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# Technical measures, energy service contracts and financial products for increasing energy savings in MMA SMEs

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## 1 Introduction

This report describes the work done by the EE-Metal project consortium for promoting actions to support the access of ESCOs to the MMA sector, benchmarking the different financial products being implemented in the partner countries for financing energy saving measures in the industrial sector.

The report describes the outputs of the various activities carried out, namely:

- review of the European regulatory framework for energy efficiency in SMEs;
- review of the existing literature on ESCOs and financial instruments for energy efficiency in companies;
- review and survey study on the different energy service contracts and the role of ESCOs in the partner countries;
- identification and analysis of innovative contractual models for overcoming the commercial and market barriers to the penetration of ESCOs in the metalworking sector;
- review and survey study on the different financial products for energy savings investments.

All such activities have been carried out thanks to the collaboration with ESCOs, ESCOs associations and financial institutions operating in the countries involved in the EE-METAL project (Spain, Italy, Poland, France).

The overall aim has been to provide SMEs of the MMA sector with a toolbox for overcoming the existing technical, commercial and financial barriers to the implementation of energy saving measures. This has been achieved supporting the access of ESCOs to the MMA sector issuing recommendations for overcoming financial barriers for the implementation of technical/technological measures identified within the SMEs involved through the EE-Metal energy audits, the ISO 50.001 certifications and the implementation of Energy Monitoring Systems.



## 2 Energy efficiency in SMEs: the regulatory framework

In Europe, until the end of the last century, paying the electricity and gas bill was like paying taxes: so much was and so much had to be paid.

At a later time, some events have changed the situation:

- the liberalization and complication of the energy market;
- International Environmental protection policies with consequences on the energy market;
- Strong competition among developing countries with low energy prices;
- Economic crisis.

The cost of energy has now become a determining factor for competitiveness and therefore for the future of all companies. Therefore energy is a crucial factor for factories and companies to determine production costs.

Productivity of an industrial company is the decisive factor for staying and growing in the current, increasingly globalized and competitive marketplace.

Productivity is generally defined as the ratio between the quantity of product resulting from a production process (production value) and the amount of resources employed (capital, labor, raw materials, etc.) for the realization of that product.

Since energy is actually a raw material, employing less energy through energy efficiency intervention implies a decrease of the denominator of the relationship, resulting in the growth of business productivity.

As any other investment, energy efficiency measures need an initial expense by the company, that is justified by saving on future operating costs. Consequently, from an economic feasibility point of view, energy efficiency measures are governed by the same criteria used for any other economic analysis of industrial investments, for which some parameters such as PBT (pay back time), the IRR (internal rate of return) and NPV (net present value) has to be evaluated.

However energy efficiency investment have some peculiarities that are not always felt in other industrial processes.

Related to and resulting from the reduction of energy consumption obtained through efficiency improvements, there are always environmental improvements (less consumption, less energy and less pollution) that have contributed to generate positive and significant results with respect to programmed environmental targets (eg. in the Kyoto and Paris Conferences).

For this reason, efficiency improvements are often affected by government tax incentives and tax breaks, varying from country to country but still governed by a general European norm. Most of current national directives descend by the European framework directive on energy

efficiency **2012/27/EU**. This Directive establishes a common framework for measures to promote energy efficiency in the Union with a view to pursue the overall objective of the energy efficiency target of saving 20% of the Union's primary energy consumption by 2020 and making further energy efficiency improvements after that date.

Directive 2012/27/EU sets minimum requirements but it shall not prevent any Member State from embracing measures that are more stringent.



Key points of the European Energy Efficiency Directive are listed below:

### **Energy efficiency targets**

Each Member State shall set an indicative national energy efficiency target, based on either primary or final energy consumption. By the 30<sup>th</sup> of June 2014, the Commission shall assess progresses achieved and whether the Union is likely to achieve energy consumption of no more than 1.474 Mtoe of primary energy and/or no more than 1.078 Mtoe of final energy in 2020.

### **Energy efficiency obligation schemes**

Each Member State shall set up an energy efficiency obligation scheme. That scheme shall ensure that energy distributors and/or retail energy sales companies achieve a cumulative end-use energy savings target of 1.5% of the annual energy sales to final customers by the 31<sup>st</sup> of December 2020.

However, in order to achieve this target, Member States will have the option of using a bundle of flexibility measures as well as equivalent alternative measures such as:

- a) the possibility of achieving 1,5% target in three stages, reaching the 1,5% in 2018; -
- b) excluding energy sales from ETS-covered industries;
- c) counting energy savings in the energy transformation, distribution sectors and counting early actions as from the 31<sup>st</sup> of December 2008.

The use of these flexibility measures should not lead to a reduction of more than 25% of the amount of the energy savings target.

### **Other public policy measures**

As an alternative to the establishment of energy efficiency obligation schemes, Member States will be able to adopt other public policy measures to achieve energy savings among final customers and provide those policy measures will meet the criteria laid down in the Directive. The policy measures may include, among other things:

- ***energy or CO<sub>2</sub> taxes*** having the effect of reducing end-use energy consumption;
- ***financing schemes and instruments or fiscal incentives***;
- ***regulations or voluntary agreements*** that lead to the application of energy-efficient technology or techniques and reduce end-use energy consumption;
- ***standards and norms*** that aim at improving the energy efficiency of products and services;
- ***energy labelling schemes***;
- ***training and education programmes***.

### **Energy audits and energy management systems**

Member States shall promote the availability to all final customers of high quality energy audits which are cost-effective and carried out in an independent manner by qualified and/or accredited experts according to qualification criteria; or implemented and supervised by independent authorities under national legislation.



### **Metering and billing information**

Member States shall ensure that, in so far as it is technically possible, financially reasonable and proportionate in relation to the potential energy savings, final customers for electricity, natural gas, district heating, district cooling and domestic hot water are provided with competitively priced individual meters that accurately reflect the final customer's actual energy consumption and that provide information on actual time of use.

Where final customers do not have smart meters, Member States shall ensure, by the 31<sup>st</sup> of December 2014, that billing information is accurate and based on actual consumption. Final customers shall have the possibility of easy access to complementary information on historical consumption allowing detailed self-checks.

### **Promotion of efficiency in heating and cooling**

By the 31<sup>st</sup> of December 2015, Member States shall carry out and notify to the Commission a comprehensive assessment of the potential for the application of high-efficiency cogeneration and efficient district heating and cooling. Member States shall carry out a cost-benefit analysis covering their territory based on climate conditions, economic feasibility and technical suitability.

