



[Applying Energy Efficient measures for metal and metalworking SMEs and industry \(EE-METAL\)](#)

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Final report on the potential energy saving measures in SMEs of the metalworking sector of 4 EU countries: a cross-country benchmarking

Phase II

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Abstract	This document shows the energy analysis, the preliminary energy saving measures obtained from the energy audits and the results obtained from the contacts established between ESCOs and the SMEs taking into account the WP5 "Overcoming existing barriers for increasing energy savings in MMA SMEs"



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FINAL REPORT ON THE POTENTIAL ENERGY SAVING MEASURES IN SMES OF THE METALWORKING SECTOR OF 4 EU COUNTRIES: A CROSS- COUNTRY BENCHMARKING

PHASE II

1 INTRODUCTION

After the completion of the energy audits and the study performed in which there are described and compared the different energy service contracts, the role of the ESCOs and the differences between the financial products for the financing of the energy saving measures (WP5), a step further is made and bring to a successful conclusion the practical application of the energy saving measures obtained in the audits performed. In other words, those energy saving measures that SMEs themselves would not be able to carry out, for economic reasons of technical training, would be realized through innovative forms of contracting.

For this reason, in addition to bringing to light these innovative forms of contracting (included in WP5), contacts have been made between ESCOs and SMEs interested in the application of energy saving measures.

For a better understanding and due to the continuity between this Phase and the information presented in Phase I, both will be unified in one single document. The Second Phase (Phase II) will be developed in detail in the item 3 of this report.

2 PHASE I

According to task 3.3 "Audit development and report of results Phase 1", every country member should carry out 20 energy audits, 80 in total, based on the common methodology developed in task 2.2

This document aims to show the energy analysis and the obtained measurements of saving from the energy audits realized so much at sectorial level, by country as on a global scale, taking into account that the four countries involved in the project are: France, Italy, Poland and Spain.

2.1 COMPANIES AUDITED

Initially, the audited companies should fulfill the following requirements:



- To be a small or medium company.
- Belong to the following subsectors:
 - NACE 24
 - NACE 25
 - NACE 28
- To have an energy consumption in accordance to sectors:
 - NACE 24: < 38 GWh/year
 - NACE 25:> 0,5 GWh/year
 - NACE 28: > 0,5 GWh/year
- And be disaggregated in the following subsectors:
 - NACE 24: 12 audited companies. 3 companies per country.
 - NACE 25: 48 audited companies. 12 companies per country.
 - NACE 28: 20 audited companies. 5 companies per country.

The business activities that encompass each of the sectors included in this document are described below:

NACE 24: Manufacture of basic metals.

Including some subsectors such as:

C24.1 - Manufacture of basic iron and steel and of ferro-alloys

C24.2 - Manufacture of tubes, pipes, hollow profiles and related fittings, of steel

C24.3 - Manufacture of other products of first processing of steel

C24.4 - Manufacture of basic precious and other non-ferrous metals

C24.5 - Casting of metals

NACE 25: Manufacture of fabricated metal products, except machinery and equipment

C25.1 - Manufacture of structural metal products

C25.2 - Manufacture of tanks, reservoirs and containers of metal

C25.3 - Manufacture of steam generators, except central heating hot water boilers

C25.4 - Manufacture of weapons and ammunition



C25.5 - Forging, pressing, stamping and roll-forming of metal; powder metallurgy

C25.6 - Treatment and coating of metals; machining

C25.7 - Manufacture of cutlery, tools and general hardware

C25.9 - Manufacture of other fabricated metal products

NACE 28: Manufacture of machinery and equipment n.e.c.

C28.1 - Manufacture of general-purpose machinery

C28.2 - Manufacture of other general-purpose machinery

C28.3 - Manufacture of agricultural and forestry machinery

C28.4 - Manufacture of metal forming machinery and machine tools

C28.9 - Manufacture of other special-purpose machinery

Finally, the audits carried out in Small and Medium companies have been:

N° OF COMPANIES				
	NACE 24	NACE 25	NACE 28	Total
FRANCE	3	15	2	20
ITALY	3	14	3	20
POLAND	3	13	5	21
SPAIN	3	13	4	20
TOTAL	12	55	14	81

With the following ranges of final energy consumptions:

FINAL ENERGY CONSUMPTION (GWh/y)			
	NACE 24	NACE 25	NACE 28
FRANCE	> 0,39 and < 44,04	> 0,63 and < 6,55	> 0,47 and < 1,10
ITALY	> 0,98 and < 12,75	> 0,46 and < 16,15	> 0,63 and < 2,12
POLAND	> 0,72 and < 20,17	> 0,14 and < 12,50	> 0,52 and < 2,71
SPAIN	> 0,92 and < 17,60	> 0,14 and < 8,14	> 0,28 and < 3,81



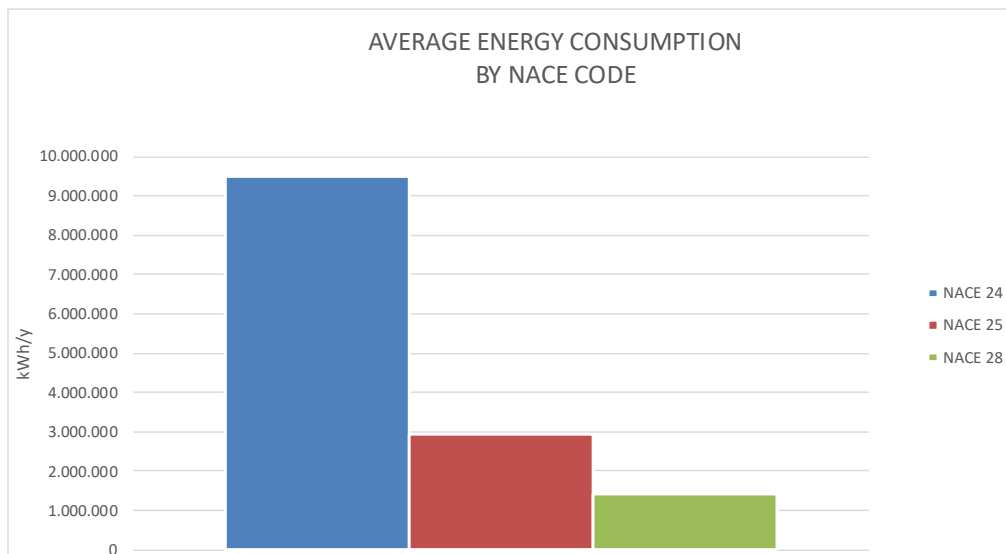
2.3 ENERGY ANALYSIS

In this paragraph it is intended to realize an energetic analysis of audited companies as a whole, by sector and by country. This study refers to final energy, that represents the sum of electricity and primary energy content of fuels taking into account gross calorific value of them (natural gas, diesel fuel, biomass etc.).

2.3.1 AVERAGE FINAL ENERGY CONSUMPTION BY SECTOR

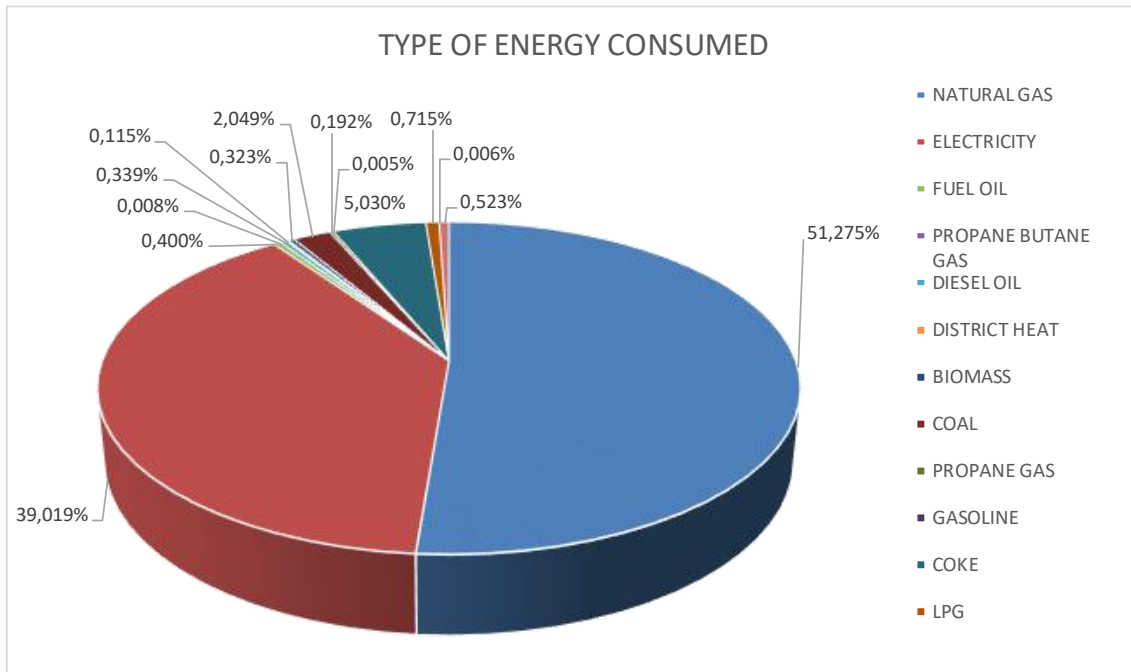
With the data acquired from the audits carried out, the following average final consumptions by sector were obtained:

AVERAGE FINAL ENERGY CONSUMPTION (GWh/y)	
NACE 24	9,49
NACE 25	2,95
NACE 28	1,40



2.3.2 TYPE OF FINAL ENERGY CONSUMPTION

The types of energy sources used by the audited companies are mainly natural gas and electricity, being the sum of both more than 90% of total consumption. Below is show a chart with the different types of energy sources which have been consumed and the importance of each of them on the total.

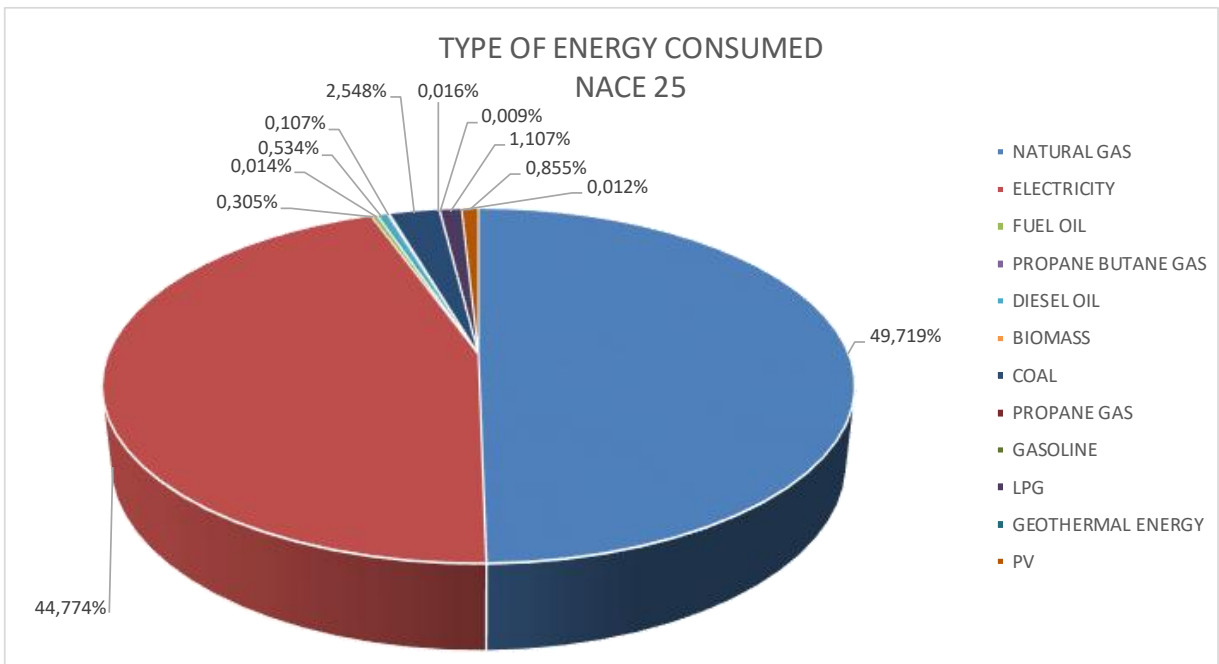
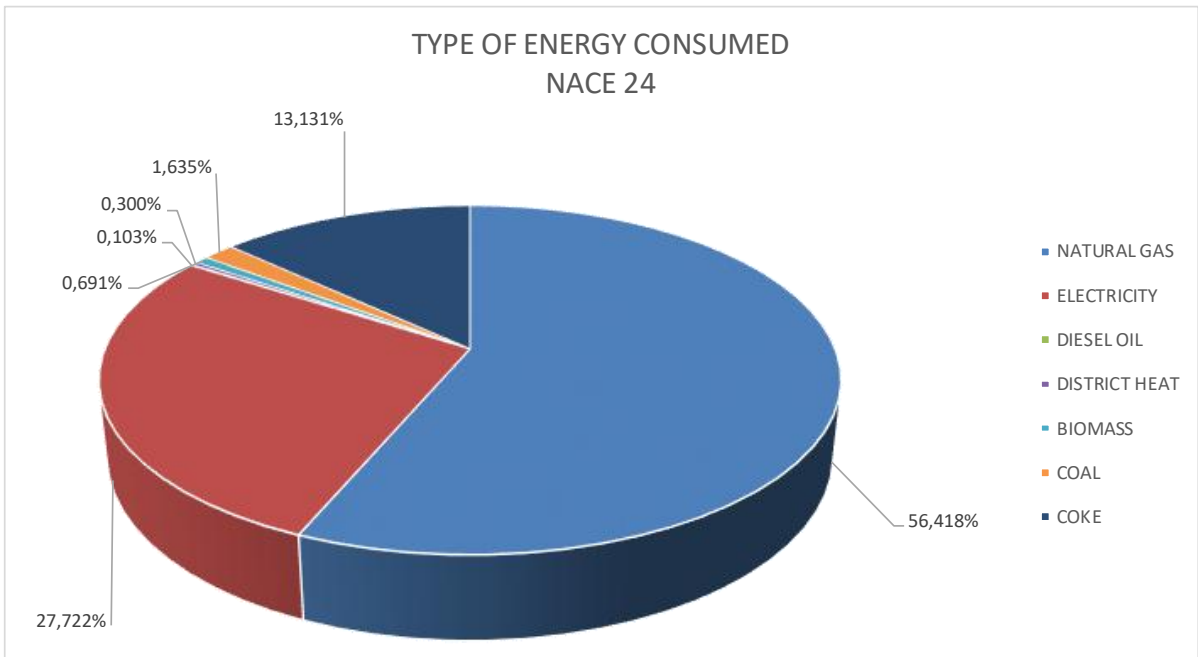


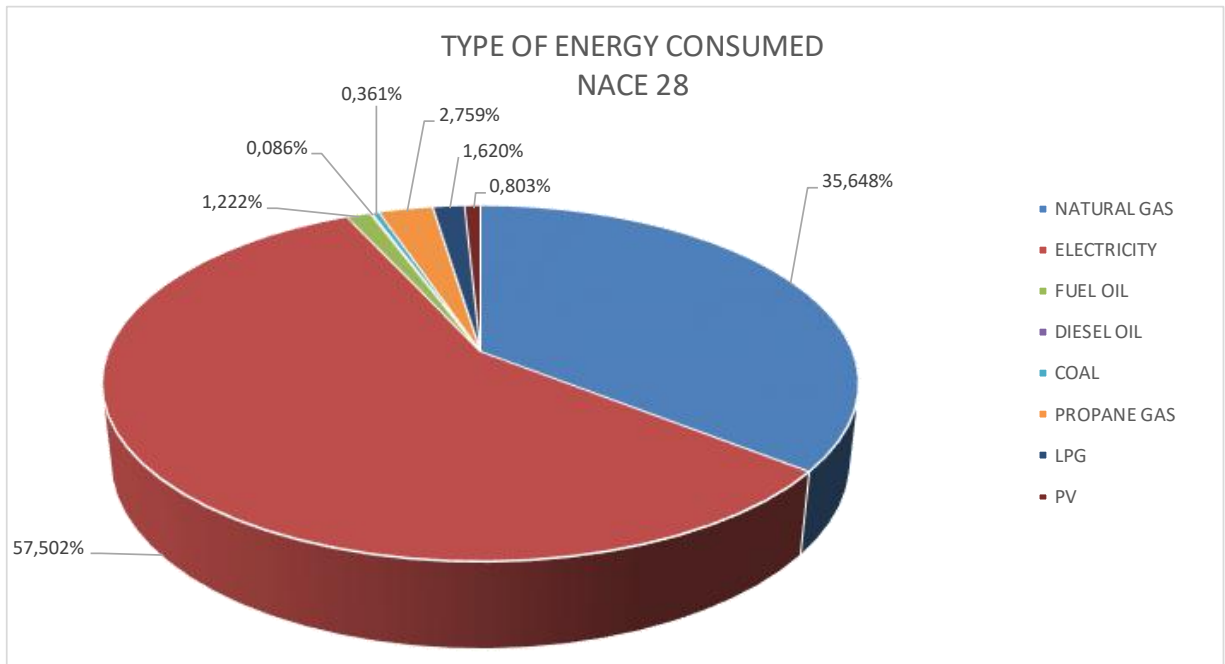
As shown in the graph, the third source of energy consumed is the coke, followed by coal.

