Interreg Europe

European Union | European Regional Development Fund

RESINDUSTRY

Interreg Europe

European Union
European Regional
Development Fund

Action Plan

Operational Program for Technology and Application for Competitiveness (OPTAC) for the 2021-2027 (Czech Republic)
Investment Priority 4; SO 4.2

Developed by the partner:

UNIVERSITY
CENTRE FOR ENERGY
EFFICIENT BUILDINGS
CTU IN PRAGUE

Low-carbon economy

RESINDUSTRY Interreg Europe

European Union European Regional Development Fund

Interreg Europe European Union | European Regional Development Fund

INDEX

Low-carbon economy

I. AP CONTEXT OF RES IN INDUSTRY

I.I. AP GENERAL INFORMATION

Project	Policies for Renewable Energy Sources in industry
Partner organisation	Czech Technical University in Prague, University Centre for Energy Efficient Buildings
Other partner organisations involved (if relevant)	Ministry of Industry and Trade, Czech Republic
Country	Czech Republic
NUTS2 region	Střední Čechy
Contact person	Michal Tobias, michal.tobias@cvut.cz

I.II. CONTEXT OF CTU-UCEEB RES ASSESSMENT

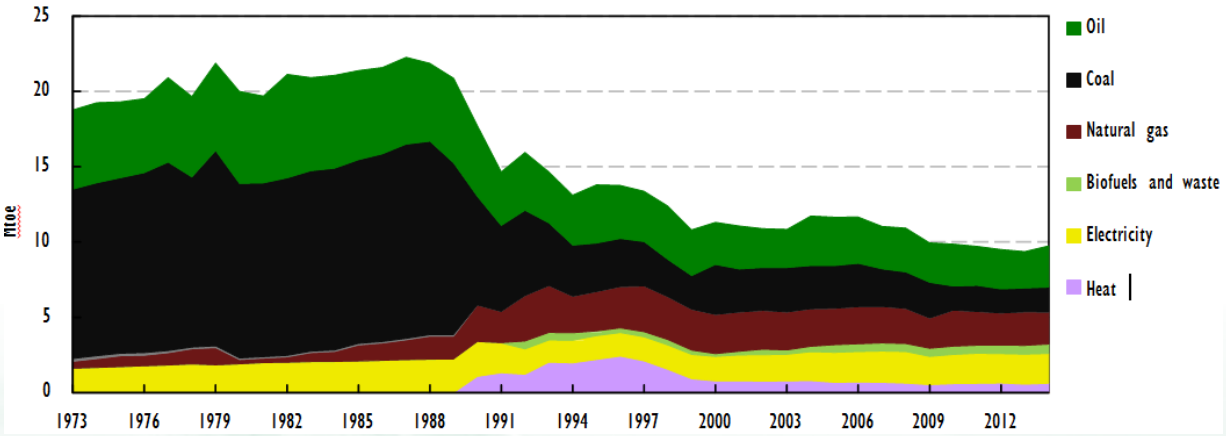
Energy consumption in the industrial sector.
Industry is the largest consuming sector in the Czech Republic, accounting for 9.7 Mtoe, or 39% of TFC in 2014. Industry consumption was 16.9% lower in 2014 compared with 2004, with its share in TFC down from 41.9%.

The fuel mix in the industry sector is diverse with:

- oil (28.1% of the total),
- natural gas (21.8%),
- electricity (20.3%),
- coal (17%),
- biofuels and waste (6.4%)
- heat (6.4%).

Over the past ten years, coal use has declined by 42.5% and heat use by 21.8%, while demand for oil contracted by 16.7% and gas by 14.4%.
Conversely, industry's demand for biofuels and waste grew by 75.1% and electricity demand grew by 2.9% over the last decade.

Industry mix demand evolution (Eurostat)



Industry is the highest energy-consuming sector in the Czech Republic. In 2013, iron and steel had a share of 19.0% of TFC, followed by chemicals and petrochemicals with 15.0%, non-metallic minerals with 14.3%, and machinery with 10.8%.

The Operational Programme Enterprise and Innovation for Competitiveness (2014-16), under the MIT, promotes energy efficiency investment in industry, through the modernization or replacement of existing

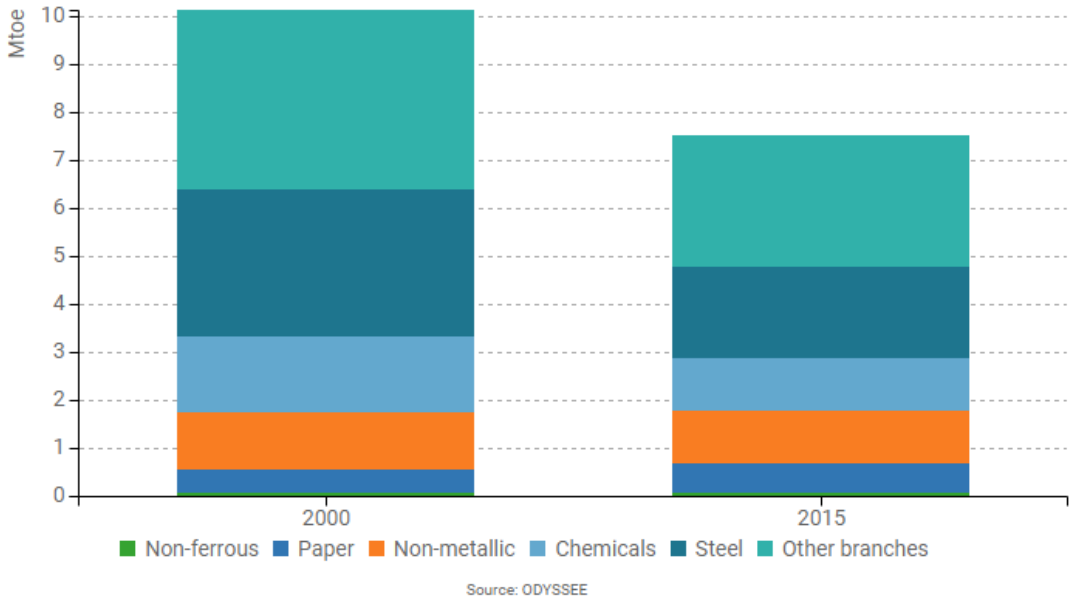
energy production facilities such as improvement of the energy performance of manufacturing processes, improvements in the thermal and technical properties of buildings, and CHP.

It also includes a component on **renewable energy for the industry**. Overall a total of CZK 20 billion has been allocated for this programme, and the estimated energy savings are 20 PJ. The Operational Programme Enterprise and Innovation (2007-13) provided the highest energy savings in 2014 with 441.8 TJ.

National profile of the industrial sector.

In the Czech Republic, final energy consumption of industry decreased rapidly by 2.0%/year during the period 2000 to 2015. While 10 main industrial sectors can be identified, 67% of consumption remains concentrated in 5 energy intensive branches (steel, chemicals, non-metallic, paper and non-ferrous).

Final energy consumption by industry branch (ODYSSEE)



Source: ODYSSEE

- Among the 5 energy intensive branches, steel industry has the biggest share of industry final energy consumption (25.5% in 2015). However, unit consumption in steel industry had a decreasing trend since 2012.
- Paper production has increasing unit energy consumption and the deterioration between 2000 and 2015 amounted 50%.

Since 2000, many factors contributed to decrease in industrial energy consumption (-2.5 Mtoe). Energy savings (-4.07 Mtoe) almost compensated increase in energy consumption due to higher activity effect (4.9 Mtoe). Structural changes account for -3.2 Mtoe.

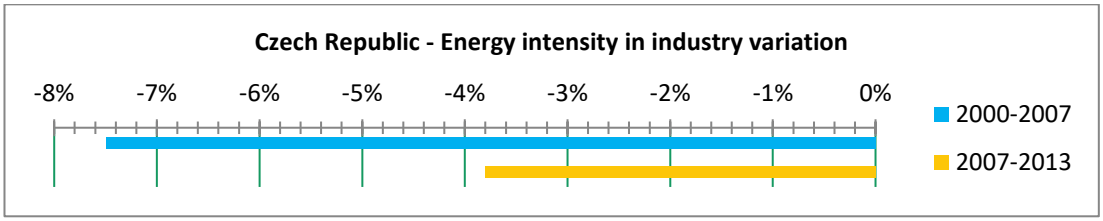
Energy intensity in industry.

The Czech Republic has one of the highest energy intensities in the EU-28. Although energy intensity has followed a downward path in line with the EU- 28 evolution, and, in particular, the catching-up economies of the 'new' Member States, it still remains well above the EU level.

Despite certain investments in energy efficiency, the Czech Republic remains one of the most energy intensive and carbon intensive economies in the European Union – mainly due to a high share of industry in GDP, and a majority share of coal in electricity generation.

In specific vision to the **energy intensity of industry**, the Czech Republic has significantly improved since 2000 but it still counts among the higher ones in the EU. The energy intensity of the industrial sector follows a persistent downward path. This development is partly a reflection of its high initial level and catching-up in respect to the consumption of energy.

As seen in the EU perspective chapter, Czech Republic, similar to Spain or Estonia, has been affected by the crisis in a negative manner, and the energy intensity is not decreasing at the same speed as it was in pre-crisis years. The Energy intensity keep decreasing, but it is now decreasing at half the pace as before.



While the overall energy intensity of industry is gradually decreasing, this does not apply to all sectors. Metals, Mining and quarrying and Wood increased their energy intensity over the period 2000-2013.
It is also interesting to identify that the sectors with the highest energy intensities cover only a small share of gross value added.

	Energy intensity	GVA share
Metals	1.68	3%
Chemical and Petrochemical	0.65	4%
Non-Metallic Minerals	0.63	4%
Paper, Pulp and Print	0.51	3%
Wood and Wood Products	0.33	2%
Food and Tobacco	0.22	6%
Textile and Leather	0.23	1%
Transport Equipment	0.06	20%
Machinery	0.06	30%
Non-specified (Industry)	0.12	10%
Mining and Quarrying	0.10	2%
Construction	0.03	16%
Total Industry	0.19	100%

The industrial sectors selected.
The analysis of the different energy consumer sectors of the industry in the Czech Republic will provide a necessary view of the energy potential to integrate renewable energies in these industries.

The analysis of the different energy consumer sectors of the industry in the Czech Republic will provide a necessary view of the energy potential to integrate renewable energies in these industries.

Next chapter develops the process and energy analysis of the following major energy consuming sectors of the industry:

- Steel and metals
- Chemical
- Non-metallic
- Food
- Paper

The Key Performance Indicators (KPI) analysed.

In the Market Analysis, KPIs were defined in order to make easier the comparisons with the energy consumptions between industrial sectors, or even between national sector at EU level, trying to provide conclusions on the different countries. KPIs support decision making by defining frames where total energy consumption of the industries can be disaggregated by potential RES technology.

KPIs have been applied to a range of well-developed and sustainable renewable technologies that can provide electricity and heat in a cost-effective way when conditions are favourable. Such sources can provide electricity and heat directly to an industry through on-site technologies, or via centralised district networks.

As the analysis has to be made from the point of view of the public administration, where public funding is to be allocated to leverage private investment, in the "conclusions" chapter, these KPIs have been transformed into impacts for each public euro invested. The conclusions have provided final KPIs for the public administrations in reference to every 1.000€ invested of public money:

KPI indicator (for every 1.000€ of public funding)
RES supported (kWth)
RES produced (kWh th)
Full-time employment (FTE)
Avoided emissions (Ton CO2)

II. POLICY CONTEXT

Name of the policy instrument addressed
Operational Program for Technology and Application for Competitiveness (OPTAC) for the 2021-2027 (Czech Republic); Investment Priority 4; SO 4.2

The Action Plan aims to impact:	X	Investment for Growth and Jobs programme
		European Territorial Cooperation programme
		Other regional development policy instrument

II.I. DETAILS OF THE OP ADRESSED

The PI addresses OP Priority Axis 4: Shift to low carbon economy; Specific objective 4.2 – Support of energy from renewable energy sources, with a planned allocation of € 260M€.

Supported activities include installation of a RES for the enterprise's own consumption (using biomass, solar systems, heat pumps and photovoltaic systems). The beneficiary is a business entity, a SME or large enterprise, including agricultural entrepreneurs and entrepreneurs in the food industry and retail.

Actions described in the SO 4.2 includes the integration of EE and RES technologies in companies. However, until now the major investment has been for EE in SME-buildings, with low industry representation, and low RES integration.

The EE has been largely achieved, but in order to increase energy independency of the industries, the companies require now to cover energy consumption with technologies which are independent from the market prices variation.

As decrease of energy consumption has been largely achieved, by increasing production of energy from RES will mean a direct increase of independency and competitiveness of industrial production.

OP needs to be improved by increasing the share of renewable supports and by identifying appropriate KPIs to allow MA to choose between RES technologies depending on the final macro-economic impact in the industries.

While the overall energy intensity of industry is gradually decreasing, this does not apply to all sectors. Metals, Mining and quarrying and Wood and wood products increased their energy intensity over the period 2000-2013.
At the same time, the energy consumed in industry displays the worst performance in the region as almost 40% of energy input is lost during the transformation ("Decline in energy intensity in the Czech Republic" European Economic Brief 2017).

In past CR faced a negative reaction from the public to subsidies to RES, especially PV power plants. The political reactions to the boom of PV power plants brought some unpopular measures increasing energy costs to consumers decreasing margins for the PV owners.

After a period of disputes the situation started to calm down, but the rising energy prices keep being a threat for the medium-term stability of industry production, which requires higher independence and stability in the energy supply.

In the last call some changes have been made to attract more applicants from all industry levels (small, medium, large) to disburse the allocated amount of funds. The aim is to identify best strategies for OP to address the needs of the RES market resulting in reducing the total energy consumption as well as stabilising the future of the energy market.

II.II. PROPOSAL OF IMPROVEMENT IN THE APPLICATION FORM

The application form defined the expected improvement that the project action would be able to apply on the Policy Instrument, by describing the necessities to cover and the type of actions foreseen to be implemented at the end of the project, in phase 2.

In CTU-UCEEB case, the necessities to be covered and the expected changes in the Policy Instrument are:

- ✓ OP needs to be improved by increasing the share of renewable supports and by identifying appropriate KPIs to allow MA to choose between RES technologies depending on the final macro-economic impact in the industries.
- ✓ To find inspiration in other regions and import best samples of RES integration in industries to be financed within their Specific objective, so launching specific grants including these new RES technologies for regional industries.
- ✓ Design a "Strategic Analysis of RES Technologies applied in industries" with a report of KPIs to be used as new methodology for the grants management, so the MA will improve the way thematic calls are organised and/or the way projects are selected. This analysis will provide technology by technology a description of KPI indicators in terms of energy independency, long term stability, best value-for-money, jobs creation, sector measure, etc.
- ✓ Design a "Monitoring system for calculating the long-term impact of SF" where a proposal of monitoring will be proposed to measure, not only direct environmental impacts, but socio-economic impact of the SF in SO 4.2.
- ✓ The creation of a communication channel/platform between industry and MA, so the final beneficiaries of the SF will be able to influence in the calls definition or provide feedback.

Through the learning process and the Action Plan activities, the project is expected to influence the Policy Instrument. In terms of results, the influence on policy instruments can be produced in various ways which can sometimes be interconnected. The program Manual pre-identify some influences to be achieved in phase 2:

- ➢ Type 1: implementation of new projects, where managing authorities and other relevant bodies can find inspiration in other regions and import new projects to be financed within their programmes.
- ➢ Type 2: change in the management of the policy instrument (improved governance), where cooperation influences the way policy instruments are managed. New approaches are adopted thanks to the lessons learnt in other regions.
- ➢ Type 3: change in the strategic focus of the policy instrument (structural change), which is the most challenging since it requires a change in the operational program. To integrate the lessons learnt from the cooperation means that authorities modify existing measures in their program.

Following these guidelines and predefined improvements, CTU-UCEEB identified several potential improvements to be achieved in its Policy Instrument:

A) TYPE 1: IMPLEMENTATION OF NEW PROJECTS

The policy instrument may provide funding for the project proposals focused on RES applied to industry, which will lead to RTD activities or triple helix cooperation to promote start-ups and growth companies in the field of cleantech including RES technology, and applied integration of these solutions to the industry sector.

Higher RES investment and higher RTD activities integrated in the industry will support the decrease of the energy dependency of the industry sector.

B) TYPE 2: CHANGE IN THE MANAGEMENT OF THE PI / IMPROVED GOVERNANCE.

Different managing authorities of the ERDF in the region (Regional Council and regional state authorities) should increase discussion and management of the environmental dimension of the OP. It is possible to launch new thematic calls focused on RES investment in industry, integrating objectives and KPIs of R&D&I activities or triple helix cooperation to promote start-ups and growth companies in the field of clean tech (inc. RES and EE solution).

The onsite demonstration of the RES innovations is one of the key factors to introduced technology in the markets, so the link between RES investment policies and RTD development policies should be coordinated. The outcomes of "Strategic Analysis of RES Technologies applied in industries", with a report of KPIs, and

proposed "Monitoring system for calculating the long-term impact of SF" will help improve the management of OP.

The application form has also included some specific indicators which helped to analyse the level of success in the improvement of the policy instruments, both for the evaluation of the final improvement and the intermediate steps to achieve this improvement.

In terms of final aim of RESINDUSTRY project, the measure has to be the increase of energy independency of the European industry sector through a higher integration of Renewable Energy Sources, by improving or launching new policies for RES promotion supported by SF. Thus, the primary impact is to improve the use of Structural Funds or other policy instruments.