### **Promotion of energy efficiency**

Member States shall evaluate and, if necessary, take appropriate measures to remove regulatory and non-regulatory barriers to energy efficiency.

Review and monitoring of implementation: by the 30<sup>th</sup> of April of each year as from 2013, Member States shall report on the progress achieved towards national energy efficiency targets.

Entry into force: 04/12/2012.

Transposition: 05/06/2014.

Delegated acts: Commission shall be empowered to adopt delegated acts to review the harmonized efficiency reference values of the Directive. The power to adopt delegated acts shall be conferred on the Commission for a period of five years from 4 December 2012 (a period that may be tacitly renewed for periods of an identical duration, unless Parliament or the Council object). A delegated act shall enter into force only if no objection has been expressed either by the European Parliament or the Council within a period of two months (this deadline may be extended by a further two months) of notification of that act to the European Parliament and the Council or if, before the expiry of that period, the European Parliament and the Council have both informed the Commission that they will not object.

## **2.1 The national policies on energy efficiency in industrial sector**

Following tables show, for each of the measures previously described and envisaged by the directive **2012/27/EU**, references of the national regulations and a brief description of the measures adopted.



### 2.1.1 National acceptance of 2012/27/EU

Spain: National acceptance of 2012/27/EU	
Legal references	Short description
Royal Decree 56/2016, of 12 February	This RD partially transposes the directive, mainly in relation to energy audits, accreditation systems for energy service providers and energy auditors and the promotion of energy efficiency in the production processes and use of heat and cold.

Italy: National acceptance of 2012/27/EU	
Legal references	Short description
D.lgs 102/2014	The Legislative Decree 102/2014, implementing Directive 2012/27/EU and in compliance with Law 96/2013, defines a set of actions aimed at improving energy efficiency in all sectors. Target of these actions is to achieve the national objective of energy savings in 2020.

Poland: National acceptance of 2012/27/EU	
Legal references	Short description
Energy Efficiency Law (EEL) (2016)	The EED is transposed into the Polish legal system by the legal act "Energy Efficiency Law" (EEL). The new EEL (2016) extends the duration of the previous EEL (2011) beyond 2016 and introduces necessary changes in order to fully implement the EED. The act adopted by the Parliament on 20 May 2016, came into force in October 2016. The new law extends the main provisions of the previous EEL with some changes to make the necessary adoptions to the EED. Some amendments in the White Certificate System.
4 <sup>th</sup> National Energy Efficiency Action Plan for Poland 2017 (NEEAP)	Article 9 Metering Already implemented in the Energy Law (EL). Smart Metering activities intensified in Poland in electric sector
1 <sup>st</sup> NEEAP: 2007	Article 16 Availability of qualification, accreditation and certification schemes
2 <sup>nd</sup> NEEAP: 2012	No implementation necessary. The qualification, accreditation and certification schemes are not planned, because of action on the
3 <sup>rd</sup> NEEAP: 2014)	



	<p>deregulation of professions in Poland. No specific requirements for energy efficiency auditors and dedicated trainings.</p> <p>Article 17 Information and training No implementation necessary. No specific professional requirements for energy efficiency auditors. Obligation for the public sector to promote good solutions.</p> <p>Article 18 Energy services Some incentives in EEL (art. 7) for public sector to take energy efficiency improvement measures and use energy performance contracting to finance these measures.</p> <p>With a view to stimulating the market for energy service companies, such as ESCOs, appropriate provisions have been introduced to existing Act of 20 May 2016 on energy efficiency.</p> <p>Article 19 Other measures to promote energy efficiency Regulatory barriers to energy efficiency removed. Weak signals to remove barriers in building sector and public sector as described in art. 19 (1) (a) and (b) EED.</p> <p>Article 20 Energy efficiency national fund, financing and technical support Special account established within the White Certificates System from which energy efficiency programs may be financed. This document has been prepared by the Ministry of Energy with input from the Ministry of Infrastructure and Construction and the Central Statistical Office (GUS).</p> <p>It contains a description of the planned measures to improve energy efficiency defining measures to improve energy efficiency in individual sectors of the economy, necessary for the implementation of the national energy efficiency target for 2016, as well as measures to achieve.</p>
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France: National acceptance of 2012/27/EU	
Legal references	Short description
Law of 13 July 2005	Sets the objectives and the main orientations of France's energy policy and complements the legislation with measures in the areas of energy management, renewable energies and the quality of the electricity transmission and distribution network.



### 2.1.2 Energy efficiency targets

Spain: Energy efficiency targets	
Legal references	Short description
NEEAP 2011-2020	<p>In accordance with the Europe 2020 Strategy, Spain's 2011 National Reform Programme, presented in April, established the target of reducing primary energy consumption by 25,2 Mtoe.</p> <p>The 2011-2020 National Energy Efficiency Action Plan set a 2020 primary energy consumption target (excluding non-energy uses) of 135.3 Mtoe by 2020 which, compared to the 2017 baseline scenario, represented a 27,5 Mtoe reduction</p> <p>In Spain's 2013 annual progress report, the country reported, an improved national primary energy consumption target for 2020 of 121,6 Mtoe.</p> <p>This target translated as a 41,2-Mtoe reduction on baseline primary energy consumption by 2020, i.e. a 25,3 % decrease, well above the 20 % overall target established for the European Union in Directive 2012/27/EU.</p>
NEEAP 2014-2020 (04/2014)	<p>In the 2014-2020 NEEAP, Spain notified the European Commission of a new energy consumption target. Primary energy consumption by 2020 is estimated at 119,893 Mtoe excluding final non-energy consumption, a reduction of 43 Mtoe rather than the 25,2 Mtoe initially notified by Spain in its 2011 National Reform Programme. This represents a 26,4% reduction on the 2017 baseline scenario.</p>
NEEAP 2017-2020 (04/2017)	<p>Reduction of 40,2 million tons of oil equivalent (toe) of primary energy consumption. In 2020 the expected consumption in terms of primary energy is 122,6 Mtoe and final energy is 87,24 Mtoe (excluding non-energy uses)</p>



