 16.

Action 2 Elaborating and implementing a Training & Coaching Programme

- **Description:** pRO-nZEB will create a short and comprehensive Training & Coaching Programme. Whenever applicable, (potential) resources will be indicated for envisaged activities;

- **Related operational objectives:** 1.2, 2.2, 2.3, 3.1, 3.2, 5.2, 5.7, 5.8, 5.9;
- **Responsible person / body for the implementation:** Horia Petran; Lucian Nica (Moldova Branch)
- **Start:** Q1 2022, **End:** Q4 2024;
- **Key Performance Indicators:** 13, 16.

Action 3 Elaborating and implementing a Programme for Networking Events

- **Description:** pRO-nZEB will create a short and comprehensive programme for networking events, with precise topics and specially tailored, and also with regard to the participation in international events. Whenever applicable, (potential) resources will be indicated for envisaged activities.
- **Related operational objectives:** 2.1, 2.2, 2.3, 4.1, 4.2, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9;
- **Responsible person / body for the implementation:** Horia Petran; Lucian Nica (Moldova Branch)
- **Start:** Q1 2022, **End:** Q4 2024;
- **Key Performance Indicators:** 6, 10, 14, 15, 16.

Action 4 Implementing the recommendations that resulted from the ESCA Bronze label evaluation in order to obtain the ESCA Silver label

- **Description:** pRO-nZEB will conduct the ESCA Evaluation for Cluster Management Excellence process aimed at obtaining Silver Label.
- **Related operational objectives:** 1.1;
- **Responsible person / body for the implementation:** Horia Petran
- **Start:** Q1 2022, **End:** 30 November 2022;
- **Key Performance Indicators:** 11.

Action 5 Implementing the best management practice and systems in the field of cluster management

- **Description:** pRO-nZEB will elaborate and implement a set of procedures that would allow the integration of best practices in its overall activity (e.g. ISO 9001:2015);
- **Related operational objectives:** 1.3;
- **Responsible person / body for the implementation:** Horia Petran;
- **Start:** Q1 2022, **End:** Q4 2024;
- **Key Performance Indicators:** 12.

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

Table 1 Activities overview

#	Action	Related operational objectives	Dimension National / International	Implementation timeline													
				2022				2023				2024					
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
1.	Elaborating and implementing a Communication & Dissemination Strategy	2.3, 3.2, 5.2, 5.9, 6.1, 6.3, 6.4, 6.5, 6.6	National & International														
2.	Elaborating and implementing a Training & Coaching Programme	1.2, 2.2, 2.3, 3.1, 3.2, 5.2, 5.7, 5.8, 5.9	National & International														
3.	Elaborating and implementing a Programme for Networking Events	2.1, 2.2, 2.3, 4.1, 4.2, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9	National & International														
4.	Implementing the recommendations that resulted from the ESCA Bronze label evaluation in order to obtain the ESCA Silver label	1.1	International														
5.	Implementing the best management practice and systems in the field of cluster management	1.3	National														

5.3. Resources

Table 2 Overview of resources necessary for the action plan implementation

#	Name	Description	Type <i>Human / Financial / Technical / other</i>	Availability <i>yes / partially/ no</i>
1.	Cluster management	Participation in each action will be agreed between the Cluster management team and the person responsible for the respective action (as indicated in the Action Plan)	Human	Yes
2.	Members / Participants contribution	The contribution of members and stakeholders participating in related activities is expected to cover substantially for the main actions related expenses	Financial	Partially
3.	EU Funded projects	The goals and objectives of this strategy and action plan may coincide with EU Funded projects in which pRO-nZEB participates and / or may participate. This will provide the required elements for achieving & boosting the operative capabilities of the Cluster, while achieving its strategic objectives, projects' goals and through an active contribution to the EU sustainable development perspectives.	Human / Financial	Partially

5.4. Procedure of monitoring and implementation plan progress assessment

Monitoring is an essential part of action plan implementation. If it is held regularly, it allows for a real-time control of completing the planned tasks and implementing corrective actions, if tasks are not bringing the estimated results. The action plan implementation is foreseen for 3 years and should be monitored on semi-annual basis. During the action plan completion monitoring, the effects of activities taken so far should be assessed and, unless they are satisfactory, the strategic goals, priorities and measures should be updated.

The action plan completion and its monitoring is recommended to be based on the tool called the Deming cycle: Plan-Do-Check-Act (Figure 6), as described, for an instance, in PN-EN ISO 50001.

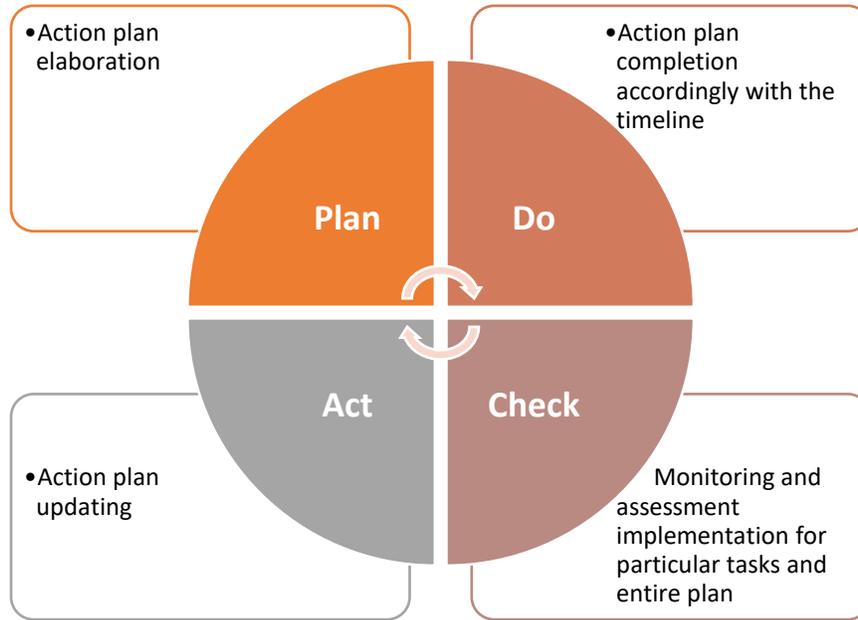


Figure 6 Action plan completion and implementation monitoring procedure based on the Deming cycle

The „Plan” part consists of development of an action plan and is being completed during the preparation of this document. The „Do” stage concerns the implementation of the particular activities and the whole plan, i.e. completion of the planned tasks. The „Check” stage, which means the action plan completion monitoring, should concern simultaneously each task separately (checking if the tasks are completed accordingly with the schedule and if the indicators have been achieved) as well as the overall plan (to what extent the plan goals have been achieved). Meanwhile, the „Act” part concerns the action plan updates and the corrective action implementation which allows to reach the previous indicators if it turns out on the previous stage that they are doubtful, or widening the plan with the new tasks and setting new indicators if the ones planned previously turn out to be completed.

Apart from the parties responsible for each Action, a responsible for monitoring the implementation of the strategy and action plan will be nominated by the management board of pRO-nZEB.

III. Development and Innovation Strategy of the Construction Cluster of Slovenia (SGG)

DEVELOPMENT AND INNOVATION STRATEGY CONSTRUCTION CLUSTER OF SLOVENIA



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Abstract	This document presents the development and innovation strategy of the Polish Construction Cluster. Section 1 presents the context of the document, which was developed within the SMART4NZEB project framework. Section 2 describes the global environment of the cluster – relevant policy instruments, as well as market and technological trends. Section 3 presents the cluster – its history, coordinator, members, and current position. Section 4 presents the cluster strategy, setting strategic and operational objectives, alongside the cluster mission and vision. Finally, section 5 consists of the action plan, which supports the implementation of the strategy.
Keywords	Strategy development, guidelines

History of Changes

Version	Author(s)	Date	Summary of Changes
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0.1	Maksymilian KOCHAŃSKI	25 May 2020	Comments and suggestion added
0.2	Katarzyna KORCZAK	27 May 2020	Improvement according to Maksymilian's suggestions
0.3	Katarzyna KORCZAK	28 May 2020	"Action plan" section (table of contents) has been added
	Vladimir Gumilar, Andro Goblon CCS	June 2020	Elaboration of strategy for CCS
0.4	Vladimir Gumilar, Andro Goblon CCS	February 2021	Detail planning of operational activities, updates of the strategy

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1. Introduction

1.1. SMART4NZEB project

The aim of the SMART4NZEB project is to boost competitiveness and support the scaling-up of 577 SMEs active in construction, energy efficiency and renewable energy sectors through strengthening capacity-building of 5 representative clusters as drivers of innovation in Central and Eastern Europe (Poland, Romania, Serbia and Slovenia) and facilitating trans-national exchanges and strategic partnerships with a focus on sharing experience between different practices, skills gaps, policies, target goals and level of engagement related to nearly Zero Energy Buildings (nZEB).

The main objective of SMART4NZEB is to create a sustainable collaboration, co-learning and capacity building between the involved partners - cluster managers and cluster members and relevant stakeholders representative for the nZEB market in the selected Central and East-European countries, with a view to develop the involved clusters management excellence and to support interregional partnerships to facilitate the development of competitive products and technological solutions intended for new and existing buildings, which will lead to market penetration of nearly zero energy buildings, related to their production, use and reuse. The objective is to drive clusters towards innovative and modern clusters being able to address cross-sectoral and cross border

1.2. WP4

This document is developed within *WP4 Clusters' development and innovation strategies*. The main objective of this WP is to create transnational collaboration-based clusters' development strategies to boost competitiveness and support the scaling-up of SMEs active in construction, energy efficiency and renewable sectors through improved and tailored services offered by the clusters based on the specific needs of the involved SMEs. As a supplementary document, action plans for the participating clusters will be also developed, to ensure that the collaboration strategies in the field of nZEB are operational, functional and allow for progress monitoring. WP4 utilizes results of other technical workpackages (Figure 1). In particular, it uses results of the SWOT analysis from WP2, survey conducted among clusters members in WP3, and feedback from ClusterXchange study visits participants.

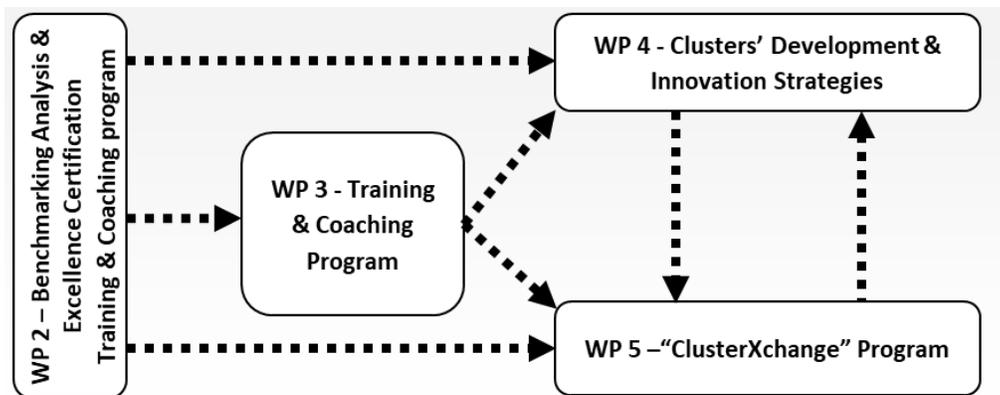


Figure 1 Workflow of SMART4NZEB project

1.3. Aim of the document

The aim of this document is to provide the Development and innovation strategy for CONSTRUCTION CLUSTER OF SLOVENIA. The Strategy should be a comprehensive guidance for helping local stakeholders in regional development of nZEB through active engagement, cross-sectoral and transnational collaboration of clusters' members.

2. Global environment of the cluster

2.1. National context and policy framework

Construction Cluster of Slovenia is, regardless of its name, a cross-sectorial cluster, focusing on the global value chain of sustainable and circular buildings, infrastructure, cities, and related industries.

Our fields of interest are:

- Construction (in general)
- Energy efficiency in buildings and districts
- Circular economy in construction sector
- Climate change
- Digitalization in construction sector
- Skills and competencies for NZEB and »circular« buildings
- Efficient use of water in buildings and waste water treatment
- Internationalization for SMEs
- Clusters
- Entrepreneurship
- Innovation
- Smart specialization

National context and policy framework which drives our activities consists of different national strategies, operational and action plans, policies, and regulation (laws, technical guidelines, standards, technical specification in the field of construction, buildings, energy efficiency, sustainable building, decarbonization, renovation, NZEB, circular economy and waste revalorization. The key ones are:

- Integrated national energy and climate plan of the Republic of Slovenia (2020): defines key targets and priorities in decarbonization, renewable energy, energy efficiency, energy security and Internal Energy Market, research, innovation and competitiveness.
- Long-Term strategy for promoting energy renovation of buildings 2050 (2021) which lays out cumulative investment needs of €6.71bn to 2030. The document defines different categories of energy renovation, including deep (NZEB) and sustainable renovation.

<https://www.energetika-portal.si//dokumenti/strateski-razvojni-dokumenti/dolgorocna-strategija-za-spodbujanje-nalozb-energetske-prenove-stavb/>,
<https://www.gov.si teme/energetska-prenova-stavb/>

- amended Rules on the efficient use of energy in buildings (under preparation) - these rules will become the key design guides, clarifying the nZEB renovation of building design requirements

- National Recovery and Resilience Plan (NRRP) (April 2021), which sets out reforms and reform objectives, and the measures and investments linked thereto, for the period until 2026 in fields of the green transition, digital transformation, smart and sustainable growth, and healthcare, social security, and housing. <https://www.eu-skladi.si/sl/po-2020/nacrt-za-okrevanje-in-krepitev-odpornosti>

The DEVELOPMENT AREA: Green transition has 5 components important for CCS work in regard NZEB, building sustainability and circular economy

COMPONENT 1: Renewable energy sources and efficient use of energy in the economy

COMPONENT 2: Sustainable renovation of buildings

COMPONENT 3: Clean and safe environment

COMPONENT 4: Sustainable mobility

COMPONENT 5: Circular economy – efficient use of resources

- National action plan for nearly zero energy buildings till 2020 (2015) – some principles, definitions and plans are adopted in the documents above.

The policies, strategies and operational documents on global and EU level, interested for us are:

1. We follow Sustainable development goals, especially:

- GOAL 6: CLEAN WATER AND SANITATION
- GOAL 7: AFFORDABLE AND CLEAN ENERGY
- GOAL 8: DECENT WORK AND ECONOMIC GROWTH
- GOAL 9: INDUSTRY, INNOVATION, AND INFRASTRUCTURE
- GOAL 11: SUSTAINABLE CITIES AND COMMUNITIES
- GOAL 12: RESPONSIBLE CONSUMPTION AND PRODUCTION
- GOAL 13: CLIMATE ACTION
- GOAL 17: PARTNERSHIPS

<https://www.un.org/sustainabledevelopment/news/communications-material/>

2. We seek and follow policies, prepared by European Commission, especially on

- clusters,
- skills and jobs,
- industry: European industrial strategy (Using the green and digital transformations to empower industry and small and medium-sized enterprises (SMEs).)
https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy_en

https://ec.europa.eu/growth/industry_en#competitiveness

- construction https://ec.europa.eu/growth/sectors/construction/competitiveness_en
https://ec.europa.eu/growth/sectors/construction/observatory_en

- e. circular economy: Circular Economy Action Plan
https://ec.europa.eu/commission/presscorner/detail/en/fs_20_437
- f. energy renovation in buildings,
https://ec.europa.eu/commission/presscorner/detail/en/fs_19_6725
- g. climate change
 - i. European Climate Law <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1588581905912&uri=CELEX:52020PC0080>
 - ii. European Climate Pact https://ec.europa.eu/clima/policies/eu-climate-action/pact_en
- h. etc (in general: on all fields of interest for CCS),
- i. European Green Deal https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

In 2012, the Commission published a Communication Strategy for the sustainable competitiveness of the construction sector and its enterprises. The document is a part of the Europe 2020 initiative. It focuses on the promotion of favorable market conditions for sustainable growth in the construction sector. Five areas are addressed:

- **Financing and digitalization:** especially for energy efficient investments in the renovation of buildings and for research and innovation in a smart, sustainable, and inclusive environment
- **Skills and qualifications:** workforce and management training for job creation through up-skilling and apprenticeships to meet demands for new competencies
- **Resource efficiency:** focusing on low emission construction, recycling and valorisation of construction, and demolition waste
- **Regulatory framework:** emphasis on reducing the administrative burden for enterprises, and particularly SMEs
- **International competition:** encouraging the uptake of Eurocodes and promoting the spread of new financial tools and contractual arrangements in non-EU countries.

3. **International agreements relating to the work of the CCS (for example, the Paris Agreement)**
<https://unfccc.int/process-and-meetings/the-paris-agreement/what-is-the-paris-agreement>

4. **Strategies and documents prepared by organizations such as:**

- a. ECTP (European Construction Technology Platform)
- b. ECCC (European Cluster Collaboration Portal)
- c. ECA (European Cluster Alliance)
- d. Ellen MacArthur Foundation
- e. Renovate Europe campaign
- f. ...

Collecting and editing this material (and monitoring changes) is one element of the SGG action plan.

2.2. Technology development trends in the construction / energy efficiency / RES industry

We are paying attention on Key Enabling Technologies and their use in Construction, Advanced Technologies for Industry (ATI) and Trends in Construction Industry.

According to plan the technology and trends watch is planned at least twice a year (in March and October), however we are paying attention on this matter daily, through e-newsletters we are receiving, social media posts (especially on LinkedIn, Twitter, but also on Facebook), etc.

Key enabling technologies (<https://ec.europa.eu/programmes/horizon2020/en/area/key-enabling-technologies>)

Key Enabling Technologies (KETs) are investments and technologies that will allow European industries to retain competitiveness and capitalize on new markets. The Industrial Technologies Programme (NMP) focuses on four KETs: nanotechnologies, advanced materials, and advanced manufacturing and processing (production technologies) and biotechnology.

Europe's industry is facing many challenges such as global competition, and the need for energy and resources to be efficient. Investing in research and innovation is essential to address these challenges and, at the same time, to help to develop and deploy solutions for societal challenges like health, energy, climate and so on.

Nanotechnologies, advanced materials, and advanced manufacturing and processing are key areas that determine Europe's position in the global market. Investing in these areas will boost competitiveness, create jobs, and support growth.

Nanotechnologies can create materials and devices on a minuscule scale - 80,000 times smaller than a human hair. Nanotechnologies are touching every aspect of human life: electronics, medicines, everyday products, our cars and our homes. Research in this area will lead to new products and services developed by the industry, capable of enhancing human health while conserving resources and protecting the environment.

Advanced materials can introduce new functionalities and improved properties, while adding value to existing products and processes, in a sustainable approach. Research can start from the material itself (e.g. biomaterials), from the industrial sector (e.g. metallurgy) or from their applications (e.g. energy, health, transport). Research in this area responds to people's needs and concerns for integrated solutions that combine energy, natural resources and human health.

Biotechnology applies scientific and engineering principles on living organisms. On one hand, it serves to improve industrial processes and on the other hand, it allows the competitive, sustainable and innovative production of materials, chemicals and fuels. In this way, biotechnology supports European industries with its scientific, technological and innovation base.

Sustainable development is key for the manufacturing sector in Europe. We need to invest in new engineering leading to flexible manufacturing, clean processes, and improved production processes, to increase the competitiveness of its industry in a sustainable and energy-efficient way.

In partnership with industry, the EU will also invest in research and innovation for Energy-efficient buildings, Factories of the Future, and Sustainable Process Industries (SPIRE). Industry is pledging further private investment in the technologies. The aim is to increase the competitiveness and energy efficiency of the construction sector, to increase sustainability of production processes and make the process industry more resource- and energy efficient. In this way, the private and public sectors will boost Europe's industrial leadership, while responding to Europe's concerns to create jobs, and address problems of energy and resource efficiency.

Based on current global research and market trends, KETs have the following characteristics:

- Knowledge and capital intensive technologies;
- High research and development (R&D) intensity;
- Rapid and integrated innovation cycles;
- High capital expenditure;
- Highly-skilled employment.

Their influence is pervasive, enabling process, product and service innovation throughout the economy. They are of systemic relevance, multidisciplinary and transsectorial, cutting across many technology areas. (Source: <http://www.mkpl.eu/key-enabling-technologies/>)

Advanced Technologies for Industry (ATI) (<https://ati.ec.europa.eu/home>)

The following 16 advanced technologies have been identified:

- Advanced Manufacturing Technology
- Advanced Materials
- Artificial Intelligence
- Augmented and Virtual Reality
- Big Data
- Blockchain
- Cloud Computing
- Connectivity
- Industrial Biotechnology
- Internet of Things
- Micro- and Nanoelectronics
- Mobility
- Nanotechnology
- Photonics
- Robotics
- Security

<https://ati.ec.europa.eu/reports/Sectoral-Watch>

2.3. Market trends in the construction / energy efficiency / RES industry

The public sector in Slovenia plays a leading role in the energy renovation of buildings. Buildings owned and used by public authorities represent about 10% of the total building stock. In order to reduce energy consumption in buildings, it is necessary to adapt and rationally manage district heating systems. From 2018 onwards, public sector organizations can only purchase energy-efficient buildings, products and services. Every year, it is necessary to renovate 3% of the area of buildings owned and used by the central government or to take alternative cost-effective measures to achieve the same improvement in the energy efficiency of public buildings.

From 2019 onwards, all newly constructed public buildings that use energy for heating and / or cooling for their operation must be constructed as almost zero-energy, and from 2021 this will apply to all other new constructions. Energy in such buildings will be largely provided from renewable energy sources.

Based on European and national legislation, the Government of the Republic of Slovenia has adopted a "Long-term strategy to encourage investment in the energy renovation of buildings". The strategy sets the following operational goals until 2020 or 2030:

- renovation of 3% of public buildings in the public sector annually,
- renovation of 1.8 million m² of buildings in the wider public sector in the period 2014-2023,
- improving the ratio between invested public funds and encouraged investments in the public sector to 1: 3,
- implementation of 5 demonstration projects of energy renovation of different types of buildings.

The expected results are the renovation of 9.1 million m² of building space, of which:

- 6 million m² of residential buildings,
- 1.8 million m² of public buildings (of which 3% of buildings in the narrower public sector are mandatory for annual renovation),
- 1.3 million m² of buildings in the private service sector in the period 2014–2023.

The strategy for the needs of renovation also defines the review of the national building stock and the system of measures and criteria for the promotion and implementation of acceptable ways in which the renovation of various types of buildings is approached. Due to the provisions of European legislation, which obliges Member States to annually renovate a certain share of public sector buildings, the Strategy places special emphasis on buildings of the narrower and wider public sector.

2.4. External resources available for the cluster development

The Republic of Slovenia does not have a cluster policy. There is no financial support for clusters. There is also no support in any other form, such as support for the promotion of clusters.

That is the reason that main sources for cluster development and implementation of its activities are acquired from European programs: FP7/H2020, COSME; ERASMUS, LIFE and some other programs in the past 10 years (90%). Additionally, 10% of the sources of financing are membership fees, and service contracts with members and other cluster participants.

The key competitiveness and industry development policy of Republic of Slovenia, is focused on Smart Strategy Specialization. **Slovenian Smart Specialization Strategy** sets out national strategic development priorities and niches that are supported on the ground by a comprehensive, focused and tailored policy mix. By implementing S4, Slovenia has rolled out an entirely new model of development and innovation cooperation between the key stakeholders and has significantly improved its integration in the European and global development and innovation networks, thematic platforms and consortia. S4 has been the driving force behind efforts to strengthen and take Slovenian innovation ecosystem to the next level, and has facilitated clustering and cluster-based economic development via so called **Strategic Research and Innovation Partnerships (SRIP)**. Compared to some other concepts, SRIPs can be seen as a combination of concepts of technological platforms, innovation partnerships, meta clusters, and key national clusters.

https://www.eu-skladi.si/portal/en/post-2020-1/programming-1/slovenian_smart_specialisation-strategy

By implementing S4, Slovenia revamped its policy mix supporting innovation, spanning idea and start-up stages and initiatives, all technology readiness levels as well as pilots, demo projects and financial instruments for commercialization. This helped put in place a robust comprehensive and coherent set of measures and instruments.

Government Office for Development and European Cohesion Policy took the first steps towards updating S4 already back in January 2020. S4 remains one of the bases underpinning the implementation of Cohesion Policy in Slovenia in the period 2021-2027. Regulations at the European level lay down that national smart specialisation strategies are to be revisited, refined and updated; also, the regulations label smart specialisation strategies as an enabling condition for Policy Objective 1 'A Smarter Europe by promoting innovative and smart economic transformation'. Further concentration and prioritisation or narrowing down of focus areas and their product lines will be undertaken on the basis of quantitative justifications for market potentials provided by Strategic Research and Innovation Partnerships for the proposed focus areas and product lines, as well as on the basis of proposals and justifications put forward during public consultation.

Some of the clusters in Slovenia have been engaged considerably in developing SRIPs, and are managing them, together with other organisations such as institutes or chambers of commerce. CCS has established close collaboration with some of them, and plans to intensify it due to fact that for the period 2021-2027 there will be no other potential national support measure for clusters as such besides S4 program. The key SRIPs where CCS works and plans to intensify engagement are:

- SRIP Network for transition to circular economy
- SRIP Smart buildings and home including wood chain
- SRIP Smart cities and communities and horizontal ICT network

There are other national resources available, but not related to cluster as such. Businesses individually or in consortia can apply for these funding opportunities. Clusters can provide consultancy and support services in preparation of the proposals and guiding the applicants. **In majority of cases, with a status of economic interest grouping, Construction cluster of Slovenia is even non-eligible applicant.**

The main public (governmental) organizations managing optional financial support for companies (e.g. cluster members) are presented below.

Public Fund of Republic of Slovenia for Entrepreneurship



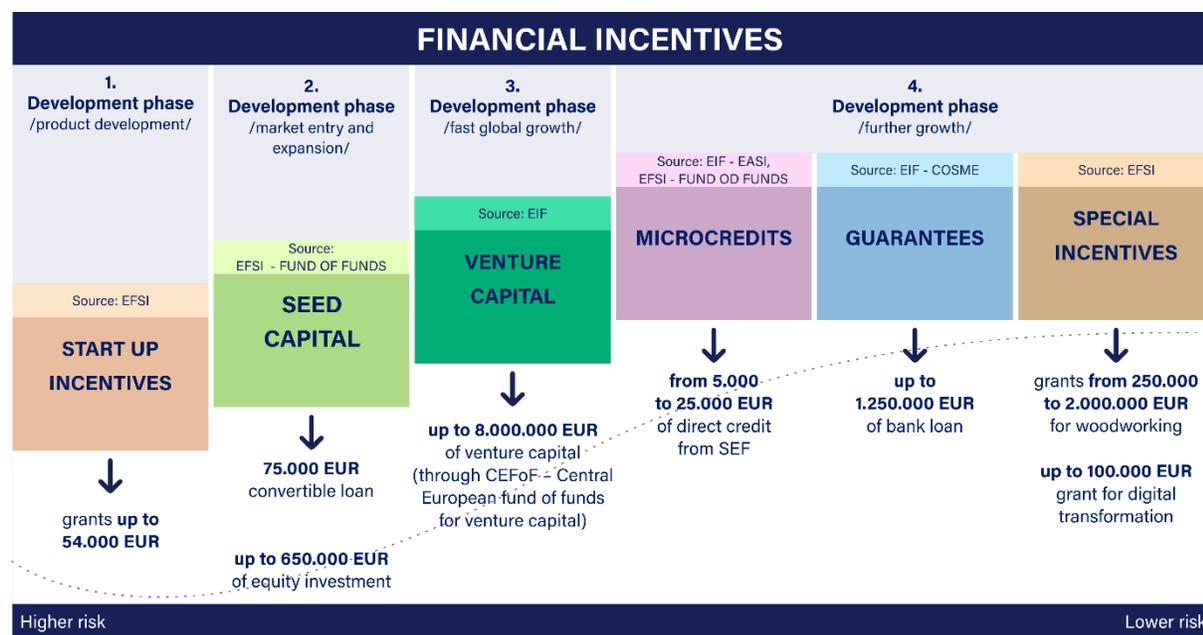
The Public Fund of Republic of Slovenia for Entrepreneurship or shortly The Slovene Enterprise Fund (the Fund or SEF) is established with purpose of improving the access to financial resources for different development – business investments of micro, small and medium-sized enterprises (SMEs) including with financial resources for SMEs start-up and micro financing in the Republic of Slovenia.

Every year the Fund is offering proper financial solutions for development – business projects in Slovenian entrepreneurial sector via financial engineering, which is majorly based on financial instruments with refundable means (loans, guarantees for loans, subsidised interest rates, venture capital) which allows combining of financial resources of different financial institutions (financial lever).

SEF offers the following financial products:

- START UP INCENTIVES (grants) for establishing an enterprise
 - a. Incentives for innovative start ups
 - b. Incentives for start - ups in problem regions
 - c. Incentives for start - up enterprises in the field of wood utilization
- SEED CAPITAL (convertible loans and capital investments) for the entry and expansion on the market
 - a. Convertible loan for start-up of innovative enterprises
 - b. Direct capital for growth of innovative enterprises
- VENTURE CAPITAL (mezzanine capital) for rapid global growth
- MICROCREDITS (direct SEFs credits) for specific target groups for current operation
 - a. Microcredits for micro and small enterprises
 - b. Microcredits for problem regions
- GUARANTEES for bank loans with interest rate subsidy for current operation and further growth. Guarantees for more favourable bank loans with interest rate subsidy are the most important financial line of the Fund, which on average represent around 75% of the amount of all approved incentives per year. This is followed by start-up and special incentives, a microcredit line, and a seed and venture capital line.
- SPECIAL INCENTIVES (grants) for special target groups

Financial incentives are intended to finance various development business activities, such as: Start-up of an enterprise, own development and innovation, rapid global growth, women entrepreneurship, socially useful products and services, creative industries, transfer of ownership between generations, business model reengineering, other,...



Information in open calls and calls in preparation for 2021-2022

Category Title - Status

- Public tender P4D 2021 - Incentives for digital transformation of companies. In preparation, open from 02.04.2021
- Public tender P7C 2021 COVID - Credits to mitigate the effects of the SARS-CoV-2 epidemic on the economy. Under preparation, open from 31.03.2021
- Public tender P1 plus 2021 - Guarantees for bank loans with interest rate subsidy. In preparation, open from 05. 03.2021
- **Public tender P2 2021 - Incentives for the start-up of innovative companies. In preparation, open from 26.02.2021**
- **Public call for start-up mentors of innovative start-up companies, Open until 28. 12.2021**

Some examples of closed call, optionally to be re-opened in 2021-2022

- Call P4D-C19 - Incentives for the digital transformation of SMEs
- Public tender SK75 2020 - 2 - SEED CAPITAL - Convertible loan for start-up of innovative companies in the amount of EUR 75,000
- Public tender P1 plus 2020 - Guarantees of the Bank Loan Fund with an interest rate subsidy
- Public tender P2 2020 - Incentives for starting innovative companies

- Public tender P7 2020 - Microcredits
- Public call VAV 14 - Prototyping voucher
- Public call Repetition of the public call for inclusion in the list of evaluators of digital transformation projects of companies within the public tender "Incentives for digital transformation of SMEs (P4D - 2019-2023)"
- Public call Public call for entry in the list of evaluators of digital transformation projects of companies within the public tender "Incentives for digital transformation of SMEs (P4D 2019-2023)"
- Public tender P4D 2019 -2023 -Incentives for digital transformation of SMEs
- Public tender SI-SK 2019 - Seed capital - Co-investment with private investors
- Public Call VAV-10 - Cyber Security Voucher
- Public call VAV-9 - Voucher for the preparation of a digital strategy
- Public call VAV-8 - Voucher for digital marketing
- Public call VAV-7 - Voucher for raising digital competencies

SPiRiT Slovenia Business Development Agency



Slovenian government's Business Development Agency (SPiRiT Slovenia, public agency) is a single point of contact for potential investors and international companies looking for new business opportunities.

Free of charge, the agency prepares and provides practical information and advice on various business opportunities in Slovenia such as specific investment locations, Slovenian suppliers, individual industries, and markets.

The agency is entrusted with the regulatory, expert and development tasks serving to increase competitiveness of Slovenia's economy in the area of entrepreneurship, internationalization, foreign investment, and technology.

ASSISTING INVESTORS

For investors, the agency provides assistance throughout the whole investment process: in-depth information on local investment opportunities on request as well as guidance on site location and assistance during the selection; connects investors with specific professional services and facilitates introductions with sector experts and other relevant authorities; and once the investment is complete, the agency includes the new business in its aftercare program where it helps it grow in Slovenia and beyond.

HELPING BUSINESS FIND THE RIGHT BUSINESS PARTNERS

Slovenia also aids businesses looking for business partners. The agency has a database of all Slovenian exporters at www.sloexport.si while, on request, it also puts together tailor-made information about Slovenian suppliers. Any enquiries the agency receives are distributed to relevant Slovenian companies while it also facilitates collective presentations of Slovenian companies at international trade fairs.

OPEN CALLS in domain related to CSL pilots

Public call for proposals "Promoting sustainable business strategic transformation and development of new business models in Slovenian companies for easier integration into global value chains" <https://www.spiritslovenia.si/razpis/323> , Deadline (last call in series): 23.04.2021

Ministry of Economic Development and Technology

The Ministry of Economic Development and Technology performs tasks in the following areas:

- Internal Market
- Entrepreneurship and Competitiveness
- Internationalisation
- Trade policy
- Regional Development
- Wood and Furniture Industry

The last call for larger scale support of R&D projects was published in 2019 within the scope of Slovenian Smart specialization implementation.

Only those RDI projects that were included in the focus areas and / or technologies according to priority areas of Strategic Development and Innovation Partnerships (SRIPs) were eligible. Focus areas and technologies were identified the following priority areas of applications:

1. Smart cities and communities
2. Smart buildings and a home with a wooden chain
3. Networks for the transition to a circular economy
4. Sustainable food production
5. Factories of the future
6. Health - medicine
7. Mobility
8. Development of materials as end products
9. Sustainable tourism

Portal EU-funds (eu-skladi.si)



Portal EE-skladi.si on the implementation of European cohesion policy in Slovenia with information on current tenders, projects and program documents.

Portal delivers information on all public call, tenders, and other options for subsidies, co-financing and other financial and non-financial incentives published by Slovenian ministries and agencies. Since the current EU financial perspective is finished, there is no information on INTERREG EUROPE calls.

Digital Innovation Hub Slovenia

DIH Slovenia is Industry Digital Transformation one-stop-shop in Slovenia and beyond. It creates awareness and provide services to grow digital competencies, share digital experience and case studies locally, regionally and internationally, influence the government to adapt regulation and open its data to foster entrepreneurship.

<https://dihslowenia.si/en/about-us/>

3. Cluster overview

3.1. History of the cluster

The CONSTRUCTION CLUSTER OF SLOVENIA (CCS) has been established as formal organisation (Economic Interest Grouping) in April 2004. The cluster initiative started two years before and has been supported as a project (minor support). CCS was as a bottom-up initiative of companies, local authorities and research institutions of Slovenian Construction sector.

CCS was established as a non-profit organization with the aim of improving efficiency, competitiveness and increasing the results and business activities of the members of the cluster.

The initial mission off the cluster was to create conditions for its members to:

- increase productivity and business efficiency
- increase innovation, acquire knowledge, develop technologies and good practices
- improve of competitiveness using the principles of clustering
- increase business and other cooperation in value chains
- search for and acquire new business opportunities in Slovenia, the EU and globally
- support business cooperation and internationalization activities on the EU and the global market
- ensure the interests and cooperation with the state and other public institutions, the research sphere and financial organizations

- integrate into the international research and development environment, cooperation with foreign countries clusters and companies.

In first years (2004-2005) the cluster and cluster office were supported within the national programme of cluster development. The support was aimed to help cluster development and cluster services (cluster office) and implementation of cluster program (R&D projects, skills and competences development, promotion and internationalization). This support was implemented as a cascade funding. After 2005, the cluster support programme ended. In 2006-2007 CCS has received support to develop the Slovenian National Construction Technology Platform. Later, some minor national public funding has been acquired.

SGG is aimed at the broad scope of companies with a wider field of building and construction, especially for energy efficient and sustainable construction and renovation of buildings, new materials, products and services, and business models - but also all the other organizations that are related to construction or to sustainable development of the built environment, green, and circular economy. SGG is a member of European Construction Technology Platform and of the E2B association (Energy Efficient Buildings).

Since the beginning of the cluster, CCS moved in direction of innovation cluster, by intensifying involvement in national and EU R&D development projects. The main competences of the SGG as innovation cluster are:

- Preparation and collaboration in RTD projects, representing industry association and industry needs and expectations, and/or directly involving cluster members (industry actors) to project activities, and/or in dissemination and exploitation activities
- EU and national R&D and innovation projects coordination and management, including costs / financial reporting and/or supporting dissemination and exploitation actions in EU funded RTD projects, technology transfer and intellectual property issues, cluster and other new collaborative organisational and business models development and implementation.

3.2. Cluster coordinator

Construction cluster of Slovenia is coordinated by Slovenski gradbeni grozd, gospodarsko interesno združenje (e.g. Construction cluster of Slovenia, Economic Interest Grouping). A cluster office e.g. cluster management organization was established in April 2004. In terms of management, General Assembly with representatives of founding members, Management Board, Working Groups (if needed) and Cluster Manager are set-up with roles and responsibilities.

Vladimir Gumilar is the cluster manager, and director of cluster organisation. He has been the key promotor of the cluster development and manages the cluster since 2004.

Vladimir Gumilar holds a Master of Science in Construction extended by Ljubljana University (Slovenia), and MBA extended by University of Kansas (USA). He has been deeply involved in the construction industry R&D coordinating different R&D projects, activities, since he graduated.

In last few years he has had an important role in developing national and regional construction clusters. Since April 2004 he is the cluster manager of CCS (CONSTRUCTION CLUSTER OF SLOVENIA, coordinating different RTD and



<p>other cluster's projects. In 2005, he supported the development of the SICTP (Slovenian Construction Technology Platform). Since 2005, he is also actively involved in EU research projects: e-NVISION, TECH-TRANSFER, REGCON and MESSIB, OPENHOUSE, RECTYRE, EE-HIGHRISE, NEWBEE, SILENTWALL, STEELPROST - supporting the R&D activities as a SME association and/or performing activities of the dissemination and exploitation. In REGCON project he developed the ICM333 methodology for the development of the innovation clusters in construction. He was a coordinator of the STOREPET project (FP7, SME associations call). He also coordinated the EU COSME project ECCA, aiming to establish European Circular Construction Alliance. Within this project he gained advanced competences in circular economy, in addition to core engineering and managerial ones.</p>	
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Andro Goblon, project manager, contributes to cluster development, planning, and implementation of cluster initiatives and projects.

<p>Andro Goblon, Civil Engineer, has been involved in different business, research, educational and training activities in the construction, with special focus on energy efficiency, environment protection and sustainable buildings. He was lecturer at the Vocational College Novo Mesto for the Communal Engineering field. At the college he was involved in different projects for vocational training programme development (space planning, environment protection technician, communal engineering). Later he was performing energy inspections and audits of public and private buildings, offering consultation services in energy and ecology fields, and participated in the development of the software applications for planning and designing of energy efficient buildings.</p> <p>In the Construction Cluster of Slovenia he works as a researcher and project manager. He coordinates and/or participates in different EU RD project activities with special expertise in dissemination and exploitation tasks. He actively participated with his competences in the following EU projects: FP7 (MESSIB, OPENHOUSE, EE-HIGHRISE, NEWBEE, SILENTWALL, STEELPROST, STOREPET), Ecoinnovation (RECTYRE), Leonardo da Vinci (Build Your English), currently in GELCLAD H2020, and GREB, ERASMUS+. He has advanced competences in training and consultancy in fields of innovation management, business model development, circular economy and new marketing channels. In the framework of EU projects, he led the activities of promoting and using the results of research in the innovation activities of companies. In doing so, he has been trained in the use of visual business planning tools and has practically used the tools in workshops within EU projects.</p>	
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3.3. Cluster activity and technology background

CCS is highly dynamic organization in terms of members, that is cluster participants which signed for the membership. The number of members reflects different aspects such as availability of public co-financing, economic situation in sector (crisis) and internal dynamic of innovation process in companies:

- Due to availability of public co-financing (2004-2006) CCS connected 22 members (11 SMEs, 2 faculties, 2 R&D organizations)

- In 2007/2011 CCS supported the work of Slovenian Construction Technology Platform and the numbers of cluster members raised to 29.
- In 2012 the number of members was 19 as many of construction companies and members of CCS bankrupted, but we acquired new ones with successful application for EU projects where these new members participated, too.
- In 2013 this figure was reduced to 11 members as the rest of members bankrupted or stepped-out due to other reasons.
- In 2018 a mayor reorganization of cluster was done as the outcome of acquiring EU funding via EU projects was actually zero, and cluster faced a huge financial crisis.
- Currently (2020), CCS has 9 SMEs as active cluster members, whereas collaboration continues with a number of committed cluster participants, e.g. other companies and R&D organization

The structure of committed cluster participants is:

30 -Industry (with 25 SMEs, and 5 non-SMEs)

2 - R&D institutions (see below)

2 – Universities (University of Primorska – Centre of Excellence InnoRenew CoE, University of Ljubljana, Faculty of Civil and Geodetic Engineering, University of Primorska, associated Faculty of Design).

There are also ongoing collaboration with University of Astrakhan, and University in Kazan, Russia.

2 – Training and education providers (School Centre Novo mesto: Secondary School of Construction, Wood Technology and Pre-School Education, Secondary School of Civil Engineering, Land Surveying and Environmental Studies Ljubljana)

3 – Others: intermediaries and political/administration stakeholders, other clusters (Wood Industry Cluster, TECES Cluster, Chamber of Commerce and Industry of Slovenia)

- *Which economy branches the cluster covers?*

Construction and with building and infrastructure value chain related sectors. That is energy efficient, circular, and sustainable building, neighbourhood, and city.

- *What is the technology background of the cluster?*

SGG is aimed at the broad scope of companies with a wider field of building and construction, especially for energy efficient and sustainable construction and renovation of buildings, new materials, products and services, and business models - but also all the other organizations that are related to construction or to sustainable development of the built environment, green, circular economy, and ICT sector.

- *Who are the main R&D&I players in the cluster?*

The key R&D players are Building and Civil Engineering Institute ZRMK and ZAG – National Building and Civil Engineering Institute.

- *Relevant projects implemented by the cluster*

CCS has been involved in more than 40 national and EU projects. The key EU projects where CCS was involved as partner or coordinator are:

- STOREPET, Development of PCM-based innovative insulating solutions for the Light-weight building sector, FP7 programme, CCS was the project coordinator
- OPEN HOUSE, Benchmarking and mainstreaming building sustainability in the EU based on transparency and openness (open source and availability) from model to implementation, FP7, project partner
- EE-HIGHRISE, Energy efficient demo multi residential high-rise building, FP7, coordinator AKROPOLA d.o.o., SGG is project partner responsible for dissemination
- ICECLAY, highly efficient production of ultra-lightweight clay-aerogel materials and their integrated composites for building insulation, FP7, coordinator: ACTIVE SPACE TECHNOLOGIES, S.A., PORTUGAL, SGG was a project partner
- NEWBEE, Development and validation of new 'processes and business models' for the next generation of performance-based energy-efficient buildings integrating new services, FP7, coordinator: TECNALIA, SPAIN, SGG was project partner responsible for dissemination.
- ECCA European Circular Construction Alliance - adopting Circular Economy for internationalization and global competitiveness of European SMEs in Building and Construction (project start 1.1.2016). EU COSME CCS. ESCP4i, Role of CCS: coordinator
- GELCLAD (EU H2020, 2016) Highly efficient cladding eco-panels with improved nano-insulation properties
- GREB (EU ERASMUS +), Modernization of the Curricula in sphere of smart building engineering – Green Building
- PEGBS: Erasmus+KA2 – Cooperation for innovation and the exchange of good practices -Capacity Building in the field of Youth

Running projects (August 2020):

<p>SMART4NZEB (EU COSME) Strengthening clusters Management Activities and Running Trans-national for implementation of nearly Zero Energy Buildings</p> 	<p>COSME</p>	<p>Partner</p>
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<p>CYBER SECURE LIGHT (EU COSME): Cyber Secure IoT Lighting and Home Automation systems for Smart Building, European Strategic Cluster Partnership for Smart Specialization, https://cybersecurelight.eu</p> 	<p>COSME</p>	<p>Partner</p>
<p>INNOVATIVE PAVEMENT SOLUTION FOR THE MITIGATION OF THE URBAN HEAT ISLAND EFFECT (ongoing), https://heatlandlife.eu/</p> 	<p>LIFE</p>	<p>Partner</p>

- LIFE HEATLAND (EU LIFE) Innovative pavement solution for the mitigation of the urban heat island effect
- CYBER SECURE LIGHT; EU COSME, Cyber Secure IoT Lighting and Home Automation systems for Smart Building, supporting, ESCP3S Cluster partnership (started in September 2018)
- SMART4NZEB; EU COSME; ESCP4X, Strengthening clusters Management Activities and Running Trans-national for implementation of nearly Zero Energy Buildings

Table 1 Cluster members as of 12.8.2021

#	Name	Type <i>SME / Public authority / Business network / Research & education</i>	Field of expertise	website
1.	CIRCON d.o.o.	SME	Circular construction	
2.	360 Arhitekturni posnetki Smiljan Simerl, s.p.	SME	3D scanning and modelling, Geodesy	https://360-recording.wixsite.com/360-recording
3.	VIRIS d.o.o.	SME	Cyber security in buildings, ethical hacker	https://www.viris.si/
4.	CREA PRO d.o.o.	SME	IT, AI systems	https://www.creapro.si/
5.	JUB d.o.o.	Large	Building materials and solutions producer	https://www.jub.si/
6.	Fit media	SME	Promotion of green technologies	https://www.fitmedia.si/

7.	PROmarketing d.o.o.	SME	Marketing, social media exploitation	www.pro-marketing.si
8.	REBISS d.o.o.	SME	Startups acceleration	https://www.linkedin.com/in/rokslokar
9.	RIHTER montažne gradnje d.o.o.	SME	Prefabricated wooded houses	www.rihter.si
10.	COGREEN d.o.o.	SME	Bio construction, hemp buildings	www.cogreen.si
11.	UNION projekt	SME	Sustainable building design and engineering	
12.	Secondary Construction School and Gymnasium Maribor	Education	Education in construction and buildings	
13.	SCHOOL CENTRE NOVO MESTO Secondary School of Construction, Wood Technology and Pre-School Education	Education	Education in construction and buildings	
14.	The Secondary School of Civil Engineering, Land Surveying and Environmental Studies Ljubljana	Education	Education in construction and buildings	

3.4. International orientation and positioning of the cluster

Since the very beginning of the cluster, CCS has actively started with international activities. The first EU project in FP7, e.g. ENVISION, started in 2006. Since then, there were more than 25 EU projects where CCS has been involved, including coordination of GELCLAD, FP7, and ECCA ESCP4i, COSME project. With that, and many project proposals preparation, CCS build a network of EU partners, especially from Spain, Portugal, Italy, Belgium, Finland, Serbia, Romania, Germany, and in recent year Russian Federation, Mongolia and Uzbekistan. Within EU project events (fairs, conferences, matchmakings, working meetings), CCS presented the members and supported the R&D cooperation. The majority of CCS members have been invited and have participated as partners, or third-party partners in EU projects and activities such as dissemination and exploitation.

CCS is a member of European Construction Technology Platform and of the E2B association (Energy Efficient Buildings). CCS is also partner of RENOVATE EUROPE initiative.

In last years, the cluster has been active in the cluster collaboration field, setting up strong network with clusters in construction, sustainable building, and circular economy. CCS is involved in three ESCPs (European Strategic Clusters partnerships):

- coordinator of ECCA (European Circular Construction Alliance, ESCP4i).
- partner in CYBER SECURE LIGHT (EU COSME): Cyber Secure IoT Lighting and Home Automation systems for Smart Building, European Strategic Cluster Partnership for Smart Specialization
- partner in SMART4NZEB; EU COSME; ESCP4X, strengthening clusters Management Activities and Running Trans-national for implementation of nearly Zero Energy Buildings

In 2019, CCS started the initiative to set-up a cluster-of-change, called International Circular Construction Clusters, with clusters from Slovenia, Belgium, France, Germany, and Romania. This is ongoing activity (August 2020).

3.5. Cluster members' needs

Cluster members needs are acquired at the regular monthly meetings and events. Due to small number of cluster members, the needs and expectations of individual members are mapped within monthly meetings, direct contacts (phone, on-line) or meetings at their premises,

A systemic survey on cluster perception and expectation of its development was planned for July/August, but will be implemented due to holidays time only in September 2021.

3.6. SWOT analysis

The SWOT Analysis of Construction Cluster of Slovenia is based on overall SWOT analysis of CCS as cluster management organisation, and specific analysis in regard the nZEB topic.

SWOT Analysis of Construction Cluster of Slovenia

STRENGTHS

NETWORKING/NETWORK: Strong network of contacts and partners in EU, maintenance of contact in third countries (for example Russia, Uzbekistan, Mongolia, Mexico to support projects` follow-up collaboration in R&D, skills development, and business collaboration
INITIATIVES LEADERSHIP Person to person contact / communication – interpersonal skills, leadership at personal level, team building, trust building
LANGUAGE SKILLS: Fluent communication in English, including writing skills. Basic understanding of Russian.
EU PROJECTS -PROPOSALS, MANAGEMENT, DISSEMINATION: Experience in participating (and leading) in EU projects Project management
PROJECT MANAGEMENT: Fast, effective implementation of tasks / specific tasks and hard working under pressure, management of administrative and financial reporting, work planning, implementation

CLUSTER DEVELOPMENT: Knowledge and experience in clusters (including being trained about cluster management, strategy, etc)
CLUSTERS COOPERATION AND PARTNERSHIPS: Partner in the European Strategic Cluster Partnership for Internationalization, Investment in Smart Specialization and Excellence (ESCP4i, ESCP3S, ESCP4X)
STRATEGY THINKING, KNOWLEDGE ON STRATEGICAL CHALLENGES: Wide knowledge in numbers of areas, combination of different topics in new ones. Strategy thinking, seeing potential threads, but also opportunities in this field. Seeing, mapping of business opportunities in actions we are taken or doing and Innovativeness in ideas for novel contents – in different situations. Systemic approach to different topic, from organisational to implementation
SPECIFIC KNOWLEDGE AND EXPERIENCE: <ul style="list-style-type: none"> • energy efficiency, energy audits of buildings, • certification of quality labelling related to construction products and services, sustainable buildings assessment, integrated design, • circular economy, circular business models, circular construction • In-dept knowledge in business model design / personal brand in this area • communication and dissemination. Persistence in communication and presentation • social media use (LinkedIn, Twitter, Facebook) and website management
COMPETENCIES FOR STRATEGIC ANALYSIS, SOLUTIONS DEVELOPMENT AND BUSINESS IMPLEMENTATION: Ability to do in-dept study and learning in particular topic, for example communication and dissemination, Canvas, Social Media, Circular economy
INFUENCING POLICIES: Critical attitude for policy actors, without fear but with precautions when communicating with public actors, and other partners
SKILLS DEVELOPMENT: Knowledge and experience in training programmes preparation and execution, workshop facilitation, implementation of trainings in EU projects

WEAKNESS

LOW EMPOWERING OF CLUSTERS MEMBERS to take more proactive role in cluster growth and development, weak communication and work with members and stakeholders
LOW BUSINESS COLLABORATION SUPPORT: Low number of cluster members to assure appropriate scope of possible internal business and development cooperation. Too much focus on innovation support, leaving members to set-up business collaboration on their own.
PUBLIC PROMOTION: Weak communication with media, lack of communication strategy, especially on social media, public promotion – weak presence, not enough engagement, Ad-hoc, unstable and not sustainable communication strategy about the cluster value proposition, opportunities, few articles (Gradbenik, Finance), social media presence, attendance on different events could be more intensive. Weak cluster's brand.
PERSONAL BRAND: Weak personal brand of cluster manager
WEAK ENTREPRENEURSHIP AND MARKETING THINKING: Too little additional training on topics such as entrepreneurship, sales, marketing. Perspective of business and earning money is weak.
SYSTEMIC APPROACH: Procrastination with important decisions (not every but many times), too much studying of details of particular topic, systemic approach which takes time, focused work on particular topic, ambition to prepare things too much in perfection / completion
RETAINED LEADERSHIP: Overtake of leadership role in areas where competences are present, staying as smart observer in many prospect areas/opportunities

CONFLICT OF INTERESTS: Not implementing tasks if not according to personal/professional perception, or plan agreed
ORGANIZATION OF WORK: Weak personal organisation of work (working at home)
FINANCING – DEPENDANCE ON EU PROJECTS: Hoping to get a good EU projects – to much focus on that
UNSUSTAINABILITY OF FINANCING: Financial challenges of non-stable financing, including no steady payment of salaries. Reduced salaries due to liquidity ding problems, Undercapitalisation due to losses in past, related to not approved project proposal, loss of members, non-payment of membership fee, low fee

OPPORTUNITIES

BUSINESS DEVELOPMENT: Mapping and creating business offers for cluster members in the fields SGG is working on. Supporting B2B business and R&D collaboration, supporting commercialization and new markets developments for members
EU PROJECT LEADERSHIPS/COORDINATION: Taking the leadership / co-coordination in the proposal elaboration. Leadership/coordination of EU project proposals for a fee/ or without. Coordination of EU project proposal elaboration, knowledge of quality proposal writing, options to find missing partners
CLUSTER NETWORK: EU network of experts in EU project proposal preparation, Exploitation of network, EU ones, including the LinkedIn network. EU wide network of clusters in construction, energy, sustainability, cluster development
EU PROJECTS: Involvement in EU projects FP//H20202, COSME, ERASMUS+ Long CVs with different engagements in EU projects, different competencies
CONSULTING AND MENTORING/COACHING SERVICES: Consulting, mentoring services for cluster members and other (including abroad) in innovation management, circular economy, business model design / CANVAS, international R&D cooperation, internationalization, and digitalisation. Integrating different contents/competences in strategic advices and coaching services.
CLUSTER DEVELOPMENT SUPPORT SERVICES: Experience in cluster initiation, implementation, and when facing different challenges
INTERNATIONAL CLUSTER DEVELOPMENT SET-UP: International Circular Construction Cluster – cluster of change development, Cluster of Change Development knowledge. ECCA – ESCP4i – still active network of partners in circular construction, presence in circular construction activities
EXPLOITATION OF EU INITIATIVES MEMBERSHIP: Membership/participation in ECTP, Renovate Europe, Contact / network with some EU officials in field of clusters
EXPLOITATION OF CLUSTER POLICIES Information, knowledge on different EU policies, options for taking part in their creation as cluster, or representative of ESCP4i, or withing ECTP

THREATS

NO PUBLIC CLUSTER MANAGEMENT SUPPORT: Cluster position in innovation support policies in Slovenia, not having status of innovation subject (like Technology Park, Business Incubator) with no option to apply for yearly public financing of cluster office activities and services. Low visibility and acceptance in national innovation eco system.
RETAINED CLUSTER MEMBERS: Low level of self-actuation and activation of clusters members, low ambitions in terms of exploiting cluster strengths

LOW NUMBER OF MEMBERS: Low numbers of members, bad structure of them in terms of potential value chain collaboration, small scope of members to deliver specific services
Low perception of being part of important story
FOUNDING MEMBERS: Low number of clusters being actual owners e.g. constituent members of Economic Interest Group, e.g. of the legal entity. Weak influence on strategy and daily management of clusters, no back-up support in events of crisis
Visibility i the industry at large, none in particular fields such as infrastructure investors, contractors, produces

NZEB related SWOT

<p>NZEB RELATED STRENGTHS:</p> <ol style="list-style-type: none"> 1. A quality education system. 2. Developed business and investment environment. 3. Prefabricated construction sector developed. 4. Market for niche providers (houses made of straw, hemp concrete, other natural building materials) 5. Developed Citizens Energy Advice Network (ENSVET project; for over 25 years); https://www.ekosklad.si/population/ensvet 6. Developed system of incentives and subsidies for co-financing energy renovation (Ekosklad) https://www.ekosklad.si/population
<p>NZEB RELATED WEAKNESSES:</p> <ol style="list-style-type: none"> 1. Additional professional training at all levels is mostly sporadic rather than systematic and continuous 2. Adoption of regulations due to different conflicting interests (different lobbies) usually takes a very long time 3. Long-term coordination of key stakeholders on achieving a common understanding of concepts such as "sustainable construction" 4. A lengthy process of obtaining building permits 5. Low level of digitalization of companies 6. Businesses' lack of interest in new paradigms (circular economy,...) in times of conjuncture, and marginalization at a time of recession 7. There are approximately 19000 companies operating in the sector, of which almost most (95%) are micro-enterprises that are (mostly) perceived as competing with each other; the result is a poor level of cooperation between companies 8. Due to the pronounced price pressure, many projects (plans) are incomplete
<p>NZEB RELATED OPPORTUNITIES</p> <ol style="list-style-type: none"> 1. Energy renovation of buildings as a major business opportunity – CCS should link its activities and services with this market opportunities. Including in regard the implementation of "Long-term strategy for the promotion of energy renovation investments in buildings". 3. Complete renovation of buildings (earthquake and energy rehabilitation) – holistic, integrated approach can be promoted and needed competences developed for cluster members, and other businesses. 4. Increased use of wood in construction
<p>NZEB RELATED THREADS:</p>

1. Too much emphasis on the lowest price in tenders compared to other criteria. Deep and nZEB retrofits being promoted by CCS, are not competitive, which lead to low awareness in regard the needs of knowledge, competences and skills in this field
2. CCS is not active in supporting and developing blue- and white-collar workers. There is a low level of interest in enrolment in secondary and vocational schools in the field of civil engineering, and the recruited workers from the former Yugoslav republics and other countries (questionable competencies in NZEB)

4. Cluster strategy

4.1. Mission

Imagine what could happen if one, mostly traditional oriented sector, which is 99.9% composed of micro, small and medium-sized enterprises change the attitude to collaboration, cooperation and communication. It is about construction sector in EU.