In this framework, RESINDUSTRY had to improve the implementation of more than 8,1 M€ of SF:

- Czech Republic SO 3.2 (of the previous OP PIC) with € 418,577,442 is expect to influence a 0,1 % (4,185M€)
- PäijätHäme SO 3.2 counts on 18,46M€ expect to influence a 5% (0,846M€)
- Extremadura ROP, IP4.1. with 6.571.952 € expect to influence a 10% (657.195 €)
- Estonian Cohesion OP SO2.4.4. with more than 150 M€ is expected to influence 1M€.
- ROP Świętokrzyskie Region priority 3 with 12% of 980M€, expect to act over 1% (1,3M€)
- Vorarlberg ROP, with more than 50M€ in M02, expects to influence 0,1% (0,4M€)
- Gozo fund to create an Eco-Island is expected to influence 2,5M€

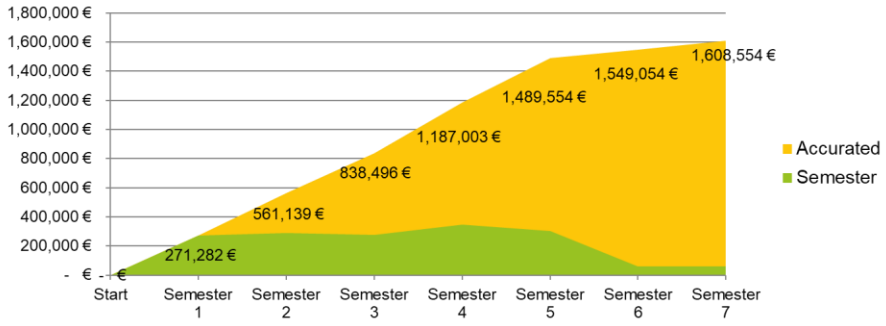
In order to achieve the final indicators of Structural Funds improved, other indicators were defined to assure the final objective:

- Output indicators
- Self-defined (RES mainly) indicators
- Economic indicators

OUTPUT INDICATOR	TARGET
Number of policy learning events organized	83
Number of good practices identified	10
Number of people with increased capacity due to participation in cooperation activities	90
Number of action plans developed	7
Number of appearances in media (e.g. press)	60
Average number of sessions at the project pages per reporting period	800

SELF DEFINED INDICATOR	TARGET
kW RES power installed in industry	6.600
Number of projects of RES in industry	10
Number of enterprises receiving support	60
Number of industries with new RES	15

ECONOMIC INDICATORS PHASE 1						PHASE 2	
Start	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7
- €	271.282 €	561.139 €	838.496 €	1.187.003 €	1.489.554 €	1.549.054 €	1.549.054 €
- €	271.282 €	289.857 €	277.357 €	348.507 €	302.551 €	59.500 €	59.500 €


1,800,000 €
1,600,000 €
1,400,000 €
1,200,000 €
1,000,000 €
800,000 €
600,000 €
400,000 €
200,000 €
- €
271,282 €
561,139 €
838,496 €
1,187,003 €
1,489,554 €
1,549,054 €
1,608,554 €
Start
Semester 1
Semester 2
Semester 3
Semester 4
Semester 5
Semester 6
Semester 7
Accurated
Semester

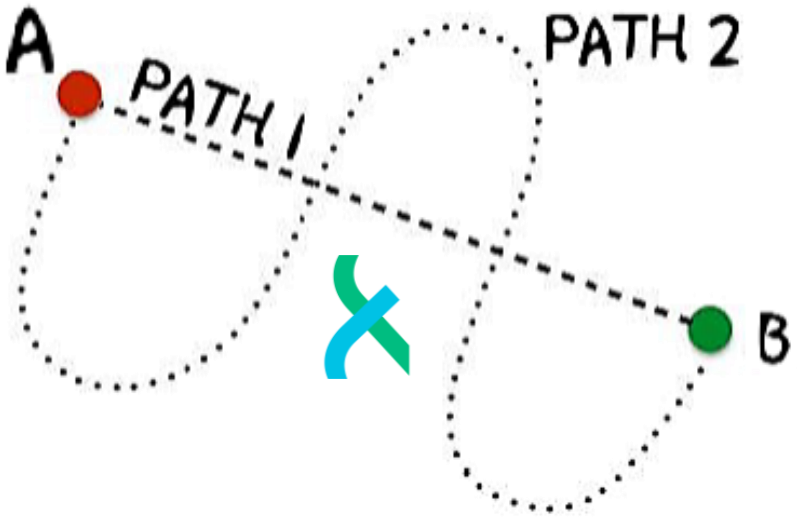
III. THE LEARNING PROCESS OF CTU-UCEEB

The Phase 1 of CTU-UCEEB has followed the indications of the learning process and approach described in the application form, which was also a transcription of the minimum structure that a learning process should have based on the Program Manual.

The Phase 1 of CTU-UCEEB has been focused on promoting exchange of experience with the rest of the partners through an interregional learning process. This learning process has been the main catalyst for generating the knowledge that CTU-UCEEB required for achieving the expected policy change in its Policy Instrument.

CTU-UCEEB learning process has been based on the identification of necessities, analysis and exchange of knowledge with the rest of partners and selection of best policy practices of Renewable energies applied in industries.

The best practice identification, analysis and selection, has been one of the main axes of work in RESINDUSTRY project. RESINDUSTRY partners have analysed the experiences and practices in each region, exchanged them within the projects and disseminated the most interesting findings.



<u>The learning actions planned and implemented.</u>
RESINDUSTRY counted on partners that had participated in previous Interreg Europe projects and had provided specific knowledge to design the project approach. Their conclusions were:

- Interregional workshops are more valuable when there is time enough for stakeholders' face-to-face talks.
- Study visits requires prior information about study sites, with initial explanation of the visit, the content and the technical data the visit will show.
- There must be designed new specific tools to increase the capacity of large group of stakeholders from the same region.

As a result, RESINDUSTRY designed in the application form a series of already known and new activities to assure a proper learning process of the project participants:

- INTERREGIONAL WORKSHOP (IW): interregional technical meetings of stakeholders, consisting on half-day face-to-face work of staff and stakeholders, in small groups, for core technical activities and decision making of the project.

- STUDY VISITS (SV): interregional exchange of knowledge, consisting on half-day visits to identified best practices of interest for the consortium, including a previous explanatory session during IW.

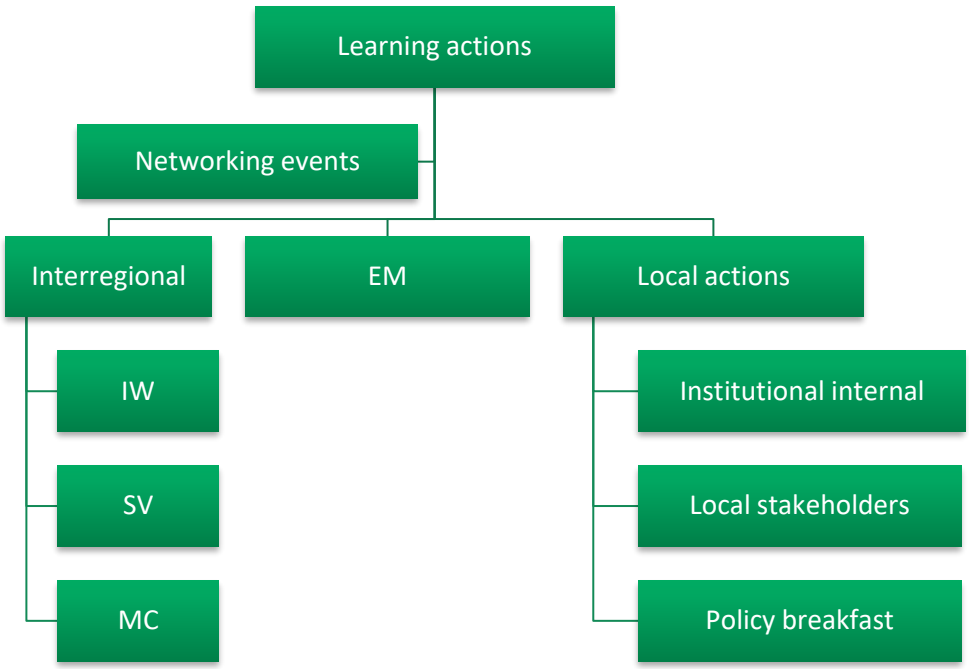
- MASTER CLASS (MC): one-day of interactive tuition and training focusing on core project topics, developing capacities. The format of the classes includes lectures, workshop activity, case studies from experts and organisations relevant to RES project investments.

- EXPERT MISSIONS (EM): as results of Study Visits partners will be able to require the mission of one expert from the institution which provided the best practice, to provide tailor-made training.

- LOCAL STAKEHOLDER SEMINAR (LSS): consists of 20 partner staff and stakeholders participating in any consortium learning activities will meet at LSS at the end of each semester to discuss progress, provide feedback.

- POLICY BREAKFAST (PB): partners will organize a meeting with high policy representatives to speak about one key outcome of the project, obtain feedback about products or present a policy recommendation.

- INSTITUTION INTERNAL MEETING (IIM): staff participating in any consortium and partner learning will gather with other colleagues at the end of each semester to report the activities.



III.I. THE APPROACH OF CTU-UCEEB TO THE POLICY INSTRUMENT IMPROVEMENT.

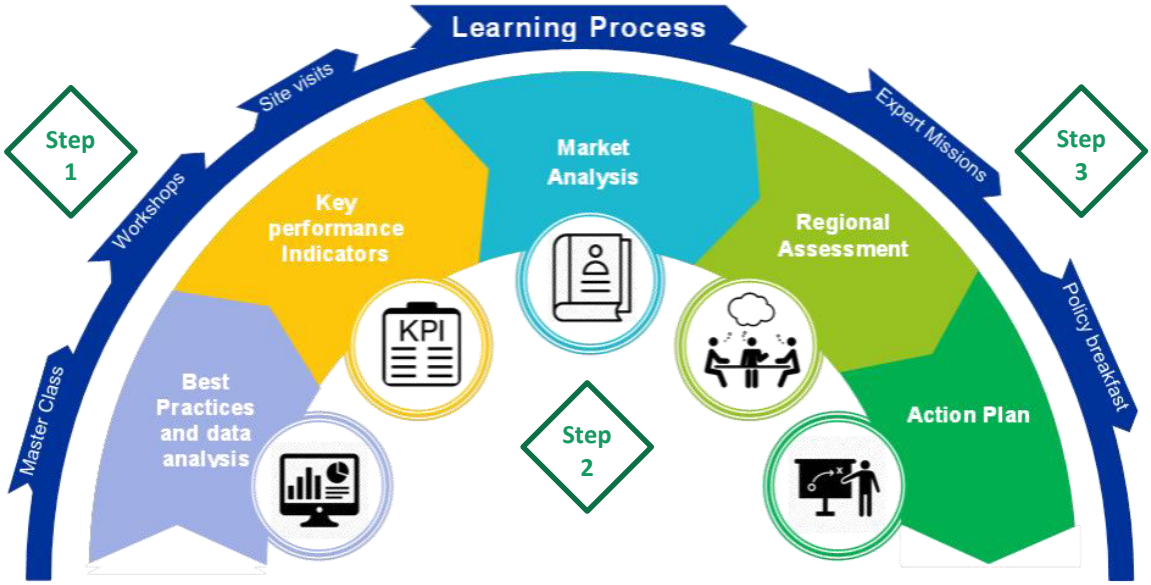
To ensure a successful learning process for CTU-UCEEB, even if each activity planned in RESINDUSTRY was defined in a robust quality manner, each partner defined an integrated approach where all activities are logically interlinked. Successful approaches usually follow a logical path.

CTU-UCEEB integrated approach to the learning process has followed 3 simple steps:

- Step1: analysis of partner situations, identification of valuable experiences.
  The standard approach is to start with the analysis of the different partners' situations and the identification of valuable experiences and practices.

- Step2: experience further analysis through activities.
  This valuable experience is then further investigated through activities such as study visits and thematic workshops.

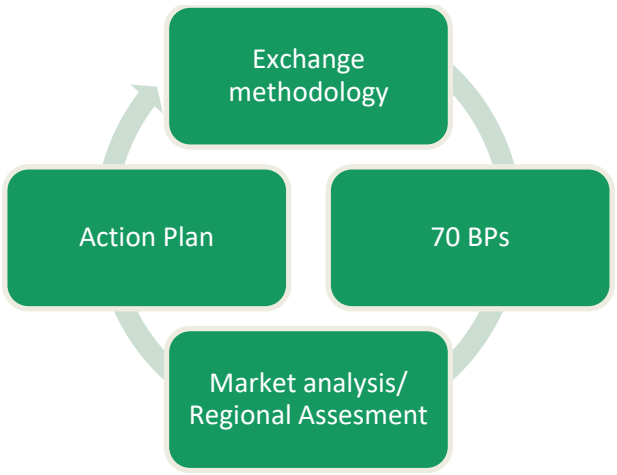
- Step3: preparation for the transfer of practices summarized in action plans.
  Finally, the transfer of knowledge and practices is mainly prepared through the elaboration of the action plans (but can also occur during the exchange of experience phase of the project).



CTU-UCEEB has implemented the different steps through activities which resulted in tangible products and deliverables, which have also supported further activities with a final result of the present Action Plan.

The **main products** produced by CTU-UCEEB have been:

- The Exchange Methodology.
- The Market Analysis.
- The best practices list and final selection.
- The Regional Assessment.
- The current Action Plan.

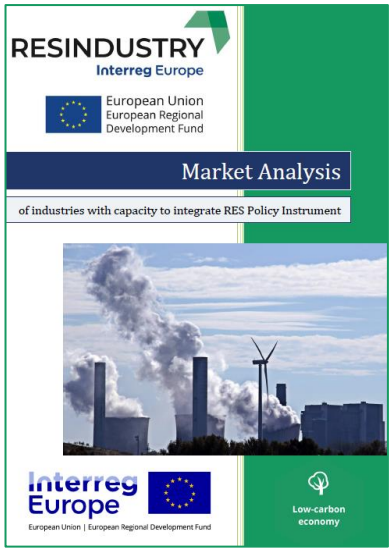


CTU-UCEEB MARKET ANALYSIS

In order to reach the long-term objective of RESINDUSTRY, the project focuses on improving the efficacy of public financing and public tools which support the RES implementation in the industry sector.

The first step in this process was to identify the current situation of the sector on the area to be influenced. The current situation analysis is called in many ways in the Interreg Europe community, such as regional identification, state of art, regional analysis, etc. and the name provided in Resindustry is Market Analysis.

The Market Analysis includes a macro analysis of the industrial sector, identifying the industry energy consumption profiles, and analysing the RES technologies with potential to be applied in the national industries. Both, the industry profiles and RES technologies, are analysed using macro data, from national official sources, and they are completed when other official local or regional data is available or supplied by local actors.



The energy consumption of the industry, in each region and country, defer greatly depending on the resources availability (gas, coal, nuclear, etc.), either national or from the neighbourhoods, while the future perspective will only depend on the natural resources available on the spot.

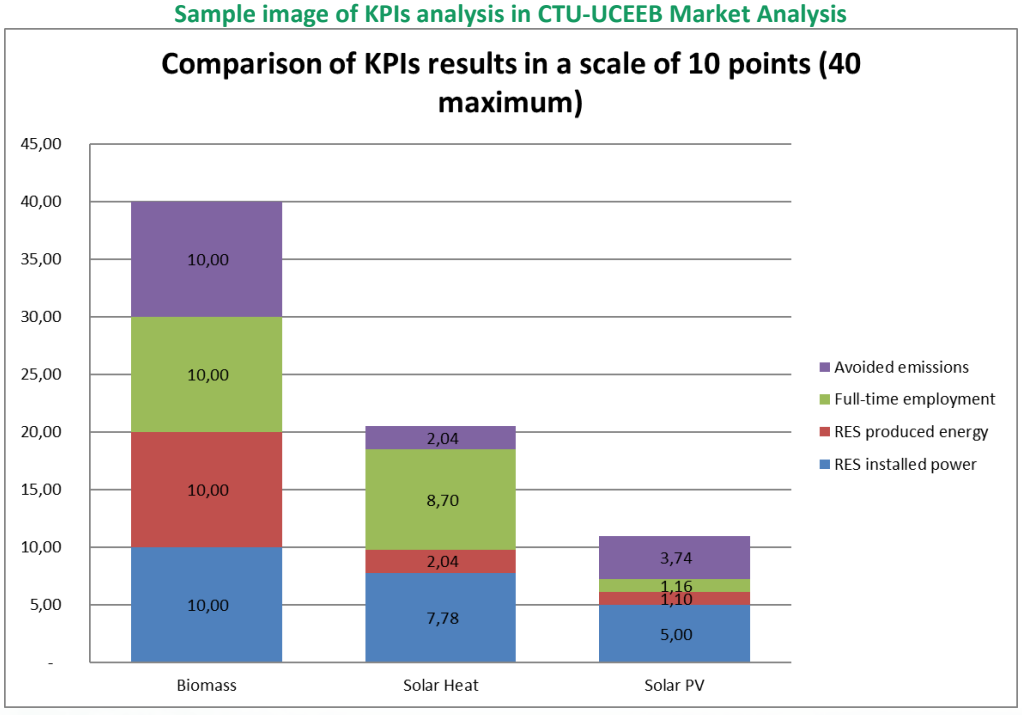
Market Analysis Objective.

The Market Analysis is also referred in the RESINDUSTRY project as a "Strategic Analysis of RES Technologies applied in industries". This analysis provides each partner with a report of energy and socioeconomic Key Performance Indicators (KPIs) which will be used to review grants management in the P.I., so the Market Analysis will improve the way thematic calls are organised and/or the way projects are selected.

This analysis provided, for each technology with capacity to be integrated in the national/regional industry, a description of KPI indicators in terms of energy generation, value-for-money, jobs creation, environmental impact, etc. Market Analysis is the base source of information for the Regional Assessment, where the partners integrated the information coming from the Best Practices and the Market Analysis data, and obtained the final situation of the regions.

Key Performance Indicators (KPIs) vary between partners, because they analysed the specific region necessities/resources, and provided customized solutions to confront the RES benefits vs the policy investment.

Sample image of KPIs analysis in CTU-UCEEB Market Analysis



In a similar way than the current profile of the industry energy consumption will be a main baseline condition for the identification of RES technologies with best economic opportunities, the natural resources available in each region will influence on the efficiency of technologies, resulting in different KPIs for the different partners.

Market Analysis Conclusions.

The Market Analysis conclusions provide a view of macro data related to national industrial energy, proposing a list of RES technologies and KPIs in the area. The Market Analysis, together with the Best practices, fed into the Regional Assessment, that is the departing point for the Action Plan.

RESINDUSTRY Interreg Europe
European Union European Regional Development Fund
Interreg Europe European Union | European Regional Development Fund

CTU-UCEEB BEST PRACTICES

The exchange of experience among RESINDUSTRY partners was the main catalyst for generating policy changes among participating regions. The learning process is based on the identification, analysis and exchange of knowledge and practices in RESINDUSTRY policy field.

In RESINDUSTRY case, good practices have to aim to the identification of renewable technologies implemented in industries, especially if they have been supported by public funds.

The samples focused on the local resources and available technologies, so the results differ between countries and partners, but the global results allow the comparison and the transfer of knowledge among regions. The best practices show a minimum of information in order to create a baseline of comparison among country practices and among project practices.

CTU-UCEEB produced 9 examples of best practices to be exchanged with RESINDUSTRY partners, and described the practices following the project template, which included technical data defined by the consortium, specially reference to KPIs also included in the Market Analysis. Some of the data in each practice are:

- Identification of the current energy baseline (fuels, energy consumption, etc.)
- RES technology definition (fuel, installed power, generated energy, CAPEX, simple payback, etc.)
- Results in terms of energy, economic and environmental achievements.

List of CTU-UCEEB practices

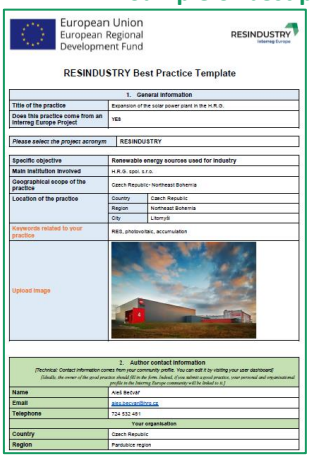
Title of practice	Place	RES
PV on the roof of delicatessen production hall	Nymburk	PV
PV and a battery storage onto the rooftop of frozen storage warehouse	Kralupy nad Vltavou	PV
Solar heating plant for metal treatment plant and paint shop	Gränichen	Solar Thermal
Solar Process Steam at RAM Pharma	Sahab	Solar Thermal
Biomass boiler	Chotíkov	Biomass
ADLER – hybrid photovoltaic system with accumulation in battery	Ostrava	PV
Fenix Group – (HCBS – High-capacity battery storage)	Jeseník	Solar Thermal
Flat-Plate Solar Collectors at Fleischwaren for Boiler Feed-water Preheating	Sieghartskirchen	Solar Thermal
Expansion of the solar power plant in the H.R.G.	Litomyšl	PV

Key Performance Indicators (KPIs), calculated in the Market Analysis were calculated on official available data, while the best practices are real data from practical samples on the region or the country.