If it is focused by NACE, in Sector 24, the greatest energy weight are those sources whose use is heat production. This is why Natural Gas in conjunction with Coke takes more than 69% of total consumption.

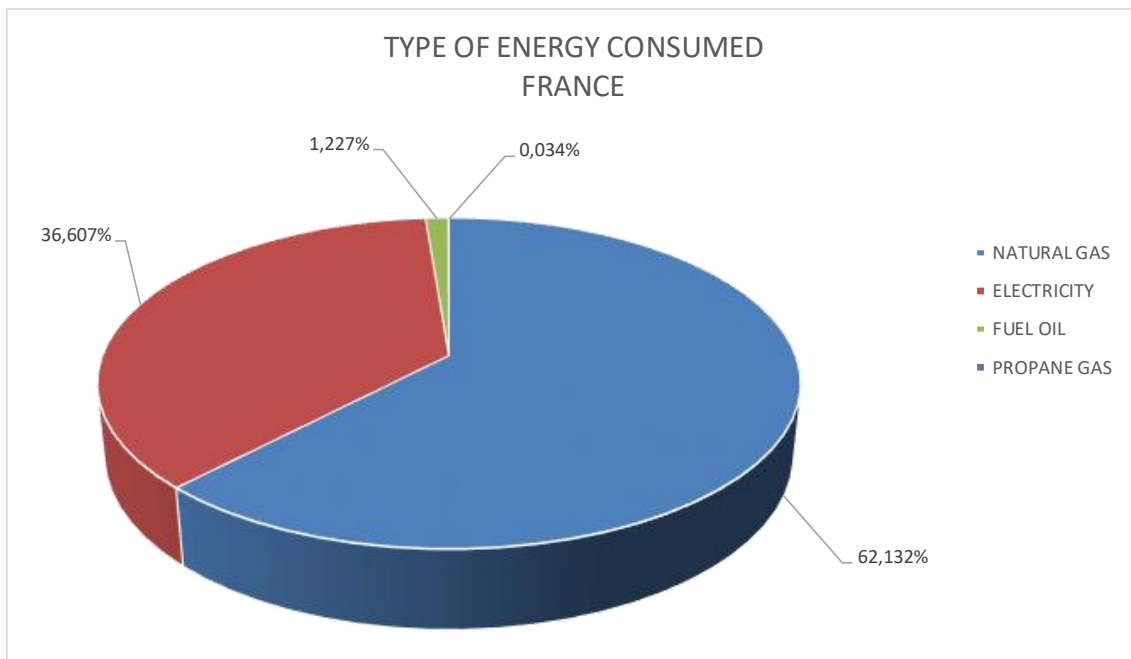
Nevertheless, in sectors 25 and 28 the use of electricity increases its weight in global computation, being more than 61% higher than natural gas in sector 28.

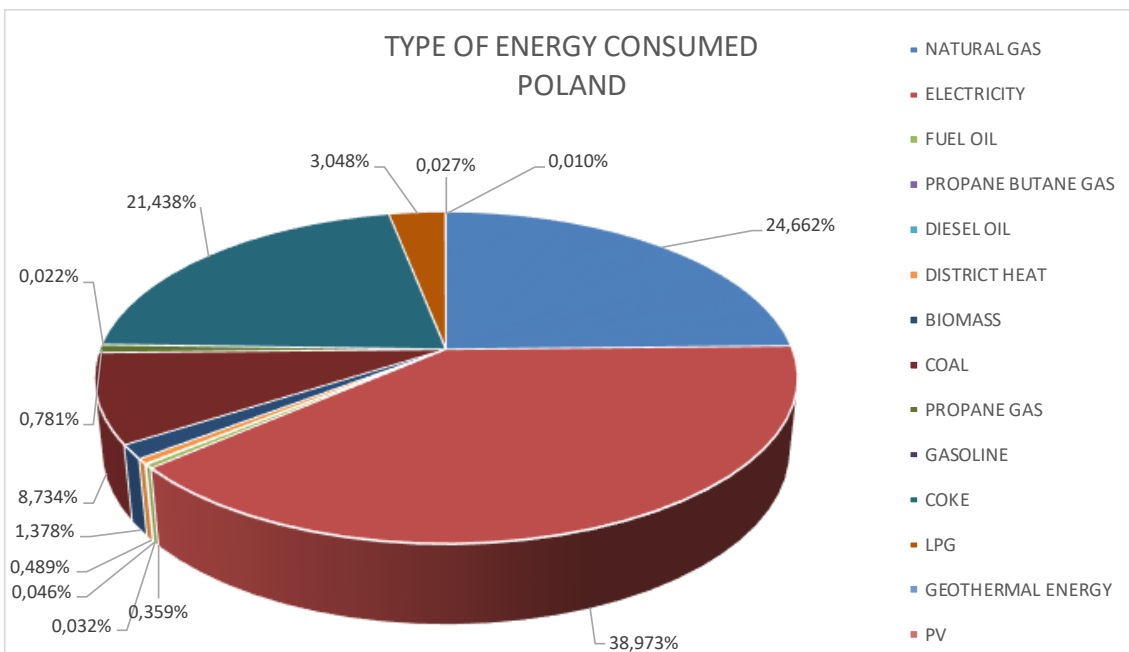
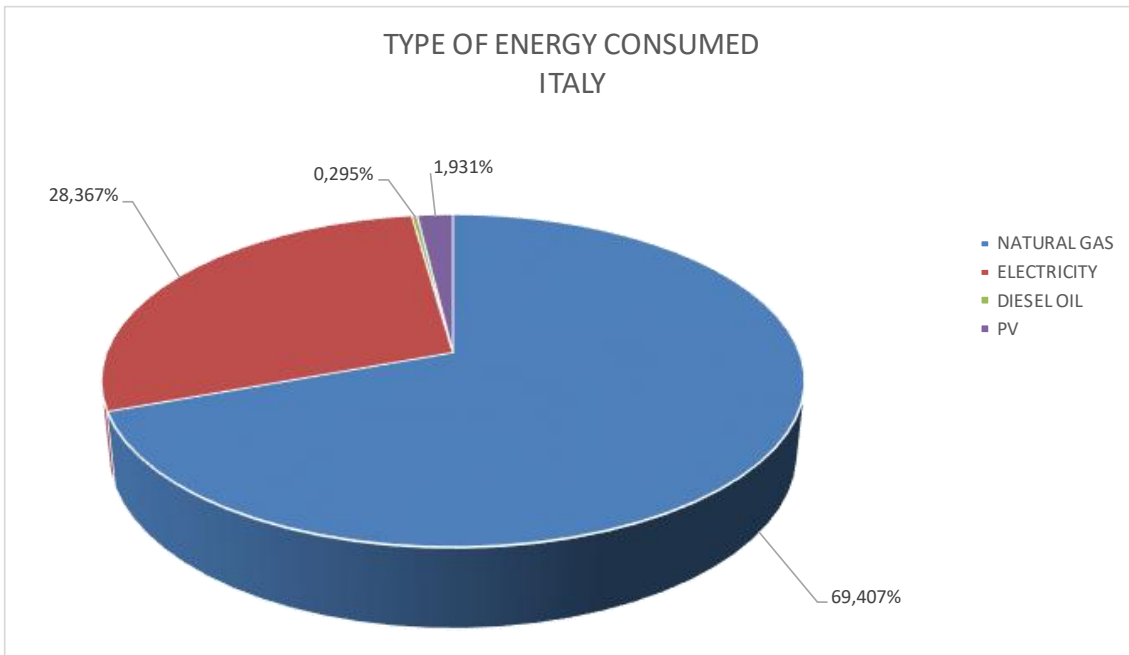
Below is shown the graphs of the energy types consumed in each of the sectors.

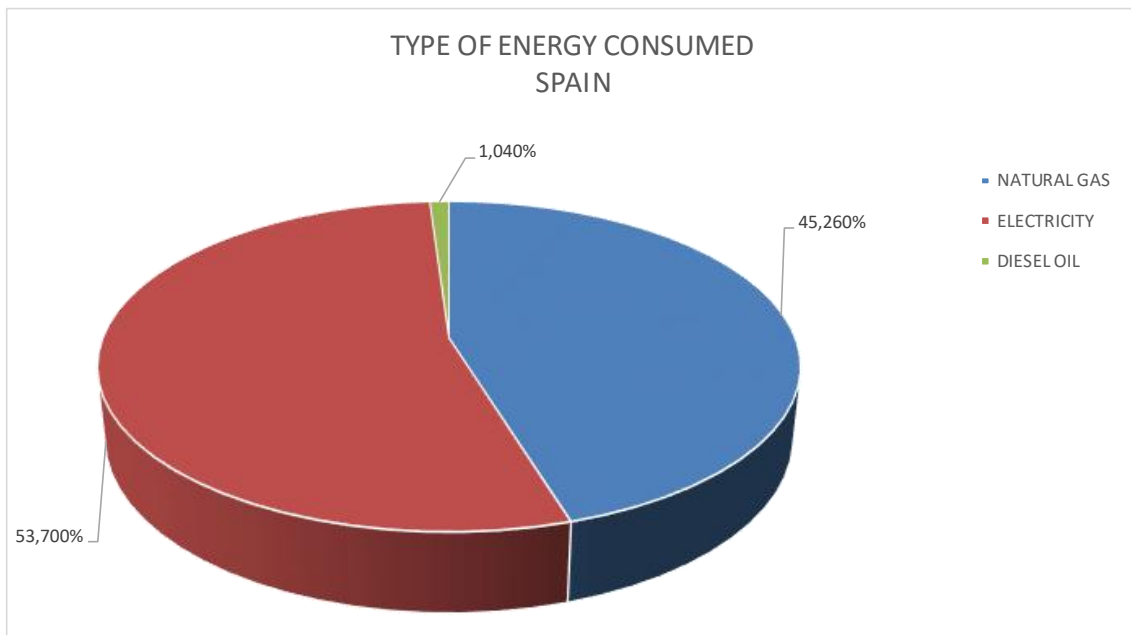




If it is focused on types of energy sources used by country and its weight on the global consumption of each of them, we will obtain the following graphs:





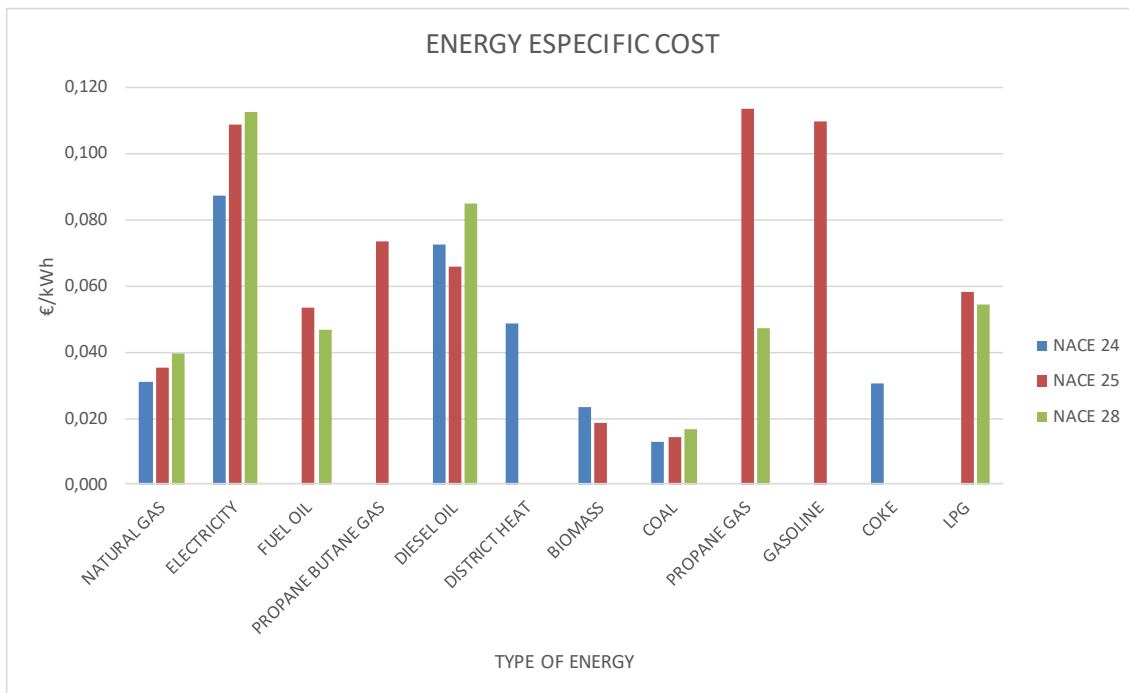


Highlight the diversity of energy sources used in Poland. Energy sources such as coke and coal are only being used in Poland, as well as renewable sources such as biomass, geothermal energy and the use of district heating to convert heat needs. Photovoltaic energy is also used in Poland and Italy, with percentages close to 2% in Italy.

2.3.3 ENERGY COSTS

This section aims to show the energy cost of the different energy sources used in the audited companies.

The following chart represents the specific cost of energy sources used in each sector studied.



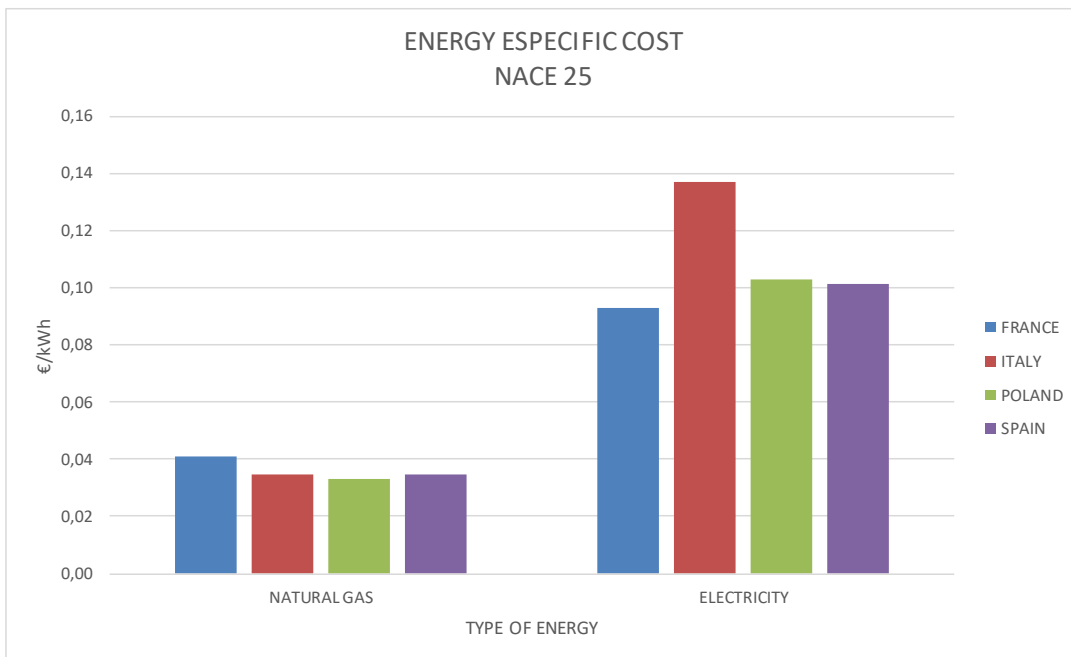
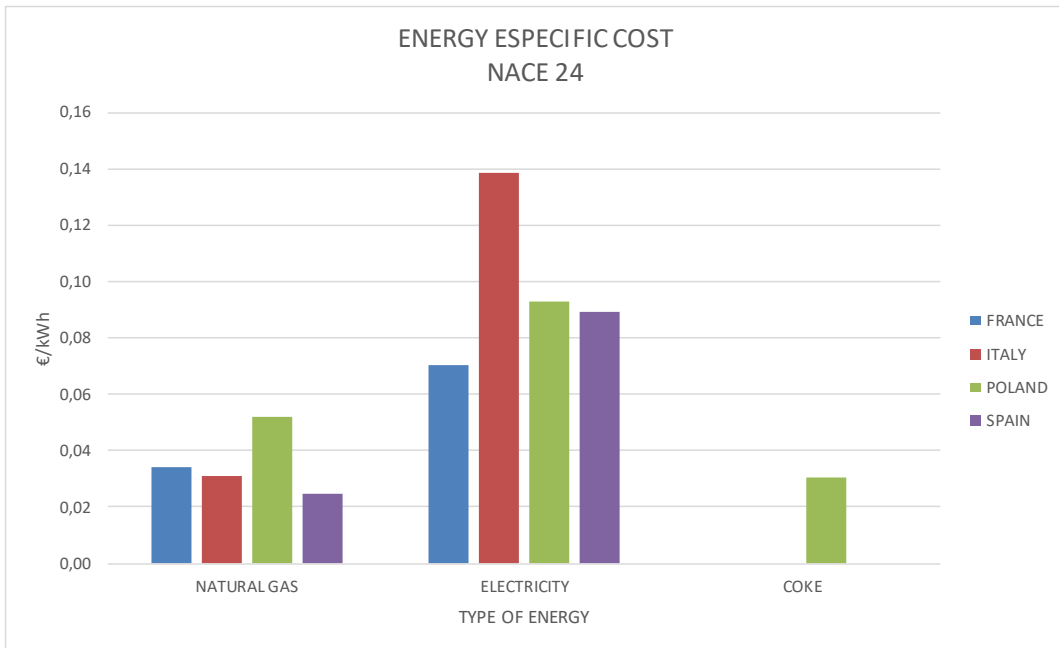
As it has been indicated previously on a global scale, the sum of the consumption of natural gas and electricity means more than 90 % of the total consumption of the audited companies. As it can be seen in the previous graph, in case of both types of energy, to higher consumption lower is the specific cost.

