



D.T2.5.7

Summary report on Pilot Action to assess Industrial sectors RE projects in Poland

WP T2: Activity 2.5 PA 2: Improving energy efficiency in Industry Sector

Prepared by	RDA ARLEG S.A
Project number and acronym	CE 1131 FIRECE
Lead partner	Chamber of Commerce of Venice Rovigo Delta-Lagunare
Address	Ul. Rataja 26, 59-220 Legnica, Poland
Email	lwona.hajduk@arleg.eu
Date, venue	20/08/2020, Legnica



INDEX

INTRODUCTION	1
EXECUTIVE SUMMARY	2
1. SUMMARY OF THE RESULTS OBTAINED FROM THE IT TOOL CALCULATION	4
1.1 Basic scenario	4
2. CONCLUSION OF THE INDUSTRIAL SECTOR ENERGY EFFICIENCY PROJECTS ASSESSMENT ANALYSIS	9
2.1 Scenario 2 - subsidy + loan (interest rate of 0,5% and 1,0%)	10
2.2 Scenario 3 - loan (interest rate of 0,5%) + own investment	11
2.3 Conclusions	13
3. CONCLUSION OF THE PERFORMANCE OF THE PROJECT LEVEL TOOL (O.T1.4) TO ASSESS PUBLIC INVESTMENTS FOR INDUSTRY'S LOW CARBON TRANSITION	15
ANNEX I: MAIN CHARACTERISTICS OF ANALYSED PROJECTS	17



Introduction

The FIRECE project aims to contribute to the achievements of targeted results of Regional Energy Plans through an increased use of (innovative) financial instruments in the Central Europe area. The particular focus is on public support to industry to invest into energy efficiency and renewable energy sources.

The activity *2.5 Improving energy efficiency in Industry Sector* includes Pilot Actions carried out in five partner countries to assess Industrial sector RE projects using the Project level tool developed in WP T1 (O.T1.4) and updated in WP T2 (O.T2.2). The goal is to assess the public investments to support Industry low carbon transition: analysis of projects/investment plans elaborated by SMEs on EE/RES to verify their quality and quantity contribute to achieve the Energy Plans' targets.

This report collects and analyses data of industry assessment in Poland, useful for the evaluation of the Pilot Action 2.



EXECUTIVE SUMMARY

Country / region / PA2 Implementation area

Poland / Lower Silesia Voivodeship

Relevant energy saving funds:

Regional Operational Programme 2014-2020 of the Lower Silesian Voivodship 2014 - 2020 (ERDF)

Target group - SMEs¹

Number of SME's involved:

8 companies:

- micro: 3
- small: 4
- medium: 1

Type of projects:

Finalized projects: 8

Energy saving measures / type of investments analysed

Energy savings projects:

Measures involved:

- Energy management: 6
- Building insulation: 6
- Replacement of doors and windows: 4
- Installation of heat pumps: 3
- Coal boiler replacement: 1

¹ SMEs are the main target group of the Pilot Action 2. Under Regulation (EU) No 651/2014 of the European Commission, micro, small and medium-sized enterprises (SMEs) are enterprises with fewer than 250 persons and whose annual turnover does not exceed EUR 50 million and / or \ their annual balance sheet total does not exceed EUR 43 million.



Renewable energy sources projects: 2

Measures involved:

- Installation of photovoltaic systems (for electricity generation):2

Involved stakeholders

Lower Silesia Intermediary Institution

SMEs



1. Summary of the results obtained from the IT tool calculation

Eight projects funded from the Regional Operational Programme 2014-2020 of the Lower Silesian Voivodship 2014 - 2020 (ERDF) were analysed using the IT Tool developed in the project and adapted to local conditions.

All investment projects carried out by SME's consisted of several measures aimed at improving energy efficiency and installation of renewable energy sources. The majority of the analysed investments constituted thermomodernisation of buildings and replacement of windows and doors, as well as application of energy management system, while two of analysed projects represented installation of renewable energy sources - photovoltaic systems.

The funding under the ROP 3.2 Measure "Energy efficiency in SME's" was provided in a form of grants, therefore, the use of grants supplemented by own resources of the companies is considered as the basic scenario and relevant results obtained from the IT tool calculations are provided in the following sub-chapter.