Italy: Energy efficiency targets	
Legal references	Short description
D.lgs 102/2014	<p>Reduction of 20 million tons of oil equivalent (Mtoe) of primary energy consumption (corresponding to 15,5 Mtoe of final energy) by 2020, compared with 2010.</p> <p>In 2010 total consumption was 177,9 and 128,5 Mtoe for primary and final energy respectively.</p> <p>Target of D.Lgs. 102/2014 was already achieved in 2015, with total consumption value of 156,2 Mtoe for primary energy (reduction of 21,7 Mtoe). Final energy consumption in 2015 was 116,4 Mtoe (reduction of 12,1 Mtoe).</p> <p>More recent version of Italian National Energy Strategy (SEN 2017) shows an expected consumption at 2020 of 153 Mtoe for primary energy and 117 Mtoe for final energy.</p>

Poland: Energy efficiency targets	
Legal references	Short description
4th National Energy Efficiency Action Plan for Poland (NEEAP)	<p>National energy efficiency targets for 2020:</p> <p>Reduction of primary energy consumption in 2010-2020: 13,6 Mtoe, Absolute level of end-use energy consumption: 71,6 Mtoe, Absolute level of primary energy consumption: 96,4 Mtoe*</p> <p><i>* In accordance with reference values for Poland included in a forecast prepared for the European Commission (PRIMES - Baseline 2007), primary energy consumption is forecast at a level of 110 Mtoe in 2020. Therefore, taking into account reduction of energy consumption by 13.6 Mtoe, we obtain: 110 Mtoe – 13.6 Mtoe = 96.4 Mtoe</i></p>

France: Energy efficiency targets	
Legal references	Short description
Law of August 17, 2015	The law on the energy transition for green growth and the accompanying action plans



### 2.1.3 Energy efficiency obligation schemes

Spain: Energy efficiency obligation schemes	
Legal references	Short description
Royal Decree-Law 8/2014 of 4 July 2014. Law 18/2014 of 15 October 2014	<p>A national energy efficiency obligation scheme is hereby established under which gas and electricity retailers, petroleum product wholesalers and liquefied petroleum gas wholesalers, hereinafter the obligated parties under the obligation scheme, shall be assigned an annual national energy savings quota, otherwise known as saving obligations.</p> <p>A National Energy Efficiency Fund, without legal personality, is hereby created for the purpose of financing national energy efficiency initiatives in compliance with Article 20 of Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012.</p> <p>Pursuant to Law 18/2014, the obligated parties (gas and electricity retailers, petroleum product wholesalers and liquefied petroleum gas wholesalers) are required to make an annual financial contribution to the Fund in order to fulfil the saving obligations imposed on them (Article 71.1).</p> <p>Alternatively, and under the terms laid down by the government in the applicable regulations, a mechanism based on the submission of Energy Saving Certificates may be introduced (Article 71(2)). However, to date, the implementing regulations needed to set up such a mechanism have not been passed and the obligated parties must therefore fulfil the savings obligation set out in Article 71(1), i.e. by making an annual financial contribution to the National Energy Efficiency Fund.</p>



Italy: Energy efficiency obligation schemes	
Legal references	Short description
D.M. 24 April 2001. D.M. 11 January 2017. D.M. 10 May 2018	<p><b>White certificates scheme</b></p> <p>Electricity or natural-gas distributors with more than 50.000 final customers (so called “obliged enterprises”) must reach fixed targets of annual primary energy saving that are set every year by law for each one of them and correspond to a percentage of input energy into their own grid.</p> <p>Energy savings are certified through tradable instruments called White Certificates, or EEC (Energy Efficiency Certificates).</p> <p>Each certificate corresponds to 1 TOE (Tonn of Oil Equivalent) of primary-energy saving and can be obtained by the obliged company directly realizing energy saving actions or buying EEC from a third part (not obliged enterprises that have implemented energy efficiency actions) in Energy Efficiency Certificates Market or with settled agreements whit them.</p> <p>All these primary-energy savings must be fully documented by investor through continuous monitoring campaign and then certified by the public authority (GSE, the manager of the national energy service).</p> <p>Obliged enterprises receive a reimbursement for each presented white certificate.</p> <p>General charges of electricity bills provide funds for EEC scheme.</p> <p>This incentive mechanism applies to energy efficiency actions that satisfy some law-fixed requirements (i.e. minimum efficiency of facilities, innovation level of the action compared to marketplace benchmark etc.).</p> <p>Recently, as a result of heavy speculative pressures that increased EEC price up to 400 € per certificate (average price from 2009 to 2016 was around 100 € per certificate), Ministerial Decree of May 2018 set a cap price of 250 €/EEC.</p> <p>From 2006 to 2017 White Certificate scheme ensured to achieve a primary energy saving of 26 Mtoe.</p>



Poland: Energy efficiency obligation schemes	
Legal references	Short description
Energy Efficiency Law (EEL) (2016)	<p>Detailed rules of energy efficiency obligation scheme (white certificates) are provided in the EEL (Chapter 4, art. 10-35)</p> <p>Obligation imposed on entities selling electric power, heat, and natural gas to carry out a project aimed at improving the energy efficiency of the final consumer or to obtain/buy white certificates (WC) and submit them for redemption to the President of the Energy Regulatory Office (ERO).</p> <p>WC will be granted only for planned energy efficiency investments or finished after the 1st January 2014. Auctioning system removed, continuous and permanent call for energy saving investment introduced. The white certificate will be granted to everyone who implements energy efficiency measure. To receive the white certificate it is necessary to submit an application to the President of the ERO for a certificate of energy efficiency and energy efficiency audit.</p> <p>EEA includes provisions which gradually will phase out the possibility to pay the substitution fee instead of carrying out the energy efficiency investments. The eligibility of paying substitution fee will be steadily limited, i.e. 30% in 2016; 20% in 2017; 10% in 2018. The possibility to meet the obligation by paying a substitution fee has been limited only to situation when there is not enough WC in the market; the value of substitution fee has been significantly increased.</p> <p>The white certificate scheme supports energy-efficient investments. A detailed list of projects to improve energy efficiency that can be obtained for white certificates is published in the notice of the Minister of Energy dated 23 November 2016. (MP 2016 item 1184).</p>