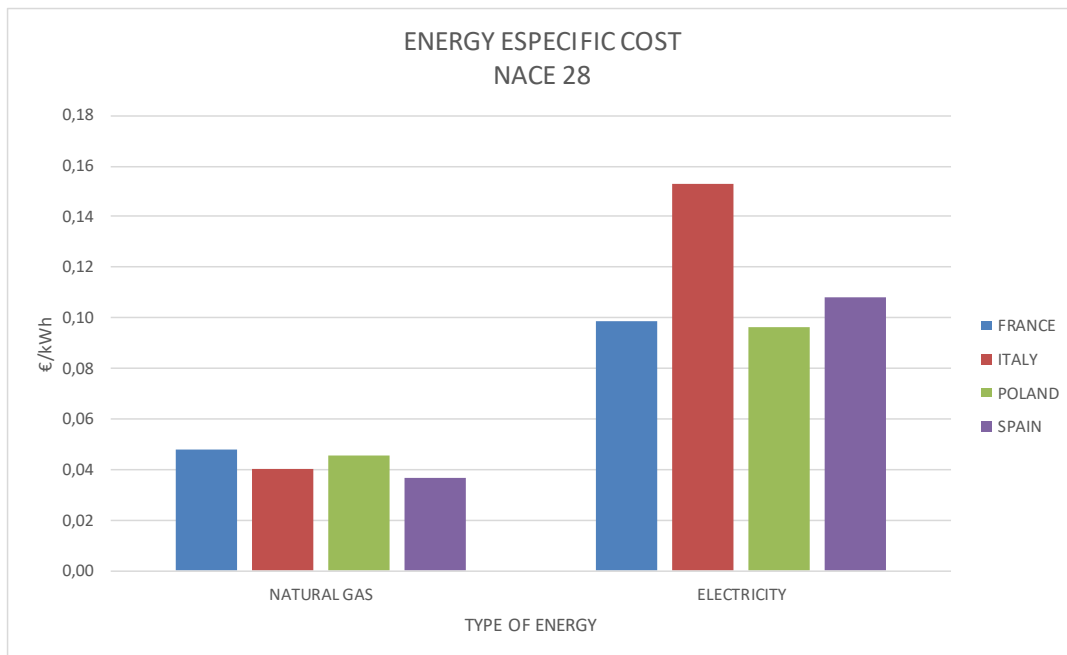
In case of NACE 24 which average consumption per company is $9,49 \times 10^6$ kWh/year the specific cost of natural gas and electricity is the minimum obtained, 0,031 €/kWh and 0,087 €/kWh respectively.

In case of NACE 25 which average annual consumption per company is $2,95 \times 10^6$ kWh/year the specific cost of natural gas and electricity is 0,035 €/kWh and 0,108 €/kWh respectively.

And in case of NACE 28 with the average annual consumption per company lower, $1,42 \times 10^6$ kWh/year, the specific cost of natural gas and electricity is the highest, 0,039 €/kWh and 0,113 €/kWh respectively.

With the data provided by the audited companies we can also obtain the charts corresponding to the specific costs of each country of the main energy sources used in each NACE.





Note that the data obtained from specific cost of natural gas and electricity by sector are quite similar to the data obtained from Eurostat for 2016 (average of the two semesters of the year) for Non-household consumers in the ranges of values of average final consumption by NACE in each of the countries.

These data are:

DATA OF EUROSTAT	NATURAL GAS COST (€/kWh). Non-household consumers. Excluding VAT and other recoverable taxes and levies.			ELECTRICITY COST (€/kWh). Non-household consumers. Excluding VAT and other recoverable taxes and levies.		
	NACE 24	NACE 25	NACE 28	NACE 24	NACE 25	NACE 28
FRANCE	0,04	0,04	0,04	0,08	0,08	0,09
ITALY	0,03	0,03	0,04	0,14	0,14	0,15
POLAND	0,03	0,03	0,03	0,07	0,07	0,08
SPAIN	0,03	0,03	0,04	0,09	0,09	0,11

NOTE: NACE 24: Natural gas consumption between 10.000 and 100.000 GJ
 NACE 25: Natural gas consumption between 10.000 and 100.000 GJ
 NACE 28: Natural gas consumption between 1.000 and 10.000 GJ
 NACE 24: Electricity consumption between 2.000 and 20.000 MWh
 NACE 25: Electricity consumption between 2.000 and 20.000 MWh
 NACE 28: Electricity consumption between 500 and 2.000 MWh

The data obtained from the audited companies are:



DATA OF EE_METAL	NATURAL GAS COST (€/kWh).			ELECTRICITY COST (€/kWh).		
	NACE 24	NACE 25	NACE 28	NACE 24	NACE 25	NACE 28
France	0,03	0,04	0,05	0,07	0,09	0,10
Italy	0,03	0,03	0,04	0,14	0,14	0,15
Poland	0,05	0,03	0,05	0,09	0,10	0,10
Spain	0,02	0,03	0,04	0,09	0,10	0,11

Highlight that the data obtained from the audits of Poland are the most distant from those offered by Eurostat.

It should be noted that the number of companies audited in this project are 81 compared to the more than 55.000 values included in Eurostat.

2.3.4 ENERGY CONSUMPTION BY END USE

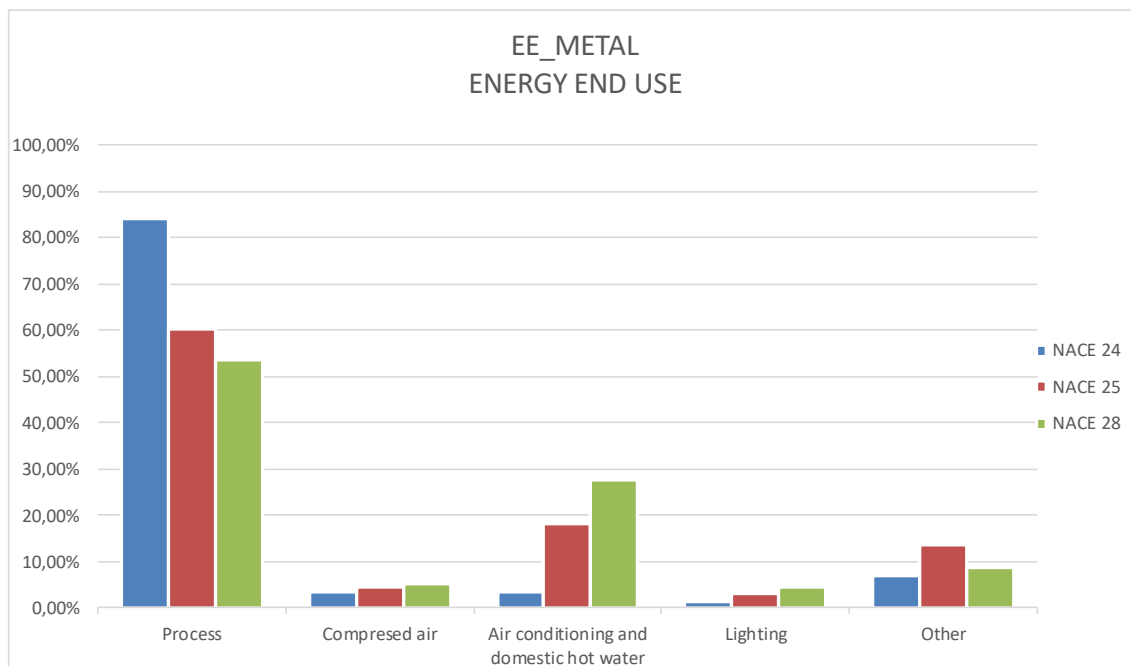
In this section, through the audits carried out, it is intended to establish for each NACE, ratios of energy consumed depending on the end use of it. In this section, through the audits carried out, it is intended to fix for each NACE energy ratios consumed according to the final use of it. However, due to the variety and plurality of the audited companies, only 5 types of final use of energy have been established. These types of end use energy are:

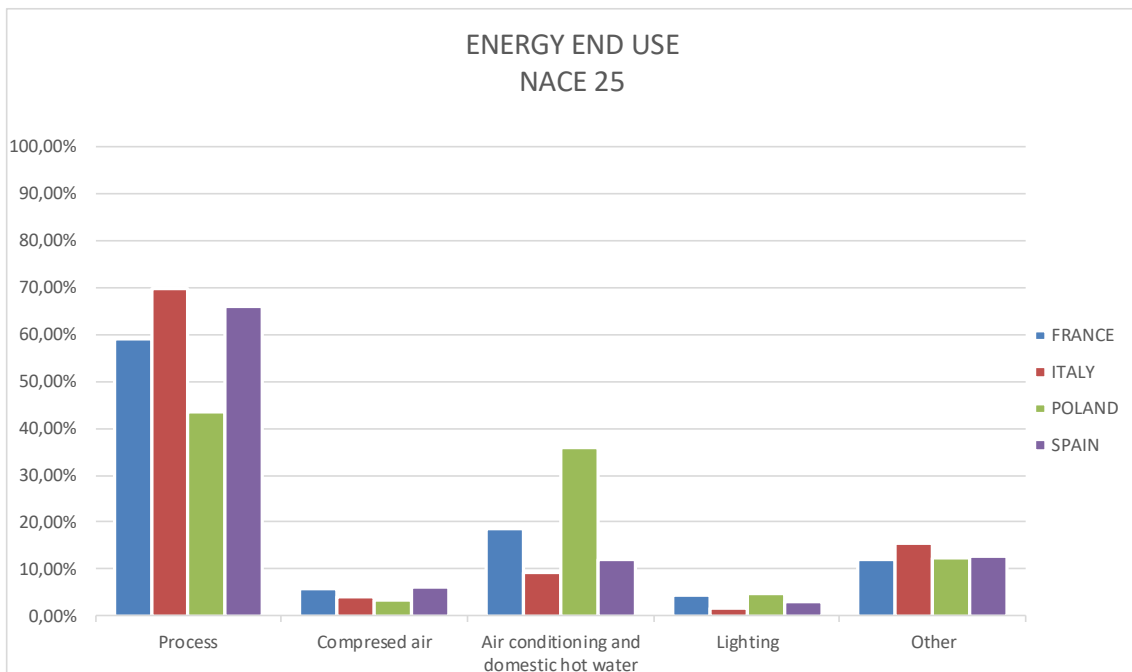
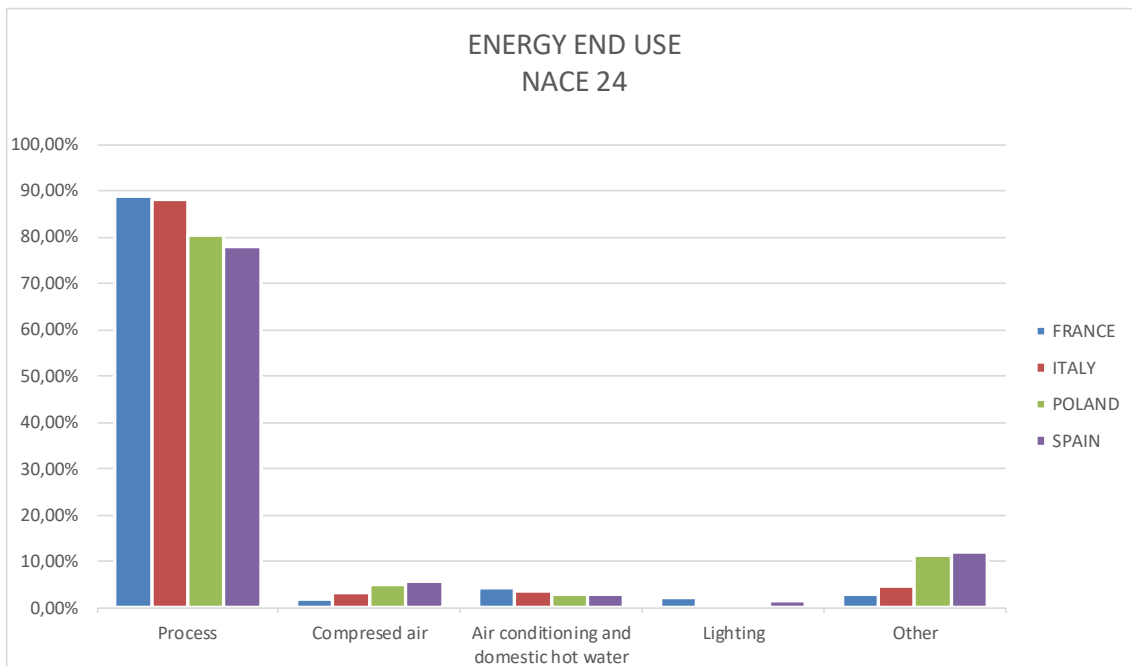
- Process
- Compressed air
- Air conditioning and domestic hot water
- Lighting
- Other

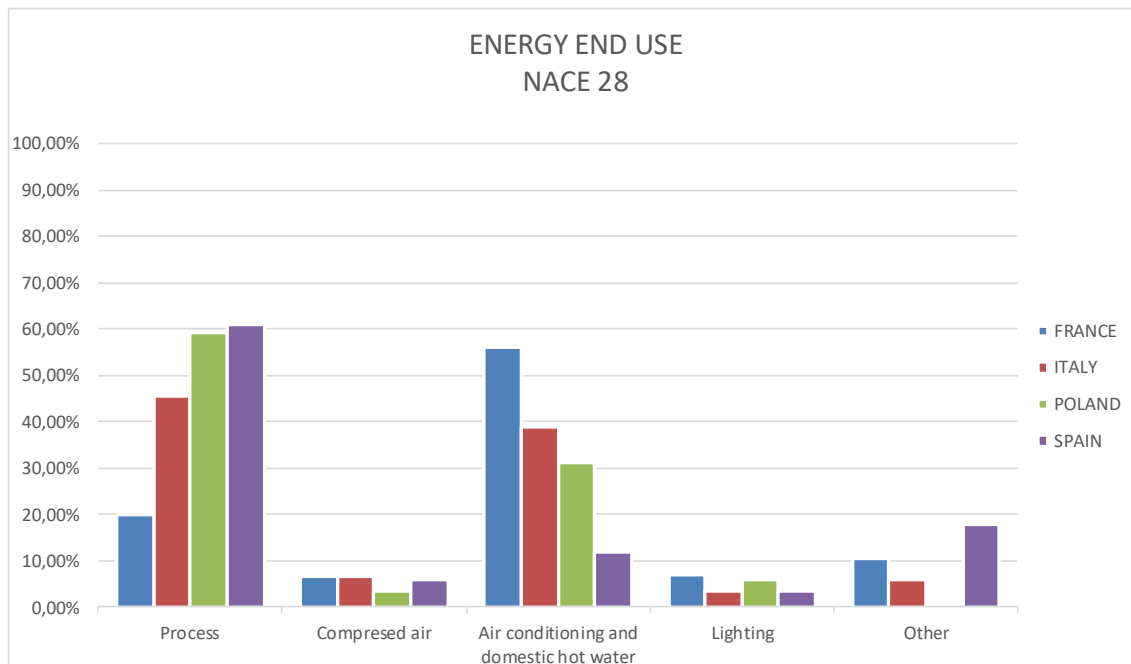


According to these end uses and the information extracted from the audits, the following energy ratios have been obtained:

% OF TOTAL CONSUMPTION						
NACE	END USE	FRANCE	ITALY	POLAND	SPAIN	EE_METAL
24	Process	88,77%	88,11%	80,41%	78,01%	84,28%
	Compressed air	1,82%	3,21%	4,96%	5,57%	3,60%
	Air conditioning and domestic hot water	4,33%	3,60%	2,77%	2,93%	3,56%
	Lighting	2,16%	0,61%	0,72%	1,49%	1,48%
	Other	2,92%	4,47%	11,14%	12,00%	7,08%
25	Process	59,14%	69,61%	43,54%	65,85%	60,41%
	Compressed air	5,63%	4,01%	3,25%	6,26%	4,58%
	Air conditioning and domestic hot water	18,56%	9,40%	35,85%	12,11%	18,24%
	Lighting	4,48%	1,66%	4,86%	2,90%	3,23%
	Other	12,19%	15,32%	12,50%	12,87%	13,54%
28	Process	19,93%	45,41%	59,33%	61,06%	53,70%
	Compressed air	6,50%	6,45%	3,55%	5,95%	5,35%
	Air conditioning and domestic hot water	56,12%	38,89%	31,17%	11,83%	27,60%
	Lighting	7,13%	3,30%	5,95%	3,42%	4,49%
	Other	10,32%	5,95%	0,00%	17,73%	8,86%







From the data obtained the following conclusions can be drawn:

- In NACE 24, the energy consumption from process exceeds 75%, with similar repercussions for all other uses in all countries.
- In NACE 25, the end-use of energy is similar in all countries, with the exception of Poland, where consumption in heating and domestic hot water is considerably higher than in other countries.
- In NACE 28, the final use of energy is more disparate, balancing the consumption in process with consumption in heating and domestic hot water. The other uses are similar in all countries.