Further, the IT tool was used to simulate how the project performance would change if financial instruments (in particular soft loans) were used. The relevant simulations are described in the chapter 2.

1.1 Basic scenario

The basic scenario consisted in the situation, when a project received a subsidy from the ROP (in most of cases - 53%), while the remaining part of the investment was covered by own resources of a company.

The three groups of indicators were considered and calculated:

- Energy savings, including costs of energy savings;
- GHG savings expressed in CO₂eq savings, including costs of the savings;
- Economic performance (cash flow, net present value, payback period).



Energy savings

The total amount of energy savings varies from 8 to 888 MWh per project. As it depends mostly on the amount of investment, this absolute indicator does not have adequate information value as such.

Regarding the costs of energy savings (expressed in €/MWh), the most expensive project was the one carried out by a beer production company (project No. 08), which concerned modernization of the technological heat and cooling system, installation of energy management system and change from electricity to gas, which show the costs over 11 783 €/MWh. However in case of project No. 08 the output data obtained from the IT tool's calculation (e.g. simple payback = 200 years) showed that the input data were incomplete/inaccurate from an energy efficiency point of view or the goal of the project was other than energy and financial savings (e.g. technological needs). On the contrary, the set of measures consisting of a building insulation, replacement of doors/windows and a modernization of a heating system achieves the lowest costs in the amount of 547 €/MWh (project No. 01), similarly to other building insulation projects combined with installation of energy management system which demonstrate also good performance with the costs ranging from 630 to 751 €/MWh.

The summary results are provided in following table:

Table 1 - Energy savings performance of the projects - basic scenario

Project	Energy savings (GJ)	Energy savings (MWh)	Cost of energy savings [€/MWh]
01	2825,35	784,82	547,11
02	277,81	77,17	2 112,13
03	3197,72	888,26	630,61
04	162,38	45,11	1 684,55
05	1460,13	405,59	751,27
06	1519,73	422,15	878,92
07	1340,87	372,46	720,62
08	30,43	8,45	11 783,55



GHG savings

The total amount of GHG (CO₂eq) savings varies from 2.855 kg to 300.094 kg per project. As it depends on the amount of investment, this absolute indicator does not have adequate information value as such.

The costs of CO₂eq savings (expressed in €/kg) range from 1,62 €/kg to 34,87 €/kg. The lower costs are shown by the projects involving a set of measures incl. building insulation, replacement of doors/windows and installation of energy management system. The projects including a photovoltaic installation (projects No. 04 and No. 06) also demonstrate good performance (2,60 €/kg and 4,99 €/kg), while the highest costs is shown by the project No. 08 (34,87 €/kg) on modernization of the technological heat and cooling system, installation of energy management system and change from electricity to gas, which demonstrates poor performance in other areas (energy, GHG emissions, economy).

The summary results are provided in following table:

Table 2 - GHG (CO₂eq) savings performance of the projects - basic scenario

Project	CO ₂ eq savings [kg/year]	CO ₂ eq savings per MWh saved [kg/MWh]	Cost of CO ₂ eq savings [€/kg]
01	265 148,71	337,85	1,62
02	26 071,45	337,85	6,25
03	300 094,27	337,85	1,87
04	15 238,76	337,85	4,99
05	137 027,83	337,85	2,22
06	142 621,07	337,85	2,60
07	125 835,72	337,85	2,13
08	2 855,74	337,85	34,87

Economic performance

All analysed projects show positive annual cash flow, which is equal to annual energy savings; there is no annual negative cash flow in terms of loan instalments as the financing consisted only in subsidies.



In contrast, when analysing “cash flow breakpoint” - i.e. a year when cumulative savings exceed cumulative expenses², we can observe considerable differences between projects. Out of all analysed projects, three projects (No. 02, 04 and 08) can never reach CF=0 and they also demonstrate negative NPV, while their repayment can be achieved several dozen or so years after the lifetime of the measure.