France: Energy efficiency obligation schemes	
Legal references	Short description
Art 14 to 17 of Law of 13 July 2005	<p>The Energy Savings Certificates scheme was introduced by the Energy Act of 13 July 2005 (POPE Act) with the aim of achieving energy savings in diffuse sectors: mainly building, but also energy efficiency in small and medium industry, agriculture or transport. This system is based on an obligation, imposed by the state on energy sellers (the obligated), to realize or have consumers achieve energy savings.</p> <p>To respect this obligation, the obligated persons can:</p> <ul style="list-style-type: none"> <li>• carry out energy saving actions with their private customers, local or professional communities and obtain EWCs;</li> <li>• buy EWCs from eligible players who have themselves carried out energy saving actions;</li> <li>• contribute financially to programs.</li> </ul> <p>Energy saving certificates are awarded by the departments of the Ministry of Energy to eligible actors (the obligated, communities - for actions on their heritage and on their territory, the National Agency for Housing (ANAH) - and social landlords).</p> <p>The obligated ones can carry out themselves the measures of saving of energy or to buy certificates to the not obliged ones</p>

#### 2.1.4 Financing schemes and instruments

Spain: Financing schemes and instruments	
Legal references	Short description
Law 15/2012 on fiscal measures for energy sustainability.	<p>Law 15/2012 of 27 December 2012 on fiscal measures for energy sustainability, in force since 2013, introduced permanent fiscal measures designed to send final energy consumers an appropriate price signal, with a view to encouraging rational and efficient energy use in line with the basic principles governing European Union fiscal, energy and environmental policy and with the ultimate objective of stimulating improvements in energy efficiency levels.</p> <p>This law introduced a tax reform designed to internalise environmental costs arising from electricity generation and spent nuclear fuel or radioactive waste storage and thus stimulate improvements in energy efficiency levels.</p>
Law 1/2005 of 9 March	<p>This Law establishes in Spain a community regime for Emissions Trading Scheme as of January 1, 2005, applicable to CO<sub>2</sub> emissions from</p>



	<p>installations that carry out the activities listed in the corresponding annex and that exceed the capacity thresholds established therein.</p> <p>The Law regulates a system of emission authorizations according to which all the facilities subject to its scope of application must have an authorization to emit greenhouse gases as of January 1, 2005.</p> <p>The authorization determines the methodology for monitoring emissions and the obligations to send verified information once a year and to deliver a number of emission rights in the emission rights registry.</p> <p>The Law defines the nature and content of a National Allocation Plan for the emission allowances for the facilities included in its scope of application.</p> <p>Currently in Spain, this law affects almost 1,100 installations and 45% of the total national emissions of all greenhouse gases.</p>
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<b>Italy: Financing schemes and instruments</b>	
Legal references	Short description
D.lgs. 102/2014	<p>Article 8, paragraph 10 of Legislative Decree. 102/2014 reserve of up to 15 million euros a year, in the period 2014-2020, for the co-financing of regional programs aimed at supporting the implementation of energy audits and the adoption of management systems compliant with ISO 50001 standards in SMEs.</p> <p>In implementation of the aforementioned legislation, two calls were launched (12 May 2015 and 4 August 2016) and subsequently the programs presented by the regions have been approved.</p> <p>For example, in Lombardy Region support scheme reimburses 50% of cost both for energy audits (with maximum eligible expenditure of 10.000 € and only for not energy intensive SMEs, according to definition of Law 167/2017 and Ministerial Decree of the 21<sup>st</sup> of December 2017. For more information about energy intensive enterprises see also paragraph 2.1.10 “Energy Audits”) and ISO 50001 implementation (with maximum eligible expenditure of 20.000 €. Energy intensive and large enterprises can be admitted to ISO 50001 implementation incentive but energy audit cost is not eligible and must be excluded). D.lgs n. 102 of 2014 established the National Fund for energy efficiency. The actions financed by the Fund aim at the energy renovation of buildings owned by public administrations, construction of networks for district heating, efficiency of public services and infrastructures, including public lighting, energy renovation of entire buildings, including social housing buildings and energy consumption reduction in industrial processes. The national fund has not been activated yet.</p>



Poland: Financing schemes and instruments	
Legal references	Short description
	<p><b>UE Financial Programming Period 2014-2020</b></p> <p>The area of intervention covers broad measures contributing to increasing the energy efficiency of small and medium enterprises, and detailed information on, among others, types of exemplary investments and potential beneficiaries are presented in the ROP implementation documents.</p> <p>Many projects might be financed by public sources through National Operational Programme, Regional Operational Programmes and funds from National Fund for Environmental Protection and Water Management and Regional Funds for Environmental Protection and Water Management.</p> <p><b>1. Horizontal measures</b></p> <p>1) The system obliging to energy efficiency (white certificates) duration From 01/01/2013 to 31/12/2020. Budget: approx. PLN 0.7 million annually from funds at the disposal of the implementing body.</p> <p>2) Operational Program Infrastructure and Environment 2014-2020 (Measure 1.3.3 - Nationwide support system for public sector, housing sector and enterprises in the field of energy efficiency and RES-Renewable energy sources); Duration: From 2015 to the end of 2023. Budget: EUR 30 million, contribution from the EU Cohesion Fund.</p> <p><b>2. Measures in the field of energy efficiency in buildings and public institutions:</b></p> <p>1) Green investment scheme (GIS). Part 6) - SOWA - Energy-efficient street lighting; Duration: From 2013 to 2017. Budget: PLN 147 million, including: PLN 74 million - Non-returnable forms (grants), PLN 73 million - Return forms (loans) / Funds derived from the transaction of sale of AAU emission units or other NFEPWM funds.</p> <p>2) Operational Program Infrastructure and Environment 2014-2020 (1.3.1, 1.3.2 - Supporting energy efficiency in public utility buildings and in the housing sector; Duration: 2014-2023. Budget: EUR 431.10 million (including utility buildings EUR 205.52 million and the housing sector EUR 225.58 million), from EU funds (Cohesion Fund).</p> <p>3) Regional operational programs (ROP) for the years 2014-2020. According to the Partnership Agreement, 60% of structural funds (European Regional Development Fund and European Social Fund) will be allocated to 16 regional programs in 2014-2020. Each voivodship has</p>