2.3.5 CHARACTERIZATION OF THE SECTORS

The establishment of an energy baseline is the most appropriate method to characterize each of the sectors of the present study has been considered.

An energy baseline represents the current energy behaviour of a company, reflects a specified period and can act as a reference at the time of implementing improvement opportunities, quantifying the savings obtained.

To calculate the baseline, the statistical method called Linear regression analysis will be used. This method consists of developing the dispersion of energy consumption chart VS the independent variable that is considered of greater influence in the process.



Then, by means of linear regression, you get the straight line equation which indicates the influence of the independent variable on energy consumption.

The form of the equation is of the type:

$$y = a + bx$$

"a" is the fixed consumption of the system and "x" the independent variable with a multiplying factor "b".

If the independent variable "x" is known, it is possible to calculate the consumption of energy "y" (independent variable) for a known period.

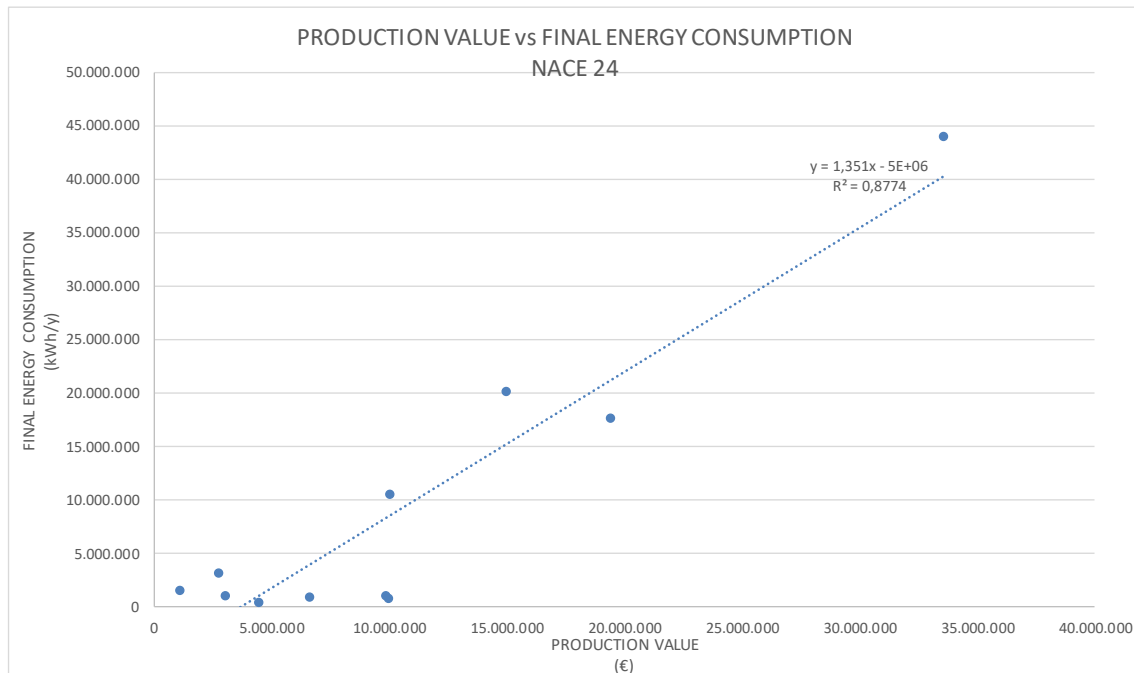
This way you can establish the difference between the expected and actual consumption.

Due to the diversity of companies, even within each NACE, an energy baseline is established in each of the sectors.

For NACE 24 the value of production in euro will be used as the independent variable and for NACE 25 and 28 the production in tonnes.

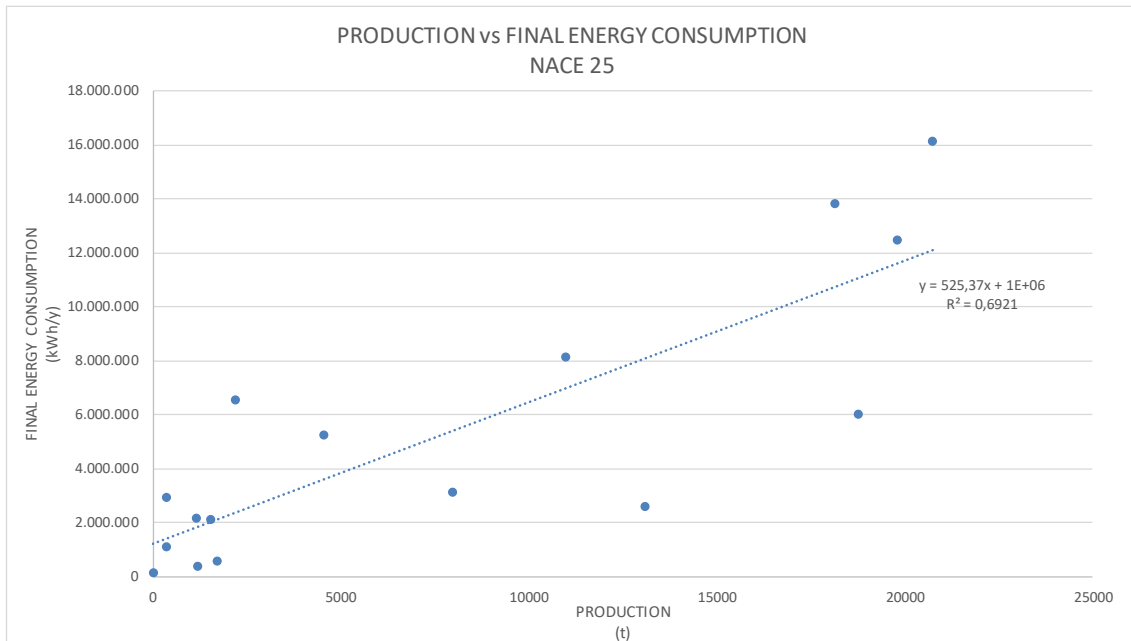
Below we can see the graphs and equations of the resulting energy baselines based on the independent variables indicated previously:

NACE 24

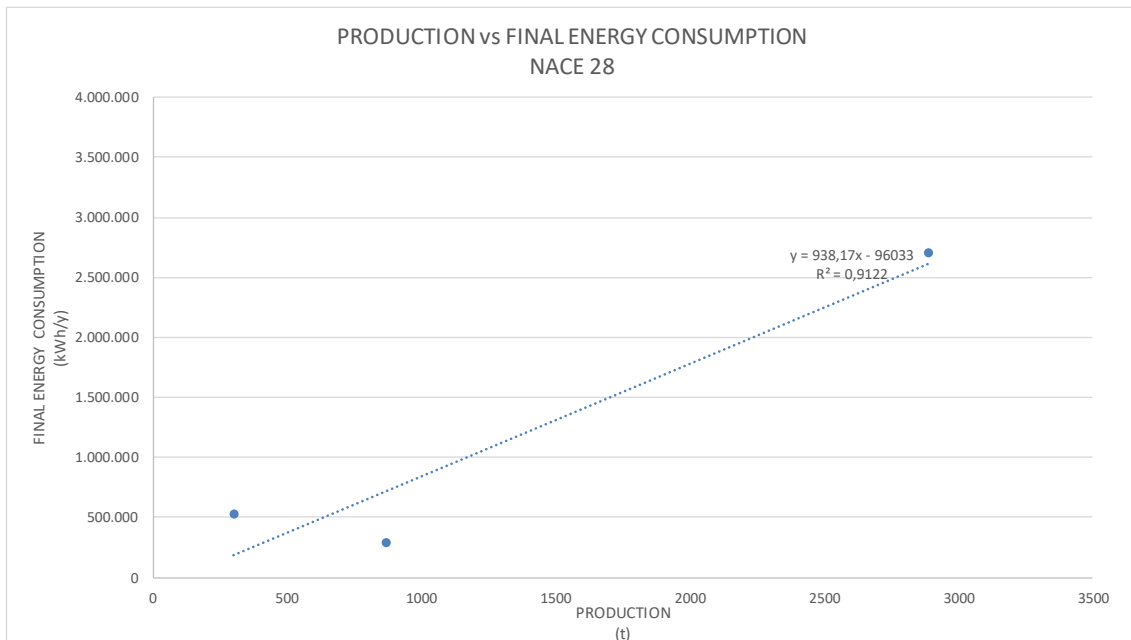




NACE 25



NACE 28





As can be seen in the graphs, in NACE 24 the number of companies that are part of the baseline are 11. They are those of which are available the data used in the elaboration of the same. In NACE 25 the companies that form the baseline are 16, companies that have the production data in tons. And in NACE 28 the companies that form the baseline are 3, companies that have the data of production in tons. The rest of the companies, due to the diversity of the elaborated product or of the production, use other type of indicators, even in some cases they do not have established control indicators.

2.4 ENERGY SAVING MEASURES

In addition to the analysis and energy review of companies, energy audits are used to propose savings measures. In our case and due to the diversity of the companies involved in the project, the saving measures proposed are of varied nature. However, these have been classified into seven groups, depending of the end use of energy.

These groups are:

- Lighting: Saving measures that decrease consumption in lighting.
- Compressed air: Saving measures that decrease the consumption in compressed air systems.
- Motors, pumps and fans: Saving measures that decrease the consumption of main electric motors of auxiliary facilities.
- Heating system: Saving measures that reduce the consumption of heating systems.
- Heat recovery: Measures to use of the residual heat of processes or auxiliary facilities.
- Process: Saving measures in the production processes themselves.
- Renewable energies: Implementation of renewable energies.
- Other: Savings measures not included in the previous sections. In this group is included the Building thermomodernization measure proposed in some companies of Poland. This is because the weather conditions are very important in the energy consumption of companies in this country and therefore the building is one of the significant points to take into account.



With this classification, the energy saving obtained by the implementation of the measures is:

Energy saving measure	Final energy saving (GWh/y)	Primary energy saving (GWh/y)	Primary energy saving (tep/y)
Lighting	2,92	7,73	3.324,60
Compressed air	3,39	6,95	2.125,00
Motors, pumps and fans	1,25	2,95	900,44
Heating system	1,38	1,91	506,97
Heat recovery	8,09	9,45	5.586,49
Process	9,59	15,16	3.087,33
Renewable energies	1,72	4,63	2.393,68
Other	9,05	13,19	9.895,30
TOTAL EE_METAL	37,39	61,97	27.819,81

The saving measures obtained from the energy audits classified in the previous groups are the following:

ENERGY SAVING MEASURE
Lighting
Change of technology (LED)
Installation of a twilight detector
Setting up of clock (programming)
Suppression of fluorescent lamps in excess
Compressed air
Leakages reduction of compressed-air system
Optimization of compressor room and distribution, leak detection, measurement of air flow and reduction of pressure network.
Installation of VSD compressor
Heat recovery from compressors
Reduction of the set pressure by 1 bar
Installation of a fresh air inlet
Cut off during nights and weekends
Addition of a buffer tank over the compressed air network
Segmentation of the compressed air network
Installation of energy saving blow gun (venturi effect)
Regulation between 2 compressors
Motors, pumps and fans
Use of variable speed drives
Use of high efficiency motors
Heating system
Replacement of equipments and/or change heating system
Reduction of setpoint temperature
Installation of air destratification



ENERGY SAVING MEASURE
Turn off the equipment
Compensation of the air extracted by ventilation
Management by zone
Optimization of the heating system
Optimization of distribution network for heating system
Optimization of combustion boilers
Heat recovery
Heat recovery from equipments
Process
Cover put on heated baths of surface treatment
Cut off of machines in stand by
Painting line energy efficiency improvement
Reduction in the number of surface treatment baths
Optimization of heat treatment furnaces
Reduction of the air extraction in standby phase on painting line
High efficiency furnaces
Optimization of electric furnaces
Replacement of melting furnace
Using covers during melting of non-ferrous metals
Change of cast steel cleaning system
Increasing the speed of a tunnel furnace operational service
Closing covers of wax regenerators
Using covers during melting of metals in the furnace
Modernization of machinery park and/or technological lines
Reduction of heat losses in the electric furnace
Heat loss reduction in the furnace
Modernization of paint shop
Modernization of cooling system
Cover tanks
Isolation of pipes
New technologies for rectifiers
Optimization of combustion equipments
Programmable temperature control
Replacement of maintenance furnaces
Renewable energies
Solar photovoltaic
Other
Installation of meters and monitoring
Decrease in the number of transformers (5 to 4)
Analysis of night electricity consumption on working days
Energy performance analysis and energy management system
Monitoring system for relevant energy user systems
Optimization/analysis of consumption during plant stop
Electric cabin - renovation of measurement tools, power factor correction, backup of transformer
Repair of insulation for hot water pipes



ENERGY SAVING MEASURE
Analysis of consumption during off-peak hours
Air treatment unit’s maintenance and regulation
Analysis of efficiency of chiller
Compressed air flow monitoring system
Optimization of electrical transformers
Installation of high efficiency chiller
Closing of entering area of shed
Filters and pressure control for VSD air extractor in spray booth
Low cost investments
Logistics changes
Modernization of the heat source
Transformer ventilation
Adjustment of energy contracts
Compensation of power factor
Building thermomodernization

By sector, the savings measures proposed in each of them are:

NACE	ENERGY SAVING MEASURE
24	Change of technology (LED)
	Installation of VSD compressor
	Reduction of the set pressure by 1 bar
	Cut off of machines not working
	Installation of a capacitor bank
	Decrease in subscribed power
	Installation of meters and monitoring
	Installation of air destratification
	Reduction of setpoint temperature in heating system
	Optimization of heat treatment furnaces
	Optimization of compressors room, leak detection, reduction of pressure
	Leakages reduction of compressed-air system
	Replacement of equipments and/or change heating system
	Heat recovery from equipments
	Use of variable speed drives
	Replacement of maintenance furnaces
	using covers during melting of metals in the furnace
	using covers during melting of non-ferrous metals
	Cut off of machines in stand by
	High efficiency furnaces
change of cast steel cleaning system	
closing covers of wax regenerators	



NACE	ENERGY SAVING MEASURE
	increasing the speed of a tunnel furnace operational service
	modernization of machinery park and/or technological lines
	modernization of cooling system
	Solar photovoltaic
	low cost investments
	Building thermomodernization
25	Change of technology (LED)
	Installation of a twilight detector
	Setting up of clock (programming)
	Suppression of fluorescent lamps in excess
	Leakages reduction of compressed-air system
	Reduction of the set pressure by 1 bar
	Optimization of compressor room and distribution, leak detection, measurement of air flow and reduction of pressure network.
	Installation of VSD compressor
	Installation of a fresh air inlet in compressed air system
	Addition of a buffer tank over the compressed air network
	Heat recovery from compressors
	Cut off during nights and weekends
	Regulation between 2 compressors
	Installation of energy saving blow gun (venturi effect)
	Segmentation of the compressed air network
	Compensation of the air extracted by ventilation
	Optimization of the heating system
	Optimization of distribution network for heating system
	modernization of paint shop
	modernization of cooling system
	Reduction of setpoint temperature
	Installation of air destratification
	Management by zone
	Replacement of equipments and/or change heating system
	Turn off the equipment
	Use of variable speed drives
	Heat recovery from equipments
	Cover put on heated baths of surface treatment
	Cover tanks
	Optimization of electric furnaces
	Cut off of machines in stand by
	heat loss reduction in the furnace



NACE	ENERGY SAVING MEASURE
28	Painting line energy efficiency improvement
	modernization of machinery park and/or technological lines
	reduction of heat losses in the electric furnace
	Reduction in the number of surface treatment baths
	Reduction of the air extraction in standby phase on painting line
	Optimization of heat treatment furnaces
	New technologies for rectifiers
	Programmable temperature control
	Optimization of combustion equipments
	Solar photovoltaic
	Installation of high efficiency chiller
	Isolation of pipes
	Air treatment unit maintenance and regulation
	Analysis of consumption during off-peak hours
	Decrease in the number of transformers (5 to 4)
	Optimization of electrical transformers
	Monitoring system for relevant energy user systems
	Adjustment of energy contracts
	Compensation of power factor
	logistics changes
	low cost investments
	Building thermomodernization
	Change of technology (LED)
	Leakages reduction of compressed-air system
	Optimization of compressor room and distribution, leak detection, measurement of air flow and reduction of pressure network.
Cut off during nights and weekends in air compressed system	
Heat recovery from compressors	
Compressor location change	
Use of variable speed drives	
Use of high efficiency motors	
Compensation of the air extracted by ventilation	
Replacement of equipments and/or change heating system	
Optimization of the heating system	
Cut off of machines in stand by	
Adjustment of energy contracts	
Monitoring system for relevant energy user systems	
Heat recovery from equipments	
Cover tanks	



NACE	ENERGY SAVING MEASURE
	New technologies for rectifiers
	modernization of machinery park and/or technological lines
	Programmable temperature control
	Solar photovoltaic
	modernization of the heat source
	Transformer ventilation
	Analysis of consumption during off peak hours
	low cost investments
	Adjustment of energy contracts
	Compensation of power factor

Within these proposals, in addition to the energy savings obtained, the investment necessary for its implementation and the gross return period of said investment are also valued.