The fastest repayment (5 years) was achieved in the project implemented by the company running the Eldercare Home, which carried out an investment involving a set of measures to modernise the building in which it operates (incl. building insulation, modernization of heating source). In case of the other projects, the repayment can be achieved after 9 to 11 years, which is also a very good economic performance. Those projects also provides a simple payback period that is lower than the lifetime of the measure, while the payback period of the remaining three projects exceeds the measure lifetime, which leads to the conclusion that without the support of grants, these projects would not have been implemented or would have been implemented on a much smaller scale.

The summary results are provided in following table:

Table 3 - Economic performance of the projects - basic scenario

Project	CF breakpoint [year]	NPV [EUR]	Simple payback [years]
01	5	485 961,32	9
02	never	-50 431,33	36
03	9	324 879,88	11
04	never	-3 186,23	29
05	9	146 397,51	16
06	11	127 037,98	18
07	9	139 754,00	12
08	never	-42 494,83	200

Note: Among the analysed projects, the one on modernization of the technological heat and cooling system, installation of energy management system and change

² In case of the basic scenario, cumulative expenses = the initial own investment.



from electricity to gas (project No.08) shows extremely poor performance in all areas - energy, GHG emissions, economy. The costs of both energy and GHG emissions savings are the highest, while CO₂eq savings (kg/year) are very low; the simple payback period equals 200 years, and the project can never reach the CF breakpoint. In case of this project, carried out by the beer production company, the output data obtained from the IT tool's calculation (e.g simple payback = 200 years) showed that the input data were incomplete/inaccurate from an energy efficiency point of view or the goal of the project was other than energy and financial savings (e.g. technological needs).



2. Conclusion of the Industrial sector energy efficiency projects assessment analysis

In order to assess an impact of the different types of instruments and different shares of financial support on the economic and environmental parameters of the projects, two alternative scenarios were developed and analysed:

- **Scenario 2** simulates the situation when the project receives a subsidy (same amount as in the basic scenario) and the rest of the investment is financed through a soft loan. The repay of the loan is 15 years, while two levels of the interest rate are considered - 0,5% and 1,0%.

Note: The soft loans for energy efficiency measures in the SME sector is an instrument which has been granted since 2018 under the Regional Operational Programme of the Lower Silesian Voivodship 2014-2020 Measure 3.2. scheme D on preferential terms for micro, small and medium-sized enterprises. Basic parameters includes: the value of the loan from 200 thousand PLN (ca. 50 000 EUR) up to 3 million PLN (ca. 715 000 EUR), the repay period is up to 15 years, the preferential rate starting from 0,5%. Financial instruments - soft loans are implemented by Financial Intermediaries selected within the framework of tenders conducted by National Economy Bank.

- **Scenario 3** excludes subsidies and consists in financing through a soft loan with the repay of 15 years and 0,5% interest rate. The loan is provided up to 100% of the investment, no company's own resources are required (one alternative) and up to 90% of the investment, while the rest is covered from the company's own resources.
- *Note: The soft loans for energy efficiency measures in the SME sector, which can cover 100% of the total investment costs has been granted since 2018 under the Regional Operational Programme of the Lower Silesian Voivodship 2014-2020 Measure 3.2. scheme D on preferential terms for micro, small and medium-sized enterprises.*

In terms of results, energy and GHG emissions savings - both absolute and relative indicators - remain the same in the described scenarios as in the basic scenario. Concerning economic indicators, the cash flow and the simple payback period also do not change, while the cash flow breakpoint and the net present value differ.

Compared to the basic scenario, some other indicators were introduced into the scenarios 2 and 3 to evaluate economic performance of the projects, including:



- Alternative subsidy share - Taking into account the NPV achieved in this scenario, the indicator shows hypothetical subsidy that would be needed to reach the same NPV without applying a loan.
- Alternative own investment - Following the previous indicator, this indicator calculates what would be necessary amount of own investment.

2.1 Scenario 2 - subsidy + loan (interest rate of 0,5% and 1,0%)

The use of financial instrument (soft loan) instead of own resources for co-funding of the project has the ability to increase its NPV and decrease the CF breakpoint - which is valid for both interest rates analysed. Although out of three projects with negative NPV in the basic scenario, two failed to achieve positive NPV, one was able to turn into positive NPV (project No. 04).