This provided the opportunity to adjust the KPI by comparing the results from the Market analysis with the results from the best practices.

In order to compare best practices among each other, special indicators were developed among partners in a regular base just adding the scoring of the different evaluation criteria. Partners evaluated each practices following the proposed criteria, identifying those practices with higher replication potential.

Sample of best practices, and best practices scoring based on replication indicators

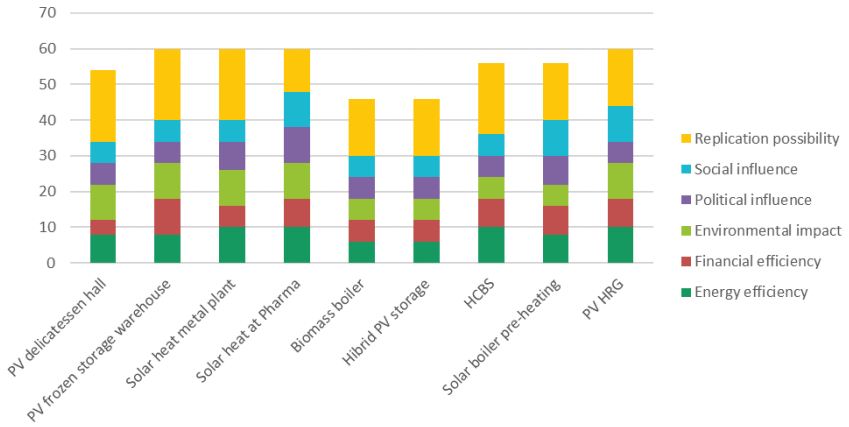

European Union
European Regional
Development Fund

RESINDUSTRY

RESINDUSTRY Best Practice Template

1. General information	
Title of the practice	Expansion of the solar power plant in the H.R.O.
Does this practice come from an Interreg Europe Project	YES
Please select the project acronym	RESINDUSTRY
Specific objective	Renewable energy sources used for industry
Main institution involved	H.R.O. spol. s r.o.
Geographical scope of the practice	Czech Republic- Northeast Bohemia
Location of the practice	Country: Czech Republic; Region: Northeast Bohemia; City: Litomyšl
Keywords related to your practice	RES, photovoltaic, accumulation
Upload image	

2. Author contact information	
Name	Aleš Bečvář
Email	
Telephone	724 832 481
Your organisation	
Country	Czech Republic
Region	Pardubice region

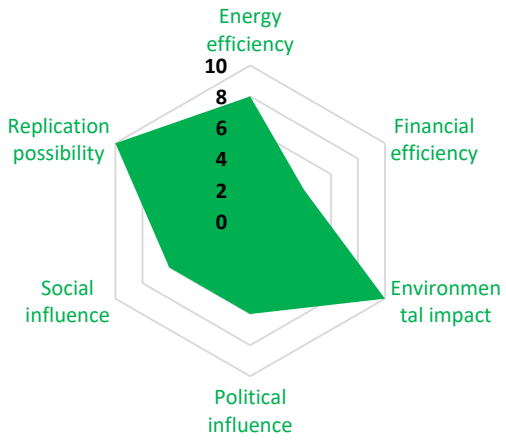


The replication indicators were applied to each practice, allowing a deep understanding of the potential impact if applied to other industries or places in the region, allowing also a better comparison with existing practices in other partner countries.

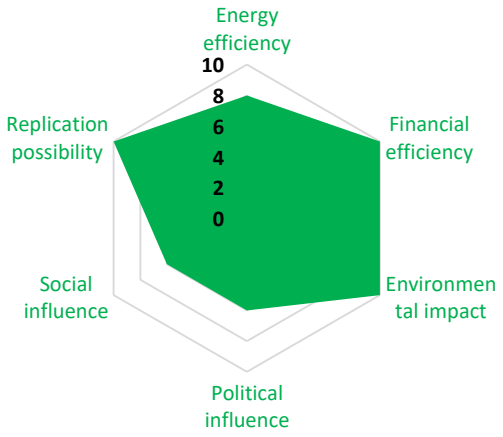
The results from the best practices comparison were gathered in a specific deliverable to be used by CTU stakeholders and rest of partners.

Sample of best practices analysis on replication indicators

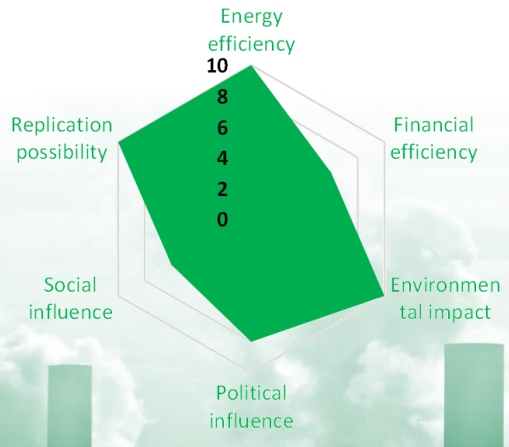
PV delicatessen hall



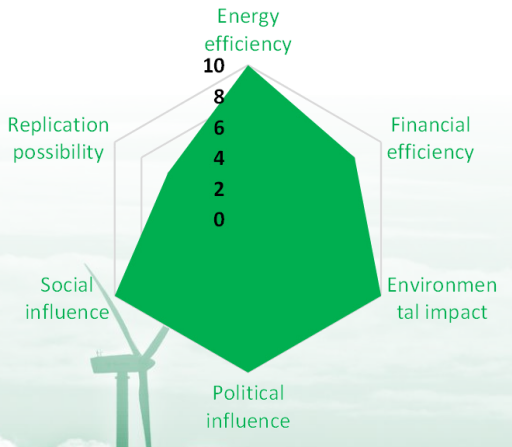
PV frozen storage warehouse



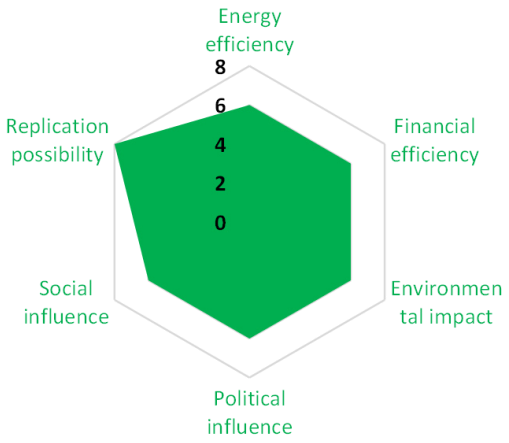
Solar heat metal plant



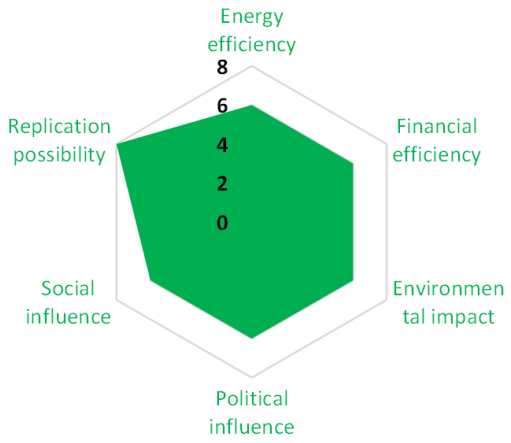
Solar heat at Pharma



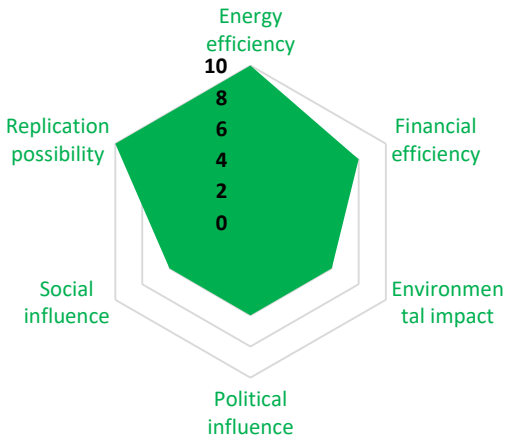
Biomass boiler



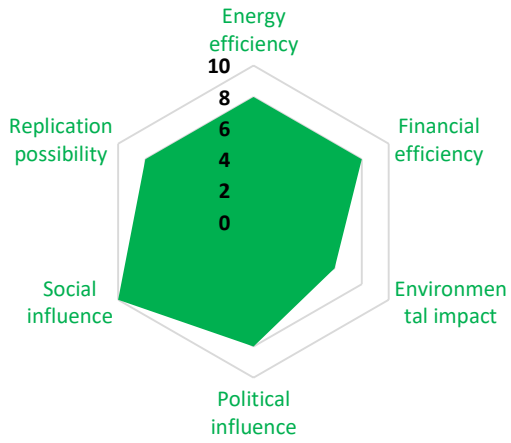
Hibrid PV storage



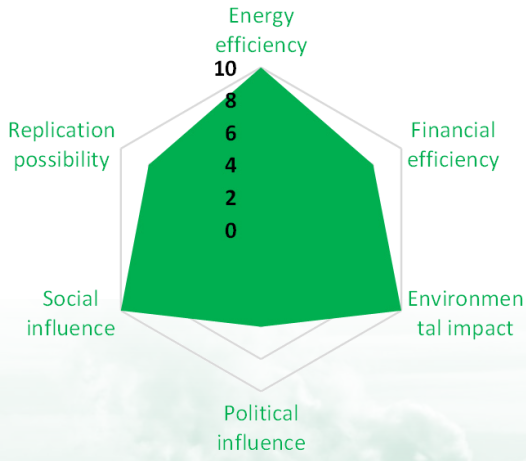
HCBS



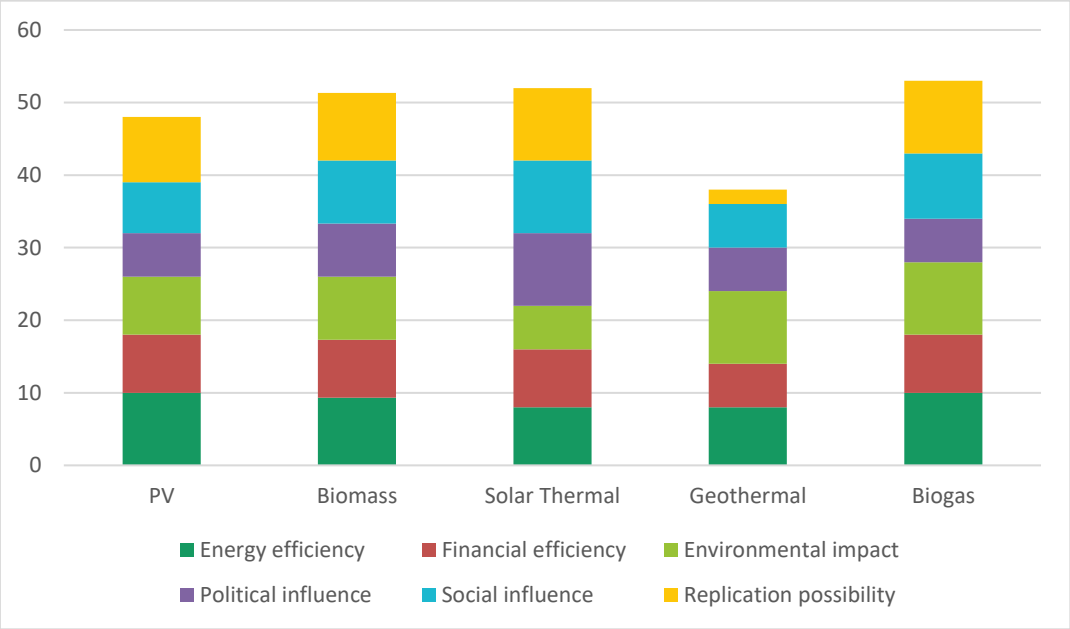
Solar boiler pre-heating

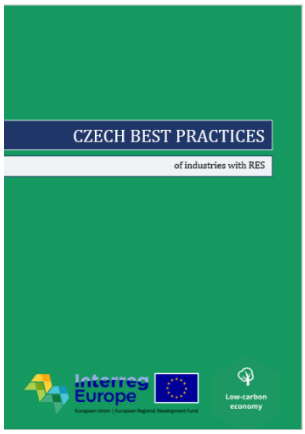


PV HRG



Replication indexes per technology based on the BPs selection of the partner



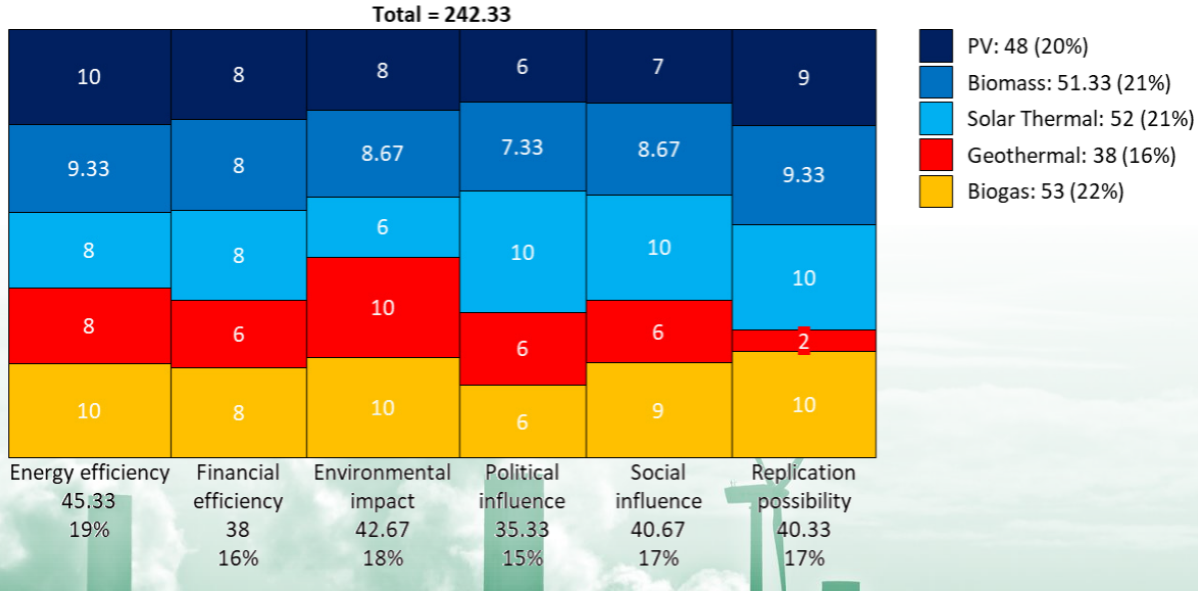


In terms of technology, the replication potential has been calculated as an average of the 10 practices.

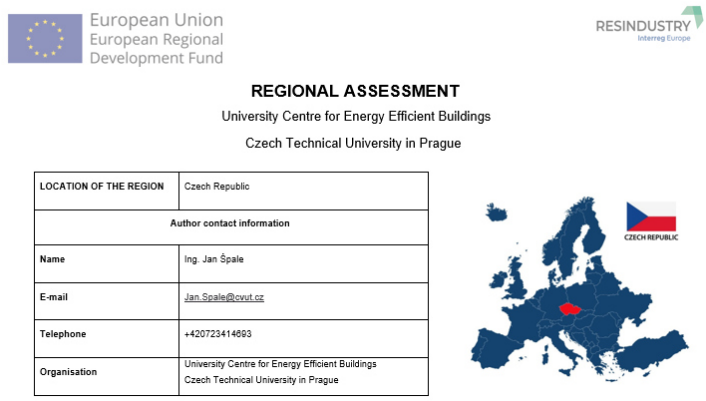
Per technology, and without application of any leverage factor, the results show that biomass technology and solar thermal technologies reach higher scoring than the rest of technologies, being PV and biogas just after the 2 first.

The relation between the technologies and the criteria used for scoring, shows again the biomass and solar as higher scored, but also provides that the energy efficiency and the environmental impact are the criteria which afford higher benefits in the best practices, being the financial efficiency one of the less influencing criteria. The following Sankey chart shows the relations among the technologies and their influence on the different criteria.

Best practices comparison report and sample of analysis



CTU-UCEEB REGIONAL ASSESSMENT.



Based on the data from the Market Analysis, the partner has defined a Regional Assessment as a previous step in the Action Plan identification of activities, the results of this Assessment were presented to the key stakeholders and to the partners in different meetings, gathering information to be used during both the learning process and the design process to be implemented in phase 2.

The following data is a sample of the information achieved during the process of R.A. definition and analysis with the relevant stakeholders and partners.

PREDOMINANT INDUSTRY SECTORS - Comments			
Sector	**Energy consumption share %**	**RES investment motive (ie. savings, CSR,…)**	**Comments**
Steel and metals	26	Blast furnace coal -> biomass replacement – savings due to emission licences	Very energy intensive – 16,7 GJ of energy per ton of steel
Chemical and pharmaceutical	15,5	CSR – (petro)chemical industry is viewed negatively concerning environment and pollution-RES investments improve the companies´ image	Petrochemicals production and fertilisers account for 70% of total cons.
Non-metallic	15	Low-quality biomass co-fired combustion in the cement kilns -> business model based on waste biomass disposal	Manufacture of cement (natural gas firing) resp. for 60% of the energy cons. In the sector
Food and beverages	8	Biomass steam boilers for process steam utilization -> savings + CSR (food and beverages companies rely on end consumer marketing, who more and more decides on the whole company image and not just the product)	84% food products – mostly manufacture of grain mill products and oils and fats
Paper and wood	7	Efficient biomass boilers for residual wood scraps -> free fuel -> savings	Wood preparation and pulp bleaching most energy intensive

One of the major analysis was the identification of current policy tools in the support of RES to applying industry, the analysis of the benefits and the limitations, in order to foresee future tools and improve the existing ones with the stakeholders feedback.

What were the sources of renewable energy financing in industry in the region in 2014-2020 - the amount of funds	EURO	OP EIC (Operational Programme Enterprise and Innovations for Competitiveness) – Energy Savings by Ministry of Industry and Trade; allocation of 4.32 bil. EUROs *Note: this policy instrument is the same for new sources and for energy savings measures (just different subdomains of the same instrument)*
Type of beneficiary (SME, large industry, agriculture)		SMEs but also large industries

What was energy efficiency financing in industry in the region in 2014-2020 - the amount of funds	EURO	OP EIC (Operational Programme Enterprise and Innovations for Competitiveness) – Energy Savings by Ministry of Industry and Trade; allocation of 4.32 bil. EUROs 241 mil. EUROs in subsidies were drawn from the OP EIC programme, according to MIT (Ministry of Industry and Trade CZ) statistics as of 31st January 2021. *Note: this policy instrument is the same for new sources and for energy savings measures (just different subdomains of the same instrument)*
Type of beneficiary (SME, large industry, agriculture)		SMEs but also large industries
What are the planned sources of renewable energy financing in industry in the region in 2021-2027, the planned amount of funds?	EURO	OP TAC (Operational Programme Technologies and Applications for Competitiveness) – Energy Savings by Ministry of Industry and Trade; allocation of 3.11 bil. EUROs *Note: this policy instrument is the same for new sources and for energy savings measures (just different subdomains of the same instrument)*
Type of beneficiary (SME, large industry, agriculture)		SMEs but also large industries
What is the planned energy efficiency financing in industry in the region in 2021-2027, the planned amount of funds?	EURO	OP TAC (Operational Programme Technologies and Applications for Competitiveness) – Energy Savings by Ministry of Industry and Trade; allocation of 3.11 bil. EUROs *Note: this policy instrument is the same for new sources and for energy savings measures (just different subdomains of the same instrument)*
Type of beneficiary (SME, large industry, agriculture)		SMEs but also large industries

With the gathered information a SWOT analysis was launched, in coordination with the regional representatives, and main economic actors, to summarize the problems and capacities identified during the process, and trying to stablish the framework for future activities.