In the EU, micro enterprises display the biggest part of the sector with 94.1%. To identify a reference point, in 2016, construction SMEs made up for 88% of total employment and 80% of total value added of the construction sector in the EU-28.

A sustainable and competitive European construction industry could bring many benefits to society and the EU economy, with more than 3 million enterprises and a total direct workforce of 18 million people, the construction sector generates about 9% of the GDP of the EU.

Many of those companies work hard in a competitive environment and usually don't have a time, resources and even knowledge for watch of new technologies and trend watching, studying new business models, seeing opportunities for internationalization, following new paradigms such as circular economy or understanding the impact of digitalization and industry 4.0 on their activities.

The mission of the Construction Cluster of Slovenia is to lead the transformation of construction sector to become innovative, competitive, and responsible in delivering circular and sustainable buildings and infrastructure, creating build environment which is energy and resource efficient, with less impact on environment, with high value for users and society, and to become attractive for employment and careers.

The cluster mission has for strategic domains of implementation:

1. Go innovative
2. Go circular
3. Go digital
4. Go international

CCS is aimed at the broad scope of companies (SMEs, entrepreneurs/start-ups, large companies, R&D organization) in the field of buildings and infrastructure value chain, especially for energy-efficient, sustainable and circular construction and renovation of buildings, materials, products, and services - but also all the other organizations (education and training, investors and finances, regional and governmental

public organizations) that are related to construction or development of the built environment: energy efficient, circular, and sustainable buildings and infrastructure, and cities.

CCS's mission will be implemented **through the cooperation, collaboration and co-learning within our innovation cluster, by providing specialized and customized business support services, developing innovative solutions and sustainable competences.**

CCS provides or channels specialized and customized business support services to members, mainly SMEs, but also to other stakeholders in the construction value chain. CCS's services support commercial cooperation and networking, R&D, transfer of technologies and innovation, training, international collaboration and internationalization. We help our members to adopt new skills, technologies, solutions, and innovate possible new business models to increase competitiveness in addressing circular economy and other challenges of actual economic development and changes.

4.2. Vision

Our vision is to become a leader in the transition to circular construction, a super cluster (according to Strategy tools definition: <https://www.strategytools.io/innovation-clusters/>) and cluster-of-change (<http://clustersofchange.eu/>), strongly positioned in European and global clusters community, innovation ecosystems, and circular transition and being attractive for venture capital and other private funding for green and circular construction development.

This will reinforce our position in Slovenia to become recognized as a leader in the transition to circular construction and construction, with highly innovative cluster members:

- capable of collaborative innovation and value chain cooperation,
- leaders or strong contributors to the implementation of the circular economy principles in the construction and construction sector while contributing to the achievement of climate and sustainable development goals in Slovenia and beyond,
- assuring social values and
- being attractive for highly competent employees.

4.3. Strategic objectives

In order to implement CCS mission and reach the target vision, the following strategic objectives have been defined:

- ⇒ **Strategic Objective 1: Improvement of cluster management excellence.**
- ⇒ **Strategic Objective 2: Lead the transition of construction to become circular, digital, and innovative**
- ⇒ **Strategic Objective 3: Develop future construction eco-system**
- ⇒ **Strategic Objective 4: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.**
- ⇒ **Strategic Objective 5: Become financially independent and have sustainable financing**

CCS has defined four strategic domains: Go innovative / Go circular / Go digital / Go international. There is number of strategic and operational objectives which are directly related to objectives of the SMART4NZEB project and NZEB field.

For example:

- the objective of facilitating strategic and sustainable partnering in the EU by designing a partnership strategy and joint collaboration activities such as creating a network of complementary partners for SMEs cooperation on international market is addressed in **Operational objective 4.1: Establishing the transnational cluster of clusters and other interested stakeholders, International Circular Construction Cluster, ICC**
- the objective of development and Implementation of a Communication & Dissemination Campaign for promotion and exploitation of clustering is address in **Operational objective 1.4: Increasing the recognition of the cluster**

4.4. Operational objectives

Construction cluster of Slovenia is highly dynamic organization in terms of membership, interests and needs of cluster members, their ambitions and readiness for co-financing particular projects and activities.

The second challenge to be addressed is cluster organization`s financing. Not being supported in any larger scheme of public financing (there is no cluster support scheme in Slovenia), the operative objectives, and action plan have to consider this particular situation and aim to assure financial sustainability along the strategic objectives planning and implementation.

The operational objectives are accompanied with some working objectives or tasks to explain what is considers under particular objective.

⇒ **Strategic Objective 1: Improvement of cluster management excellence.**

- **Operational objective 1.1: Increasing the level of skills and competencies about cluster management and development, and implementation of the best management practice and systems for cluster development.**
 - Attending the relevant trainings for both cluster managers (Vladimir Gumilar, Andro Goblon) such as Cluster4smart training, Global cluster development program
 - Demonstration of acquired knowledge within the cluster management, and other actions implementation.
- **Operational objective 1.2: Improving of other soft skills and competencies, relevant for cluster management, communication, entrepreneurship, marketing, use of social media, storytelling, sales, strategic thinking, and new economy models**
 - List of potential trainings available from third parties, to upgrade our personal knowledge about the topics
 - Preparing the personal yearly learning plan for cluster managers
 - Implementation of training and demonstration of acquired knowledge
- **Operational objective 1.3: Improving communication and work with members and stakeholders**

- Establishing active participation in the cluster, planning strategies and joint activities,
 - Building mutual trust, finding synergies and competences,
 - Networking and channelling of services of R&D organizations, ensuring the dynamics of cooperation with private and public organizations in research and development, education and public organizations):
 - Preparing communication goal
 - Preparing the instructions for communication routine
 - Preparing the quarterly communication plan
- Operational objective 1.4: **Increasing the recognition of the cluster.**

Due to lack of cluster support policies in Slovenia for more than 10 years, there is no or weak perception or knowledge on cluster among different industry and other stakeholders. This objective aims to raise the awareness on clusters, their role in innovation and competitiveness policies, impact and benefits for members, and means of getting engaged in clusters.

In Slovenia, CCS is not recognized in order to exploit its international recognition and cluster's competences. The objective of tasks related to this operational objective is to become a recognized subject of eco-innovation systems, within the building and construction sector, a within public actors and policy makers. Finally, to become listed as a subject of innovation eco-system, eligible to apply for public funding schemes.

The objective is to develop and implement a Communication & Dissemination Campaign for promotion and exploitation of clustering, including exploitation of current and future memberships and activities of CCS such as:

- European Construction Technology Platform and of the
- E2B association (Energy Efficient Buildings),
- founder of ECCA (European Circular Construction Alliance) and
- national supporting member of the Renovate Europe campaign,
- listed on European Cluster Collaboration Portal and
- partner in three European strategic cluster partnerships:
- for internationalization
- for investments in smart specialization
- for cluster excellence and
- partner in more than 20 EU R&D or technology transfer or skills development projects.

⇒ **Strategic Objective 2: Lead the transition of construction to become circular, digital, and innovative**

- Operational objective 2.1: **Involvement in key EU strategic initiatives and project setting the direction of construction sector development and transition**

In order to lead the transformation of construction sector to become innovative, competitive, and responsible in delivering circular and sustainable buildings and infrastructure, CCS need to be actively involved in different European initiatives where the overall directions of sector development are being defined and driven. This is a pool of knowledge how and why these challenges are important, and of approaches and strategies to be followed.

- Operational objective 2.2: **Development and delivery of integral services for the cluster members and cluster participants**

CCS provides or channels specialized and customized business support services to members, mainly SMEs, but also to other stakeholders in the construction value chain. CCS's services support commercial cooperation and networking, R&D, transfer of technologies and innovation, training, international collaboration and internationalization. We help our members innovate possible new business models to adopt new skills, technologies, and paradigms such as the circular economy. These services can be divided to four strategic domains:

1. Go innovative
2. Go circular
3. Go digital
4. Go international

Integral services for the cluster members and cluster participants are systemic services and use of different tools and approaches customised for particular member or group of members and cluster participants. Integral services combine different services such as awareness rising, training, coaching, strategic planning, value chain collaboration, international collaboration and internationalization. This is customised combination of services like:

- Technological trends, policies and other external influences,
- Training and transfer of knowledge, development of innovation and other competencies
- Helping in the transition to a circular economy in the sector, including training and coaching
- Workshops for the introduction of modern business practices, business model design and innovation, customer recognition,
- Training in the areas of innovation management, circular economy, the development of business models, and the use of business modelling tools for various business processes.
- Effective information and promotion on social networks LinkedIn, Facebook, Twitter.

Services will be also offered to other cluster organizations, and to other organization, such as members of International Circular Construction Cluster. The objective is to develop at least one

service quarterly. Basic services (awareness rising) will be free in the frame of the membership fee (checking and reinventing the services regularly, for example quarterly), but the majority will be paid services as an important source of cluster financing.

- Operational objective 2.3: **Lead strategic initiatives and projects**

A number of challenges outlined within the cluster dynamic, cooperation, co-work in projects, implementation of services – are to be addressed by jointly initiated and planned strategic initiatives and/or projects. These can be financed/co-financed by public or private sources.

⇒ **Strategic Objective 3: Develop future construction eco-system**

Transition towards future construction, higher competitiveness, resilience to current and future global challenges, needs upgrade and new skills development, of construction actor, and of other actors/stakeholders in the building and infrastructure value chain.

We need to map the needs for strategic, managerial, technical, and other skills and competences development to of innovation level, marketing and sales skills of cluster members, e.g. potential trainings, consultation, coaching to be provided by cluster organization or available from third parties. This includes also soft skills and competencies, relevant for management, communication, entrepreneurship, marketing, use of social media, storytelling and sales.

- Operational objective 3.1: **Strategic partnerships in Slovenia and abroad**

This operational objective addresses the potential of partnering with other stakeholders or stakeholders` organization in Slovenia such as DIH Slovenia Association, Secondary and high schools, Vocational training centres, universities, other clusters. A short term goal is also to initiate the set -up of the Slovenian Clusters Association, and connect it with European Clusters Alliance.



<https://clustersalliance.eu/>

- Operational objective 3.2: **Skills and competences center**

The trainings consultation, coaching provided by cluster are in the fields of:

- new and renewed technologies of the sustainable building and in construction,

- energy efficiency and renewables in building and districts,
- water efficiency, green skills,
- resource efficiency, green, circular construction and economy,
- new business and financial models in building and construction.
- and, in general, also on protection of the environment and heritage preservation.

- **Operational objective 3.3: Circular construction living lab**

The transition to circular constructions needs engagement and involvement of different stakeholders, from industry, but also public organizations, end-users and their representatives, NGOs working in the environmental domain. The circular construction living lab is conceived as a dynamic organisation and co-work, co-development of these stakeholders, based on assuring mutual benefits and synergies.

- **Operational objective 3.4: New business acceleration lab**

New types and business models of value chain collaboration, collaborative business, start-ups and spin-off from different activities of cluster need breeding environment where different services, tools, demonstration capabilities are available. This part of CCS eco systems aims to support the transition from lab and demonstration stage to industrialization and actual business implementation.

⇒ **Strategic Objective 4: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.**

CCS has strong network of contacts and partners in EU and in third countries (for example Russia, Uzbekistan, Mongolia, Mexico, Serbia).

- **Operational objective 4.1: Establishing the transnational cluster of clusters and other interested stakeholders, International Circular Construction Cluster, ICCC** (with recent initiative, e.g. International Circular Construction Cluster (ICCC), is about changing the construction value chains towards circularity on global scope, sharing knowledge and best practices).

⇒ **Strategic Objective 5: Become financially independent and have sustainable financing**

○ Operational objective 5.1: **Set-up advanced finance planning**

To assure sustainable financing, a new advanced finance planning needs to be set-up. This means also new skills of cluster managers, in addition to sales and marketing skills.

○ Operational objective 5.2: **Increasing the number of new members, including start-ups /entrepreneurs, and private investors (VCs) to support commercialization of research results, and support start-ups**

For being financially independent and having enough funding for staff costs (2 employees), services from others, training and other costs, at current membership costs for SMEs, we need 100 members. With additional employees in the cluster, which are needed in the near future, we need at least 25 new members for each new employee.

○ Operational objective 5.3: **Improving the skills and competencies about proposal writing, and collaboration in proposals preparation to win at least one EU project proposal per financing year.**

- Active participation in preparation of H2020 and COSME project proposals
- Feedback analysis of rejected project proposals evaluations from the last 5 years (document)
- Special training for writing proposals
- Initiation of bottom-up project proposal coordinated by CCS
- Active participation in preparation of H2020, COSME, ERASMUS and LIFE project proposals / maintenance of network of partners interested for proposals
- Active participation in preparation of H2020, COSME, ERASMUS and LIFE project proposals / maintenance of network of partners interested for proposals

○ Operational objective 5.4: **Assure a sustainable sources of private funding**

- Reduce the share of public financing and increase the share of private financing, including the revenues increases, to cover losses in past and reserves for the future
- Develop a strategy to attract private funding for cluster development
- Identify potential private funding options, including new (paid) services for cluster members and others.

4.5. Key Performance Indicators

Table 2 Key Performance Indicators (KPIs) of the strategy implementation

⇒ **Strategic Objective 1: Improvement of cluster management excellence.**

No	Objective	KPI	Baseline		Target	
			Value	Year	Value	Year
1.1	increasing the level of skills and competencies about cluster management and development,	Training certificates	3	2020	6	2020
		<i>Cluster4smart training program</i>	1		2	
		<i>Global cluster development program</i>	1		2	
		<i>Clusters of change bootcamp training</i>	1		2	
		Cluster Excellence Label, according to European Secretariat for Cluster Analysis (ESCA) https://www.cluster-analysis.org/	none	2020	Bronze	2021
					Silver	2025
					Gold	2030
1.2	Improving of other soft skills and competencies, relevant for cluster management, communication, entrepreneurship, marketing, use of social media, storytelling, sales, strategic thinking, new economy models	List of potential trainings available from third parties (updated monthly)	1	2020	1	2020
		Personal yearly learning plan for cluster managers	2	2020	2	2021
		Training certificates obtained.	2	2020	6	2020
		Trainings provided for cluster members and cluster participants	2	2020	6	2021
1.3	Improving communication and work with members	List of cluster members, their specifics, interest and needs, email addresses, social media profiles, etc (document; updated monthly)	1	2020	1	2020
		Instructions for communication routine (document; updated quarterly)	1	2020	1	2020

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		Number of regular web meetings (monthly)	6	2020	12	2021
		Number of personal physical meetings with cluster members (If not possible to meet personally, meeting could be via web, Skype for example)	At least one per three months	2020	At least one per three months	2021
		Number of regular physical meetings (quarterly) for cluster members	1	2020	4	2021
		Number of reports about the cluster work (pdf document; monthly)	12	2020	12	2021
		Number of e-newsletters prepared for subscribers (monthly)	12	2020	12	2020
		Number of regular updates of the CCS website (at least monthly)	12	2020	12	2020
1.4	Increasing the recognition of the cluster	No. of policy makers/public servants with positive attitude and contributions to cluster support	none	2020	6	2021
1.4		No. of request for information on options to join cluster	10	2020	50	2021
1.4		No. of articles in professional magazines and media	2	2020	20	2021
		Social media presence – increase of ...				
1.4		Achieved status, to be eligible for apply for national public support in subject of innovation ecosystem	none	2020	Status achieved	2022

⇒ **Strategic Objective 2: Lead the transition of construction to become circular, digital, and innovative**

No	Objective	KPI	Baseline		Target	
			Value	Year	Value	Year
2.1	Involvement in key EU strategic initiatives and project setting the direction of construction sector development and transition	No. of documents gathers in data base	20	2020	50	2021
		No. of EU initiatives/policy related actions/initiatives	3	2020	6	2021
		No. of EU project proposals involvement	2	2020	6	2021
		Technology and trends watch (twice a year; in March and October and updated regularly when new information occurred)	1	2020	2 2 2	2021 2022 2023
2.2	Development of advanced and integral services for the cluster members aimed at boosting their competitiveness on national and European level	No. of integral strategic consultation/coaching services developed per year	none	2020	2	2021
		Updates of the list of services (document; updated regularly)	1	2020	4	2020
		No. of integral strategic consultation/coaching services provided by cluster organization ¹	none	2020	4	2021
					6	2022
2.3	Lead strategic initiative and projects in Slovenia and beyond	No. of lead strategic initiatives and projects	none	2020	2	2021

¹ Consulting/coaching for particular members/group of members which includes systemic, multi stage process

⇒ **Strategic Objective 3: Develop future construction eco-system**

No	Objective	KPI	Baseline		Target	
			Value	Year	Value	Year
3.1	Strategic partnerships in Slovenia and abroad	No. of partnership agreements in Slovenia and abroad	3*	2020	8	2021
3.2	Skills and competences center	No. of in-dept trainings / competence development fields/topics	2	2020	8	2021
3.2	Preparing cluster members` yearly skills and competences development plan	Personal plan per cluster mem	0	2020	1	2022
3.3	Circular construction living lab	Term of reference prepared			1	2021
		No. of meetings implemented			3	2021
3.4	New business acceleration lab	Term of reference prepared			1	2021
		No. of meetings implemented			3	2021
		No. of start-ups supported			5	2022

*Zeleno omrežje/Slovenia, Faculty of design/Slovenia, Kazan technical university/Russian Federation

⇒ **Strategic Objective 4: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.**

No	Objective	KPI	Baseline		Target	
			Value	Year	Value	Year
4.1	Establishing the transnational cluster of clusters and other interested stakeholders in the International Circular Construction Cluster, ICC	Number of members (clusters, other)	5 (interested partners in incubation)	2020	40	2021
		No. of key activities	planning	2020	3	2021
		Scope of private financing assured for ICC development	planning	2020	40%	2022

⇒ **Strategic Objective 5: Become financially independent and have sustainable financing**

No	Objective	KPI	Baseline		Target	
			Value	Year	Value	Year
5.1	Set-up advanced finance planning	Updates of yearly financial plan (document identifying revenues and costs; updated monthly, including the coverage of past losses**)	1	2020	12	2020
5.2	Developing the awareness campaign to attract new members and run the campaign periodically	No. of multi-channel campaigns	1	2020	4 4 4	2021 2022 2023
	Increasing the number of new members, including start-ups /entrepreneurs, and private investors (VCs) to support commercialization of research results, and support start-ups	No. of members / active, with membership fee	10	2020	50 75 100	2021 2022 2023
		No. of start-ups /entrepreneurs	1	2020	2	2021
		Private investors/financing organisation	0	2020	2	2021
5.3	Improving the skills and competencies about proposal writing, and collaboration in proposals preparation to win at least one EU project proposal per financing year.	No. of EU (H2020/Horizon Europe, Erasmus, LIFE...) project proposals to be involved in	1	2020	3	2021
		No. of EU (H2020/Horizon Europe, COSME, Erasmus, LIFE...) projects approved	1	2020	3	2021
		Feedback analysis of rejected project proposals evaluations from the last 5 years (document updated regularly)	1	2020	4	2021
		Special training for writing proposals (number of attendees from CCS)	1	2020	2	2020
5.4	Assure a sustainable source of private funding	% of yearly budget financed by public funding ²	95%	2020	60% 40% 30%	2021 2022 2023
		Membership fee (increased no. of members	2,5% ³	2020	20% 25% 30%	2021 2022 2023

² EU based financing of EU projects and activities implementation

³ Membership fee, remunerations on inclusion to EU projects only

		Service fee	2,5%	2020	20% 25% 20%	2021 2022 2023
		Private investments	none	2020	10% 20%	2022 2023

** A revenue increases are planned to cover past losses and a planned reserve for future years.

5. Action plan

5.1. Aim of the action plan

The aim of the action plan is to support implementation of the cluster's strategy and provide operational guidelines for the cluster managers for reaching strategic and operational objectives.

5.2. Actions

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

Table 3 Activities overview

#	Action	Related operational objectives	Dimension <i>National / International</i>	Implementation timeline															
				2020		2021				2022				2023					
				Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
	Strategic Objective 1: Improvement of cluster management excellence																		
	1.1: Increasing the level of skills and competencies about cluster management and development, and implementation of the best management practice and systems for cluster development																		
	Attending the relevant trainings for both cluster managers (Vladimir Gumilar, Andro Goblon): Cluster4smart training & Global cluster development program	1.1	Nat.																
	Attending the relevant trainings for both cluster managers (Vladimir Gumilar, Andro Goblon): Cluster4smart training & Global cluster development program	1.1	Nat.																
	Implementation of the best management practice and systems for cluster development / Bronze label of cluster excellence	1.1	Nat.																
	Advanced cluster management training (such as Clusters of change bootcamp training)	1.1	InterNat.																
	*Implementation of training and demonstration of acquired knowledge	1.1	Nat.																
	Planning for the Silver/Gold label assessment	1.1	Nat.																
	Silver label self-assessment	1.1	InterNat.																
	Planning for the Silver/Gold label assessment	1.1	Nat.																
	1.2: Improving of other soft skills and competencies, relevant for cluster management,																		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	communication, entrepreneurship, marketing, use of social media, storytelling, sales, strategic thinking, new economy models																
	List of potential trainings available from third parties, to upgrade our personal knowledge about the topics	1.2	Nat.														
	Preparing the personal yearly learning plan for cluster managers	1.2	Nat.														
	*Implementation of training and demonstration of acquired knowledge	1.2	Nat.														
	1.3: Improving communication and work with members and stakeholders			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	Mapping the cluster members, their specifics, interest and needs, email addresses, social media profiles, etc (document; updated monthly)	1.3	Nat.														
	Preparing communication goals plan with members, including web meetings, regular physical meetings, visits of cluster members, e-newsletters, reports on work done, and website updates	1.3	Nat.														
	1.4: Increasing the recognition of the cluster			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	Planning and implementation of promotional campaign in Slovenia, targeting different segments of stakeholders: policy makers and public servants in Slovenia, potential cluster members from Slovenia (construction sector), other related sectors	1.4	Nat.														
	Planning continuous communication and promotional plan (social media, cluster managers personal branding, communication with media, professional magazines (Gradbenik, ...))	1.4	Nat.														
	*Continuous communication and promotional plan implementation	1.4	Nat.														
	Acquiring the status of innovation subject	1.4	Nat.														

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

Strategic Objective 2: Lead the transition of construction to become circular, digital, and innovative																
2.1: Involvement in key EU strategic initiatives and project setting the direction of construction sector development and transition			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
*Technology and trends watch (twice a year; in March and October and updated regularly when new information occurred), including review of key policy documents, EU/other joint initiatives, including relevant programmes and calls for project proposal	2.1	InterNat.														
Planning of engagement and more active role in initiatives, such as Renovate Europe, ECTP and ECCP, and in relevant EU project proposals (Green Deal call...)	2.1	InterNat.														
2.2: Development and delivery of integral services for the cluster members and cluster participants			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Strategic consultation/coaching services preparation / update	2.2															
Promotional campaign for integral services	2.2															
First service contract realization	2.2															
2.3: Lead strategic initiatives and projects			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Initiation and planning of first lead strategic initiative of cluster for cluster members, mapping the needs for strategic, joint initiatives and projects	2.3															
Set-up management boards for initiatives planning and acquisition of funding, implementation of first lead strategic initiative of cluster for cluster members	2.3															
Yearly plan of strategic initiatives, activities and projects for cluster members	2.3															

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

5.1: Set-up advanced finance planning			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Review current finance planning, cost monitoring, and revenues planning	5.2			■	■											
Set-up advance finance planning – continuous costs and revenues monitoring and planning	5.2				■											
Continuous costs and revenues monitoring and planning	5.2				■	■	■	■	■	■	■	■	■	■	■	■
Set-up software platform for project and activities planning, including cost monitoring and reporting in EU projects	5.2					■										
5.2: Increasing the number of new members, including start-ups /entrepreneurs, and private investors (VCs) to support commercialization of research results, and support start-ups			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Mapping study of start-ups and private investors							■	■								
Matchmaking event / investors day / project idea pitching / presenting support services of cluster									■							
Cluster enlargement with new members										■	■					
5.3 Improving the skills and competencies about proposal writing, and collaboration in proposals preparation to win at least one EU project proposal per financing year			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Active participation in preparation of H2020 and COSME project proposals				■	■											
Feedback analysis of rejected project proposals evaluations from the last 5 years (document)							■									
Special training for writing proposals							■									
Initiation of bottom-up project proposal coordinated by CCS								■								
Active participation in preparation of H2020, COSME, ERASMUS and LIFE project proposals / maintenance of network of partners interested for proposals			■	■	■	■	■	■	■	■	■	■	■	■	■	■

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

5.4: Assure a sustainable source of private funding			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Q4-20	Identify potential private funding options, including new (paid) services for cluster members and others	5.4														
Q1-21	Develop a strategy to increase private funding for cluster development focusing of paid services	5.4														
Q2-21	Implement and monitor increase private funding for cluster development focusing of paid services	5.4														
Q1-22	In-house private investment and venture capital fund planning	5.4														

5.3. Resources

Table 4 Overview of resources necessary for the action plan implementation

#	Name	Description	Type <i>Human / Financial / Technical / other</i>	Availability <i>yes / partially/ no</i>
1.	Professional cluster coordinator	A person who will be responsible for the cluster coordination, the action plan implementation and monitoring, with enough available time allocated to these activities	Cluster manager, Vladimir Gumilar, close to full time engagement needed	Partially, as involvement in EU projects and their preparation overtakes the majority of time
2.	Project manager, member of the board	A person, responsible for coordination of different joint/internal project and activities withing implementation of action plan	Project manager, half time needed	Partially as engaged in different running EU projects
3.	Marketing/communication manager	A person, responsible for communication, promotion, marketing, training coordination	Full time person	No
4.		Software platform for project and activities planning, including cost monitoring and reporting in EU projects	Technical	No
5.		Studio equipment for webinar/webconferences	Technical	No

5.4. Procedure of monitoring and implementation plan progress assessment

Monitoring is an essential part of action plan implementation. If it is held regularly, it allows for a real-time control of completing the planned tasks and implementing corrective actions, if tasks are not bringing the estimated results. The action plan implementation is foreseen for 3 years and should be monitored on semi-annual basis. During the action plan completion monitoring, the effects of activities taken so far should be assessed and, unless they are satisfactory, the strategic goals, priorities and measures should be updated.

The action plan completion and its monitoring is recommended to be based on the tool called the Deming cycle: Plan-Do-Check-Act (Figure 2), as described, for an instance, in PN-EN ISO 50001.

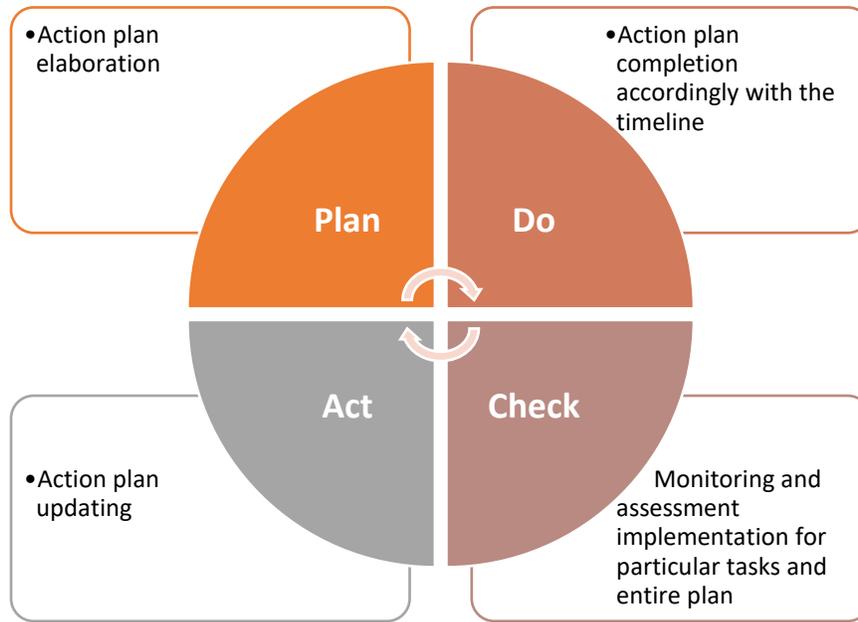


Figure 2 Action plan completion and implementation monitoring procedure based on the Deming cycle

The „Plan” part consists of development of an action plan and is being completed during the preparation of this document. The „Do” stage concerns the implementation of the particular activities and the whole plan, i.e. completion of the planned tasks. The „Check” stage, which means the action plan completion monitoring, should concern simultaneously each task separately (checking if the tasks are completed accordingly with the schedule and if the indicators have been achieved) as well as the overall plan (to what extent the plan goals have been achieved). Meanwhile, the „Act” part concerns the action plan updates and the corrective action implementation which allows to reach the previous indicators if it turns out on the previous stage that they are doubtful, or widening the plan with the new tasks and setting new indicators if the ones planned previously turn out to be completed.

IV. Development and Innovation Strategy of the Polish Construction Cluster (PCC)

DEVELOPMENT AND INNOVATION STRATEGY POLISH CONSTRUCTION CLUSTER



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Reviewers	PRO-NZEB, SGG, RIC Pro-Akademia, Dundjer
Abstract	This document presents the development and innovation strategy of the Polish Construction Cluster. Section 1 presents the context of the document, which was developed within the SMART4NZEB project framework. Section 2 describes the global environment of the cluster – relevant policy instruments, as well as market and technological trends. Section 3 presents the cluster – its history, coordinator, members, and current position. Section 4 presents the cluster strategy, setting strategic and operational objectives, alongside the cluster mission and vision. Finally, section 5 consists of the action plan, which supports the implementation of the strategy.
Keywords	Strategy development, guidelines

History of Changes

Version	Author(s)	Date	Summary of Changes
0.0	Adam Krajewski	9 May 2020	First draft of table of content
0.1	KRAJEWSKA Ewa	25 May 2020	Comments and suggestion added
0.2	Katarzyna KORCZAK	27 May 2020	Improvement according to Ewa's suggestions
0.3	Katarzyna KORCZAK	28 May 2020	"Action plan" section (table of contents) has been added
1.0	Adam KRAJEWSKI	30 November 2021	Strategy completed

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1. Introduction

1.1. SMART4NZEB project

The aim of the SMART4NZEB project is to boost competitiveness and support the scaling-up of 577 SMEs active in construction, energy efficiency and renewable energy sectors through strengthening capacity-building of 5 representative clusters as drivers of innovation in Central and Eastern Europe (Poland, Romania, Serbia and Slovenia) and facilitating trans-national exchanges and strategic partnerships with a focus on sharing experience between different practices, skills gaps, policies, target goals and level of engagement related to nearly Zero Energy Buildings (nZEB).

The main objective of SMART4NZEB is to create a sustainable collaboration, co-learning and capacity building between the involved partners - cluster managers and cluster members and relevant stakeholders representative for the nZEB market in the selected Central and East-European countries, with a view to develop the involved clusters management excellence and to support interregional partnerships to facilitate the development of competitive products and technological solutions intended for new and existing buildings, which will lead to market penetration of nearly zero energy buildings, related to their production, use and reuse. The objective is to drive clusters towards innovative and modern clusters being able to address cross-sectoral and cross border challenges.

1.2. WP4

This document is developed within *WP4 Clusters’ development and innovation strategies*. The main objective of this WP is to create transnational collaboration-based clusters’ development strategies to boost competitiveness and support the scaling-up of SMEs active in construction, energy efficiency and renewable sectors through improved and tailored services offered by the clusters based on the specific needs of the involved SMEs. As a supplementary document, action plans for the participating clusters will be also developed, to ensure that the collaboration strategies in the field of nZEB are operational, functional and allow for progress monitoring. WP4 utilizes results of other technical workpackages (Figure 1). In particular, it uses results of the SWOT analysis from WP2, survey conducted among clusters members in WP3, and feedback from ClusterXchange study visits participants.

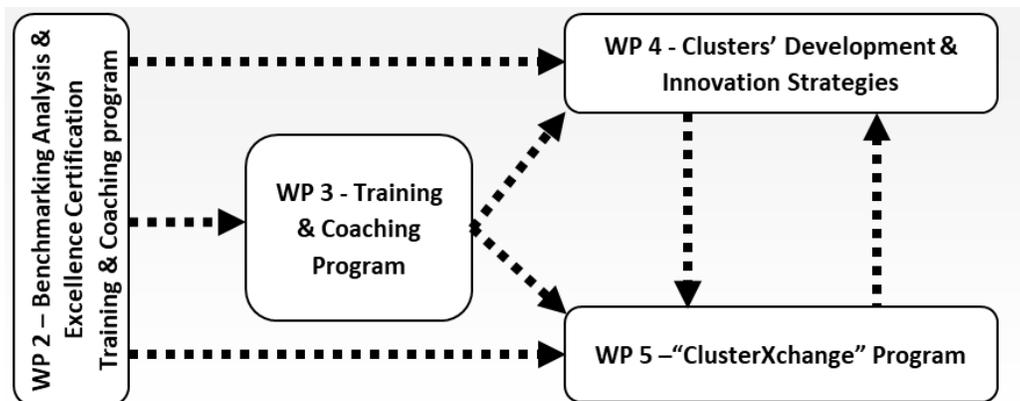


Figure 1 Workflow of SMART4NZEB project

1.3. Aim of the document

The aim of this document is to provide the Development and innovation strategy for Polish Construction Cluster. The Strategy should be a comprehensive guidance for helping local stakeholders in regional development of nZEB through active engagement, cross-sectoral and transnational collaboration of clusters' members.

2. Global environment of the cluster

2.1. National context and policy framework

The EU's seven-year budget for 2014-2020 sets out the financial outlays for all the activities of the European Union during 98 months. European Commission budget policy (actual funds to be spent on the basis of incoming invoices and other contracts) in the amount of 988 billion EUR. The economic situation in Poland will be strongly dependent on the tool quality of the EU. In the completed perspective, the EU, our country was a net port (it acquired 65 billion euros net more from Brussels than it had paid into it).

Poland is the biggest beneficiary of EU aid. In the years 2014-2020, the European Union allocated EUR 106 billion for our country (in constant prices from 2011), i.e. 4 billion more than in the period 2007-2013. 72.9 billion EUR is spent on money under the cohesion policy, 18.7 billion EUR is direct subsidies, and EUR 9.8 billion is intended for economic development.

Perspective for 2014-2020 will be implemented in Poland 6 national programs managed by the Ministry of Infrastructure and Development and 16 regional programs managed by Marshal's Offices.

The largest amount of funds was allocated to the Infrastructure and Environment Program with main priorities including environmental protection, low-emission economy, energy protection. The second largest funds, apart from funds for Regional programs, is the Intelligent Development Program – new program focusing on innovations.

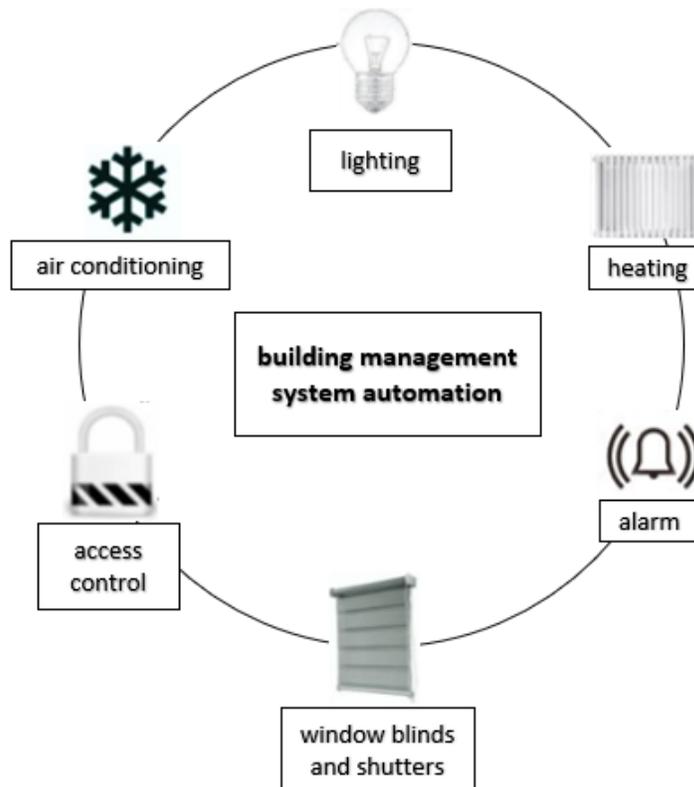
The policy implemented by the European Union largely focuses on the development of local structures of business environment institutions and associations, thanks to which a significant part of funds will be distributed through clusters, which will allow for faster development and promotion of cooperation. With regard to the development of the clusters themselves, the EU policy identifies the following areas: improving the quality of cluster management and improving management processes in cluster organizations, developing managers' competences; internationalization of cooperation between clusters in Europe and beyond; developing intersectoral cooperation and creating new industries; involving groups in the processes of identifying and implementing smart specializations; better use of clusters for the development of SMEs.

2.2. Technology development trends in the construction industry

Currently, several trends in the development of technology in construction can be identified, including among others automation and intelligent construction, the use of Industry 4.0 solutions and technologies related to obtaining energy from renewable sources. The indicated trends directly fit into the initiatives to improve building parameters in terms of lower energy consumption, whether through self-sufficiency, design taking into account the minimization of energy consumption, but also enabling the facility to intelligently respond to changing weather and weather conditions.

Automation in construction

The idea of building automation was born in the 1970s in the USA. It was then that systems were created that began to interfere with individual installations in the building (BMS - Building Management System). Currently, there are many solutions on the market that are offered under the common name of building automation, while buildings equipped with such automation are called "intelligent buildings". The use of some of these solutions allows you to increase the efficiency of the building and save energy.



An important field of automation for the construction industry is the automation of window covers and windows - among others thanks to them, we can create bioclimatic facades. Facades with bioclimatic properties react to changes in the weather conditions outside the building, allowing for energy-saving lighting of the room or improving the natural ventilation of the rooms. The used element of automation for the construction industry are fully automatic sun screens, which allow for rational use of light and at the same time avoiding excessive sunlight. Modern sun visor control systems have a sun tracking function, thanks to which the louvers of the louvres adjust automatically to the position adapted to the angle of the sun's rays.

Automatic opening and closing of windows allows, in turn, to reduce air conditioning costs. Bioclimatic facades enable natural ventilation of rooms and cooling the building at night, when the users are absent. Such a system also makes it possible to increase the comfort of people using the building thanks to the constant exchange of used air and pollutants. Automatic opening and closing of windows is possible

thanks to time programmers and weather sensors which react to the degree of sunlight and temperature outside the building.

HVAC systems are the major energy consumers in buildings. Operation and control of HVAC systems have significant impacts on the energy or cost efficiency of buildings besides their designs. Buildings nowadays are mostly equipped with comprehensive building automation systems (BASs) and building energy management control systems (EMCSs) that allow the possibility of enhancing and optimizing the operation and control of HVAC systems. Supervisory and optimal control, which addresses the energy or cost-efficient control of HVAC systems while providing the desired indoor comfort and healthy environment under the dynamic working conditions, is attracting more attention of the building professionals and the society and provides incentives to make more efforts in developing more extensive and robust control methods for HVAC systems.

2.3. Market trends in the construction industry

Representatives of the construction industry, when asked about the greatest trends, first of all pointed to remotely controlled automatic buildings using appropriate applications (82%). Not much less, 77% companies believe that modern buildings will use solutions based on the so-called green infrastructure (green terraces, roofs, facades), and 72% claims that they will take into account the needs of employees' families and local communities. In turn, the idea of fully autonomous buildings in terms of energy demand was encountered by 52% of the companies that were surveyed. The least frequent among the respondents turned out to be the trend of facades blending into cities (18%).

Technologies that, according to the surveyed entities operating in the construction industry, have a chance to become popular, are primarily solutions increasing the energy efficiency of buildings (93%) as well as renewable energy sources and intelligent systems in construction (both 89% of responses). It is also worth noting that among the phenomena observed in the construction industry, rainwater recovery (81%), prefabricated products (77%), passive houses (74%) and new building materials (68%) also have great potential.

In Poland, the above-mentioned sustainable construction solutions are basically a standard in new office buildings, industrial, commercial, hotel and residential buildings. The Polish Green Building Association informs that over 500 buildings have already obtained green certificates, such as BREEM, LEED or WELL. As many as half of them are located in Masovia, 55 in Małopolska, and 48 in Lower Silesia.

3. Cluster overview

3.1. History of the cluster

Polish Construction Cluster (originally Eastern Construction Cluster, status changed in 2018) began operating in 2011 integrating 30 business entities. In 2012, an organization development strategy was adopted which defined the mission, vision and strategic goals of the cluster initiative. In the first quarter of 2015, the cluster structure expanded to over 60 entities. Implementation of the priorities of the main strategic document Europe 2020, among others in the shape of the 2014-2020 programming period, has identified new challenges for countries, enterprises and citizens of Poland and the European Union. Systematic support for institutions and entrepreneurs operating in the field of construction services by creating a stable cooperation framework, building an innovative network of connections based on the

transfer of knowledge, technology and innovative solutions between members of the Cluster, business environment institutions, research units and scientific institutions as well as local governments, resulted in the creation of the Cluster, which after just 4 years of activity, in September 2015, has been granted by Ministry of Economy the status of a Key National Cluster – a distinction given at that time only to 16 clusters in the country.

3.2. Cluster coordinator

Polish Advisory & Consulting Association (Polskie Stowarzyszenie Doradcze i Konsultingowe - PSDiK) from the beginning of its existence has been working for economic development through the services provided and initiatives undertaken for this purpose. The association brings together representatives of advisory, consulting and financial companies. PSDiK also provides services in the area of obtaining European funds, as well as offers knowledge and the necessary experience in running and implementing projects co-financed by the EU. The Association provides comprehensive support for Clusters in the field of strengthening potential of Clusters and their members and thus increasing the quality and of their activities.

3.3. Cluster activity and technology background

Table 1 Cluster members as of November 2021

#	Name	Type	Field of activity	Website
1	"AQUATECH" SPÓŁKA AKCYJNA zmiana nazwy spółki na AQT Water S.A.	SME	sewage treatment	http://aqtech.com.pl/
2	"GALMET SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ" SPÓŁKA KOMANDYTOWA	Big enterprise	heating systems	https://galmet.com.pl/
3	"PARK NAUKOWO-TECHNOLOGICZNY POLSKA-WSCHÓD W SUWAŁKACH SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ"	Research & education	science, technology	
4	"PREFABET - OSŁAWA DĄBROWA" SPÓŁKA AKCYJNA	SME	concrete production	https://prefabet.com.pl/
5	"SONAROL" SPÓŁKA JAWNA NAJDA	Big enterprise	woodwork	https://sonarol.pl/
6	ELEKTROMONTAŻ WSCHÓD SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	power installations	http://elektromontazwschod.pl/
7	FOGO SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	power installations	https://www.fogo.pl/
8	GRANIT-COLOR SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	granite products	https://www.granit-color.com.pl/
9	KAMIR PHU SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	Building Materials	https://kamirphu.pl/
10	PROSPERPLAST 1 SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	products from PVC	
11	PRZEDSIĘBIORSTWO BUDOWLANO - USŁUGOWE "BIRKBU D" ANDRZEJ BIRUK I WSPÓLNICY SPÓŁKA JAWNA	SME	general contracting	https://www.birkbud.pl
12	PRZEDSIĘBIORSTWO PRODUKCYJNO - HANDLOWE "SILIKATY - BIAŁYSTOK" SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	Building Materials	https://silikaty.com.pl/
13	PRZEDSIĘBIORSTWO PRODUKCYJNO-HANDLOWE "MELIOREX" SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	earthworks and drainage works	http://meliorex.pl/
14	TOP SPÓŁKA AKCYJNA	SME	information technology	https://topsa.com.pl/
15	ZAKŁAD POLIGRAFICZNY POL - MAK PRZEMYSŁAW MAKOWIAK, DANUTA MAKOWIAK SPÓŁKA JAWNA	SME	interior fittings	https://pol-mak.com.pl/
16	ZFO SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	woodwork	http://zfo.org.pl/

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17	BUDMAX TĘPIŃSKI I WSPÓLNICY SPÓŁKA JAWNA	SME	concrete production	http://budmaxbeton.pl/
18	"AQUER" MACIEJ DYBA, JAROSŁAW KRAM SPÓŁKA JAWNA	SME	water and sewage installations	http://aquer.pl
19	"DESTYLACJE POLSKIE" SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	construction chemicals	http://www.destylacjepolskie.com.pl/pl
20	"DUBIŃSKI" RADOŚLAW DUBIŃSKI	SME	woodwork	https://dubinski.com.pl/
21	"FADBET" Spółka akcyjna	SME	Building Materials	https://www.fadbet.pl/
22	"GOM" Sp. J. M. Obuchowicz, G. Obuchowicz	SME	Building Materials	https://hurtowniagom.pl
23	"KOMA SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ SPÓŁKA KOMANDYTOWA"	SME	waste disposal	koma.net.pl
24	"MSG GRANIT" Swatkowscy Sp.J.	SME	granite products	http://www.msg-granit.pl/
25	"ROGOWSKI DEVELOPMENT" SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	development activity	http://www.rogowskidevelopment.pl/
26	"SPUTNIK" TOMASZ PASTWA	SME	woodwork	
27	"TIS" SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	heating systems	http://tis.tuchola.pl/
28	13 VIP Piotr Zubrycki	SME	furniture	https://www.13vip.pl/
29	13 VIP Sp. z o.o. , sp. k.	SME	furniture, equipment	https://13vip.com.pl/
30	4 HOME & KITCHEN Aneta Zubrycka	SME	home decoration	https://www.4home.pl
31	4CNC SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	cnc machines	
32	Abakus Okna S.A.	SME	woodwork	https://www.abakus-okna.com.pl/pl/
33	ABM spółka cywilna	SME	construction and sale of houses	
34	ACE GLASS M. Woźniak Sp. z o.o.	SME	glass producer	https://aceglass.pl
35	ACER Konrad Wójcik	SME	garden architecture	
36	ADJATECH Sp. z o.o. Sp.K.	SME	foundry	https://adjatech.pl/
37	Agaflex Sp. z o.o.	SME	water instalations	https://agaflex.pl/
38	AgroSolar Polska Sp. z o.o.	SME	photovoltaic instalations	https://agrosolar.pl/
39	Akademia Górniczo Hutnicza	Research & education	education	https://www.agh.edu.pl/
40	Alex-moda Sp. z o.o.	SME	textiles	https://adecor.pl/
41	ALEXTA Sp. z o.o. Sp. k.	SME	building services	http://www.alexta.pl/
42	ALGAENAUTIC Sp. z o.o.	SME	R&D	http://www.algaenautic.com/
43	Alina Wasiluk Parkiet Hajnówka	SME	wooden floors	
44	ALUPLAST Sp. z o.o.	Big enterprise	windows and doors	https://www.aluplast.com.pl/
45	ALUPROF SPÓŁKA AKCYJNA	SME	windows and doors	https://aluprof.eu/
46	Amage Systems sp. z o.o., Wieliczka	SME	IT in construction	https://www.amagesystems.pl/en/contact/
47	ANCHOR PBW SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	medical construction	http://www.anchor.bialystok.pl/
48	Arkance Systems Poland sp. z o.o.	SME	IT	https://www.arkance-systems.pl/
49	Art Elektro Marek Zadykowicz	SME	electric instalations	
50	ART-ABAŻUR K. Kromczyński i Wspólnicy Spółka Jawna	SME	textiles	https://art-abazur.com.pl/

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51	Askon sp. z o.o.	SME	wooden floors	https://askonspzoo.pl/
52	BARWA SYSTEM Sp. z o.o.	SME	suspended ceilings	https://www.barwasystem.pl/
53	BASKAN Piotr Kania	SME	decoration	https://greendesigners.katalogbiz.pl/
54	BAUSAN ALUMINIUM Sp. z o.o.	SME	windows and doors	http://www.bausan.pl/
55	BEATA JACHOWICZ-BUCZKOWSKA P.H. ALUPOL-CMDRUK	SME	roofing membranes	
56	BIM Ally sp. z o.o.	SME	IT	https://bimproduction.eu/
57	Biuro Handlowe NETTO PLUS Sp. z o. o., Sp. k.	SME	ceramic tiles	http://www.netto.net.pl/
58	Biuro Techniczno-Handlowe BTH Import Stal Sp. z o.o.	Big enterprise	metal processing	https://bth.pl/
59	BŁAŻEJ KOSTRZEWA "GALABETON"	SME	paving	http://www.galabeton.pl/
60	BOGMAR Sp. z o.o. Sp.K.	SME	windows, doors, gates	http://www.bogmar.biz/
61	BOTTONOVA Sp. z o.o.	SME	lighting	http://bottonova.eu/
62	BTI PROMOCJA POLSKIEGO EKSPORTU SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	business environment institution	
63	BUDIMEX S.A.	Big enterprise	infrastructural construction	http://www.budimex.pl/pl/site.html
64	BUDOKOP Wojciech SUKOW	SME	ground works	https://www.budokop.pl/
65	Centrum Informatyki ZETO S.A.	SME	IT	https://www.zetobialystok.pl/
66	Centrum Transferu Ekotechnologii sp. z o.o.	SME	new technologies	http://www.ctet.pl/
67	CERRAD Sp. z o.o.	Big enterprise	ceramic tiles	https://cerrad.com/
68	Cezar Przedsiębiorstwo Produkcyjne Dariusz Bogdań Niewiński	Big enterprise	widnow, door profiles	https://cezaru.eu/
69	Classen Pol S.A.	Big enterprise	wooden floors and doors	https://classen.pl/
70	CLASSIC SOFA Sp. z o.o.	SME	furniture	
71	Climatic Sp. z o.o. Sp. k.	SME	modular building	https://climatic.pl/
72	Consulting Stanisław Jaroszek	SME	electric instalations	https://www.elektropaks.pl/
73	CORAL W.Perkowski, J.Perkowski Sp.J.	SME	photovoltaic instalations	https://coral.com.pl/
74	Countsolar Sp. z o.o.	SME	photovoltaics	https://ecoabm.pl/
75	CT SERVICE Spółka Akcyjna	SME	anti-slip floor protection	http://antyposlizgowawa.com/
76	Czarnomysy Mariusz, - VEMAR	SME	window shades	https://vemar.pl/ofirmie/
77	DAKO Sp. z o.o.	Big enterprise	windows and doors	https://www.dako.eu/
78	DB BETON Sp. zo.o.	SME	concrete	http://dbbeton.pl/
79	DECCO S.A.	SME	windows and doors	http://www.decco.eu/
80	DEFENDOOR Sp. z o.o.	SME	windows and doors	
81	DEVELOPERGO Sp. z o.o.	SME	building menagment	https://www.developergo.pl/
82	DĘBINKA Grzegorz Matejko	SME	wooden floors	http://www.debinkapodlogi.pl/
83	DOMEL Sp. z o.o.	SME	windows and doors	https://domel.pl/
84	Dominal W. Perkowski J. Perkowski sp. J.	SME	photovoltaic instalations	
85	DOZBUD DEVELOPMENT Zalewski Zbigniew	SME	building menagment	https://dozbud.pl/

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86	Drewlux S.C. U.P.H. Szmidt J., Sieńko S.	SME	wooden doors	https://drewluxj.pl/
87	Drewnoland s.c.	SME	wooden furniture and accessories	https://www.drewnoland.eu/
88	DREWOOD Włodzimierz Zabielski	SME	wooden doors	http://www.drewood.pl/pl/s1/Firma_Drewood_zajmuje_si%C4%99_produkcj%C4%85_wyrob%C3%B3w_z_drewna.html
89	ecoABM Kamil Andruszkiewicz	SME	photovoltaics	https://ecoabm.pl/
90	Ekoinstal Holding Sp. z o.o. Sp. K.	SME	steel constructions	https://www.ekoinstal.pl/
91	EKOPROJEKT SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	heating instalations	https://ekoprojekt.com/
92	ELMONT Grupa Sp. z o.o.	SME	eco-energy instalations	http://www.elmontgrupa.pl/
93	ELREM SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	electroenergetic instalations	http://elrem.pl/
94	ELS Poland Sp. z o.o.	SME	construction materials	https://elspoland.pl/
95	Elserwis Sp. z o.o.	SME	electric instalations	http://bpie.pl/
96	EMKAN- PRO Krzysztof Murawski	SME	biological treatment plants	
97	Empol B2B Sp. z o.o.	SME	business enviroment institution	
98	Empol SA	SME	windows	https://empol.pl/
99	Enetecs Sp. z o.o.	SME	engineering technologies	https://enetecs.com/pl/
100	ERKADO Zbigniew Kozłowski przekształcona w ERKADO sp. z o.o.	Big enterprise	doors	https://erkado.pl/
101	Erkado Radom Sp. z o.o. Sp. k.	Big enterprise	doors	
102	EURO LOGISTICS GROUP Sp. z o.o.	SME	wood-like products	
103	Eurofirma Media Sp. z o.o.	SME	business enviroment institution	http://www.eurofirma.pl/
104	EUROKONTAKT SP.Z O.O.	SME	job placement / construction industry	https://eurokontakt.eu/
105	EUROSOFT Sp. z o.o.	SME	IT	https://www.eurosoft.com.pl/index.php
106	EVER Home S.A.	SME	wooden floors	
107	EVERHOUSE SP. Z O.O.	SME	wooden doors	http://www.everhouse.pl/
108	Evertec Sp. z o.o.	SME	HVAC	http://evertecsolutions.com/pl/
109	Exbud sp. z o.o. sp. k.	SME	building materials	http://www.exbudpieniezno.pl/
110	Export two sp. z o.o.	SME	export services	
111	F.B.I. TASBUD S.A.	SME	general contractor	https://fbitasbud.pl/
112	F.H.U. ATIS DOM Wojciech Jurczuk	SME	single-family housing	https://www.atisdom.pl/kontakt.html
113	F.H.U. BUDINTEL Paweł Ciąpała	SME	building materials warehouse	
114	FA KROSNO SA	SME	gas installations	http://www.fakrosno.pl/
115	FAM-Technika Odlewnicza Sp. z o.o.	SME	construction furniture, founding and galvanizing	https://famto.pl/pl/home/
116	FARGOTEX Sp. z o.o.	SME	furniture and decorative fabrics	https://www.fargotex.pl/
117	Faro Tekstylija Sp. z o.o. Sp. k.	SME	textiles	https://www.faro.com.pl/
118	Ferrox sp. z o.o.	SME	electric instalations	http://ferrox.pl/