The following table shown a summary of the savings measures obtained from the energy audits carried out. It shows the savings obtained, both energy and economic, investment, the gross amortization period of such investment, the number of companies in which the saving measure has been proposed and the CO₂ emissions avoided by the proposal.



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ENERGY SAVING MEASURE	Final energy saving		Primary energy saving		Primary energy saving		Cost savings		Investment		Gross amortization period	CO2 emissions		Companies in which the measure is proposed	Companies in which the measure is proposed
	GWh/y	(%)	GWh/y	%	tep/y	%	€/y	%	€	%	years	avoided tCO2/y	%	Units	%
Ligthing	2,92	7,81%	7,73	12,47%	3.324,60	11,95%	293.120,71	12,39%	1.925.921,03	16,58%	6,57	1.311,51	11,31%		
Change of tecnology (LED)	2,861	7,65%	7,582	12,23%	3.311,74	11,90%	287.390,71	12,15%	1.922.171,03	16,55%	6,69	1.307,28	11,27%	61,00	75,31%
Installation of a twilight detector	0,026	0,07%	0,067	0,11%	5,77	0,02%	2.730,00	0,12%	2.500,00	0,02%	0,92	1,90	0,02%	4,00	4,94%
Setting up of clock (programming)	0,012	0,03%	0,031	0,05%	2,65	0,01%	1.000,00	0,04%	1.250,00	0,01%	1,25	0,87	0,01%	1,00	1,23%
Suppression of fluorescent lamps in excess	0,020	0,05%	0,052	0,08%	4,44	0,02%	2.000,00	0,08%	0,00	0,00%	0,00	1,46	0,01%	1,00	1,23%
Compressed air	3,39	9,07%	6,95	11,22%	2.125,00	7,64%	286.300,28	12,10%	467.347,84	4,02%	1,63	1.073,91	9,26%		
Leakages reduction of compressed-air system	1,009	2,70%	2,682	4,33%	1.329,00	4,78%	92.544,28	3,91%	58.300,00	0,50%	0,63	488,52	4,21%	36,00	44,44%
Optimization of compressor room and distribution, leak detection, measurement of air flow and reduction of pressure network.	0,663	1,77%	1,520	2,45%	338,98	1,22%	96.266,43	4,07%	168.122,20	1,45%	1,75	254,77	2,20%	21,00	25,93%
Installation of VSD compressor	0,297	0,79%	0,714	1,15%	61,28	0,22%	32.599,00	1,38%	79.552,00	0,68%	2,44	62,28	0,54%	7,00	8,64%
Heat recovery from compressors	1,146	3,07%	1,402	2,26%	341,38	1,23%	36.719,64	1,55%	128.673,64	1,11%	3,50	241,50	2,08%	13,00	16,05%
Reduction of the set pressure by 1 bar	0,042	0,11%	0,108	0,17%	9,32	0,03%	3.997,00	0,17%	500,00	0,00%	0,13	3,08	0,03%	10,00	12,35%
Installation of a fresh air inlet	0,004	0,01%	0,010	0,02%	0,85	0,00%	337,92	0,01%	1.800,00	0,02%	5,33	0,75	0,01%	2,00	2,47%
Cut off during nights and weekends	0,099	0,26%	0,179	0,29%	15,38	0,06%	10.060,00	0,43%	500,00	0,00%	0,05	13,52	0,12%	4,00	4,94%



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ENERGY SAVING MEASURE	Final energy saving		Primary energy saving		Primary energy saving		Cost savings		Investment		Gross amortization period	CO2 emissions		Companies in which the measure is proposed	Companies in which the measure is proposed
	GWh/y	(%)	GWh/y	%	tep/y	%	€/y	%	€	%	years	avoided tCO2/y	%	Units	%
Addition of a buffer tank over the compressed air network	0,024	0,06%	0,061	0,10%	5,24	0,02%	3.550,00	0,15%	4.000,00	0,03%	1,13	1,72	0,01%	2,00	2,47%
Segmentation of the compressed air network	0,019	0,05%	0,049	0,08%	4,19	0,02%	1.600,00	0,07%	1.500,00	0,01%	0,94	1,38	0,01%	1,00	1,23%
Installation of energy saving blow gun (venturi effect)	0,017	0,05%	0,045	0,07%	3,86	0,01%	1.626,00	0,07%	600,00	0,01%	0,37	1,27	0,01%	3,00	3,70%
Regulation between 2 compressors	0,070	0,19%	0,181	0,29%	15,53	0,06%	7.000,00	0,30%	23.800,00	0,20%	3,40	5,11	0,04%	1,00	1,23%
Motors, pumps and fans	1,25	3,34%	2,95	4,77%	900,44	3,24%	114.755,46	4,85%	377.847,85	3,25%	3,29	442,65	3,82%		
Use of variable speed drives	1,196	3,20%	2,838	4,58%	890,34	3,20%	106.675,46	4,51%	323.847,85	2,79%	3,04	426,07	3,67%	24,00	29,63%
Use of high efficiency motors	0,054	0,14%	0,117	0,19%	10,10	0,04%	8.080,00	0,34%	54.000,00	0,46%	6,68	16,58	0,14%	9,00	11,11%
Heating system	1,38	3,69%	1,91	3,08%	506,97	1,82%	92.979,07	3,93%	263.587,19	2,27%	2,83	341,86	2,95%		
Replacement of equipments and/or change heating system	0,355	0,95%	0,650	1,05%	370,66	1,33%	34.056,55	1,44%	136.568,57	1,18%	4,01	131,74	1,14%	12,00	14,81%
Reduction of setpoint temperature	0,084	0,23%	0,104	0,17%	8,97	0,03%	4.315,00	0,18%	5.000,00	0,04%	1,16	15,53	0,13%	7,00	8,64%
Installation of air destratification	0,298	0,80%	0,298	0,48%	25,66	0,09%	11.250,00	0,48%	20.487,50	0,18%	1,82	60,86	0,52%	5,00	6,17%
Turn off the equipment	0,057	0,15%	0,060	0,10%	33,48	0,12%	2.743,33	0,12%	0,00	0,00%	0,00	12,75	0,11%	3,00	3,70%
Compensation of the air extracted by ventilation	0,147	0,39%	0,261	0,42%	22,43	0,08%	14.548,00	0,62%	21.693,52	0,19%	1,49	20,56	0,18%	2,00	2,47%
Management by zone	0,095	0,25%	0,095	0,15%	8,17	0,03%	3.700,00	0,16%	1.000,00	0,01%	0,27	19,38	0,17%	1,00	1,23%
Optimization of the heating system	0,204	0,55%	0,204	0,33%	17,54	0,06%	7.626,00	0,32%	57.957,60	0,50%	7,60	41,62	0,36%	2,00	2,47%



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	GWh/y	(%)	GWh/y	%	tep/y	%	€/y	%	€	%	years	avoided tCO2/y	%	Units	%
Optimization of distribution network for heating system	0,075	0,20%	0,164	0,26%	14,00	0,05%	12.000,00	0,51%	20.880,00	0,18%	1,74	23,62	0,20%	1,00	1,23%
Optimization of combustion boilers	0,064	0,17%	0,070	0,11%	6,05	0,02%	2.740,19	0,12%	0,00	0,00%	0,00	15,81	0,14%	3,00	3,70%
Heat recovery	8,09	21,65%	9,45	15,24%	5.586,49	20,08%	298.133,91	12,60%	1.223.456,06	10,53%	4,10	2.078,56	17,92%		
Heat recovery from equipments	8,093	21,65%	9,448	15,24%	5.586,49	20,08%	298.133,91	12,60%	1.223.456,06	10,53%	4,10	2.078,56	17,92%	30,00	37,04%
Process	9,59	25,64%	15,16	24,47%	3.087,33	11,10%	561.939,89	23,76%	2.031.436,71	17,49%	3,62	2.257,89	19,47%		0,00%
Cover put on heated baths of surface treatment	0,022	0,06%	0,056	0,09%	4,81	0,02%	2.000,00	0,08%	3.000,00	0,03%	1,50	2,73	0,02%	1,00	1,23%
Cut off of machines in stand by	0,763	2,04%	1,915	3,09%	164,68	0,59%	53.437,00	2,26%	42.802,50	0,37%	0,80	60,77	0,52%	5,00	6,17%
Painting line energy efficiency improvement	0,570	1,52%	0,712	1,15%	61,25	0,22%	31.200,00	1,32%	237.120,00	2,04%	7,60	104,49	0,90%	2,00	2,47%
Reduction in the number of surface treatment baths	0,550	1,47%	1,419	2,29%	122,03	0,44%	46.475,00	1,96%	0,00	0,00%	0,00	40,15	0,35%	1,00	1,23%
Optimization of heat treatment furnaces	2,865	7,66%	3,126	5,04%	268,81	0,97%	133.943,00	5,66%	455.406,20	3,92%	3,40	562,85	4,85%	2,00	2,47%
Reduction of the air extraction in standby phase on painting line	0,045	0,12%	0,116	0,19%	9,98	0,04%	2.700,00	0,11%	4.500,00	0,04%	1,67	3,29	0,03%	1,00	1,23%
High efficiency furnaces	0,145	0,39%	0,144	0,23%	12,40	0,04%	4.000,00	0,17%	30.400,00	0,26%	7,60	29,52	0,25%	1,00	1,23%
Optimization of electric furnaces	0,023	0,06%	0,050	0,08%	4,30	0,02%	3.700,00	0,16%	12.580,00	0,11%	3,40	7,24	0,06%	1,00	1,23%
Replacement of melting furnace	1,762	4,71%	1,752	2,83%	150,20	0,54%	62.000,00	2,62%	400.000,00	3,44%	6,45	249,94	2,16%	1,00	1,23%



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ENERGY SAVING MEASURE	Final energy saving		Primary energy saving		Primary energy saving		Cost savings		Investment		Gross amortization period	CO2 emissions		Companies in which the measure is proposed	Companies in which the measure is proposed
	GWh/y	(%)	GWh/y	%	tep/y	%	€/y	%	€	%	years	avoided tCO2/y	%	Units	%
Using covers during melting of non-ferrous metals	0,091	0,24%	0,274	0,44%	235,25	0,85%	9.624,84	0,41%	0,00	0,00%	0,00	75,28	0,65%	1,00	1,23%
change of cast steel cleaning system	0,003	0,01%	0,009	0,01%	7,38	0,03%	301,83	0,01%	0,00	0,00%	0,00	2,36	0,02%	1,00	1,23%
increasing the speed of a tunnel furnace operational service	0,117	0,31%	0,351	0,57%	301,81	1,08%	12.347,66	0,52%	0,00	0,00%	0,00	96,57	0,83%	1,00	1,23%
closing covers of wax regenerators	0,010	0,03%	0,031	0,05%	26,57	0,10%	1.087,02	0,05%	0,00	0,00%	0,00	8,50	0,07%	1,00	1,23%
using covers during melting of metals in the PIT 100 furnace	0,054	0,14%	0,161	0,26%	138,57	0,50%	5.669,37	0,24%	0,00	0,00%	0,00	44,34	0,38%	1,00	1,23%
modernization of machinery park and/or technological lines	0,341	0,91%	1,022	1,65%	879,40	3,16%	33.491,57	1,42%	112.061,45	0,96%	3,35	281,39	2,43%	8,00	9,88%
reduction of heat losses in the electric furnace	0,013	0,03%	0,040	0,06%	34,42	0,12%	1.004,64	0,04%	709,22	0,01%	0,71	11,01	0,09%	1,00	1,23%
heat loss reduction in the furnace	0,095	0,25%	0,104	0,17%	89,70	0,32%	5.710,47	0,24%	37.115,84	0,32%	6,50	19,15	0,17%	1,00	1,23%
modernization of paint shop	0,135	0,36%	0,148	0,24%	127,47	0,46%	5.885,92	0,25%	107.550,00	0,93%	18,27	27,22	0,23%	1,00	1,23%
modernization of cooling system	0,055	0,15%	0,165	0,27%	141,42	0,51%	6.881,96	0,29%	53.191,50	0,46%	7,73	45,26	0,39%	3,00	3,70%
Cover tanks	0,113	0,30%	0,273	0,44%	23,44	0,08%	12.198,01	0,52%	75.000,00	0,65%	6,15	40,50	0,35%	3,00	3,70%
Insulation of pipes	0,720	1,93%	0,774	1,25%	66,59	0,24%	28.800,00	1,22%	50.000,00	0,43%	1,74	163,30	1,41%	1,00	1,23%
New technologies for rectifiers	0,340	0,91%	0,818	1,32%	70,36	0,25%	33.642,82	1,42%	193.000,00	1,66%	5,74	121,55	1,05%	4,00	4,94%
Optimization of combustion equipments	0,064	0,17%	0,069	0,11%	5,91	0,02%	1.874,10	0,08%	0,00	0,00%	0,00	14,49	0,12%	2,00	2,47%



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ENERGY SAVING MEASURE	Final energy saving		Primary energy saving		Primary energy saving		Cost savings		Investment		Gross amortization period	CO2 emissions		Companies in which the measure is proposed	Companies in which the measure is proposed
	GWh/y	(%)	GWh/y	%	tep/y	%	€/y	%	€	%	years	avoided tCO2/y	%	Units	%
Programmable temperature control	0,074	0,20%	0,178	0,29%	15,31	0,06%	7.681,68	0,32%	42.000,00	0,36%	5,47	26,45	0,23%	4,00	4,94%
Replacement of maintenance furnaces	0,615	1,64%	1,456	2,35%	125,24	0,45%	56.283,00	2,38%	175.000,00	1,51%	3,11	219,56	1,89%	1,00	1,23%
Renewable energies	1,72	4,59%	4,63	7,47%	2.393,68	8,60%	160.397,26	6,78%	2.058.829,99	17,72%	12,84	1.013,16	8,74%		
Solar photovoltaic	1,716	4,59%	4,63	7,47%	2.393,68	8,60%	160.397,26	6,78%	2.058.829,99	17,72%	12,84	1.013,16	8,74%	32,00	39,51%
Other	9,05	24,22%	13,19	21,29%	9.895,30	35,57%	557.737,32	23,58%	3.268.747,26	28,14%	5,86	3.077,27	26,54%		
Installation of meters and monitoring	0,449	1,20%	0,469	0,76%	40,35	0,15%	21.710,00	0,92%	24.000,00	0,21%	1,11	89,88	0,78%	3,00	3,70%
Decrease in the number of transformers (5 to 4)	0,200	0,53%	0,516	0,83%	44,38	0,16%	16.900,00	0,71%	57.460,00	0,49%	3,40	14,60	0,13%	1,00	1,23%
Analysis of night electricity consumption on working days	-	-	-	-	-	-	-	-	-	-	-	-	-	1,00	1,23%
Energy performance analysis and energy management system	-	-	-	-	-	-	-	-	3.000,00	0,03%	-	-	-	1,00	1,23%
Monitoring system for relevant energy user systems	0,207	0,55%	0,452	0,73%	75,60	0,27%	48.650,00	2,06%	64.600,00	0,56%	1,33	65,20	0,56%	18,00	22,22%
Optimization/analysis of consumption during plant stop	-	-	-	-	-	-	-	-	-	-	-	-	-	1,00	1,23%
Electric cabin - renovation of measurement tools, power factor correction, backup of transformer	-	-	-	-	-	-	-	-	-	-	-	-	-	1,00	1,23%
Repair of insulation for hot water pipes	0,044	0,12%	0,053	0,09%	4,50	0,02%	1.584,00	0,07%	3.000,00	0,03%	1,89	10,80	0,09%	1,00	1,23%
Analysis of consumption during off-peak hours	0,091	0,24%	0,199	0,32%	17,00	0,06%	14.000,00	0,59%	0,00	0,00%	0,00	28,66	0,25%	6,00	7,41%