	<p>a certain part of all financial resources available in the program and develops its ROP.</p> <p><b>3. Energy efficiency measures in industry and SMEs</b></p> <p>1) Support for entrepreneurs in the field of low-emission and resource-efficient economy. Part 2 - Increasing energy efficiency; Duration: From 2013 to 2017. Budget: PLN 724.5 million, NFOŚiGW Funds: repayable forms (loans)</p> <p>2) Operational Program Infrastructure and Environment 2014-2020 (Measure 1.2 - Promotion of energy efficiency and use of renewable energy sources in enterprises); Duration: From January 1, 2014 to December 31, 2023. Budget: EUR 150.32, EU allocation (Cohesion Fund) in the form of repayable assistance.</p> <p>3) Support for projects in the field of low-emission and resource-efficient economy. Lot 4 - Energy efficiency in enterprises ;. Duration: From 2017 to 2023. Budget: PLN 500 million, NFOŚiGW Funds: repayable forms (loans)</p> <p>4) Regional operational programs for the years 2014-2020</p> <p><u>Examples:</u></p> <p><u>E-CUMULATOR - An Ecological Accumulator for the Industry</u></p> <p>The goal of the program is to reduce the negative impact of projects on the environment through investment activities in industry. Types of projects are listed in the Announcement of the Minister of Energy of 23 November 2016 on a detailed list of undertakings aimed at improving energy efficiency. This program is implemented from 2015 to 2023.</p> <p><u>EWE Energy efficiency in enterprises</u></p> <p>The goal of the program is to support projects that increase energy efficiency in enterprises. Types of projects which will be supported:</p> <ul style="list-style-type: none"><li>- listed in the Announcement of the Minister of Energy of 23 November 2016 on a detailed list of undertakings aimed at improving energy efficiency</li><li>- technological changes in the existing facilities, installations and technical equipment.</li></ul> <p>This program is implemented from 2017 to 2023.</p> <p>The program for access to financial instruments for the SME sector (PoISEFF)</p> <p>PoISEFF's offer is addressed to small and medium-sized enterprises (SMEs) interested in investing in new technologies and devices that reduce energy consumption or produce energy from renewable sources. Financing can be obtained in the form of a loan or leasing of up to EUR 1 million through the financial institutions participating in the Program (banks, lease institutions). Budget: EUR 150 million from the</p>
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	European Bank for Reconstruction and Development (EBRD) funds. Duration: Start: 2011. End: not determined.
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France: Financing schemes and instruments	
Legal references	Short description
Corresponds to the application of article 75 of the Grenelle 2 law	Mandatory GHG balance every 3 years from December 31, 2012 (every 4 years from December 24, 2015)

### 2.1.5 Energy or CO2 taxes

Spain: Energy or CO2 taxes	
Legal references	Short description
<p>Law 2/2011 of 4 March 2011</p> <p>Real Decree 1494/2011, of 24 October, which regulates the Carbon Fund for a Sustainable Economy.</p> <p>Order IET/274/2015 of 13 February 2015</p>	<p>This Law on sustainable economy created a fund for buying carbon credits the aim of which is to generate low-carbon economic activity and to contribute to meeting Spain's greenhouse gas emission reduction commitments.</p> <p>The CLIMA Projects financed by Spain's FES-CO2 (Carbon Fund for a Sustainable Economy) are implemented in Spain to reduce greenhouse gases (GHGs) and are intended to reorient the Spanish production system towards a low-carbon model.</p> <p><u>CLIMA projects in the residential, non-ETS industry and transport sectors.</u></p> <p>The FES-CO2 launches an annual call for the selection of Clima Projects, within the first four-month period of each year. After announcing the launch of the call, a deadline is opened in which interested project promoters have to send their samples of interest.</p> <p>Before 31 May of each year, the promoters of the selected Clima projects must submit a verified monitoring report to the FES-CO2. After the submission of these reports, during the four years following the</p>



Resolution of April 17, 2017	<p>signing of the purchase agreement, the FES-CO2 will acquire and pay the amount agreed for the agreed emission reductions verified.</p> <p><u>Industrial competitiveness incentive programme.</u> The aim of the industrial competitiveness incentive programme was to stimulate business investment that would contribute significantly towards generating added value in the industrial sector. Support came in the form of reimbursable loans, with a 10-year repayment period, for industrial investment to improve and/or modify previously existing production lines. These modifications could comprise changes to the line's production capacity but could not constitute new production lines separate from the older ones. In all cases, companies eligible for support through this programme had to report on final energy savings for the projects for which support was provided.</p> <p><u>Energy Efficiency National Fund</u> Resolution of the Institute for the Diversification and Saving of Energy, which publishes the Resolution of March 6, 2017, of the Board of Directors, which establishes the regulatory bases of the second call of the aid program for energy efficiency actions in SMEs and large companies in the industrial sector. The purpose of the aid programme is to incentivise and promote the implementation of projects involving energy saving and efficiency and CO2 emission reduction via measures in the industrial sector. The aid provided under this programme took the form of monetary grants without consideration. The actions financed by the fund are: 1) Projects designed to improve the technology used in industrial equipment and processes (investment to replace equipment, plant and ancillary energy-consuming systems with equipment and plant using highly efficient technology or the best technology available in order to reduce energy consumption and CO2 emissions). 2) Projects to install energy management systems, understood as all the measures necessary as regards the metering of energy consumption variables, the installation of devices to regulate and monitor process parameters and the installation of the IT systems needed to perform analysis, regulation and monitoring.</p>
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Italy: Energy or CO2 taxes	
Legal references	Short description
European Directive 2003/87/CE	<p><b>Emission Trading Scheme (ETS)</b></p> <p>ETS is an European Scheme that sets a maximum threshold for EU carbon dioxide emissions of specific activities (i.e. steel production, power plants, aviation, etc.).</p> <p>Emissions are allocated in allowance quotes (1 ton of CO2 corresponds to 1 allowance quote) that can be bought or sold on a dedicated trade market.</p> <p>In ETS scheme every obliged operator must balance its greenhouse gas emissions with a corresponding amount of allowance quotes. Operators of some specific manufacturing sectors (with a relevant risk of delocalization) receive a certain number of free quotes while all other companies must buy it through public auction. Total amount of allowance quotes on EU market decreases every year: Emission Trading System will guarantee a reduction of greenhouse gas emissions of 43% in comparison with 2005 for ETS sectors.</p> <p>ETS apply to over 11000 industrial plant and 600 aviation operators all over Europe. In Italy 1200 companies are involved in this scheme and they cover about the 40% of national CO2 emissions.</p>