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119	Finishparkiet Fabryka Parkietu Spółka z ograniczoną odpowiedzialnością Sp. K.	SME	flooring	https://www.finishparkiet.com.pl/
120	Firma Adwokacka Bartosz Parfieniuk	SME	law firm	http://www.firmaadwokacka.eu/pl/adwokokat_bartosz_parfieniuk.aspx
121	Firma PLASTIXAL Kołakowski Mariusz	SME	windows and doors	https://plastixal.pl/
122	Firma PLASTIXAL Kołakowski Mariusz	SME	windows	https://plastixal.pl/
123	Firma Produkcyjno-Usługowo-Handlowa KOBEX Stanisław Rembisz	SME	steel constructions	https://www.kobexstal.pl/pl/kontakt.html
124	FOLPLAST Sp. z o.o. Sp. k. (dawniej Wytwórnia Wyrobów Foliowych "FOLPLAST" Teresa Pawlik, Romuald Pawlik Spółka jawna)	SME	industry and construction foil packaging	
125	Fundacja Rozwoju Przedsiębiorczości Businesscaddy	SME	entrepreneurship development foundation	http://www.businesscaddy.org/
126	FUTURA MACHINERY Sp. z o.o.	SME	production of batteries and accumulators	
127	Fyda Andrzej Firma Produkcyjno - Handlowa INS TERM	SME	HVAC	https://www.ins-term.com/
128	GERDA Sp. z o.o.	Big enterprise	windows and doors	https://drzwi-gerda.com
129	GetAnna, Warszawa	SME	IT tools	
130	GIERA Znaki Drogowe Sp. j.	SME	infrastructural construction	
131	GLASMARK SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	glassworks	https://www.glasmark.pl/
132	Glass-Serwis Ewelina Wysocka	SME	glassworks machinery	http://glass-serwis.pl/
133	GLOBART MEDIA A. GOŁĘBICKI, M. HORBA, T. ŁASKI SPÓŁKA JAWNA	SME	marketing agency	
134	GLOBART PRINT A. Gołębicki, M. Horba, T. Łaski, M. Stachowiak SPÓŁKA JAWNA	SME	specialized printing services	http://globartprint.bialystok.pl/
135	GOGLER Brzeziński Suszko Sp. J.	SME	IT tools	https://gogler.pl/
136	Gór-Stal Sp. z o.o.	SME	instulation materials	https://www.gorstal.pl/
137	Greenko Sp. z o.o.	SME	business advisory and training	https://greenko.pl/
138	Griltex Polska Sp. z o.o.	SME	building materials	https://griltex.pl/
139	GRUPA BURKIETOWICZ SPÓŁKA JAWNA (dawniej: Wiązary Burkietowicz Sp. J.)	SME	wooden products	http://wiazary.pl/
140	Grupa Eltron sp. z o.o.	SME	IT tools	https://grupaeltron.pl/
141	HARTIKA Sp. z o.o.	SME	composite wood systems	https://3spare.eu/
142	HENSFORT Sp. z o.o.	SME	produkcja wyrobów dla budownictwa z tworzyw sztucznych	http://remii.pl/index.php?c=104
143	HF INVERTER POLSKA S.C.	SME	motors and generators	https://hfinverter.co/
144	Hoch Systemy Kominowe Sp. z o.o. Sp. k.	SME	chimney construction	https://hoch-systemykomino.wpl/
145	IDEA LED Mateusz Banasik	SME	lighting	https://idealed.eu/
146	IDEO Sp. z o.o.	SME	IT tools	https://www.ideo.pl/
147	IES Kamil Wujek	SME	led lighting	
148	IMS Modular Sp. z o.o.	SME	modular housing	http://imsmodular.pl/index.php?display=8
149	INNpuls Sp. z o.o.	SME	business advisory and training	https://www.innpuls.pl/

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150	INNTECH POLAND SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	reinforced concrete prefabrication	
151	INSTALBUD JĘDRZEJ WOJTASZEK 2. Leila Jędrzej Wojtaszek, współnik spółki cywilnej	SME	building services	
152	Instytut Innowacji Technologii Politechniki Białostockiej Sp. z o.o.	Big enterprise	business environment institution	https://instytutpb.com/
153	Inventivity Foundation	SME	business environment institution	https://inventivity.net/
154	Ireneusz Kozłowski SA	SME	blacksmithing	http://www.ireneuszkozowski.pl/
155	IZODOM 2000 Polska Sp. z o.o.	SME	foam-based construction materials	https://www.izodom2000polska.com/?lang=pl
156	IZOHAN Sp. z o. o. (dawniej "IZOLEX" SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ)	SME	waterproofing and construction chemicals	https://bplusb.pl/
157	JMP Polska Sp. z o.o. Sp. k.	SME	medicine-based construction	https://jmpmedical.pl/kontakt/
158	Kabel 1 Maciej Jabłoński	SME	construction machinery	
159	Kaiser Schody Samonożne Krzysztof Witaszewski	SME	decorative stairs	http://www.schodykaiser.pl/pl/kontakt.html
160	KAN sp. z o.o.	Big enterprise	water and heat instalations	http://pl.kantherm.com/
161	Kancelaria Adwokacka Andrzej Bołtryk	SME	law firm	https://adwokatboltryk.pl
162	Kancelaria Radców Prawnych Bieluk i Partnerzy	SME	law firm	https://bieluk.pl
163	KANEX Sp. z o.o.	Big enterprise	water instalations	http://www.kanex.com.pl/PL/index.html
164	KAZIMIERZ GINTER ZAKŁAD PRODUKCJI MATERIAŁÓW BUDOWLANYCH ZAKŁAD PRACY CHRONIONEJ	SME	building materials	https://ginter.pl/
165	KDM Dariusz Mazur	SME	geotechnical, hydrotechnical and drilling equipment	https://www.kdm.net.pl/
166	KEYLITE RW POLSKA SP. Z O.O.	Big enterprise	roof winfows	https://keylite.pl/
167	KiK Sp. z o.o. Sp. K.	SME	industrial construction	https://www.ikonka.com.pl/
168	Kompania Górnicza Sp. z o.o.	SME	construction resources	http://kompaniagornicza.pl/kontakt/centrala/
169	KP4 SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	developer	
170	KRYMAR sc I.Sokół , M. Sieniuc	SME	construction machinery	
171	KZWM OGNIOCHRON SPÓŁKA AKCYJNA	SME	fire protection systems	https://www.ogniochron.eu/
172	Lafarge Cement S.A.	Big enterprise	cement, concrete, aggregates	https://www.lafarge.pl/
173	LAINER SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ SPÓŁKA KOMANDYTOWA	SME	industrial flooring	http://lainer.pl/
174	LAN Technika	SME	teletechnics	http://lanteknika.pl/
175	LANDSBERG SP. Z O.O. SP.K.	SME	steel profiles and sections	http://www.landsberg.pl/
176	Led Europe Sp. z o.o.	SME	lighting	https://led-europe.pl/
177	LEDIN Sp. z o.o. Sp. k.	SME	lighting	https://ledin.pl
178	Ledolux Poland Sp. z o.o.	SME	OEM/ODM LED DOB Modules	https://ledolux.pl/
179	Light Club Sp. z o.o.	SME	lighting	
180	LUBELSKI FORNIR Sp. z o.o.	Research & education	wood production	https://www.lubelskifornir.pl
181	MAGTRANS S.C. Magdalena Kapusta, Jarosław Kapusta	SME	supply	

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182	MANUFATURA MEBLI Sp. z o.o.	SME	furniture manufacture	https://manufakturamebli.pl/
183	MAR-BUD SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ BUDOWNICTWO SPÓŁKA KOMANDYTOWA (dawniej MAR-BUD Budownictwo Sp. z o. o.)	SME	General contractor	http://mar-bud.pl/
184	MARVIS Białystok Sp. z o.o. Sp. k.	SME	Development activities	
185	Media Jacek Romanowski	SME	marketing	https://www.mirox.pl
186	Medica Karolina Kabot	SME	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials	
187	MEDOS Marian Buławka, Ewa Buławka Sp.J.	Big enterprise	Accessories for doors and windows.	https://www.medos.pl/home/
188	MEGAPLOT J.Wójcicki, M.Jaęła Sp. j	SME	construction machinery	
189	Mirox Sp. z o.o.	SME	windows	https://www.mirox.pl
190	MJ JEDWABNE Męczkowscy Spółka Jawna	SME	paving stones	http://www.mj.com.pl/
191	MR2 Sp. z o.o.	SME	lighting	https://blaupunkt.com/cpl/
192	Muraspec Sp. z o.o.	SME	wall coverings	
193	NAMOR Jaworski Sp.J.	SME	building and renovation services	
194	NAN sp.j.	SME	Foil manufacture and distribution of packaging materials	http://www.folienan.pl/
195	Narzędzia sp. z o.o.	SME	Building tools	http://narzedzia.gda.pl/
196	New Trendy Sp. z o.o.	SME	shower enclosures	http://www.newtrendy.pl/
197	Nord Auto Sp. z o.o.	SME	Wholesale and retail sale of passenger cars and vans	https://nordauto.hyundai.pl/
198	NORGPOL CZERWIŃSKI sp.j.	SME	professional fittings for tempered glass	https://cglass.pl/
199	NOVA STAL Sp. zo.o.	SME	production of steel reinforcements for PVC windows, construction profiles, sections and angles.	http://www.novastal.com.pl/index.php/pl/
200	OFFSHORE INSTRUMENTS spółka z ograniczoną odpowiedzialnością spółka komandytowa	SME	distribution and sales	
201	OLAN Sp. z o.o.	SME	manufacture of aluminium and steel constructions structures	http://www.olan.siedlce.pl/
202	OMEGA INNOVATION Sp. z o. o.	SME	thermal energy storage solutions	http://www.omegainnovations.eu/
203	OMEGA SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	construction services	
204	OPTIPREF Sp. z o.o. Sp. k.	SME	prefabricated construction	https://optipref.pl
205	P.H.U.R. FELIX 2	SME	photovoltaics	https://ph-felix.pl
206	P.H.U.R. FELIX Marek Danilczuk	SME	air conditioning equipment	http://www.phfelix.pl/kontakt
207	P.P.H.U OLCZAK Grzegorz Olczak	SME	tempered glass	https://szklarski.com/pl/szklarski-comunikalne-szklane-inspiracje/
208	P.P.H.U. "MAT-POL" Kazimierz Plata	SME	windows; door; fences; blinds; pvc rolling shutter	https://mat-pol.com.pl/
209	P.P.H.U. Sp. j. Stropex Renata Bruzi, Krzysztof Bruzi	SME	windows and doors	https://www.stropex.pl

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210	PAGEN Sp. z o.o.	SME	production of windows and doors	http://pagen.pl/
211	PANMAR Czekańska Szmyd Spółka Jawna	SME	manufacture	https://www.panmar.pl/
212	Państwowa Wyższa Szkoła Zawodowa w Suwałkach, Suwałki	Research & education	research and development	https://www.pwsz.suwalki.pl/
213	PATROL GROUP Sp. z o.o. S.K.A.	Big enterprise	production of plastic articles	https://patrolgroup.com/
214	PAW Sp. z o.o.	SME	textiles	https://paw.net.pl
215	Perfectdoor Sp. z o.o.	SME	doors	https://perfectdoor.pl
216	PERFEKTA Piotr Jończyk	SME	finishing, renovation and interior decoration	http://perfekta.bialystok.pl/
217	PHU Prestige Bożena Ostaszewska	SME	production and sale of window covers, interior decorations and finishing elements.	https://www.roletyprestige.pl/
218	PIKUD Sp. z o.o.	SME	Manufacture of concrete construction products	
219	Plonmar Sp. z o.o.	SME	Wholesale of wood, construction materials and sanitary equipment	http://plonmar.pl/
220	Podkarpacki Klaster Energii Odnawialnej	SME	Activities of professional organizations	https://energia.rzeszow.pl/
221	Politechnika Białostocka	Research & education	research and development	https://pb.edu.pl/
222	Politechnika Warszawska	Research & education	research and development	https://www.pw.edu.pl/
223	POLSKI INSTYTUT INOWACJI I TRANSFERU TECHNOLOGII SA	Research & education	research and development	https://www.piitt.pl/
224	Polski Klaster Eksporterów Budownictwa	SME	Activities of other membership organizations not elsewhere classified	https://www.pcocce.com/
225	Polski Komfort Sp. z o.o.	SME	HVAC	https://v-k.pl/
226	Polskie Górnictwo Skalne Sp. z o.o.	SME	Extraction of gravel and sand; clay and kaolin mining	http://pgs.com.pl/
227	Polskie Stowarzyszenie Doradcze i Konsultingowe	SME	Consulting services	http://polskiestowarzyszenie.pl/
228	POWER UP Walentyna Świącicka	SME	building materials	
229	POZ BUD T&R S.A.	SME	manufacturing	http://www.pozbud.pl/
230	PPU Palisander Sp. zo.o.	SME	provision	https://www.palisander.com.pl/
231	Pracownia Projektowa Enspro sp. z o.o.	SME	Activities in the field of architecture	http://enspro.pl/
232	PREFABET Sp. z o.o.	SME	manufacturing	
233	PRESTIGE GLASS ADAM STOBBA	SME	manufacturing	http://prestigeglass.pl/
234	PROFIGIPS Wiśnik, Pecyna Sp. Jawna	SME	Manufacture of fabricated metal products, except machinery and equipment	https://www.profigips.com/
235	PROFILNET Sp. z o.o. Sp. k	SME	Production of metal products	http://profilnet.eu/
236	Przedsiębiorstwo Handlowo- Usługowe FIEDOR-BIS Zofia Wawrzynek	SME	road barriers and transport service of sold products	http://www.fiedor-bis.pl/
237	Przedsiębiorstwo Produkcyjno- Handlowe Unicell Poland Sp. z o.o.	SME	manufacturing	https://unicell.pl/
238	Przedsiębiorstwo Budowlane EKO SYSTEM Kostro, Radlmacher spółka jawna	SME	general contracting	http://eko-system.pl/
239	Przedsiębiorstwo Budownictwa Mieszkaniowego "ŚRÓDMIEŚCIE" Spółka jawna	SME	Construction of single-family houses,	https://www.pbmsr.odmiescie.pl/

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			Construction of apartment blocks	
240	Przedsiębiorstwo Budowy Dróg i Mostów Sp. z o.o.	Big enterprise	Infrastructural construction	https://www.pbdim.com.pl/
241	Przedsiębiorstwo Instalacyjno-Budowlane Kazimierz Samborski	SME	installation services	
242	Przedsiębiorstwo Inżynierii Łądowej Aquarius sp.z o.o. sp. k.	SME	infrastructure building and sanitary and water supply	http://pil-aquarius.pl/
243	Przedsiębiorstwo Produkcji Betonów "PREFBET" Sp. z o.o.	SME	Manufacture of concrete construction products	http://www.prefbet.pl/pl/start.aspx
244	PRZEDSIĘBIORSTWO PRODUKCYJNO - USŁUGOWO - HANDLOWE KOMBINAT BUDOWLANY SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	developer	https://www.kombinatbud.com.pl
245	Przedsiębiorstwo Produkcyjno Handlowe Glass-Product Mariusz Kulikowski	SME	manufacturing	https://www.glass-product.pl/
246	Przedsiębiorstwo Produkcyjno Usługowo Handlowe "ELPOL" Rafał Kosiedowski	SME	manufacturing	https://www.elpol1.pl/
247	Przedsiębiorstwo Produkcyjno Usługowo Handlowe SUPRON 3 Spółka z o.o.	SME	Manufacture of other fabricated metal products, not elsewhere classified	https://supron.pl/
248	PRZEDSIĘBIORSTWO PRODUKCYJNO-USŁUGOWE "PLASTIMET" SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	manufacturing	https://plastimet.com.pl/
249	Przedsiębiorstwo Robót Drogowych Spółka Akcyjna	SME	Works related to the construction of roads and highways	https://prdsabp.pl/
250	Przedsiębiorstwo Telekomunikacyjne Tellacz Jerzy Markiewicz	SME	distribution and sales	www.tellacz.com.pl
251	PRZEDSIĘBIORSTWO WIELOBRANŻOWE "KONSPO" MARIUSZ LATOS I ZBIGNIEW GLINIECKI - SPÓŁKA JAWNA	SME	produkcja wyrobów dla budownictwa z tworzyw sztucznych	
252	PRZEDSIĘBIORSTWO WIELOBRANŻOWE "VIKING KTS" SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	manufacturing	https://www.vikking.eu/
253	PRZEDSIĘBIORSTWO WIELOBRANŻOWE RAK-BUD, RACZKOWSKI I WSPÓLNICY SPÓŁKA JAWNA	SME	heating industry	https://rakbud.com.pl/
254	Purinova Sp. z o.o.	SME	building chemicals	https://purinova.com
255	PXF Lighting Jacek Bieniak	SME	manufacturing	https://www.pxf.pl
256	RAIKO Polska Sp. z o.o.	SME	building materials	
257	RC Design Sp. z o.o.	SME	Manufacture of office and shop furniture	http://www.rcdesign.pl/
258	RISING STAR Sp. z o.o.	SME	Scientific research and development in the field of other natural and technical sciences	
259	ROMB Spółka Akcyjna	SME	construction joinery	http://www.romb.pl
260	RUKE Zbigniew Rus	SME	Shaping and processing of flat glass	http://ruke.eu
261	Rutkowski Development Spółka Jawna	SME	developer	https://rutkowskidevelopment.pl/
262	SaarGummi Construction	SME	manufacturing	https://construction.saargummi.com/
263	SALAMANDER Window & Door Systems S.A.	Big enterprise	supplier of PVC profiles	https://www.salamander-windows.com/pl
264	Salux Sp. z o.o.	SME	Manufacture of fiber cement	
265	SAPLING S.A.	SME	environmental protection technologies	
266	Sekwencja Sp. z o.o.	SME	Other business and management consultancy	https://www.sekwencja.eu/
267	SKALMAR T. Skalniak, A. Mazur Spółka Jawna	SME	Production of plastic products for construction	https://www.skalmar.pl/

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268	SKB Spółka Akcyjna	SME	construction services	https://skb.net.pl
269	SKY POWER Stanisław Świącicki	SME	marketing services	
270	Slowroom Katarzyna Hiller	SME	textiles	https://slowroom.eu/
271	Smart Faktor S.A.	SME	marketing services	https://web.smartfaktor.pl
272	SMARTWOODS Sp. z o.o.	SME	Production of wooden packaging	https://smartwoods.pl/
273	SN STRUKTON Sp. z o.o.	SME	manufacturing	http://www.snstrukton.com/
274	SO EASY SYSTEM Sp. z o.o.	SME	windows and doors	
275	Soon Architekci S.C. Adam Skrobisz Tomasz Niedzielski	SME	full scope of services at each stage of the design process.	https://soonarchitekci.com/
276	Soprema Polska Sp. z o.o.	SME	sealing, coverings, soundproofing boards and insulation.	https://www.soprema.pl/
277	SPARKZ Maksymilian Kisieliński	SME	Protective elements	https://sparkz.com.pl
278	SPEC-GLAS SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	manufacturing	http://www.spec-glas.com/
279	Spectra Lighting Sp. z o.o.	SME	lighting	http://www.spectra-lighting.pl
280	STAN SZKŁO Sp. z o.o.	SME	manufacturing	https://www.stan-szklo.pl/
281	STANISZEWSKY BETON SPÓŁKA JAWNA	SME	manufacturing	http://staniszewscy.com.pl/
282	STARGUM STANKIEWICZ spółka jawna (dawniej STARGUM Stankiewicz Sp. z o.o.)	SME	building materials	https://www.stargum.pl
283	STARHUS Sp z o.o.	SME	implementation of construction projects related to the construction of buildings	https://procyon.group/
284	Stelweld Sp. z o.o.	Big enterprise	Metal processing and coating metals	http://www.stelweld.com.pl/pl/
285	Stilo Energy S.A.	SME	photovoltaics	https://stiloenergy.pl/
286	Stoll Polska Sp. z o.o.	SME	Production of construction machinery	http://stollpolska.pl/
287	STREB POLSKA SP. z o.o.	SME	property management	
288	Suwalskie Przedsiębiorstw Produkcyjno- Handlowe WITAL Kolenkiewicz, Udzieto Sp.J.	SME	manufacturing	http://wital.com.pl/
289	SZKŁOLAND Sp. z o.o.	SME	Shaping and processing of flat glass	http://szkloland.pl/
290	Świętokrzyskie Centrum Innowacji i Transferu Technologii sp. z o.o.	Research & education	research and development	http://www.it.kielce.pl/
291	Technologie Drogowe SOCHACKI	SME	Construction of roads and highways	https://tdsochacki.pl/
292	Tektura Opakowania Papier S.A.	SME	Production of paper and cardboard	https://www.topsa.pl/
293	TERM-OIL sp. z o.o.	SME	production of concrete construction products	http://term-oil.pl/
294	TINES SA	Big enterprise	Manufacture of concrete construction products	https://www.tinescg.com
295	TM TECHNOLOGIE Sp.z o.o.	SME	manufacturing	https://tmtechnologie.pl/
296	TMH Mateusz Karewicz	SME	Manufacture of office and shop furniture	https://takemehome.pl/
297	Tobo Datzuk Spółka Jawna	SME	Produkcja mebli biurowych i sklepowych	https://sklep.tobo.pl/
298	Tomaszowskie Kopalnie Surowców Mineralnych "Biała Góra" Sp. z o.o.	SME	building resources	

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299	TOP-TEN Express Poland Sp. z o.o.	SME	transport and logistics	https://www.toptenexpress.pl
300	Towarzystwo Amicus	SME	Consulting services	https://www.towarzystwoamicus.pl/
301	TURKUS SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ SPÓŁKA KOMANDYTOWA	SME	distribution and sales	https://www.turkus.net.pl/
302	Uczelnia Jańskiego w Łomży	Research & education	research and development	https://lomza.janski.edu.pl/
303	UNIBEP S.A.	Big enterprise	general contracting	https://unibep.pl/
304	UNIGLASS POLSKA SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	manufacturing	http://uniglasspolska.pl/
305	Uniwersytet w Białymstoku	Research & education	research and development	https://uwb.edu.pl/
306	Uniwersytet Warmińsko-Mazurski	Research & education	research and development	http://www.uwm.edu.pl/
307	Uroczysko Sp. z o.o.	SME	biological treatment plants	
308	UST-M Sp. z o. o.	SME	Production of plastic products for construction	https://www.ustm.pl/
309	UX2 Centrum Technologiczne Sp. z o.o.	SME	technologic transfers	https://ux2.pl
310	VERMICULITE POLAND Sp.z o.o.	SME	Manufacture of other non-metallic mineral products, not elsewhere classified	http://vermiculite.pl/
311	Vinderen MIKSPOL Sp. z o. o.	SME	manufacturing	
312	Vinderen Sp. z o. o.	SME	manufacturing	https://www.vinderen.com/
313	VITO POLSKA SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	manufacturing	https://vitopolska.com/
314	VITRINTEC Sp. z o.o.	SME	Production of products from aluminum and aluminum alloys	https://www.vitrintec.pl/
315	VOBRI s.c.	SME	wood production	https://www.vobri.com/
316	Voolt Sp. z o.o.	SME	electric instalations	https://voolt.pl
317	WALBET A.D.K. Walkowiak Sp.J.	SME	concrete production	https://www.walbet.pl
318	Wealth Management Partners Poland Sp. z o.o.	SME	occupational health and safety	https://wmppl.com
319	WIPER Sp. z o.o.	SME	producer of shower drainage systems	http://wiper.pl/start
320	WITRAŻ Sp. z o.o. Sp. k.	SME	Produkcja wyrobów dla budownictwa	https://www.witraz.eu/
321	WOD-BUD sp. z o.o.	SME	Infrastructural construction	https://wodbud.com.pl/
322	Wojciech Stasieluk Przedsiębiorstwo Handlowo-Uslugowe "KONAR"	SME	manufacturing	http://konar.net.pl/
323	WOJNAROWSCY Sp. z o.o.	SME	lighting	https://spectrumled.pl
324	WW EKOCEM Sp. z o.o. Sp. k.	SME	construction machinery	http://wwekochem.com
325	Wyższa Szkoła Agrobiznesu w Łomży, Łomża	Research & education	research and development	https://wsa.edu.pl/
326	Wyższa Szkoła Ekonomiczna	Research & education	research and development	http://www.wse.edu.pl/
327	Wyższa Szkoła Finansów i Zarządzania	Research & education	research and development	http://www.wsfiz.edu.pl/
328	Wyższa Szkoła Logistyki	Research & education	education	http://wsl.com.pl
329	YUNIVERSAL Podlaski Sp. z o. o.	SME	developer	https://www.yuniversalpodlaski.pl/
330	ZAKŁAD CERAMIKI BUDOWLANEJ "OWCZARY" R.E.R. STĘPIEŃ SPÓŁKA JAWNA	SME	manufacturing	https://www.owczary.pl/

331	ZAKŁAD PRODUKCYJNY BEMPRESA SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ	SME	Processing of milk and cheese making	http://bempresa.com/
332	Zakład Stolarstwa Budowlanej "CAL" Z. Cywiński i wspólnicy spółka jawna	SME	construction carpentry	https://www.drzwi-cal.pl/
333	Zakład Stolarski Wacław Awruk	SME	manufacturing	https://wawruk.pl
334	ZAKŁADY PRODUKCJI KRUSZYW RUPIŃSCY Spółka Jawna	Big enterprise	Extraction of gravel and sand; clay and kaolin mining	https://zpksumow.o.pl/
335	Zakłady Przemysłu Sklejek BIAFORM SA	Big enterprise	Manufacture of veneer sheets and wood-based panels	https://biaform.com.pl/
336	Zalass Consulting sp. z o.o., Kraków	SME	Market research and public opinion research	https://zalassconsulting.pl/
337	Zekon Sp. z o.o.	Big enterprise	Production of metal structures and their parts	https://www.zekon.pl/pl/start/
338	ZIP Sp. z o.o.	SME	Production of sawmill products	https://venifloor.com
339	ZWM Dojnikowscy sp. z o.o.	SME	Metal processing and coating metals	https://www.zwmdojnikowscy.pl

3.4. International orientation and positioning of the cluster

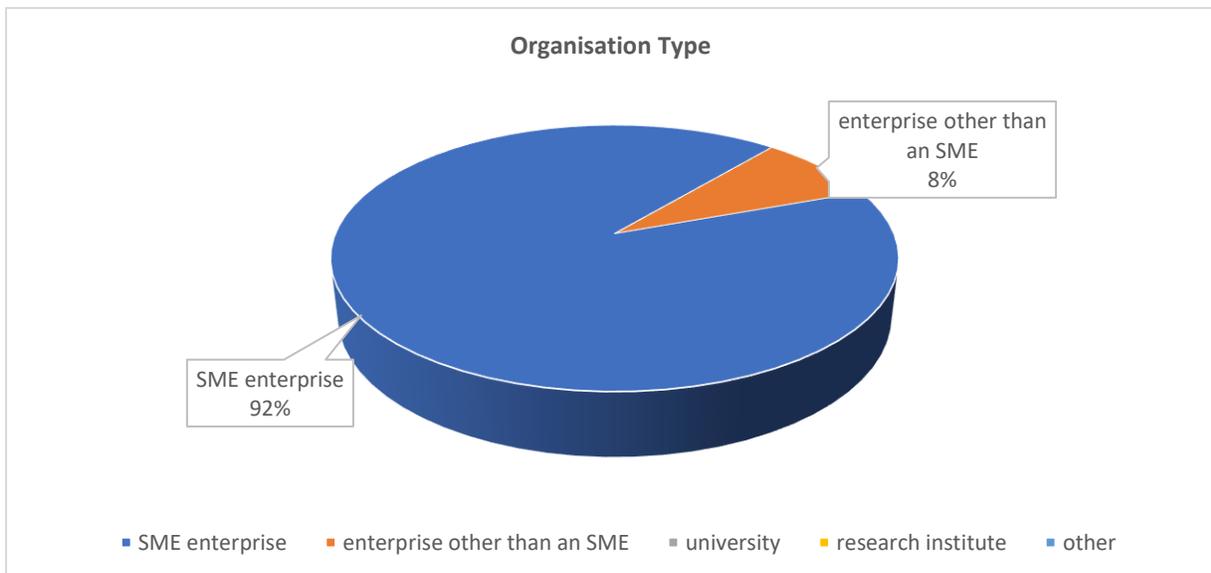
For many years, the Polish Construction Cluster has been carrying out activities aimed at the internationalization of the offer of associated companies and establishing international contacts in order to develop competences and create a network of contacts and connections. This activity consists of participation in international fairs - both directly and through organizational and financial assistance to entrepreneurs - as well as trips as part of economic missions, networking meetings, seminars, conferences, etc.

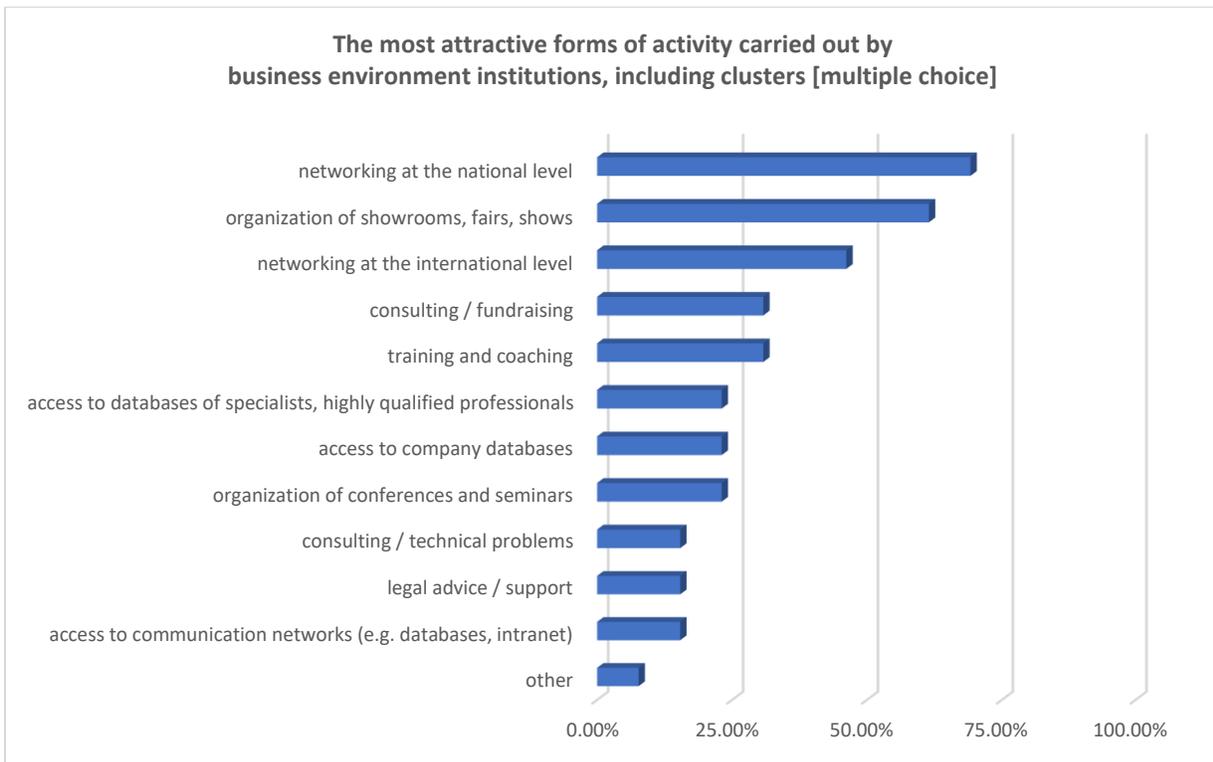
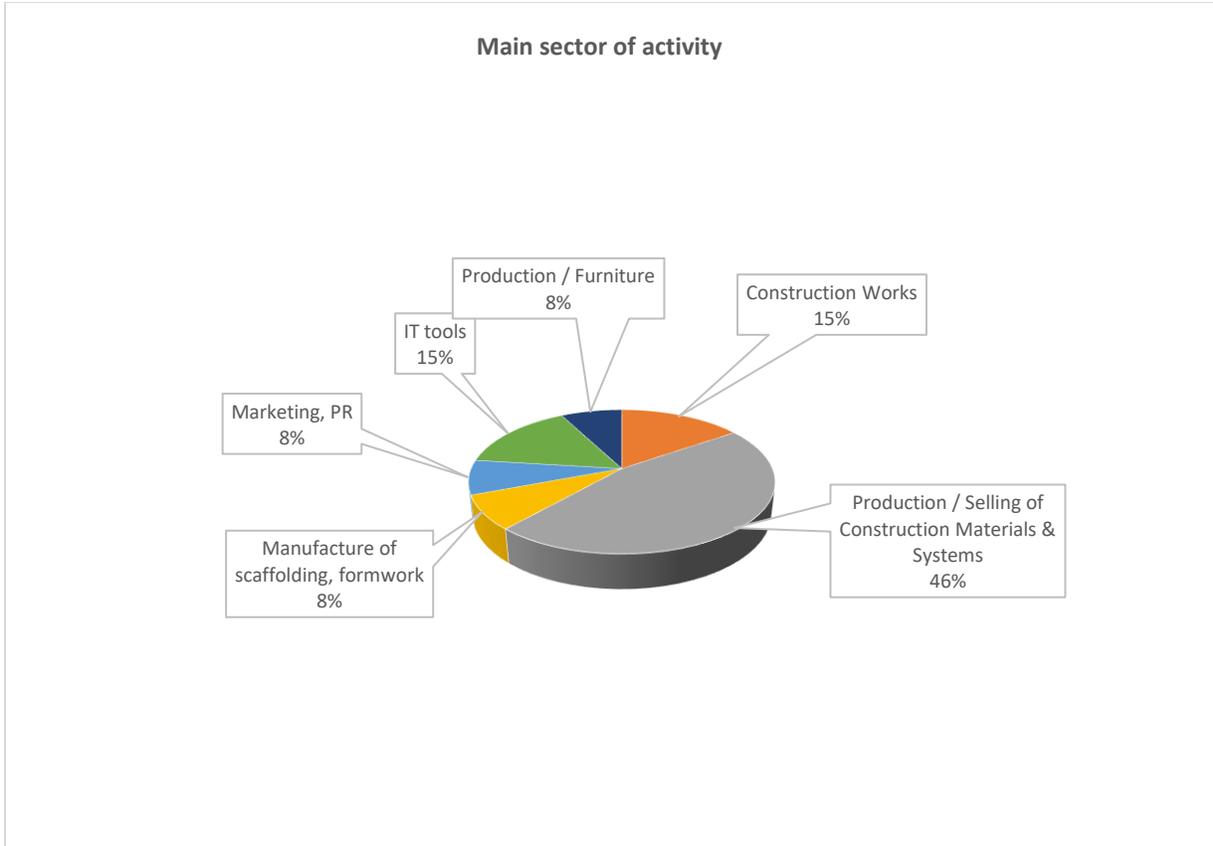
One of the dominant activities is participation in international fairs. Over the past few years, the cluster has been present at many events, including (bearing in mind the importance of the events) subsequent editions of BIG5 in Dubai, MOSBUILD in Moscow, NAHB IBS in Las Vegas and Orlando, R + T in Stuttgart and Shanghai, BEX ASIA in Singapore, DOMOTEX in Hanover, AQUATHERM in Moscow and Almaty, WATER & HEAT in Minsk, BATIBOUW in Brussels, ISH in Frankfurt, MADE EXPO in Milan, ELFAK in Göteborg, RESTA in Vilnius, KLIMATA AQUA TEX in Krasnoyarsk, INTERLIGHT in Amsterdam Moscow, BUDPRAGRES in Minsk, BATIMAT in Paris, SWISSBAU in Basel, FENSTERBAU FRONTALE in Nuremberg, MOSTRA in Milan, INTERTRAFIC in Mexico, INTERSCHUTZ in Hannover, KAZBUILD in Almaty, BUILDTECH in Berlin, Stockholm in Nuremberg, NORDBYGG in Stockholm Sydney and many more. The Polish Construction Cluster exhibits at almost all fairs in Poland, collectively representing the offer of associated companies. Participation in the fair as an exhibitor is still one of the most effective forms of promotion of the offer, mainly due to the possibility of establishing direct, personal contact with a potential contractor, while the participation of cluster representatives confirms the status of the institution, its strength, range and credibility. A huge benefit is also the fact that apart from the presence of interested cluster members, during such events it is possible to promote the offer of all associated companies, which greatly increases the range of promotional activities. Participation in the indicated events takes place as part of the "SHOW YOURSELF" project implemented by the Polish Construction Cluster, which program is co-financed from EU funds. The rank of the cluster that has been developed over the years has made it possible to obtain the status of the National Key Cluster, which today allows for effective application for co-financing of activities that largely end with the export success of the associated companies (subsequent editions of the project amount to nearly EUR 8.5 million) . All trips are preceded by market consulting, an analysis of attractiveness in terms

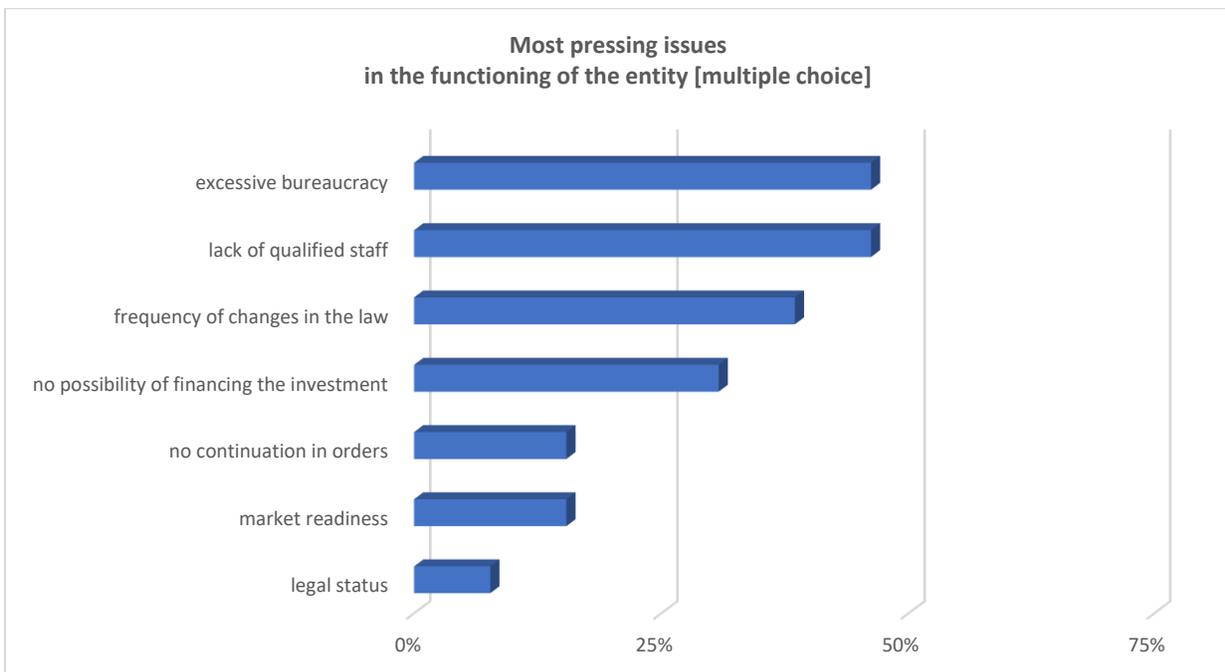
of a specific entrepreneur's offer, export availability, transport costs and tax restrictions - all these activities maximize the chances of a successful expansion.

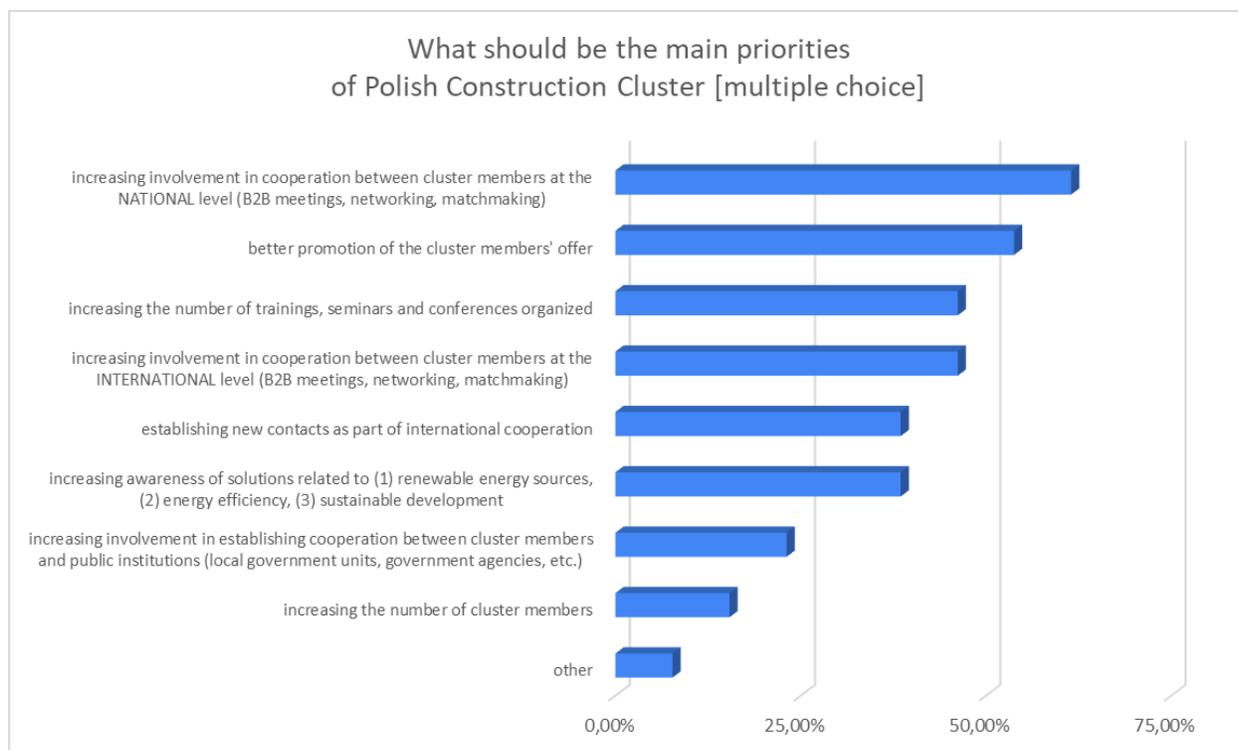
Simultaneously with promotional activities in the form of participation in fairs, the cluster initiates and coordinates individual meetings of entrepreneurs with representatives of foreign institutions such as diplomatic posts, chambers of commerce and industry, research and certification institutes, law firms specializing in servicing foreign investors in terms of tax, labor law, etc. Irrespective of this, the cluster organizes meetings with potential contractors according to the expectations of the selected entrepreneur. Only in 2017-2020, a series of economic missions was completed, including visits to the indicated institutions, among others to Russia, the USA, Sweden, Norway, Singapore, Germany, Australia, China, Japan, Sweden, Italy, India, Lebanon, Egypt, the United Emirates Arab countries, Switzerland and Singapore. The visit to Singapore is one of the best examples of the success of the cluster's international cooperation. During the visit, we managed to organize a series of meetings with SIBL - Singapore Institute of Building Ltd - an institute specializing in improving the quality of construction in terms of technical, economic, quality and energy-saving. This institution deals with certification and sets construction standards in the indicated region of Asia, acting as a door for external suppliers and investors. After a series of meetings held in September 2017, the cooperation took specific shapes, when SIBL representatives decided to visit Poland on the occasion of the largest construction fair BUDMA in February 2018 at the invitation of the Ministry of Entrepreneurship and the Polish Construction Cluster. After a series of meetings, many members of the cluster established direct cooperation with SIBL, which resulted in the launch of certification processes, and then in establishing commercial cooperation with companies from a given region. A continuation of these activities was another trip of a new group of entrepreneurs associated in the cluster to Singapore in September 2019, which was the result of the exchange of experiences between the associated companies and the presentation of the practical results of the cooperation established between Polish companies and SIBL.

3.5. Cluster members' needs









3.6. SWOT analysis

Strengths

1. Large number of construction materials and products manufacturers of on the Polish market, including large Polish companies providing their products worldwide (e.g. Drutex – windows producer, Blachy Pruszyński – roof and elevation steel claddings, Wienerberger – bricks and tiles).
2. R&D institutes in the field of construction and construction materials, e.g. Institute of Ceramics and Building Materials, Instytut Techniki Budowlanej (Building Research Institute)
3. Experience in recruiting personnel from abroad, e.g. from Ukraine – in the beginning of 2020 there were over 440 thousand employees from abroad (Migracje.gov.pl, 2020)
4. Innovativeness of companies – in 2017 91% of construction companies declared that they have introduced innovations in their activities (Madyda, 2018)
5. High and growing construction capacity of the sector – in 2019 construction of over 160 thousand new flats was completed (as compared to 2009: 130 thousand flats) (Polska Agencja Prasowa, 2019)
6. Growing export value of Polish construction companies and share of foreign contracts (Sosna, 2019). In 2019 27% of construction companies exported their products or services (Rozkrut, Kowalczyk, & Boguszewski, 2020).

Weaknesses

1. Lack of experience in constructing nZEBs.
2. Lack of cross-sectoral links between companies providing complementary solutions for nZEB.
3. Lack of qualified workers. There is a need to hire foreigners from Ukraine, Belarus, and even from Asia (Nepal, Bangladesh, Philippines). In 4th quarter of 2019, there were 20,600 free jobs in the construction sector (Główny Urząd Statystyczny, 2020).
4. Other sources indicate a shortage of approx. 120,000 employees in the sector (Śmietana, 2019). In 2019 69% of construction companies have experienced problems in recruitment or resignations of employees (Rozkrut et al., 2020).
5. Limited access to financing – 83% of Polish construction companies find this as a barrier for introducing innovations (Madyda, 2018).
6. Profit margins in the construction sector are lower than in the other economic sectors in Poland (BIG InfoMonitor; Polski Związek Pracodawców Budownictwa, 2019). 56% of Polish construction companies find low margins as a barrier for introducing innovations (Madyda, 2018). In 2019, large construction companies improved their net profitability from -0.7 percent to 1.2 percent, but it is still lower compared to SMEs (profitability of approx. 5-9%) (BIG InfoMonitor; Polski Związek Pracodawców Budownictwa, 2019).
7. Overdue payments frequent in the sector. In 2019 the number of companies with overdue financial commitments increased compared to 2018 by over 10 percent (up to 44,894 enterprises). Overall, approx. 6% of companies have problems in this field (BIG InfoMonitor; Polski Związek Pracodawców Budownictwa, 2019)

Opportunities

1. High demand for new buildings. There are 371 dwellings per 1000 citizens in Poland, while the OECD average is 460-480. 40% of Polish citizens live in overcrowded dwellings (Business Insider Polska, 2019; EUROSTAT, 2020)
2. Rising awareness of Polish citizens in terms of energy consumption in buildings, in particular related to air quality. Rising demand for ecological heating sources. 88% of Polish citizens would decide to build an energy-saving home (Danfoss, H+H, Rockwool, 2019).
3. Rising demand for small-scale renewable energy sources, PV in particular.
4. Governmental programme “Mój prąd” (“My electricity”) offering a donation of up to 5000 PLN (~1150 EUR) for installation of PV in households. Significant R&D and innovation funding is also available (e.g. Smart Growth Operational Programme - ERDF).
5. The revised Energy Performance of Buildings Directive (EU) 2018/844 requires from MS to set cost-optimal minimum energy performance requirements for new buildings.
6. Since 2021, all new buildings must be nearly-zero energy ones, according to the EPBD directive. Furthermore, 70% of residential buildings require renovation (Energia Press, 2020).

Threats

1. Germany is going to open its labour market for Ukrainian workers in March 2020, when the new Skilled Immigration Act for qualified professionals from non-EU countries comes into

force. There is a threat that better employment conditions will encourage Ukrainian economic migrants to leave Poland (Khrebet, 2020; Michalska, 2020). However, less than 25% of Ukrainians living in Poland would like to look for a new job in Germany, when it becomes possible (Rynek Infrastruktury, 2020)

2. Rising costs of construction materials, fuels and land decrease investment potential of citizens. (Alebank.pl, 2019; Gazeta Prawna, 2019).
3. Lack of qualified and experienced staff in constructing highly energy efficient or nearly-zero energy buildings.
4. COVID-19 epidemic crisis affecting negatively investment decisions (Polski Związek Pracodawców Budownictwa, 2020)
5. Growing costs of labour on the market are considered as a major barrier to the sector's development (Rozkrut et al., 2020)
6. Underegistered employment and payment of part of employees' salaries without taxes and social security contributions. In 2019 56% of construction companies have observed that this type of illegal activities take place at least to some extent (Rozkrut et al., 2020).

4. Cluster strategy

4.1. Mission

Mission of Polish Construction Cluster is:

Supporting enterprises in the construction industry and sectors related to the value chain in whole country and Easter Poland macroregion in strengthening cooperation networks and standardizing processes for the development of internal and synergistic potential through the increase of innovation, diffusion of good practices and internationalization of operations.

4.2. Vision

Vision of Polish Construction Cluster:

Achieving the position of a leading construction cluster in Poland, creating a new quality in energy-saving construction and having a real impact on domestic economic policy.

4.3. Strategic objectives

- ⇒ **Strategic Objective 1: Improvement of cluster management excellence.**
- ⇒ **Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.**
- ⇒ **Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.**
- ⇒ **Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.**
- ⇒ **Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.**
- ⇒ **Strategic Objective 6: Increasing the recognition of the cluster.**

- ⇒ **Strategic Objective 7: Increase of the cluster's economic potential**
- ⇒ **Strategic Objective 8: Intensification of customer orientation activities, with particular emphasis on internationalization**

4.4. Operational objectives

- ⇒ **Strategic Objective 1**: Improvement of cluster management excellence.
 - Operational objective 1.1: **Implementation of the best management practice and systems in the field of cluster management**
 - Operational objective 1.2: **Upgrading the cluster website as a two-sided mobile communications platform of services and knowledge in scope of the cluster specialization,**

- ⇒ **Strategic Objective 2**: Improvement of innovation level, marketing and sales skills of cluster members.
 - Operational level 2.1: **Developing competency of technology, knowledge and best practices transferring and exchanging**
 - Operational objective 2.2: **Strengthening the capacity of the joint R&D project realization**

- ⇒ **Strategic Objective 3**: Development of **new services for the cluster members** aimed at boosting their competitiveness on national and European level.
 - Operational objective 3.1: **Regular trainings and workshops regarding increasing competency of technology, knowledge and best practices transferring and exchanging**
 - Operational objective 3.2: **Regular invitations to implementation of joint R&D projects, co-financed by external sources; especially by the European Commission.**

- ⇒ **Strategic Objective 4**: Facilitating strategic and sustainable **partnering in the EU** and overseas of the cluster members.
 - Operational objective 4.1: **Promotion of partnerships between cluster members and NZEB partner's members (Romania, Slovenia, Serbia) on the B2B level**
 - Operational objective 4.2: **Stimulating the participation of cluster members in R&D activities on the national, and EU level**

- ⇒ **Strategic Objective 5**: Building up **cross-sectoral and trans-national synergies and value chains** with construction, energy efficiency and renewable energy sources industries.
 - Operational objective 5.1: **Initializing of cross-sectoral and trans-national cooperation by promotion of energy efficiency, and renewable energy sources through mutual workshops**
 - Operational objective 5.2: **Regular match-making trans-national meetings on the cluster platform in order to prepare joint R&D projects.**

- ⇒ **Strategic Objective 6: Increasing the recognition of the cluster.**
 - Operational objective 6.1: **Promoting cluster through creation its visual identity through web-based communication platform: website & social media (Facebook, Twitter, LinkedIn), video and printed materials, and press conferences.**

- ⇒ **Strategic Objective 7: Increase of the cluster's economic potential**
 - Increase in the share of enterprises engaged in export activities
 - A priority approach to zero and plus energy solutions
 - Focus on eco-innovation
 - Diversity and increase of the product, service and commercial offer
 - Implementation of research and development results available on the domestic and European market.
 - Joint procurement of audit services
 - Introduction of a common system for assessing product, service and commercial quality
 - Raising the competence of the management staff
 - Intensification of cooperation between cluster enterprises with innovation centers and research units

- ⇒ **Strategic Objective 8: Intensification of customer orientation activities, with particular emphasis on internationalization**
 - Internationalization of cluster members through the cluster's participation in foreign economic missions
 - Joint bidding for cluster members, e.g. at a consortium, in response to announced contracts from the construction sector
 - Joint activities in the area of systemic protection of intellectual property arising in the entities of the cluster
 - Expansion of the cluster sales and purchasing platform
 - Organization of industry conferences, seminars and trainings
 - Creating supra-regional project consortia
 - Organization of periodic study visits and intra-cluster internships
 - Promotion of the WKB brand, clusters in the country and abroad - traditional and electronic media
 - Strategic alliance with foreign clusters

4.5. Key Performance Indicators

Table 2 Key Performance Indicators (KPIs) of the strategy implementation

No	Objective	KPI	Baseline		Target	
			Value	Year	Value	Year
1.1	Obtaining the Bronze Cluster Management Excellence label	Bronze Certificate	0	2020	1	2021
1.2	Upgrading the cluster website as a two-sided mobile communications	Website actualization	0	2021	1	2022

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	platform of services and knowledge in scope of the cluster specialization					
2.1	Increasing awareness of the open innovation approach and developing specific skills of knowledge sharing within the cluster	BIM trainings developed by cluster coordinator	0	2021	1	2022
2.2	Developing competency of technology, knowledge and best practices transferring and exchanging	Online workshops on new technologies in construction industry	0	2021	1	2023
3.1	Regular trainings and workshops regarding increasing competency of technology, knowledge and best practices transferring and exchanging	Organizing workshops on circular economy, nZEB, BIM technology	0	2020	1	2022
3.2	Regular invitations to implementation of joint R&D projects, co-financed by external sources; especially by the European Commission.	Promoting financing opportunities within cluster members (newsletter, workshops)	0	2020	1	2022
4.1	Promotion of partnerships between cluster members and NZEB partner's members (Romania, Slovenia, Serbia) on the B2B level	Implemented 11 B2B meetings with partners from Romania, Slovenia, Serbia	0	2021	1	2022
4.2	Stimulating the participation of cluster members in R&D activities on the national, and EU level	Participation in common R&D activities by cluster members (at least 3 cluster members)	0	2021	1	2022
5.1	Initializing of cross-sectoral and trans-national cooperation by promotion of energy efficiency, and renewable energy sources through mutual workshops	Performed international workshops	1	2021	1	2022
5.2	Regular match-making trans-national meetings on the cluster platform in order to prepare joint R&D projects	Participating in new project within international consortium	0	2020	1	2022
6.1	Promoting cluster through creation its visual identity through web-based communication platform: website & social media (Facebook, Twitter, LinkedIn), video and printed materials, and press conferences.	Number of website visits, number of posts on social media	1	2021	4	2023
7	Increase of the cluster's economic potential	Increase in number of cluster members	233	2020	250	2022

8	Intensification of customer orientation activities, with particular emphasis on internationalization	Facilitating number of participations in international trade fairs	0	2020	1	2022
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5. Action plan

5.1. Aim of the action plan

The aim of the action plan is to support implementation of the cluster's strategy and provide operational guidelines for the cluster managers for reaching strategic and operational objectives.