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ENERGY SAVING MEASURE	Final energy saving		Primary energy saving		Primary energy saving		Cost savings		Investment		Gross amortization period	CO2 emissions		Companies in which the measure is proposed	Companies in which the measure is proposed
	GWh/y	(%)	GWh/y	%	tep/y	%	€/y	%	€	%	years	avoided tCO2/y	%	Units	%
Air treatment unit's maintenance and regulation	0,022	0,06%	0,048	0,08%	4,10	0,01%	3.300,00	0,14%	11.220,00	0,10%	3,40	6,93	0,06%	1,00	1,23%
Analysis of efficiency of chiller	-	-	-	-	-	-	-	-	-	-	-	-	-	1,00	1,23%
Compressed air flow monitoring system	0,000	0,00%	0,000	0,00%	0,00	0,00%	1.500,00	0,06%	1.500,00	0,01%	1,00	0,00	0,00%	1,00	1,23%
Optimization of electrical transformers	0,012	0,03%	0,026	0,04%	2,20	0,01%	1.800,00	0,08%	3.600,00	0,03%	2,00	3,69	0,03%	1,00	1,23%
Installation of high efficiency chiller	0,013	0,03%	0,027	0,04%	2,30	0,01%	1.800,00	0,08%	13.680,00	0,12%	7,60	3,94	0,03%	2,00	2,47%
Closing of entering area of shed	-	-	-	-	-	-	-	-	-	-	-	-	-	1,00	1,23%
Filters and pressure control for VSD air extractor in spray booth	-	-	-	-	-	-	-	-	-	-	-	-	-	1,00	1,23%
low cost investments	1,370	3,66%	4,116	6,64%	3.539,06	12,72%	129.578,39	5,48%	0,00	0,00%	0,00	1.132,46	9,77%	21,00	25,93%
logistics changes	0,051	0,14%	0,057	0,09%	48,71	0,18%	4.769,42	0,20%	4.728,13	0,04%	0,99	13,58	0,12%	1,00	1,23%
modernization of the heat source	0,054	0,14%	0,060	0,10%	51,22	0,18%	7.601,78	0,32%	52.009,46	0,45%	6,84	14,44	0,12%	1,00	1,23%
Transformer ventilation	0,007	0,02%	0,017	0,03%	1,46	0,01%	774,81	0,03%	3.600,00	0,03%	4,65	2,52	0,02%	1,00	1,23%
Adjustment of energy contracts	0,000	0,00%	0,000	0,00%	0,00	0,00%	120.496,64	5,09%	26.127,48	0,22%	0,22	0,00	0,00%	14,00	17,28%
Compensation of power factor	0,047	0,13%	0,113	0,18%	9,70	0,03%	25.944,64	1,10%	97.829,79	0,84%	3,77	16,75	0,14%	6,00	7,41%
Building thermomodernization	6,488	17,35%	7,042	11,36%	6.054,73	21,76%	157.327,64	6,65%	2.902.392,40	24,98%	18,45	1.673,83	14,43%	8,00	9,88%
TOTAL EE_METAL	37,39		61,97		27.819,81		2.365.363,89		11.617.173,93		4,91	11.596,80			



2.5 CONCLUSIONS PHASE I

The following results can be highlighted as conclusions of the phase I:

- With the implementation of the measures obtained from energy audits, the proposed energy saving represents 12,63% of the total consumption of the companies involved in the project.
- The energy savings proposed with the measures whose gross amortization periods are less than 1 year, represents 1,56% of the total consumption of the companies involved in the project.
- Measures with low gross amortization periods, such as measurements in the compressed air system and heating system, are measures proposed in the end use energy classification groups of the highest impact (excluding the process). In sectors 25 and 28, the sum of the consumption of the compressed air and heating system is more than 20% of the total consumption.
- The measures proposed with less than 1 year gross amortization periods represent a saving of more than 12,37% of the total savings proposed.
- The proposed measures that have greater energy savings are included in the energy end use groups "Others". They are measures focused on the specificities of each company and each country.
- The proposed measures to reduce consumption in lighting, represent a significant saving in relation to the total proposed savings (7,8%). However, the gross amortization period of the investment exceeds 6 years, a much high than the companies have in consideration for the implementation of measures.
- The proposed measures to reduce consumption in compressed air system, represent a significant saving in relation to the total proposed savings (9,07%). Even, the gross amortization period of the investment is less than 2 years, a very attractive figure for companies to consider their implementation.
- Implementation of renewable energies (photovoltaic in our project) have gross amortization periods of more than 10 years, which is an important barrier to its installation.



3 PHASE II

As indicated above, this Phase is performed following the energy audits, so that the energy saving measures proposed in them, could be executed and introduced in the SMEs through the Energy Saving Companies (ESCOs).

3.1 SELECTION OF ENERGY SAVING MEASURES MOST REPRESENTATIVE OF ENERGY AUDITS

In the next charts, the most representative energy saving measures from the Energy Audits are shown. Those that for the number of SMEs in which they have been identified and/or for the energy savings foreseen after their implementation meaning and important reduction of the energy consumption in the companies.

FRANCE

MEASURE	Nº companies in which the measure has been identified	Total primary energy saving (*)	Average primary energy saving	Average investment cost	Gross amortization period GP
Replacement of lighting fixtures with LED technology	16	2,12 GWh/y	0,13 GWh/y	16.089 €	4,83 y
Optimization of the heating system	5	0,43 GWh/y	0,09 GWh/y	34.000 €	4,67 y
Implementation of new air compressor (with variable speed)	2	0,36 GWh/y	0,18 GWh/y	8.000 €	2,00 y

ITALY

MEASURE	Nº companies in which the measure has been identified	Total primary energy saving (*)	Average primary energy saving	Average investment cost	Gross amortization period GP
Change luminaire type (to LED)	14	0,589 GWh/y	0,045 GWh/y	17.046,00 €	7,4 y
Optimization of compressors room, leak detection, reduction of pressure	19	1,458 GWh/y	0,077 GWh/y	8.900,00 €	2,0 y
Installation of VSD engine or high efficiency engine	16	0,338 GWh/y	0,024 GWh/y	6.192,00 €	9,0 y
Analysis of off-peak consumption	8	0,199 GWh/y	0,050 GWh/y	0,00 €	0,0 y
Installation of energy monitoring system (SCADA)	19	0,452 GWh/y	0,050 GWh/y	3.728,00 €	1,6 y



MEASURE	Nº companies in which the measure has been identified	Total primary energy saving (*)	Average primary energy saving	Average investment cost	Gross amortization period GP
Replacement and optimization of furnaces	3	1,946 GWh/y	0,649 GWh/y	400.000,00 €	6,5 y

Notes: Information of primary energy saving (total and average), average investment cost and/or gross amortization period are not available in some cases. For this reason, values in the table have been calculated considering available data only.

For example, relamping with LED is suggested in 14 companies but data are available for 13 companies only. So primary energy saving, investment cost and GP have been calculated considering information of 13 companies.

POLAND

MEASURE	Nº companies in which the measure has been identified	Total primary energy saving (*)	Average primary energy saving	Average investment cost	Gross amortization period GP
Heat recovery from process equipment	14	2,66 GWh/y	0,190 GWh/y	28.617,87 €	7,03 y
Change of luminaire type (to LED)	20	3,44 GWh/y	0,172 GWh/y	50.268,77 €	18,17 y
Modernization of machinery park and/or technological lines	8	1,02 GWh/y	0,128 GWh/y	14.007,68 €	4,08 y
Implementation of renewable energies (solar photovoltaic)	21	2,58 GWh/y	0,123 GWh/y	64.701,68 €	17,90 y
Building thermomodernization	8	7,04 GWh/y	0,880 GWh/y	362.799,05 €	18,81 y

SPAIN

MEASURE	Nº companies in which the measure has been identified	Total primary energy saving (*)	Average primary energy saving	Average investment cost	Gross amortization period GP
Implementation of renewable energies (solar photovoltaic self-consumption)	9	1,90 GWh/y	0,21 GWh/y	65.566,09 €	9,57 y
Change of lighting technology (to LED)	12	1,44 GWh/y	0,12 GWh/y	36.480,47 €	7,03 y
Use of variable speed drivers (VSDs)	9	0,99 GWh/y	0,11 GWh/y	14.370,40 €	4,27 y



MEASURE	Nº companies in which the measure has been identified	Total primary energy saving (*)	Average primary energy saving	Average investment cost	Gross amortization period GP
New technologies for rectifiers	4	0,82 GWh/y	0,20 GWh/y	48.250,00 €	5,74 y
Reducing losses compressed air	8	0,45 GWh/y	0,06 GWh/y	5.787,50 €	2,57 y

3.2 IDENTIFICATION OF ESCOs

Those ESCOs that have been interested in the participation and implementation of energy saving proposals to SMEs are listed below.

FRANCE

- **AIRIS** is a company specialized in LED lighting. With its network of partners, it designs, manufactures and markets LED products for various sectors: mass distribution, logistics warehouses and industries. It also offers services such as: lighting studies, gross amortization period calculation and installation financing.
- **PHOTON GROUP** is a company specialized in innovative solutions to improve energy performance and in the design and development of high-performance lighting solutions. It designs and integrates LED lighting solutions and the associated control and management tools.
- **SANIPAC** is a company specialized in innovative and economical solutions for traditional heating, solar heating, solar water heating, heat pump, wood heating, photovoltaic installation, air conditioning and water treatment. Thanks to its partners, it is able to offer financing solutions.
- **ATLAS COPCO** is a company specialized in the design and marketing of air compressors. It develops reliable and energy-efficient products thanks to the latest technologies developed in the field (variable speed drive, energy recovery, etc.).
- **SPI ENERGIE** is a company specialized in the sale and rental of industrial air production and treatment equipments. It offers a service for the installation and maintenance of compressors, dryers, vacuum pumps, filtration and condensate drainage systems.
- **TECHSIM** is a company specialized in the design, installation and maintenance of compressed air production equipment. It is part of the DALKIA EDF Group. It designs, supplies and installs energy-efficient compressed air production, processing and distribution solutions (variable speed drive, energy recovery, etc.).



ITALY

- **SaveNRG srl:** Save NRG was born in 2015, offering tailor-made service to its customers in the following expertise areas: Energy Efficiency, Smart Energy and Renewable Energy, BioLiving, BioArchitecture e Green Building, Waste & Water. A team of professionals from different disciplinary areas, specialised in the energy and environmental sector, which has operated at both national and international level for over 20 years, has decided to come together to save NRG.
- **Persico Engineering srl:** The company designs and implements innovative solutions aimed at the construction of technological systems and equipment for energy efficiency. Always attentive to the interaction between the different automations that live together in industrial plants, creating innovative solutions, the company has enthusiastically welcomed the market trend to integrate production technologies aimed at improving working conditions and productivity, Industry 4.0 Technology .
- **Global System Consulting :** The company was founded in 2003 starting from commercial experience and then turned into pure consultancy and only towards a single sector such as energy. Global System Consulting is a network of professionals is born that are able to meet the most varied production fields starting from simple documentary Audit to the executive project in case the company has the need. The Global System Consulting in the evolution of this market has been accredited as E.S.Co. in order to provide its customers with a 360 degree service.

POLAND

As a result of the activities undertaken as part of the EE-METAL project, 29 companies have been identified on the Polish market that declare themselves to be operating under the ESCO formula. These companies were asked to be interested in cooperation in the project consisting in submitting offers to the audited SME companies. This mainly concerned the most frequent needs of SMEs identified in audits, as specified in point 6.1.

Initially, 5 ESCO companies expressed interest in further cooperation. Other ESCO companies did not express any willingness to cooperate due to:

- the scope of their specialization,
- the provision of services mainly to the large companies,
- the provision of services only to the local government entities,
- operating in another region of Poland.

At a later stage, selected ESCOs received:

- a. contact details for audited companies interested in receiving an offer for investments in energy-saving activities,
- b. summary list of the most-recommended energy-saving solutions,
- c. standardized form for reporting contacts with SMEs.



ESCOs:

- **PREDA sp. z o.o. sp. k.:** Company offers investment services related to energy efficiency, including ESCO and ECP investments and obtains financial resources for energy projects.
- **Lumix LED Sp. z o.o.:** Company is a comprehensive supplier of the highest quality solutions in the field of LED lighting, dedicated to corporate clients, large enterprises and institutions as well as small businesses around the world.
- **Lars Lighting Sp. z o.o.:** Producer of innovative and energy-saving outdoor lighting and interior lighting for residential and public buildings, offices and shopping centers, industrial halls and warehouses, universities, schools and hospitals.
- **Hydrochem DGE S.A.:** Company offers comprehensive investment service and prepares the concept of financing investments based on subsidy, preferential and commercial sources, as well as using the most modern financing instruments tailored to the client's capabilities.
- **Polska Efektywność Energetyczna Sp. z o.o.:** Company provides services for business customers who can save money by implementing energy modernization projects or who are required by the Energy Efficiency Act to implement projects aimed at improving energy efficiency.

SPAIN

- **EiDF Solar:** Company dedicated to the installation of photovoltaic solar plants, mainly in companies and for electrical self-consumption. It carries out integral engineering services that range from conducting feasibility studies, engineering projects, maintenance and technical advice to turnkey projects.
- **CONTROLA EFICIENCIA ENERGÉTICA S.L.:** Energy services company founded in 2009. Since the beginning of the activity, it covers all the energy efficiency actions; from the energy audit to the implementation of energy saving measures and support for the implementation of energy efficiency management systems. Its foundations are the high qualification of its technicians, the use of the most modern instruments of measurement and analysis and a wide accumulated experience in the industrial sector. It quantifies the energy that the client uses and needs, studies the energy needs of the organization and its current situation and with the knowledge acquired, it implements the most efficient means, using the least amount of energy possible and maintaining these principles during the useful life of these means. It offers its clients a service with high quality standards and results guaranteed by their own experiences.



3.3 N° of SMEs INTERESTED / CONTACTED

Once the energy audits were performed, the SMEs involved in the project were offered with the possibility of make contact with the ESCOS and being able to introduce through them the energy saving measures identified in the energy audits. The number of SMEs interested in establish these contacts to introduce the energy saving measures mentioned are listed below. In some cases, other saving measures not included in the audits were offered to the SMEs by the ESCOs.

FRANCE

MEASURE	N° of SMEs
Replacement of lighting fixtures with LED technology	2
Optimization of the heating system	1
Implementation of new air compressor (variable speed drive)	4

ITALY

MEASURE	N° of SMEs
Implementation of power quality system	2
relamping LED	1

POLAND

MEASURE	N° of SMEs
Implementation of renewable energies (solar photovoltaic)	7
Change of luminaire type (to LED)	8
Heat recovery from process equipment	0
Modernization of machinery park and/or technological lines	0
Building thermomodernization	6
Control system of working time and consumption of electricity (*)	2

(*) This measure is proposed by ESCO and was not included in the energy audit



SPAIN

MEASURE	Nº of SMEs
Implementation of renewable energies (solar photovoltaic self-consumption)	2
Change of lighting technology (to LED)	0
Use of variable speed drivers (VSDs)	0
New technologies for rectifiers	0
Reducing losses compressed air	4
Natural lighting with special skylights, with UV filter, insulation and diffusion of light to the entire surface. (*)	4
Energy consumption monitoring with counters and implementation of software for energy management (*)	4
Separation of air conditioning circuits in the office area between the ground floor and the first floor, with gates and individual thermostats. (*)	1
Air treatment system for industrial warehouse in summer season, which includes the supply and placement of two evaporative air conditioners, capable of reducing the ambient temperature to 10°C less than the outside air temperature. Elevation means are not included. (*)	1
Energy efficiency consulting service. (*)	4

(*) This measure is proposed by ESCO and was not included in the energy audit

3.4 WORK WITH ESCOs

FRANCE

Following the EE-METAL energy audits carried, SMEs quickly sought to implement the energy-saving measures recommended in the reports. So much so that many of them did not expect us to connect them with ESCOs. They used their usual suppliers or those who approached them.

To increase and diversify the contacts we took advantage of the various Energy Workshops organized during the EE-METAL program. This allowed us to identify new solution providers and connect them with SMEs. Several contacts were made directly during the Workshops, without us having systematic feedback.

In addition, we also sent an email to all the 20 audited SMEs to inform them of the ESCOs we identified and put them in contact with each other.



ITALY

Despite the successful collaboration with the ESCOs that was developed within the activities of WP5, in Italy some difficulties were faced in stimulate the interest of the SMEs involved in the audits on the opportunities connected to the ESCO market.

In July a quite successful workshop with ESCOs (40 participants) was held, but only preliminary B2B relationships resulted following the event.

Therefore a timely work with the individual companies started in order to stimulate and promote the opportunities offered by the ESCOs in supporting investment opportunities resulting from the audits. In August an e-mail has been sent to inform all the 20 companies involved in energy audits about the opportunities related to ESCOs, with informative materials.