	Helpful (to achieving the objective)	**Harmful** (to achieving the objective)
Internal origin (atributes of the RES usage in industry)	**S** STRENGTHS • Plentiful of biomass reserves which can be used locally -> boiler rooms refurbishments and exchanges of former fossil energy sources for renewable • Dozens of good practices projects available which are the showcase of how RES may reduce costs, waste and improve sales by added marketing value whilst saving the environment • Suitable applications for distributed solar PV sources at the large production halls and warehouses	**W** WEAKNESSES • The region is not very fond of renewable energy resources especially wind, geothermal and hydro or they are already depleted/used • Energy sector is over-regulated = very difficult procedure to connect new energy sources into the grid, when own consumption does not exceed the production • Discontinuity in energy policies • Lack of technical and commercial skills in RES for SMEs
External origin (atributes of the environment)	**O** OPPORTUNITIES • Majority of industrial sectors in Czechia are very energy intensive, so a small percentage changes make great effect in the overall • Utilization of biomass from recultivation of bark beetle damaged forests • Industries are encouraged to invest into RES due to pragmatic reasons of not enough grid capacity and stability to connect new large consumers -> decentralization of energy production • Concept of prosumers is being introduced which will make it easier for the industries to operate on the market with electricity • Solar PV installations will create new job positions locally to install the PV panels onto the rooftops of the industries • Steady increase in the price of emission licenses will encourage industries to invest into RES • “Green marketing” and CSR	**T** THREATS • Tedious administrative connected to the subsidies for RES may discourage some of the potential users • Dominant position of fossil fuels could take years and decades to move towards renewables • Some of the most energy intensive industrial sectors in the region are depended either on fossil fuels or large amounts of electricity for the production process • Capacities and human resources of the supply chain especially for the solar PV installation companies are reaching its limit • Industries lack experience with policy instruments for RES investments

CTU-UCEEB ACTION PLAN.

Produced in close cooperation between CTU-UCEEB and the Managing Authority, the present action plan is a document providing details on how the lessons learnt from the cooperation will be exploited in order to improve the policy instrument defined.

The present Action Plan specifies the nature of each action to be implemented, the timeframe, the players involved, the costs (if any) and funding sources (if any).

A sample template for the action plan is provided in the programme manual, and has been considered for the definition of some chapters of this document, even if the final structure has been enlarged to explain the whole process followed by CTU-UCEEB to reach the present final document.

The structure of the Action Plan has been enlarged with the objective to create a full view of the deliverable produced by CTU-UCEEB and the activities where the staff and stakeholders have been involved.

The Action plan has described the following blocks of information:

- The context of the RES Assessment based on the Market Analysis.
- The Policy Instrument content and expected improvements.
- The deliverable produced by CTU-UCEEB through the project.
- The learning actions where CTU-UCEEB staff and stakeholders participated.
- The conclusions from the previous documents and activities.
- The proposed actions to create the policy change.

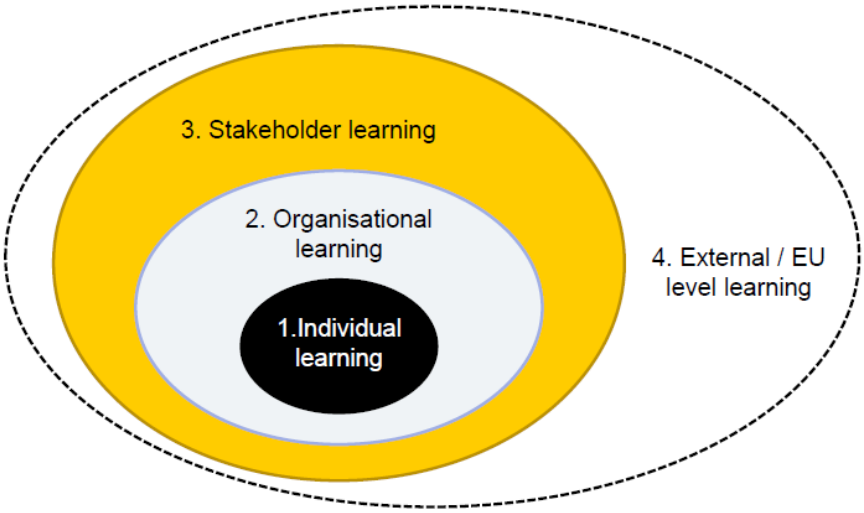
The content of this action plans has been submitted to the programme and published on the project websites.

III.II. CTU-UCEEB ACTIVITIES AND LEVELS OF LEARNING COVERED

Through the implementation of the project actions, and the delivery of project products, CTU-UCEEB has achieved to produce a process of policy learning covering each of the expected 4 levels of learning. In this section, some samples of the learning activities are displayed.

Some of CTU-UCEEB activities cover one single level of learning, but most activities achieve to cover several levels at the same time, especially the individual learning which is always included.

When designing RESINDUSTRY methodology to carry out the interregional exchange of experience, partners paid particular attention to the multidimensional aspect of the learning process, so the learning process covered the four different levels.



This section shows how each of the deployed project activity has influenced in several of the learning levels.

INTERREGIONAL WORKSHOP (IW) AND STUDY VISITS (SV).

The main interregional face to face exchange was based on the workshops and study visits, were stakeholders and staff from every partner region met to work on technical documents, share views and opinions, and visit new practices from the hosting partner. Each visit consisted on (due to COVID crisis some of these activities had to change into virtual activities):

- Interregional technical meetings of stakeholders, consisting on half-day face-to-face work of staff and stakeholders, in small groups, for core technical activities and decision making of the project
- Interregional exchange of knowledge, consisting on half-day visits to identified best practices of interest for the consortium, including a previous explanatory session during IW.

Each interregional action has a dossier published in the website, where the information of the technical action is summarised. Additionally, this report is used for other

The IW and SV has been technically developed as expected, with the exceptions of those face-to-face actions which had to be replaced for online activities due to COVID restrictions. The exchanges produced were:

INTERREGIONAL WORKSHOP IW1 ON BEST PRACTICE (BP) AND STUDY VISIT SV1
Half day workshop where partners worked on the templates of the BPs to be produced, and another half-day seminar to introduce the local BP, and posterior site-visits.

INTERREGIONAL WORKSHOP IW2 AND STUDY VISIT SV2
Hosted and led by FHV, half-day workshop to present 5 draft practices per region, with a process of peer-review between partners and stakeholders, and a later half-day seminar to introduce the local BP, and posterior site-visits.

INTERREGIONAL WORKSHOP IW3 AND STUDY VISIT SV3
Hosted by GOZO, but led by TLP (CTU-UCEEB), it has to be online, workshop to work on the 70 BPs. A process of presentation, scoring and filtering produced a selection of top 10 good practices for the Policy Platform. This process was also the initiation of the selection of 1 practice per partner to receive the Expert Mission. Another half-day seminar introduced the local BP.
INTERREGIONAL WORKSHOP IW4 AND STUDY VISIT SV4
Hosted by TLP of Regional Assessment (MOSR), one-day workshop for revision of draft RA. Working groups compared KPIs from different Analysis, and conclusions were debated about the KPIs divergences, with half-day seminar.

INTERREGIONAL WORKSHOP IW5 AND STUDY VISIT SV5
Hosted by Agenex, but led by TREA, after MC3, stakeholders worked on groups reviewing the Draft AP. The results were presented and discussed with all participants, including half-day seminar and site-visits.

The levels of learning achieved by this action are:

- Level 1: Individual learning of the project staff participating in the action, both from hosting and visiting partners.
- Level 3: Stakeholder learning of the stakeholders from the visiting partners and from the local stakeholder group of the hosting partner.
- Level 4: External learning created by the dissemination previous to the visit and after the visit, both at local and regional level using the local media, and also at EU level through the project website.

For each of the actions the involved learners were:

- Individual level of learning: 2 staff per partner
- Stakeholder level of learning: 2 stakeholders per partner + full local stakeholder group (20)
- External level of learning: 1-2 staff of Interreg EU projects related to RES (validated by JS)

MASTER CLASS (MC)

Master Classes had been designed as a point of departure for development of important products or deliverables, so each MC was placed in advance to the starting of a desk work.

The general structure of the classes consisted on one or two days of interactive tuition and training, with focus on topics which were to be developed in the coming months, such as market assessment, RES project identification, financing solutions and other related topics. The format of the classes includes lectures, workshop activity, case studies and guest lectures from experts and organisations relevant to RES project investments.

MASTER CLASS (MC1) ON EXCHANGE METHODOLOGY.
Task Leader Partner (TLP), coinciding with Lead Partner (LP), CTU-UCEEB hosted a Master Class on Exchange Methodologies. During 2 days consortium detailed each partner strategy for the learning process. 2 staff per partner, guided by an external expert attended the event, hosted by LP.

MASTER CLASS MC2 ON REGIONAL ASSESSMENT RA.
Coinciding with Gozo online event (due to COVID restrictions), TLP (MOSR) coordinated a Master Class on Regional Assessment definition, led by experts and consisting of 1,5 days of lectures, workshops and case studies on RA definition.

Partners worked on a template of RA, including a "Strategic Analysis of RES Technologies for regional industry". The results will be environmental and socioeconomic Key Performance Indicators (KPIs) which vary from region to region depending of the natural resources available, the regional and national legal framework, etc.

MASTER CLASS MC3 ON ACTION PLAN.
TLP of AP (TREA) coordinated a Master Class MC3 on AP definition, hosted by Extremadura, consisting of 1,5 days work on activities definition. The class included training, workshop and case studies. Led by experts the staff defined the Draft AP using final RA and Policy Breakfast feedback.

The levels of learning achieved by this action are:

- Level 1: Individual learning of the project staff participating in the action, both from hosting and visiting partners.
- Level 4: External learning created by the dissemination previous to the Master Class and after it, both at local and regional level using the local media, and also at EU level through the project website.

For each of the Classes the involved learners were:

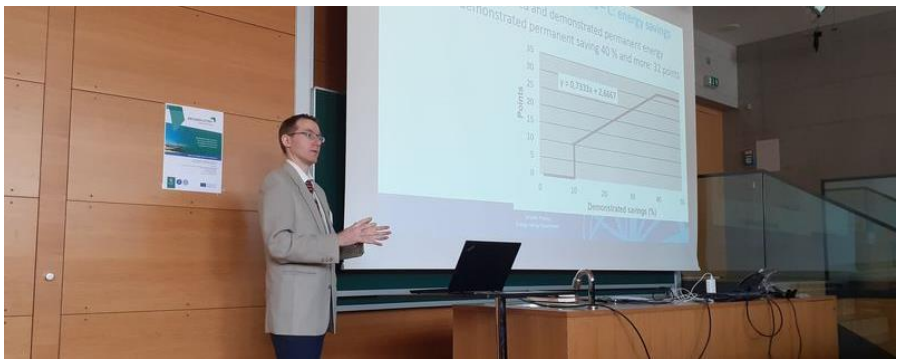
- Individual level of learning: 2 staff per partner
- External level of learning: 1-2 staff of Interreg EU projects related to RES (validated by JS)

EXPERT MISSIONS (EM)

As results of Study Visits partners were able to require the mission of one expert from the institution which provided the best practice, to provide tailor-made training.

The expert mission provided one-day specific learning to a large group of staff and stakeholders of the same region. Based on the selected BP, partners required the mission of one expert from the institution, company or region which provided the best practice.

Expert Missions are different from Master Class because the focused on the specific necessities of each partner, allowing a deep capacity building of a large group of stakeholders of a unique PI. As result, a group of local stakeholders and staff is able to cover specific necessities on a selected thematic, being the missing tool that previous cooperation's have found as lacking in the learning process.



The local stakeholder group and the partner staff were able to select specific best practices among the 70 defined by the project partners, and a full training was prepared to cover any missing technical or political information related to the selected practices. Expert Missions were conceived as the final learning tools in the process prior to the definition of the Final Action Plan.

The levels of learning achieved by this action are:

- Level 1: Individual learning of the project staff participating in the action.
- Level 3: Stakeholder learning of the stakeholders from the local stakeholder group.
- Level 4: External learning created by the dissemination previous and after the Mission, both at local and regional level using the local media, and also at EU level through the project website.

For each of the Missions the involved learners were:

- Individual level of learning: 10 staff from partner hosting the EM
- Stakeholder level of learning: 10 stakeholders from local stakeholder group

LOCAL STAKEHOLDER SEMINAR (LSS)

As a part of increasing the learning process among the stakeholder level, a seminar has been organized regularly among the local stakeholder Group.

This Seminar consists of 10 to 20 partner staff and stakeholders, who participated in project learning activities, meeting at the end of each semester to discuss progress, provide feedback and review advances.

The objective of these seminars was to follow-up the advances of the project among the stakeholders, updating the project achievements and sharing the learned outcomes with them.

These seminars have been the second main tool of learning among the stakeholders, just after the study visits, because they assured that the information gathered on the project reached the local stakeholder group.

Stakeholders have been in position to receive up to date information about the project, providing any comments and potential improvements of the project activities, assuring that both Regional Assessment and Action Plan were aligned with the Policy Instrument.

The levels of learning achieved by this action are:

- Level 1: Individual learning of the project staff organizing the action.
- Level 3: Stakeholder learning of the stakeholders in the local stakeholder group.
- Level 4: External learning created by the dissemination previous and after the seminar, both at local and regional level using the local media, and also at EU level through the project website.

For each of the Seminar the involved learners were:

- Individual level of learning: 5-10 staff from partner.
- Stakeholder level of learning: 5-10 stakeholders from local stakeholder group.

POLICY BREAKFAST (PB)

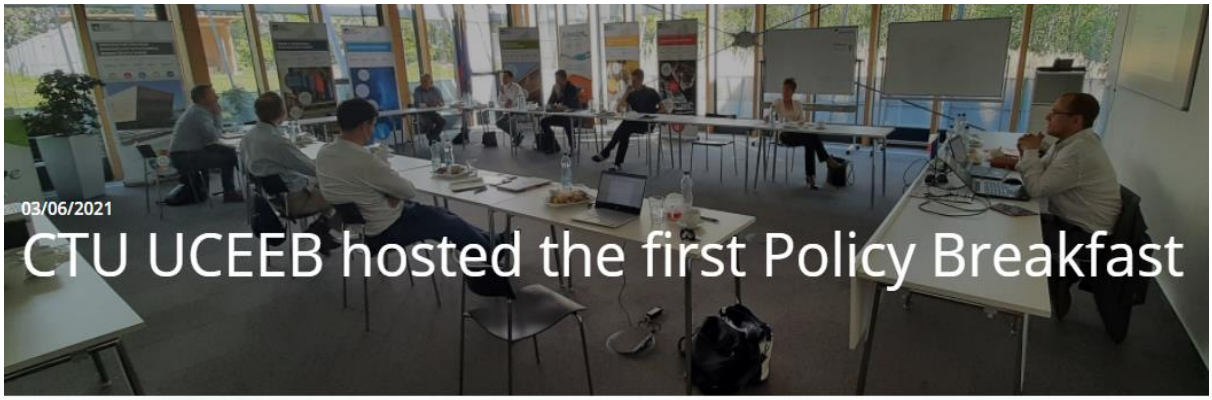
Policy breakfast have been designed as a supporting tool in the process of policy influence, and Managing Authorities involvement in the process of policy instrument improvement.

The policy breakfast is a working meeting, which, placed in a more relaxed environment, seeks to keep policy representatives informed of the project achievements, assuring the alignment of the project actions to the future will of policy maker when improving the policy.

Through this simple action, the partner assured a better integration of the actions described in the Action Plan, because the actions were previously validated and confirmed in several breakfast with the policy representatives.

Every partner has organized a meeting with high policy representatives to speak about the different project outcomes of the project, obtaining feedback about products or present a policy recommendation.

To optimize the impact of interregional learning and to make sure the activities of the action plan were to be implemented later on, these meeting involved not only policy makers, but a wide range of players, as it was rare that one single organization could promote a thematic policy improvement.



INSTITUTION INTERNAL MEETING (IIM)

In order to reach the second level of learning the project designed specific Organizational or institutional learning. Such learning occurs when the new knowledge does not remain at the level of individuals alone, but is also shared within the organizations these individuals are working for.

Organizational learning increases the chance that the learning gained from the cooperation had an impact in the regions. The way to enlarge this organizational learning was to design a unique learning action.

Usual tools are internal reporting meetings where the staff members directly involved in the cooperation report back to the relevant colleagues, managers and elected representatives of the organisation. These key interested parties were in many cases directly involved in the interregional exchange of experience activities when needed, but also this meeting assured a complete exchange of experience.

Following this guidelines, RESINDUSTRY staff participating in any consortium and partner learning gathered with other colleagues at the end of each semester to report the project activities, achievement and future actions. These regular meetings had facilitated the planning of the project, the participation of different staff and produced an easier internal and external coordination of the actions.

COMMUNICATION AND DISSEMINATION

CTU-UCEEB has implemented the corresponding activities required to achieve the main objective of the communication strategy, which was to disseminate Project´s results to stakeholders and the general public, but also to inform about the Interreg objectives and benefits of cooperation among EU Regions and Countries.

The RESINDUSTRY Communication and Exploitation Strategy was elaborated at the beginning of the project in order to set guidelines for the organization of dissemination activities and elaboration of dissemination materials.

The Communication and Exploitation Strategy objective was to assure that the process of policy learning occurs at 4 levels, made through 4 sub-objectives:

1. To achieve internal Communication (individual and organisational learning)
2. To assure the involvement of stakeholders (Regional Stakeholders learning)
3. To transfer the learning outcomes to other EU stakeholders (external/EU learning)
4. To produce awareness among the citizens about the project (external/EU learning)

The communication is a min tool to achieve the Level 4 of learning, the External learning. The fourth level refers to learning beyond the regions. External learning is certainly the most challenging ‘type’ of learning, but it is also less crucial for the projects since it does not directly impact policy change in the participating regions.

In a capitalisation programme like Interreg Europe, it was important that the lessons learnt at project level were also exploited at programme level in order to be of benefit for other public authorities in Europe. The communication strategy of RESINDUSTRY took into the account all these parameters when defining the minimum tools and outputs to be achieved by the consortium.

Sample of communication actions of the partner and consortium

Communication Outputs:

- One detailed Dissemination Strategy, Internal Database and Mailing List
- Website, leaflets, posters, and rollup, 4 project newsletters
- 5 study visit dossiers by host partner
- One Local Dissemination Event per partner in S5, open to the public with 40-60 key actors.
- One final Conference in phase 2

CTU-UCEEB has actively participated in the communication process of the project, promoting the project at local, regional, national and European level. Some of the main used tools have been news, press releases and emails/bulletins, where the partner described the project achievement and the future results to be achieved.