5.2. Actions

Action 1 Conducting the ESCA Evaluation for Cluster Management Excellence certification

- **Description:** Polish Construction Cluster manager will conduct the ESCA Evaluation for Cluster Management Excellence process aimed to recertificate Bronze Label.
- **Related operational objectives:** 1.1: Implementation of the best management practice and systems in the field of cluster management
- **Responsible person / body for the implementation:** Adam Krajewski
- **Start:** Q2 2020, **End:** Q1 2021
- **Key Performance Indicators:** ESCA Evaluation Report, ESCA Bronze label

Action 2 Strengthening and promoting Polish Construction Cluster and clustering initiative

- **Description:** PCC will actively initiate and participate in activities towards increasing clusters recognition, inform of its activities and projects in Poland and abroad
- **Related operational objectives:** 1.2 Upgrading the cluster website as a two-sided mobile communications platform of services and knowledge in scope of the cluster specialization; 6.1 Promoting cluster through creation its visual identity through web-based communication platform: website & social media (Facebook, Twitter, LinkedIn), video and printed materials, and press conferences; 7 Increase of the cluster's economic potential; 5.1 Initializing of cross-sectoral and trans-national cooperation by promotion of energy efficiency, and renewable energy sources through mutual workshops
- **Responsible person / body for the implementation:** Adam Krajewski, Tomasz Kozlowski, Anna Moskwa, Karolina Kozłowska
- **Start:** Q1 2021, **End:** Q4 2023
- **Key Performance Indicators:** Website actualization; Number of website visits, number of posts on social media; Increase in number of cluster members

Action 3 Promoting and educating about nZEB, circular economy and BIM technology

- **Description:** PCC plans to actively organize and promote trainings, workshops and other activities increasing awareness and competence involving nZEB, circular economy and BIM technology
- **Related operational objectives:** 2.1 Increasing awareness of the open innovation approach and developing specific skills of knowledge sharing within the cluster; 2.2 Developing competency of technology, knowledge and best practices transferring and exchanging; 3.1 Regular trainings and workshops regarding increasing competency of technology, knowledge and best practices transferring and exchanging
- **Responsible person / body for the implementation:** Anna Moskwa, Adam Krajewski
- **Start:** Q1 2021, **End:** Q4 2023
- **Key Performance Indicators:** BIM trainings developed by cluster coordinator; Online workshops on new technologies in construction industry; Organizing workshops on circular economy, nZEB, BIM technology

Action 4 Creating new offer directed at cluster members

- **Description:** Cluster will partake numerous activities directly aimed at increasing possibilities for cluster members allowing for them to benefit financially, technologically and facilitating internationalization of their offer
- **Related operational objectives:** 3.2 Regular invitations to implementation of joint R&D projects, co-financed by external sources; especially by the European Commission; 4.1 Promotion of partnerships between cluster members and NZEB partner's members (Romania, Slovenia, Serbia) on the B2B level; 4.2 Stimulating the participation of cluster members in R&D activities on the national, and EU level; 5.2 Regular match-making trans-national meetings on the cluster platform in order to prepare joint R&D projects; 8 Intensification of customer orientation activities, with particular emphasis on internationalization
- **Responsible person / body for the implementation:** Tomasz Kozlowski, Anna Moskwa, Adam Krajewski,
- **Start:** Q1 2021, **End:** Q4 2023
- **Key Performance Indicators:** Promoting financing opportunities within cluster members (newsletter, workshops); Implemented 11 B2B meetings with partners from Romania, Slovenia, Serbia; Participation in common R&D activities by cluster members (at least 3 cluster members); Participating in new project within international consortium; Facilitating number of participations in international trade fairs

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Table 3 Activities overview

#	Action	Related operational objectives	Dimension <i>National / International</i>	Implementation timeline															
				2020		2021				2022				2023					
				Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
	Conducting the ESCA Evaluation for Cluster Management Excellence certification 1.1,	1.1	International																
	Strengthening and promoting Polish Construction Cluster and clustering initiative	1.2, 5.1, 6.1, 7	National / International																
	Promoting and educating about nZEB, circular economy and BIM technology	2.1, 2.2, 3.1,	National																
	Creating new offer directed at cluster members	3.2, 4.1, 4.2, 5.2, 8	National / International																

5.3. Resources

Table 4 Overview of resources necessary for the action plan implementation

#	Name	Description	Type <i>Human / Financial / Technical / other</i>	Availability <i>yes / partially/ no</i>
1.	Professional cluster coordinator (2 people)	A person who will be responsible for the cluster coordination, the action plan implementation and monitoring	Human	partially
2.	Specialists delegated to the Project (2 people)	A person who will be responsible for implementing 11 B2B meetings with partners from Romania, Slovenia, Serbia A person who will be responsible for conducting 2 international workshops with partners from Romania, Slovenia, Serbia	Human	partially
3.	Office space	Professional office space with necessary equipment – 110 m2	Technical	Yes
4.	Members / Participants contribution	The contribution of members and stakeholders participating in related activities is expected to cover substantially for the main actions related expenses	Financial	Partially
5.	National and EU founded projects	The goals and objectives of this strategy and action plan may coincide with EU Funded projects	Human / Financial	Partially

5.4. Procedure of monitoring and implementation plan progress assessment

Monitoring is an essential part of action plan implementation. If it is held regularly, it allows for a real-time control of completing the planned tasks and implementing corrective actions, if tasks are not bringing the estimated results. The action plan implementation is foreseen for 3 years and should be monitored on semi-annual basis. During the action plan completion monitoring, the effects of activities taken so far should be assessed and, unless they are satisfactory, the strategic goals, priorities and measures should be updated.

The action plan completion and its monitoring is recommended to be based on the tool called the Deming cycle: Plan-Do-Check-Act (Figure 2), as described, for an instance, in PN-EN ISO 50001.

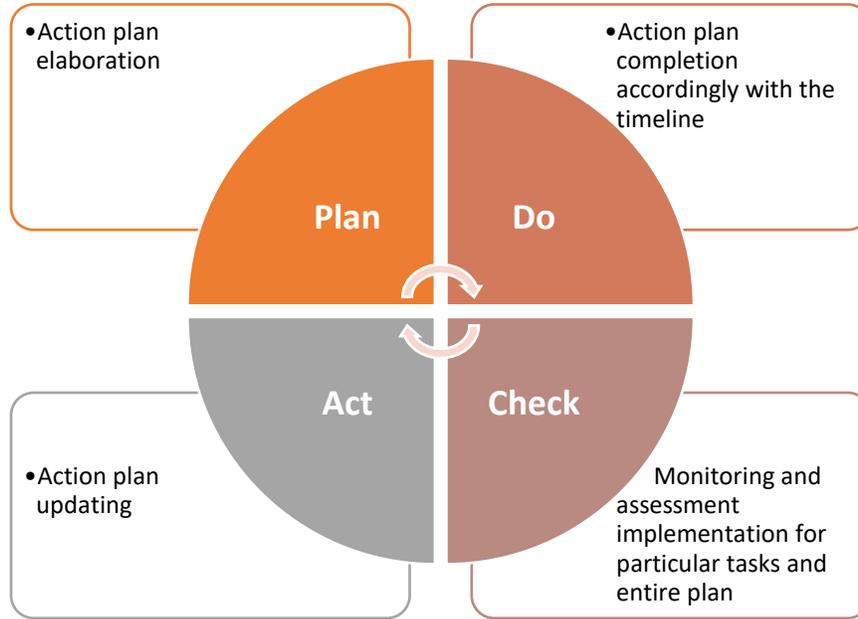


Figure 2 Action plan completion and implementation monitoring procedure based on the Deming cycle

The „Plan” part consists of development of an action plan and is being completed during the preparation of this document. The „Do” stage concerns the implementation of the particular activities and the whole plan, i.e. completion of the planned tasks. The „Check” stage, which means the action plan completion monitoring, should concern simultaneously each task separately (checking if the tasks are completed accordingly with the schedule and if the indicators have been achieved) as well as the overall plan (to what extent the plan goals have been achieved). Meanwhile, the „Act” part concerns the action plan updates and the corrective action implementation which allows to reach the previous indicators if it turns out on the previous stage that they are doubtful, or widening the plan with the new tasks and setting new indicators if the ones planned previously turn out to be completed.

V. Development and Innovation Strategy of the 'Bioenergy for the Region' Cluster

DEVELOPMENT AND INNOVATION STRATEGY BIOENERGY FOR THE REGION CLUSTER



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SMART4NZEB D4.1 Clusters Development and Innovation Strategy

Project	Strengthening clusters Management Activities and Running Trans-national for implementation of nearly Zero Energy Buildings – SMART4NZEB
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Authors	Katarzyna KORCZAK, Ewa KOCHAŃSKA
Reviewers	PRO-NZEB, SGG, PSDik, Dundjer
Abstract	This document presents the development and innovation strategy of the Polish Construction Cluster. Section 1 presents the context of the document, which was developed within the SMART4NZEB project framework. Section 2 describes the global environment of the cluster – relevant policy instruments, as well as market and technological trends. Section 3 presents the cluster – its history, coordinator, members, and current position. Section 4 presents the cluster strategy, setting strategic and operational objectives, alongside the cluster mission and vision. Finally, section 5 consists of the action plan, which supports the implementation of the strategy.
Keywords	Strategy development, guidelines

History of Changes

Version	Author(s)	Date	Summary of Changes
0.0	Katarzyna KORCZAK	9 May 2020	First draft of table of content
0.1	Maksymilian KOCHAŃSKI	25 May 2020	Comments and suggestion added
0.2	Katarzyna KORCZAK	27 May 2020	Improvement according to Maksymilian’s suggestions
0.3	Katarzyna KORCZAK	28 May 2020	“Action plan” section (table of contents) has been added
0.4	Katarzyna KORCZAK	6 July 2020	Chapter 2 and 3 completed, excluding section 3.5
0.5	Ewa KOCHAŃSKA	17 July 2020	Chapter 4 and 5 completed, review and update of Chapter 2.
0.6	Katarzyna KORCZAK	31 July 2020	Section 3.5 completed
0.7	Katarzyna KORCZAK	11 January 2021	Minor updates according to reviewer’s feedback
0.8	Katarzyna KORCZAK	9 July 2021	Minor updates according to reviewer’s feedback
1.0	Katarzyna KORCZAK	30 November 2021	Update of Section 2 – global environment of the cluster; update of the cluster members list; Minor updates according to reviewer’s feedback

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1. Introduction

1.1. SMART4NZEB project

The aim of the SMART4NZEB project is to boost competitiveness and support the scaling-up of 577 SMEs active in construction, energy efficiency and renewable energy sectors through strengthening capacity-building of 5 representative clusters as drivers of innovation in Central and Eastern Europe (Poland, Romania, Serbia and Slovenia) and facilitate trans-national exchanges and strategic partnerships with a focus on sharing experience between different practices, skills gaps, policies, target goals and level of engagement related to nearly Zero Energy Buildings (nZEB).

The main objective of SMART4NZEB is to create a sustainable collaboration, co-learning and capacity building between the involved partners - cluster managers and cluster members and relevant stakeholders representative for the nZEB market in the selected Central and East-European countries, with a view to develop the involved clusters management excellence and to support interregional partnerships to facilitate the development of competitive products and technological solutions intended for new and existing buildings, which will lead to market penetration of nearly zero energy buildings, and new products / services related to their production, use and reuse. The overall objective of the action is to drive the partnering clusters towards innovative and modern clusters being able to address cross-sectoral and cross border challenges.

1.2. Context of the Work Program

This document is developed within *WP4 Clusters’ development and innovation strategies*. The main objective of this WP is to create transnational collaboration-based clusters’ development strategies to boost competitiveness and support the scaling-up of SMEs active in construction, energy efficiency and renewable sectors through improved and tailored services offered by the clusters based on the specific needs of the involved SMEs. As a supplementary document, action plans for the participating clusters will be also developed, to ensure that the collaboration strategies in the field of nZEB are operational, functional and allow for progress monitoring. WP4 utilizes results of other technical work packages (Figure 1). In particular, it uses results of the SWOT analysis from WP2, survey conducted among clusters members, and feedback from those who participate in the ClusterXchange scheme (<https://clustercollaboration.eu/tags/clusterxchange>).

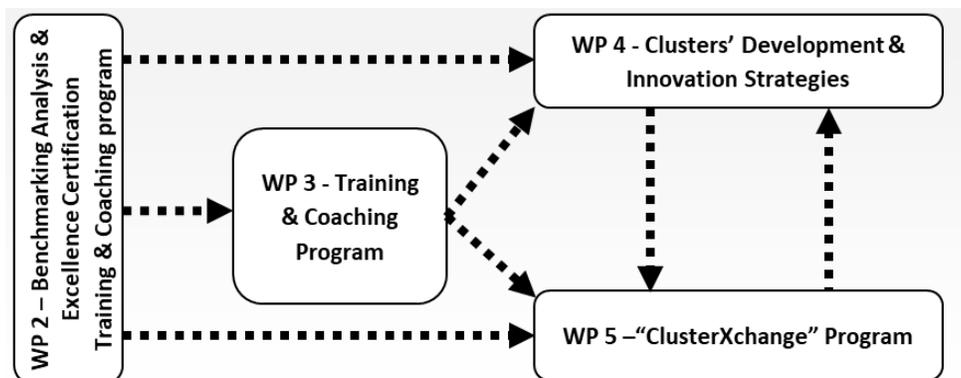


Figure 1 Workflow of SMART4NZEB project

1.3. Aim of the document

The aim of this document is to provide the Development and innovation strategy for the Bioenergy for the Region Cluster. The Strategy should be a comprehensive guidance for helping local stakeholders in regional development of nZEB through active engagement, cross-sectoral and transnational collaboration of clusters' members. The strategy will serve all members of the Bioenergy for the Region Cluster, representing the following sectors:

- SMEs: 57
- Large Companies: 3
- Public authorities: 11
- Business networks: 6
- Research and education: 7.

2. Global environment of the cluster

2.1. Global and European environment of the cluster

The main objective of the Bioenergy for the Region Cluster's activities is widely understood to be the development of renewable energy sources, supported by promotion of energy efficiency improvement. Renewable energy sources (wind, solar, hydroelectric, ocean energy, geothermal energy, biomass and biofuels) are an alternative to fossil fuels and contribute to reducing greenhouse gas emissions, diversifying energy supplies and reducing dependence on uncertain and unstable fossil fuel markets, especially oil and gas. Effective global action towards a safe and sustainable low-carbon and climate-resilient energy system is essential to tackling climate change and achieving the objectives of the 2030 Agenda, stated by the United Nations Department of Economic and Social Affairs. Central for such action is the provision of universal access to energy, wider deployment of renewable energy, increasing resilience of energy systems and improving energy efficiency. Progress toward the achievement of the UN the 7th Sustainable Development Goal (SDG7): **Ensure access to affordable, reliable, sustainable and modern energy for all** remains mixed and falls short of what is needed to reach the goal by 2030. Still more than a billion people, mostly in rural areas, live without the benefits of electricity, while about three billion people still lack access to clean and safe cooking fuels and technologies, with catastrophic consequences in terms 2 of over 4 million premature deaths due to indoor pollution affecting primarily women and children. While modern renewable energy is expanding rapidly in the electricity generation sector across the world, comparable progress has not occurred with renewable energy in the heat or transport sectors. Despite advancements in reducing energy intensity globally, progress is not yet sufficient to meet the energy efficiency target under SDG7. However, in opinion of The United Nations High-level Political Forum (HLPF), achieving SDG7 remains feasible. Despite the challenges, Forum emphasized that technological innovations, new business models and a growing number of best practices are bringing this goal within reach. To accelerate progress, they emphasized, among others, the need for:

- i. enabling environments including bold policies and stable regulatory conditions;
- ii. concerted action by public and private sectors to overcome financing challenges;
- iii. scaled up capacity building;
- iv. integrated, cross sectoral approaches to break the silos and operationally realize interlinkages;
- v. regional cooperation to promote harmonization, innovation and competitiveness.

On the European Union level, the EU legislation on the promotion of renewable energy sources and reducing energy consumption and energy losses has evolved considerably in recent years. In 2009, EU leaders set a target that by 2020, 20% of EU energy consumption should come from renewable sources, and the annual energy consumption should decrease by 20%. In 2018 *The Clean Energy for All Europeans* package was proposed. One of its purpose is to maintain the Union's position as a world leader in the field of renewable energy sources and, in a broader context, to help the Union meet its emission reduction commitments under the Paris Agreement. It set a binding target that by 2030, final energy consumption in the Union should be obtained at least 32% from renewable sources, and a clause allowing this target to be increased by 2023. The energy efficiency target was set to decrease energy consumption by 32.5% by 2030. *The Clean Energy for All Europeans* legislative proposals covers energy efficiency, renewable energy, the design of the electricity market, security of electricity supply and governance rules for the Energy Union. Energy efficiency measures are increasingly recognized as a means not only to achieve sustainable energy supply, reduce greenhouse gas emissions, improve security of supply and reduce import costs, but also to promote the Union's competitiveness. Energy efficiency is therefore a strategic priority of the Energy Union, and the EU promotes the principle of *energy efficiency first*. In addition, the Commission proposes a new way forward for Ecodesign as well as a strategy for connected and automated mobility. The package also includes actions to accelerate clean energy innovation and to renovate Europe's buildings. It provides measures to encourage public and private investment, promote EU industrial competitiveness and mitigate the societal impact of the clean energy transition.

As part of the European Green Deal, the European Commission announced in July 2021 a “Fit for 55” package, which is a set of proposals to update or revise EU legislation so that it supports reaching the overarching EU objective of becoming a climate-neutral by 2050. One of the mid-term objectives is to decrease greenhouse gas emissions by 55%, compared to 1990 levels. The overarching objective of the EU is to reach climate neutrality by 2050.

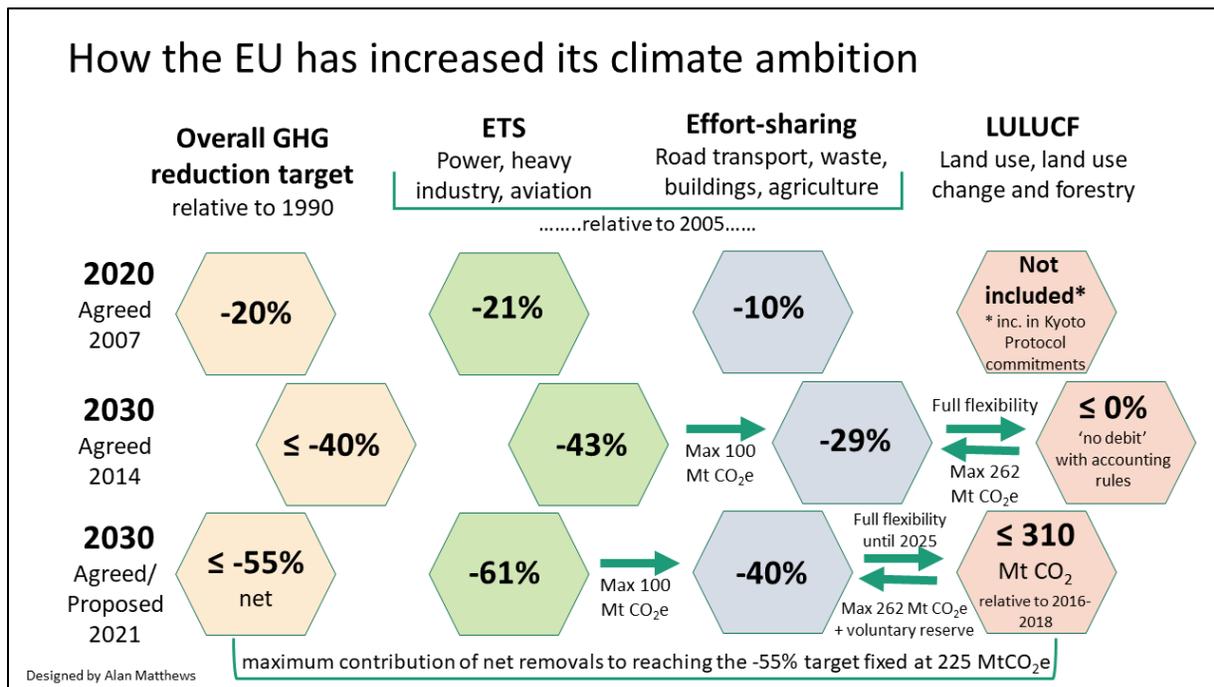


Figure 2 EU GHG emission targets (source: https://twitter.com/xalan_matthews/status/1415432688480276483)

The European Commission promotes also increasing energy efficiency of the building stock. Buildings are the single largest energy consumer in Europe, as they are responsible for approximately 40% of EU energy consumption and 36% of CO₂ emissions. At present, about 35% of the EU's buildings are over 50 years old and almost 75% of the building stock is energy inefficient. At the same time, only about 1% of the building stock is renovated each year. Renovation of existing buildings can lead to significant energy savings as it could reduce the EU's total energy consumption by 5-6% and lower CO₂ emissions by about 5%. Investments in energy efficiency stimulates the economy, especially the construction industry, which generates about 9% of Europe's GDP and directly accounts for 18 million direct jobs. SMEs in particular benefit from a boosted renovation market, as they contribute more than 70% of the value-added in EU's building sector. The Energy Performance of Buildings Directive (2010/31/EU - EPBD) updated in 2018 (2018/844/EU) requires that all EU Countries must establish a long-term renovation strategy to support the renovation of their national building stock into a highly energy efficient and decarbonised building. This is a one step forward the current target of all new buildings to be nearly zero-energy (nZEB) by 2020. nZEB have very high energy performance (in accordance with Annex I of the EPBD). The low amount of energy that these buildings require comes mostly from **renewable sources**.

On December 2019 European Commission presented *The European Green Deal* – a roadmap for making the EU's economy sustainable by turning climate and environmental challenges into opportunities across all policy areas and making the transition just and inclusive for all. Climate change and environmental degradation are an existential threat to Europe and the world. To overcome these challenges, Europe needs a new growth strategy that transforms the Union into a modern, resource-efficient and competitive economy where:

- there are no net emissions of greenhouse gases by 2050;
- economic growth is decoupled from resource use;
- no person and no place are left behind.

The European Green Deal provides a roadmap with actions to boost the efficient use of resources by moving to a clean, circular economy and stop climate change, revert biodiversity loss and cut pollution. It outlines investments needed and financing tools available and explains how to ensure a just and inclusive transition. *The European Green Deal* covers all sectors of the economy, notably transport, energy, agriculture, buildings, and industries such as steel, cement, ICT, textiles and chemicals.

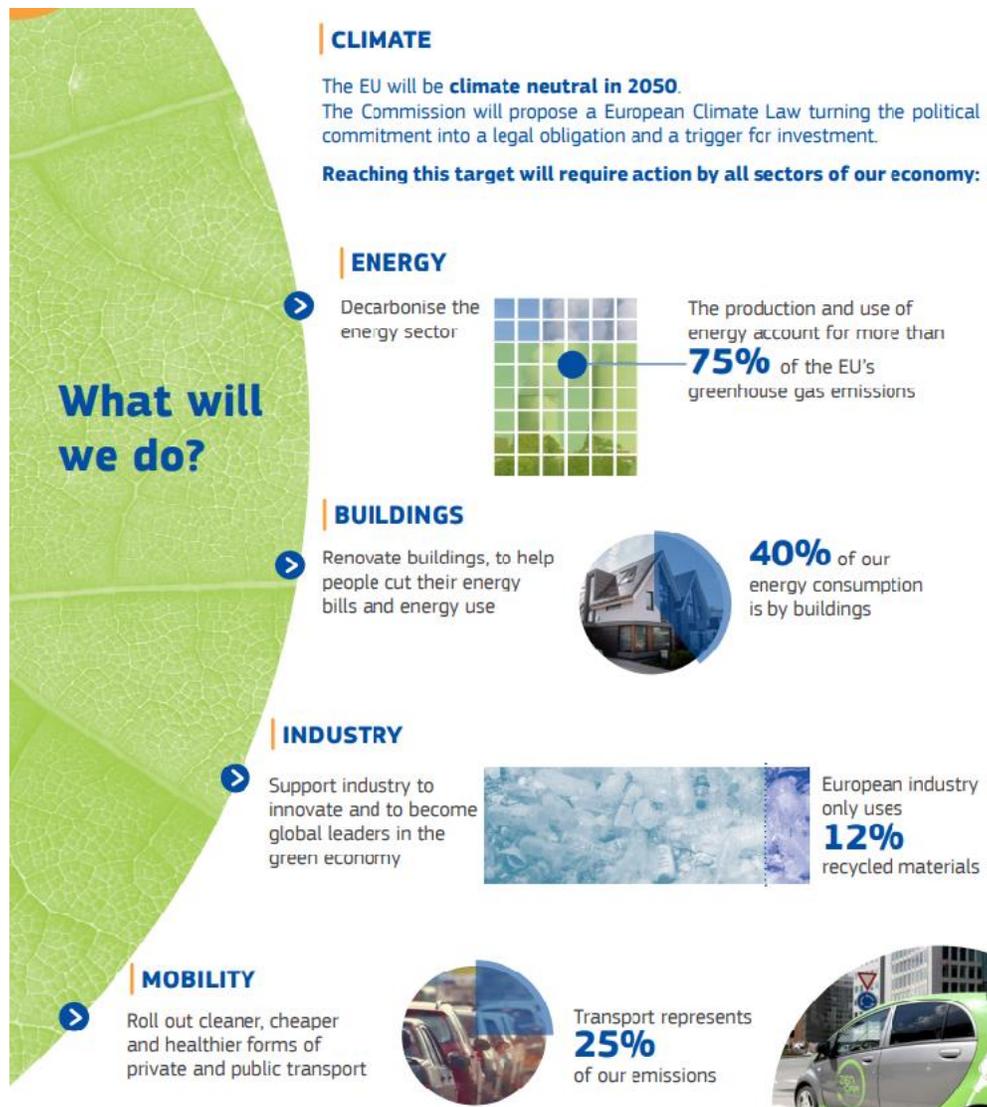


Figure 3 Infographics of the European Green Deal, Source: https://ec.europa.eu/commission/presscorner/detail/en/fs_19_6714

Meeting the objectives of *The European Green Deal* will require significant investment. Achieving the current 2030 climate and energy targets is estimated to require €260 billion of additional annual investment, representing about 1.5% of 2018 GDP. This investment will need the mobilization of the public and private sectors. The Commission will present in early 2020 a Sustainable Europe Investment Plan to help meet investment needs. At least 25% of the EU's long-term budget should be dedicated to climate action, and the European Investment Bank, Europe's climate bank, will provide further support. For the private sector to contribute to financing the green transition, the Commission will present a Green Financing Strategy in 2020.

Bioenergy for the Region Cluster is one of the stakeholder of the global and European endeavours and participates in the global efforts related to renewable energy sources development together with the environmental protection actions, creating new economical resource management rules, and all kind energy production and the food processing as well as waste management technology development.

2.2. National context and policy framework

In the last decade the Polish government has established a set of programmes supporting energy efficiency improvement in all economy sectors, dedicated various bodies and industries, e.g. buildings, public bodies, SMEs, transport, power sector, and horizontal measures. These include e.g. energy efficiency obligation scheme (white certificates), energy audits and energy management systems in large companies, qualification, accreditation and certification schemes (energy performance of buildings certificate). In the context of buildings, in 2015 the Polish Government adopted the "The "National Plan aimed at increasing the number of nearly zero energy buildings". The document focuses on legislative changes necessary to increase the number of NZEB in Poland and indicates measures and programmes that can be used by bodies interested in the development of NZEB. Despite its name, the document does not include any action plan, understood as a set of tasks that should be performed, with timeline and responsibilities assigned. This resulted in poor recognisability of the NZEB concept in Poland.

One of major problems in Poland with the decarbonisation of the economy is the well-grounded energy mix and the lack of political decisions to change this mix. The fuel mix of electricity generation in Poland has been based predominantly on solid fuels for many decades. In addition, the generation power base is outdated. Many of the generating units are inefficient, uneconomic, and do not comply ecological standards, so they should be withdrawn from use in the near future. Poland, which consumes approximately 170 TWh of electricity annually, needs to determine the direction of the further development of the energy sector. The concepts of covering domestic demand for electricity were outlined by the government in the draft Energy Policy of Poland until 2040, where it was pointed out that the most important pillars of the Energy Policy should be the following:

- i. the energy security of the country,
- ii. competitiveness,
- iii. the improvement of the energy efficiency of the economy,
- iv. limiting the impact on the environment.

In line with the Paris Climate Agreement the governments of EU countries have declared coal phase-out by 2030. Poland was one the last countries that made similar declaration, however with a significant lower level of ambition. In the *Energy Policy of Poland until 2040* the government plans that the last coal-based power plant will be closed in 2049. The same document sets the following target in the field of the development of renewable energy sources:

- lowering the emission intensity of the energy sector and the diversification of energy generation;
- a 21% renewable energy sources (RES) in gross final energy consumption in 2030 in Poland is planned;
- 1–1.3% of annual consumption should increase in heating and cooling, maintaining the increase in the electricity sector;
- the implementation of offshore wind energy,
- 10% and 14% RES in transport in 2020 and 2030, respectively,
- development of distributed production renewable energy system,
- the possibility of RES balancing (storage sites, energy clusters, regulatory sources),
- financial support system dedicated to the renewable energy sources development.

The Polish *National Energy and Climate Plan for 2021–2030* sets the following targets:

- 7% reduction of greenhouse gas emissions in non-ETS sectors compared to 2005 levels,
- 21-23% share of energy from renewable energy sources in gross final energy consumption,
- 14% share of energy from renewable energy sources in transport,
- 1.1 percentage points of annual increase of energy from renewable energy sources in the heating and cooling sector
- 23% increase of energy efficiency, compared to PRIMES2007 forecasts,
- 56-60% reduction of the share of coal in electricity production.

'Bioenergy for the Region' is a co-operation platform of companies, research institutions, local administration and business support institutions. The main aim of our co-operation is sustainable energy development in Central Poland. In the context of the climate change, we promote innovative solutions in renewable power engineering in local and regional dimensions.

'Bioenergy for the Region' Cluster aims to achieve its purposes through:

- complex solution of issues concerning the regulation of the biomass market in Central Poland, in particular the methods of collection, processing and use as a RES;
- integration of members of the Cluster - businesses, researchers and local authorities in order to increase the share of solar and wind energy in the energy balance of the region;
- educational and information activities, promoting the use of renewable energy and energy efficiency.

2.3. Technology development trends in the energy efficiency and RES industry

Two basic trends in the development of energy technologies in Poland can be observed: the first concerns clean coal technologies, and the second - renewable energy technologies.

The lack of a clear national strategy in the field of renewable energy sources development and the lack of consideration in Polish industrial policy of the need to promote and shape the development of the RES production industry have slowed down the formation of larger RES production companies, which could become global or even EU or domestic market leaders in their areas. However, many companies have already been established that significantly meet the needs of the domestic market of RES and have made efforts for international expansion. The RES production sector is not monitored in Poland in a systematic and complete way, it is not included in national statistics. Domestic producers of renewable energy devices are also not widely represented in industry associations and chambers of commerce, which is why little is known about the problems and needs of device manufacturers. There is a noticeable tendency to increase in the share and number of companies of RES production specialization with multi-branch character, producing various components and devices not specific for renewable energy, and a trend to decrease in the number of companies specializing in the production of basic devices, key for the renewable energy sources industry. Another observation shows that the RES company engage only around 20-40% of their technological capacity for the production. This trend has been continued for at least two decades and leads to unprofitability of the domestic RES industry and total dependence on the import of modern technologies for renewable energy source development.

The Polish renewable energy industry does not develop its own proprietary, exclusive technologies, but is based on solutions and technologies obtained from abroad. Components for the construction of solar

farms and wind farms are imported. The main PVP suppliers are Chinese companies, like JA Solar, Trina Solar, JinkoSolar etc., while the largest producers of wind turbines are Danish Vestas, Danish-Japanese MHI Vestas, Siemens Gamesa, General Electric and companies from China. The wind power net capacity installed in Poland was 6,347 MW at the end of 2020, and annual electricity production – 11.4 TWh. The installed solar photovoltaic net capacity in Poland was 887 MW in the end of 2020 and it was twice as big as in 2019. All PV installation generated 0.7 TWh in 2020. In total, share of energy electricity production from renewable energy sources reached 12.52% in 2020.

Building energy efficiency technologies can be divided into two main categories: technologies improving energy efficiency of traditional buildings (both new and existing ones), and novel technologies of buildings construction.

The first group consists of solutions improving energy performance of a building, such as:

- insulation systems of the exterior surface (walls, ceilings), e.g. mineral wool, styrofoam,
- energy efficient windows,
- heat and power source: gas and biomass boilers, heat pumps, electric heating (e.g. electric mats),
- heating distributions system elements, e.g. thermostatic valves,
- LED lighting,
- ventilation systems, e.g. heat recovery systems,
- efficient pumps, insulation of pipes, effective and optimized control,
- energy management and control systems.

Most of these technologies that are applied in Poland are of foreign origin – they are imported to Poland and Polish companies only distribute and/or install them. There are however a few exceptions. Polish windows producers (Drutex, Oknoplast) have a strong position on both national and international market and provide high quality energy efficient windows solutions. The boiler market is dominated in Poland by domestic manufacturers, both large companies and SMEs. In fact, they are dynamically developing their businesses due to the coal ban introduced by many Polish municipalities in recent years – they shift from coal to biomass highly efficient biomass boilers.

Novel building technologies include mainly prefabricated components (e.g. façade panels) and buildings. They are offered usually by SMEs (often start-ups). Prefabrication can reduce construction time significantly, and can provide higher energy performance standard, due to limited risk of human mistake at a construction site. Companies offering this type of buildings often advertise their products as highly efficient, zero- or even plus-energy constructions. This market is developing, however still quite small. Example of companies: Budihome, Box Haus, Solace house, Ecologic.

2.4. Market trends in the energy efficiency and RES industry

After a dynamic development in 2012-2016, the RES market entered a two-years stagnation phase, resulting from unfavorable legislation changes preventing from investing in large off-shore wind farms. In 2019 the RES capacity started growing again, mainly thanks to huge popularity of micro-PV installations among private investors (Figure 4). Despite the recent inhibition in the wind energy sector, it stays the largest RES branch in Poland with the capacity of 6,347 MW (63.2% of share) (Figure 5). It is followed by biomass (1,512 MW, 15.2%) and water (976 MW, 9.8%). All these three subsectors (wind, water, biomass) are a part of the power system in Poland, providing electricity on a large scale. This is reflected in the size of an average installation – for biomass it is 28.7 MW (usually biomass boilers in power and CHP plants),

for wind turbines – 4.9 MW, and for water – 1.3 MW (Figure 6). On contrary, PV installations are rather small – 400 kW on average. They are developed both by large companies, SMEs and private consumers. The largest PV plant of a capacity of 3.77 MW is located in Czernikowo (WNP 2019), and is owned by Energa, a state-owned large energy supplier and distributor. The PV market is driven by small customers, buying installations for their own needs. In 2019 the total number of PV prosumers in Poland (usually households possessing small PV installation) increased almost threefold, from 51 thous. to 149 thous. This is mainly due to governmental programme “Mój Prąd” (My electricity) providing up to 5000 PLN (~1200 EUR) donation for households for small scale PV installations (2-10 kWp), but also decreasing prices of PV and rising electricity costs. Small installations have a share of 70% of a total PV capacity in Poland (IEO 2020). It is expected that by the end of 2020 the total PV market in Poland will reach PLN 5 billion (IEO 2020).

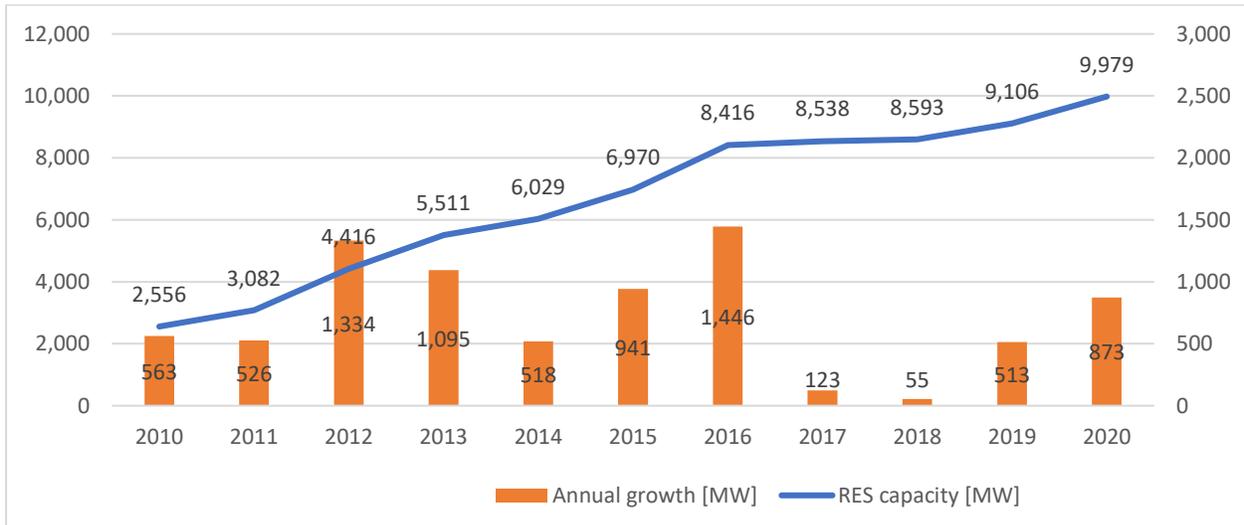


Figure 4 RES capacity in Poland, 2010-2020. Source: own work based on data of URE

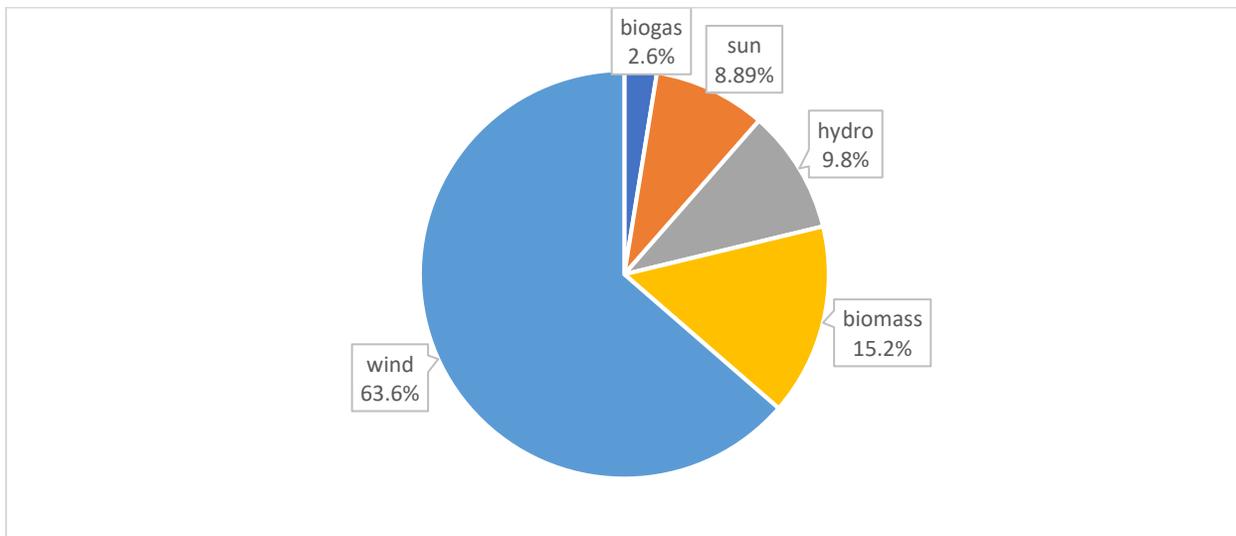


Figure 5 RES installed capacity structure in Poland, 2020. Source: own work based on data of URE

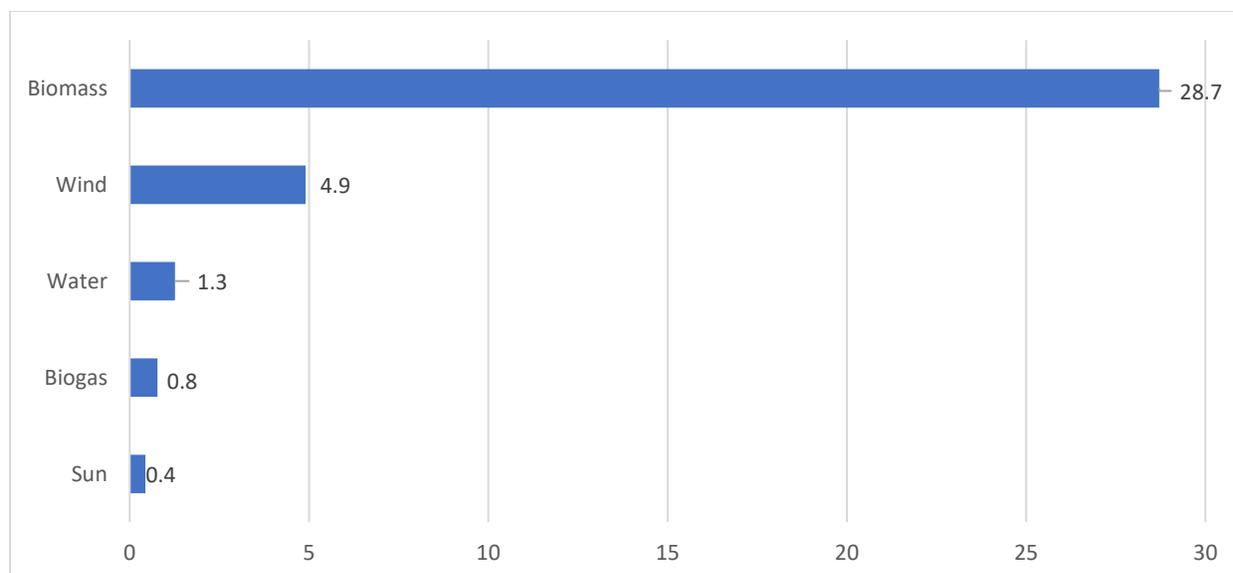


Figure 6 Average capacity of RES installations, 2019 (MW)

Energy efficiency market in Poland is focused on two main sectors: industry and buildings. Large companies are obliged by the Energy efficiency act to conduct an energy audit every 4 years unless they implemented an energy management system or environment energy system (EMAS). The first due date was set to 1 October 2017 and effected in a massive demand for services of energy auditors in 2017 and 2021. The building energy efficiency market is more stable, however it is also driven by governmental and local policies. Following regulations of the Environment Protection Act, since July 2018 it is not possible to sell a solid fuel boiler of a class lower than 5, according to PN-EN 303-5. In fact, in many municipalities burning solid fuel is illegal, according to “ani-smog acts”. Households are encouraged to install ecological heating sources, in particular district heating, heat pumps and gas boilers. This is supported by the governmental programme “Clean Air” (Czyste Powierze) providing grants for owners of private residential buildings for a thermal modernization of a building and exchange of a heating source. It is possible to get up to 30,000 PLN in case the modernization includes a heat pump and PV, or 20,000 PLN for only a heating source exchange. Total budget of the programme is PLN 103 billion and is implemented between 2018 and 2030 (NFOŚiGW n.d.). It is expected that this programme will boost the ecological heating sources market.

Gas boilers are still the most popular heating source in single-family buildings. 47% of newly sold heating devices were gas boilers (Figure 7). Heat pumps have the smallest share, but this market has been continuously growing in recent years. It is estimated that there are already 128,000 heat pumps installed in Polish households. They are used for space heating and domestic hot water heating. In 2019 it increased by 37% and considering only heat pumps dedicated to central heating systems – by 64%. This translates to 42,800 heat pumps sold. The market leader are air-to-water heat pumps – their sales raised by 91% in 2019, compared to 2018, reaching 20,000 units. Since the “Clean Air” programme launching, almost 18,000 heat pumps have been installed thanks to this grant. It is expected that by 2030 there will be between 1.09-2.09 mln heat pumps installed in Polish households, reaching 10-22.8% share of the heating sources (Port PC 2020).

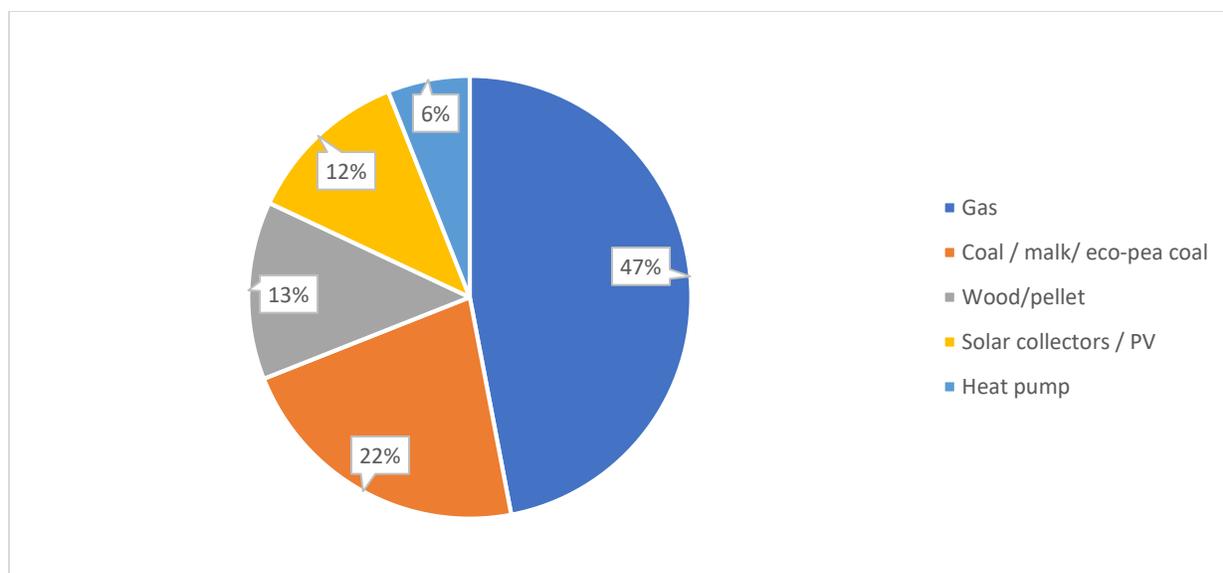


Figure 7 Sales of heating devices by fuel type/medium in 2019 (SPIUG 2020)

2.5. External resources available for the cluster development

The first cluster in Poland started its activity in 2003. Since then, over 150 clusters representing 28 branches have been established. Since the beginning they have been funded and developed thanks to work and donation of their members. In 2011 the Ministry of Economy and Polish Agency for Enterprise Development inaugurated a working group for cluster policy. In 2014 the working group recommended that the main goal of cluster policy should be to strengthen the innovation and competitiveness of the Polish economy based on the intensification of cooperation, interaction and knowledge sharing within clusters, and to support the development of strategic economic specializations. In fact, the suggestion was that the financial support should be available only for Key National Clusters (Krajowy Klaster Kluczowy, KKK).

National Key Cluster (KKK) is a cluster of significant importance for the Poland's economy and high international competitiveness. KKKs are identified at national level, based on the following criteria: critical mass, development and innovation potential, existing and planned cooperation, experience and potential of the cluster coordinator. KKKs are selected in an open competition organised by the Ministry of Entrepreneurship and Technology in cooperation with the Polish Agency for Enterprise Development. As of July 2020, there are 15 KKKs.

Direct public support for clusters is available from Smart Growth Operational Programme and Eastern Poland Operational Programme:

- Internationalization of the KKK - an instrument dedicated directly to clusters (EUR 33.25 million);
- Preferences for projects submitted by members of the KKK (additional points for membership in the KKK granted at the stage of proposal evaluation);
- Support for supra-regional cooperation links (EUR 100 million).

3. Cluster overview

3.1. History of the cluster

The Bioenergy for the Region Cluster (B4R) has been established in April 2007 as a bottom-up initiative of companies, local authorities and research institutions based in Łódź Voivodeship. It is an open cooperation initiative, which at the end of 2021 brought together 57 SMEs, 3 large enterprises, 7 research institutes, 11 public authorities and 6 business environment institutions, a total of 84 entities operating in renewable energy sources and energy efficiency area. The cluster's goal is to work for the sustainable bioenergy development of Central Poland in the context of the European Commission's policy in the field of energy and climate change.

3.2. Cluster coordinator

The Bioenergy for the Region cluster is coordinated by the Research and Innovation Centre Pro-Akademia (RIC Pro-Akademia). It is the first professional non-governmental public benefit research organization in Poland, established in Lodz in 1996. In its scientific and research activities, the organization focuses on interdisciplinary, multi-sectoral and international cooperation. RIC Pro-Akademia employs 20 permanent experts and collaborates with over 150 external professionals in the field of technology, economics and social science. The main source of financial income of RIC Pro-Akademia are project grants (~60%), followed by direct contracts with SMEs and public authorities for conducting tailored research activities (~35%).

3.3. Cluster activity and technology background

As of June 2020, the cluster is composed of 83 members (Table 1), excluding the coordinator. The cluster is balanced in terms of the members structure, since it associates all type of entities. Most of the members are SMEs (56), followed by Public authorities (11) and Research and education institutions (7) (Figure 8). Core activity of the cluster members is related to biomass energy, energy efficiency and other renewable energy sources, in particular solar and HVAC installations. Members dealing with biomass cover the whole value chain: production of energy plants (e.g. Gospodarstwo Rolne Tomasz Maciaszczyk), production and sales of fuels from biomass (e.g. Pellet Energy Sp. z o.o., Firma Handlowo Usługowa Krzysztof Kłys), production of energy (e.g. BIOENERGY PROJECT Sp. z o. o.), manufacturing of machines and tools for the biomass industry (e.g. EKO-MAX Sp.z o.o), as well as R&D in the field of biomass cultivation (e.g. Instytut Ogrodnictwa). Members working in the field of energy efficiency focus on providing advisory services, including energy audits and energy management (e.g. Agencja Użytkowania i Poszanowania Energii Sp. z o. o., Projekt Grupa Witold Kurczyński). This group consist of also construction companies providing passive and energy efficient buildings (e.g. INWESTOR Janusz Mostowski, Przedsiębiorstwo "MAGNUS" Arkadiusz Muszyński). Companies from the solar energy sector deliver mainly PV installations, sometimes combined with heating systems and smart building systems. 11 members and the coordinator provide research and education services, in particular in RES and energy efficiency fields. Key R&D&I players are RIC Pro-Akademia which initiates most of the joint research projects among cluster members, but also Łódź University of Technology, Instytut Energetyki and Instytut Ogrodnictwa.

Examples of already implemented projects:

- Testing and implementation of a pilot service in the field of management of energy efficiency in an enterprise – RIC Pro-Akademia conducted a series of free-of-charge energy audits of SMEs that resulted in increasing their energy efficiency.
- Construction of a Technology Transfer Center in the field of Renewable Energy Sources – The main goal of the project was to increase the innovativeness of enterprises associated in the Bioenergy for the Region Cluster by providing a common laboratory area that would be used for development of innovative products and services.
- Sustainable Energy Action Plan for Konstaktynow Lodzki– RIC Pro-Akademia developed a SEAP for Municipality of Konstaktynow Łódzki. The plan sets energy efficiency, RES and CO2 emissions targets, as well as an action plan.
- Efficiency of energy clusters in the Visegrad Region – RIC Pro-Akademia conducted a research on the effectiveness of Polish energy clusters, in particular in the view of the cluster policy at the central level in Poland and provided conclusions for the final report on the cluster policy of the Visegrad Group.