Thanks to the work of timely and specific information to the individual companies, CSMT managed to involve 3 companies, putting them in contact with the ESCOs that could best respond to some of their intervention needs, which emerged during the audit phase.

2 companies received from the ESCOs the proposal of investments with forecast of energy savings; 1 company is still working with the ESCOs, which will provide its proposal and contract condition in January 2019.

POLAND

In the period 18.06 - 13.07.2018 project partners (MPPK & AUIPE) contacted the audited SMEs in order to agree on the possibility of receiving offers from ESCO companies for energy-saving investments recommended in the audit. Out of 21 companies participating in the audits, 7 SMEs did not express interest in receiving an offer from ESCO due to the implementation of the investment with their own funds.

The verified list of 14 SMEs was transferred to 5 ESCOs, of which 2 were mainly active in diagnosing the situation and needs of SMEs through e-mail contact, telephone contact and direct visits. These companies reported the progress of contacts with audited companies.

As a result of the activities carried out, 6 companies postponed the decision to invest in energy-saving measures for a further period (next year). It was caused most often by:

- high complexity and cost of investments,
- a desire to gradually implement energy-saving measures,
- current involvement in other investments.

The remaining 8 companies continued talks with ESCO, as a result they received individual offers from them, as shown in the table below. Due to the above-mentioned reasons, none of the companies was interested in the offer for heat recovery from the process equipment, modernization of machinery park and/or technical lines.



SPAIN

After conducting the Energy Audits and to carry out this Phase of the Project, the 20 participating companies were contacted directly and offered the possibility of contacting ESCOs and receiving an offer for the implementation of saving measures. 14 out of 20 companies declined the offer arguing that they preferred to carry out savings measures by themselves by means of their technology providers. The rest, 6 companies, contacted ESCOs and received individual proposals, or they are waiting to receive them. In some cases, these proposals include savings measures not identified in the energy audits.

3.5 RESULTS

The results obtained from the contacts made between the ESCOs and the SMEs are shown below for each country.

3.5.1 FRANCE

In the next chart the energy saving measures that have been included in the proposal from the ESCOs and the number of SMEs that have been offered with such proposal.

Measure	AIRIS	PHOTON GROUP	SANIPAC	ATLAS COPCO	SPI ENERGIE	TECHSIM
Replacement of lighting fixtures with LED technology	1 SME	1 SME				
Optimization of the heating system			1 SME			
Implementation of new air compressor (variable speed drive)				2 SMEs	1 SME	1 SME

The following charts show the principal features of the offer made by the ESCOs for each energy saving measure presented.

SHEET 1	
Measure:	Replacement of lighting fixtures with LED technology
Name of ESCO:	AIRIS
SME:	Number 1
NACE sector of SME:	C25
Proposed primary energy saving:	0,06 GWh/y
Type of proposed contract:	Performance consulting contracts, (eg project management,)



SHEET 1		
	Result contracts, eg. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:		
Contract period:	5 years	
Other comments:	Monthly rent: 290 € Monthly energy savings: 350 € Monthly gain over 5 years: 60 €	

SHEET 2		
Measure:	Replacement of lighting fixtures with LED technology	
Name of ESCO:	PHOTON GROUP	
SME:	Number 2	
NACE sector of SME:	C25	
Proposed primary energy saving:	0,31 GWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	X
	Renting	
	Leasing	
	Other:	
Description of contract conditions:		
Contract period:		
Other comments:	For the installation of this more energy-efficient equipment, the company has received energy-saving certificates. This economic advantage is presented by ESCO in its proposal.	

SHEET 3	
Measure:	Optimization of the heating system
Name of ESCO:	SANIPAC
SME:	Number 2
NACE sector of SME:	C25



SHEET 3		
Proposed primary energy saving:	0,08 GWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	X
	Renting	
	Leasing	
	Other:	
Description of contract conditions:		
Contract period:		
Other comments:	<p>For the installation of this more energy-efficient equipment, the company has received energy-saving certificates.</p> <p>This economic advantage is presented by ESCO in its proposal.</p>	

SHEET 4		
Measure:	Implementation of new air compressor (variable speed drive)	
Name of ESCO:	ATLAS COPCO	
SME:	Number 1	
NACE sector of SME:	C25	
Proposed primary energy saving:	0,09 GWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	X
	Renting	
	Leasing	
	Other:	
Description of contract conditions:		
Contract period:		
Other comments:	<p>For the installation of this more energy-efficient equipment, the company has received energy-saving certificates.</p> <p>This economic advantage is presented by ESCO in its proposal.</p>	



SHEET 5		
Measure:	Implementation of new air compressor (variable speed drive)	
Name of ESCO:	ATLAS COPCO	
SME:	Number 3	
NACE sector of SME:	C25	
Proposed primary energy saving:	0,04 GWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	X
	Renting	
	Leasing	
Description of contract conditions:	Other:	
Contract period:		
Other comments:	For the installation of this more energy-efficient equipment, the company has received energy-saving certificates. This economic advantage is presented by ESCO in its proposal.	

SHEET 6		
Measure:	Implementation of new air compressor (with variable speed)	
Name of ESCO:	SPI ENERGIE	
SME:	Number 4	
NACE sector of SME:	C24	
Proposed primary energy saving:	0,05 GWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	X
	Renting	
	Leasing	
Description of contract conditions:	Other:	
Contract period:		



SHEET 6	
Other comments:	For the installation of this more energy-efficient equipment, the company has received energy-saving certificates. This economic advantage is presented by ESCO in its proposal.

SHEET 7		
Measure:	Implementation of new air compressor (variable speed drive)	
Name of ESCO:	TECHSIM	
SME:	Number 4	
NACE sector of SME:	C24	
Proposed primary energy saving:	0,04 GWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	X
	Other:	
Description of contract conditions:		
Contract period:	5 years	
Other comments:	For the installation of this more energy-efficient equipment, the company has received energy-saving certificates. This economic advantage is presented by ESCO in its proposal.	



3.5.2 ITALY

In the next chart the energy saving measures that have been included in the proposal from the ESCOs and the number of SMEs that have been offered with such proposal.

Measure	SaveNRG srl	Persico Engineering srl	Global System Consulting
Implementation of power quality system	1 SME	1 SME	
relamping LED			1 SME (*)

(*) Detailed data concerning investments, energy savings and type of contract will be provided in January 2019

The following charts show the principal features of the offer made by the ESCOs for each energy saving measure presented.

SHEET 1		
Measure:	Implementation of power quality sistem	
Name of ESCO:	SaveNRG srl	
SME:	1	
NACE sector of SME:	C24 – Manufacture of basic metals	
Proposed primary energy saving:	65.706 kWh/y (7% of actual consumption of the plant)	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	Leasing at 7 years. The rate is equal to 70% of expected saving.	
Contract period:	7 years	
Other comments:		

SHEET 2		
Measure:	Implementation of power quality sistem	
Name of ESCO:	PERSICO ENGINEERING SRL	
SME:	2	
NACE sector of SME:	C28 - Manufacture of machinery and equipment n.e.c.	
Proposed primary energy saving:	226.385 kWh/year	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	



SHEET 2		
	Contracts with financing, partial or total, of interventions by the company (shared risks)	X
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	Installation and maintenance included	
Contract period:	10 years	
Other comments:		

3.5.3 POLAND

In the next chart the energy saving measures that have been included in the proposal from the ESCOs and the number of SMEs that have been offered with such proposal.

Measure	PREDA sp. z o.o. sp. k.	Polska Efektywność Energetyczna Sp. z o.o.
Implementation of renewable energies (solar photovoltaic)	7 SMEs	
Change of luminaire type (to LED)	7 SMEs	1 SME
Building thermomodernization	6 SMEs	
Control system of working time and consumption of electricity		2 SMEs

The following charts show the principal features of the offer made by the ESCOs for each energy saving measure presented.

SHEET 1		
Measure:	Implementation of renewable energies (solar photovoltaic)	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	1	
NACE sector of SME:	25	
Proposed primary energy saving:	0,1 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	



SHEET 1		
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 2		
Measure:	Implementation of renewable energies (solar photovoltaic)	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	2	
NACE sector of SME:	25	
Proposed primary energy saving:	0,1 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 3		
Measure:	Implementation of renewable energies (solar photovoltaic)	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	3	
NACE sector of SME:	24	
Proposed primary energy saving:	0,2 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	



SHEET 3		
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 4		
Measure:	Implementation of renewable energies (solar photovoltaic)	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	4	
NACE sector of SME:	25	
Proposed primary energy saving:	0,6 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 5		
Measure:	Implementation of renewable energies (solar photovoltaic)	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	5	
NACE sector of SME:	25	
Proposed primary energy saving:	0,1 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	



SHEET 5	
	Other:
Description of contract conditions:	n.d.
Contract period:	n.d.
Other comments:	

SHEET 6		
Measure:	Implementation of renewable energies (solar photovoltaic)	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	6	
NACE sector of SME:	28	
Proposed primary energy saving:	0,1 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 7		
Measure:	Implementation of renewable energies (solar photovoltaic)	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	7	
NACE sector of SME:	25	
Proposed primary energy saving:	0,03 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	



SHEET 7	
Description of contract conditions:	n.d.
Contract period:	n.d.
Other comments:	

SHEET 8		
Measure:	Change of luminaire type (to LED)	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	1	
NACE sector of SME:	25	
Proposed primary energy saving:	0,04 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 9		
Measure:	Change of luminaire type (to LED)	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	2	
NACE sector of SME:	25	
Proposed primary energy saving:	0,18 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	



SHEET 9	
Other comments:	

SHEET 10		
Measure:	Change of luminaire type (to LED)	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	3	
NACE sector of SME:	24	
Proposed primary energy saving:	0,07 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 11		
Measure:	Change of luminaire type (to LED)	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	4	
NACE sector of SME:	25	
Proposed primary energy saving:	0,08 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		



SHEET 12		
Measure:	Change of luminaire type (to LED)	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	5	
NACE sector of SME:	25	
Proposed primary energy saving:	0,02 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 13		
Measure:	Change of luminaire type (to LED)	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	6	
NACE sector of SME:	28	
Proposed primary energy saving:	n.d.	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:	This measure is proposed by ESCO and was not included in the energy audit	

SHEET 14	
Measure:	Change of luminaire type (to LED)
Name of ESCO:	PREDA sp. z o.o. sp. k.



SHEET 14		
SME:	7	
NACE sector of SME:	25	
Proposed primary energy saving:	0,01 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 15		
Measure:	Change of luminaire type (to LED)	
Name of ESCO:	Polska Efektywność Energetyczna Sp. z o.o.	
SME:	8	
NACE sector of SME:	25	
Proposed primary energy saving:	0,12 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	X
	Result contracts, e.g. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 16	
Measure:	Building thermomodernization
Name of ESCO:	PREDA sp. z o.o. sp. k.
SME:	1
NACE sector of SME:	25
Proposed primary energy saving:	0,4 GWh/y



SHEET 16		
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 17		
Measure:	Building thermomodernization	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	3	
NACE sector of SME:	24	
Proposed primary energy saving:	1,2 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 18		
Measure:	Building thermomodernization	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	4	
NACE sector of SME:	25	
Proposed primary energy saving:	1,1 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	



SHEET 18		
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 19		
Measure:	Building thermomodernization	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	5	
NACE sector of SME:	25	
Proposed primary energy saving:	0,2 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
Other:		
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 20		
Measure:	Building thermomodernization	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	6	
NACE sector of SME:	28	
Proposed primary energy saving:	n.d.	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X



SHEET 20		
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:	This measure is proposed by ESCO and was not included in the energy audit	

SHEET 21		
Measure:	Building thermomodernization	
Name of ESCO:	PREDA sp. z o.o. sp. k.	
SME:	7	
NACE sector of SME:	25	
Proposed primary energy saving:	0,04 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	
	Result contracts, e.g. Energy Performance Contract (shared savings)	X
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:		

SHEET 22		
Measure:	Control system of working time and consumption of electricity	
Name of ESCO:	Polska Efektywność Energetyczna Sp. z o.o.	
SME:	2	
NACE sector of SME:	25	
Proposed primary energy saving:	0,1 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	X
	Result contracts, e.g. Energy Performance Contract (shared savings)	



SHEET 22		
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:	This measure is proposed by ESCO and was not included in the energy audit	

SHEET 23		
Measure:	Control system of working time and consumption of electricity	
Name of ESCO:	Polska Efektywność Energetyczna Sp. z o.o.	
SME:	6	
NACE sector of SME:	28	
Proposed primary energy saving:	0,2 GWh/y	
Type of proposed contract:	Performance consulting contracts, (e.g. project management,)	X
	Result contracts, e.g. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity	
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	n.d.	
Contract period:	n.d.	
Other comments:	This measure is proposed by ESCO and was not included in the energy audit	



3.5.4 SPAIN

In the next chart the energy saving measures that have been included in the proposal from the ESCOs and the number of SMEs that have been offered with such proposal.

Measure	EIDF Solar	Controla Eficiencia Energética, S.L.
Implementation of renewable energies (solar photovoltaic self-consumption)	2 SMEs (*)	
Reducing losses compressed air		4 SMEs
Natural lighting with special skylights, with uv filter, insulation and diffusion of light to the entire surface.		4 SMEs
Energy consumption monitoring with counters and implementation of software for energy management		4 SMEs
Separation of air conditioning circuits in the office area between the ground floor and the first floor, with gates and individual thermostats.		1 SME
Air treatment system for industrial warehouse in summer season, which includes the supply and placement of two evaporative air conditioners, capable of reducing the ambient temperature to 10°C less than the outside air temperature. Elevation means are not included.		1 SME
Energy efficiency consulting service.		4 SMEs

(*) There are no detailed data on energy savings, investments and types of contracts offered by the ESCO. (Currently, PYMEs and ESCO are in contact)

The following charts show the principal features of the offer made by the ESCOs for each energy saving measure presented.

SHEET 1		
Measure:	Natural lighting with special skylights, with uv filter, insulation and diffusion of light to the entire surface.	
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.	
SME:	1	
NACE sector of SME:	C25	
Proposed primary energy saving:	10.861 kWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	X
	Renting	



SHEET 1	
	Leasing
	Other:
Description of contract conditions:	The ESCO carries out the supply, installation and commissioning of the measure. The SME finances the cost of the measure by its own means.
Contract period:	
Other comments:	This measure is proposed by ESCO and was not included in the energy audit

SHEET 2		
Measure:	Natural lighting with special skylights, with uv filter, insulation and diffusion of light to the entire surface.	
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.	
SME:	2	
NACE sector of SME:	C28	
Proposed primary energy saving:	5.329 kWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	X
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	The ESCO carries out the supply, installation and commissioning of the measure. The SME finances the cost of the measure by its own means.	
Contract period:		
Other comments:	This measure is proposed by ESCO and was not included in the energy audit	

SHEET 3	
Measure:	Natural lighting with special skylights, with uv filter, insulation and diffusion of light to the entire surface.
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.
SME:	3
NACE sector of SME:	C28



SHEET 3		
Proposed primary energy saving:	31.218	kWh/y
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	X
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	The ESCO carries out the supply, installation and commissioning of the measure. The SME finances the cost of the measure by its own means.	
Contract period:		
Other comments:	This measure is proposed by ESCO and was not included in the energy audit	

SHEET 4		
Measure:	Natural lighting with special skylights, with uv filter, insulation and diffusion of light to the entire surface.	
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.	
SME:	4	
NACE sector of SME:	C28	
Proposed primary energy saving:	31.218	kWh/y
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	X
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	The ESCO carries out the supply, installation and commissioning of the measure. The SME finances the cost of the measure by its own means.	
Contract period:		



SHEET 4	
Other comments:	This measure is proposed by ESCO and was not included in the energy audit

SHEET 5		
Measure:	Detection of leaks in compressed air systems, and marking them	
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.	
SME:	1	
NACE sector of SME:	C25	
Proposed primary energy saving:	87.842 kWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	X
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	The ESCO carries out the supply, installation and commissioning of the measure. The SME finances the cost of the measure by its own means.	
Contract period:		
Other comments:		

SHEET 6		
Measure:	Detection of leaks in compressed air systems, and marking them	
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.	
SME:	2	
NACE sector of SME:	C28	
Proposed primary energy saving:	1.332 kWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	X
	Renting	



SHEET 6	
	Leasing
	Other:
Description of contract conditions:	The ESCO carries out the supply, installation and commissioning of the measure. The SME finances the cost of the measure by its own means.
Contract period:	
Other comments:	

SHEET 7		
Measure:	Detection of leaks in compressed air systems, and marking them	
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.	
SME:	3	
NACE sector of SME:	C28	
Proposed primary energy saving:	10.146 kWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	X
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	The ESCO carries out the supply, installation and commissioning of the measure. The SME finances the cost of the measure by its own means.	
Contract period:		
Other comments:		

SHEET 8	
Measure:	Detection of leaks in compressed air systems, and marking them
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.
SME:	4
NACE sector of SME:	C28
Proposed primary energy saving:	10.146 kWh/y