As special mention, CTU-UCEEB has produced specific videos for communicating in a more effective manner.

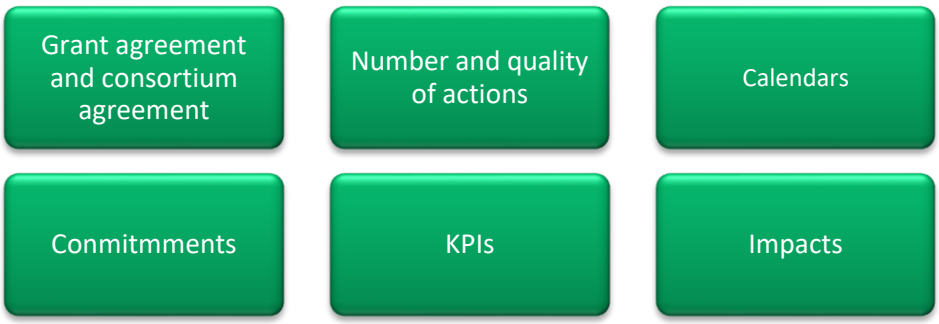
III.III. THE QUALITY OF THE PARTNER LEARNING

Each partner had a predefined structure of quality assurance provided by the project, and including specific internal and external quality evaluation tools, which has supported the consortium in the achievement of high-quality standards during the learning process.

RESINDUSTRY has created a Robust Quality Unit (RQU) composed by TLP and external experts to support partners in learning activities. Past experiences showed partners tend to focus resource on technical deliverables, turning aside the assurance of the learning quality process.

The beneficiary's Quality Assessment systems sought to support the correct application of the technical work included in the application form and specified for the beneficiary. This support was reflected through work evaluation and monitoring systems, acting in a similar way to a Project Management system for any service project.

In RESINDUSTRY, the beneficiary's Quality Assessment system took the commitments acquired in the Grant Agreement with the coordinator, and transferred them to technical working documents for the partner, subsequently evaluating their implementation.



Thanks to the project structures, the exchange of experience activities has been of robust quality, being a pre-condition to an efficient learning process. So each action has been properly prepared, implemented, documented and monitored.

The UNIT, composed by TLP CTU-UCEEB, MOSR and TREA, with the support of external experts at national level, assured that the activities are properly prepared, implemented, documented and evaluated:

- Preparation: all the information needed to carry out the activities must be made available in advance. In particular, the objectives and agenda of each activity need to be clear and shared with the participating partners. If needed, partners can also be asked to send their contributions before the activity takes place.
  RESINDUSTRY preparation required on-time preparation of full explanatory document for each event by host partner, incl. learning objectives for IW and SV, which has been evaluated after each action.
  Following the Exchange Methodology, the host partner prepared (1 month in advance) a full explanation document for each event to be implemented in the project.
  Additionally, each Methodology defined per partner was designed to assure the learning process: 1) achieving 4 levels of learning; 2) assuring the quality; 3) integrated approach. Going further that this application form, it described each activity in detail, with a foreseen agenda and content.

- Implementation: each organiser had to ensure proper management of the activity. The quality of a moderator, issues such as languages or intercultural context, etc. were taken into account in each panned activity. Depending on the activities, innovative techniques were used to ensure interactivity and the involvement of all participants in the exchange of experience.

- Documentation and monitoring: after each key action, a report summarising the main outcomes was produced. For example, after each SV one publishable dossier in English was produced by host partner

summing up all activities. This information was both used internally in the different stakeholders meeting, and used for dissemination.

All these steps have been evaluated through the RQU structure, both internal and external, assuring that the project actions were achieving the expected level of quality. So an extra level of quality evaluation has applied:

- Evaluation: the quality of each learning activities has been measured by survey per participant, resulting in a quality assurance report per semester. The evaluation of each activity (through a simple satisfaction questionnaire) has helped in the improvement of the activities, allowing a continuous upgrading of future activities.

LP has evaluated the quality of the learning activities of each partner, supported by the external expert and coordinated with the rest of national external experts on quality of learning. Through questionnaires, the LP and the quality expert measured the quality of the learning actions per participant, resulting in quality reports. If deviations were identified, the expert launched warning reports or some contingency Plan, however, this contingency was not necessary during the project phase 1. Every six months, the Robust Quality Unit has delivered a quality assurance report including the analysis of the results from questionnaires of learning activities.

Role of experts

There was no obligation to involve experts in the exchange of experience process but external assistance was considered to be helpful and a way to professionalise this process (e.g. by supporting the exchange methodology definition and follow up). External input was also needed to ensure a more in-depth coverage of certain aspects of the topic tackled by the project or to help partners that are less experienced in the joint working process.

Experts has been contracted by each partner, in order to assure that each participant passed both and internal project evaluation and an external evaluation.

Quality Evaluation Report

The evaluation report compiles the project's objectives, the project's actions, and the beneficiary's capacities, to apply an evaluation methodology and ensure that the expected impacts are achieved.

The quality report focuses on evaluating and quantifying certain key parameters or key productivity indicators, which serve to measure the success of the project in reference to what was defined in the proposal submitted to the Program. Offer a list of key productivity indicators, as well as systems to quantify them and thus be able to analyse their level of performance.

The evaluation analysed a list of key productivity indicators, as well as systems to quantify them and thus be able to analyse their level of execution. The project parameters that will be evaluated through key productivity indicators are:

- The quality of the learning actions
- The calendar evolution of indicators
- The delivery of learning products.
- Communication and economic indicators

Following this objective, the structure of the evaluation report was:

- ≫ Group 1. Quality level in learning actions
- ≫ Group 2. Level of learning
  - Stakeholder participation
  - Technical products delivery
- ≫ Group 3. Transversal communication and coordination
- ≫ Group 4. COVID effect over learning process

The Group 1 of question has evaluated that the activities are properly prepared, implemented and documented.

RESINDUSTRY Interreg Europe

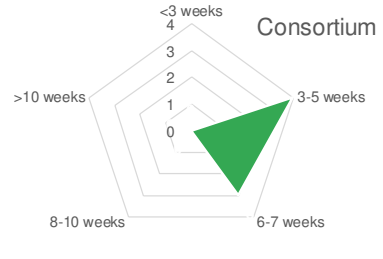
European Union European Regional Development Fund

QUALITY EVALUATION REPORT, RESINDUSTRY PROJECT

Semester: 2 Partner: CTU UCEEB

Group 1. Quality level in learning actions

IW2 + SV2 - PREPARATION - How many weeks in advance was the information received in order to analyse it and invite stakeholders?

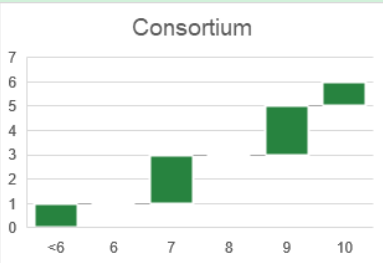


Answer	CTU UCEEB	3-5 weeks

<3 weeks is considered as not reaching the quality requirements

Sample of evaluation of implementation in IW.

IW3 - IMPLEMENTATION - The theoretical contents were clearly explained during the IW3 and the contents were enough to achieve the event objectives.

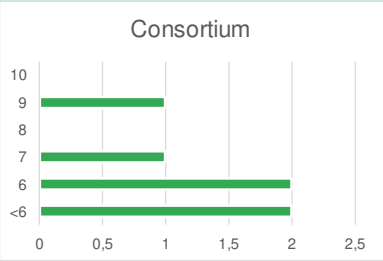


Answer	CTU UCEEB	10

Average consortium scoring 7,7

Sample of questions or evaluation related to Master Classes.

MC2 - IMPLEMENTATION - The theoretical contents were clearly explained during the Master Class and the contents were enough to understand the work to do in the Regional Assessment.



Answer	CTU UCEEB	6

Average consortium scoring 5,0
(10 maximum)

The Group 2 of question analysed the Level of learning, based on the follow up of stakeholder participation and the achievement of learning actions.

In this aspect, the number of stakeholder participation has been analysed in each semester, evaluating if the project reached 90 participants with increased capacity thanks to exchange experiences, 10 stakeholders (regional stakeholder group) per partner and 20 staff (3 per partner).

The Group 2 of question also analysed the number of learning activities in each semester, evaluating if the project reached the 83 learning activities:

- Five Study Visits, Interregional Workshop and Master Classes MC (Exchange Methodology, Regional Assessment, Actions Plan) (5)
- Four Institutional Internal Meetings, and four Local Stakeholder Meetings per partner (4x7+4x7)
- A minimum of one Expert Mission per partner (1x7)
- Two Policy Breakfasts per partner (2x7)
- One partner meeting in Phase 2

5 SV and IW (5)

MC1, MC2, MC3 integrated in the SV and IW (0)

Networking Event 1, 2 and 3 as communication (0)

4 local Stakeholder Meetigs per partner (28)

4 Institutional internal meetings per partner (28)

Expert Mission per partner (7)

Two policy breakfast per partner (14)

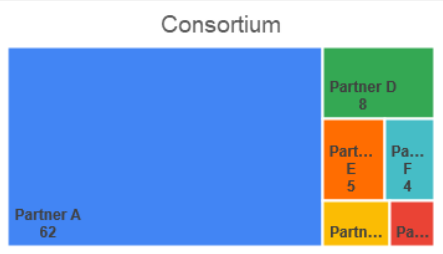
One partner meeting in Phase 2 (1)

Total of learning activities = 83

Group 2. Level of learning

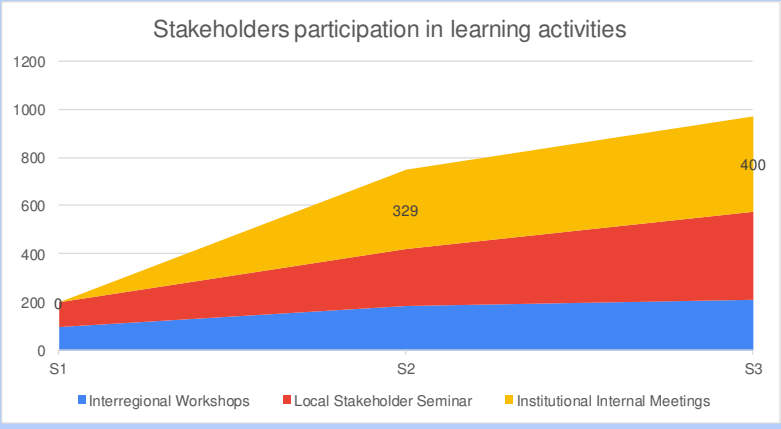
Stakeholder participation

How many stakeholders and staff were online connected to the IW3?



Answer	CTU UCEEB	8

This activity expect the following attendance:
Individual level of learning: 2 staff per partner
Stakeholder level: 2 stakeholders per partner + full local stakeholder group (20)
External level: 1-2 staff of Interreg EU projects related to RES (to be validated)
Less than 4 staff+stakeholders per partner is to be compensated.

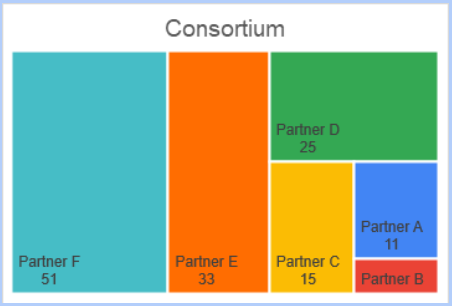


207 stakeholders in IW and SV

366 stakeholders in Local Sakehholders Seminar

400 stakeholders in Institutional Internal Meetings

How many stakeholders and staff participated in your second Local Stakeholder Seminar LSS2?



Answer	CTU UCEEB	25

10 per partner are expected to meet each semester, lower numbers are to be compensated.

The Group 3 of question has evaluated that the project coordinator and the rest of partners with key roles, either technical, economic or communication, were implementing correctly the expected duties.

In terms of Coordination, some milestones were analyzed:

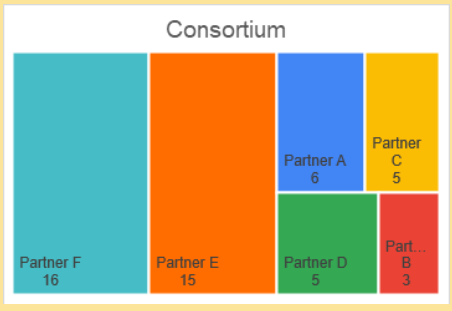
- Subsidy Contract, Partnership agreements, Project handbooks, day-to-day management structures.
- Methodology for quality monitoring
- 5 SC and 5 skype PCU meeting.
- 5 quality assurance report

In terms of communication, some milestones were analyzed:

- One detailed Dissemination Strategy
- One Internal Data Base and Mailing List
- Leaflets, Posters, and rollup
- Website
- 4 project newsletters
- 5 study visit dossier by host partner
- One Regional Dissemination Event per partner in S5, open to the public with 40-60 key actors.
- One final Conference in phase 2

Group 3. Transversal communication and coordination

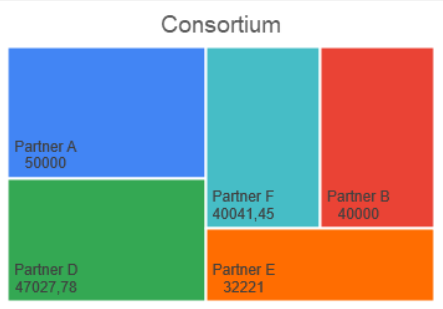
How many appearances in media have you promoted in online sites by month 18?



Answer	CTU UCEEB	5

2 to 4 **Each partner is expected to promote 2 to 4 media appearances per semester at national, regional or local level. The final objective being 10 per partner.**

How much budget was executed and reported in semester 3?



Answer	CTU UCEEB	47.027,78
Objective		48.629,00

Answer	Consortium	209.290,23
Objective	Consortium	253.332,00

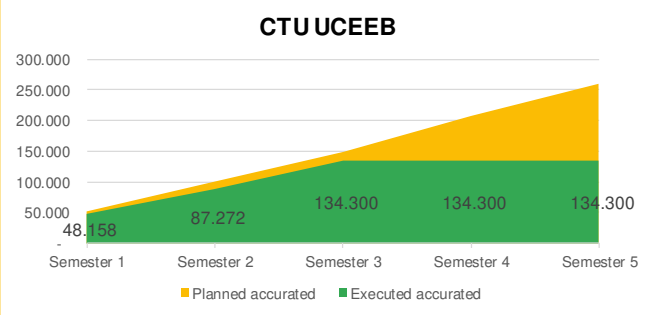
CTU UCEEB

Semester 3 execution VS planned execution is **96,7%**

Accurated execution for all semesters is 0,902934575794859% of planned.

The partner is exposed to a descertification of budget at the end of phase 1, corresponding to

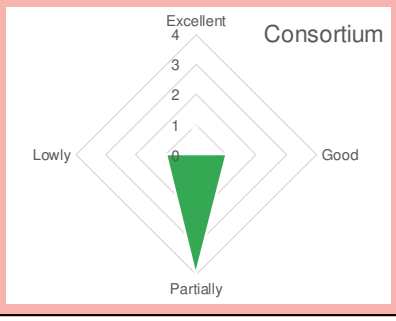
€ 14.437,22



The Group 4 of question has evaluated the impact of COVID crisis over any of the previous key aspects of the project implementation and expected results.

Group 2. Level of learning

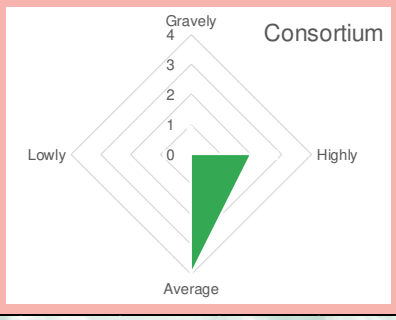
IW and MC are supposed to be a key project moment for staff and stakeholders sharing knowledge. In which degree the exchange of experiences was produced among online participants?



Answer	CTU UCEEB	Lowly, language and online communication are great barriers

Average opinions are "partially, the exchange formatting does not allow good interaction"

COVID crisis will keep affecting 2021 activities, both economic and social. How do you consider that your technical activities had been affected in this semester?



Answer	CTU UCEEB	Highly, actions had to be delayed affecting the planning. Contingency Plan is required.

Average opinions are highly - average, which highline that a contingency strategy will be an added value for the project

IV. CONCLUSSIONS FROM THE LEARNING PROCESS

IV.I. THE OPPORTUNITIES OF THE SECTOR

The Czech Republic has experienced strong growth in the renewable energy sector with the share of RES increasing from 2010 to 2018 despite claims that the potential of RES is limited by natural conditions and environmental protection requirements.

Biomass is the only widely available RES for the heating industry, and the RES sector is dominated by production from biofuels and biomass. The country is more than likely to reach its EU 2020 target of 13% renewable energy in gross final energy consumption.

The SEP established RES corridor targets for 2040, which projects up to 25% renewable energy in total energy consumption. The SEP continues to place a strong focus on biomass. Reaching the envisaged share of RES by 2040 will require more focus on developing the renewable energy sector and examining the potential of all RES such as PV, wind, geothermal and biomass as well as opportunities in the heating sector (heat pumps, biomass). Each option will need to contribute if the country is to reach the targets for 2040.

The SEP establishes several strength baselines for the development of higher RES rates in the sector, using domestic sources, and creating new business opportunities. This will help the economic development of states on macro level, although the initial setup cost is high, the technologies need to be supported as they become more affordable over time.

These resources are environmentally friendly, can repeat itself and can be used in the long term. While solar energy being renewed on a daily basis, biomass energy sources can be achieved on farms within a program. Renewable energy provides centrally control for state. Establishment of small production plants will contribute to more efficient use of electricity networks.

As political long-term strategy, the renewable energy to be promoted now will contribute states' s long term energy diversification and energy competitiveness, so the SEP takes more determined steps in order to advance in renewable energy integration in all economic sectors.

There are good opportunities in the current situation of the energy sector, and the political decisions established at national level, to promote the integration of Renewable Energy Sources in industry:

- Market volume will increase with increasing effectiveness. State of the sensitivity to environmental pollution under the Paris Agreement and efforts to bring constraints on the use of fossil fuels are positive developments for renewables.
- The developments on biomass in the future can provide great improvements and output in the national market.
- One of the opportunities for renewable energy is future development of technology sector, with the help of technology cost effective utilities. SMES developments in technology, used for storing energy in the magnetic field, will provide great opportunities.
- SMES technology as more effective use of superconductors will bring about more challenges. The studies for using hydrogen as an energy is advancing. It is thought that the hydrogen will generate mayor energy source in the future.
- Reflecting the emissions associated with conventional sources of energy in energy prices would lead to improved profitability for solar thermal installations.
- Public support is widely available for investments in RES technologies. Some resources are abundant at economic cost.

IV.II. DEFINING INDICATORS FOR POLICY EVALUATION

One of the aims of the project is the definition of a series of energy indicators in which the total energy consumption of the industries can be disaggregated by potential RES technology. These indicators are called Key Performance Indicators (KPI) and they are useful in order to make easier the comparisons with the energy consumptions of other factories which operate in the same field, and with other technologies.