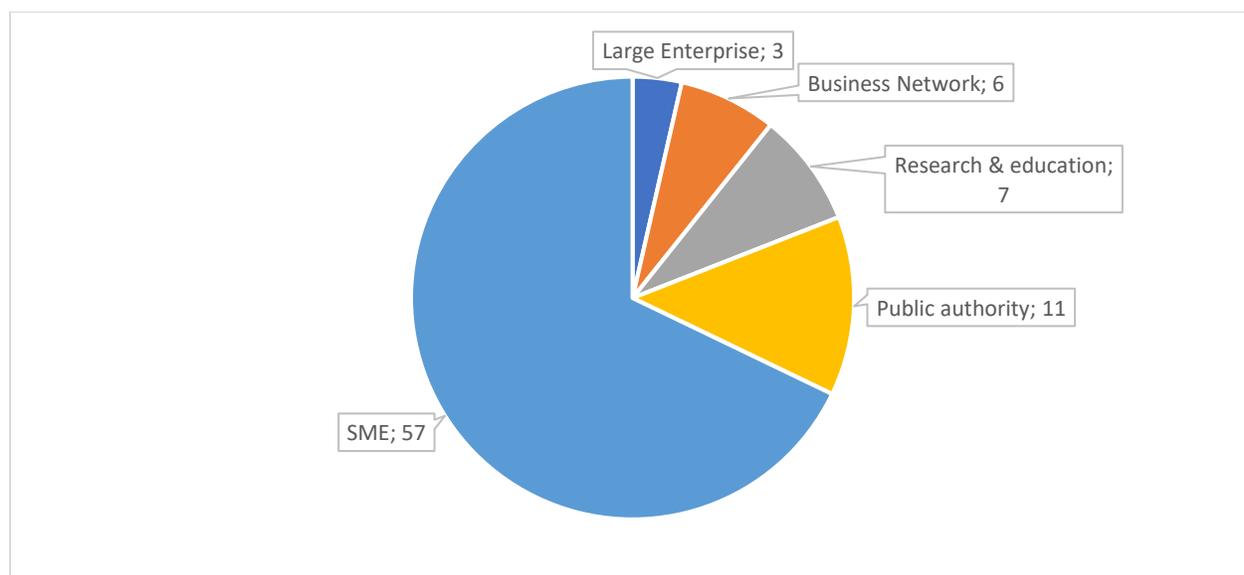


Figure 8 Structure of the cluster's members

Table 1 Cluster members as of November 2021

N	Name	Type	Field of expertise	website
1)	Agencja Użytkowania i Poszanowania Energii Sp. z o. o.	Business Network	Energy efficiency advisory services. Energy audits, economic analysis of fuel efficiency. Supporting ecological activities.	http://www.auipe.pl
2)	Agencja Usług Porządkowych „Czyścioszek” Beata Bieńko	SME	Facility Management	-
3)	ALLMENDINGER Sp. z o. o.	SME	Supplier of individual, energy-saving solutions for the construction industry	http://www.allmendinger.pl
4)	BIOENERGY PROJECT Sp. z o. o.	SME	Production of bioenergy using plant substrates. Owner of an agricultural biogas plant.	http://bep.net.pl

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5)	Biomass Training Research Szymon Szufa	SME	Advanced services in the field of innovative methods of biomass processing.	-
6)	Bracia Kolanowscy Ogrody Marcin Kolanowski	SME	Production of energy plants, services in the field of biomass cultivation. Modern and energy-saving technologies for individual recipients and projects.	http://kolanobros.pl
7)	BRANDEKO A. Dębski	SME	Heating, gas and air conditioning installations	http://www.brandeko.pl/
8)	CELMIT Sergiusz Janowski	SME	Wholesale of frozen fruit and vegetables, herbs, concentrates, sugar, fats, oils and vegetable meals with the management of organic waste for energy purposes.	http://www.celmit.pl
9)	Centrum Transferu Technologii Uniwersytetu Łódzkiego	Business Network	Education, training and consulting in the field of innovative ideas in the scientific, business and public sphere. Technology transfer from universities and research units to enterprises.	http://www.ctt.uni.lodz.pl/
10)	CONSENSUS Rafał Klimaszewski	SME	Services in the field of effective energy management in real estate.	http://www.consensus.net.pl/
11)	CWD Sp. z o.o.	SME	Production, sale and export of innovative biomass boilers.	http://grupa-cwd.pl/
12)	EGC Sp.z o.o	SME	Consultation services for cluster members in the preparation of grant applications for projects related to renewable energy.	http://www.egc.pl/
13)	EKO-CAL BIS Sitarek Spółka Jawna	SME	Production of energy-saving central heating boilers.	-
14)	EKO-MAX Sp.z o.o	SME	Production of granulators for pellets from agricultural biomass and low and medium power boilers for efficient and energy-efficient heating of houses and industrial facilities.	-
15)	EKO-PLAN Krzysztof Łudczak	SME	Energy assessments of flats, buildings, single-family houses, terraced houses and all building structures, as well as certification of entire housing estates. Energy certificates and energy audits.	http://www.eko-plan.com.pl
16)	EKO-RABEX Sp.z o.o	SME	Wholesale of fuels and related products.	-
17)	ELBIS Sp.z o.o.	SME	Contract project manager in the implementation of investment in wind park projects.	https://elb2.pl/
18)	Energia Słońca - QEko	SME	Photovoltaics	https://energiaslonca.pl
19)	ERGOM Sp. z o. o.	SME	Supplier of electrical equipment for energy, automotive, telecommunications and RES.	https://www.ergom.com/
20)	Ericpol Sp.z o.o.	Large Enterprise	Professional ICT products for the needs of renewable energy project management, energy control in buildings, increasing energy efficiency.	https://www.ericpol.pl/
21)	Europejskie Centrum Gospodarcze Sp. z o.o	SME	Agricultural production. Management of agricultural, organic waste for energy production in a biogas plant.	http://www.ecg.net.pl/
22)	Firma Handlowo Usługowa FUNZON Marek Tworek	SME	Distributor of ecological motor vehicles and electric bikes.	https://funzon.pl/
23)	Firma Handlowo Usługowa Krzysztof Kłys	SME	Sales of energy fuels	http://opaltuszyn.pl/
24)	FU Czyścioszek Beata Bieńko	SME	Facility management	-
25)	FU Jacek Podstawek	SME	Facility management	-
26)	Gmina Daszyna	Public authority	Supporting local enterprises for activity in the field of renewable energy sources and focusing	http://www.daszyna.4bip.pl

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			on the development of the commune on renewable energy sources. The BdlaR cluster projects were implemented in the Daszyna commune.	
27)	Gmina Konstantynów Łódzki	Public authority	Supporting local enterprises in the field of renewable energy sources and focusing on renewable energy sources.	https://www.konstantynow.pl
28)	Gmina Lipce Reymontowskie	Public authority	Supporting local enterprises operating in the field of renewable energy sources, especially solar energy and biomass plants.	http://www.lipcereymontowskie.pl
29)	Gmina Miasto Łęczycza	Public authority	Supporting the development of enterprises running a business in the field of renewable energy sources and focusing on the city's development on energy efficiency, low-emission transport and renewable energy sources.	https://leczyca.info.pl
30)	Gmina Wodzierady	Public authority	Supporting the development of enterprises in the field of renewable energy sources, especially wind energy.	https://wodzierady.pl/
31)	Gospodarstwo Rolne Tomasz Maciaszczyk	SME	Production of energy willow plants on the area of 5 hectares.	-
32)	HIACYNT Jacek Duda M	SME	Wholesale trade services of fruit and vegetables. Organic waste management for energy purposes.	-
33)	HPI Polska	SME	Distributor of car modeling. Owner of the track for racing car models using renewable energy.	https://hpi.pl/
34)	Instytut Energetyki - Instytut Badawczy	Research & education	R&D in the field of biomass cultivation and processing, selection of the right types of energy plants and algae for natural conditions, research on remediation of degraded soils through biomass cultivation and cultivation of plants fertilized with sewage sludge.	https://www.ien.com.pl/
35)	Instytut Ogrodnictwa	Research & education	R&D in the field of biomass cultivation and processing, selection of the right types of energy plants and algae for natural conditions, research on remediation of degraded soils through biomass cultivation and cultivation of plants fertilized with sewage sludge.	http://www.inhort.pl/
36)	Instytut Szkoleń i Doradztwa Sp. z o.o. (poprzednia nazwa: Ustronna Media Sp. z o.o.)	SME	Training and consulting company offering services in the field of obtaining external financing, among others, for investments in renewable energy.	http://isid.pl/
37)	Instytut Technologiczno - Przyrodniczy	Research & education	Expertise on biofuels, solar and geothermal energy.	https://www.itp.edu.pl/
38)	INWESTOR Janusz Mostowski)	SME	Construction company interested in developing passive technologies.	http://www.inwestor.lowicz.pl/
39)	ISO Studio	SME	Design and graphic services for companies operating in the renewable energy area, as well as active activity for sustainable bioenergetic development of the Lodz region.	https://iso100studio.com
40)	JANIS Sp. z o.o. Sp. K.	SME	Wide range of services, including innovative finishing of fabrics with silver nanoparticles.	http://www.janis.pl/
41)	Kral Sp. z o.o	SME	Recycling services in the field of building materials.	http://www.kral.lodz.pl
42)	KROBAN	SME	Medical devices in the area of neonatology produced with environmentally friendly methods.	https://www.kroban.pl/
43)	LUFY.COM.PL	SME	Gunsmithing services	http://lufy.com.pl/

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44)	Łódzka Rada Federacji Stowarzyszeń Naukowo-Technicznych - NOT	Business Network	Supporting enterprises in solving specific technical and economic issues.	http://not.lodz.pl/
45)	Łódzki Ośrodek Doradztwa Rolniczego	Business Network	Development and innovation in the field of ecology and environmental protection	https://lodr-bratoszewice.pl/
46)	Łódzki Regionalny Park Naukowo-Technologiczny Sp. z o.o	Business Network	R&D in the field of modern technologies. Public aid for SMEs interested in laboratory research and implementation of innovative technologies. Research services in the fields of biochemistry and bioprocesses.	http://bionanopark.pl/
47)	M7 GRUPA Sp. z o.o	SME	Floor panels, skirting boards and doors used, among others, in homes and energy-saving facilities.	-
48)	Madej Wróbel Sp.z o.o	Large Enterprise	Oriented to modern technologies of energy processing of animal biomass waste and reducing the cost of the technological processes through the use of renewable energy sources.	http://www.madejwrob el.pl/
49)	Mariusz Zatylny Architekt	SME	Designing energy-efficient buildings, passive architecture, Interest in the subject of available social bio-building and sustainable social development	-
50)	Miasto Bełchatów	Public authority	Supporting local of enterprises conducting business activities in the field of renewable energy sources, energy mix and waste recycling and waste transformation for energy purposes.	https://www.belchatow .pl/
51)	Międzynarodowe Centrum Ekologii PAN	Public authority	R&D in the field of aquatic ecosystems, broadly understood hydrology and early warning systems for floods.	https://instytucja.pan.p !
52)	Municipality of Parzęczew	Public authority	Municipality interested in development of RES	http://www.parzeczew. pl
53)	Neostar Green Energy sp. z o.o	SME	Energy consulting with particular emphasis on renewable energy and environmental issues.	-
54)	P.P.H. MAWi Mariola Zięba	SME	Services in installation of combined heating systems, including floor heating, solar systems and other elements using renewable energy.	https://mawi.com.pl
55)	P.P.H.U. LUKAN Export-import Anna Klimek	SME	Production process of outerwear with energy from renewable sources.	http://lukan.com.pl/
56)	Pellet Energy Sp. z o.o.	SME	Production of ecological solid fuel - pellets, as well as a provider of comprehensive energy solutions using biofuels.	https://www.pelletener gy.pl/pl/
57)	PERLIPOL K.Kuśmierk, G.Derlatka, J.Benben spółka jawna	SME	Production of perlite.	https://www.perlipol.c om.pl/
58)	PHU Dytrych Sp. z o.o.	SME	A construction company focusing mainly on the revitalization of post-factory and residential buildings, including energy-efficient technologies and renewable energy.	http://www.dytrych.pl/
59)	PHU Lider-S	SME	Solar power plants built based on polycrystalline modules.	-
60)	PolContact Krzysztof Śniegula	SME	Electric heating systems, PV, smart building systems	https://polcontact.pl
61)	Politechnika Łódzka Instytut Architektury i Urbanistyki	Research & education	R&D in the field of energy efficiency of buildings and eco-design.	http://www.bais.p.lodz. pl
62)	Politechnika Łódzka, Wydział Inżynierii	Research & education	R&D in the field of energy processing of biomass and organic waste, including the use of sewage sludge.	http://www.bais.p.lodz. pl

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	Procesowej i Ochrony Środowiska			
63)	Politechnika Łódzka, Wydział Mechaniczny	Research & education	Research on energetics and energy mechanics.	https://www.mechaniczny.p.lodz.pl/
64)	Politechnika Łódzka, Wydział Organizacji i Zarządzania	Research & education	R&D in management processes in the production and services sector on the renewable energy market.	https://www.p.lodz.pl/wydzial-organizacji-zarzadzania
65)	Polska Izba Biomasy	Business Network	Support in the creation and implementation of biomass and biogas investments.	http://www.biomasa.org.pl/
66)	Projekt Grupa Witold Kurczyński	SME	Energy audits services.	http://projekt-grupa.firmy.net/
67)	Przedsiębiorstwo "MAGNUS" Arkadiusz Muszyński	SME	All-year wooden and summer houses made of logs - with thermal isolation and closed frame construction built with renewable energy.	-
68)	Przedsiębiorstwo Gospodarki Komunalnej Daszyna Sp. z o.o	Public authority	Development of renewable energy sources in the Daszyna area.	http://www.pgkdaszyn.a.pl
69)	Przedsiębiorstwo Innowacyjne VIRTECH	SME	Photovoltaic, wind and water power plants.	https://virtech.pl
70)	Przedsiębiorstwo Instalacyjno-Budowlane INSBUD Krzesiński sp.j.	SME	Energy-saving construction using renewable energy	-
71)	Przedsiębiorstwo Produkcyjne MDEkoPower Sp. z o.o	SME	Innovative technologies - renewable energy sources and thermo-modernization	-
72)	Przedsiębiorstwo Wielobranżowe ANPOL Rajmund Andrych	SME	Company trades and produces biomass	http://anpol-biskupice.pl
73)	PWPUIH "Inter Solar" Sp. z o.o.	SME	Manufacturer of traditional food interested in implementing renewable energy technologies. Potential investments in the area of photovoltaics, production of biofuels based on algae and wind energy.	http://intersolar.com.pl
74)	SAM-ROL Sp.z o.o	SME	Trade agency, machines for cultivation of energy plants.	http://www.sam-rol.pl
75)	Starostwo Powiatowe w Poddębicach	Public authority	Supporting the local enterprises conducting business activity in the field of renewable energy sources and focusing on the development of the area for renewable energy sources, especially solar energy and geothermal energy.	https://www.poddebicki.pl
76)	Starostwo Powiatowe w Skierniewicach/ Powiat skierniewicki	Public authority	Supporting the local enterprises conducting business activity in the field of renewable energy sources and focusing on the development of the area for renewable energy sources, especially solar energy and geothermal energy.	http://powiat-skierniewice.pl
77)	SUNRISE Adam Świerczyński	SME	Electrical and photovoltaic installations.	http://sunrisefotowoltaika.pl
78)	Sylwan Ewelina Chlebowska	SME	Modern solutions in the field of generating energy from a renewable source – wind.	-
79)	Tanieogrzewanie sp. jawna	SME	Services; maintenance of renewable energy devices.	https://tanieogrzewanie.pl/
80)	TEX INWESTYCJE Sp. z o.o.	SME	Heating, gas and air conditioning installations	-
81)	Trimen Chemicals S.A.)	SME	Synthetic and analytical services for biochemical, biotechnology, pharmaceutical companies	https://www.trimen.pl/
82)	Veolia Energia Łódź S.A.	Large Enterprise	Energy audits, implementation of a media consumption optimization plan, modernization	https://www.veolia.pl/

			of energy equipment, systems encouraging energy savings.	
83)	WI-BUD Witold Janczak	SME	Ventilation installations with heat recovery (recuperation), solar systems and the provision of advisory services related to the energy efficiency of buildings.	https://centrumrekuperacji.pl/
84)	WIND-HYDRO Grzegorz Łukasiewicz	SME	Technical consultancy, engineering and design in the field of water management techniques.	https://windhydro.pl/

3.4. International orientation and positioning of the cluster

The development of renewable energy sector is a global challenge that goes beyond a single region or country. That is why the Bioenergy for the Region Cluster actively collaborate with international partners. The aim of this collaboration is:

- improvement of the image of Poland as an attractive economic partner in the field of renewable energy and a place to establish valuable business contacts and conducting environmentally friendly business activities,
- foster the international knowledge and experience exchange in the field of renewables,
- promote international partnerships of members of the Bioenergy for the Region Cluster.

To this end, the Bioenergy for the Region Cluster is a part of the following international networks:

⇒ **European Cluster Collaboration Platform**

The European Cluster Collaboration Platform is a service facility aiming to provide cluster organisations with modern tools allowing to

- make efficient use of networking instruments (search/find potential partners and opportunities)
- develop collaboration trans-nationally (within Europe) and internationally (beyond Europe)
- support the emergence of new value chains through cross-sectorial cooperation
- access the latest quality information on cluster development
- improve their performance and increase their – as well as their members’ - competitiveness.

⇒ **Cluster-Dialogue Germany-Poland**

The main goal of the network is to initiate joint economic and research projects between clusters from Poland and Germany. The "Cluster-Dialogue Germany-Poland" network includes:

- deENet Kompetenznetzwerk Dezentraler Energietechnologien e.V.
- East-West-Science Center - University of Kassel
- Dr. Grundmann Consult
- Bioenergy Cluster for the Region

⇒ **TREC Danube**

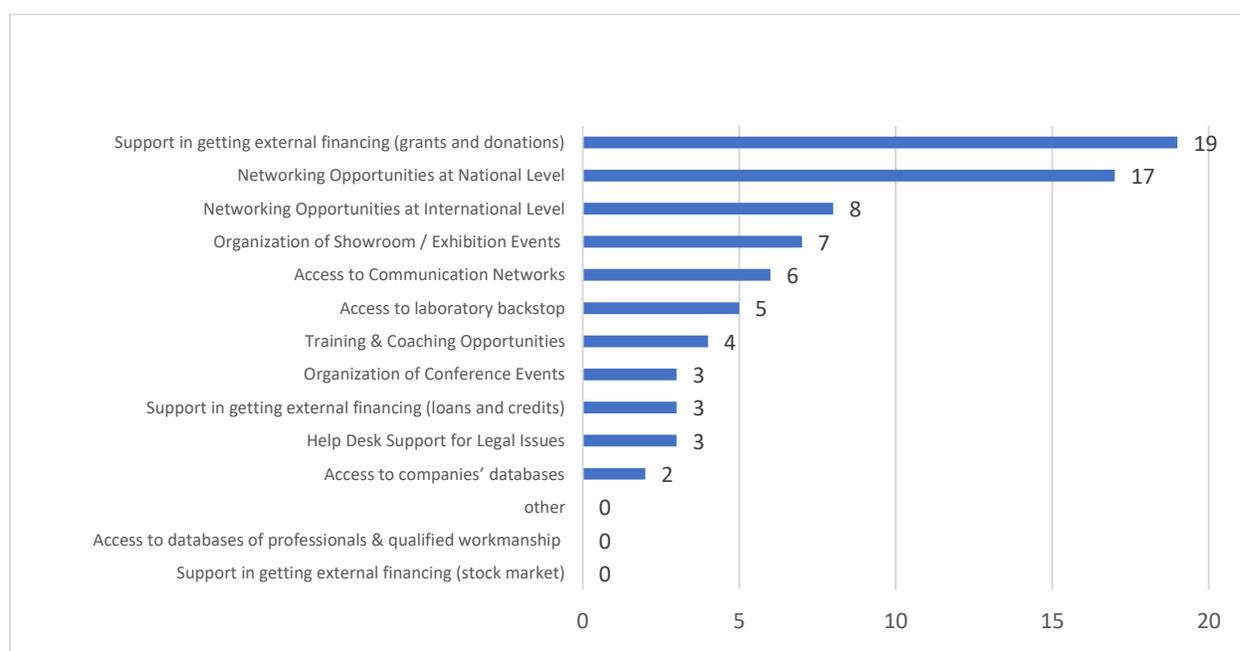
The Transnational Renewable Energy Cluster of the Danube Valley is a transnational network of regional clusters in the field of renewable energy, energy systems and bioeconomy. The cluster connects networks, business partners and research and development organizations from the Danube region and Central Europe. TREC is a platform initiating international R&D projects and innovations in the field of energy and environmental technologies.

3.5. Cluster members' needs

In July 2020, the cluster coordinator conducted an online survey among cluster members about their needs and expectations regarding the cluster activities. 21 out of 80 cluster members provided their answers.

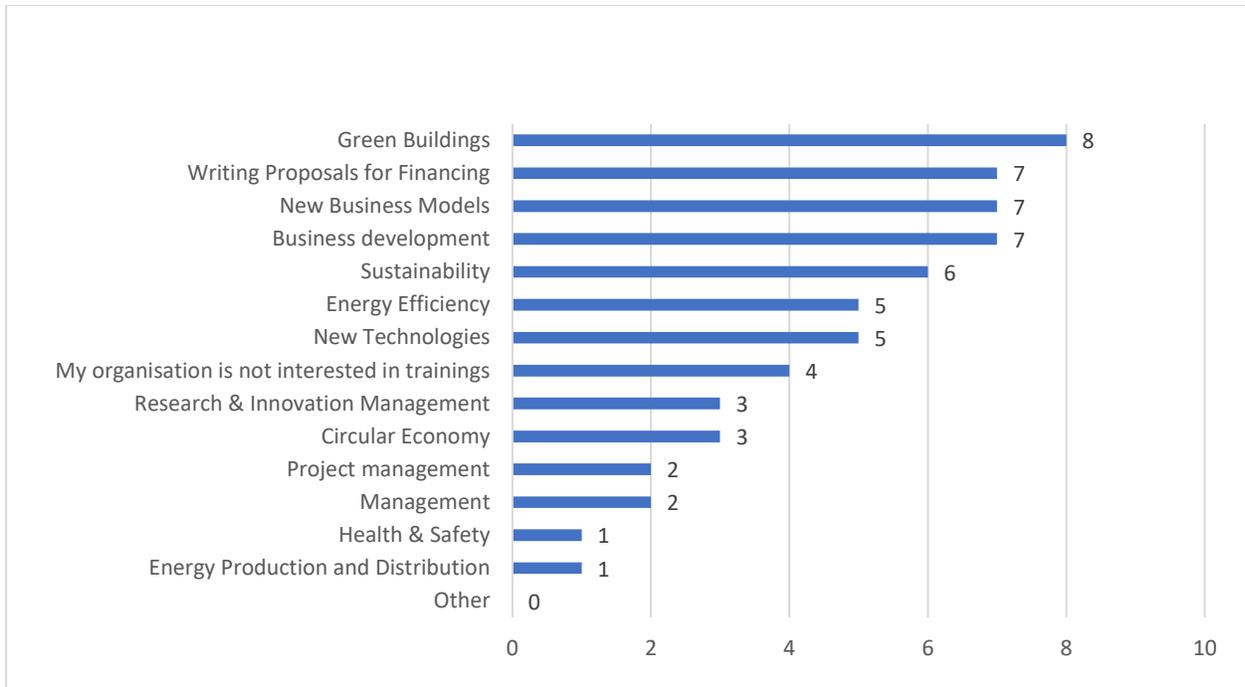
- 1) *The list below indicates activities / types of services that can be provided by a cluster. Please mention which of them would be mostly relevant / of interest for your Organisation? (multiple choice)*

Cluster members are mostly interested in getting support in an acquiring grants and donations for their projects (19 answers) and extending their networks on national level (17). Less popular, but still interesting, is supporting them by the cluster in networking on international level (8). Organisation of showroom of products offered by the cluster companies enjoys rather moderate concern (7), similarly to providing access to communication networks (6), laboratory backstop (5) or training and coaching opportunities (4). Interestingly, external financing schemes such as loans or stock market are not popular.



- 2) *In your opinion, which are the most relevant topics for training the staff of your Organisation? (multiple choice)*

Regardless rather moderate interest of cluster members in trainings offered by the cluster, there is a clear preference on certain topics. Green buildings is the most interesting field (8), followed by Writing proposals for financing, New business models, and Business development (7 answers for each). This suggests that cluster members would like to learn new skills that would help them in development of their organisations. Courses on specific technical fields, such as sustainability (6), energy efficiency (5) and new technologies (5) are also popular. On the other hand, courses on energy production and distribution, health and safety, management or project management are of interest of single members.



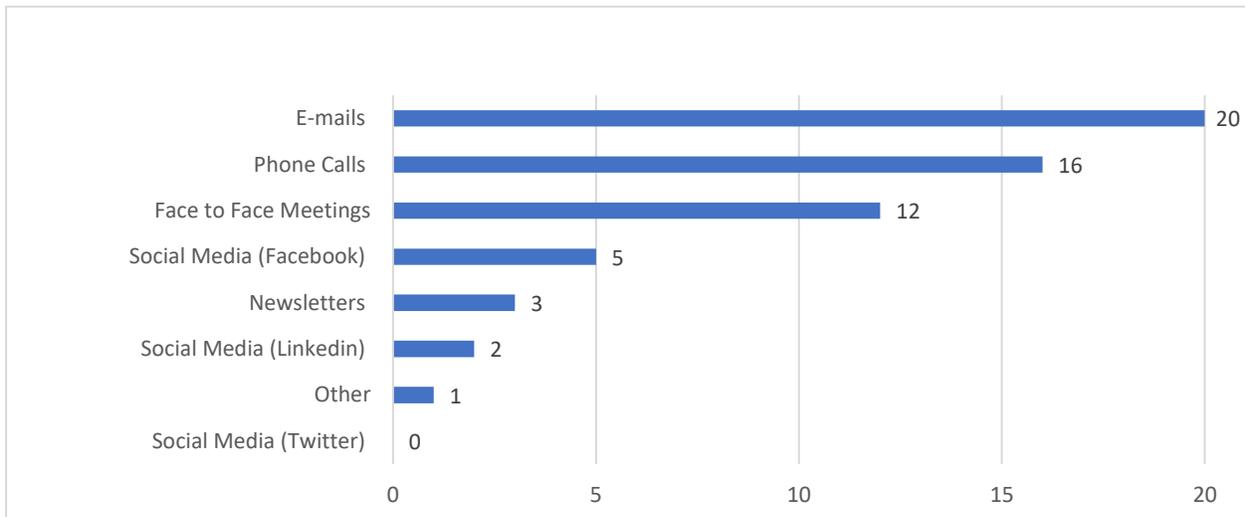
3) What are the most relevant issues in your Organisation's activity? (multiple choice)

Issues impacting on financial flows are the most meaningful issue for cluster members: strong competition (9), lack of funding and financing opportunities (8), financial liquidity (5). Barriers implied by external entities, such as bureaucracy (6) and frequent legislation changes (5) are also significant obstacles.



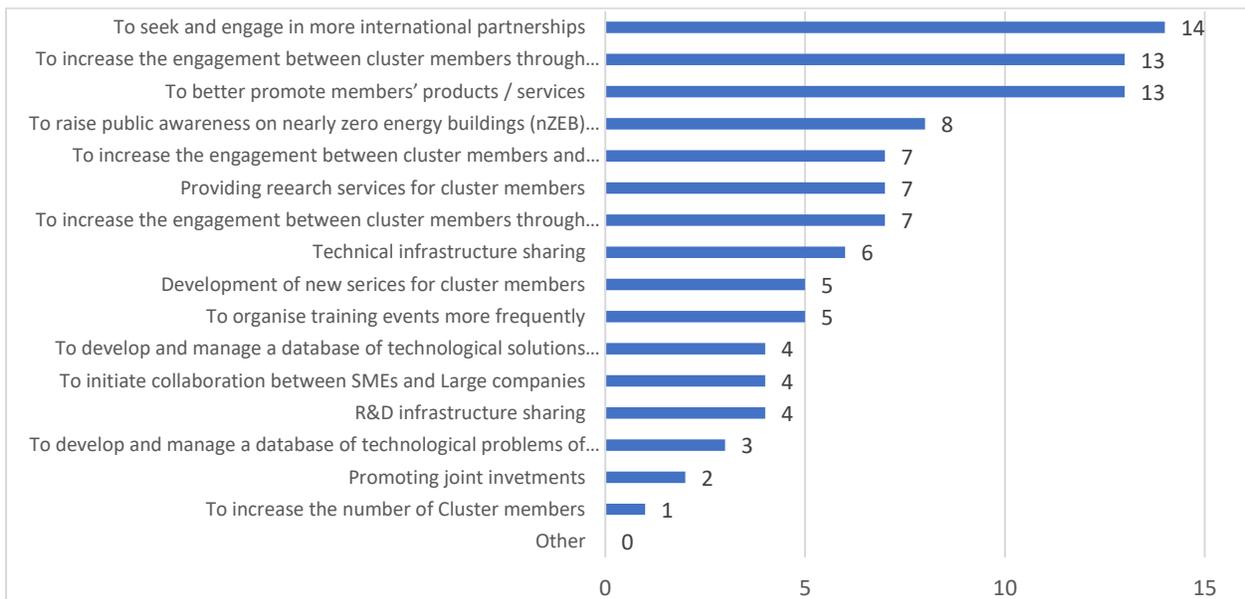
4) What are your preferred ways to stay in touch with partners? (multiple choice)

Email (20) and phone calls (16) are the most proffered communication channels of cluster members. Direct face to face contact (12) is also popular. Social media such as Facebook (5) or LinkedIn (2) are chosen by some members only. Twitter is not used.



5) *In your opinion, what should be the most important objectives for our Cluster? (multiple choice)*

Enhancing and supporting partnerships, both international (14) and national (13), in particular within the cluster, are the most important objectives for cluster members. Other significant objective should be promoting cluster members' products and services (13). Raising awareness on nearly zero energy buildings (nZEB) / energy efficiency / sustainability is considered as relevant for 8 members. Other significant objectives include providing research services for cluster members by the coordinator and increasing the engagement between cluster members and public authorities. On the other hand, increasing the number of cluster members or promoting joint investments was not considered as essential for the cluster.



3.6. SWOT analysis of the construction sector in Poland in the context of the nZEB development

The „National plan aimed at increasing the number of NZEB buildings” was adopted in Poland in 2015. The aim that this document sets is to create an environment that by 31 December 2020 all new buildings are nZEB. It focuses on legislation adjustment and indicates which legal acts should be amended or updated. No action plan is included. The plan contains a proposal of a definition of nZEB. The proposal however has not been further proceeded, which means that there is no legally binding NZEB definition in Poland. In fact, the “nZEB” term is not really used. More popular are “deep renovation” or “passive standard” ones. Funding agencies providing support for improving building energy performance do not require NZEB standard. More popular is requiring a given decrease of energy consumption (e.g. 55%).

Furthermore, the energy performance of the building stock in Poland is relatively low. Over 70% of residential building in Poland have been constructed before 1988, and their demand for primary energy varies from 160 to 350 kWh/m²a and higher. Most buildings do not meet modern requirements, in particular those regarding thermal insulation of walls, roofs and windows. In the coming years, a significant number of buildings will need a modernization, in particular in terms of improving their energy performance. Households in Poland consume 20% of final energy (excluding transportation fuels). The majority of energy (72%) is used by households for heating purposes, and this need to be improved, since according to the recommendations of the International Energy Agency, it should be 35%. Thus, there is room for construction companies for development in this market segment.

The biggest strength of the construction sector is the large number of construction materials and products manufacturers of on the Polish market, including large Polish companies providing their products worldwide (e.g. Drutex – windows producer, Blachy Pruszyński – roof and elevation steel claddings, Wienerberger – bricks and tiles). They act not only on national market, but also go abroad. In 2019 27% of construction companies exported their products or services (Rozkrut, Kowalczyk, & Boguszewski, 2020). They also develop their innovativeness– in 2017 91% of construction companies declared that they have introduced innovations in their activities (Madyda, 2018). Companies are supported by R&D institutes in the field of construction and construction materials, e.g. Institute of Ceramics and Building Materials, Instytut Techniki Budowlanej (Building Research Institute). On the other hand, 83% of Polish construction companies find limited access to financing this as a barrier for introducing innovations (Madyda, 2018). Other weakness is lack of experience in constructing nZEBs of the Polish construction market. There is also lack of cross-sectoral links between companies providing complementary solutions for nZEB, e.g. with energy efficiency or RES industries. An important opportunity for the market is a high demand for new buildings. There are 371 dwellings per 1000 citizens in Poland, while the OECD average is 460-480. 40% of Polish citizens live in overcrowded dwellings (Business Insider Polska, 2019; EUROSTAT, 2020). Furthermore, there is observed rising awareness of Polish citizens in terms of energy consumption in buildings, in particular related to air quality, and rising demand for ecological heating sources and small-scale renewable energy sources, PV in particular. 88% of Polish citizens would decide to build an energy-saving home (Danfoss, H+H, Rockwool, 2019). Demand for renewables is supported by the governmental programme “Mój prąd” (“My electricity”) offering a donation of up to 5000 PLN (~1150 EUR) for installation of PV in households. Significant R&D and innovation funding is also available (e.g. Smart Growth Operational Programme - ERDF). Significant threat for the market is related to rising costs of construction materials, fuels and land decrease investment potential of citizens. (Alebank.pl, 2019; Gazeta Prawna, 2019). Furthermore, lack of qualified and experienced staff in constructing highly energy efficient

or nearly-zero energy buildings may also be a barrier for the sector. Finally, the COVID-19 pandemic crisis may affect investment decisions negatively (Polski Związek Pracodawców Budownictwa, 2020).

4. Cluster strategy

4.1. Mission

The Bioenergy for the Region (B4R) Cluster is a cooperation platform of competitors, founded to support its members, whose mission is to increase competitiveness through technology transfer for the emerging regional renewable energy industry by developing innovative and environmentally friendly energy products and services, through building links between small and large enterprises, science and the economy, local governments and foreign partners.

4.2. Vision

In 2025, the Bioenergy for the Region Cluster will be a leading Central European cooperative, possessing:

- 1) own energy specializations combined with the energy efficiency solutions for buildings, industry and transport, together with waste management specialization,
- 2) patented and introduced on the European market innovative products and services,
- 3) a laboratory base dedicated to cluster's specializations,
- 4) a network of business and research partners around the world.

4.3. Strategic objectives

- ⇒ Strategic Objective 1: Improvement of cluster management excellence.
- ⇒ Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.
- ⇒ Strategic Objective 3: Development of new services within the B4R cluster specialization for the cluster members aimed at boosting their competitiveness on national and European level.
- ⇒ Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.
- ⇒ Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency, waste processing and renewable energy sources industries.
- ⇒ Strategic Objective 6: Increasing the recognition of the cluster.

4.4. Operational objectives

- ⇒ Strategic Objective 1: **Improvement of cluster management excellence.**
 - Operational objective 1.1: Implementation of the best management practice and systems in the field of cluster management
 - Operational objective 1.2: Upgrading the cluster website as a two-sided mobile communications platform of services and knowledge in scope of the cluster specialization,
 - Operational level 1.3: Implementation of the CRM Collaboration Project Management application for facilitating the contacts of the cluster members like Bitrix24 or similar,
 - Operational level 1.4: Implementation a system of fees of selected services provided by the cluster coordinator.

- ⇒ Strategic Objective 2: **Improvement of innovation level, marketing and sales skills of cluster members.**
 - Operational objective 2.1: Increasing awareness of the open innovation approach and developing specific skills of knowledge sharing within the cluster
 - Operational level 2.2: Developing competency of technology, knowledge and best practices transferring and exchanging,
 - Operational objective 2.3: Strengthening the capacity of the join R&D project realization,
 - Operational objective 2.4: Implementation the standard procedure of join market activity.
- ⇒ Strategic Objective 3: **Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.**
 - Operational objective 3.1: Regular trainings and workshops regarding increasing competency of technology, knowledge and best practices transferring and exchanging,
 - Operational objective 3.2: Regular invitations to implementation of joint R&D projects, co-financed by external sources; especially by the European Commission.
- ⇒ Strategic Objective 4: **Facilitating strategic and sustainable partnering in the EU of the cluster members.**
 - Operational objective 4.1: Stimulating the participation of cluster members in R&D activities on the national and EU level,
 - Operational objective 4.2: Supporting interdisciplinary, cross-sectoral and trans-national partnering of the B4R Cluster members.
- ⇒ Strategic Objective 5: **Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency, waste processing and renewable energy sources industries.**
 - Operational objective 5.1: Regular match-making cross-sectoral meetings on the cluster platform in order to prepare joint R&D projects,
 - Operational objective 5.2: Regular match-making trans-national meetings on the cluster platform in order to prepare joint R&D projects.
- ⇒ Strategic Objective 6: **Increasing the recognition of the cluster.**
 - Operational objective 6.1: Rising the communication and the ICT quality level of the cluster website,
 - Operational objective 6.2: Annual meetings of the member and stakeholders of the cluster.

4.5. Key Performance Indicators

Table 2 Key Performance Indicators (KPIs) of the strategy implementation

No.	Objective	KPI	Baseline		Target	
			Value	Year	Value	Year
1.1	Implementation of the best management practice and systems in the field of cluster management	Implementation of ISO 9001:2015 standard	0	2020	1	2022
1.2	Implementation of the best management practice and systems in the field of cluster management	Maintaining the Bronze Cluster Management Excellence label	1	2021	1	2023

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1.3	Building the two-sided mobile communications platform of knowledge in scope of the cluster specialization	Cluster website http://www.bioenergiadlaregionu.eu/centrum-transferu-technologie-oze/ctt-oze/ expanded with new functionalities for knowledge sharing	0	2021	1	2023
1.4	Implementation of the CRM Collaboration Project Management application for facilitating the contacts of the cluster members like Bitrix24 or similar	Cluster website http://www.bioenergiadlaregionu.eu/centrum-transferu-technologie-oze/ctt-oze/ equipped with the application Bitrix24 or similar	0	2021	1	2022
1.5	Implementation a system of fees for selected services provided by the cluster coordinator.	Preparation a draft of fee regulations, submission it to open on-line discussion and approval by cluster members	0	2021	1	2022
1.6	Implementation a system of fees of selected services provided by the cluster coordinator.	Cluster website http://www.bioenergiadlaregionu.eu/centrum-transferu-technologie-oze/ctt-oze/ equipped with the accepted and quarterly updated fee regulations	0	2021	1	2023
2.1	Increasing awareness of the open innovation approach and developing specific skills of knowledge sharing within the cluster	Cluster website http://www.bioenergiadlaregionu.eu/centrum-transferu-technologie-oze/ctt-oze/ equipped with the podcasts presented good practices of open innovation approach	0	2021	1	2022
2.2	Developing competency of technology, knowledge and best practices transferring and exchanging	Organization on-line workshops, dedicated to increasing competency of knowledge and best practices transferring and exchanging	0	2021	6	2023
2.3	Strengthening the capacity of the join R&D project realization	Organization face-to-face or on-line meetings with the selected member of the cluster, accordingly to new calls for proposals and potential to be a partner of the join R&D project	5	2021	15	2023
2.4	Implementation the standard procedure of join market activity	Preparation a draft of the standard procedure of join market activity, submission it to open on-line discussion and approval by cluster members	0	2021	1	2023
2.4	Implementation the standard procedure of join market activity	Cluster website http://www.bioenergiadlaregionu.eu/centrum-transferu-technologie-oze/ctt-oze/ equipped with the accepted and quarterly updated procedure of join market activity	0	2021	1	2023
3.1	Regular trainings and workshops regarding increasing competency of	Organization on-line trainings, dedicated to increasing competency of knowledge and best practices transferring and exchanging	0	2021	6	2023

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	technology, knowledge and best practices transferring and exchanging					
3.2	Regular invitations to realization of join R&D projects, co-financed by external sources, especially by the European Commission	Cluster website http://www.bioenergiadlaregionu.eu/centrum-transferu-technologie-oze/ctt-oze/ equipped with the updated information regarding new calls for proposals appropriate for the members of the cluster	0	2021	15	2024
4.1	Stimulating the participation of cluster members in R&D activities on the national and EU level	Personalized mailing of information regarding interesting R&D activities on the national and EU level	0	2021	150	2023
4.2	Supporting interdisciplinary, cross-sectoral and trans-national partnering of the B4R Cluster members	Cluster website http://www.bioenergiadlaregionu.eu/centrum-transferu-technologie-oze/ctt-oze/ equipped with the matchmaking room	0	2021	1	2024
5.1	Regular match-making cross-sectoral meetings on the cluster website in order to prepare the join R&D project	Organization the match-making cross-sectoral meetings on the cluster website in the matchmaking room	0	2021	6	2024
5.2	Regular match-making trans-national meetings on the cluster website in order to prepare the join R&D project.	Organization the match-making trans-national meetings on the cluster website in the matchmaking room	0	2021	6	2024
6.1	Rising the communication and the ICT quality level of the cluster website	Upgrading the user-friendly functionalities of the cluster website	0	2021	1	2024
6.2	Annual meetings of the member and stakeholders of the cluster	Organization once-a-year meeting of the member and stakeholders of the cluster	0	2021	3	2024

5. Action plan

5.1. Aim of the action plan

The aim of the action plan is to support implementation of the cluster's strategy and provide operational guidelines for the cluster managers for reaching strategic and operational objectives.

5.2. Actions

Action 1 Preparation to the ESCA Evaluation for Cluster Management Excellence certification

- Description: The Bioenergy for the Region coordinator will implement measures allowing for maintaining the Bronze Label under the ESCA Evaluation for Cluster Management Excellence.
- Related operational objectives: 1.1: Implementation of the best management practice and systems in the field of cluster management
- Responsible person / body for the implementation: Ewa Kocharńska– Leader of the Cluster, Agnieszka Nowaczyk - Marketing Officer
- Start: Q1 2022, End: Q4 2024
- Key Performance Indicators: ESCA Evaluation Report, ESCA Silver Label

Action 2 Upgrading and optimization of the cluster website as the main channel of communication, knowledge sharing, networking and services distribution

- Description: The B4R coordinator together with the ICT officer and subcontractors will improve the cluster website and equip it with some new advanced functionalities
- Related operational objectives: 1.2, 1.3, 1.4, 2.1, 2.4, 3.2, 4.2
- Responsible person / body for the implementation: Ewa Kocharńska, Katarzyna Woźniak - ICT Officer
- Start: Q1 2022, End: Q2 2023
- Key Performance Indicators: Reports/ Protocols of acceptance of the work performed on the website

Action 3 Development of new services for the cluster members aimed at boosting their competitiveness on national and European level

- Description: The B4R coordinator together with the broker of innovation and ICT officer will implement new services for the members of the B4R Cluster
- Related operational objectives: 1.4, 2.2, 2.3, 2.4, 3.1, 5.1, 5.2
- Responsible person / body for the implementation: Ewa Kocharńska, Dariusz Zych – Broker of Innovation, Katarzyna Woźniak
- Start: Q1 2022, End: Q4 2023
- Key Performance Indicators: Reports of implementation of new services within the B4R Cluster

Action 4 Increasing the recognition of the cluster

- Description: The B4R coordinator together with the Scientific Board of the B4R Cluster will stimulate the dissemination and recognition of the Cluster
- Related operational objectives: 4.1, 6.1, 6.2
- Responsible person / body for the implementation: Ewa Kocharńska, Agnieszka Nowaczyk
- Start: Q1 2022, End: Q4 2024
- Key Performance Indicators: List of new stakeholders of the B4R cluster

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

Table 3 Activities overview

No.	Action	Related operational objectives	Dimension <i>National / International</i>	Implementation timeline											
				2022				2023				2024			
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1.	Preparation to the ESCA Evaluation for Cluster Management Excellence certification	1.1	National												
2.	Upgrading and optimization of the cluster website as the main channel of communication, knowledge sharing, networking and services distribution	1.2, 1.3, 2.1, 2.4, 3.2, 4.2	National/ International												
3.	Development of new services for the cluster members aimed at boosting their competitiveness on national and European level	1.5, 2.2, 2.3, 2.4, 3.1, 5.1, 5.2	National/ International												
4.	Increasing the recognition of the cluster	4.1, 6.1, 6.2	National/ International												

5.3. Resources

Table 4 Overview of resources necessary for the action plan implementation

#	Name	Description	Type <i>Human/ Financial / Technical/ Other</i>	Availability <i>yes/ partially/ no</i>
1.	Professional cluster coordinator	A leader, supported by a team who will be responsible for the cluster coordination, the action plan implementation and monitoring	Human/ Financial	Yes/ No
2.	ICT officer	A person, supported by a team who will be responsible for the upgrading of cluster website	Human/ Financial	Yes/ No
3.	Broker of innovation	A person, supported by a team who will be responsible for creation and implementation of new services	Human/ Financial	Yes/ No
4.	Marketing Officer	A person, supported by a team, who will be responsible for communication within the cluster and with all stakeholders of the cluster	Human/ Financial	Yes/ No

5.4. Procedure of monitoring and implementation plan progress assessment

Monitoring is an essential part of action plan implementation. If it is held regularly, it allows for a real-time control of completing the planned tasks and implementing corrective actions, if tasks are not bringing the estimated results. The action plan implementation is foreseen for 3 years and should be monitored on semi-annual basis. During the action plan completion monitoring, the effects of activities taken so far should be assessed and, unless they are satisfactory, the strategic goals, priorities and measures should be updated.

The action plan completion and its monitoring is recommended to be based on the tool called the Deming cycle: Plan-Do-Check-Act (Figure 9), as described, for an instance, in PN-EN ISO 50001.

The main responsible person for monitoring of the action plan implementation is President of RIC Pro-Akademia and Coordinator of the Bioenergy for the Region Cluster.

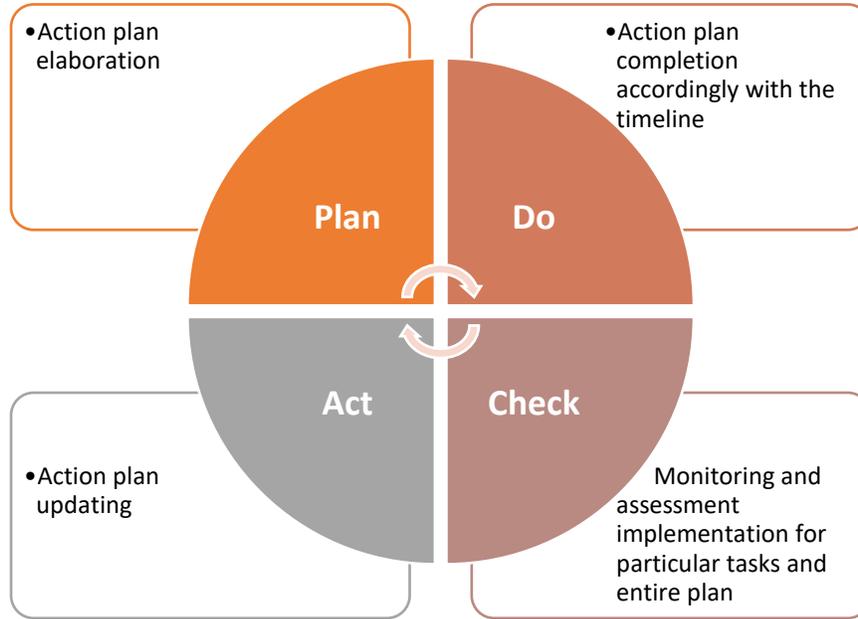


Figure 9 Action plan completion and implementation monitoring procedure based on the Deming cycle

The „Plan” part consists of development of an action plan and is being completed during the preparation of this document. The „Do” stage concerns the implementation of the particular activities and the whole plan, i.e. completion of the planned tasks. The „Check” stage, which means the action plan completion monitoring, should concern simultaneously each task separately (checking if the tasks are completed accordingly with the schedule and if the indicators have been achieved) as well as the overall plan (to what extent the plan goals have been achieved). Meanwhile, the „Act” part concerns the action plan updates and the corrective action implementation which allows to reach the previous indicators if it turns out on the previous stage that they are doubtful, or widening the plan with the new tasks and setting new indicators if the ones planned previously turn out to be completed.

VI. Development and Innovation Strategy of the Construction Cluster Dundjer Serbia

DEVELOPMENT STRATEGY CONSTRUCTION CLUSTER DUNDJER



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SMART4NZEB D4.1 Clusters Development and Innovation Strategy

Project	Strengthening clusters Management Activities and Running Trans-national for implementation of nearly Zero Energy Buildings – SMART4NZEB
Grant Agreement No.	874425
Version	0.0
Date	15/11/2021
WP	4
Work Package Leader	PRO-AKADEMIA
Dissemination level	Internal (Only for SMART4NZEB Consortium Members)
Authors	Biljana AVRAMOVIC
Reviewers	PRO-NZEB, SGG, PSDik, Pro-Akademia
Abstract	This document presents the development and innovation strategy of the Polish Construction Cluster. Section 1 presents the context of the document, which was developed within the SMART4NZEB project framework. Section 2 describes the global environment of the cluster – relevant policy instruments, as well as market and technological trends. Section 3 presents the cluster – its history, coordinator, members, and current position. Section 4 presents the cluster strategy, setting strategic and operational objectives, alongside the cluster mission and vision. Finally, section 5 consists of the action plan, which supports the implementation of the strategy.
Keywords	Strategy development, guidelines

History of Changes

Version	Author(s)	Date	Summary of Changes
0.0	Katarzyna KORCZAK	9 May 2020	First draft of table of content
0.1	Maksymilian KOCHAŃSKI	25 May 2020	Comments and suggestion added
0.2	Katarzyna KORCZAK	27 May 2020	Improvement according to Maksymilian's suggestions
0.3	Biljana AVRAMOVIC	23 Sep 2020	First version for Dundjer
1.0	Biljana AVRAMOVIC	15 Nov 2021	Third version for Dundjer

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1. Introduction

1.1. SMART4NZEB project

The aim of the SMART4NZEB project is to boost competitiveness and support the scaling-up of 577 SMEs active in construction, energy efficiency and renewable energy sectors through strengthening capacity-building of 5 representative clusters as drivers of innovation in Central and Eastern Europe (Poland, Romania, Serbia and Slovenia) and facilitating trans-national exchanges and strategic partnerships with a focus on sharing experience between different practices, skills gaps, policies, target goals and level of engagement related to nearly Zero Energy Buildings (nZEB).

The main objective of SMART4NZEB is to create a sustainable collaboration, co-learning and capacity building between the involved partners – cluster managers and cluster members and relevant stakeholders representative for the nZEB market in the selected Central and East-European countries, with a view to develop the involved clusters management excellence and to support interregional partnerships to facilitate the development of competitive products and technological solutions intended for new and existing buildings, which will lead to market penetration of nearly zero energy buildings, related to their production, use and reuse. The objective is to drive clusters towards innovative and modern clusters being able to address cross-sectoral and cross border

1.2. WP4

This document is developed within *WP4 Clusters' development and innovation strategies*. The main objective of this WP is to create transnational collaboration-based clusters' development strategies to boost competitiveness and support the scaling-up of SMEs active in construction, energy efficiency and renewable sectors through improved and tailored services offered by the clusters based on the specific needs of the involved SMEs. As a supplementary document, action plans for the participating clusters will be also developed, to ensure that the collaboration strategies in the field of nZEB are operational, functional and allow for progress monitoring. WP4 utilizes results of other technical workpackages (Figure 1). In particular, it uses results of the SWOT analysis from WP2, survey conducted among clusters members in WP3, and feedback from ClusterXchange study visits participants.

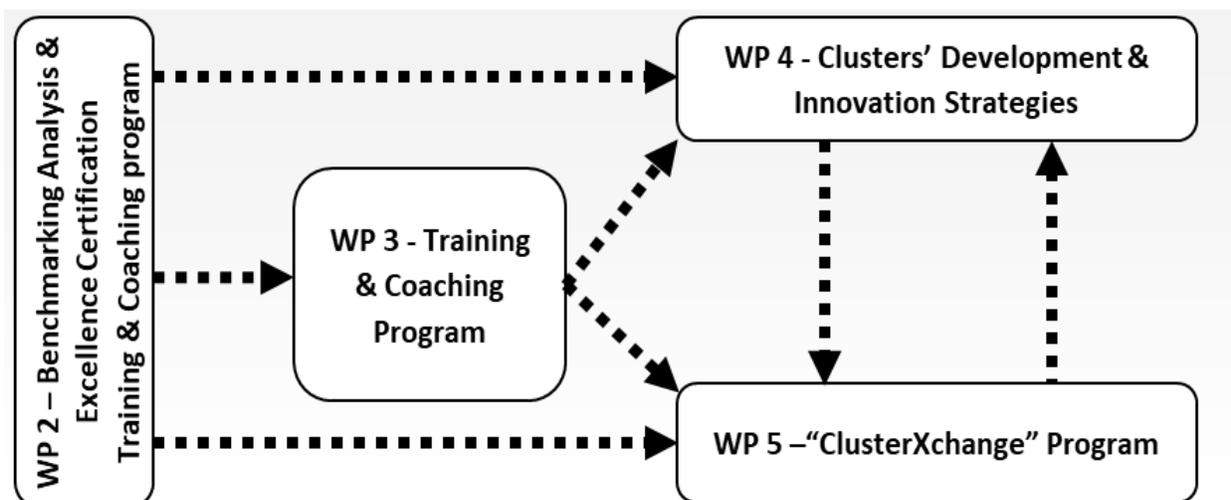


Figure 1 Workflow of SMART4NZEB project

1.3. Aim of the document

The aim of this document is to provide the Development and innovation strategy for Construction Cluster Dundjer. The Strategy should be a comprehensive guidance for helping local stakeholders in regional development of nZEB through active engagement, cross-sectoral and transnational collaboration of clusters' members.

2. Global environment of the cluster

2.1. Global and European environment of the cluster

EU ASSISTANCE TO SERBIA

The EU is by far the biggest donor to Serbia with more than €3.6 billion (3.688) in grants provided over the past 18 years in all fields, ranging from rule of law, public administration reform, social development, environment and agriculture. The financial assistance is provided through EU's Instrument for Pre-Accession (IPA) which aims to help Serbia to prepare for assuming and effectively implementing obligations of its future membership in the EU. EU Member States provided substantial bilateral assistance too.

EU grants total to date equals €3.688 billion:

- Instrument for Pre-Accession Assistance (2007-2018): 2.1667 billion
- CARDS 2000-2006: 1.15 billion
- Multi-country programmes (2014–2017): 0.378 billion

The EU is also the largest lender to Serbia, with more than €4.3 billion worth of loan agreements:

- Banks (European Investment Bank – EIB, European Bank for Reconstruction and Development – EBRD, Council of Europe Development Bank – COEDB, KfW) total €4.377 billion in the period 2007-2018. Of this sum, EIB separately has provided €2.913 billion in the period 2007 – 2018.
- EU Member States donations have reached €523.86 million (from 2007 to 2016).
- Investments from Member States reached almost €6 billion in three years period (2014-2017).

The main objective of the Construction Cluster Dundjer activities is development of renewable energy sources, supported by promotion of energy efficiency improvement. Renewable energy sources (wind, solar, hydroelectric, ocean energy, geothermal energy, biomass and biofuels) are an alternative to fossil fuels and contribute to reducing greenhouse gas emissions, diversifying energy supplies and reducing dependence on uncertain and unstable fossil fuel markets, especially oil and gas. Effective global action towards a safe and sustainable low-carbon and climate-resilient energy system is essential to tackling climate change and achieving the objectives of the 2030 Agenda, stated by the United Nations Department of Economic and Social Affairs. Central for such action is the provision of universal access to energy, wider deployment of renewable energy, increasing resilience of energy systems and improving energy efficiency. Progress toward the achievement of the UN the 7th Sustainable Development Goal (SDG7): Ensure access to affordable, reliable, sustainable and modern energy for all remains mixed and falls short of what is needed to reach the goal by 2030. Still more than a billion people, mostly in rural areas, live without the benefits of electricity, while about three billion people still lack access to clean and safe cooking fuels and technologies, with catastrophic consequences in terms 2 of over 4 million

premature deaths due to indoor pollution affecting primarily women and children. While modern renewable energy is expanding rapidly in the electricity generation sector across the world, comparable progress has not occurred with renewable energy in the heat or transport sectors. Energy efficiency is therefore a strategic priority of the European Union, and the EU promotes the principle of *energy efficiency first*.

2.2. National environment of the cluster

At the national level there is still no national strategy for cluster development of any kind, so in terms of influencing, there is no influence of national policy on cluster development in any field. There are some legislations in the field of energy efficiency in construction sector, based on EU directives demands, and recommendations, like: Energy passport for the building, and Certificate on the Energy Performance of Buildings, but there is still no broader, synchronized action plans for implementation of energy efficiency and use of RES.

Buildings are big consumers of energy all over the world; in Europe they consume 40% of the total energy, while in Serbia that percentage is higher and amounts to as much as 60%. The reason for such a large consumption of energy in buildings lies in the fact that the largest number of residential buildings in Serbia were built during the 60s to 80s of the 20th century, when not much attention was paid to energy efficiency and energy consumption.

In Serbia, 300-400,000 houses do not have thermal insulation at all. Only for heating such houses, over 220 kWh / m² of energy is needed per year, while in addition to heating, it is necessary to provide additional energy for cooling in the summer, energy for lighting and household appliances - thus increasing the total energy consumption in the building.

For comparison, the average energy consumption for heating buildings in European countries is 70 kWh / m² of energy per year, while in Serbia the average consumption is twice as high and is about 150 kWh / m² per year.

The first step taken in 2011 in order to solve this problem in Serbia is the introduction of new regulations in the field of energy efficiency of buildings: Rulebook on energy efficiency of buildings and Rulebook on conditions, content and manner of issuing certificates of energy performance of buildings "Official Gazette. RS Gazette", no. 61/2011.

The introduction of these regulations was extremely important in the construction industry, both to improve the quality of construction, and to raise awareness of the general public about the importance and benefits that energy efficient buildings provide in the entire built environment and how they improve housing quality. Today, the minimum standards that these regulations require in the construction of new and reconstruction of old buildings is no longer just an obligation imposed on contractors, but also a requirement that investors themselves set before designers and builders.

The minimum standard that is implied during the construction of facilities is that they meet the requirements for "C" energy class of the facility. According to the energy consumption for heating, all buildings can be classified from "G" class - the highest energy consumption and the worst category, to "A +" class - the lowest energy consumption and the best category of the building. As an obligatory part of the project documentation that is attached when applying for a building permit is the Energy Efficiency Study of the facility, in which the budget must prove that the facility will be a minimum "C"

category for new facilities or, during reconstruction, that the facility category was one class more than the existing condition. When applying for a building use permit, the obligatory document is the Energy Passport of the building, which guarantees that the constructed building is in accordance with the designed documentation and gives the final assessment of the energy efficiency of the building.

The passport is the final certificate of energy consumption in the building and has a period of validity of 10 years, when it needs to be reworked with measurements of actual consumption in the building during use. This way of certification of buildings enables the introduction of new criteria for assessing the market values of real estate, when the selling price of a residential unit needs to define not only the value of the location where it is located but also the quality of construction, materials used, thermal insulation and thermal installations. energy consumption in that facility. In the last 7 years, since the construction of energy efficient facilities began in Serbia, users have had the opportunity to see the benefits they provide, primarily in the form of cost reduction and increased comfort within the facilities.

Today, designers are witnessing that investors are increasingly demanding the construction of facilities that will meet not only the minimum requirements - C category, but also raise the standard for one ladder more - B category.

A better energy category means an increase in the cost of construction, because it is necessary to install better materials, more insulation, better carpentry, efficient heating systems - the justification of the investment lies in shorter repayment periods through savings from reduced bills for heating, cooling and maintenance, but also increasingly dominant. in increasing the market value of the property itself. We can say that the introduction of energy efficiency in the regulation of the construction industry has raised the quality and standards of construction in every sense.

In addition to the obvious economic benefits - higher market value and lower maintenance costs, we must not forget the benefits that these facilities have to an increased sense of comfort and health of people who live in them. In well-insulated buildings with quality carpentry, thermal comfort is increased - the temperature difference between walls, floors, ceilings and indoor air is reduced, which leads to a more pleasant feeling. For that reason, the recommended air temperatures in these facilities are lower by 2-3°C compared to inefficient facilities.

Then, in buildings where there is not enough thermal insulation and which have significant thermal bridges (most often at the joints of ceilings and floors with walls, overlapping terrace tiles, etc.) or where thermal insulation is improperly performed, condensation and mold are common in these places thermal bridges.

The Rulebook on Energy Efficiency of Buildings in Serbia introduced as a mandatory item the inspection of the elements of the thermal envelope for the risk of condensation, dewing of internal surfaces and the formation of mold. In this way, the level of comfort and health of users in new facilities is raised.

In addition to the structure of the building and the applied building materials, the following steps that can raise the level of efficiency of the building and reduce the final energy consumption in them is in the application of more advanced technologies: household appliances with high efficiency (A, A+), energy saving lighting, application home automation systems, application of renewable energy sources - use of heat pumps, solar collectors, photovoltaic panels for electricity production and the like.

With the increasing use of such systems in our market, a new chapter in construction practice will soon open when we will talk about low-energy houses, passive houses or zero-energy houses.

2.3. Technology development trends in the construction, energy efficiency and RES industry

Due to favourable climatic conditions, and number of sunny days during the year in Serbia, there is good chance for development of solar power plants, but the state is not supporting feeding tariffs, as stated in its regulations, so that small PV installations are still not pay off solution.

In spite of good geographic conditions of river flows for small hydro power plants, state institutions are not willing to allow the use of rivers for that purpose.

Presence of huge amounts of recycling materials, that can be used as building insulation, still rather ends at landfill, than to be reused as an insulation, due to lack of organized system for collection and processing of recycling materials.

Building energy efficiency technologies can be divided into two main categories: technologies improving energy efficiency of traditional buildings (both new and existing ones), and novel technologies of buildings construction.

The first group consists of solutions improving energy performance of a building, such as:

1. Insulation systems of the exterior surface (walls, ceilings), e.g. Mineral wool, styrofoam,
2. Energy efficient windows,
3. Heat and power source: gas and biomass boilers, heat pumps, electric heating (e.g. Electric mats),
4. Heating distributions system elements, e.g. Thermostatic valves,
5. Led lighting,
6. Ventilation systems, e.g. Heat recovery systems,
7. Efficient pumps, insulation of pipes, effective and optimized control,
8. Energy management and control systems.

Most of these technologies that are applied in Serbia are of foreign origin – they are imported to Serbia and Serbian companies only distribute and/or install them

Novel building technologies include mainly prefabricated components (e.g. façade panels) and buildings. They are offered usually by SMEs (often start-ups). Prefabrication can reduce construction time significantly, and can provide higher energy performance standard, due to limited risk of human mistake at a construction site. Companies offering this type of buildings often advertise their products as highly efficient, zero- or even plus-energy constructions. This market is developing, however still quite small.

2.4. Market trends in the construction, energy efficiency and RES industry

Serbian energy sector is not market-based and economically efficient to the extent, that generates its own development. In spite of fact that there is a certain market in Serbia related to NZEB, political opportunism and lack of readiness for depolitisation and professionalization in energy sector, reduces the possibility for its further development.