SHEET 8		
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	X
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	The ESCO carries out the supply, installation and commissioning of the measure. The SME finances the cost of the measure by its own means.	
Contract period:		
Other comments:		

SHEET 9		
Measure:	Energy consumption monitoring with counters and implementation of software for energy management	
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.	
SME:	1	
NACE sector of SME:	C25	
Proposed primary energy saving:	131.763	kWh/y
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	X
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	The ESCO carries out the supply, installation and commissioning of the measure. The SME finances the cost of the measure by its own means.	
Contract period:		
Other comments:	This measure is proposed by ESCO and was not included in the energy audit	



SHEET 10		
Measure:	Energy consumption monitoring with counters and implementation of software for energy management	
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.	
SME:	2	
NACE sector of SME:	C28	
Proposed primary energy saving:	31.975 kWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	X
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	The ESCO carries out the supply, installation and commissioning of the measure. The SME finances the cost of the measure by its own means.	
Contract period:		
Other comments:	This measure is proposed by ESCO and was not included in the energy audit	

SHEET 11		
Measure:	Energy consumption monitoring with counters and implementation of software for energy management	
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.	
SME:	3	
NACE sector of SME:	C28	
Proposed primary energy saving:	97.400 kWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	X
	Renting	
	Leasing	
	Other:	



SHEET 11	
Description of contract conditions:	The ESCO carries out the supply, installation and commissioning of the measure. The SME finances the cost of the measure by its own means.
Contract period:	
Other comments:	This measure is proposed by ESCO and was not included in the energy audit

SHEET 12		
Measure:	Energy consumption monitoring with counters and implementation of software for energy management	
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.	
SME:	4	
NACE sector of SME:	C28	
Proposed primary energy saving:	97.400 kWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	X
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	The ESCO carries out the supply, installation and commissioning of the measure. The SME finances the cost of the measure by its own means.	
Contract period:		
Other comments:	This measure is proposed by ESCO and was not included in the energy audit	

SHEET 13		
Measure:	Energy efficiency consulting service	
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.	
SME:	1	
NACE sector of SME:	C25	
Proposed primary energy saving:	164.704 kWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	



SHEET 13		
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	
	Renting	
	Leasing	
	Other: Consulting project	X
Description of contract conditions:	The ESCO carries out the consulting project. The SME finances the cost of the measure by its own means.	
Contract period:		
Other comments:	This measure is proposed by ESCO and was not included in the energy audit	

SHEET 14		
Measure:	Energy efficiency consulting service	
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.	
SME:	2	
NACE sector of SME:	C28	
Proposed primary energy saving:	39.969	kWh/y
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	
	Renting	
	Leasing	
	Other: Consulting project	X
Description of contract conditions:	The ESCO carries out the consulting project. The SME finances the cost of the measure by its own means.	
Contract period:		
Other comments:	This measure is proposed by ESCO and was not included in the energy audit	

SHEET 15	
Measure:	Energy efficiency consulting service
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.



SHEET 15	
SME:	3
NACE sector of SME:	C28
Proposed primary energy saving:	94.965 kWh/y
Type of proposed contract:	Performance consulting contracts, (eg project management,)
	Result contracts, eg. Energy Performance Contract (shared savings)
	Contracts with financing, partial or total, of interventions by the company (shared risks)
	Equity (financial resources of the client)
	Renting
	Leasing
	Other: Consulting project
Description of contract conditions:	The ESCO carries out the consulting project. The SME finances the cost of the measure by its own means.
Contract period:	
Other comments:	This measure is proposed by ESCO and was not included in the energy audit

SHEET 16		
Measure:	Separation of air conditioning circuits in the office area between the ground floor and the first floor, with gates and individual thermostats.	
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.	
SME:	4	
NACE sector of SME:	C28	
Proposed primary energy saving:	97.400 kWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	X
	Renting	
	Leasing	
	Other:	
Description of contract conditions:	The ESCO carries out the supply, installation and commissioning of the measure. The SME finances the cost of the measure by its own means.	



SHEET 16	
Contract period:	
Other comments:	This measure is proposed by ESCO and was not included in the energy audit

SHEET 17		
Measure:	Air treatment system for industrial warehouse in summer season, which includes the supply and placement of two evaporative air conditioners, capable of reducing the ambient temperature to 10°C less than the outside air temperature. Elevation means are not included.	
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.	
SME:	4	
NACE sector of SME:	C28	
Proposed primary energy saving:	97.400 kWh/y	
Type of proposed contract:	Performance consulting contracts, (eg project management,)	
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	X
	Renting	
	Leasing	
Description of contract conditions:	The ESCO carries out the supply, installation and commissioning of the measure. The SME finances the cost of the measure by its own means.	
Contract period:		
Other comments:	This measure is proposed by ESCO and was not included in the energy audit	

SHEET 18	
Measure:	Energy efficiency consulting service
Name of ESCO:	CONTROLA EFICIENCIA ENERGÉTICA S.L.
SME:	4
NACE sector of SME:	C28
Proposed primary energy saving:	94.965 kWh/y
Type of proposed contract:	Performance consulting contracts, (eg project management,)



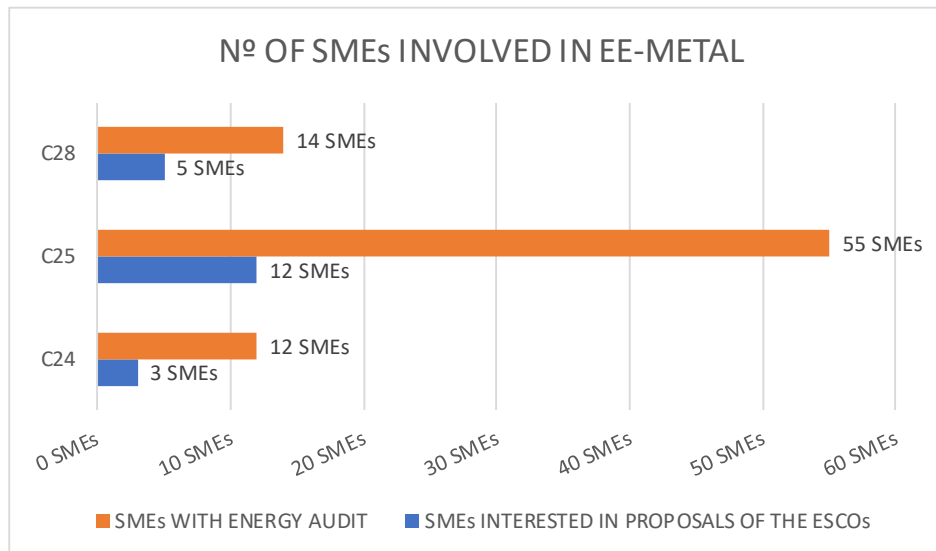
SHEET 18		
	Result contracts, eg. Energy Performance Contract (shared savings)	
	Contracts with financing, partial or total, of interventions by the company (shared risks)	
	Equity (financial resources of the client)	
	Renting	
	Leasing	
	Other: Consulting project	X
Description of contract conditions:	The ESCO carries out the consulting project. The SME finances the cost of the measure by its own means.	
Contract period:		
Other comments:	This measure is proposed by ESCO and was not included in the energy audit	



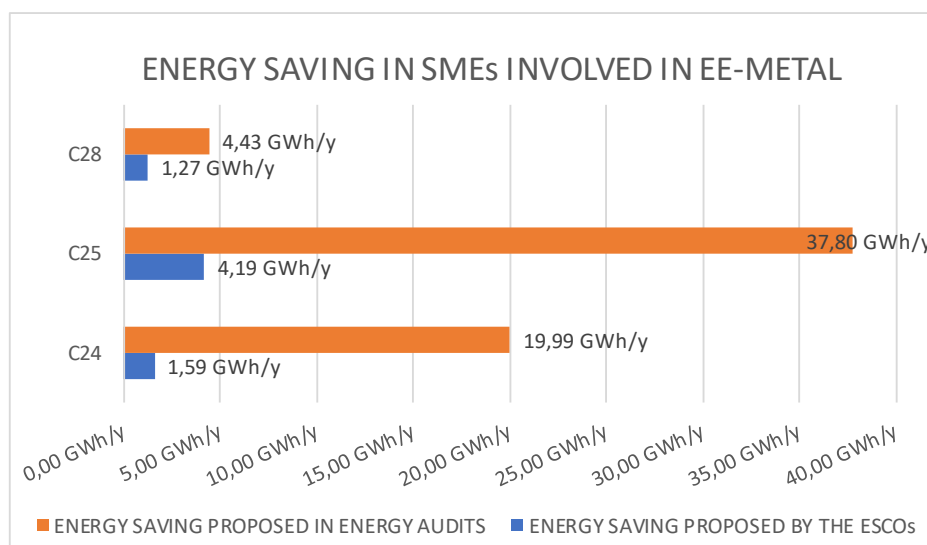
3.6 SUMMARY OF RESULTS

As a summary of the above, can be highlighted the following:

The 24,7% of the 81 companies audited are interested in making contact with the Energy Service Companies (ESCOs) and therefore introduce energy saving measures through them. 15% of this 24,7% belongs to NACE 24, 60% to NACE 25 and the remaining 25% to NACE 28.



With the implementation of the proposed measures through the ESCOs, the primary energy saving achieved would be 7,04 GWh/y, which represents 11,34% of the estimated energy saving in the audits.



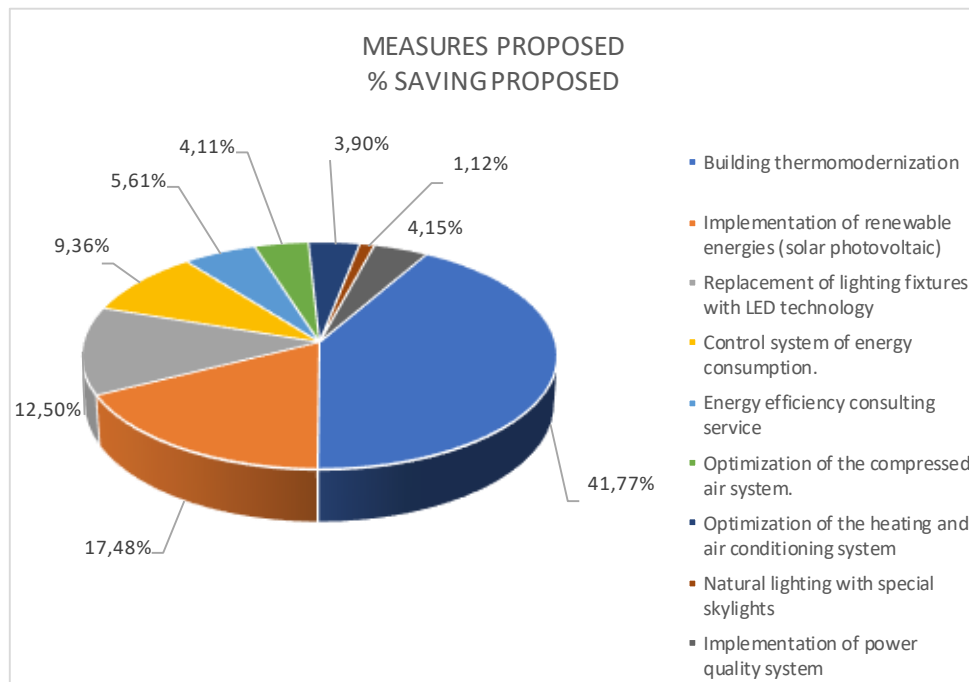
Note that this saving only corresponds to the ESCO proposals. However, there are savings measures indicated in the energy audits that will be carried out directly by SMEs through their own technology providers. For example, according to energy audits, the change of lighting by



LED technology has periods of gross amortization of the investment over 6 years, a much high value than the companies have in consideration for the implementation of measures. However, the change of lighting by LED technology is being implemented in many of the SMEs gradually.

The energy saving measures proposed by the Energy Service Companies and the primary energy saved with the implementation of them are listed below:

MEASURES	PRIMARY ENERGY SAVING PROPOSED	Nº OF PROPOSALS MADE BY ESCOs	PRIMARY ENERGY SAVING PROPOSED / PROPOSAL
Building thermomodernization	2,94 GWh/y	5	0,59 GWh/y
Implementation of renewable energies (solar photovoltaic)	1,23 GWh/y	7	0,18 GWh/y
Replacement of lighting fixtures with LED technology	0,88 GWh/y	9	0,10 GWh/y
Control system of energy consumption.	0,66 GWh/y	8	0,08 GWh/y
Energy efficiency consulting service	0,39 GWh/y	4	0,10 GWh/y
Optimization of the compressed air system.	0,29 GWh/y	7	0,04 GWh/y
Optimization of the heating and air conditioning system	0,27 GWh/y	1	0,27 GWh/y
Natural lighting with special skylights	0,08 GWh/y	4	0,02 GWh/y
Implementation of power quality system	0,29 GWh/y	2	0,15 GWh/y
TOTAL	7,04 GWh/y	47	



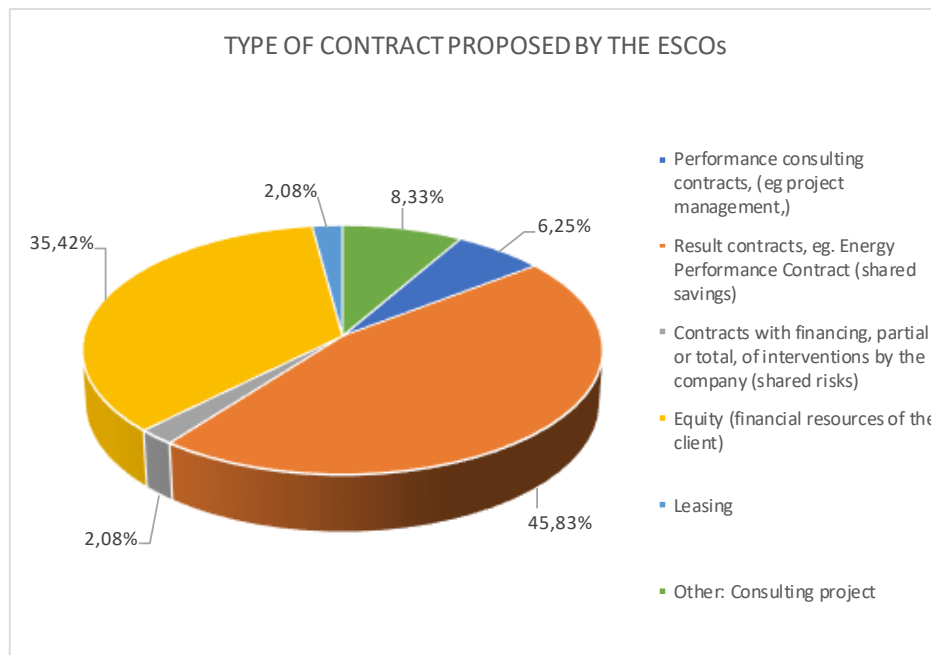
As can be seen in the graph, the ‘Building thermomodernization’ measure is the one that proposes the greatest savings, 41,77% of the total savings, followed by the ‘Implementation of renewable energies (solar photovoltaic)’ with 17,48% and the ‘Replacement of lighting fixtures with LED technology’ with 12,50%.

The funding for the implementation of these savings measures can be of various types, as can be seen in document D5.1-5.2 (WP5). The types of contracts proposed by the ESCOs to the SMEs in the contacts maintained during the execution of this Phase are shown below.

TYPE OF CONTRACT PROPOSED BY THE ESCOs	Nº OF PROPOSALS
Performance consulting contracts, (eg project management,)	3
Result contracts, eg. Energy Performance Contract (shared savings)	22
Contracts with financing, partial or total, of interventions by the company (shared risks)	1
Equity (financial resources of the client)	17
Renting	0
Leasing	1
Other: Consulting project	4
TOTAL	48



Note that there are 48 proposals with different types of financing contracts by the ESCO, but 47 proposals have been included for the calculation of energy savings. This is because an SME has received two proposals from different ESCOs for the same saving measure. Only one of them has been accounted for in the total savings proposed by the ESCOs



Pie chart shows how proposals sample can be basically divided between shared saving contracts and equity solutions. While the first option is very appreciated because economic resources for the investment are provided by the ESCO, in the second case company cash flow due to the energy efficiency action is increased.

Other kind of financial tools seems not to be so spread on the market, especially in case of shared risks solution.

Many reasons could explain this: maybe market is not so mature for this kind of products or maybe a shared risk tool is not so attractive for the companies.



3.7 CONCLUSIONS PHASE II

As conclusions we can indicate the following:

- Of the 81 companies audited, 25% (20 SMEs) were interested in receiving proposals for energy saving measures from ESCOs.

- The ESCOs have submitted 47 proposals for energy saving measures to the 20 interested SMEs.

- The 47 proposals suppose a Primary Energy saving of 7.04 GWh/y.

- The type of financing contract that has been mostly proposed by the ESCOs is Result contracts (shared saving)