All projects with higher annual financial savings than the annual loan instalment generate positive cash flow since the beginning with; therefore their CF breakpoint is 1 year. In case of those two projects with negative NPV, their annual loan instalment was always higher than annual energy savings.

The summary results are provided in following tables:

Table 4 - Economic performance of the projects - scenario 2 (0,5 % interest rate)

Project	CF breakpoint [year]	NPV [EUR]	Alternative subsidy share [%]	Alternative own investment [EUR]
01	1	520 570,66	61	166 686,45
02	never	-19 816,28	46	87 392,65
03	1	521 610,79	54	256 224,10
04	1	10 188,01	61	29 310,39
05	1	171 025,69	61	118 614,94
06	1	155 368,27	61	146 095,51
07	1	221 635,92	61	104 526,30
08	never	-32 785,03	60	40 187,03



Table 5 - Economic performance of the projects - scenario 2 (1% interest rate)

Project	CF breakpoint [year]	NPV [EUR]	Alternative subsidy share [%]	Alternative own investment [EUR]
01	1	513 940	60	173 317,48
02	never	-23 293	44	90 869,26
03	1	511 418	52	266 417,07
04	1	9 022	60	30 476,40
05	1	166 307	60	123 333,62
06	1	149 556	59	151 906,87
07	1	217 478	60	108 684,51
08	never	-34 384	58	41 787,73

2.2 Scenario 3 - loan (interest rate of 0,5%) + own investment

The use of financial instrument (the preferential interest rate of 0,5%) and own resources without any subsidy very significantly decreases the projects NPV compared to both basic scenario and scenario 2- which is valid for both amounts of a loan analysed.

Out of eight analysed projects only four projects were able to achieve positive NPV (one of the project from basic scenario and two projects from scenario 2 turned into negative NPV). However when it comes to CF breakpoint, three projects improved their CF breakpoint and were able to generate higher financial savings than annual loan instalment.

For all the projects, the hypothetical subsidy share is 17,00 % in case of the variant with 100% loan and 15% in case of the variant with 90% loan and 10% own resources.



The summary results are provided in following tables:

Table 6 - Economic performance of the projects - scenario 3 (loan 100%, own recourses 0%)

Project	CF breakpoint [year]	NPV [EUR]	Alternative subsidy share [%]	Alternative own investment [EUR]
01	1	331 697,28	17	355 559,83
02	never	-67 392,98	17	134 969,74
03	1	313 996,61	17	463 837,97
04	never	-23 426,44	17	62 924,84
05	17	37 322,10	17	252 318,53
06	never	-5 781,73	17	307 245,00
07	1	103 907,70	17	222 254,52
08	never	-75 049,84	17	82 451,84

Table 7 - Economic performance of the projects - scenario 3 (loan 90%, own recourses 10%)

Project	CF breakpoint [year]	NPV [EUR]	Alternative subsidy share [%]	Alternative own investment [EUR]
01	3	324 314,74	15	362 942,36
02	never	-70 195,37	15	137 771,74
03	4	304 366,18	15	473 468,70
04	never	-24 732,96	15	64 231,36
05	18	32 083,18	15	257 557,45
06	never	-12 161,10	15	313 624,36
07	6	99 293,00	15	226 869,22
08	never	-76 761,80	15	84 163,80



2.3 Conclusions

Comparison of the three different financing models includes:

- subsidy + own resources (the most common funding model in Poland);
- subsidy + soft loan;
- soft loan + own resources.

The most favourable economic indicators were achieved in the scenario 2 including subsidy and soft loans substituting own resources, which leads to significantly increased NPV and decreased the CF breakpoint. Whereas the substitution of subsidy with a soft loan delivers decrease of NPV and increase of CF breakpoint in comparison to basic scenario (see table 8).

Table 8 - Economic performance of the projects

Indicator	Basic scenario Subsidy + own resources	Scenario 2 Subsidy + soft loan	Scenario 3 Soft loan + own resources
Net present value (NPV)			
Projects with NPV >0	5	6	4
Projects with NPV < 0	3	2	4
Cash flow (CF) breakpoint			
Projects with CF breakpoint “never”	3	2	4
Projects with CF breakpoint = 1 year	0	6	3

When combining a subsidy with a soft loan (scenario 2), six projects significantly improved their CF breakpoint and generate positive cash flow since the beginning. Their annual financial savings are higher than the annual loan instalment and at the same time, the company does not need to provide its own initial investment. Only two failed to achieve positive NPV.