Serbia probably will not meet its national target of 15% the share of renewable energy in 2020 on time. Achieving the 15% target renewable energy in the energy mix appears unreal: in 2018, this share was only 11.3%. The effects of renewable energy auctions organized in 2018-2020 are not enough to make up for this gap, especially since most of the new RES installations will be built after 2020.

Serbian government will have to convince Brussels that Serbia has permanently entered the path of real support for renewable energy sources, and the acceleration in renewable energy development visible from 2018 will be continued. Serbia should prove that, although we have not reached the threshold for 2020, we want to have a constructive share in the implementation of the EU goal for 2030. Such an approach will certainly meet with a positive reaction of the European Commission and may help to avoid penalties if the effects are visible. Otherwise, Serbia will be exposed to a number of consequences.

The lack of a clear national strategy in the field of renewable energy sources development and the lack of consideration in Serbian industrial policy of the need to promote and shape the development of the RES production industry have slowed down the formation of larger RES production companies, which could become global or even EU or domestic market leaders in their areas. However, many companies have already been established that significantly meet the needs of the domestic market of RES and have made efforts for international expansion. The RES production sector is not monitored in Serbia in a systematic and complete way, it is not included in national statistics.

2.5. External resources available for the cluster development

The main goal of cluster policy should be to strengthen the innovation and competitiveness of the Serbian economy based on the intensification of cooperation, interaction and knowledge sharing within clusters, and to support the development of strategic economic specializations.

The relevant measures available for our cluster are our dedication to R&D, EU projects, and innovation as the only direction where cluster members could find their future development. Modern market-based economy, demands from cluster members to keep pace with new technologies in: materials, project management, and marketing. That is why introduction of ICT, and digital tools in construction sector, together with EU standards, is the only way through today's digital era of economy. Those are the fields where our cluster has the assignment to raise the competitiveness of its members at national and international level. Cluster is identified at national level, as a cluster with development and innovation potential, existing and planned cooperation, experience and potential of the cluster coordinator. In the early years of its existence, cluster was marked as highly positioned according to International Cluster Observatory with index of specialization of 8,7 (the other clusters in Serbia was marked between 1 and 2). Unfortunately, Serbia still does not have national strategy for cluster development, which means that clusters are not foreseen for financing under Ministries and other public institutions, so cluster is exclusively financed by EU projects.

3. Cluster overview

3.1. History of the cluster

Early history of Cluster:

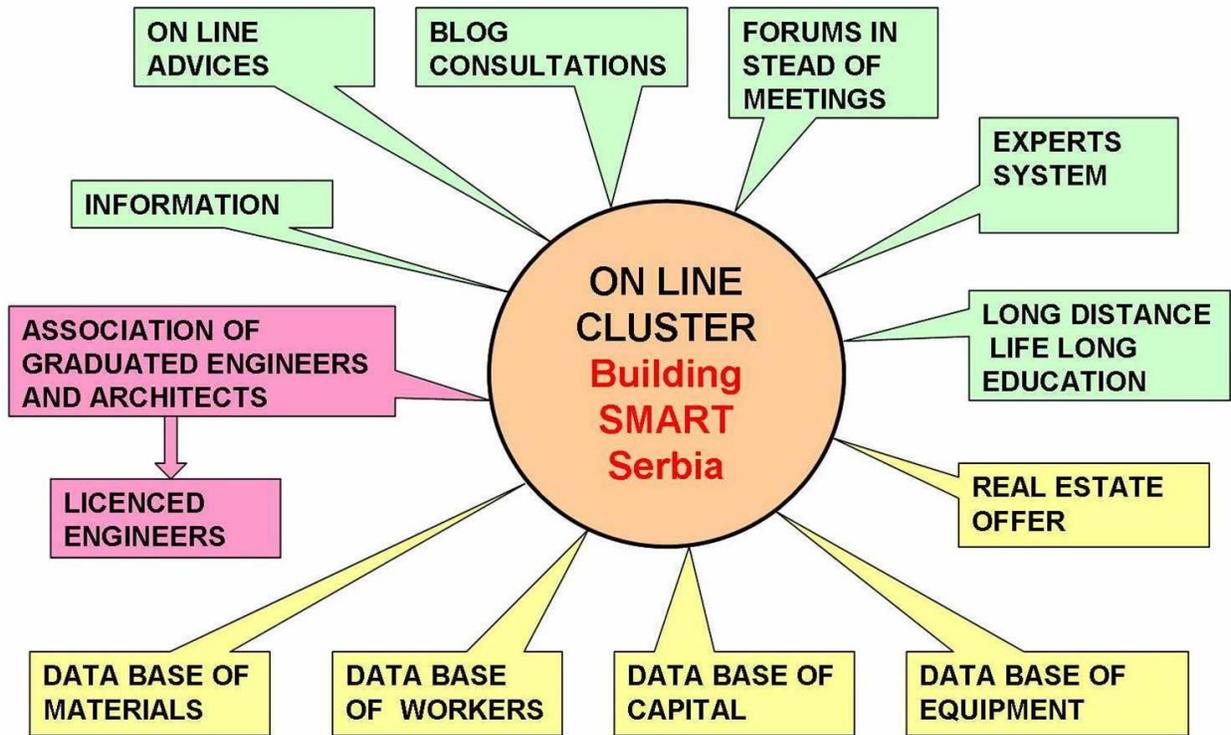
Construction cluster DUNDJER is founded at the end of 2007, as one of the very first clusters and the only cluster in this sector in Serbia. Founders were 9 companies, 4 Faculties, and 1 supporting organization. During 2008 DUNDJER membership increase to 50, and now it counts 60 members. Cluster

DUNDJER gathers companies specialized for building construction, engineering, and planning, and has following bodies: managing board, supervising board, 8 committees and a head manager (Committees for Education, International Collaboration, Research and Development, Promotion of Export Activities, Marketing, Financing, Information Systems, Relations with Local and National Authorities). Cluster was supported by Ministry of Economy and successfully has been presented in Italy as a member of Serbian cluster delegation. Cluster has also collaboration with construction cluster in Slovenia, and membership in the international BuildingSMART association. At the international scene, members of Cluster Dundjer have constructed big objects for HOLCIM Swiss, attracted over 20 million investments from Israel construction company to our country, and participated in one of the largest investment in Serbia, building of Korean factory in Nis. Cluster DUNDJER was creating an environment for growth of the small and medium enterprises in this sector and empowering easier start-ups for new SME-s inside cluster, through education and technological and human resources development. For this purpose, cluster had organized number of educations, presentations, on-line consultations, symposiums and workshops in order to lift skills of engineers, technicians and workers and make them competitive for new jobs and challenges of the market. As a result of intensive activities, Cluster Dundjer has been graded as the best in Serbia, based on benchmarking of European Cluster Observatory (2009).

Recent history:

After first mainly basic IT and professional software education for members (Windows, Word, Excel, Internet, POWERPIONT, Access, and AutoCad, ArchiCad, Tower, Nemetscheck, Stress, SAP, Revit. etc), educational activities have been oriented to BuildingSmart and BIM technology, FIDIC contracting, Risk Assessment in Construction industry and Real Estate Investments. In addition, based on needs of majority of members, the education activities have been oriented to basic vocational education, i.e. dual education in basic skills, like masons, carpenters, painters, cranists, lift fitters, ceramics, plumbers, electricians, insulators, joiners, welders, etc. Special attention was paid to R&D activities, resulting in reward for Best Innovation Idea by Ministry of Science and Technology and for human resource development by Digital Agenda of R. Serbia. In the same time, the Cluster has been awarded by Bronze Label for Cluster Management Excellence. Recent research in insulation materials including recycling materials resulted in number of international and national research grants. Nowadays activities are mainly oriented to

- Communication and network development
- Human resources development / education
- Technological development
- Access to international markets
- Financial resources
- Cooperation with state institutions



3.2. Cluster coordinator

Cluster DUNDJER gathers companies specialized for building construction, engineering, and planning, and has following bodies: managing board, supervising board, 8 comities and a head manager (Committees for Education, International Collaboration, Research and Development, Promotion of Export Activities, Marketing, Financing, Information Systems, Relations with Local and National Authorities). The main coordinator of all activities is Head Manager, which as executive coordinates actions of managing board, and all the comities. The research orientation of Cluster is supported by professors of University of Nis and teaching staff of Technical Secondary School and Public Vocational School.

3.3. Cluster activity and technology background

Based on cluster members' profiles, please describe the following issues:

Table 1 Cluster members as of November 2021

#	Name	Type	Field of expertise	website
1.	University of Nis	Academic institution	Education, R&D, innovation	https://www.ni.ac.rs/
2.	Faculty of Civil and Architecture, Nis	Academic institution	Education, R&D, innovation	http://gaf.ni.ac.rs/index1.php
3.	Faculty of Mechanical Engineering, Nis	Academic institution	Education, R&D, innovation	http://www.masfak.ni.ac.rs/index.php/en/
4.	Faculty of Electronic	Academic	Education, R&D,	https://www.elfak.ni.ac.rs/en/

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#	Name	Type	Field of expertise	website
	Engineering, Nis	institution	innovation	
5.	Faculty of Science	Academic institution	Education, R&D, innovation	https://www.pmf.ni.ac.rs/
6.	Faculty of Occupational Safety	Academic institution	Education, R&D, innovation	https://www.znrfak.ni.ac.rs/
7.	Faculty of Economics	Academic institution	Education, R&D, innovation	http://www.eknfak.ni.ac.rs/en/
8.	IRC ALFATEC Nis	R&D	Innovation	http://alfatec.rs/
9.	CPE Nis	R&D, Education	Education	https://www.companywall.rs/firma/centar-za-istravanje-razvoj-i-obrazovanje-odraslih-iz-oblasti-inzenjerske-informatike-centar-za-pe/MMoYFXUR
10.	Nasumica Nis	SME	Software	https://www.companywall.rs/firma/nasumica/MMhvLPaY
11.	HTS HIDRO CONSULTING Nis	SME	Consulting	https://hts-hidro-consulting.ls.rs/rs/
12.	Vagres inzenjering Nis	Investor	Construction	https://vagres.rs/
13.	Kapaprojekt Nis	SME	Construction	http://www.kapaprojekt.com/
14.	Deltaelektronik Nis	SME	Elevator escalators	https://search.bisnode.rs/rs/129298/doo-delta-elektronik-nis-ozrenska-14/
15.	ABR Nis	SME	Construction	http://abr.co.rs/
16.	Stabilprojekt Nis	SME	Design, consulting, engineering	https://stabilprojekt.com/
17.	Timing Interprojekt Nis	SME	Design, consulting, engineering	https://search.bisnode.rs/rs/120167/doo-ipi-inter-projekt-inzenjering/
18.	Sargan Inzenjering Nis	SME	Design, consulting, building	https://www.daibau.rs/sargan_inzenjering_doo_nis_preduzece_za_proizvodnju
19.	Varing Nis	Investor	Construction	http://varing-nis.com/
20.	Sampion Nis	Investor	Construction	http://www.sampiongradnja.rs/
21.	Gramont Nis	Investor	Construction	http://gramontinzenjering.rs/en
22.	N-ING Beograd	SME	Construction	http://www.ning.rs/index.html
23.	Eco-therm Nis	SME	Consulting	https://ecotherm-engineering.ls.rs/rs/
24.	SWGm Beograd	SME	Software	http://www.swgm.rs/
25.	TeamCAD Beograd	SME	Software	https://www.teamcad.rs/index.php/en/
26.	Milinkovic Beograd	SME	RES	http://milinkovicco.com/
27.	Toncev gradnja Surdulica	Investor	Construction	http://www.toncev.com/
28.	Fox Nis	SME	Construction	http://www.foxprojektovanje.rs/
29.	Eurolift Nis	SME	Elevator escalators	http://www.euroliftgroup.com/
30.	AGtim Nis	SME	software	http://www.agtim.com/
31.	Granit Vlasotince	SME	Construction	https://www.kompanije.net/firma.php?id=7326
32.	Bagi trans Kraljevo	SME	Construction machinery	http://www.bagi.rs/web/guest/pocetna
33.	Cemernik gradnja	SME	Construction	https://search.bisnode.rs/rs/507606/stef

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

#	Name	Type	Field of expertise	website
	Zitkovac			an-dojcinovic-pr-gradjevinska-radnja-cemernik-gradnja-zitkovac/
34.	Gradnja stil Nis	SME	Construction	https://search.bisnode.rs/rs/122222/gradnja-stil-doo-nis/
35.	Kolubara Beograd	SME	Construction	https://www.kolubara.rs/
36.	Termodom Zajecar	SME	Construction	http://www.termodomknb.com/
37.	Juzna Morava Nis	public	Water supply	https://www.pttimenik.com/nis/vp-juzna-morava-ad-nis
38.	Eurostand team Nis	SME	Consulting	https://www.companywall.rs/firma/gordana-stojanovic-prvulovic-pr-eurostand-team/MMlc0FUR
39.	Logos Nis	SME	Real estate	http://www.logos.co.rs/
40.	Balkan Crna Trava	SME	Real estate	https://search.bisnode.rs/rs/48230/ozz-balkan-crna-trava/
41.	MIN stambena zadruga Nis	SME	Real estate	http://www.privrednik.com/klasifikacija-delatnosti/8-IZGRADNJA-STAMBENIH-I-NESTAMBENIH-ZGRADA-#d412000
42.	Kingdominvest Nis	SME	Real estate	http://www.kingdominvest.com/
43.	MKL Inzenjering Nis	SME	Building materials	http://www.mklnis.com/
44.	Cvetkovicgradnja Nis	SME	Painting	http://www.gtdcvetkovic.rs/
45.	DSI Nis	SME	Design, consulting, engineering	https://dizajn-struktura-inzenjering.ls.rs/rs/
46.	Nisstan Nis	public	maintenance	http://nisstan.rs/
47.	PRO-GO Nis	NGO	Consulting	
48.	Simpa color Beograd	SME	Painting	https://novamedia.rs/showCompany/9880/simpa-color-
49.	Optimal IT Nis	SME	Consulting	https://www.daibau.rs/optimal_doo_nis
50.	Tico computers Nis	SME	software	https://www.tico.rs/
51.	Drvoles Nis	SME	Doors	https://search.bisnode.rs/rs/909115/drvoles/
52.	Aluming Nis	SME	Doors	http://www.aluming.rs/
53.	Lam number one Nis	SME	Floors	https://www.pttimenik.com/parket-i-laminat-nis/lam-number-one-laminat
54.	Delta-commerce Nis	SME	Construction	https://search.bisnode.rs/rs/75267/pred-uzece-za-spoljnu-i-unutrasnju-trgovinu-delta-commerce-doo-nis/
55.	Magdon Nis	Investor	Construction	http://magdon.rs/
56.	Prizmainzenjering Novi sad	Investor	Construction	http://prizmainzenjering.com/
57.	EltaMT Nis	SME	Construction	https://elta-mt.ls.rs/rs/
58.	Supervision Nis	SME	Construction	https://supervision.ls.rs/rs/
59.	Nisprojekt AD Nis	Investor	Design Construction	https://www.companywall.rs/firma/nisprojekt-ad-nis---u-stecaju/MMNwHUOY

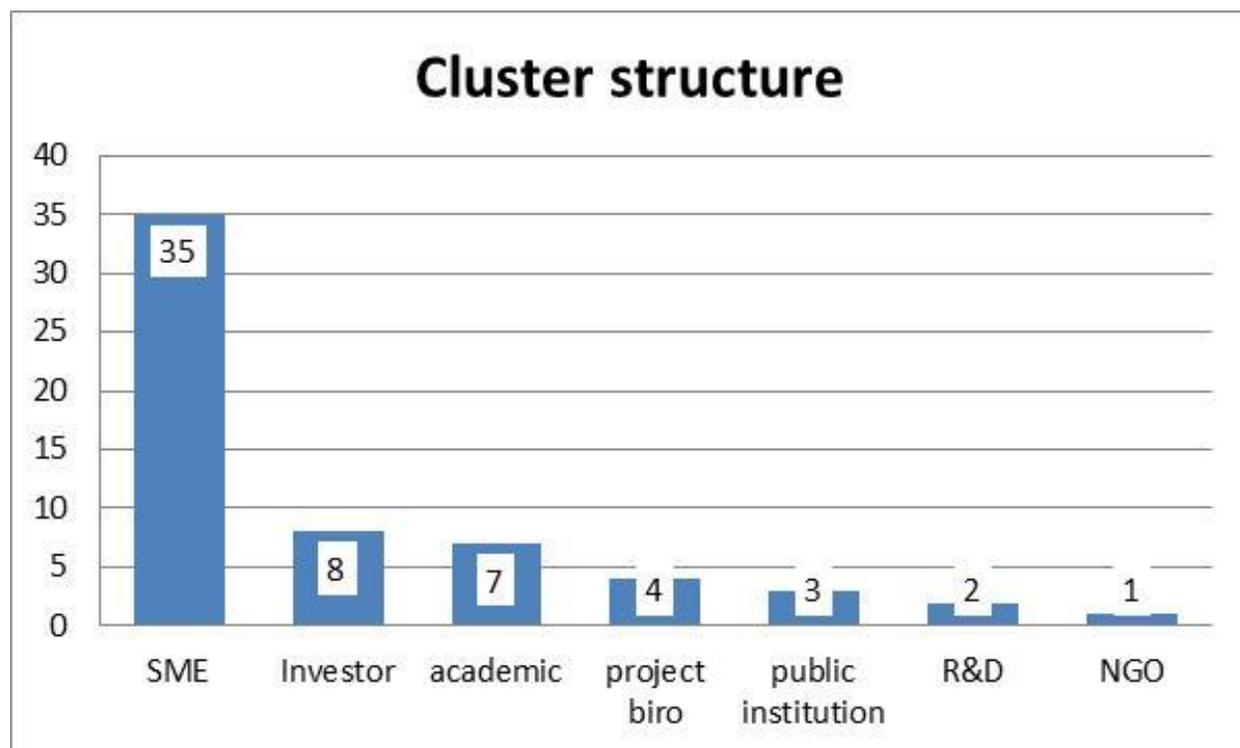
#	Name	Type	Field of expertise	website
60.	Municipality of Knjazevac	Public authority	Municipality interested in Open House methodology of building assessment	http://www.razvoj.rs/

Which economy branches the cluster covers?

Cluster Dundjer covers Construction sector and all supporting industries as well as R&D, innovation, and education.

What is the technology background of the cluster?

Basic technology background for cluster activities are: Energy Efficiency, Renewable Energy Sources, especially solar and hydro power, water quality monitoring, ICT in construction sector, recycling in construction sector, especially for insulation purposes, construction skills education technics (Dual education). The special attention is paid to applying and developing standards in construction, like ISO, OPEN HOUSE, BREEM, LEED, DGNB (BuildingSMART, BIM), USGB, FIDIC.



Who are the main R&D&I players in the cluster?

The main players for R&D&I activities are, first of all, chairs of comities with this orientation, i.e.

Committee for Research and Development, Committee for Education, Committee for Research and Development, Committee for International Collaboration, Committee for Information Systems, strongly supported by head manager. Depending on the type of activity, the corresponding chair of committee mobilizes project team members from cluster SMEs and R&D and innovation oriented organizations. The basis for those activities are faculties from University of Niš, first of all, Faculty of Civil Engineering and Architecture, Faculty of Mechanical Engineering, Faculty of Electronic Engineering, Faculty of Science, Faculty of Occupational Safety, Faculty of Economics. Very active in R&D&I activities are research organizations, IRC ALFATEC Nis and Center for Permanent Education (CPE) from Niš. Some support in research is obtained by external partners, like University of Belgrade, Nord-Rheine Westphalia University from Bochum, Fraunhofer Institute from Germany, depending on project type.

Relevant projects implemented by the cluster

The Cluster Dundjer has implemented number of projects, as noted below.

1. „Implementation of International Regional Expert Conference about Cluster Cooperation as a Tool for Development of Business-Educational Tourism,“ approved and financed by Office for Local Economic Development and Projects of City of Niš (KLERP), Niš, 2020.
2. “Increasing SME Competitiveness for EU Market by Introduction of New EU Standards for Quality and Sustainability Assessment of Buildings”. UNOPS-EUPRO, Grant -161-2019.
3. „Implementation of International Regional Expert Conference About Digitalization of Cultural Heritage“ approved and Financed by KLERP Niš br. 4939/2019-01, 2019.
4. “Designing Methodology for Participation of Three Members of Cluster Dundjer in the Dual Education System in the Assessment Criteria of Location, Technical Characteristic and Environment of Buildings” approved and financed by KLERP Niš, 2019.
5. “Designing Methodology for Participation of Three Members of Cluster Dundjer in the Dual Education System in the Field of Energy Efficiency, Ecology, and Solar Energy,“ approved and co-financed by KLERP Niš, 2018.
6. “Empowering of Women's Engineering Profession, in the Niš Region, Through Training in MATLAB and OOP,“ approved and co-financed by Ministry for Trade, Tourism and Telecommunication of R. Serbia, 2017
7. “Increase energy efficiency of building through the development of intelligent MEASURING-CONTROL SYSTEM (MCS) for electricity consumption demand management” approved and co-financed by Serbian Development Agency, 2017.
8. “Remote control of street light based on LED TECHNOLOGY” approved and co-financed by National Agency for Regional Development of R. Serbia, 2015..
9. “IZORETEX as a new ecological and energy efficient material” approved and co-financed by National Agency for Regional Development of R. Serbia, 2014.
10. FP7 project “STOREPET”, funded by the European Community’s Seventh Framework Programme under Grant Agreement No. 286730.
<https://sites.google.com/a/storepet-fp7.eu/storepet/consortium-and-management>, EU FP7 project 2011-2014.
11. FP7 project “OPEN HOUSE”. This project receives funding from the European Community’s Seventh Framework Programme under Grant Agreement No. 244130. <http://www.openhouse-fp7.eu/> EU FP7 project 2010-2012.
12. National first award for the Best Innovation Idea in the 2010. from Ministry of Science and Technology of Republic Serbia for the device BIOTOXINOMER.

- www.dundjer.co.rs/biotoksinomer.ht ,
Ministry of Science and Technology of R. Serbia 2010.
13. ROMANI-SERBIAN ON LINE DICTIONARY is the first on line dictionary in this part of Europe. The goal was to increase employment among Roman population in the construction sector by improving communication between employers and workers www.dundjer.co.rs/recnik/ . Awarded by Ministry of Information and Telecommunication of R. Serbia, 2011.
 14. "Development and Production of Pilot Plant Based on Renewable Energy Sources for Increasing Energy Efficiency of Buildings" approved and co-financed by Ministry of Economy and Regional Development of R. Serbia, . www.dundjer.co.rs/workshop_23032011.htm, National Agency for Regional Development, 2010.
 15. "development of methodology for calculation of electric energy capacity of small solar power plant and its application on available projected roof area", approved and co-financed by Ministry of Economy and Regional Development of R. Serbia, National Agency for Regional Development, 2011. . www.dundjer.co.rs/elektrane_na_krovovima.htm
 16. EU project „ADRIATIC DANUBIAN CLUSTERING“ in Maribor and Banja Luka at the international workshop about possibilities of economic collaboration between Danubian countries. SEE Transnational Cooperation program 2009-2011.
http://www.southeast-europe.net/en/projects/approved_projects/?id=81
 17. Construction Cluster DUNDJER has developed economic collaboration between Balkan local municipalities and region Friulia Venezia Giulia (FVG), Italy under project “SVILUPPO LOCALE E ACQUIS COMMUNAUTAIRE NELLE MUNICIPALITA' DEI BALCANI - ACQUIS 3” . Construction Cluster Dundjer has organized a number of B2B meetings between partners from FVG and Serbia in construction sector during the 2 year project. Regia FVG Italy – Dundjer, 2010-2012.
http://www.dundjer.co.rs/pordenone_italy.htm
 18. Workshop "SPEED RAILROADS FOR CORRIDOR 10" with guest professor from Ruhr Universität Bochum, Herr Prof. Dr. Günther Schmid, PhD.,
www.dundjer.co.rs/brze_pruge.htm
 19. Workshop "RISK ASSESSMENT IN CONSTRUCTION SECTOR" with guest professor from Faculty of Civil Engineering Austeen, Texas, USA, Prof. Dr. Ivan Damnjanovic, PhD., Faculty of Civil Engineering Austin, Texas, USA, 2009.www.dundjer.co.rs/risk_assessment.htm
 20. International expert symposium: "ENERGY EFFICIENCY AND RENEWABLE ENERGY SOURCES" with large number of university professors from country and abroad, bringing the leading companies from that sector: "SMA" Germany and "ITALIANA MEMBRANE" Italy. Event has been followed by press conference. SMA Germany, ITALIANA MEMBRANE, Italy, 2011.
www.dundjer.co.rs/solarna_elektrana.htm
 21. Construction Cluster DUNDJER has sent 4 young engineers in Ruhr Universität Bochum, Deutschland for 4 months scholarship in order to bring best practices, and knowledge from developed country to Serbia through project “CLUSTER INTERNATIONALIZATION THROUGH TRANSFER OF KNOW HOW FROM GERMANY”, University Ruhr Bohum, Germany, 2009.
 22. Construction Cluster DUNDJER as a member of state delegation from Serbia took part in project INePS – GIFIP financed by INFORMEST Italy “CLUSTER PROMOTION IN CENTRAL AND EASTERN EUROPE,“
Interreg C INFORMEST ITALY, 2008.
 23. Seminar "NEW TECHNOLOGIES IN PROJECT MANAGEMENT", held in Vrnjacka banja with guests professors from Faculty of Civil Engineering and Architecture, University Nis, Dundjer, 2008..
www.dundjer.co.rs/vrnjacka_banja.htm

24. "STRENGTHENING COMPETITIVENESS OF NATIONAL CLUSTERS THROUGH INVESTMENT IN HUMAN RESOURCES DEVELOPMENT" approved and co-financed by Ministry of Economy and Regional Development. Project content
 - 1) Establishment of cluster's Educational-research-information center (ERIC) 50m², equipped with 15 PCs, legal software, video beam, cameras, internet, library with over 400 books, etc. www.dundjer.co.rs/eric.htm
 - 2) Creation of Virtual Private Network (VPN) www.dundjer.co.rs/vpn.htm
 - 3) Set up a bilingual web site for cluster (www.dundjer.co.rs) and hosting for web sites for some cluster members.
 - 4) Implemented and co-financed retraining for 50 construction workers, www.dundjer.co.rs/prekvalifikacije.htm
 - 5) IT courses in engineer informatics for 20 engineers, basic IT courses for 30 technicians. www.dundjer.co.rs/kursevi.htmMinistry of Economy and Regional Development, Dundjer, 2008.
25. TEMPUS project ARWQM "Construction of Pilot Devices for Advanced River Water Quality Monitoring Stations (ARWQM)". (TEMPUS CM-SCM-C006A05-2005). European Union TEMPUS project 2005.
26. «INNOVATIVE USE OF ICT IN CONSTRUCTION SECTOR» resulted with first pilot informative display based on LED technology with original software. Dundjer 2006.

3.4. International orientation and positioning of the cluster

The international collaboration of Cluster Dundjer has been established with Slovenia, Italy, Germany, Bulgaria, Finland, Spain, Portugal, Greece, and Slovakia. The majority of collaboration with European partners has been established in frame of European projects (some successful, some only in project preparation), like Slovenia, Italy, Spain, Portugal, Germany, Greece, Bulgaria, and Slovakia. Cluster Dundjer is member of international association BuildingSMART from Berlin, Germany and European Cluster Collaboration Platform (ECCP). In frame of regional cooperation of Nis Region and Region Friuli Venetia Giulia, Cluster Dundjer represented R. Serbia (Project INEPS). The visit of numbers of Dundjer SME's visited Municipality of Pordenone, with topics Energy Efficiency in building constructions, especially for wooden houses. Regarding international fairs, Cluster Dundjer visited on regular base International fair of Thessaloniki, Greece, Fair in Budva, Montenegro, and International Fair in Belgrade. The Cluster management organized visit to Budapest as action of establishing cooperation between Middle Europa and China. Construction Cluster Dundjer took part in the Fair of Project Ideas for Southeast Europe in Zagreb, Croatia.

3.5. Cluster members' needs

Results of the survey that provided by Cluster Dundjer

Consequences of the CORONA virus pandemic on the business of SMEs in Serbia

Micro and small enterprises in Serbia employ 629 thousand people. In addition to direct employment, these companies have a much wider social impact on the quality of life of over 3 million people in our country - families of employees, small suppliers such as agricultural farms whose livelihoods are endangered without these companies and others. In addition, a large number of these companies

operate in underdeveloped municipalities where they represent an important support and income of the local community.

The coronary virus pandemic has presented us, among many others, with an economic challenge - how to maintain the liquidity of the economy and save jobs, especially in the business of micro and small enterprises. In order to better respond to the needs of these companies in the coming period, we wanted to explore the challenges they face and the types of support they need to mitigate the economic and social consequences of the pandemic.

The cluster Dundjer conducted a survey in the period from March 25 to 29, 2020, in which 209 micro and small companies from Serbia participated. We will share the results of the research with our partners - representatives of the international community, the public sector and the rest of the private sector, so that together we can design and implement adequate measures to overcome the challenges that companies face.

The research was conducted by filling out an electronic questionnaire by the company.

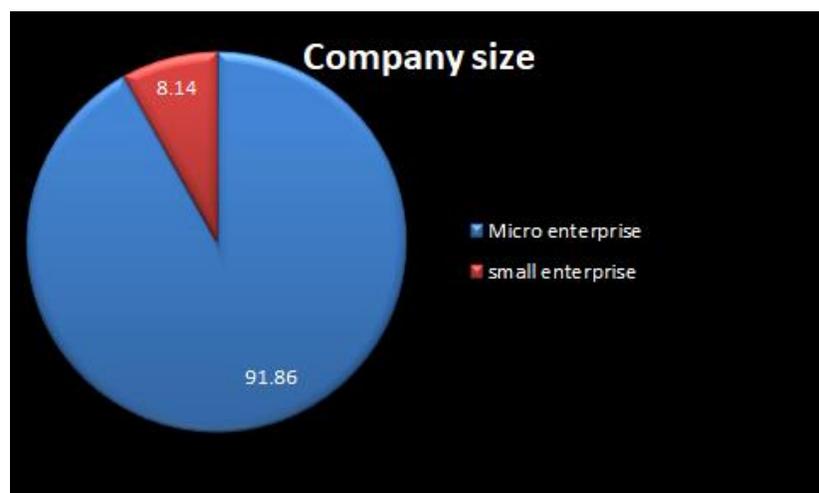
1.1. Sample structure

The research was conducted on a sample of 209 companies from the territory of the Republic of Serbia.

1.2. Company size

According to the size of enterprises, the largest number of enterprises that participated in the survey belongs to the category of micro enterprises (up to 10 employees and revenues less than EUR 700,000), 91.86% of them. This is followed by small businesses (up to 50 employees and revenues of less than EUR 8.8 million) with 8.14%.

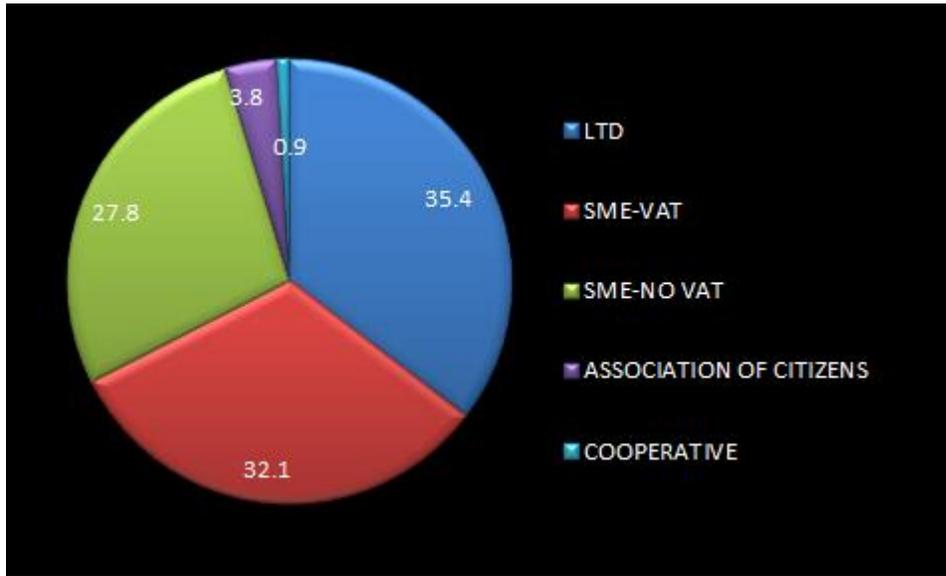
Company size



1.3. Legal form

According to the legal form, the largest number of respondents operate in the form of a limited liability company (35.2%), followed by book entrepreneurs (31.9%), flat rate entrepreneurs (27.6%), citizens' associations (4.3%) and finally cooperatives and social cooperatives (0.9 %).

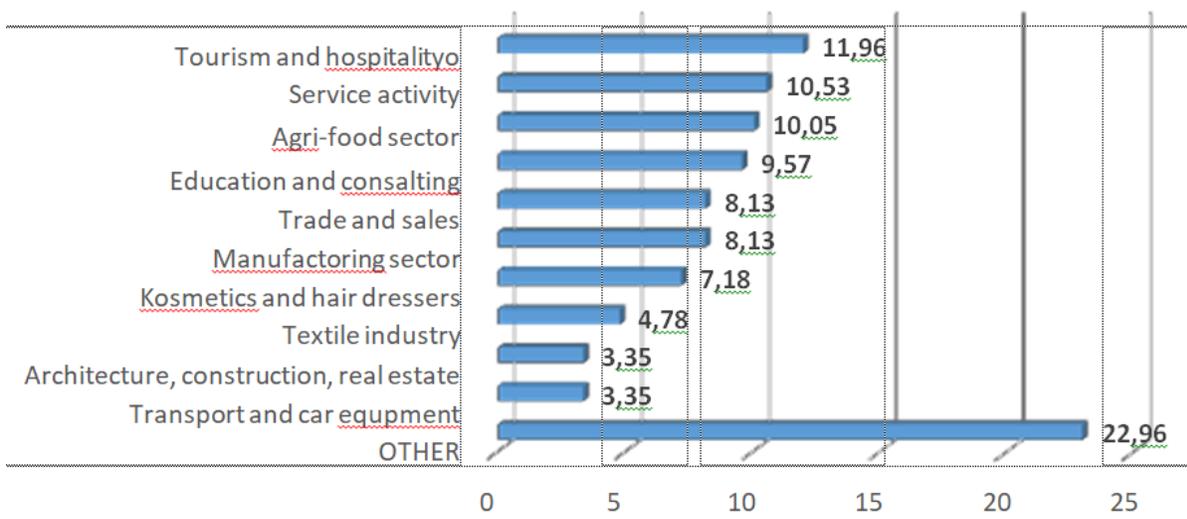
Legal form



1.4. Business sector

According to the sector they come from, the largest number of surveyed companies comes from the tourism and catering sectors (11.96%), followed by services (10.53%) and the agri-food sector (10.05%), followed by education and consulting (9.57%), trade and sales (8.13%), manufacturing sector (8.13%), cosmetics and hairdressing (7.18%), textile and tailoring (4.78%). In addition, from the represented sectors there are also architecture, construction and real estate (3.35%), transport and car equipment (3.35%). Within the second category are sectors where less than 3% of enterprises (health and social services, IT sector, bookkeeping and accounting, arts and publishing, etc.)

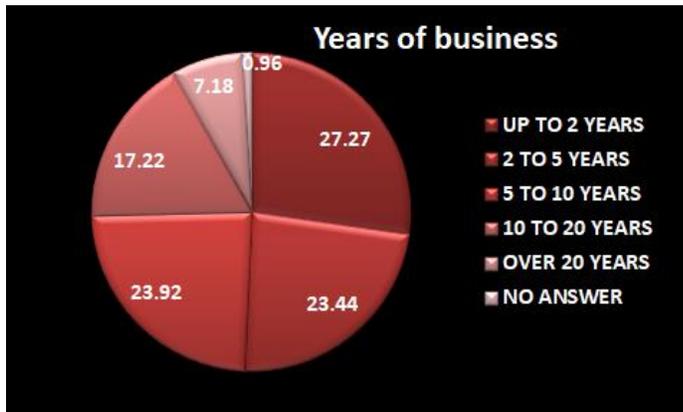
Business sector



1.5. Years of business

When it comes to the year of establishment, companies that operate up to 2 years make up 27.27% of the sample, companies that exist from 2 to 5 years make up 23.44%, companies that exist from 5 to 10 years 23.92%, companies that exist from 10 to 20 years 17.22 %, and in the end companies older than 20 make up 7.8% of the sample. 0.96% of respondents did not give an answer.

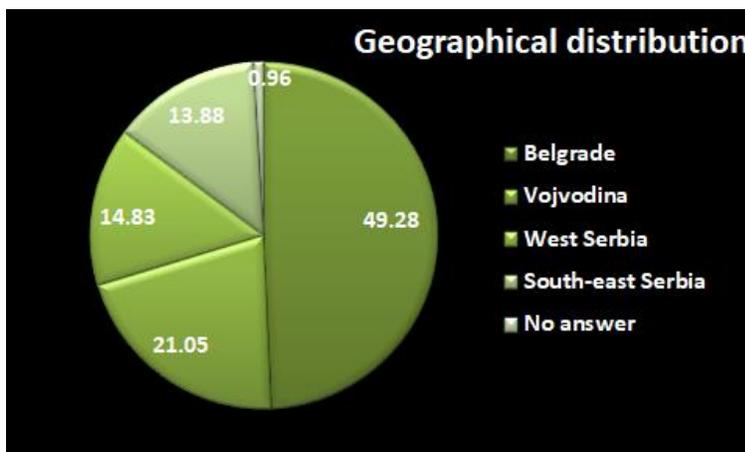
Years of business



1.6. Geographical distribution

When it comes to geographical distribution, the largest number of surveyed companies comes from Belgrade (49.28%), then from Vojvodina (21.05%), then from Sumadija and Western Serbia (14.83%) and finally from Southern and Eastern Serbia (13.88%).

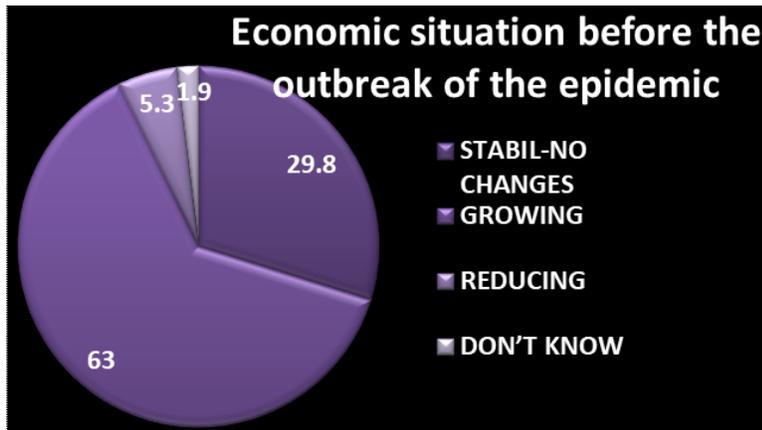
Geographical distribution



1.7. The situation before the outbreak of the epidemic

When it comes to the economic situation in the company before the outbreak of the pandemic, the largest number of surveyed companies estimate that their company was in a period of strengthening and growth, 63% of them. At 29.8% the situation was stable and unchanged, 5.3% of companies felt it was declining, while 1.9% of companies said they did not know or did not want to answer this question.

Economic situation before the outbreak of the epidemic

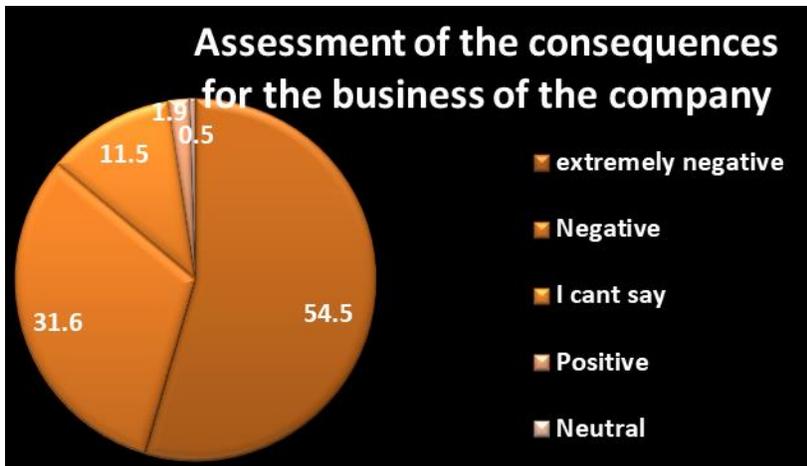


2. Assessment of the consequences for the business of the company

2.1. The impact of the pandemic on the revenues and operations of the company

When asked how the pandemic will affect the business and income of companies, 54.5% of entrepreneurs answered extremely negatively, 31.6% negatively, 0.5% neutrally, while 1.2% answered that the pandemic will have a positive impact on their business. 11.5% of surveyed companies still cannot estimate the consequences of pandemics on their business

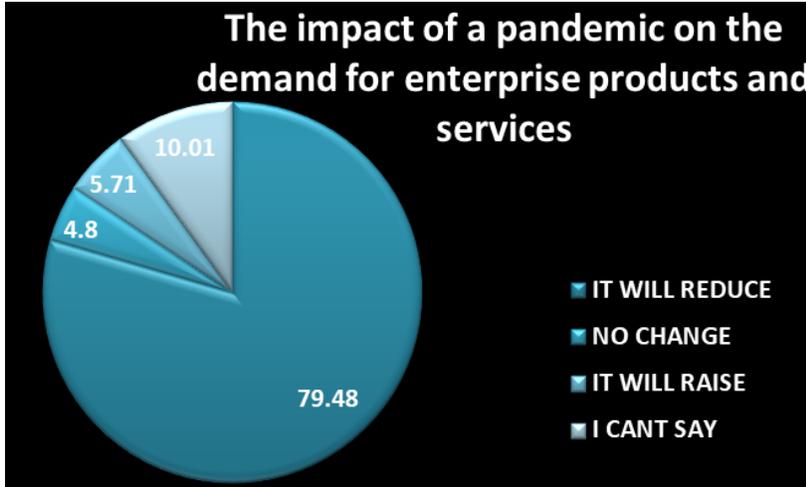
Assessment of the consequences for the business of the company



2.2. The impact of a pandemic on the demand for enterprise products and services

When asked how the pandemic will affect the demand for your products and services, in the next three months, 79.4% of companies believe that demand will decrease, 10% do not know the answer to this question, 5.7% of companies believe that demand will increase while 4.8% of companies do not expect any change in demand in the next 3 months.

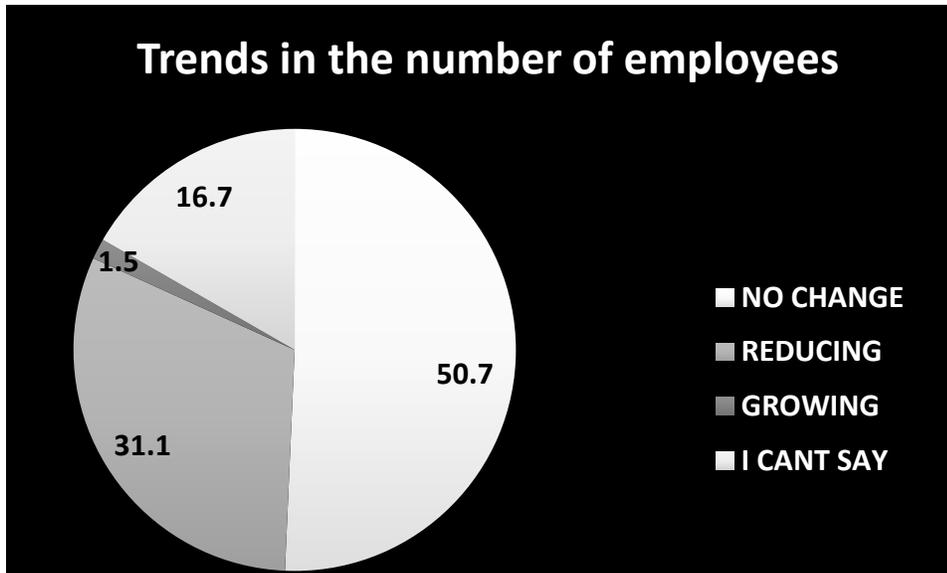
The impact of a pandemic on the demand for enterprise products and services



2.3. Trends in the number of employees in the coming period

When asked how companies predict trends in the number of employees in the coming period, 50.7% believe that they will be unchanged, 31.1% predict that the number of employees will decrease, 16.7% of respondents do not know the answer to this question and 1.5% of companies predict that the number of employees will increase

Trends in the number of employees

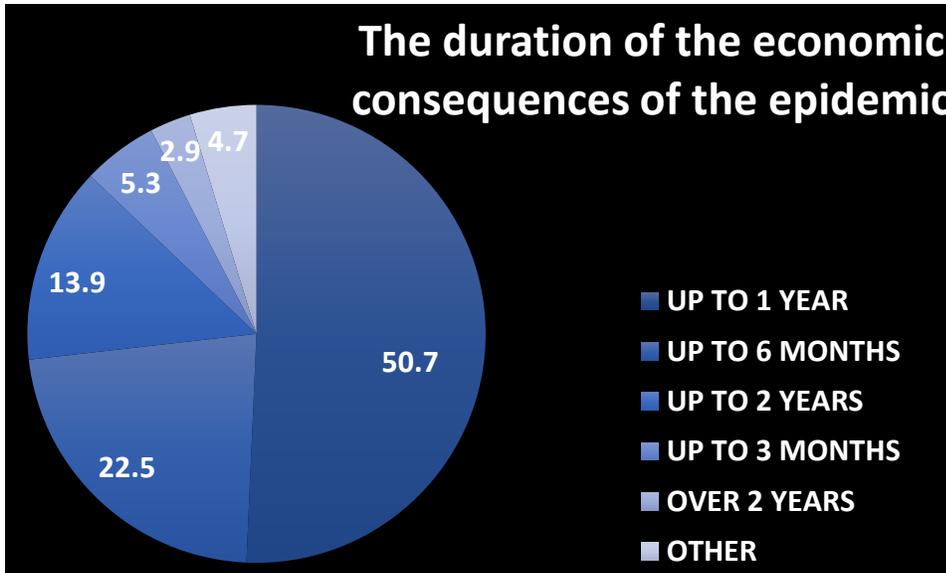


2.4. The duration of the economic consequences of the epidemic

When asked how long they believe that the consequences of the epidemic will have an impact on the operations of their companies, 50.7% answered within a year, 22.5% within 6 months, 13.9% within 2

years, 5.3% within three months, while 2.9% answered that the consequences would last more than two years.

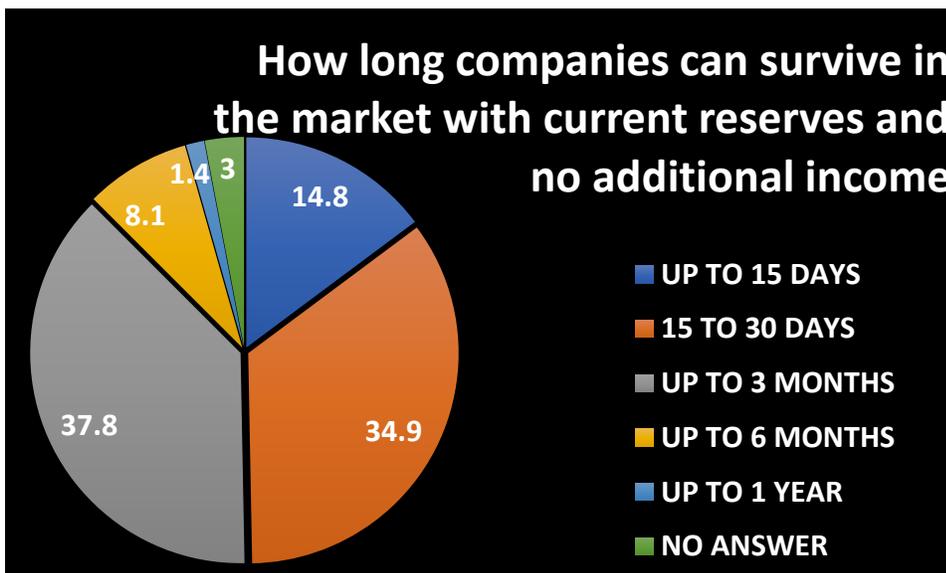
The duration of the economic consequences of the epidemic



2.5. How long companies can survive in the market with current reserves and no additional income

When asked how long the company can survive in the market with current reserves and no additional income, 37.8% of surveyed companies answered that they can survive up to three months, 34.9% from 15 to 30 days, 14.8% up to 15 days, 8.1% up to six months, and only 1.4% up to one year.

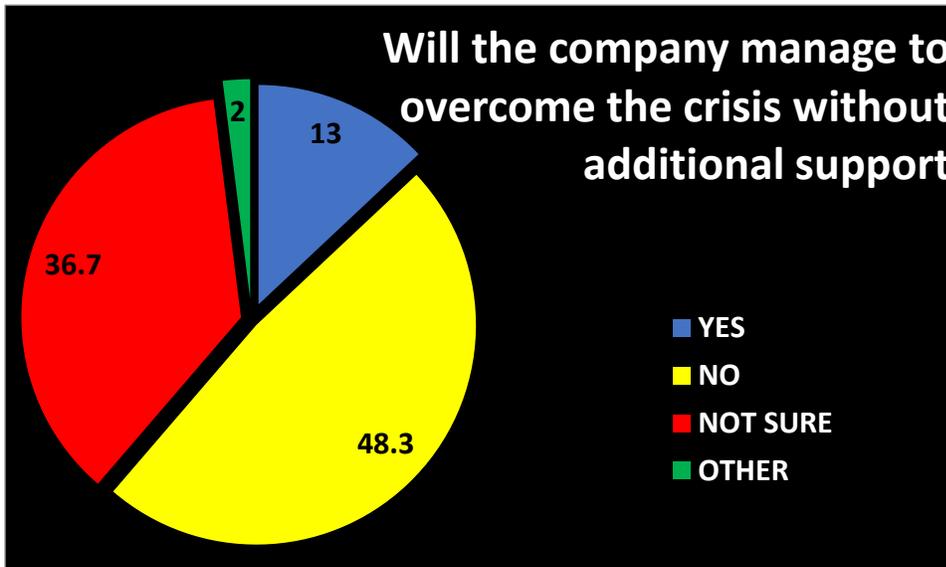
How long companies can survive in the market with current reserves and no additional income



2.6. Overcoming the crisis without additional support

When asked whether the company will be able to overcome the current crisis situation without additional support, 48.3% of the surveyed companies answered negatively, 12.4% positively, while 37.3% were not sure

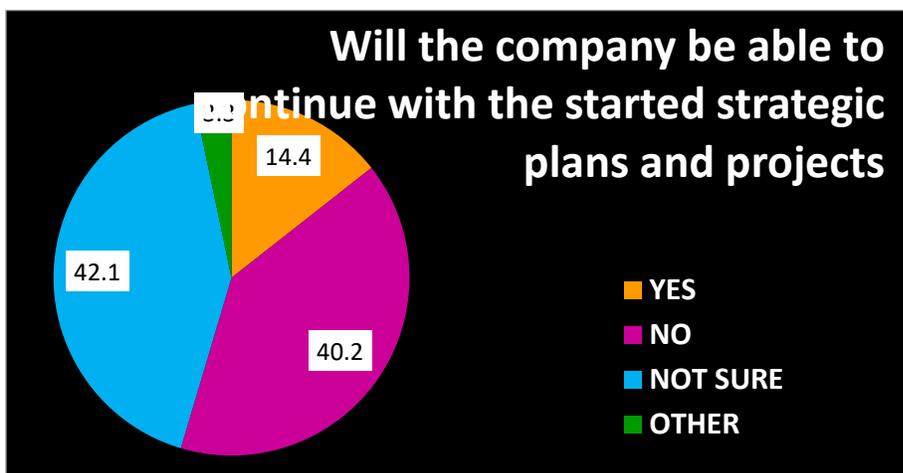
Will the company manage to overcome the crisis without additional support?



2.7. Continuation of strategic plans and projects

When asked, will the company be able to continue with the strategic plans and projects started in this year, 40.2% of companies responded with NO, 14.4% with YES, while 42.1% are not sure.

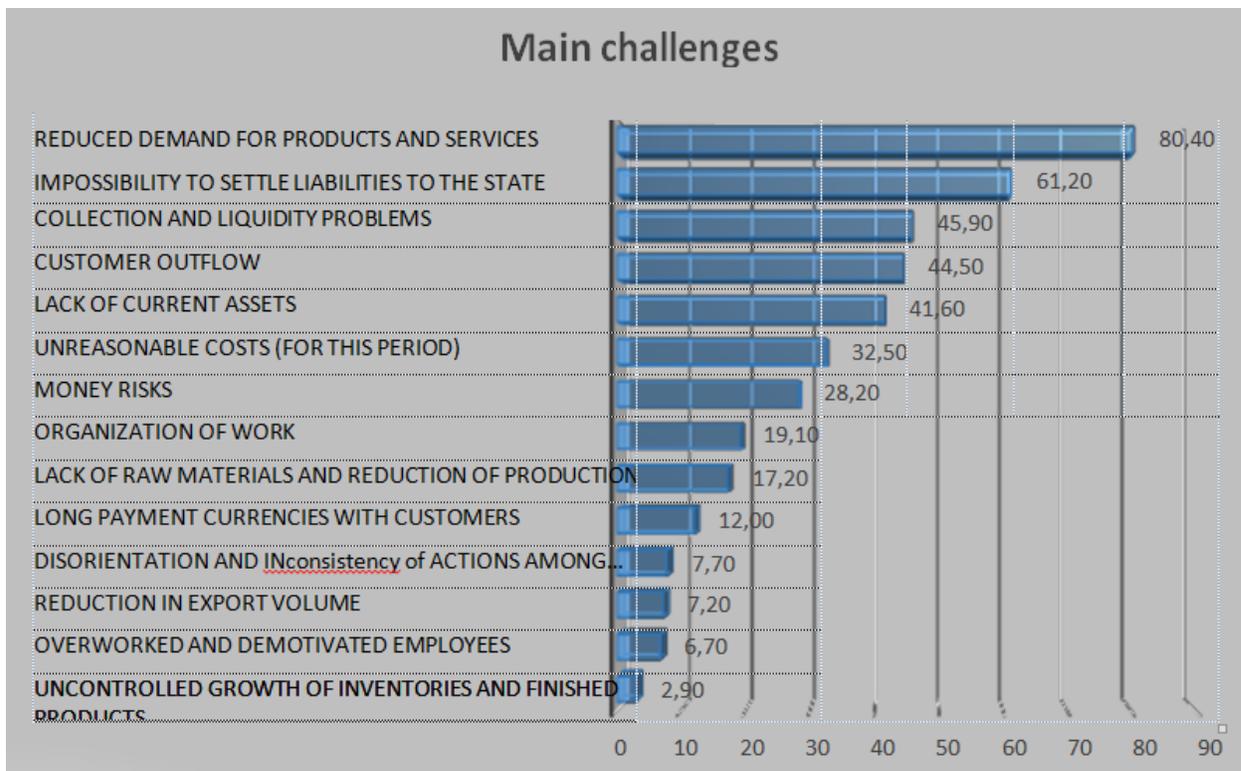
Will the company be able to continue with the started strategic plans and projects?



3. MAIN CHALLENGES FOR BUSINESS OPERATIONS

3.1. Key challenges for business operations

When it comes to the challenges posed to businesses by the pandemic, respondents had the option to choose up to 5 major challenges they face at the moment. According to the obtained results, the most significant challenges are reduced demand for products and services (80.4%), then the inability to settle liabilities to the state (61.2%), problems with collection and liquidity (45.9%), outflow of customers (44.5%), lack of working capital (41.6%), and unreasonable costs for this period (32.5%). In addition, there are also monetary risks (28.2%), work organization (19.1%), lack of raw materials and reduced production (17.2%), long currency payments with customers (12%), disorientation and inconsistency of actions among people (7.7%), decrease in export volume (7.2%), overworked and demotivated employees (6.7%) and uncontrolled growth of stocks and finished products (2.9%).