A typical KPI used in the industrial field is defined as the primary energy consumption scaled on the number of factory outputs (KPIa), so that the energy consumptions of the factory can be correlated directly to the number of outputs produced. In most of cases the primary energy consumption tends to decrease with the increase of the output production, being the evidence of a primary energy consumption independent from the industrial production volumes. However, this KPIa has to be identified industry to industry and cannot be generally calculated.

There is a range of well-developed and sustainable renewable technologies that can provide electricity and heat in a cost-effective way when conditions are favourable. Such sources can provide electricity and heat directly to an industry through on-site technologies, or via centralised district networks. The main sources of renewable energy sources to be analysed at national level are:

- solar thermal energy
- bioenergy
- solar photovoltaic energy

Regarding KPIs of every technology, and potential savings to be achieved, there are several main aspects to consider that have a bigger impact on the comparable costs of the energy produced by technologies, when placed in the same location. These are the initial cost of the system, the lifetime of the system, the cost of maintenance or the system performance.

Moreover, production will depend on the location (affecting climate, insulation, taxes, cost of living, etc.) and quality of the system (affecting performance, lifetime and cost). This can vary significantly from region to region or from country to country, so the specific analysis has to take into account these parameters.

The Market analysis has selected a minimum of KPIs that are required to be known for each selected technology. These KPIs provides a common ground of analysis for the technologies. The KPI selected are:

CAPEX, measured as €/kWth or KWp depending on technology	Direct labour intensity, measured as FTE/MW of installed power, either thermal or electric
OPEX, measured as €/kWth or KWp depending on technology. But expressed as a % of CAPEX	Indirect labour intensity, measured as FTE/MW of installed power, either thermal or electric
Fuel supply cost, measured as €/MWh, for those technologies requiring fuel provision	Emissions, measured as kg CO2/kWh for the different fuels to be replaced
LCOE, measured as €/MWh, either thermal or electric	Lifetime (years)

As the analysis was to be made from the point of view of the public administration, where public funding is to be allocated to leverage private investment, these KPIs have been transformed into impacts for each public euro invested. The conclusions have provided final KPIs for the public administrations in reference to every 1.000€ invested of public money:

KPI indicator (for every 1.000€ of public funding)
RES supported (kWth)
RES produced (kWh th)
Full-time employment (FTE)
Avoided emissions (Ton CO2)

IV.III. RES INDICATORS PER CZECH REPUBLIC

BIOMASS IN CZECH REPUBLIC

According to calculations proposed by the Czech Ministry of Industry and Trade, the most of the RES development between 2021 and 2030 in the heating and cooling sector is supposed to be covered by burning biomass (the proposed figures for 2030 are 36.723 TJ for non-household biomass, while the current figure is 26.631 TJ).

In 2017 the industrial sectors that consumed the most solid biomass for process heat are those that generated biomass residues, such as the pulp, paper and wood products industries, which were responsible for 85% of the industrial biomass final energy consumption. Of some relevance is the non-metallic mineral sector, which, despite not generating biomass residues, accounted for 6% of the biomass consumption for process heat.

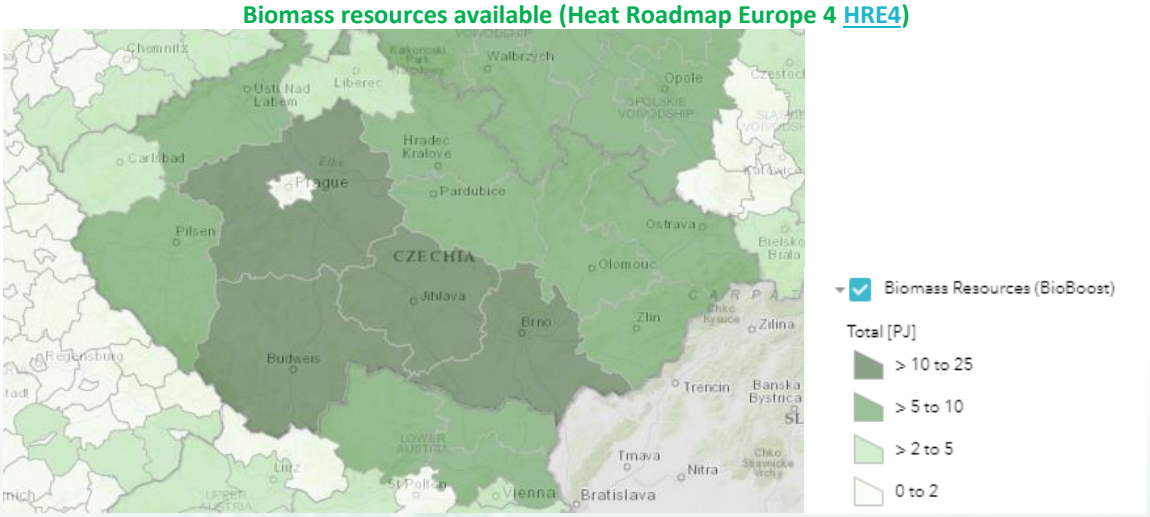
Additionally to heat, some industrial establishments are auto producers and produce electricity and heat, which is in part delivered to users outside the plant. This is common, for example, in the pulp and paper industry, and in the production of wood-based panels, where solid biomass is often used in CHP systems.

In the Czech Republic, biomass is the only widely available RES for the heating industry, so the RES sector is dominated by production from biofuels and biomass. Due to its versatility, biomass has the highest potential among the different renewable energy options in the industry. Biomass can be used as a feedstock to replace fossil fuels, it can be used to produce low, medium, and high temperature heat, and it can be used as a fuel for localized electricity production.

The Action Plan for the Biomass in the Czech Republic 2012-2020 established that the biomass potential in the Czech Republic, calculated for agricultural and forest for energy production is in the range of 160.2 - 217.2 PJ/year with a mean value of 189.7 PJ/year.

The main share of this potential lies in the field of agricultural biomass (85%) with a complementary share of forest mass (15%). The stated energy potential of agricultural biomass has not been achieved, nevertheless, the indicated potential places the biomass as a significant energy raw material with an important growing medium-term development potential.

Biomass resources available (Heat Roadmap Europe 4 HRE4)



The Czech Republic's industrial energy consumption is dominated by 5 sectors (iron and steel, chemical and petrochemical, non-metallic minerals, pulp and paper, and food and beverages), acting on these sectors has major environmental impacts. One possible strategy to help achieving the EU28 climate targets is increasing solid biomass use for energy production in these five sectors.

Both biomass combustion and gasification equipment can provide the full range of temperatures required by industrial processes. Certain industrial sectors, though, cannot efficiently use raw biomass and benefit from the use of upgraded biomass.
Charcoal and pellets are commercially available on the European market, but they are often sourced outside the EU.

The industrial facilities that generate considerable amounts of solid biomass by-products have often already implemented bioenergy projects. There is still margin, however, for further bioenergy valorization and/or different biomass uses.

Future sustainable biomass availability is one of the main uncertainties when considering a greater industrial biomass uptake. In EU28, solid biomass production has been increasing, and currently production and consumption are almost balanced. However, the increased pressure on the limited European biomass resources raises the need for monitoring biomass resources in relation to demand and to choose the most sustainable options for their use.
Policies to promote further substitution of fossil fuels with solid biomass in industry should be designed, but include strong sustainability measures and consider the risk of market distortion and carbon leakage.

The result from the market analysis in relation to the main key performance indicators for the biomass application in industry are:

KPI indicators for biomass

CAPEX for <1MWth (€/kWth)	400 - 600
CAPEX for >1MWth (€/kWth)	350-500
OPEX (% of CAPEX)	3%
Supply cost (€/MWh)	20-40
LCOE (€/MWh)	110

Labor intensity (FTE/MWth)	60
Lifetime (years)	25
Indirect labor intensity (FTE/MWth)	21.8
Emissions (kg CO_2/kWh) avoiding coal	0.325
Emissions (kg CO_2/kWh) avoiding natural gas	0.181

If the analysis is made from the point of view of the public administration, where public funding is to be allocated to leverage private investment, the KPIs have to be shown as **impacts for each public euro invested**.

KPI indicator	KPI on lifetime
Public investment	1.000 €
RES supported (kWth)	2
RES produced (kWh th)	300.000
Full-time employment (FTE)	5,61
Avoided emissions (Ton CO_2)	1.358

SOLAR ENERGY IN CZECH INDUSTRY

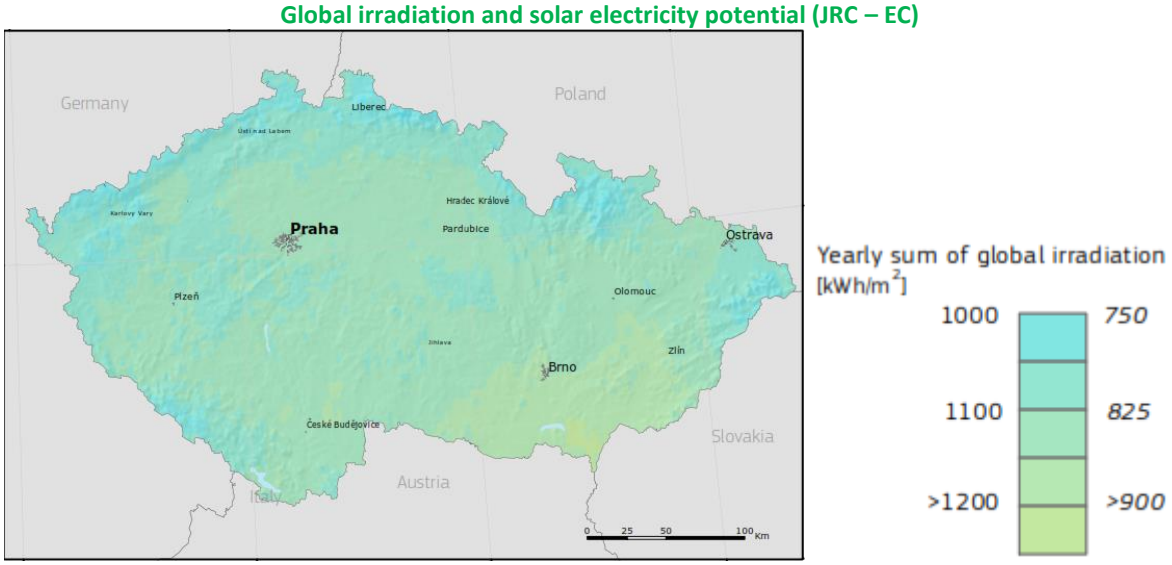
Solar thermal energy can fulfill a substantial amount of heat demand in a wide range of industries in the Czech Republic. In similar samples, solar thermal can provide technically about half of this energy consumption by supplying hot water and steam in a temperature range of up to 400°C.

In industries such as the textile, brick and food processing, solar thermal energy can provide hot air and hot water needed for curing, drying, dyeing, washing, boiling, pasteurisation and sterilisation.

Key challenges for solar thermal heat in industrial applications are the upfront costs which produces pay-back times longer than industry expects (< 3 years), the relatively low fossil fuel prices charged in the industrial sector, and the integration into existing industrial processes. For small- and medium-size enterprises, rooftop space and finance opportunities for the upfront costs are the key barriers.

In Czech Republic DNI average is 1.100 kWh/m2 with variations of 10% depending on specific locations. These values are calculated for horizontally mounted modules, but it can be improved in 100 kWh/m2 if the modules are placed in optimally-inclined position.

Global irradiation and solar electricity potential (JRC – EC)



One opportunity is to integrate solar thermal heating plants during the construction of new industrial plants.

For small- and medium-size industrial plants, solar process heat could reduce the dependence on volatile fossil fuel prices. The challenge is to maximize the share of heat provided by solar heating. This means that solar heating needs to be accompanied by storage to allow process heating during nonsun hours.

KPI indicators for solar thermal heat.

CAPEX for <10.000m2 (€/m2)	300 - 600	Labor intensity (FTE/MWth)	60.58
CAPEX for >10.000m2 (€/m2)	250	Lifetime (years)	25
OPEX (% of CAPEX)	2%	Indirect labor intensity (FTE/MWth)	27.26
Supply cost (€/MWh)	0	Emissions (kg CO_2/kWh) avoiding coal	0.325
LCOE (€/MWh)	85	Emissions (kg CO_2/kWh) avoiding natural gas	0.181

If the analysis is made from the point of view of the public administration, where public funding is to be allocated to leverage private investment, the KPIs have to be shown as **impacts for each public euro invested**.

KPI indicator	KPI on lifetime	KPI on lifetime
Public investment	1.000 €	1.000 €
RES supported (m2 & kW th)	2.2	1.6
RES produced (kWh th)	61.111	61.111
Full-time employment (FTE)	4.88	4.88
Avoided emissions (Ton CO_2)	277	277

Despite the technical potential, as well as the potential economic benefits of using solar heat in industry, actual deployment levels remain low. To achieve higher market penetration, policy options are: create more awareness of the benefits of solar process heating, especially in industrial clusters of small- and medium-size enterprises; provide financing mechanisms to cover upfront costs; and consider whether support for solar thermal could be an alternative to fossil fuel price subsidies to national industries.

For **PV electricity**, the LCOE analysis carried out by JRC, and detailed in the KPI chapter, shows that the price at which electricity must be generated from PV over the project's lifetime is currently not competitive at national level.

The sample, from Joint Research Centre (JRC), Ispra, Italy in 2019 LCOE values were calculated for rooftop PV systems in the Czech Republic with CAPEX for an installed PV system 1.100€/kWp and OPEX as 3% of CAPEX, in addition to other departure data, indicated that the country has 0% percentage of cost-competitive rooftop PV installations.

The % shows the share of the economic potential as a proportion of the technical one for each country. It provides the percentage of rooftop systems that are cost-competitive and produce electricity at a lower cost than the latest available (2017) retail electricity prices in the analysed countries.

The values show that solar irradiation is not the primary factor in determining the economic competitiveness of rooftop PV electricity. Neighborhood countries with similar solar resources have very different economic potential, especially as result of different retail prices, but grid parity is not presently possible in the Czech Republic.

KPI indicators for solar PV electricity.

CAPEX for industrial site (€/kWp)	1.000	Labor intensity (FTE/MWp)	15
OPEX (% of CAPEX)	2%	Lifetime (years)	30
Supply cost (€/MWh)	0	Indirect labor intensity (FTE/MWp)	6.75
LCOE (€/MWhe)	150	Emissions (kg CO_2/kWhe) avoiding electricity	0.513

If the analysis is made from the point of view of the public administration, where public funding is to be allocated to leverage private investment, the KPIs have to be shown as **impacts for each public euro invested**.

KPI indicator	KPI on lifetime
Public investment	1.000 €
RES supported (kWp)	1.0
RES produced (kWhe)	33.000
Full-time employment (FTE)	0.65
Avoided emissions (Ton CO_2)	508

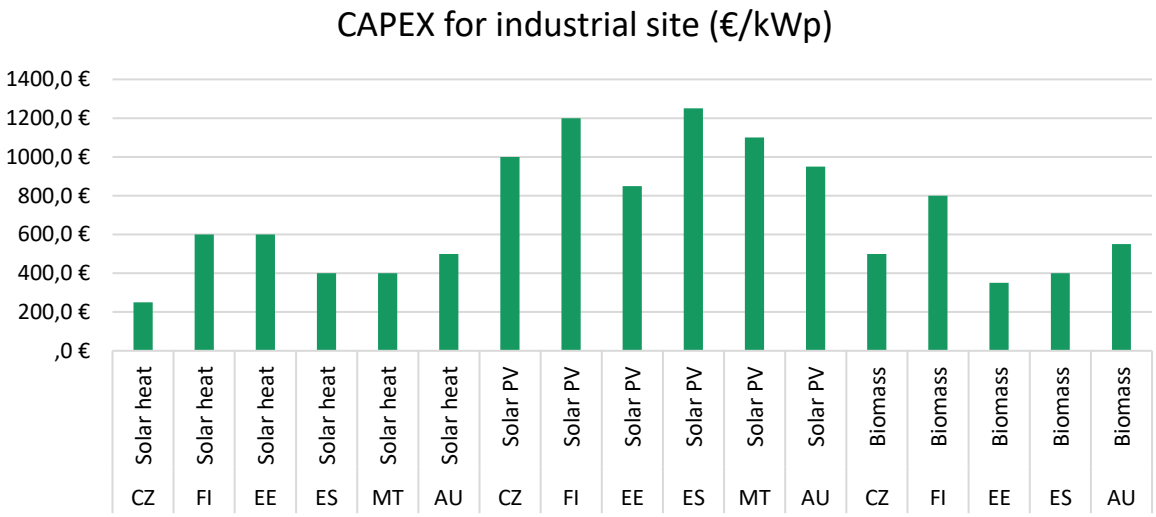
COMPARISON OF INDICATORS PER COUNTRY

Similar Key Performance Indicators have been calculated for each country of the consortium, so a potential comparison of values can be reached, in order to create a baseline for the later conclusions per country.

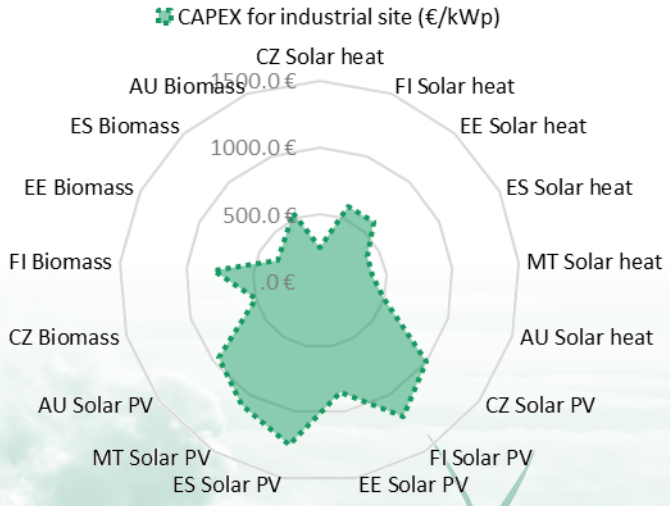
Capital Expenditure (CAPEX) has been calculated as an indicator which measure how much energy power investment can be achieved with the public support. In this sense, it is important for the administration to promote as much Renewable Energy Power as possible, in order to cover the peak of energy demand that the energy system will require in specific moments.

CAPEX has been used to calculate the KPI related to Watt peak which can be introduced in the energy system. As the objective is to introduce in the energy system as much RES power as possible, lower CAPEX allows more power installation with the same capital, so lower CAPEX are beneficial for the system.

Comparison of CAPEX calculated per country and technology in RESINDUSTRY



Even if considering global markets, CAPEX can vary importantly between countries for a same technology, such as biomass, where prices in Spain or Estonia are half the price for an installation in Finland. This will significantly affect the profitability of the country investment if the final energy produced is taken into account as a main KPI.



For instance, with the same 100.000€ of public support, and having similar natural resources, countries such as Czech Republic and Estonia will have to design different support tools for reaching the same results.