Poland: Energy or CO2 taxes	
Legal references	Short description
The Act of 17 July 2009 on the System to Manage the Emissions of Greenhouse Gases and Other Substances	<p>Emission allowance trading is the basic instrument used to reduce the amount of greenhouse gases introduced into the atmosphere, and its assumptions are contained in Directive 2003/87 /EC establishing a scheme for greenhouse gas emission allowance trading in the Community.</p> <p>This Act is an element of regulation relating to the reduction of emissions of greenhouse gases and other substances. It has filled the gap of a systemic regulation in the Polish national legal system. The law introduces solutions which allow Poland to fulfil international commitments in respect of:</p> <ul style="list-style-type: none"><li>– reduction of emissions of greenhouse gases and other substances,</li><li>– registration of gas emissions,</li><li>– reporting the volume of pollutants emitted into the atmosphere.</li></ul> <p>The Act established a national emissions balancing and management system, which organises all data on the quantity of emissions of greenhouse gases and other substances.</p>



<p>The Act of 12 June 2015 on Greenhouse Gas Emission Allowance Trading Scheme</p>	<p>The Directive 2009/29/EC of 23 April 2009 amending Directive 2003/87/EC was implemented into the Polish law. The basic legal act on emission allowance trading in Polish legal system:</p> <ul style="list-style-type: none"> <li>- <i>the Act of 12 June 2015 on Greenhouse Gas Emission Allowance Trading Scheme</i></li> </ul> <p>The law implements provisions relating in particular to the qualification of installations covered by the scheme. The ETS Act (Emissions Trading System) also introduces the rules for disposal of emission allowances, the terms for auctioning and the system of effective sanctions securing the performance of obligations imposed by the law.</p> <p>From the beginning of Phase III of the EU Emissions Trading System (2013–2020), the power sector has to buy all its allowances (auctioning). However, Poland like nine other Member States, can choose to allocate a limited number of free allowances to power stations (EU decision about exceptions: 13.07.2012 and 22.01.2014)</p> <p>The system is supervised by the Minister of the Environment. The trading system emission allowance of greenhouse gases regulates the operation of the National Centre for Emissions Balancing and Management (KOBiZE).</p> <p>According to KOBiZE, around 750 installations in Poland are currently covered by the EU ETS system.</p>
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<b>France: Energy or CO2 taxes</b>	
Legal references	Short description
<p>Directives 2009/29 / EC and 2003/87 / EC</p> <p>The provisions were transposed into French law by the decree of December 3, 2012.</p>	<p>The aim of the EU ETS (Emission Trading System) is to set up an international carbon market. Each Member State has an allocated CO2 emission quota which it allocates to several industrial sites. Each of the sites must respect the emission threshold assigned to it. Taxable companies also have the possibility to exchange quotas on the European emission allowance market:</p> <ul style="list-style-type: none"> <li>- an installation that emits more than its allocation must obtain the missing allowances: this is the polluter-pays principle;</li> <li>- a facility that emits less than its allocation can sell its unused allowances and thus benefit from revenues, which can be mobilized for example to finance investments that allow them to control their emissions.</li> </ul> <p>In the manufacturing industry, GHG emissions, including CO2, are 70% of the combustion. Improving energy efficiency therefore reduces these emissions.</p>



	There are 3 periods (2005-2008, 2009-2012 and 2013-2020). The third period provides free allocations by installation and benchmark favouring high-performance installations ; free allocation of quotas gradually decreasing from 80% in 2013 to 30% in 2020; new sectors are included (such as the intra-EU aviation sector or foundries)
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### 2.1.6 Fiscal incentives

Spain: Fiscal incentives	
Legal references	Short description
	In some autonomous regions such as Navarra and the Basque Country, companies have the possibility to deduct a percentage of the corporate tax payment when they invest in renewable energy facilities.

Italy: Fiscal incentives	
Legal references	Short description
DM 16 February 2016 (Conto termico 2.0.)  Law 232/2016 (Tax deductions of energy efficiency measures for buildings)	<p><b>Conto termico 2.0.</b> The new Thermal Account 2.0 is a government incentive provided by the GSE (Energy Services Manager) to increase the energy efficiency (building insulation, high performance windows etc.) of existing buildings (reserved for public administration) and for the production of thermal energy from renewable sources and high efficiency systems (aimed at individuals, businesses and public administrations) in small size plants (heat pumps, solar thermal systems, biomass boiler etc.).</p> <p><b>Tax deductions of energy efficiency measures for buildings</b> Currently, tax deductions of 65% for the energy renovation of buildings are provided for expenses incurred by 31 December 2018. Incentive apply to actions for decreasing energy demand for heating (including micro-cogeneration), improvement building insulation level, installation of solar thermal panels, replacement of heat production plants with high efficiency equipment.</p>



<b>Poland: Fiscal incentives</b>	
Legal references	Short description
The Act of 6 December 2008 on excise duty	<p>Two categories introduced by the Polish government, which can be used by enterprises using energy-consuming technologies, energy-intensive enterprises and industrial consumers.</p> <ul style="list-style-type: none"><li>- full excise duty exemption according to art. 30 point 7a and 7b of the Act – it concerns the use of energy-intensive processes in production.</li><li>- partial return from excise duty, carried out by reimbursement of part of the paid excise tax on electricity used by this plant - the basic requirement is running business in accordance with at least one of the codes of the Polish Classification of Activities (PKD) indicated in the art. 31d of the Act.</li></ul>

<b>France: Fiscal incentives</b>	
Legal references	Short description
Article 156 of the <b>Law of August 17, 2015</b>	Companies that consume a lot of electricity can benefit, for all or part of their sites, from special electricity supply conditions. In return, they are committed to adopting best practices in terms of energy performance

### 2.1.7 Standards and norms that aim to improve energy efficiency of products and services

<b>Spain: Standards and norms that aim to improve energy efficiency of products and services</b>	
Legal references	Short description
	<p>The measures adopted or planned to promote energy services are:</p> <ol style="list-style-type: none"><li>1. Legislative measures to promote energy services: Energy services companies are recognised under Spanish law by Royal Decree-Law 6/2010 of 9 April 2010 on measures to stimulate economic recovery and employment. In Spain, the measures to stimulate the energy services market set out by Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 were aimed primarily at the public sector, which is also required to play an exemplary role in applying energy saving and efficiency measures and in promoting procurement of energy services. Various agreement models have been drawn up that are compatible with the two types of procurement</li></ol>