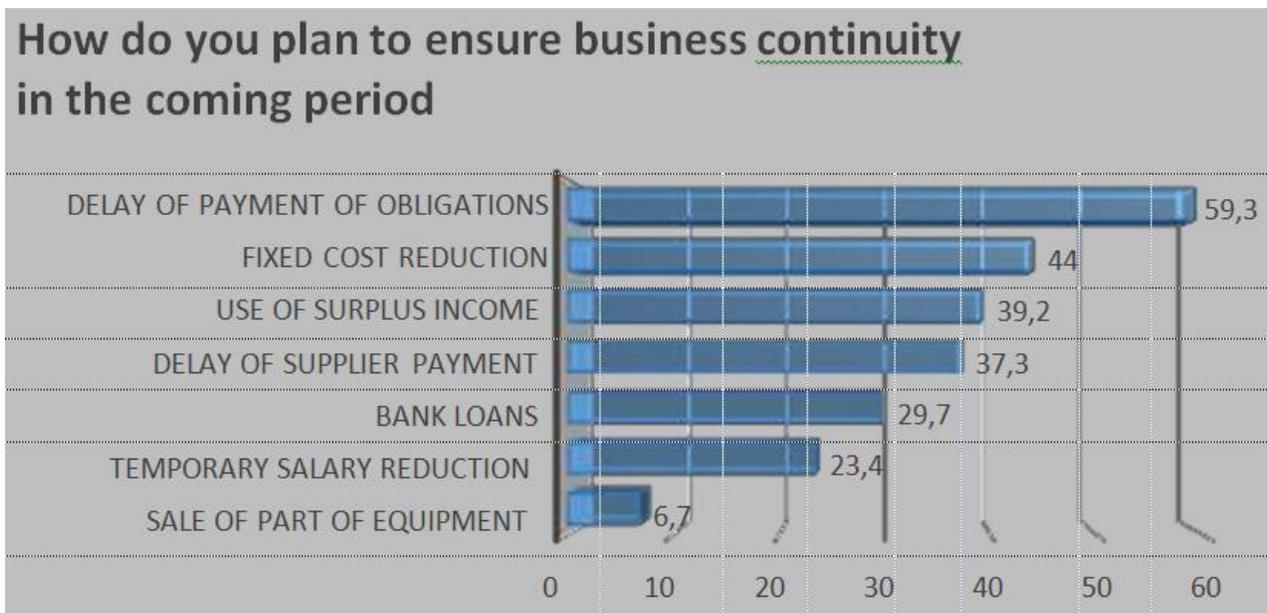
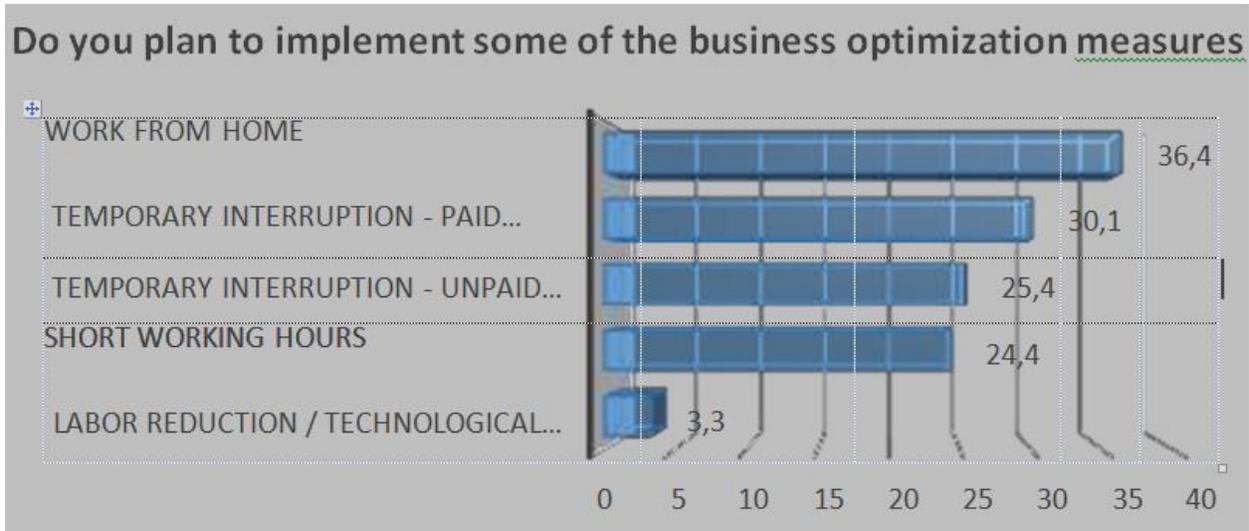
4. STRATEGIES FOR OVERCOMING THE CRISIS

4.1. Business optimization measures

When it comes to implementing business optimization measures, companies also had the opportunity to choose multiple responses. According to the obtained results, the largest number of surveyed companies apply the practice of work from home (36.4%), followed by temporary interruption of work in the form of paid leave (30.1%), then temporary interruption of work in the form of unpaid leave (25.4%) and part-time work (24.4%). The smallest number of surveyed companies has reached or plans to reach for a reduction of the workforce (3.3%).

4.2. Ensuring business continuity in the coming period

As part of the research, the companies answered the question of how to ensure business continuity in the coming period and had the opportunity to choose three to five main ways. According to the obtained results, the largest number of companies plan to postpone the payment of liabilities to the state (59.3%), followed by the reduction of fixed costs (44%), then the use of surplus revenues from previous periods (39.2%), postponement of payments to suppliers (37.3%), borrowing from banks (29.7%), temporary reduction of employees' salaries (23.4%), elimination of stocks (20.1%) and finally sale of equipment (6.7%).

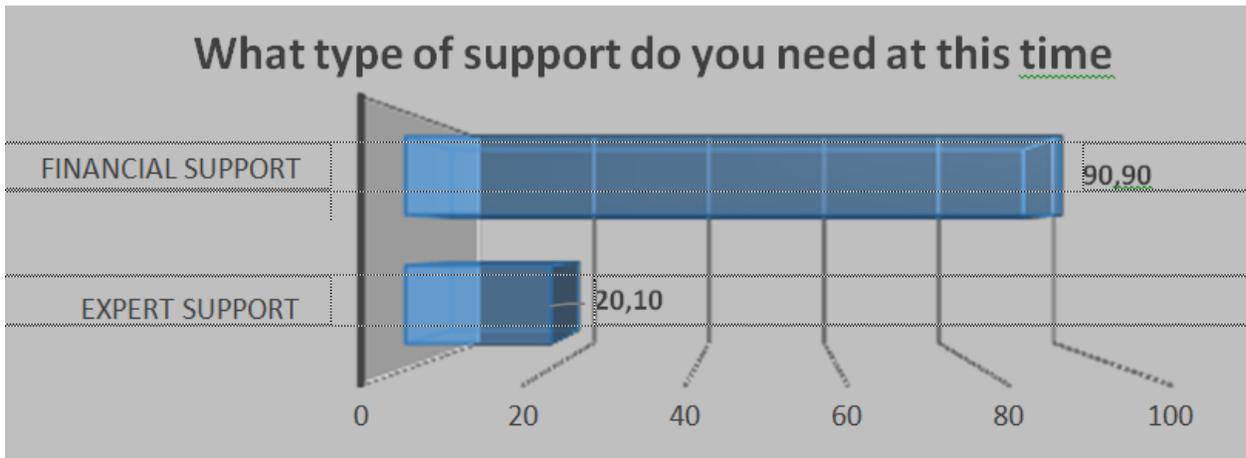


5. SUPPORT NEEDED

Within this segment of the questionnaire, companies answered questions about what type of support they need to overcome the crisis situation. Within each question in this segment, companies had the opportunity to choose multiple answers.

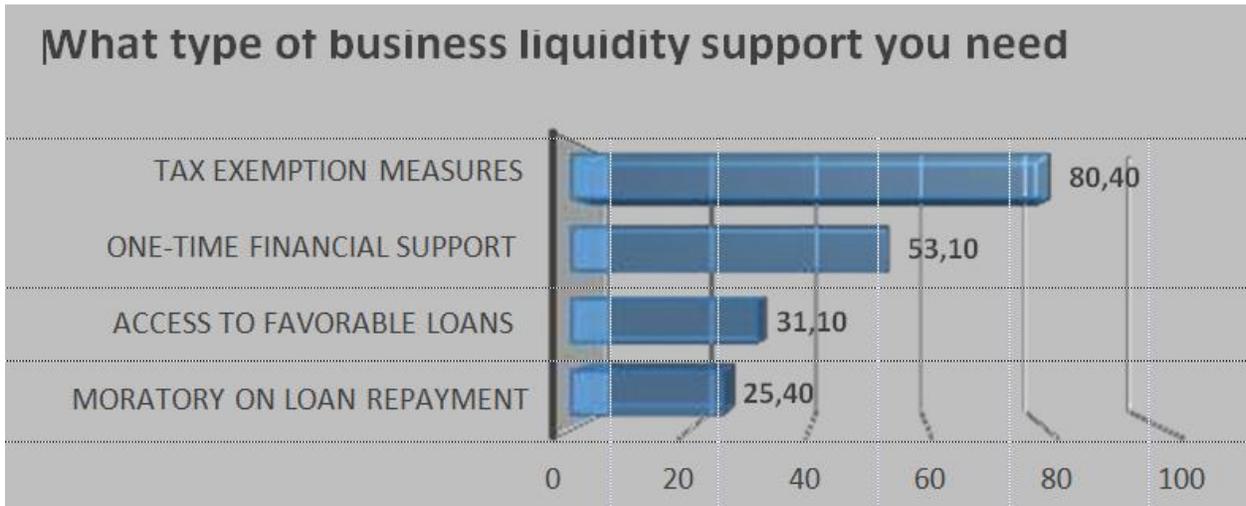
5.1. Required type of support

When asked what kind of support they need at the moment, **90.9% of companies answered that they need financial support**, while 20.1% of them need professional support.



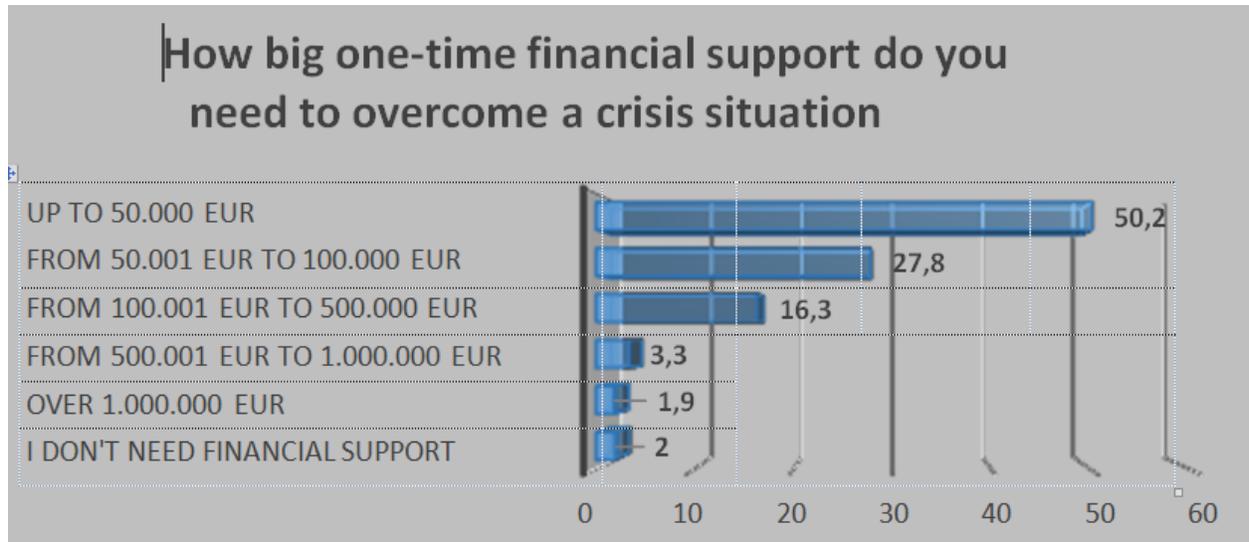
5.2. Type of support to provide liquidity to the company

When it comes to support for providing liquidity to companies, the largest number of companies would be exempted from taxes and contributions (80.4%), followed by one-time financial support (53.1%), then access to soft loans (31.1%) and a moratorium on loan repayment to banks and all state duties (25.4%).



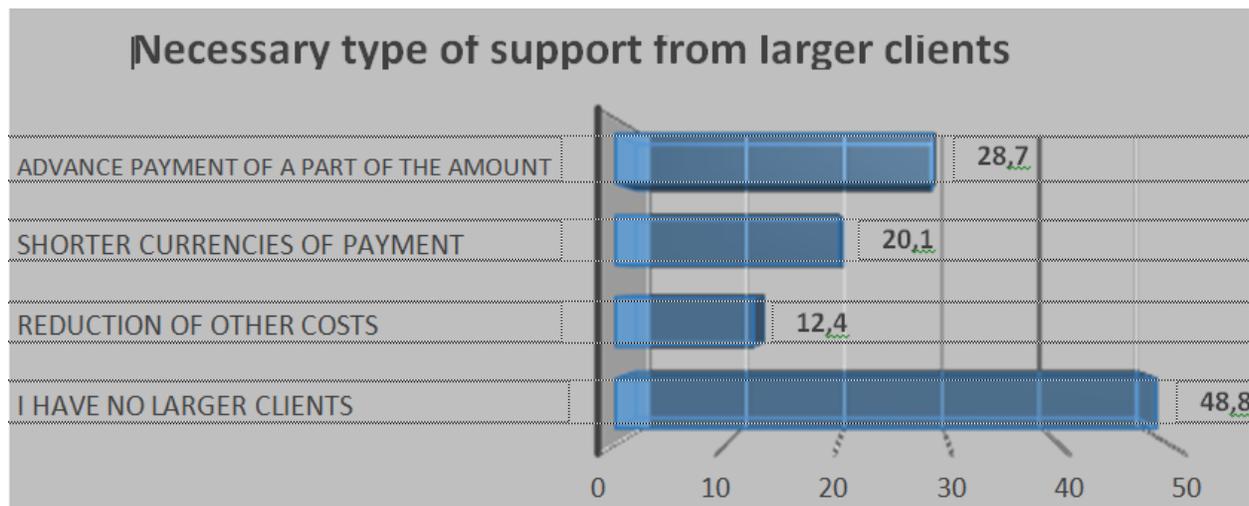
5.3. One-time financial support for overcoming the crisis situation

When it comes to one-time financial support, most companies would need up to 50,000 EUR to overcome the crisis situation, which is the case with half of the respondents (50.2%). Then there are amounts from 50,001 EUR to 100,000 EUR (27.8%), from 100,001 EUR to 500,000 EUR (16.3%), from 500,001 EUR to 1.000,000 EUR (3.3%) and finally the amount of over 1.000,000 EUR (1.9%). Financial support is not needed by 2% of companies.



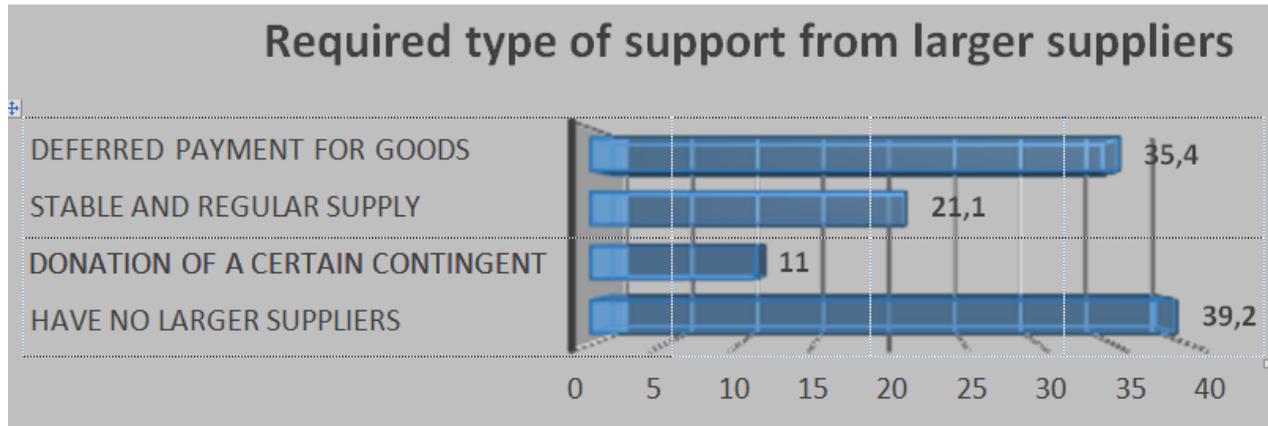
5.4. Necessary type of support from larger clients

When it comes to larger clients (clients with a larger share as a sales channel, large retail chains, etc.), most companies would be supported in the form of advance payment of some part of the amount (28.7%), followed by shorter payment currencies (20.1%).) and reduction of other costs (12.4%). 48.8% of companies stated that they do not have larger clients.



5.5. Necessary type of support from larger customers who have the role of suppliers

When it comes to the support of larger customers who have the role of suppliers, most companies would mean **delayed payment** for goods (35.4%), followed by a stable and regular supply of goods (21.1%), then lower prices of goods (17.2%) and finally donations of certain contingent of goods (11%). 39.2% of surveyed companies do not have major suppliers.



5.6. Required type of professional and technical support

When asked what type of professional and technical support would be important to companies at this time, the largest number of respondents answered that it is the adjustment of the business model to the current situation (43.1%), followed by business consulting and planning (30.6%), then financial consulting (27.8%) and finally legal advice (15.3%). 25.4% of companies answered that they do not need professional and technical support at this time.



5.7. Proposed other measures for large companies and the private sector

When asked if they have proposals for other measures that large companies and the private sector could take to help small and micro enterprises, the surveyed companies gave a large number of diverse and interesting proposals. Some of the most common are:

- Favoring and highlighting small domestic producers in relation to cheap imported goods, increasing demand for products and services of small domestic producers;

- Support in promotion and marketing, active involvement of large companies in the promotion of micro and small companies in crisis;
- Adherence to agreed payment currencies;
- Inclusion in retail chains and free listing of micro and small enterprises from Serbia;
- Assistance in the form of business and financial consulting;
- Assistance in securing new clients;
- Postponement of bill payment deadlines and the possibility of payment in installments;
- Donations in the form of goods or funds;
- Liquidity loans.

5.8. Proposal of other measures for the Government of the RS

Asked whether they have proposals for other measures that the RS Government could take to help small and micro enterprises, the overwhelming majority of surveyed companies reiterated that at this time the most needed support is in the form of tax and contribution relief to the state, as well as direct financial support. In addition, some of the frequent suggestions are:

- Easier and faster access to soft loans (without collateral and too long procedures, lower interest rates, longer Grace period);
- Moratorium on payment of utilities and other bills;
- Arrangement of the state with the owners of the premises in order to postpone the collection of rent or reduce the rent;
- Covering part of the salary of employees during the pandemic;
- Greater consultation of small and micro enterprises on their needs.

6. POTENTIALS FOR RESOLVING THE CRISIS SITUATION

6.1. Capacities to help overcome the consequences of a pandemic

When asked whether the company has the capacity to help overcome social and economic problems caused by the corona virus and in what way, the largest number of surveyed companies stated that they have no or very limited capacity (67.46%). Among those who stated that they have certain capacities, some of the most common ways to provide assistance are:

- Donation and delivery of meals, groceries and hygiene products;
- Redirecting production to hygiene products and medical equipment with the help of finding materials;
- 3D printing of visor parts for medical staff;
- Production and distribution of reusable masks;
- Social actions according to vulnerable categories and distribution of assistance to the elderly in rural areas;

- Making your volunteer team available and organizing volunteer actions;
- Making its information channels available.

6.2. Implemented actions and activities

When asked if they have already carried out any special activities and actions in order to repair the consequences of the pandemic, a large number of companies said that they are carrying out actions of donating food and hygiene products to vulnerable groups, that they have started producing protective masks for health institutions or the general population. , as well as to conduct volunteer actions.

6.3. Additional suggestions

When asked to give additional suggestions, the largest number of companies emphasized that at this moment, the most important thing is the fast reaction of the state. Also, some of the additional suggestions and suggestions are:

Recognizing and exploiting the potential of each company to resolve the crisis, creating a body for coordination of companies and their roles;

After the abolition of the state of emergency, buy everything that does not have to be imported from raw materials and finished products from domestic producers.

3.6. SWOT analysis

3.6.1 Strengths

Organizational

5. Local Energy Agency
6. Municipal Energy plan
7. Energy manager (within the city council)
8. Introduced energy efficiency managers in every municipality
9. Energy passport for buildings

Economical

10. Good natural resources to generate solar, hydro and biogases energy
11. Energy efficient household devices
12. Good environmental performance of firewood
13. Interest-free loans for energy efficiency for houses and apartments
14. Available resources and potentials
15. Established Energy Community at national level
16. Signing of the Stabilization and Association Agreement between Serbia and the EU

Political-Legal

17. Introduction of energy requirements in the buildings' regulations

18. Legal framework for implementing EE

Public involvement and awareness rising

19. Sufficient grid capacity
20. Use of solar thermal and PV systems in schools
21. Changing lifestyle in respect to the environment
22. Promotion of public involvement through Changing lifestyle
23. Raised level of citizens' awareness of the importance of energy efficiency

Activities

24. Implementation of some EE measures in public buildings and public lighting
25. Installation of PV panels in public buildings

3.6.2 Weaknesses

Organizational

1. No energy working group
2. High external energy dependence
3. Non-economic energy prices and disparities in prices of energy and fuels
4. Non-economic use of energy
5. Small scale of renewable energy economy
6. Subsidized electricity tariffs

Economical

7. Absence of a local finance scheme to support the incorporation of renewables and EE measures in buildings
8. Poor insulation of building envelopes (thermal, acoustic...)
9. Doors and windows do not breathe well
10. Roofs and foundations in poor condition
11. Outdated lighting system
12. Less than 1/3 of buildings connected to district heating
13. Negligible percentage of use of renewable energy sources
14. Lack of use of recycled materials
15. Lack of ICT use in buildings

Political-Legal

16. Absence of a local Energy policy
17. Absence of a municipal ordinance to promote the use of renewables
18. Technological obsolescence of existing and the lack of new facilities
19. Inefficiency of public energy companies
20. The legacy of nature devastation and excessive pollution

Public involvement and awareness rising

21. Insufficient awareness of social and environmental benefits of renewables
22. Weak institutions at both policy and operational level
23. Lack of technical and commercial skills in renewables

Activities

24. No EE measures implemented in old buildings
25. Inefficient utilization of domestic resources

3.6.3 Opportunities

Organizational

1. Implementation of the actions based on the Municipality Energy Plan
2. Introduction of cleaner production principles in the energy sector

Economical

3. Creation of local support scheme for RE/EE
4. Favourable climatic conditions for the use of solar energy
5. Introducing of thermal pump in heating
6. Small hydropower plants
7. Introduction of ICT into buildings (measuring and control systems, SCADA, MSC)
8. Introduction of new environmental and EE materials
9. Favourable climatic conditions for the use of wind energy (northern Serbia)
10. Insulation materials from recycled auto-textile materials
11. Building materials from recycled construction waste
12. Potential for individual houses off-greed PV supply
13. Decrease of PV price around the world
14. Reduction of CO₂ emissions towards global responsibility

Political-Legal

15. Definition of an Energy Policy for the municipality
16. Implementation of the Ordinance to promote the use of RE
17. Integration of the Republic of Serbia into the EU

Public involvement and awareness rising

18. Increasing gap between energy supply and demand
19. Increase awareness raising campaigns, workshops and seminars to spread knowledge and raise awareness to a broader public
20. Raising the overall economic competitiveness of energy systems

Activities

21. Improving of energy efficiency policy
22. Construction of gas interconnections with systems in neighbouring countries
23. Promotion of projects with solar, thermal and PV panels
24. Implementation of EE measures in buildings and public lighting

3.6.4 Threats

Organizational

1. Underdevelopment and inadequacy of energy data collection and statistics

Economical

2. Extra costs for the implementation of EE measures on existing buildings
3. Potentially high R&D expenses
4. Temporary financial support may lead to lack of continuity of RE/EE projects
5. Tendency for further reducing of feeding tariffs by state
6. Enlarging of mass abandonment and neglecting of family houses in villages
7. Exacerbation of state policy for renewables
8. Global climate changes
9. National financial crisis
10. Nacional political crisis
11. Earthquakes, floods, droughts

Political-Legal

12. Energy could not be considered as a political priority
13. Lengthy and complex procedures to obtain permits and licenses

Public involvement and awareness rising

14. Lack of public interest
15. Discontinuity of energy policies
16. High waste processing fee
17. Public opposition to bioenergy plants or monocultures of energy crops
18. The lack of transparency in energy policy making
19. Energy crisis in the world and the possibilities of new energy "shocks"
20. Global disagreement about climate change policy and "cleaner" energy strategies
21. Disagreement in energy policy in the region due to unresolved social and political issues
22. Political opportunism and lack of readiness for depolitization and professionalization in energy sector.
23. Lack of harmonization of standards and regulations with the EU, or failure in implementation.

Activities

24. Displacement of population
25. Saturation of local electrical grid

4. Cluster strategy

4.1. Mission

The mission of Construction Cluster Dundjer is to increase competitiveness through technology transfer for the emerging regional renewable energy industry by developing innovative and environmentally friendly energy products and services, through building links between science and the economy, develop dual-education, and public-private partnership.

4.2. Vision

A short-term objectives for Construction Cluster Dundjer are to establish:

- 1) Network of on-line services for cluster members,
- 2) Cluster academy for dual-education
- 3) Cluster laboratory dedicated to renewable energy sources, and
- 4) Cluster network of business and research partners around the world.

4.3. Strategic objectives

- ⇒ **Strategic Objective 1: Improvement of cluster management excellence.**
- ⇒ **Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.**
- ⇒ **Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.**
- ⇒ **Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.**
- ⇒ **Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.**
- ⇒ **Strategic Objective 6: Increasing the recognition of the cluster.**

4.4. Operational objectives

- ⇒ **Strategic Objective 1**: Improvement of cluster management excellence.
 - Operational objective 1.1: **Implementation of the best management practice and systems in the field of cluster management**
 - Operational objective 1.2: **Upgrading the cluster website as a two-sided mobile communications platform of services and knowledge in scope of the cluster specialization,**
- ⇒ **Strategic Objective 2**: Improvement of **innovation level**, marketing and sales skills of cluster members.
 - ⇒ Operational objective 2.1: **Increasing awareness of the open innovation approach and developing specific skills of knowledge sharing within the cluster**
 - ⇒ Operational level 2.2: **Developing competency of technology, knowledge and best practices transferring and exchanging,**
 - ⇒ Operational objective 2.3: **Strengthening the capacity of the join R&D project realization,**
 - ⇒ Operational objective 2.4: **Implementation the standard procedure of join market activity.**

- ⇒ **Strategic Objective 3:** Development of **new services for the cluster members** aimed at boosting their competitiveness on national and European level.
 - Operational objective 3.1: **Training in EPBD Directives methodology Open House, for assessment the building sustainability**
 - Operational objective 3.2: **Regular trainings and workshops regarding increasing competency of technology, knowledge and best practices transferring and exchanging,**
 - Operational objective 3.3: **Regular invitations to implementation of joint R&D projects, co-financed by external sources; especially by the European Commission.**

- ⇒ **Strategic Objective 4:** Facilitating strategic and sustainable **partnering in the EU** of the cluster members.
 - Operational objective 4.1: **Promotion of partnerships between cluster members and NZEB partner’s members (RO, SLO, PL) on the B2B level**
 - Operational objective 4.2: **Stimulating the participation of cluster members in R&D activities on the national and EU level,**
 - Operational objective 4.3: **Supporting interdisciplinary, cross-sectoral and trans-national partnering**

- ⇒ **Strategic Objective 5:** Building up **cross-sectoral and trans-national synergies and value chains** with construction, energy efficiency and renewable energy sources industries.
 - Operational objective 5.1: **Initializing of cross-sectoral and trans-national cooperation by promotion of energy efficiency, and renewable energy sources through mutual workshops**
 - Operational objective 5.2: **Regular match-making trans-national meetings on the cluster platform in order to prepare joint R&D projects.**

- ⇒ **Strategic Objective 6:** Increasing the recognition of the cluster.
 - Operational objective 6.1: **Promoting cluster through creation its visual identity through web-based communication platform: website & social media (Facebook, Twitter, LinkedIn), video and printed materials, and press conferences.**

4.5. Key Performance Indicators

Table 2 Key Performance Indicators (KPIs) of the strategy implementation

No	Objective	KPI	Baseline		Target	
			Value	Year	Value	Year
1.1	Implementation of the best management practice and systems in the field of cluster management	Obtaining the Bronze Cluster Management Excellence label	0	2020	1	2021
2.1	Linking R&D institutions with SMEs in development of new, construction materials	Developed new ecological insulation material	1	2021	1	2023
3.1	Training in EPBD Directives methodology Open House for	Trained evaluators for assessment of building	1	2021	1	2022

	assessment the building sustainability	sustainability according to Open House methodology				
4.1	Promotion of partnerships between cluster members and NZEB partner's members (RO, SLO, PL) on the B2B level	Implemented 11 B2B meetings with partners from RO, SLO, PL	1	2021	1	2022
5.1	Initializing of cross-sectoral and trans-national cooperation by promotion of energy efficiency, and renewable energy sources through mutual workshops	Performed 2 international workshops with partners from RO, SLO, PL	1	2021	1	2022
6.1	Promoting cluster through creation its visual identity through web-based communication platform: website & social media (Facebook, Twitter, LinkedIn), video and printed materials, and press conferences.	Number of website visits, number of posts on social media	1	2021	4	2023

5. Action plan

5.1. Aim of the action plan

The aim of the action plan is to support implementation of the cluster's strategy and provide **operational guidelines** for the cluster managers for reaching strategic and operational objectives.

5.2. Actions

Action 1 Conducting the ESCA Evaluation for Cluster Management Excellence certification

- **Description:** Construction cluster Dundjer manager will conduct the ESCA Evaluation for Cluster Management Excellence process aimed to recertificate Bronze Label.
- **Related operational objectives:** 1.1: Implementation of the best management practice and systems in the field of cluster management
- **Responsible person / body for the implementation:** Biljana Avramovic, Prof. dr Djordje Djordjevic
- **Start:** Q2 2020, **End:** Q1 2021
- **Key Performance Indicators:** ESCA Evaluation Report, ESCA Bronze label

Action 2 Developing a new ecological insulation material

- **Description:** A new ecological insulation material will be made of car-textile waste
- **Related operational objectives:** 2.1: Linking R&D institutions with SMEs in development of new, construction materials
- **Responsible person / body for the implementation:** Prof. dr Djordje Djordjevic, Pinter odplast Nis, VAGRES Nis
- **Start:** Q1 2021, **End:** Q4 2023
- **Key Performance Indicators:** Produced samples of new insulation materials

Action 3 Name

- **Description:** Training the cluster members for evaluators for assessment of building sustainability according to Open House methodology
- **Related operational objectives: 3.1:** Training in EPBD Directives methodology Open House for assessment the building sustainability
- **Responsible person / body for the implementation:** Biljana Avramovic, Prof. dr Djordje Djordjevic
- **Start:** Q1 2021, **End:** Q1 2022
- **Key Performance Indicators:** Trained evaluators for assessment of building sustainability according to Open House methodology

Action 4 Name

- **Description:** Implemented 11 B2B meetings with partners from RO, SLO, PL
- **Related operational objectives: 4.1:** Promotion of partnerships between cluster members and NZEB partner's members (RO, SLO, PL) on the B2B level
- **Responsible person / body for the implementation:** Biljana Avramovic, Prof. dr Djordje Djordjevic
- **Start:** Q1 2021, **End:** Q1 2022
- **Key Performance Indicators:** Implemented 11 B2B meetings with partners from RO, SLO, PL

Action 5 Name

- **Description:** Conducted 2 international workshops with partners from RO, SLO, PL
- **Related operational objectives: 5.1:** Initializing of cross-sectoral and trans-national cooperation by promotion of energy efficiency, and renewable energy sources through mutual workshops
- **Responsible person / body for the implementation:** Biljana Avramovic, Prof. dr Djordje Djordjevic
- **Start:** Q1 2021, **End:** Q1 2022
- **Key Performance Indicators:** Performed 2 international workshops with partners from RO, SLO, PL

Action 6 Name

- **Description:** Creation of visual identity of cluster through internal and external communication
- **Related operational objectives: 6.1:** Promoting cluster through creation its visual identity through web-based communication platform: website & social media (Facebook, Twitter, LinkedIn), video and printed materials, and press conferences.
- **Responsible person / body for the implementation:** Biljana Avramovic, Prof. dr Djordje Djordjevic
- **Start:** Q1 2021, **End:** Q4 2023
- **Key Performance Indicators:** Number of website visits, number of posts on social media

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

Table 3 Activities overview

#	Action	Related operational objectives	Dimension <i>National</i> / <i>International</i>	Implementation timeline															
				2020		2021				2022				2023					
				Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
1.	Conducting the ESCA Evaluation for Cluster Management Excellence certification	1.1	International	X	X														
2.	Developing a new ecological insulation material	2.1	National			X	X	X	X	X	X	X	X	X	X	X	X		
3.	Training the cluster members for evaluators for assessment of building sustainability according to Open House methodology	3.1	National / International			X	X	X	X	X	X	X	X	X	X				
4.	Implemented 11 B2B meetings with partners from RO, SLO, PL	4.1	International			X	X	X	X	X									
5.	Performed 2 international workshops with partners from RO, SLO, PL	5.1	International			X	X	X	X	X									
6.	Promoting cluster through creation its visual identity through web-based communication platform: website & social media (Facebook, Twitter, LinkedIn), video and printed materials, and press conferences	6.1	National / International			X	X	X	X	X	X	X	X	X	X	X	X		

5.3. Resources

Table 4 Overview of resources necessary for the action plan implementation

#	Name	Description	Type <i>Human / Financial / Technical / other</i>	Availability <i>yes / partially/ no</i>
1.	Professional cluster manager	A person who will be responsible for the cluster coordination, the action plan implementation and monitoring	Human	Yes
2.	1 Researcher (PhD) 2 SMEs	Representative of the R&D institution and 2 SMEs will be responsible for the action plan implementation and monitoring	Human / Financial / Technical	Yes
3.	Professional cluster manager, and cluster coordinator	A person who will be responsible for making the curricula and person who will be responsible for implementation of trainings	Human	Yes
4.	Professional cluster manager, and cluster coordinator	A person who will be responsible for Implementing 11 B2B meetings with partners from RO, SLO, PL	Human	Yes
5.	Professional cluster manager, and cluster coordinator	A person who will be responsible for conducting 2 international workshops with partners from RO, SLO, PL	Human	Yes
6.	Professional cluster manager, and cluster coordinator	A person who will be responsible for creation of visual identity of cluster	Human	Yes

5.4. Procedure of monitoring and implementation plan progress assessment

Monitoring is an essential part of action plan implementation. If it is held regularly, it allows for a real-time control of completing the planned tasks and implementing corrective actions, if tasks are not bringing the estimated results. **The action plan implementation is foreseen for 3 years** and should be monitored on semi-annual basis. During the action plan completion monitoring, the effects of activities taken so far should be assessed and, unless they are satisfactory, the strategic goals, priorities and measures should be updated.

VII. Annex 1 Peer review results

A. Review of the Pro-nZEB Cluster strategy by the Construction Cluster of Slovenia

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	PRO-NZEB
Country	Romania

2. Reviewer

Name	Andro Goblon
Organisation	SGG
Email	andro.goblon@sgg.si
Country	Slovenia
Date	19. 11. 2020

3. Strategy evaluation

3.1. Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	1. Introduction			
	1.1. SMART4NZEB project			
	1.2. WP4 / Context of the Work Program			
	1.3. Aim of the document			
	2. Global environment of the cluster			
	2.1. National context and policy framework			
	2.2. Technology development trends in the construction / energy efficiency / RES industry			
	2.3. Market trends in the construction / energy efficiency / RES industry			
	2.4. External resources available for the cluster development			
	3. Cluster overview			
	3.1. History of the cluster			
	3.2. Cluster coordinator			

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	3.3. Cluster activity and technology background		
	3.4. International orientation and positioning of the cluster		
	3.5. Cluster members' needs		
	3.6. SWOT analysis		
	4. Cluster strategy		
	4.1. Mission		
	4.2. Vision		
	4.3. Strategic objectives		
	4.4. Operational objectives		
	4.5. Key performance indicators		
	5. Action plan		
	5.1. Aim of the action plan		
	5.2. Actions		
	5.3. Resources		
	5.4. Procedure of monitoring and implementation plan progress assessment		
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?		
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?		
4.	Does the section 2.3 describe market trends in the industry of the cluster?		
5.	Does the Maybe just more specific describe relevant measures available for clusters that would support their development?		
6.	Does the section 3.1 describe the history of the cluster?		
7.	Does the section 3.2 describe the coordinator of the cluster?		
8.	Does the section 3.3 discuss the following issues?		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<ul style="list-style-type: none"> • Cluster members structure 			
	<ul style="list-style-type: none"> • Economy branches of the cluster members 			
	<ul style="list-style-type: none"> • Technology background of the cluster 			
	<ul style="list-style-type: none"> • Main R&D&I players of the cluster 			
	<ul style="list-style-type: none"> • Relevant projects implemented by the cluster 			
	<ul style="list-style-type: none"> • Table of cluster members 			
9.	Does the section 3.4 describe the coordinator of the cluster?			
10.	Does the section 3.5 describe results of the survey on members' needs?			
11.	Does the section 3.6 summarises SWOT analysis from WP2?			
12.	Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions: <ul style="list-style-type: none"> • Why the organisation exists? • Where it goes? • What it should achieve? • Whose needs and what needs it should satisfy? 			Maybe just a more detailed description about "Whose needs and what needs it should satisfy?"
13.	Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?			
14.	Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?			
15.	Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e. <ul style="list-style-type: none"> ⇒ Strategic Objective 1: Improvement of cluster management excellence. ⇒ Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members. ⇒ Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level. ⇒ Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members. 			In general, YES. SO2 in the PRO NZEB strategy SO2 NO (or maybe as a reviewer I didn't find connection) SO4

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<p>⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i></p> <p>⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i></p>		SO4
			SO1
16.	Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?		
17.	Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?		
18.	Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: "How much?" and "By when?".		
19.	Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?		
20.	Do all operational objectives are linked to KPIs?		
21.	Does the section 5.1 specifies the aim of action plan?		
22.	Does the section 5.2 specifies actions that will be done by the cluster?		
23.	Do all operational objectives are linked to actions in section 5.2?		
24.	Does the description of each action presented in Section 5.2 contain the following data:		
	<i>Description</i>		
	<i>Related operational objectives</i>		
	<i>Responsible person / body for the implementation</i>		
	<i>Start and end</i>		
	<i>Key Performance Indicators</i>		
25.	Does the section 5.2 include a table showing the timeline of actions?		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?			Maybe just more specific.
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?			
28.	Does the report include captions of figures and tables?			
29.	Are numerical values expressed in metric units (m, kg)?			
30.	Are monetary values expressed in EUR, or both in national currency and EUR?			
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?			
32.	Are pre-defined text styles (MS Word -> <i>Home -> Styles</i>) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)			

3.2. Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	
The report can be submitted after some minor corrections*	
The report can be submitted only after major corrections*	

* Please justify below

- Section 2.4 to be added.
- In the section 4.1 maybe just a more detailed description about "Whose needs and what needs it should satisfy?".
- In the section 4.3 find the connections between strategic objectives.
- In the section 5.3 be just more specific.

B. Review of the Pro-nZEB Cluster strategy by the Bioenergy for the region Cluster

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	PRO-NZEB
Country	Romania

2. Reviewer

Name	Katarzyna Korczak
Organisation	RIC Pro-Akademia
Email	Katarzyna.korczak@proakademia.eu
Country	Poland
Date	30.08.2021

3. Strategy evaluation

3.1. Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	1. Introduction	X		
	1.1. SMART4NZEB project	X		
	1.2. WP4 / Context of the Work Program	X		
	1.3. Aim of the document	x		
	2. Global environment of the cluster	x		
	2.1. National context and policy framework	X		
	2.2. Technology development trends in the construction / energy efficiency / RES industry	x		
	2.3. Market trends in the construction / energy efficiency / RES industry	x		
	2.4. External resources available for the cluster development	x		
	3. Cluster overview	X		
	3.1. History of the cluster	X		
	3.2. Cluster coordinator	x		
	3.3. Cluster activity and technology background	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	3.4. <i>International orientation and positioning of the cluster</i>	x		
	3.5. <i>Cluster members' needs</i>	x		
	3.6. <i>SWOT analysis</i>	x		
	4. <i>Cluster strategy</i>	X		
	4.1. <i>Mission</i>	X		
	4.2. <i>Vision</i>	X		
	4.3. <i>Strategic objectives</i>	X		
	4.4. <i>Operational objectives</i>	x		
	4.5. <i>Key performance indicators</i>	x		
	5. <i>Action plan</i>	X		
	5.1. <i>Aim of the action plan</i>	X		
	5.2. <i>Actions</i>	X		
	5.3. <i>Resources</i>	X		
	5.4. <i>Procedure of monitoring and implementation plan progress assessment</i>	x		
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?	x		
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?	x		
4.	Does the section 2.3 describe market trends in the industry of the cluster?	x		
5.	Does the section 2.4 describe relevant measures available for clusters that would support their development?	x		
6.	Does the section 3.1 describe the history of the cluster?	x		
7.	Does the section 3.2 describe the coordinator of the cluster?	x		
8.	Does the section 3.3 discuss the following issues?			
	• <i>Cluster members structure</i>	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<ul style="list-style-type: none"> • <i>Economy branches of the cluster members</i> 	x		
	<ul style="list-style-type: none"> • <i>Technology background of the cluster</i> 	x		
	<ul style="list-style-type: none"> • <i>Main R&D&I players of the cluster</i> 	x		
	<ul style="list-style-type: none"> • <i>Relevant projects implemented by the cluster</i> 	x		You may consider adding the nZEB Ready project in the next update of the strategy.
	<ul style="list-style-type: none"> • <i>Table of cluster members</i> 	x		
9.	Does the section 3.4 describe the international orientation and positioning of the cluster?	x		
10.	Does the section 3.5 describe results of the survey on members' needs?	x		
11.	Does the section 3.6 summarises SWOT analysis from WP2?	x		
12.	Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions: <ul style="list-style-type: none"> • <i>Why the organisation exists?</i> • <i>Where it goes?</i> • <i>What it should achieve?</i> • <i>Whose needs and what needs it should satisfy?</i> 	x		The font colour should be changed to black (no it is grey)
13.	Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?	x		
14.	Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?	x		Paragraphs' styles of should be unified ("Having in mind..." differs from other in this section)
15.	Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e. <ul style="list-style-type: none"> ⇒ <i>Strategic Objective 1: Improvement of cluster management excellence.</i> ⇒ <i>Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.</i> ⇒ <i>Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.</i> 	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<p>⇒ <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i></p> <p>⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i></p> <p>⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i></p>			
16.	Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?	x		
17.	Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?	x		
18.	Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: “How much?” and “By when?”.	x		
19.	Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?	x		
20.	Do all operational objectives are linked to KPIs?	x		
21.	Does the section 5.1 specifies the aim of action plan?	x		
22.	Does the section 5.2 specifies actions that will be done by the cluster?	x		
23.	Do all operational objectives are linked to actions in section 5.2?	x		
24.	Does the description of each action presented in Section 5.2 contain the following data:			
	<i>Description</i>	x		
	<i>Related operational objectives</i>	x		
	<i>Responsible person / body for the implementation</i>	x		
	<i>Start and end</i>	x		
	<i>Key Performance Indicators</i>	x		
25.	Does the section 5.2 include a table showing the timeline of actions?	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?	x		
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?	x		
28.	Does the report include captions of figures and tables?	x		
29.	Are numerical values expressed in metric units (m, kg)?	x		
30.	Are monetary values expressed in EUR, or both in national currency and EUR?	x		
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?	x		
32.	Are pre-defined text styles (MS Word -> <i>Home</i> -> <i>Styles</i>) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)	x		

3.2. Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	x
The report can be submitted after some minor corrections*	
The report can be submitted only after major corrections*	

* Please justify below

The strategy is well written and based on solid analysis of the cluster environment, in particular market and technology trends. The extensive list of strategic and operational objective presents a clear vision of the cluster's development and its role on the Romanian and European market. The document require only minor formatting edit, according to the remarks in the table in section 3.1.

C. Review of the Pro-nZEB Cluster strategy by the Polish Construction Cluster

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	PRO-NZEB
Country	Romania

2. Reviewer

Name	Adam Krajewski
Organisation	Polskie Stowarzyszenie Doradcze i Konsultingowe
Email	a.krajewski@polskiestowarzyszenie.pl
Country	Poland
Date	23 rd February 2021

3. Strategy evaluation

3.1. Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	1. Introduction			
	1.1. SMART4NZEB project	X		
	1.2. WP4 / Context of the Work Program	X		
	1.3. Aim of the document	X		
	2. Global environment of the cluster	X		
	2.1. National context and policy framework	X		
	2.2. Technology development trends in the construction / energy efficiency / RES industry	X		
	2.3. Market trends in the construction / energy efficiency / RES industry	x		
	2.4. External resources available for the cluster development	x		
	3. Cluster overview			
	3.1. History of the cluster	x		
	3.2. Cluster coordinator	x		
	3.3. Cluster activity and technology background	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	3.4. <i>International orientation and positioning of the cluster</i>	X		
	3.5. <i>Cluster members' needs</i>	x		
	3.6. <i>SWOT analysis</i>	x		
	4. <i>Cluster strategy</i>			
	4.1. <i>Mission</i>	X		
	4.2. <i>Vision</i>	X		
	4.3. <i>Strategic objectives</i>	x		
	4.4. <i>Operational objectives</i>	x		
	4.5. <i>Key performance indicators</i>	x		
	5. <i>Action plan</i>			
	5.1. <i>Aim of the action plan</i>	X		
	5.2. <i>Actions</i>	X		
	5.3. <i>Resources</i>	x		
	5.4. <i>Procedure of monitoring and implementation plan progress assessment</i>	x		
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?	x		
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?	x		
4.	Does the section 2.3 describe market trends in the industry of the cluster?	X		
5.	Does the section 2.4 describe relevant measures available for clusters that would support their development?	x		Not all resources mentioned are strictly directed at cluster development, rather than possible activities.
6.	Does the section 3.1 describe the history of the cluster?	x		
7.	Does the section 3.2 describe the coordinator of the cluster?	x		
8.	Does the section 3.3 discuss the following issues?			

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<ul style="list-style-type: none"> • <i>Cluster members structure</i> 	x		
	<ul style="list-style-type: none"> • <i>Economy branches of the cluster members</i> 	x		
	<ul style="list-style-type: none"> • <i>Technology background of the cluster</i> 	x		
	<ul style="list-style-type: none"> • <i>Main R&D&I players of the cluster</i> 	x		
	<ul style="list-style-type: none"> • <i>Relevant projects implemented by the cluster</i> 	x		
	<ul style="list-style-type: none"> • <i>Table of cluster members</i> 	x		
9.	Does the section 3.4 describe the international orientation and positioning of the cluster	x		Most of this section is devoted barriers in internationalization and international projects implemented by the Cluster. There could be more information on individual experiences of cluster members.
10.	Does the section 3.5 describe results of the survey on members' needs?	x		
11.	Does the section 3.6 summarises SWOT analysis from WP2?	x		
12.	Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions: <ul style="list-style-type: none"> • <i>Why the organisation exists?</i> • <i>Where it goes?</i> • <i>What it should achieve?</i> • <i>Whose needs and what needs it should satisfy?</i> 	x		
13.	Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?	x		
14.	Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?	x		
15.	Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e. <ul style="list-style-type: none"> ⇒ <i>Strategic Objective 1: Improvement of cluster management excellence.</i> ⇒ <i>Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.</i> ⇒ <i>Strategic Objective 3: Development of new services for the cluster members aimed at</i> 		x	

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<p><i>boosting their competitiveness on national and European level.</i></p> <p>⇒ <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i></p> <p>⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i></p> <p>⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i></p>			
16.	Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?	x		
17.	Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?	x		
18.	Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: "How much?" and "By when?".	x		
19.	Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?	x		
20.	Do all operational objectives are linked to KPIs?	x		
21.	Does the section 5.1 specifies the aim of action plan?	x		
22.	Does the section 5.2 specifies actions that will be done by the cluster?	x		
23.	Do all operational objectives are linked to actions in section 5.2?	x		
24.	Does the description of each action presented in Section 5.2 contain the following data:			
	<i>Description</i>	x		
	<i>Related operational objectives</i>	x		
	<i>Responsible person / body for the implementation</i>	x		
	<i>Start and end</i>	x		
	<i>Key Performance Indicators</i>	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

25.	Does the section 5.2 include a table showing the timeline of actions?	x		
26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?	x		
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?	x		
28.	Does the report include captions of figures and tables?		x	
29.	Are numerical values expressed in metric units (m, kg)?		x	
30.	Are monetary values expressed in EUR, or both in national currency and EUR?	x		
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?	x		
32.	Are pre-defined text styles (MS Word -> <i>Home -> Styles</i>) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)	x		

3.2. Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	
The report can be submitted after some minor corrections*	x
The report can be submitted only after major corrections*	

* Please justify below

Strategy is almost complete, few small changes/additional information.

D. Review of the Construction Cluster of Slovenia strategy by the Polish Construction Cluster

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	Construction Cluster of Slovenia
Country	Slovenia

2. Reviewer

Name	Adam Krajewski
Organisation	PSDiK
Email	a.krajewski@polskiestowarzyszenie.pl
Country	Poland
Date	03.12.2020

3. Strategy evaluation

3.1. Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	1. Introduction	X		
	1.1. SMART4NZEB project	X		
	1.2. WP4 / Context of the Work Program	X		
	1.3. Aim of the document	X		
	2. Global environment of the cluster	X		
	2.1. National context and policy framework	X		
	2.2. Technology development trends in the construction / energy efficiency / RES industry	X		
	2.3. Market trends in the construction / energy efficiency / RES industry	X		
	2.4. External resources available for the cluster development	X		
	3. Cluster overview	X		
	3.1. History of the cluster	X		
	3.2. Cluster coordinator	X		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	3.3. Cluster activity and technology background	X		
	3.4. International orientation and positioning of the cluster	X		
	3.5. Cluster members' needs	X		
	3.6. SWOT analysis	X		
	4. Cluster strategy	X		
	4.1. Mission	X		
	4.2. Vision	X		
	4.3. Strategic objectives	X		
	4.4. Operational objectives	X		
	4.5. Key performance indicators	X		
	5. Action plan	X		
	5.1. Aim of the action plan	x		
	5.2. Actions	x		
	5.3. Resources	X		
	5.4. Procedure of monitoring and implementation plan progress assessment	X		
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?		x	This section focuses mostly on the EU policy, mentioning only few national policies and indicating expanding this section in the future as element of action plan.
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?	x		
4.	Does the section 2.3 describe market trends in the industry of the cluster?	X		
5.	Does the section 2.4 describe relevant measures available for clusters that would support their development?	x		Description of this section is scarce, as there is no national cluster policy in Slovenia and therefore no resources available. There are mentioned EU programs available for clusters in Slovenia.
6.	Does the section 3.1 describe the history of the cluster?	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

7.	Does the section 3.2 describe the coordinator of the cluster?	X		
8.	Does the section 3.3 discuss the following issues?			
	• <i>Cluster members structure</i>	X		
	• <i>Economy branches of the cluster members</i>	X		
	• <i>Technology background of the cluster</i>	X		
	• <i>Main R&D&I players of the cluster</i>	x		
	• <i>Relevant projects implemented by the cluster</i>	x		
9.	Does the section 3.4 describe the international orientation and positioning of the cluster?	x		
	Does the section 3.5 describe results of the survey on members' needs?		x	
11.	Does the section 3.6 summarises SWOT analysis from WP2?	x		
12.	Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions: • <i>Why the organisation exists?</i> • <i>Where it goes?</i> • <i>What it should achieve?</i> • <i>Whose needs and what needs it should satisfy?</i>	x		
13.	Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?	x		
14.	Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?	x		
15.	Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e. ⇒ <i>Strategic Objective 1: Improvement of cluster management excellence.</i> ⇒ <i>Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.</i> ⇒ <i>Strategic Objective 3: Development of new services for the cluster members aimed at</i>		x	4/5 out of strategic objectives are related to Smart4nZEB objectives.

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	<p><i>boosting their competitiveness on national and European level.</i></p> <p>⇒ <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i></p> <p>⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i></p> <p>⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i></p>			
16.	Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?			
17.	Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?	x		
18.	Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: "How much?" and "By when?".	x		
19.	Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?		x	Only few of the mentioned operational objectives lack information on time of implementation (e.g.: 3.3, 3.4).
20.	Do all operational objectives are linked to KPIs?		x	
21.	Does the section 5.1 specifies the aim of action plan?	X		
22.	Does the section 5.2 specifies actions that will be done by the cluster?		x	Action plan is not finished, some of the operational objectives are not defined.
23.	Do all operational objectives are linked to actions in section 5.2?		x	
24.	Does the description of each action presented in Section 5.2 contain the following data:			
	<i>Description</i>		x	
	<i>Related operational objectives</i>		x	
	<i>Responsible person / body for the implementation</i>		x	
	<i>Start and end</i>		x	
	<i>Key Performance Indicators</i>		x	

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

25.	Does the section 5.2 include a table showing the timeline of actions?	X		It's presented in two different tables that need to be combined and/or completed.
26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?	X		
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?	X		
28.	Does the report include captions of figures and tables?		X	
29.	Are numerical values expressed in metric units (m, kg)?		x	
30.	Are monetary values expressed in EUR, or both in national currency and EUR?		x	
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?		x	
32.	Are pre-defined text styles (MS Word -> <i>Home</i> -> <i>Styles</i>) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)	x		

3.2. Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	
The report can be submitted after some minor corrections*	x
The report can be submitted only after major corrections*	

* Please justify below

Strategy almost finished, although missing parts are strategic for its comprehensiveness. The concept of action plan is defined although few operational objectives need more detailed description.

E. Review of the Construction Cluster of Slovenia strategy by the Bioenergy for the region Cluster

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	Construction Cluster of Slovenia
Country	Slovenia

2. Reviewer

Name	Katarzyna Korczak
Organisation	Research and Innovation Centre Pro-Akademia
Email	Katarzyna.korczak@proakademia.eu
Country	Poland
Date	24.02.2021

3. Strategy evaluation

3.1. Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	1. Introduction	x		
	1.1. SMART4NZEB project	x		
	1.2. WP4 / Context of the Work Program	x		
	1.3. Aim of the document	x		
	2. Global environment of the cluster	x		
	2.1. National context and policy framework	x		
	2.2. Technology development trends in the construction / energy efficiency / RES industry	x		
	2.3. Market trends in the construction / energy efficiency / RES industry	x		
	2.4. External resources available for the cluster development	x		
	3. Cluster overview	x		
	3.1. History of the cluster	x		
	3.2. Cluster coordinator	x		Fonts in this sections should be unified
	3.3. Cluster activity and technology background	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	3.4. <i>International orientation and positioning of the cluster</i>	x		
	3.5. <i>Cluster members' needs</i>		x	This section should provide outputs of the survey on cluster members needs
	3.6. <i>SWOT analysis</i>	x		
	4. <i>Cluster strategy</i>	x		
	4.1. <i>Mission</i>	x		
	4.2. <i>Vision</i>	x		
	4.3. <i>Strategic objectives</i>	x		
	4.4. <i>Operational objectives</i>	x		
	4.5. <i>Key performance indicators</i>	x		
	5. <i>Action plan</i>	x		
	5.1. <i>Aim of the action plan</i>	x		
	5.2. <i>Actions</i>	x		
	5.3. <i>Resources</i>	x		
	5.4. <i>Procedure of monitoring and implementation plan progress assessment</i>	x		
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?		x	There is a number of policies and areas of interest of the international community listed. National policies are however a minority of them, and are only mentioned, without any comment. I recommend splitting this section into two subsections – for international and national aspects. National policies should be also described or commented on how they influence the clusters development.
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?	x		I suggest extending the description with references to nZEB.
4.	Does the section 2.3 describe market trends in the industry of the cluster?	x		
5.	Does the section 2.4 describe relevant measures available for clusters that would support their development?	x		
6.	Does the section 3.1 describe the history of the cluster?	x		
7.	Does the section 3.2 describe the coordinator of the cluster?	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

8.	Does the section 3.3 discuss the following issues?	x		
	• <i>Cluster members structure</i>	x		
	• <i>Economy branches of the cluster members</i>	x		
	• <i>Technology background of the cluster</i>	x		
	• <i>Main R&D&I players of the cluster</i>	x		
	• <i>Relevant projects implemented by the cluster</i>	x		
	• <i>Table of cluster members</i>	x		
9.	Does the section 3.4 describe the international orientation and positioning of the cluster?	x		
10.	Does the section 3.5 describe results of the survey on members' needs?		x	This section should provide outputs of the survey on cluster members' needs. If you collect feedback from cluster members during meetings and conducting a CAWI survey is not doable, I suggest describing here answers to "collective interview" that you could do during one of such a meeting.
11.	Does the section 3.6 summarises SWOT analysis from WP2?	x		
12.	Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions: • <i>Why the organisation exists?</i> • <i>Where it goes?</i> • <i>What it should achieve?</i> • <i>Whose needs and what needs it should satisfy?</i>	x		
13.	Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?	x		
14.	Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?	x		
15.	Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e. ⇒ <i>Strategic Objective 1: Improvement of cluster management excellence.</i> ⇒ <i>Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.</i> ⇒ <i>Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.</i>		x	Not all S4N strategic objectives are included. The following are missing: - <i>Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members</i> - <i>Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.</i>

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<p>⇒ <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i></p> <p>⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i></p> <p>⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i></p>			<p>- <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i></p> <p>- <i>Strategic Objective 6: Increasing the recognition of the cluster.</i></p> <p>To be sure that the strategy complies the requirements of the project and the Grant Agreement, I strongly suggest adding these four missing objectives to the current five.</p>
16.	Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?	x		
17.	Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?	x		When extending the list of strategic objectives, new operational ones should be added as well
18.	Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: "How much?" and "By when?".	x		Quantification of objectives is presented in the section 4.5. KPIs
19.	Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?	x		
20.	Do all operational objectives are linked to KPIs?	x		
21.	Does the section 5.1 specifies the aim of action plan?	x		
22.	Does the section 5.2 specifies actions that will be done by the cluster?	x		
23.	Do all operational objectives are linked to actions in section 5.2?	x		
24.	Does the description of each action presented in Section 5.2 contain the following data:			
	<i>Description</i>	x		There are no descriptions, however names of actions are sufficient enough and thus it is clear what should be done.
	<i>Related operational objectives</i>	x		
	<i>Responsible person / body for the implementation</i>		x	A person or body responsible for the implementation should be added. If all activities will be implemented by Andro and/or Vladimir, a sentence with this info before the table should be sufficient.