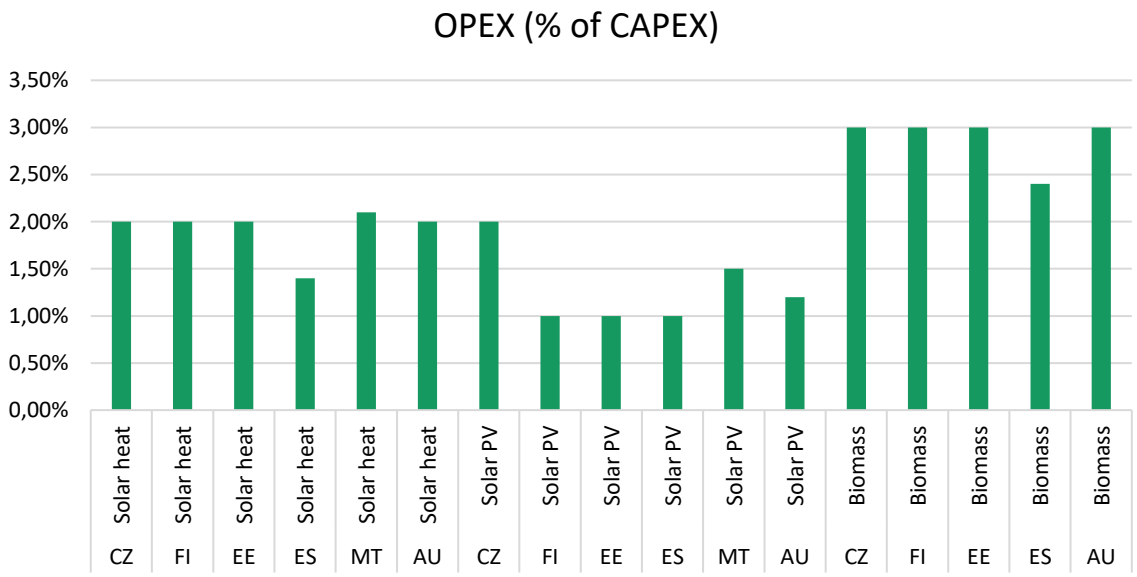
If the current country strategy would be to install as much RES power as possible in order to cover the peak demand of the country, then different indicators have to be considered when designing the policy support:

- Estonia and Finland have similar CAPEX in solar heat, 600€ / kWp while in biomass Estonia have 350€/kWp versus nearly 800€/kWp in Finland.
- Just considering promotion of installed power capacity, Estonia will have to include biomass as key technology while Finland should consider the solar technology as prime promoter.
- Czech Republic is placed in average price of technologies, but considering the side indicators of the technologies, the biomass is ahead of the rest of technologies analysed.

However, to consider one indicator as unique strategy promoter is done in very scarce strategies. The common design has to include several indicators, where not only the power installed is considered, but other indicator such as the final energy delivered of the economic impact of the final investment.

The Operational Expenditure (OPEX) is established in most of cases as reference to the initial capital expenditure or CAPEX, as a % of this amount. This economic value can be considered as not interfering the decision of the public policy, but in a final term it will affect to the final energy price, which is a key indicator used on the promotion of renewable energies for the last year all over Europe, so OPEX has to be considered as a value interfering final decisions of public support.

Comparison of OPEX calculated per country and technology in RESINDUSTRY



In a similar way than CAPEX, even if considering global markets, OPEX can vary importantly between countries for a same technology, such as Solar PV, where prices in Czech Republic can double prices on Spain or Finland. However, in this case, as it will be displayed in the calculation of the final energy prices, OPEX does not affect significantly the final energy produced as a main KPI.

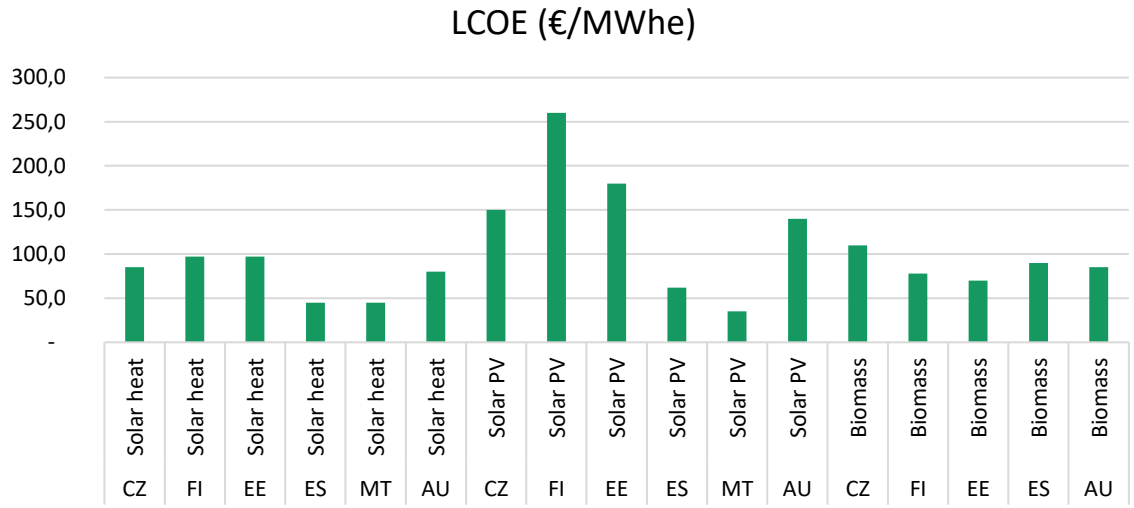
Levelized Cost of Energy (LCoE) is one of the main key indicators to be considered, both by the private investor and the public supporter, because it calculates the energy cost as the sum of costs over lifetime, divided by the sum of energy produced over same lifetime.

LCOE does not represent cost of energy for consumer, but it is a key figure from the investor point of view. On the other hand, care should be taken in LCOE values if compared among different studies, because LCOE for a given energy source is highly dependent on the assumptions, financing terms and technological deployment analysed.

In any case, if similar references and data sources are taken into account for the calculation of LCOE in different technologies, thus LCOE allows the comparison of different technologies (e.g., wind, solar, natural gas) of unequal life spans, project size, different capital cost, risk, return, and capacities.

This is the reason of proposing LCOE as a main KPI in RESINDUSTRY analysis of technologies.

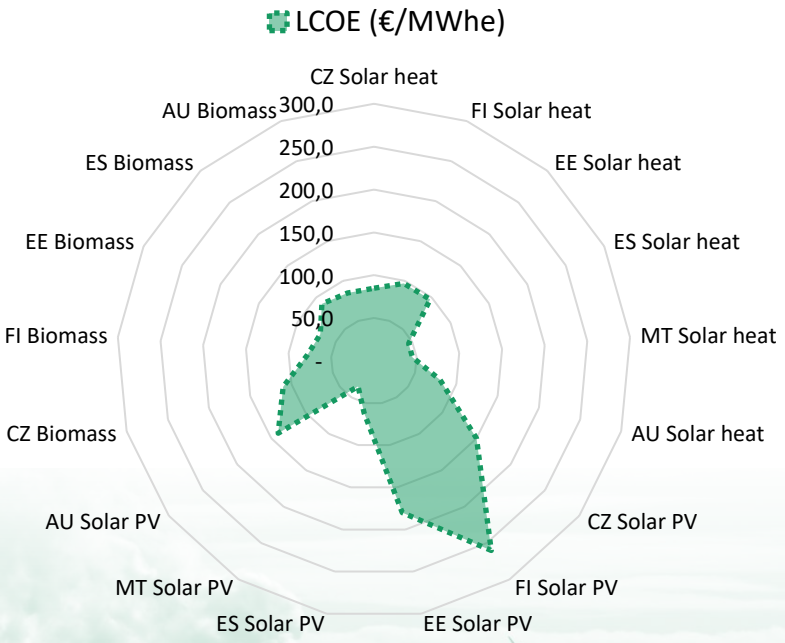
Comparison of LCOE calculated per country and technology in RESINDUSTRY



In a logical way, LCOE is the result of a calculation taking into account many different factors, where the natural resources available is one of the main parameter influencing the result, together with the investment cost per technology, the operation cost, etc.

Public authorities could use these parameters when analysing which technology can provide the political objectives at national level, using the public resources in a more cost-effective way. For example, inside a same country, such as Finland, some technologies provide energy with a cost doubling other technologies, so the public support would be more effective if streamed to technologies with lowest LCOE.

However, political support to technologies has also to consider the diversification of the energy mix, together with the capacity of each technology to generate specific energy types, due to some technologies such as CHP can generate both heat and electricity while PV can generate just electricity.



In the general project analysis, some technologies are exceptionally well placed in the generation of energy in a cost-effective way, such as:

- Solar, both PV and heat, in Malta and Spain.
- Biomass in Finland and Estonia.
- Solar is similarly placed as biomass in Czech Republic, but general indicators favour biomass.

BEST PRACTICES POTENTIAL IMPROVEMENT TO MARKET ANALYSIS

For most KPIs, the data provided in the Best Practice process didn't provide any review on the proposed indicators of the Market analysis, thus the results remain the same for many KPIs:

- Kg CO^2 avoided
- RES produced (kWhe or kWhth)
- Full-time employment (FTE)
- Avoided emissions (Ton CO2)
- OPEX (% of CAPEX)
- Supply cost (€/MWh)
- LCOE (€/MWhe)

CAPEX for industrial site (€/kWp)

The Best Practices have provided data for 3 technologies have produced the following results.

	€/kw				
	BP 1	BP 2	BP 3	BP 4	Average
PV	2.750	1.265	2.027	762	1.701
Biomass	800				800
Solar Thermal	1.000	1.200	782	1.339	1.080

This potential review of CAPEX per technologies could influence the KPI indicators calculated from the point of view of the public administration, where public funding is to be allocated to leverage private investment.

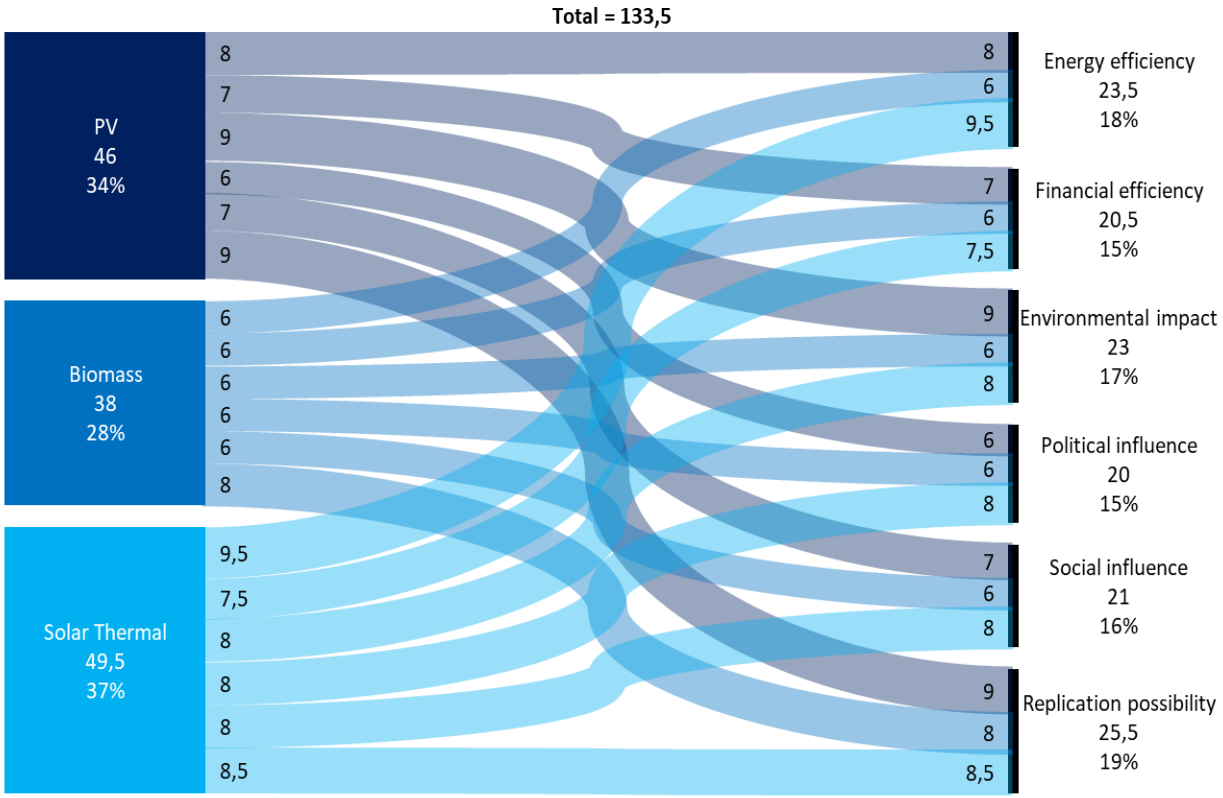
Again, if the KPIS are calculated in the base of influence achieved for every 1.000€, the following new KPIs are resulted:

SOLAR PV	M.A.	M.A. Revision
KPI indicator	KPI on lifetime	KPI on lifetime
Public investment	1.000 €	1.000 €
RES supported (kWp)	1,0	0,6
RES produced (kWhe)	33.000,0	19.399
Full-time employment (FTE)	0,7	0,38
Avoided emissions (Ton CO2)	508	299

SOLAR HEAT	M.A.	M.A. Revision
KPI indicator	KPI on lifetime	KPI on lifetime
Public investment	1.000 €	1.000 €
RES supported (kWp)	2,2	0,9
RES produced (kWhe)	61.111,1	25.457
Full-time employment (FTE)	4,9	2,03
Avoided emissions (Ton CO2)	277	207

BIOMASS	M.A.	M.A. Revision
KPI indicator	KPI on lifetime	KPI on lifetime
Public investment	1.000 €	1.000 €
RES supported (kWp)	2,0	1,3
RES produced (kWhe)	300.000,0	187.500
Full-time employment (FTE)	5,6	3,51
Avoided emissions (Ton CO2)	1.358	1.523

As the number of best practices has not been large, the potential modification may not be considered until the data from other practices is analysed and a good sample is gathered. So the Market Analysis data must prevail until a larger data of practices is collected. In this sense, Managing Authorities has surely data from previous practices funded by public lines, so this contract can be done with historical data from their data base.



NATIONAL PUBLIC INVESTMENT INDICATORS KPIS

Once every technology has been shown in terms of similar KPIs, a comparison can be made among the different impacts achieved by technologies when they are supported in a similar way by public funding.

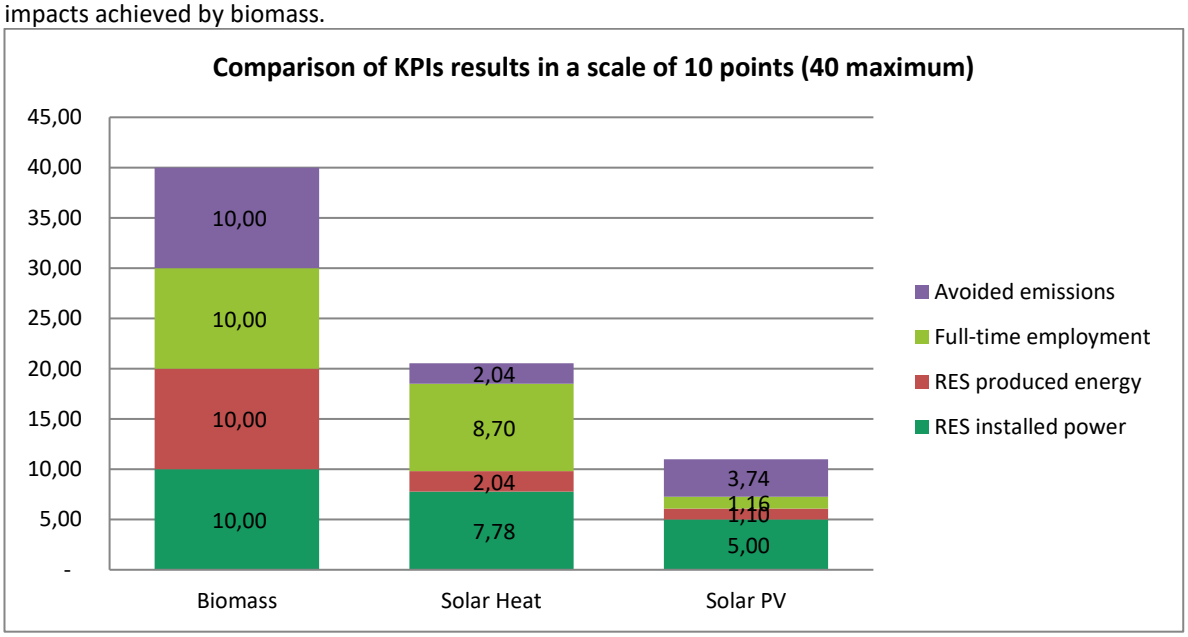
KPI indicator (values on lifetime)	Biomass	Solar Heat	Solar PV
Public investment	1.000 €	1.000 €	1.000 €
RES power (kW th; kW th; kWp)	2,00	1.56	1,00
RES produced (kWh th; kWh th; kWhe)	300.000	61.111	33.000
Full-time employment (FTE)	5.61	4.88	0.65
Avoided emissions (Ton CO_2)	1.357.50	276.53	507.87

	RES installed power (kW th; kW th; kWp)	RES produced energy (kWh th; kWh th; kWhe)	Full-time employment (FTE)	Avoided emissions (Ton CO_2)
Biomass	2.00	300.000	5.61	1.357.50
Solar Heat	1.56	61.111	4.88	276.53
Solar PV	1.00	33.000	0.65	507.87

If a simple conversion system is applied to the technologies and their achieved indicators, trying to compare the results achieved, by providing 10 points to the highest impact achieved and applying a simple lineal conversion rule of three to the other impacts, the following values result.

	RES installed power	RES produced energy	Full-time employment	Avoided emissions
Biomass	10.00	10.00	10.00	10.00
Solar Heat	7.78	2.04	8.70	2.04
Solar PV	5.00	1.10	1.16	3.74

Graphically, the results are clearly favoring the biomass technology in every KPI, while solar heat get a second position with half the impacts of the biomass, while Solar PV remains in third position with close to ¼ of the impacts achieved by biomass.



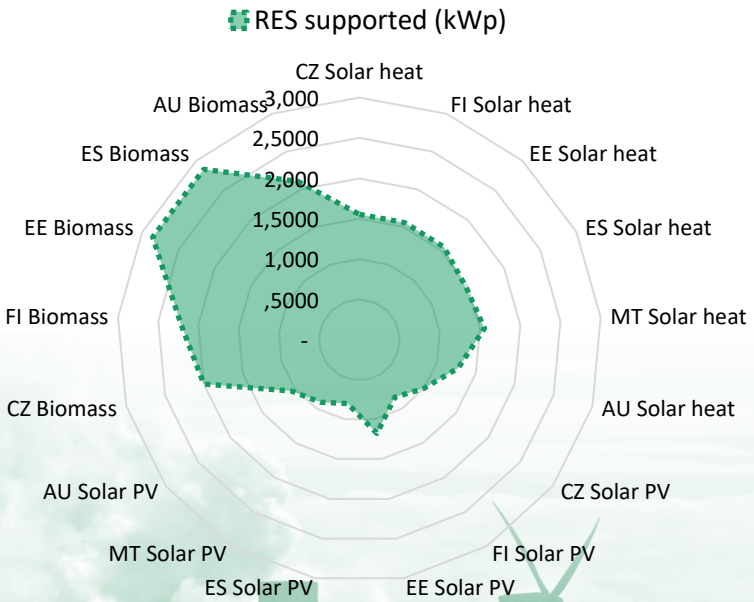
COMPARISON NATIONAL PUBLIC INVESTMENT INDICATORS

As a final review, the Key Performance Indicators have been redefined for each country of the consortium, calculated on a public investment base.