	<p>allowed for this activity under the law on public procurement (Ley de Contratos del Sector Público), namely the combined supply and services agreement and the public-private partnership agreement.</p> <p>Law 8/2013 of 26 June 2013 on urban renovation, regeneration and renewal provides for participation by energy service companies in programmes to improve energy efficiency in buildings — enabling them to finance operations with savings amortised over time — and implementation of energy saving and efficiency measures</p> <ol style="list-style-type: none"> <li>2. Economic measures to support the procurement of energy services: All lines of support for improvement of energy efficiency (approved by the Energy Saving and Efficiency Action Plan) have included energy service companies as potential beneficiaries with the aim of encouraging this type of procurement.</li> <li>3. Measures to promote energy services: As part of the measures adopted to promote energy services, IDAE has dedicated a section of its website to information on these.</li> </ol> <p>List of energy service suppliers: In order to increase awareness about energy service companies, the IDAE has created a database of ESCOs based on the information they have submitted to their regional authorities.</p>
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<b>Italy:</b> Standards and norms that aim to improve energy efficiency of products and services	
Legal references	Short description
Legislative Decree n. 50 of 18 April 2016	<p><i>Green Public Procurement:</i> In Italy the legislation is summarized in the "Action Plan for the sustainability of consumption in the Public Administration sector (PAN GPP)", updated with D.M. 10 April 2013. Many documents followed this plan to describe the minimum environmental criteria (CAM) for different product sectors or services. These documents are issued by ministerial decree and published in the official gazette. The inclusion of the CAM in the public tender documents became mandatory following the issuing of the new procurement code, Legislative Decree n. 50 of 18 April 2016, which in Article 34 provides for the application of CAM in public tenders.</p> <p>Therefore, for the Italian public administration it becomes compulsory to make green purchases, for the products and services for which the relative CAMs have been issued by the Ministry of the Environment.</p>



<b>Poland:</b> Standards and norms that aim to improve energy efficiency of products and services	
Legal references	Short description
Directive 2009/125/EC  The Act of 29 January 2004 on Public Procurement Law. Dz. U. of 2016 item 1020.  The Act of 20 May 2016 on energy efficiency. (Journal of Laws of 2016, item 831),  Regulation of the Prime Minister of May 10, 2011 regarding other than the price of obligatory criteria for the evaluation of offers in relation to certain types of public procurement (Journal of Laws, item 559)  National Action Plan on energy efficiency for Poland 2017	<p>The Directive provides consistent EU-wide rules for improving the environmental performance of products, such as household appliances, information and communication technologies or engineering. The Directive sets out minimum mandatory requirements for the energy efficiency of these products. This helps prevent creation of barriers to trade, improve product quality and environmental protection.</p> <p>The provisions of the Act provide a number of solutions allowing for taking into account social or environmental aspects within the framework of public procurement procedures (regarding sustainable public procurement).</p> <p>Act of 20 May 2016 on energy efficiency (Journal of Laws of 2016, item 831), which obliges public authorities to: purchase energy-efficient products or acquire or rent energy-efficient buildings.</p> <p>Policy focused on increasing the energy efficiency of the economy will be continued, translating into a reduction in its energy consumption,</p> <ul style="list-style-type: none"><li>- the planned activities are based on market mechanisms to the maximum extent and use budget financing to a minimum,</li><li>- the objectives are implemented on the basis of the least costs, i.e. through the use of to the maximum extent of existing mechanisms and organizational infrastructure,</li><li>- the national potential for improving energy efficiency will be used.</li></ul>

<b>France:</b> Standards and norms that aim to improve energy efficiency of products and services	
Legal references	Short description
<b>European Directive ErP (Energy related Products)</b> (2009/125/CE)	The European Directive ErP (Energy related Products), also known as the "Ecodesign Directive", applies to products that have an impact on energy consumption throughout their life cycle: manufacture, use, end of life and destruction. It sets eco-design requirements through regulations for different equipment. The directive does not lay down requirements for the existing fleet but is of interest to companies when renewing their equipment



### 2.1.8 Energy labelling schemes

<b>Spain:</b> Energy labelling schemes	
Legal references	Short description
REGULATION (EU) 2017/1369 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU	<p>It refers to the labelling of energy-related products and the standardized information to be included in relation to energy efficiency, energy consumption and other resources.</p> <p>It aims to inform the consumer of said consumption, allowing the comparison between products in the market.</p> <p>Current Regulation in energy labelling are:</p> <p>Household dishwashers, household refrigerating appliances, household washing machines, televisions, air conditioners, household tumble driers, electrical lamps and luminaires, vacuum cleaners, space heaters, water heaters, domestic ovens and range hoods, residential ventilation, professional refrigerated storage cabinets, local space heaters and solid fuel boilers and packages of a solid fuel boiler, supplementary heaters, temperature controls and solar devices.</p>

<b>Italy:</b> Energy labelling schemes	
Legal references	Short description
EU directive 2010/30 D.lgs 102/2014	<p>In Italy, energy label of electrical appliances has been introduced since 1998. Over the years, the legislation has undergone some changes and today is mandatory for the following appliances placed on the Community market: refrigerators and freezers, washing machines, dryers, dishwashers, electric ovens, electric lamps, air conditioners, boilers and heating systems.</p>

<b>Poland:</b> Energy labelling schemes	
Legal references	Short description
The Act of 14 September 2012, Amended by the Act of 27 May 2015 on obligations to inform about the energy consumption	<p>Historically, in Poland the provisions of Directive 2010/30 / EU have been implemented by the provisions of the Act of 14 September 2012 on obligations regarding information on the energy consumption of energy-using products (Journal of Laws of 2012 item 1203), which was amended by the Act of 27 May 2015 amending the Act on obligations regarding information on the energy consumption of energy-using products and certain other acts (Journal of Laws of 2015, item 1069).</p> <p>The act sets out:</p>



of energy-using products	<ul style="list-style-type: none"> <li>- obligations to provide information on the consumption of energy and other basic resources by products that use energy or the impact of these products on energy consumption;</li> <li>- the organization and operation of the system of control over the performance of information obligations.</li> </ul> <p>The supplier is obliged to:</p> <ul style="list-style-type: none"> <li>- add to the product using energy, placed on the market or put into service, labels and cards in Polish language;</li> <li>- attach the card to any booklets or other documentation provided with the energy-using product;</li> <li>- place on the label and in the sheet data compatible with the technical parameters of the product using energy.</li> </ul> <p>On August 1, 2017, EU Regulation of Parliament and Council 2017/1369 of 4 July 2017, establishing the framework for energy labeling, came into force.</p>
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France: Energy labelling schemes	
Legal references	Short description
directive 92/75/CEE	The energy label appeared in 1994. First to the electrical appliances (refrigerators and freezers, washing machine, dishwasher ...), she was diversified since, as long as the consumer goods that must be displayed (televisions, air conditioners, but also housing, vehicles, tires ...) that by the indications it provides (noise, water consumption ...)