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<i>Start and end</i>	x		
	<i>Key Performance Indicators</i>	x		
25.	Does the section 5.2 include a table showing the timeline of actions?	x		
26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?	x		
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?	x		
28.	Does the report include captions of figures and tables?	x		
29.	Are numerical values expressed in metric units (m, kg)?	x		
30.	Are monetary values expressed in EUR, or both in national currency and EUR?	x		
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?		x	
32.	Are pre-defined text styles (MS Word -> <i>Home -> Styles</i>) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)	x		

3.2. Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	
The report can be submitted after some minor corrections*	x
The report can be submitted only after major corrections*	

* Please justify below

The strategy is well written and is based on an in-depth analysis of the current position of the cluster. It clearly shows the ambition of the cluster managers that want to develop the cluster into a strong and recognizable organisation working on both national and international markets.

The major shortcoming of the strategy is that it does not fully comply with the SMART4NZEB Grant Agreement in terms of strategic objectives. As indicated above, the list of 5 already defined Strategic Objectives should be extended with the missing four, coming directly from the project. Furthermore, outputs of the survey on cluster members' needs should be added.

Additionally, auxiliary comments in *grey italic* should be removed, and fonts unified (a few paragraphs in Times New Roman instead of Calibri).

F. Review of the Construction Cluster of Slovenia strategy by the Construction Cluster Dundjer

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	Construction Cluster of Slovenia
Country	Slovenia

2. Reviewer

Name	Biljana Avramovic
Organisation	Construction Cluster Dundjer
Email	Biljana.avramovic@yahoo.com
Country	Serbia
Date	16.08.2021

3. Strategy evaluation

3.1. Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	<i>1. Introduction</i>	x		
	<i>1.1. SMART4NZEB project</i>	x		
	<i>1.2. WP4 / Context of the Work Program</i>	x		
	<i>1.3. Aim of the document</i>	x		
	<i>2. Global environment of the cluster</i>	x		
	<i>2.1. National context and policy framework</i>	x		
	<i>2.2. Technology development trends in the construction / energy efficiency / RES industry</i>	x		
	<i>2.3. Market trends in the construction / energy efficiency / RES industry</i>	x		
	<i>2.4. External resources available for the cluster development</i>	x		
	<i>3. Cluster overview</i>	x		
	<i>3.1. History of the cluster</i>	x		
	<i>3.2. Cluster coordinator</i>	x		
	<i>3.3. Cluster activity and technology background</i>	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	3.4. <i>International orientation and positioning of the cluster</i>	x		
	3.5. <i>Cluster members' needs</i>	x		
	3.6. <i>SWOT analysis</i>	x		
	4. <i>Cluster strategy</i>	x		
	4.1. <i>Mission</i>	x		
	4.2. <i>Vision</i>	x		
	4.3. <i>Strategic objectives</i>	x		
	4.4. <i>Operational objectives</i>	x		
	4.5. <i>Key performance indicators</i>	x		
	5. <i>Action plan</i>	x		
	5.1. <i>Aim of the action plan</i>	x		
	5.2. <i>Actions</i>	x		
	5.3. <i>Resources</i>	x		
	5.4. <i>Procedure of monitoring and implementation plan progress assessment</i>	x		
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?	x		
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?	x		
4.	Does the section 2.3 describe market trends in the industry of the cluster?	x		
5.	Does the section 2.4 describe relevant measures available for clusters that would support their development?	x		
6.	Does the section 3.1 describe the history of the cluster?	x		
7.	Does the section 3.2 describe the coordinator of the cluster?	x		
8.	Does the section 3.3 discuss the following issues?	x		
	• <i>Cluster members structure</i>	x		
	• <i>Economy branches of the cluster members</i>	x		
	• <i>Technology background of the cluster</i>	x		
	• <i>Main R&D&I players of the cluster</i>	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<ul style="list-style-type: none"> • <i>Relevant projects implemented by the cluster</i> 	x		
	<ul style="list-style-type: none"> • <i>Table of cluster members</i> 	x		
9.	Does the section 3.4 describe the international orientation and positioning of the cluster?	x		
10.	Does the section 3.5 describe results of the survey on members' needs?	x		
11.	Does the section 3.6 summarises SWOT analysis from WP2?	x		
12.	Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions: <ul style="list-style-type: none"> • <i>Why the organisation exists?</i> • <i>Where it goes?</i> • <i>What it should achieve?</i> • <i>Whose needs and what needs it should satisfy?</i> 	x		
13.	Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?	x		
14.	Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?	x		
15.	Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e. <ul style="list-style-type: none"> ⇒ <i>Strategic Objective 1: Improvement of cluster management excellence.</i> ⇒ <i>Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.</i> ⇒ <i>Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.</i> ⇒ <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i> ⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i> ⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i> 	x		
16.	Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

17.	Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?	x		
18.	Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: “How much?” and “By when?”.	x		
19.	Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?	x		
20.	Do all operational objectives are linked to KPIs?	x		
21.	Does the section 5.1 specifies the aim of action plan?	x		
22.	Does the section 5.2 specifies actions that will be done by the cluster?	x		
23.	Do all operational objectives are linked to actions in section 5.2?	x		
24.	Does the description of each action presented in Section 5.2 contain the following data:			
	<i>Description</i>	x		
	<i>Related operational objectives</i>	x		
	<i>Responsible person / body for the implementation</i>	x		
	<i>Start and end</i>	x		
	<i>Key Performance Indicators</i>	x		
25.	Does the section 5.2 include a table showing the timeline of actions?	x		
26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?	x		
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?	x		
28.	Does the report include captions of figures and tables?	x		
29.	Are numerical values expressed in metric units (m, kg)?	x		
30.	Are monetary values expressed in EUR, or both in national currency and EUR?	x		
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

32.	Are pre-defined text styles (MS Word -> Home -> Styles) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)	x		
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3.2. Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	x
The report can be submitted after some minor corrections*	
The report can be submitted only after major corrections*	

* Please justify below

The strategy is well written and is based on an in-depth analysis of the current position of the cluster. It clearly shows the ambition of the cluster managers that want to develop the cluster into a strong and recognizable organisation working on both national and international markets.

G. Review of the Polish Construction Cluster strategy by the Bioenergy for the region Cluster

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	Polish Construction Cluster
Country	Poland

2. Reviewer

Name	Katarzyna Korczak
Organisation	Research and Innovation Centre Pro-Akademia
Email	Katarzyna.korczak@proakademia.eu
Country	Poland
Date	28-10-2020

3. Strategy evaluation

3.1. Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	<i>1. Introduction</i>	x		
	<i>1.1. SMART4NZEB project</i>	x		
	<i>1.2. WP4 / Context of the Work Program</i>	x		
	<i>1.3. Aim of the document</i>	x		
	<i>2. Global environment of the cluster</i>			
	<i>2.1. National context and policy framework</i>	x		
	<i>2.2. Technology development trends in the construction / energy efficiency / RES industry</i>	x		
	<i>2.3. Market trends in the construction / energy efficiency / RES industry</i>	X		
	<i>2.4. External resources available for the cluster development</i>	X		The section does not contain any input
	<i>3. Cluster overview</i>	X		
	<i>3.1. History of the cluster</i>	x		
	<i>3.2. Cluster coordinator</i>	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	3.3. <i>Cluster activity and technology background</i>	x		The section does not contain any input
	3.4. <i>International orientation and positioning of the cluster</i>	x		
	3.5. <i>Cluster members' needs</i>	x		The section does not contain any input
	3.6. <i>SWOT analysis</i>	x		The section does not contain any input
	4. <i>Cluster strategy</i>	X		
	4.1. <i>Mission</i>	X		
	4.2. <i>Vision</i>	X		
	4.3. <i>Strategic objectives</i>	X		
	4.4. <i>Operational objectives</i>	X		
	4.5. <i>Key performance indicators</i>	X		
	5. <i>Action plan</i>	X		
	5.1. <i>Aim of the action plan</i>	X		
	5.2. <i>Actions</i>	X		The section does not contain any input
	5.3. <i>Resources</i>	x		The section does not contain any input
	5.4. <i>Procedure of monitoring and implementation plan progress assessment</i>	x		
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?		x	This section focuses on the EU policy, not national one. It is recommended to include Polish policy related to the construction and energy efficiency sector
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?	x		Currently the section includes a comprehensive description of automation in construction and HVAC systems. Description of other technologies, mentioned in the introduction of this section, should be added.
4.	Does the section 2.3 describe market trends in the industry of the cluster?	x		A reference to the source of the survey cited in this section should be added.

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

5.	Does the section 2.4 describe relevant measures available for clusters that would support their development?		x	
6.	Does the section 3.1 describe the history of the cluster?	x		Period 2016-2020 could be mentioned.
7.	Does the section 3.2 describe the coordinator of the cluster?	x		
8.	Does the section 3.3 discuss the following issues?			
	• <i>Cluster members structure</i>		x	
	• <i>Economy branches of the cluster members</i>		x	
	• <i>Technology background of the cluster</i>		x	
	• <i>Main R&D&I players of the cluster</i>		x	
	• <i>Relevant projects implemented by the cluster</i>		x	
8.	• <i>Table of cluster members</i>		x	
9.	Does the section 3.4 describe the international orientation and positioning of the cluster?	x		Paragraphs in Polish should be removed
10.	Does the section 3.5 describe results of the survey on members' needs?		x	
11.	Does the section 3.6 summarises SWOT analysis from WP2?		x	
12.	Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions:	x		
	• <i>Why the organisation exists?</i>			
	• <i>Where it goes?</i>			
	• <i>What it should achieve?</i>			
	• <i>Whose needs and what needs it should satisfy?</i>			
13.	Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?	x		
14.	Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?			
15.	Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e. ⇒ <i>Strategic Objective 1: Improvement of cluster management excellence.</i>		x	There are three strategic objectives defined in the strategy, and they do not include the 6 ones resulted from SMART4NZEB project. It is

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<p>⇒ <i>Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.</i></p> <p>⇒ <i>Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.</i></p> <p>⇒ <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i></p> <p>⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i></p> <p>⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i></p>			suggested to add the six S4N objectives to the existing 3.
16.	Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?	x		Operational objectives listed in this section are comprehensive, however they are related to three strategic objectives. When adding the missing strategic objectives, operational objectives should be also updated.
17.	Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?	x		
18.	Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: "How much?" and "By when?".		x	Some objectives should be redefined, so that they are quantifiable. E.g. "Greater involvement in the vocational education segment" -> "Organisation / supporting of organisation of two vocational trainings"
19.	Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?		x	
20.	Do all operational objectives are linked to KPIs?		x	
21.	Does the section 5.1 specifies the aim of action plan?	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

22.	Does the section 5.2 specifies actions that will be done by the cluster?		x	
23.	Do all operational objectives are linked to actions in section 5.2?		x	
24.	Does the description of each action presented in Section 5.2 contain the following data:			
	<i>Description</i>		x	
	<i>Related operational objectives</i>		x	
	<i>Responsible person / body for the implementation</i>		x	
	<i>Start and end</i>		x	
	<i>Key Performance Indicators</i>		x	
25.	Does the section 5.2 include a table showing the timeline of actions?		x	
26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?		x	
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?	x		
28.	Does the report include captions of figures and tables?	x		
29.	Are numerical values expressed in metric units (m, kg)?	x		
30.	Are monetary values expressed in EUR, or both in national currency and EUR?	x		
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?		x	
32.	Are pre-defined text styles (MS Word -> Home -> Styles) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)	x		

3.2. Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	
The report can be submitted after some minor corrections*	
The report can be submitted only after major corrections*	x

* Please justify below

The strategy is the first draft – there are some sections comprehensively described, with a lot of details and in-depth analysis, and some of sections are missing. It is recommended to complete the missing sections in the next draft.

H. Review of the Polish Construction Cluster strategy by the Construction Cluster Dundjer

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	Polish Construction Cluster
Country	Poland

2. Reviewer

Name	Biljana Avramovic
Organisation	CONSTRUCTION CLUSTER DUNDJER
Email	Biljana.avramovic@yahoo.com
Country	Serbia
Date	25.02.2021

3. Strategy evaluation

3.1. Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	<i>1. Introduction</i>	X		
	<i>1.1. SMART4NZEB project</i>	X		
	<i>1.2. WP4 / Context of the Work Program</i>	X		
	<i>1.3. Aim of the document</i>	X		
	<i>2. Global environment of the cluster</i>	X		
	<i>2.1. National context and policy framework</i>	X		
	<i>2.2. Technology development trends in the construction / energy efficiency / RES industry</i>	X		
	<i>2.3. Market trends in the construction / energy efficiency / RES industry</i>	X		
	<i>2.4. External resources available for the cluster development</i>	X		
	<i>3. Cluster overview</i>	X		
	<i>3.1. History of the cluster</i>	X		
	<i>3.2. Cluster coordinator</i>	X		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

No.	Question	Yes	No	Comments
	3.3. Cluster activity and technology background	X		
	3.4. International orientation and positioning of the cluster	X		
	3.5. Cluster members' needs	X		
	3.6. SWOT analysis	X		
	4. Cluster strategy	X		
	4.1. Mission	X		
	4.2. Vision	X		
	4.3. Strategic objectives	X		
	4.4. Operational objectives	X		
	4.5. Key performance indicators	X		
	5. Action plan	X		
	5.1. Aim of the action plan	X		
	5.2. Actions	X		
	5.3. Resources	X		
	5.4. Procedure of monitoring and implementation plan progress assessment	X		
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?	X		
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?	X		
4.	Does the section 2.3 describe market trends in the industry of the cluster?	X		
5.	Does the section 2.4 describe relevant measures available for clusters that would support their development?	X		
6.	Does the section 3.1 describe the history of the cluster?	X		
7.	Does the section 3.2 describe the coordinator of the cluster?	X		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

No.	Question	Yes	No	Comments
8.	Does the section 3.3 discuss the following issues?	X		
	• <i>Cluster members structure</i>	X		
	• <i>Economy branches of the cluster members</i>	X		
	• <i>Technology background of the cluster</i>	X		
	• <i>Main R&D&I players of the cluster</i>	X		
	• <i>Relevant projects implemented by the cluster</i>	X		
	• <i>Table of cluster members</i>	X		
9.	Does the section 3.4 describe the coordinator of the cluster?	X		
10.	Does the section 3.5 describe results of the survey on members' needs?	X		
11.	Does the section 3.6 summarises SWOT analysis from WP2?	X		
12.	Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions: <ul style="list-style-type: none"> • <i>Why the organisation exists?</i> • <i>Where it goes?</i> • <i>What it should achieve?</i> • <i>Whose needs and what needs it should satisfy?</i> 	X		
13.	Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?	X		
14.	Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?	X		
15.	Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e. ⇒ <i>Strategic Objective 1: Improvement of cluster management excellence.</i> ⇒ <i>Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.</i> ⇒ <i>Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.</i>	X		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

No.	Question	Yes	No	Comments
	<p>⇒ <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i></p> <p>⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i></p> <p>⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i></p>			
16.	Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?	X		
17.	Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?	X		
18.	Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: "How much?" and "By when?".	X		
19.	Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?	X		
20.	Do all operational objectives are linked to KPIs?	X		
21.	Does the section 5.1 specifies the aim of action plan?	X		
22.	Does the section 5.2 specifies actions that will be done by the cluster?	X		
23.	Do all operational objectives are linked to actions in section 5.2?	X		
24.	Does the description of each action presented in Section 5.2 contain the following data:			
	<i>Description</i>	X		
	<i>Related operational objectives</i>	X		
	<i>Responsible person / body for the implementation</i>	X		
	<i>Start and end</i>	X		
	<i>Key Performance Indicators</i>	X		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

No.	Question	Yes	No	Comments
25.	Does the section 5.2 include a table showing the timeline of actions?	X		
26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?	X		
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?	X		
28.	Does the report include captions of figures and tables?	X		
29.	Are numerical values expressed in metric units (m, kg)?	X		
30.	Are monetary values expressed in EUR, or both in national currency and EUR?	X		
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?	X		
32.	Are pre-defined text styles (MS Word -> <i>Home -> Styles</i>) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)	X		

3.2. Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	YES
The report can be submitted after some minor corrections*	
The report can be submitted only after major corrections*	

* Please justify below

I. Review of the Polish Construction Cluster strategy by the Pro-nZEB Cluster

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	Polish Construction Cluster
Country	Poland

2. Reviewer

Name	Andrei Popescu
Organisation	pRO-nZEB
Email	andrei@woakey.com
Country	Romania
Date	13 September 2021

3. Strategy evaluation

Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	<i>1. Introduction</i>	X		
	<i>1.1. SMART4NZEB project</i>	X		
	<i>1.2. WP4 / Context of the Work Program</i>	X		Subchapter name could be enhanced
	<i>1.3. Aim of the document</i>	X		
	<i>2. Global environment of the cluster</i>		X	
	<i>2.1. National context and policy framework</i>	X		
	<i>2.2. Technology development trends in the construction / energy efficiency / RES industry</i>	X		
	<i>2.3. Market trends in the construction / energy efficiency / RES industry</i>	X		
	<i>2.4. External resources available for the cluster development</i>		X	
	<i>3. Cluster overview</i>	X		
	<i>3.1. History of the cluster</i>	X		
	<i>3.2. Cluster coordinator</i>	X		
	<i>3.3. Cluster activity and technology background</i>		X	

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	3.4. <i>International orientation and positioning of the cluster</i>	X		
	3.5. <i>Cluster members' needs</i>	X		
	3.6. <i>SWOT analysis</i>	X		
	4. <i>Cluster strategy</i>	X		
	4.1. <i>Mission</i>	X		
	4.2. <i>Vision</i>	X		
	4.3. <i>Strategic objectives</i>		X	Objectives do not cover initial Template / SMART4NZEB objectives
	4.4. <i>Operational objectives</i>		X	
	4.5. <i>Key performance indicators</i>		X	Still missing key points
	5. <i>Action plan</i>		X	
	5.1. <i>Aim of the action plan</i>		X	
	5.2. <i>Actions</i>		X	
	5.3. <i>Resources</i>		X	
	5.4. <i>Procedure of monitoring and implementation plan progress assessment</i>		X	
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?	X		This could be improved
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?	X		Reference to nZEB should be made more clear
4.	Does the section 2.3 describe market trends in the industry of the cluster?	X		
5.	Does the section 2.4 describe relevant measures available for clusters that would support their development?		X	
6.	Does the section 3.1 describe the history of the cluster?	X		
7.	Does the section 3.2 describe the coordinator of the cluster?	X		
8.	Does the section 3.3 discuss the following issues?		X	

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<ul style="list-style-type: none"> • Cluster members structure 		X	
	<ul style="list-style-type: none"> • Economy branches of the cluster members 		X	
	<ul style="list-style-type: none"> • Technology background of the cluster 		X	
	<ul style="list-style-type: none"> • Main R&D&I players of the cluster 		X	
	<ul style="list-style-type: none"> • Relevant projects implemented by the cluster 		X	
	<ul style="list-style-type: none"> • Table of cluster members 		X	
9.	Does the section 3.4 describe the coordinator of the cluster?	X		Describes the International orientation and positioning of the cluster
10.	Does the section 3.5 describe results of the survey on members' needs?	X		
11.	Does the section 3.6 summarises SWOT analysis from WP2?	X		
12.	Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions: <ul style="list-style-type: none"> • Why the organisation exists? • Where it goes? • What it should achieve? • Whose needs and what needs it should satisfy? 	X		This could be detailed further
13.	Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?	X		This could be detailed further
14.	Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?		X	Objectives do not cover initial Template / SMART4NZEB objectives
15.	Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e. <ul style="list-style-type: none"> ⇒ Strategic Objective 1: Improvement of cluster management excellence. ⇒ Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members. ⇒ Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level. 		X	Objectives do not cover initial Template / SMART4NZEB objectives

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<p>⇒ <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i></p> <p>⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i></p> <p>⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i></p>			
16.	Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?		X	Strategic Objectives only
17.	Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?		X	
18.	Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: “How much?” and “By when?”.		X	
19.	Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?		X	
20.	Do all operational objectives are linked to KPIs?		X	
21.	Does the section 5.1 specifies the aim of action plan?		X	
22.	Does the section 5.2 specifies actions that will be done by the cluster?		X	
23.	Do all operational objectives are linked to actions in section 5.2?		X	
24.	Does the description of each action presented in Section 5.2 contain the following data:			
	<i>Description</i>		X	
	<i>Related operational objectives</i>		X	
	<i>Responsible person / body for the implementation</i>		X	
	<i>Start and end</i>		X	
	<i>Key Performance Indicators</i>		X	
25.	Does the section 5.2 include a table showing the timeline of actions?		X	

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?		X	
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?		X	
28.	Does the report include captions of figures and tables?	X		
29.	Are numerical values expressed in metric units (m, kg)?	X		
30.	Are monetary values expressed in EUR, or both in national currency and EUR?	X		
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?		X	
32.	Are pre-defined text styles (MS Word -> <i>Home</i> -> <i>Styles</i>) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)	X		Additional attention to formatting may be required.

Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	
The report can be submitted after some minor corrections*	
The report can be submitted only after major corrections*	X

* Please justify below

Comments from Template to be removed.

Some points are missing.

History of Changes needs attention / is it correct?!

J. Review of the Bioenergy for the region Cluster strategy by the Construction Cluster Dundjer

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	Bioenergy for the region
Country	Poland

2. Reviewer

Name	Biljana Avramovic
Organisation	Construction Cluster Dundjer
Email	Biljana.avramovic@yahoo.com
Country	Serbia
Date	31.10.2020.

3. Strategy evaluation

3.1. Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	<i>1. Introduction</i>	Y		
	<i>1.1. SMART4NZEB project</i>	Y		
	<i>1.2. WP4 / Context of the Work Program</i>	Y		
	<i>1.3. Aim of the document</i>	Y		
	2. Global environment of the cluster			
	<i>2.1. National context and policy framework</i>	Y		
	<i>2.2. Technology development trends in the construction / energy efficiency / RES industry</i>	Y		
	<i>2.3. Market trends in the construction / energy efficiency / RES industry</i>	Y		
	<i>2.4. External resources available for the cluster development</i>	Y		
	3. Cluster overview			
	<i>3.1. History of the cluster</i>	Y		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	3.2. Cluster coordinator	Y		
	3.3. Cluster activity and technology background	Y		
	3.4. International orientation and positioning of the cluster	Y		
	3.5. Cluster members' needs	Y		
	3.6. SWOT analysis	Y		
	4. Cluster strategy			
	4.1. Mission	Y		
	4.2. Vision	Y		
	4.3. Strategic objectives	Y		
	4.4. Operational objectives	Y		
	4.5. Key performance indicators	Y		
	5. Action plan			
	5.1. Aim of the action plan	Y		
	5.2. Actions	Y		
	5.3. Resources	Y		
	5.4. Procedure of monitoring and implementation plan progress assessment	Y		
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?	Y		
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?	Y		
4.	Does the section 2.3 describe market trends in the industry of the cluster?	Y		
5.	Does the section 2.4 describe relevant measures available for clusters that would support their development?	Y		
6.	Does the section 3.1 describe the history of the cluster?	Y		
7.	Does the section 3.2 describe the coordinator of the cluster?	Y		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

8.	Does the section 3.3 discuss the following issues?			
	• <i>Cluster members structure</i>	Y		
	• <i>Economy branches of the cluster members</i>	Y		
	• <i>Technology background of the cluster</i>	Y		
	• <i>Main R&D&I players of the cluster</i>	Y		
	• <i>Relevant projects implemented by the cluster</i>	Y		
	• <i>Table of cluster members</i>	Y		
9.	Does the section 3.4 describe the coordinator of the cluster?	Y		
10.	Does the section 3.5 describe results of the survey on members' needs?	Y		
11.	Does the section 3.6 summarises SWOT analysis from WP2?	Y		
12.	Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions: <ul style="list-style-type: none"> • <i>Why the organisation exists?</i> • <i>Where it goes?</i> • <i>What it should achieve?</i> • <i>Whose needs and what needs it should satisfy?</i> 	Y		
13.	Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?	Y		
14.	Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?	Y		
15.	Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e. ⇒ <i>Strategic Objective 1: Improvement of cluster management excellence.</i> ⇒ <i>Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.</i> ⇒ <i>Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.</i>	Y		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<p>⇒ <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i></p> <p>⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i></p> <p>⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i></p>			
16.	Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?	Y		
17.	Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?	Y		
18.	Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: “How much?” and “By when?”.	Y		
19.	Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?	Y		
20.	Do all operational objectives are linked to KPIs?	Y		
21.	Does the section 5.1 specifies the aim of action plan?	Y		
22.	Does the section 5.2 specifies actions that will be done by the cluster?	Y		
23.	Do all operational objectives are linked to actions in section 5.2?	Y		
24.	Does the description of each action presented in Section 5.2 contain the following data:			
	<i>Description</i>	Y		
	<i>Related operational objectives</i>	Y		
	<i>Responsible person / body for the implementation</i>	Y		
	<i>Start and end</i>	Y		
	<i>Key Performance Indicators</i>	Y		
25.	Does the section 5.2 include a table showing the timeline of actions?	Y		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?	Y		
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?	Y		
28.	Does the report include captions of figures and tables?	Y		
29.	Are numerical values expressed in metric units (m, kg)?	Y		
30.	Are monetary values expressed in EUR, or both in national currency and EUR?	Y		
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?	Y		
32.	Are pre-defined text styles (MS Word -> <i>Home -> Styles</i>) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)	Y		

3.2. Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	X
The report can be submitted after some minor corrections*	
The report can be submitted only after major corrections*	

* Please justify below

Development and innovation strategy is very good presented.

K. Review of the Bioenergy for the region Cluster strategy by the Pro-nZEB Cluster

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	Bioenergy for the region
Country	Poland

2. Reviewer

Name	Andrei Popescu
Organisation	pRO-nZEB
Email	andrei@woakey.com
Country	Romania
Date	24.02.2021

3. Strategy evaluation

3.1. Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	<i>1. Introduction</i>	x		
	<i>1.1. SMART4NZEB project</i>	x		
	<i>1.2. WP4 / Context of the Work Program</i>	x		Numbering should be corrected (1.1 instead of 1.2)
	<i>1.3. Aim of the document</i>	x		Numbering should be corrected (1.2 instead of 1.3)
	<i>2. Global environment of the cluster</i>	x		
	<i>2.1. National context and policy framework</i>	x		Became 2.2
	<i>2.2. Technology development trends in the construction / energy efficiency / RES industry</i>	x		Became 2.3
	<i>2.3. Market trends in the construction / energy efficiency / RES industry</i>	x		Became 2.4
	<i>2.4. External resources available for the cluster development</i>	x		Became 2.5
	<i>3. Cluster overview</i>	x		
	<i>3.1. History of the cluster</i>	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	3.2. Cluster coordinator	x		
	3.3. Cluster activity and technology background	x		
	3.4. International orientation and positioning of the cluster	x		
	3.5. Cluster members' needs	x		Methodology (e.g. tools used) for surveying may be added, if author believes it can be relevant
	3.6. SWOT analysis	x		Page 25 is empty
	4. Cluster strategy	x		
	4.1. Mission	x		
	4.2. Vision	x		
	4.3. Strategic objectives	x		
	4.4. Operational objectives	x		
	4.5. Key performance indicators	x		
	5. Action plan	x		
	5.1. Aim of the action plan	x		
	5.2. Actions	x		
	5.3. Resources	x		
	5.4. Procedure of monitoring and implementation plan progress assessment	x		
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?	x		Became 2.2
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?	x		Became 2.3
4.	Does the section 2.3 describe market trends in the industry of the cluster?	x		Became 2.4
5.	Does the section 2.4 describe relevant measures available for clusters that would support their development?	x		Became 2.5
6.	Does the section 3.1 describe the history of the cluster?	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

7.	Does the section 3.2 describe the coordinator of the cluster?		x	
8.	Does the section 3.3 discuss the following issues?	x		
	• <i>Cluster members structure</i>	x		
	• <i>Economy branches of the cluster members</i>	x		
	• <i>Technology background of the cluster</i>	x		
	• <i>Main R&D&I players of the cluster</i>	x		
	• <i>Relevant projects implemented by the cluster</i>	x		
	• <i>Table of cluster members</i>	x		
9.	Does the section 3.4 describe the coordinator of the cluster?	x		
10.	Does the section 3.5 describe results of the survey on members' needs?	x		
11.	Does the section 3.6 summarises SWOT analysis from WP2?	x		
12.	Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions: <ul style="list-style-type: none"> • <i>Why the organisation exists?</i> • <i>Where it goes?</i> • <i>What it should achieve?</i> • <i>Whose needs and what needs it should satisfy?</i> 	x		
13.	Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?	x		
14.	Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?	x		
15.	Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e. ⇒ <i>Strategic Objective 1: Improvement of cluster management excellence.</i> ⇒ <i>Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.</i> ⇒ <i>Strategic Objective 3: Development of new services for the cluster members aimed at</i>	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<p><i>boosting their competitiveness on national and European level.</i></p> <p>⇒ <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i></p> <p>⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i></p> <p>⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i></p>			
16.	Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?	x		
17.	Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?	x		
18.	Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: “How much?” and “By when?”.	x		
19.	Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?	x		
20.	Do all operational objectives are linked to KPIs?	x		
21.	Does the section 5.1 specifies the aim of action plan?	x		
22.	Does the section 5.2 specifies actions that will be done by the cluster?	x		
23.	Do all operational objectives are linked to actions in section 5.2?			1.4 missing – doublechecking needed for all
24.	Does the description of each action presented in Section 5.2 contain the following data:			
	<i>Description</i>	x		
	<i>Related operational objectives</i>	x		
	<i>Responsible person / body for the implementation</i>	x		
	<i>Start and end</i>	x		
	<i>Key Performance Indicators</i>	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

25.	Does the section 5.2 include a table showing the timeline of actions?	x		
26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?	x		
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?	x		
28.	Does the report include captions of figures and tables?	x		
29.	Are numerical values expressed in metric units (m, kg)?	x		
30.	Are monetary values expressed in EUR, or both in national currency and EUR?	x		
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?	x		
32.	Are pre-defined text styles (MS Word -> Home -> Styles) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)	x		

3.2. Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	
The report can be submitted after some minor corrections*	x
The report can be submitted only after major corrections*	

* Please justify below

KPIs numbering should be corrected.

Minor corrections may be required in editing / formatting (pends on the choice of the author) – e.g. font size varies in some paragraphs – e.g. pg 12 of 36 font size is 12. Some minor typos have been noticed (e.g. page 11 of 36). A final review of the text (typos, grammar, etc) could be made after all reviews are completed.

Responsible person for monitoring the overall implementation of the Action Plan could be maybe nominated?

Numbering of subchapters should be corrected in some places (e.g. 1.1 twice)

nZEB oriented actions / objectives could be included maybe?

Some empty pages

L. Review of the Bioenergy for the region Cluster strategy by the Construction Cluster of Slovenia

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	BIOENERGY FOR THE REGION CLUSTER
Country	Poland

2. Reviewer

Name	Andro Goblon
Organisation	Construction Cluster of Slovenia
Email	andro.goblon@sgg.si
Country	Slovenia
Date	12. 11. 2021

3. Strategy evaluation

3.1. Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	1. Introduction			
	1.1. SMART4NZEB project			
	1.2. WP4 / Context of the Work Program			Wrong number: 1.1. CONTEXT OF THE WORK PROGRAM
	1.3. Aim of the document			Wrong number: 1.2. AIM OF THE DOCUMENT
	2. Global environment of the cluster			
	2.1. National context and policy framework			
	2.2. Technology development trends in the construction / energy efficiency / RES industry			
	2.3. Market trends in the construction / energy efficiency / RES industry			
	2.4. External resources available for the cluster development			
	3. Cluster overview			

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	3.1. History of the cluster		
	3.2. Cluster coordinator		
	3.3. Cluster activity and technology background		
	3.4. International orientation and positioning of the cluster		
	3.5. Cluster members' needs		
	3.6. SWOT analysis		
	4. Cluster strategy		
	4.1. Mission		
	4.2. Vision		
	4.3. Strategic objectives		
	4.4. Operational objectives		
	4.5. Key performance indicators		
	5. Action plan		
	5.1. Aim of the action plan		
	5.2. Actions		
	5.3. Resources		
	5.4. Procedure of monitoring and implementation plan progress assessment		
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?		In fact is the section 2.2
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?		In fact is the section 2.3
4.	Does the section 2.3 describe market trends in the industry of the cluster?		In fact is the section 2.4
5.	Does the section 2.4 describe relevant measures available for clusters that would support their development?		In fact is the section 2.5
6.	Does the section 3.1 describe the history of the cluster?		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

7.	Does the section 3.2 describe the coordinator of the cluster?			
8.	Does the section 3.3 discuss the following issues?			
	• <i>Cluster members structure</i>			
	• <i>Economy branches of the cluster members</i>			
	• <i>Technology background of the cluster</i>			
	• <i>Main R&D&I players of the cluster</i>			
	• <i>Relevant projects implemented by the cluster</i>			
9.	Does the section 3.4 describe the coordinator of the cluster?			
	Does the section 3.5 describe results of the survey on members' needs?			
10.	Does the section 3.6 summarises SWOT analysis from WP2?			
11.	Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions:			
	<ul style="list-style-type: none"> • <i>Why the organisation exists?</i> • <i>Where it goes?</i> • <i>What it should achieve?</i> • <i>Whose needs and what needs it should satisfy?</i> 			<p>This is the answer on WHAT is the B4R cluster:</p> <p><i>The Bioenergy for the Region (B4R) Cluster is a cooperation platform for competitors whose mission is to increase competitiveness through technology transfer for the emerging regional renewable energy industry by developing innovative and environmentally friendly energy products and services, through building links between small and large enterprises, science and the economy, local governments and foreign partners.</i></p>
12.	Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?			
13.	Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?			

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

15.	<p>Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e.</p> <p>⇒ <i>Strategic Objective 1: Improvement of cluster management excellence.</i></p> <p>⇒ <i>Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.</i></p> <p>⇒ <i>Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.</i></p> <p>⇒ <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i></p> <p>⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i></p> <p>⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i></p>			
16.	<p>Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?</p>			
17.	<p>Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?</p>			
18.	<p>Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: “How much?” and “By when?”.</p>			
19.	<p>Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?</p>			
20.	<p>Do all operational objectives are linked to KPIs?</p>			
21.	<p>Does the section 5.1 specifies the aim of action plan?</p>			
22.	<p>Does the section 5.2 specifies actions that will be done by the cluster?</p>			
23.	<p>Do all operational objectives are linked to actions in section 5.2?</p>			<p><i>Action 2 Upgrading the cluster website as the main channel of</i></p>

			<p><i>communication, knowledge sharing, networking and services distribution</i></p> <p>What means “upgrading”?</p> <p>If cluster website is the main channel of communication, etc., than website optimization should also be planned.</p> <p><i>Action 3 Development of new services for the cluster members aimed at boosting their competitiveness on national and European level</i></p> <p>Are planned services enough?</p> <p><i>Action 4 Increasing the recognition of the cluster</i></p> <p>What about the use of social media and other means of communication?</p>
24.	Does the description of each action presented in Section 5.2 contain the following data:		
	<i>Description</i>		
	<i>Related operational objectives</i>		
	<i>Responsible person / body for the implementation</i>		
	<i>Start and end</i>		
	<i>Key Performance Indicators</i>		
25.	Does the section 5.2 include a table showing the timeline of actions?		
26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?		
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?		
28.	Does the report include captions of figures and tables?		
29.	Are numerical values expressed in metric units (m, kg)?		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

30.	Are monetary values expressed in EUR, or both in national currency and EUR?		
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?		
32.	Are pre-defined text styles (MS Word -> Home -> Styles) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)		

3.2. Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	
The report can be submitted after some minor corrections*	X
The report can be submitted only after major corrections*	

* Please justify below

See the comments.

M. Review of the Construction Cluster Dundjer strategy by the Pro-nZEB Cluster

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	Construction Cluster Dundjer
Country	Serbia

2. Reviewer

Name	Andrei-Laurențiu Popescu
Organisation	PRO-nZEB
Email	andrei@woakey.com
Country	Romania
Date	26 October 2020

3. Strategy evaluation

3.1. Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	<i>1. Introduction</i>	x		
	<i>1.1. SMART4NZEB project</i>	x		
	<i>1.2. WP4 / Context of the Work Program</i>	x		
	<i>1.3. Aim of the document</i>	x		
	<i>2. Global environment of the cluster</i>	x		
	<i>2.1. National context and policy framework</i>	x		
	<i>2.2. Technology development trends in the construction / energy efficiency / RES industry</i>	x		It is recommended that more information on existing trends for the analysed sectors is provided. (e.g. what new technologies are being used or made available recently / will be made available)
	<i>2.3. Market trends in the construction / energy efficiency / RES industry</i>	X		It is recommended that more specific information is acquired in order to identify potential solutions to improve the context.
<i>2.4. External resources available for the cluster development</i>	x		It is recommended that more specific (potential) resources are identified (e.g. funding	

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

			opportunities, potential new partners, personnel, etc.)
3. Cluster overview	x		
3.1. History of the cluster	x		
3.2. Cluster coordinator	x		
3.3. Cluster activity and technology background	x		
3.4. International orientation and positioning of the cluster	x		
3.5. Cluster members' needs		x	As part of the WP4, Task 4.3, Dundjer should finalize their surveying activities with respect to the needs & interests of their members.
3.6. SWOT analysis	x		Attention to formatting & numbering should be corrected
4. Cluster strategy	x		
4.1. Mission	x		
4.2. Vision	x		
4.3. Strategic objectives	x		
4.4. Operational objectives	x		
4.5. Key performance indicators	x		Baselines and Targets set are unclear. All objectives should be more specific and quantifiable – i.e. for example, No. 6.1 should be split between number of posts / website visits, etc.
5. Action plan	x		
5.1. Aim of the action plan	x		
5.2. Actions	x		<p>Actions should have brief names?</p> <p>Text should probably be reviewed in some places (e.g. Action 4 description: “Implementation” instead of “Implemented”; same for Action 5)</p> <p>As the Action Plan should be especially focused on presenting how the Cluster will contribute to</p>

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				the implementation of nZEB, I would recommend some reference to nZEB – e.g. could be something related to the (future) local requirements for nZEB.
	5.3. Resources	x		
	5.4. Procedure of monitoring and implementation plan progress assessment	x		Maybe this could be further detailed.
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?	x		This could be further detailed.
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?		X	More details could be provided.
4.	Does the section 2.3 describe market trends in the industry of the cluster?		x	Not all sectors covered. More details could be provided.
5.	Does the section 2.4 describe relevant measures available for clusters that would support their development?	x		More details could be provided.
6.	Does the section 3.1 describe the history of the cluster?	x		
7.	Does the section 3.2 describe the coordinator of the cluster?	x		
8.	Does the section 3.3 discuss the following issues?			
	• Cluster members structure	x		
	• Economy branches of the cluster members	x		
	• Technology background of the cluster	x		
	• Main R&D&I players of the cluster	x		
	• Relevant projects implemented by the cluster	x		
	• Table of cluster members	x		
9.	Does the section 3.4 describe the coordinator of the cluster?	x		*Describes International orientation and positioning of the cluster
10.	Does the section 3.5 describe results of the survey on members' needs?		x	

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11.	Does the section 3.6 summarises SWOT analysis from WP2?	x		Attention to formatting & numbering should be corrected
12.	Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions: <ul style="list-style-type: none"> • <i>Why the organisation exists?</i> • <i>Where it goes?</i> • <i>What it should achieve?</i> • <i>Whose needs and what needs it should satisfy?</i> 	x		Not all questions are answered. Further details could be provided.
13.	Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?	x		
14.	Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?	x		
15.	Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e. ⇒ <i>Strategic Objective 1: Improvement of cluster management excellence.</i> ⇒ <i>Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.</i> ⇒ <i>Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.</i> ⇒ <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i> ⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i> ⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i>	x		
16.	Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?	x		
17.	Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

18.	Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: “How much?” and “By when?”.	x		
19.	Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?	x		Baselines and Targets set are unclear. All objectives should be more specific and quantifiable – i.e. for example, No. 6.1 should be split between number of posts / website visits, etc.
20.	Do all operational objectives are linked to KPIs?	x		Better identification of KPI is recommended (see previous comment)
21.	Does the section 5.1 specifies the aim of action plan?	x		Reference to nZEB should be made.
22.	Does the section 5.2 specifies actions that will be done by the cluster?	x		Correlation with KPIs should be improved.
23.	Do all operational objectives are linked to actions in section 5.2?	x		
24.	Does the description of each action presented in Section 5.2 contain the following data:			
	<i>Description</i>	x		
	<i>Related operational objectives</i>	x		
	<i>Responsible person / body for the implementation</i>	x		
	<i>Start and end</i>	x		
	<i>Key Performance Indicators</i>	x		Improvements could be made as suggested in previous comments.
25.	Does the section 5.2 include a table showing the timeline of actions?	x		
26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?	x		
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?		x	Only as per draft
28.	Does the report include captions of figures and tables?		x	N/A for now
29.	Are numerical values expressed in metric units (m, kg)?		x	N/A for now

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

30.	Are monetary values expressed in EUR, or both in national currency and EUR?	x	N/A for now
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?	x	
32.	Are pre-defined text styles (MS Word -> <i>Home -> Styles</i>) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)	x	Some corrections should be made

3.2. Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	
The report can be submitted after some minor corrections*	
The report can be submitted only after major corrections*	x

* Please justify below

As per the Grant Agreement WP4, the 3 key sectors (construction, energy efficiency and energy from renewable sources) that are relevant for nZEB should be considered. For now, Chapter 2.1, 2.2 and 2.3 of this paper could be further improved with more information, that would allow a more targeted approach in the region (could better support certain actions).

Task 4.3 of the GA foresees the action plans development **will be based on results of surveys distributed by each cluster to its members** and the experiences collected through evaluation questionnaires after completion of each visit under ClusterXchange programme. Reference to surveys is missing. Reference to evaluation questionnaires should be made.

External resources could be further detailed.

The KPIs (incl. targets and baselines) should be improved / made more specific.

Tables and Graphics should be used whenever presenting information, if possible (e.g. WP2).

Overall, the focus on nZEB and SMEs could be emphasized more / improved (guidance for helping local stakeholders in regional development of nZEB through active engagement, cross-sectoral and transnational collaboration of clusters' members).

N. Review of the Construction Cluster Dundjer strategy by the Construction Cluster of Slovenia

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	Construction Cluster Dundjer
Country	Serbia

2. Reviewer

Name	Andro Goblon
Organisation	SGG
Email	andro.goblon@sgg.si
Country	Slovenia
Date	February 2021

3. Strategy evaluation

3.1. Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	1. Introduction			
	1.1. SMART4NZEB project			
	1.2. WP4 / Context of the Work Program			
	1.3. Aim of the document			
	2. Global environment of the cluster			
	2.1. National context and policy framework			
	2.2. Technology development trends in the construction / energy efficiency / RES industry			
	2.3. Market trends in the construction / energy efficiency / RES industry			
	2.4. External resources available for the cluster development			
	3. Cluster overview			
	3.1. History of the cluster			
	3.2. Cluster coordinator			

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	3.3. Cluster activity and technology background		
	3.4. International orientation and positioning of the cluster		
	3.5. Cluster members' needs		
	3.6. SWOT analysis		
	4. Cluster strategy		
	4.1. Mission		
	4.2. Vision		
	4.3. Strategic objectives		
	4.4. Operational objectives		
	4.5. Key performance indicators		
	5. Action plan		
	5.1. Aim of the action plan		
	5.2. Actions		
	5.3. Resources		
	5.4. Procedure of monitoring and implementation plan progress assessment		
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?		
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?		What about comparing the existing knowledge and competencies in construction sector in Serbia and expected knowledge and competencies, related to NZEB? Is there a gap?
4.	Does the section 2.3 describe market trends in the industry of the cluster?		Imagine the situation where government does not exist. In this case you can think on yourself (the cluster and what can cluster do with own sources and competencies).

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

				(The government could be an excuse, but this doesn't solve the situation.)
5.	Does the section 2.4 describe relevant measures available for clusters that would support their development?			Within the possibilities that exist.
6.	Does the section 3.1 describe the history of the cluster?			
7.	Does the section 3.2 describe the coordinator of the cluster?			
8.	Does the section 3.3 discuss the following issues?			
	<ul style="list-style-type: none"> • <i>Cluster members structure</i> 			It could be also presented graphically, as a percentage.
	<ul style="list-style-type: none"> • <i>Economy branches of the cluster members</i> 			It could be also presented graphically, as a percentage.
	<ul style="list-style-type: none"> • <i>Technology background of the cluster</i> 			It could be also presented graphically, as a percentage.
	<ul style="list-style-type: none"> • <i>Main R&D&I players of the cluster</i> 			It could be also presented graphically, as a percentage.
	<ul style="list-style-type: none"> • <i>Relevant projects implemented by the cluster</i> 			
	<ul style="list-style-type: none"> • <i>Table of cluster members</i> 			<p>We suggest to be more specific in the Table 1.</p> <p>What is the unique competencies and knowledge of the cluster members? (Instead of the general description in the column "Field of expertise".)</p> <p>Understanding of this could open the window of opportunities for the cluster and it's members.</p>
9.	Does the section 3.4 describe the coordinator of the cluster?			
10.	Does the section 3.5 describe results of the survey on members' needs?			See the comment above, related to "Table of cluster members"
11.	Does the section 3.6 summarises SWOT analysis from WP2?			The SWOT analysis, described in the strategy, is describing the cluster environment, regarding it's field of

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

			<p>work and expertize. This means that can help define cluster activities.</p> <p>However, cluster own SWOT analysis is missing. What are clusters strenghts? Where are opportunities for cluster? Etc.</p>
12.	<p>Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions:</p> <ul style="list-style-type: none"> • <i>Why the organisation exists?</i> • <i>Where it goes?</i> • <i>What it should achieve?</i> • <i>Whose needs and what needs it should satisfy?</i> 		
13.	<p>Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?</p>		
14.	<p>Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?</p>		
15.	<p>Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e.</p> <p>⇒ <i>Strategic Objective 1: Improvement of cluster management excellence.</i></p> <p>⇒ <i>Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.</i></p> <p>⇒ <i>Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.</i></p> <p>⇒ <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i></p> <p>⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i></p> <p>⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i></p>		
16.	<p>Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?</p>		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

17.	Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?		
18.	Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: “How much?” and “By when?”.		
19.	Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?		
20.	Do all operational objectives are linked to KPIs?		
21.	Does the section 5.1 specifies the aim of action plan?		
22.	Does the section 5.2 specifies actions that will be done by the cluster?		
23.	Do all operational objectives are linked to actions in section 5.2?		
24.	Does the description of each action presented in Section 5.2 contain the following data:		
	<i>Description</i>		
	<i>Related operational objectives</i>		
	<i>Responsible person / body for the implementation</i>		
	<i>Start and end</i>		
	<i>Key Performance Indicators</i>		
25.	Does the section 5.2 include a table showing the timeline of actions?		
26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?		
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?		
28.	Does the report include captions of figures and tables?		
29.	Are numerical values expressed in metric units (m, kg)?		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

30.	Are monetary values expressed in EUR, or both in national currency and EUR?	<input type="checkbox"/>	<input type="checkbox"/>	
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?	<input type="checkbox"/>	<input type="checkbox"/>	
32.	Are pre-defined text styles (MS Word -> Home -> Styles) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)	<input type="checkbox"/>	<input type="checkbox"/>	

3.2. Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	<input type="checkbox"/>
The report can be submitted after some minor corrections*	<input checked="" type="checkbox"/>
The report can be submitted only after major corrections*	<input type="checkbox"/>

* Please justify below

O. Review of the Construction Cluster Dundjer strategy by the Polish Construction Cluster

1. Strategy identification

Strategy title	Development and innovation strategy
Cluster	Construction Cluster Dundjer
Country	Serbia

2. Reviewer

Name	Adam Krajewski
Organisation	PSDiK
Email	a.krajewski@polskiestowarzyszenie.pl
Country	Poland
Date	08.11.2021

3. Strategy evaluation

3.1. Technical evaluation

No.	Question	Yes	No	Comments
1.	Does the report include the following sections?			
	<i>1. Introduction</i>			
	<i>1.1. SMART4NZEB project</i>	x		
	<i>1.2. WP4 / Context of the Work Program</i>	x		
	<i>1.3. Aim of the document</i>	x		
	<i>2. Global environment of the cluster</i>			2.1. Global and European environment of the cluster
	<i>2.1. National context and policy framework</i>	x		2.2. National environment of the cluster
	<i>2.2. Technology development trends in the construction / energy efficiency / RES industry</i>	x		2.3. Technology development trends in the construction / energy efficiency / RES industry
	<i>2.3. Market trends in the construction / energy efficiency / RES industry</i>	x		2.4. Market trends in the construction / energy efficiency / RES industry
	<i>2.4. External resources available for the cluster development</i>	x		2.5. External resources available for the cluster development

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<i>3. Cluster overview</i>			
	<i>3.1. History of the cluster</i>	x		
	<i>3.2. Cluster coordinator</i>	x		
	<i>3.3. Cluster activity and technology background</i>	x		
	<i>3.4. International orientation and positioning of the cluster</i>	x		
	<i>3.5. Cluster members' needs</i>	x		
	<i>3.6. SWOT analysis</i>	x		
	<i>4. Cluster strategy</i>			
	<i>4.1. Mission</i>	x		
	<i>4.2. Vision</i>	x		
	<i>4.3. Strategic objectives</i>	x		
	<i>4.4. Operational objectives</i>	x		
	<i>4.5. Key performance indicators</i>	x		
	<i>5. Action plan</i>			
	<i>5.1. Aim of the action plan</i>	x		
	<i>5.2. Actions</i>	x		
	<i>5.3. Resources</i>	x		
	<i>5.4. Procedure of monitoring and implementation plan progress assessment</i>	x		
2.	Does the section 2.1 describe national policies influencing the cluster development? Also, does the section 2.1 describe national policies on the relevant field (construction / energy efficiency / RES – depending on the cluster field of expertise)?	x		2.2. National environment of the cluster
3.	Does the section 2.2 describe technology development trends in the industry of the cluster? Does the description refer to nZEB?	x		2.3. Technology development trends in the construction / energy efficiency / RES industry
4.	Does the section 2.3 describe market trends in the industry of the cluster?	x		2.4. Market trends in the construction / energy efficiency / RES industry
5.	Does the section 2.4 describe relevant measures available for clusters that would support their development?	x		2.5. External resources available for the cluster development

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

6.	Does the section 3.1 describe the history of the cluster?	x		
7.	Does the section 3.2 describe the coordinator of the cluster?	x		
8.	Does the section 3.3 discuss the following issues?			
	• <i>Cluster members structure</i>	x		
	• <i>Economy branches of the cluster members</i>	x		
	• <i>Technology background of the cluster</i>	x		
	• <i>Main R&D&I players of the cluster</i>	x		
	• <i>Relevant projects implemented by the cluster</i>	x		
8.	• <i>Table of cluster members</i>	x		
9.	Does the section 3.4 describe the coordinator of the cluster?	x		
10.	Does the section 3.5 describe results of the survey on members' needs?	x		Survey taken on 209 companies. It's impossible to distinct which companies are cluster members.
11.	Does the section 3.6 summarises SWOT analysis from WP2?	x		
12.	Does the section 4.1 specifies the cluster mission? In particular, does it answer the following questions:	x		
	• <i>Why the organisation exists?</i>			
	• <i>Where it goes?</i>			
	• <i>What it should achieve?</i>			
	• <i>Whose needs and what needs it should satisfy?</i>			
13.	Does the section 4.2 specifies the cluster vision? In particular, does the vision refer to the future desired state or to the situation that is expected by the cluster?	x		
14.	Does the section 4.3 specifies the cluster strategic objectives, i.e. long-term goals?	x		
15.	Does the cluster strategic objectives specified in the section 4.3 include <u>at least</u> six objectives resulted from SMART4NZEB project. i.e. ⇒ <i>Strategic Objective 1: Improvement of cluster management excellence.</i>	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<p>⇒ <i>Strategic Objective 2: Improvement of innovation level, marketing and sales skills of cluster members.</i></p> <p>⇒ <i>Strategic Objective 3: Development of new services for the cluster members aimed at boosting their competitiveness on national and European level.</i></p> <p>⇒ <i>Strategic Objective 4: Facilitating strategic and sustainable partnering in the EU of the cluster members.</i></p> <p>⇒ <i>Strategic Objective 5: Building up cross-sectoral and trans-national synergies and value chains with construction, energy efficiency and renewable energy sources industries.</i></p> <p>⇒ <i>Strategic Objective 6: Increasing the recognition of the cluster.</i></p>			
16.	Does the section 4.4 specifies the cluster operational objectives, i.e. short-term goals?	x		
17.	Does the cluster operational objectives specified in the section 4.4 are linked to strategic objectives from section 4.3?	x		
18.	Does the cluster operational objectives specified in the section 4.4 are quantifiable and expressed in measurable terms, e.g. they answer questions: "How much?" and "By when?".		x	
19.	Does the section 4.5 defines key performance indicators, i.e. measurable values that demonstrates progress towards objective? Does each KPI is linked with given objective, baseline value and year, and target value and year?	x		
20.	Do all operational objectives are linked to KPIs?	x		
21.	Does the section 5.1 specifies the aim of action plan?	x		
22.	Does the section 5.2 specifies actions that will be done by the cluster?	x		
23.	Do all operational objectives are linked to actions in section 5.2?	x		
24.	Does the description of each action presented in Section 5.2 contain the following data:			
	<i>Description</i>	x		
	<i>Related operational objectives</i>	x		

SMART4NZEB D4.1 Clusters Development and Innovation Strategy

	<i>Responsible person / body for the implementation</i>	x		
	<i>Start and end</i>	x		
	<i>Key Performance Indicators</i>	x		
25.	Does the section 5.2 include a table showing the timeline of actions?	x		
26.	Does the section 5.3 specifies resources (human, financial, technical and other relevant) necessary for the implementation of the action plan?	x		
27.	Does the section 5.4 specifies how the action plan implementation will be monitored?	x		
28.	Does the report include captions of figures and tables?	x		
29.	Are numerical values expressed in metric units (m, kg)?	x		
30.	Are monetary values expressed in EUR, or both in national currency and EUR?	x		EUR
31.	Are all auxiliary comments (written in <i>grey italic</i>) removed?		x	
32.	Are pre-defined text styles (MS Word -> <i>Home</i> -> <i>Styles</i>) used correctly? (e.g. "Normal" for typical paragraphs, "Heading 2" for 2 nd level headings etc.)	x		

3.2. Comments, opinions and remarks of the reviewer

Please mark "X" the relevant option:

The report can be submitted without any modifications	
The report can be submitted after some minor corrections*	x
The report can be submitted only after major corrections*	

* Please justify below

As listed above, small changes should be made for the strategy to be final.