This country base KPI allows a potential comparison of values can be reached, in order to create a baseline for the later conclusions per country.

Power installed, calculated as the number of kW peak power which can be installed with 1.000€ investment, even if the rate of public funding has not been predefined, has been calculated a main KPI.

Comparison of power installed with 1.000€ investment per country and technology in RESINDUSTRY



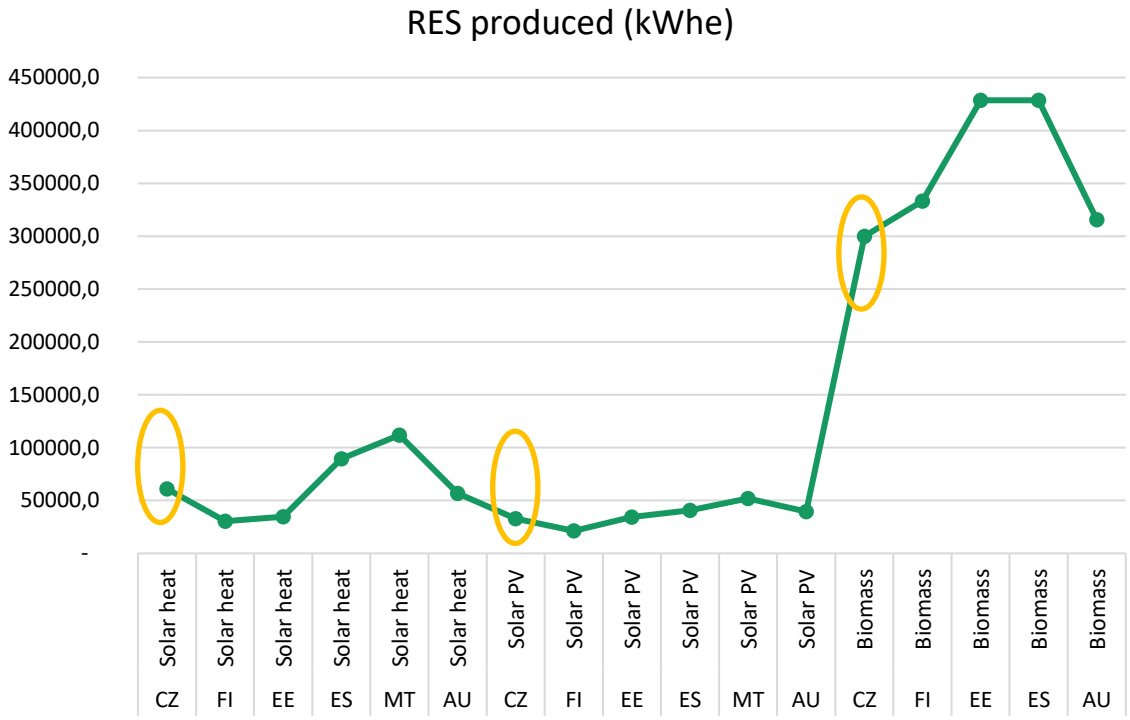
The Power installed has been calculated as an indicator which measure how much energy power investment can be achieved with the public support. In this sense, it is important for the administration to promote as much Renewable Energy Power as possible, in order to cover the peak of energy demand that the energy system will require in specific moments.

Power installed has been used to calculate the KPI related to Watt peak which can be introduced in the energy system.

The primary energy produced in kWh could be the final key indicators to be considered, both by the private investor and the public supporter, because it calculates the energy to be delivered in a base of 1.000€ invested.

On the other hand, care should be taken in these indicators to other related data such as the cost for operation and maintenance of this energy produced, so in a way this indicator should be considered together with LCOE, because LCOE for a given energy source is highly dependent on the assumptions, financing terms and technological deployment analysed.

Comparison of energy produced with 1.000€ investment per country and technology in RESINDUSTRY



Other indicators have been analysed and included in the different country descripction, in order to enlarge the references that the Managing Authority can use when analysing the public investment benefit.

One important indicator has been the emplyment, which in most of literature refers to jobs creation per sector of renewable energy (labor intensity). Labor intensity has been defined as jobs/MW (or FTEs/MW), and later transferred into jobs per 1.000 € of investment.

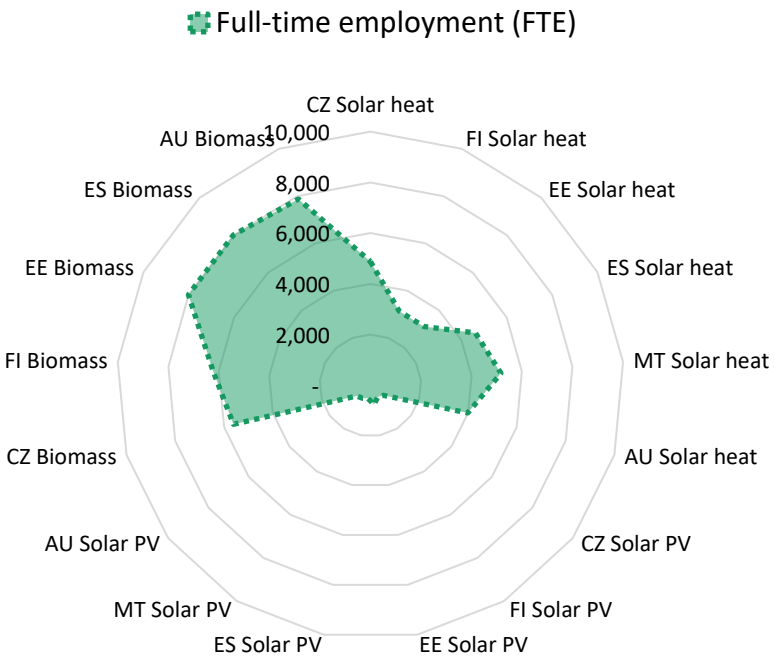
The employment effect is defined as the direct and indirect employment related to the added RES capacity, O&M and exploitation of RES.

- Direct jobs are those created through contractual or non-contractual engagement with an incorporated company
- Indirect jobs are the formal and informal jobs created by vendors and suppliers who serve the sector upstream or provide services for day-to-day operations either with or without a contract.
- Induced jobs are those created through forward linkages as workers in the sector spend salaries on goods and services throughout the larger economy.

Potential employment placement in a full lifetime of RES in industries

Project Development	Construction & Installation	Operations & Maintenance
• Technical design • Feasibility study • Permitting • Project finance	• Procurement • Transporation & logistics • Construction & fabrication • Civil works • Installation	• Customer service • Technical maintenance • Payment collection

Comparison of employment produced with 1.000€ investment per country and technology in RESINDUSTRY

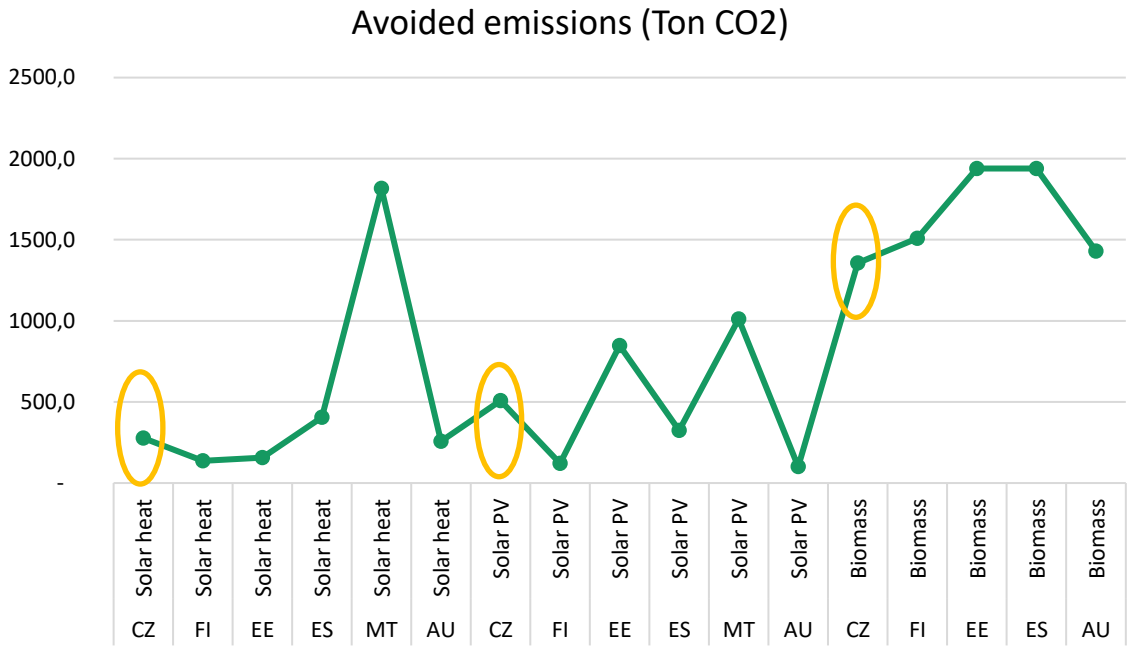


In every country, the main technology in terms of FTE has been biomass, specially due to the production of biomass feedstock. Biomass analysis of employment presented additional job creation structures, especially in the fuel supply side, which had important impacts in the final job creation factors.

In relation to the environmental KPIs, renewable energy sources contribute to improving air quality and human health, for instance by supplying electricity or heat without combustion.

Technologies such as solar PV electricity, geothermal energy, heat pumps or solar thermal energy are therefore most effective at cutting the air pollutant emissions that are associated with most burning processes.

Comparison of CO2 avoided with 1.000€ investment per country and technology in RESINDUSTRY



Relation between countries and technologies is not direct, because each country has different emissions levels due to the current energy mix, with Malta having a high rate of emiccion for each kWh produced, and thus being the most benefited country for introducing any RES technology.

On the technology side, biomass is generally the technologies achieving more emissions reduction.

V. DETAILS OF THE ACTION ENVISAGED

V.I. ACTION 1

Dissemination activities – increasing new projects, RTD activities

V.I.A. THE BACKGROUND

During the dissemination events, local stakeholder meetings and international events as well as during the face-to-face meetings with stakeholders and possible future applicants, we have discovered lack of information among stakeholders, creating space for speculations about the complexity of the applications and the overall range of possible support. Dissemination of the information about the provided subsidies as well as other supporting measures, such as advisory activities is essential to increase the overall awareness of the possibilities to obtain support for investment into RES.
The local as well as international events that brought public bodies and private companies together to one table either to directly discuss the supporting activities or indirectly as a stakeholder participating on the international events.
We found very useful the personal connections and discussions during the international meetings which already led to increased capacity of the applicants.
The lessons learnt from these events also showed the necessity of communication between the managing authorities and private companies (the possible applicants).

There has been already a proof of success during the project lifetime. According to the meetings provided by the CTU-UCEEB between the managing authorities and the stakeholders the important information have been exchanged and provided. This led directly to the communication between the applicants (industrial companies) and the managing authorities with a concrete output – the support provided for the installation of the RES (PV panels) on the site of the manufactory (Lahůdky Fiala, a.s. – loan provided by the National Development Bank).

V.I.B. ACTION

According to the lack of information present on the market the CTU-UCEEB together with the Ministry of Industry and Trade (MIT) proposed creation of local advisory experts able to provide enough relevant information to the stakeholders and possible applicants.
For the purpose of the local advisory experts the current local offices of the servicing agency for administration of the subsidies provided by the MIT (API agency) is to be used together with local advisory companies providing consultancy services in accordance to the subsidies provided. The API agency experts are to be financed by the MIT. Private consultancy companies will provide the services according to their own pricing policy.
CTU will participate in the action by providing assistance to the MIT and occasional advisory during meetings and seminars provided.

The dissemination will compose with regular information days, personal advisory, local stakeholder meetings and marketing materials to be provided as well as personal meetings.
By providing the relevant information during the events or meetings and seminars providing by the MIT as well as the CTU (the LP) will activate private funds as well as innovative ideas and start-up companies to participate within the possible operational program.
The action will focus on the new calls to be provided by the MIT for the programming period of 2021-2027.
OP Technology and application for competitiveness (OP TAK) 2021 -2027
Managing body: Ministry of Industry and Trade of the Czech Republic
Priority 4: - shift to law carbon economy; Specific axis 4.2 – Support of energy from RES
2Q 2022, grant and FI for SMEs in all CZ regions except Prague to mitigate the impact of pandemic mitigation and increase of productivity of Czech enterprises

0,26 billion EUR

202 MW total installed capacity

Heat Pumps, PVE, Wind, hydro, biogas, biomass

V.I.C. PLAYERS INVOLVE

The CTU-UCEEB as a partner of the RESINDUSTRY project took its leading role and proposed a series of dissemination events to split information about possible support for the SMEs to install RES within their production sites as well as with cooperation and through the site of the MIT – the managing authority of the subsidy provided.

V.I.D. TIMEFRAME

First event is planned to take place at the beginning of June this year where stakeholders and members of the managing authorities, together with energy professionals and RES developers should take part.

06/22
- **Final dissemination event**
- MIT introduction to the new opperational program

07/22
- New calls to be instroduced
- **Policy breakfast, face-to-face meetings**
- **Meeting with stakeholders and possible applicants**

09/22
- Providing **consultancy services to the applicants**
- Dissemination of the subsidy calls through social media

12/22
- Estimated end of the first submission period

03/23
- Evaluation of the application by the MIT

06/23
- Estimated - subsidy provided to applicants

V.II. ACTION 2

Easing administrative complexity during the applying for subsidy – change in management of the PI

V.II.A. THE BACKGROUND

One of the biggest barriers experienced according to the experiences exchanged on the local as well as on the international level. Administration complexity is creating pressure on the time and costs, sometimes creating almost impossible to apply for an application without proper guidance from the professional advisor of subsidy expert.

During the first phase of the project the Market analysis including the Strategic analysis of RES Technologies applied in industry was created and was used as the background for managing the newly introduced operating period calls for RES, the OPTAC with calls to be released during the 3rd quarter of 2022. As well as the Expert mission provided by the Estonian brewery representatives and the good practise describing the RES used within the beer production and the lessons learnt during the preparation of the project in Estonia.

V.II.B. ACTION

The action plan proposes to avoid time consuming endless lists of forms, certifications, declarations and other requirements to provide during the applying process as well as during the realization phase of the project. The building permits and public tenders are among the biggest time and money consuming administrative steps identifies

There has been already a proof of success during the lifetime of the project. The MIT took into consideration the experience and good practices of the project (including the Estonian example presented during the Expert mission in Prague) as a part of argument to ease some of the administrative burdens for the new calls. For example, the Call I - Photovoltaic systems with / without accumulation from component 2.3 Transition to cleaner energy sources from the National Recovery Plan issued in March 2022 – the simpler supplier selection procedure.

V.II.C. PLAYERS INVOLVE

According to the Action plan proposed, the MIT will try to implement some easing mechanisms within the process of subsidy application as well as during the realization phase.

V.II.D. TIMEFRAME

06/22
- **Final dissemination event**
- MIT introduction to the new opperational program
- Discussions and output for the recomendation

07/22
- New calls to be instroduced

09/22
- Meetings with applicants - barriers experienced
- Dissemination of the subsidy calls through social media

12/22
- Estimated end of the first submission period

03/23
- Evaluation of the application by the MIT

06/23
- Estimated - subsidy provided to applicants

07/23
- Providing lessons learned from applicants to the MA (CTU will prepare the output for MIT)

V.III. ACTION 3

Increasing the overall installed capacity of the RES within the industries.

V.III.A. THE BACKGROUND

During the dissemination events, local stakeholder meetings and international events as well as during the face-to-face meetings with stakeholders and possible future applicants, we have discovered lack of information among stakeholders, creating space for speculations about the complexity of the applications and the overall range of possible support.
The local as well as international events that brought public bodies and private companies together to one table either to directly discuss the supporting activities or indirectly as a stakeholder participating on the international events.
We found very useful the personal connections and discussions during the international meetings which already led to increased capacity of the applicants. The lessons learnt from these events also showed the necessity of communication between the managing authorities and private companies (the possible applicants) to effectively modify the future requirements of the calls to address the RES in industry support and to motivate new applicants to apply for support as well as the already RES using companies to increase their RES capacities.

There has been already a proof of success during the project lifetime. According to the meetings provided by the CTU-UCEEB between the managing authorities and the stakeholders the important information have been exchanged and provided. This led directly to the communication between the applicants (industrial companies) and the managing authorities with a concrete output – the support provided for the installation of the RES (PV panels) on the site of the manufactory (Lahůdky Fiala, a.s. – loan provided by the National Development Bank).

V.III.B. ACTION

The action will focus on the new calls to be provided by the MIT for the programming period of 2021-2027.
OP Technology and application for competitiveness (OP TAK) 2021 -2027
Managing body: Ministry of Industry and Trade of the Czech Republic
Priority 4: - shift to law carbon economy; Specific axis 4.2 – Support of energy from RES
2Q 2022, grant and FI for SMEs in all CZ regions except Prague to mitigate the impact of pandemic mitigation and increase of productivity of Czech enterprises

0,26 billion EUR

202 MW total installed capacity

Heat Pumps, PVE, Wind, hydro, biogas, biomass

There shall be also a synergy with another call:
OP Technology and application for competitiveness (OP TAK) 2021 -2027
Managing body: Ministry of Industry and Trade of the Czech Republic
Priority 4: - shift to law carbon economy; Specific axis 4.1 – Support of measures within energy efficiency
2Q 2022, grant and FI for SMEs in all CZ regions except Prague to mitigate the impact of pandemic mitigation and increase of productivity of Czech enterprises

0,5 billion EUR

3,3 PJ energy savings

insulation, increase energy efficiency of technologies, smart technologies, components for adaptation, RES (heat pumps, PV, solar collectors, biomass boilers)

V.III.C. PLAYERS INVOLVE

The CTU-UCEEB as a partner of the RESINDUSTRY project took its leading role and proposed a series of dissemination events to split information about possible support for the SMEs to install RES within their production sites as well as with cooperation and through the site of the MIT – the managing authority of the subsidy provided.

V.III.D. TIMEFRAME

06/22
- **Final dissemination event**
- MIT introduction to the new opperational program

07/22
- New calls to be instroduced
- **Policy breakfast, face-to-face meetings**
- **Meeting with stakeholders and possible applicants**

09/22
- Providing **consultancy services to the applicants**
- Dissemination of the subsidy calls through social media

12/22
- Estimated end of the first submission period

03/23
- Evaluation of the application by the MIT

06/23
- Estimated - subsidy provided to applicants

Date: 29.6.2022

Signature: _____

Stamp of the organisation (if available): _____

ČESKÉ VYSOKÉ UČENÍ TECHNICKÉ V PRAZE
UNIVERZITNÍ CENTRUM ENERGETICKY EFEKTIVNÍCH BUDOV
273 43 Buštěhrad, Třinecká 1024
IČ: 68407700
-7-

Date: 26.7.2022

Signature: _____

Stamp of the organisation (if available): _____

MINISTERSTVO PRŮMYSLU A OBCHODU
Na Františku 32
110 15 PRAHA 1 - STARÉ MĚSTO
- 104 -