However, when increasing the share of a loan to 90% and 100% (scenario 3), four projects demonstrated negative NPV, however in case of three other projects their CF breakpoint significantly improved in comparison to basic scenario.

Taking into account the environmental savings achieved by the projects, the implementation of investments in all projects has contributed to the achievement of the objectives of national/regional energy plans. However, while analysing selected



projects at the same time in terms of economic feasibility, which is equally important, the best results have been achieved with a certain level of a subsidy component combined with soft loans.



3. Conclusion of the performance of the Project level tool (O.T1.4) to assess public investments for industry's low carbon transition

ENVIROS was a responsible partner for the development of the Tool including the graphical design as well as for local specifications finalized based on other partners' data.

The IT Tool used in the process of RES/EE projects assessment was prepared by the Czech partner ENVIROS and based on Czech data, which included the national strategies and plans related to energy, as well as datasets available from energy audits carried out by ENVIROS experts. Therefore it required the adaptation to local specification and energy plans for Poland / Lower Silesia region. It was especially difficult to obtain the data on emission factors for the individual energy sources, as not all required data were available or consistent with the project area for Poland.

In the end, the tool completed with Polish input data was adapted to local conditions with the help of ENVIROS, and after some adjustments to the calculations, it worked properly and was able to be used in the pilot activities to assess Industrial sectors RE projects in the Poland.

User friendliness

The interface of the tool is simple; it does not require an advanced level of IT skills. The results are presented in a clear and easy to interpret manner. The daily use of the IT tool has a positive impact on the understanding of the IT tool users of the basic aspects related to energy consumption and the impact of energy consumption on environmental parameters.

Recommendations and suggestions

The use of the IT tool to assess public investments for industry's low carbon transition proved to be very useful in the evaluation of SME's projects clearly linking investments done to energy saving effects. The wider use of the tool provides an opportunity to make targeted decisions on key areas of support for SMEs related to energy efficiency improvements.



The tool showed that when assessing more complex projects, the quantity and quality of data collected during project implementation is insufficient. Further work is required in this direction. The following scenarios are possible:

- improving the quality of required data provided by SMEs and using the IT tool as it is now
- recognition that the tool is unable to properly evaluate more complex projects and using the IT tool as a filter to find such projects; in such a situation, complex projects required different procedures
- recognition that extending the IT tool with the next parameters is necessary and performing the required work.



Annex I: Main characteristics of analysed projects

Company	Sector	Size	Project	Investment	Status
1.	Services (Eldercare & Care Home)	Micro	Set of measures: <ul style="list-style-type: none"> - building insulation: insulation of walls, floor, roof - replacement of external doors/windows - modernization of heating system 	429 385 EUR	implemented and verified
2.	Servicing and installation of air conditioning	Small	Set of measures: <ul style="list-style-type: none"> - installation of heat pumps - replacement of external doors/windows - building insulation 	162 993 EUR	implemented and verified
3.	Rental and property management	Medium	Building insulation Energy management	560 145 EUR	implemented and verified
4.	Health center	Small	Set of measures: <ul style="list-style-type: none"> - building insulation: insulation of walls, floor, roof - replacement of external doors/windows - replacement of heating system - energy management system - Installation of photovoltaic systems 	75 990 EUR	implemented and verified



			- installation of heat pumps		
5.	Printing house	Small	Building insulation: insulation of walls, floor, roof Replacement of coal boiler	304 707 EUR	implemented and verified
6.	Hotel and spa	Small	Set of measures: - building insulation: insulation of walls, floor, roof - replacement of external doors/windows - energy management system - Installation of photovoltaic systems - installation of heat pumps	371 038 EUR	implemented and verified
7.	Guesthouse and restaurant	Micro	Set of measures: - building insulation - replacement of doors/windows - energy management	268 401 EUR	implemented and verified
8.	Beer production	Micro	Set of measures - modernization of the technological heat and cooling system, - installation of energy management system - change from electricity to gas	48 531 EUR	implemented and verified