### 2.1.9 Training and education programs

Spain: Training and education programs	
Legal references	Short description
Royal Decree 56/2016, of 12 February	<p>The Institute for Energy Diversification and Saving (IDAE) website (<a href="http://www.idae.es">www.idae.es</a>) hosts an extensive collection of specialist publications, virtual classrooms and audiovisual content on energy efficiency.</p> <ul style="list-style-type: none"> <li>• Institutional advertising and communication campaigns</li> <li>- Since 2004, the IDAE has carried out regular campaigns aimed at the general public and focused on energy efficiency in different everyday settings</li> <li>• INTERNET: IDAE website and other online communication channels</li> <li>- Dedicated to the promotion of energy efficiency and renewable energies, <a href="http://www.idae.es">www.idae.es</a> has been online since 1999 and provides</li> </ul>



	<p>information of public interest aimed at companies and the general public. Its content spans news, calls for applications, planning documents, studies, training platforms, tools for calculating energy system performance and carbon dioxide emissions, proprietary audiovisual advertising and information content, publications and benchmark databases on energy-efficient cars and household appliances, among many other topics.</p> <ul style="list-style-type: none"><li>- Other online communication channels: Apart from its website, the IDAE manages other online communication channels which also help inform consumers about using energy efficiently: Social media, Online platform for the MOVEA plan to promote alternative-fuel vehicles, 'Guía de la Energía' website.</li><li>• Regular communications: IDAE e-newsletter</li><li>- In 2004, the IDAE began distributing a newsletter entitled 'Boletín Electrónico del IDAE' which provides specialised information on IDAE activities regarding energy saving and efficiency and renewable energies</li><li>• Proprietary audiovisual content.</li><li>- Since 2005, the IDAE has run a differentiated communication campaign focusing on energy saving and efficiency and renewable energies, producing audiovisual content targeting the general public in-house or in partnership with third parties. This content is designed to be broadcast over a variety of channels, including television, internet and even cinemas.</li><li>• Public information service on energy efficiency and renewable energies</li><li>- The IDAE runs a public information service on energy efficiency and renewable energy (Servicio de Información al Ciudadano en Eficiencia Energética y Energías Renovables, SICER) that has responded to over 210 000 queries since it was launched in late 2008 and is rated highly by users.</li><li>• Training</li><li>- The IDAE has developed two e-learning platforms: one for the general public, and another for central government staff.</li><li>○ Energy efficiency training for the general public: This e-learning platform offers a series of courses, accessible online at <a href="http://www.aprendecomoahorrarenergia.es">www.aprendecomoahorrarenergia.es</a>, intended for the general public. These courses are free and also includes downloadable guides and additional documentation.</li><li>○ Energy efficiency training for central government staff: With regard to specific training in energy efficiency for central government staff, the elearning platform developed by the IDAE</li></ul>
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	<p>is: <a href="http://formacion.paee-age.es/">http://formacion.paee-age.es/</a>. This training platform has two clear objectives:</p> <ul style="list-style-type: none"> <li>▪ To train those responsible for energy in buildings and energy managers at ministries in their role.</li> <li>▪ To promote energy saving by providing information and raising awareness among government staff</li> </ul> <p>Those people who want to become an Energy Auditor and do not have the official university degree (or other undergraduate degrees, university degrees or Master's degree in which basic knowledge of energy, building facilities, industrial processes, energy accounting, measurement equipment and energy of data and energy saving techniques) must conduct a training course. These courses are organized by private entities recognized by the competent body.</p>
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<b>Italy:</b> Training and education programs	
Legal references	Short description
N.A.	<p>Many training and educational programs are provided by ENEA, the Italian National Agency for New Technologies, Energy and Sustainable Economic Development.</p> <p>Training courses to become Energy Manager or Energy expert are usually organized by private institutions.</p>

<b>Poland:</b> Training and education programs	
Legal references	Short description
The Act of 29 August 2014 on the energy performance of buildings	<p><i>Public information service on energy efficiency and renewable energies:</i> Information on energy efficiency improvement measures and financial mechanisms are available to all relevant market actors, such as consumers and SMEs. There are also many organisations, associations, and institutions whose tasks include providing information and advisory services regarding the promotion of energy conservation issues. They include in particular such organisations as: national energy agencies, regional energy agencies and other sector-specific organisations. Information campaigns addressed to the public, whose objective is to shape ecological attitudes and to show how to save energy, also play an important role in creating better energy efficiency. The Ministry of Economy, in collaboration with the National Fund of Environmental Protection and Water Management implements of a nation-wide advisory programme regarding energy efficiency (including RES), also in</p>



	<p>enterprises. This programme will be implemented in the years 2015-2023.</p> <p><i>Trainings:</i></p> <p>Training courses are usually organized by private institutions and offered by faculties of third level educational institutions. Currently, additional requirements are only to be met by persons preparing buildings energy performance certificates. Energy performance certificates may be prepared by persons who:</p> <ul style="list-style-type: none"> <li>- within the scope of regulations governing third level education completed studies awarding a Master’s degree or completed engineering studies in architecture, construction, environment engineering, energy, or</li> <li>- completed third-level education, if they also completed appropriate postgraduate studies (the programme of postgraduate studies should include the issues concerned energy performance of buildings, energy audits, energy-efficient construction and RES), or</li> <li>- have a construction licence.</li> </ul>
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France: Training and education programs	
Legal references	Short description
N.A.	<p>Many training and educational programs are provided by ADEME, the French National Agency for New Technologies, Energy and Sustainable Economic Development.</p> <p>Training courses to become Energy Manager or Energy expert are usually organized by private institutions.</p>

### 2.1.10 Energy audits

Spain: Energy audits	
Legal references	Short description
Royal Decree 56/2016, of 12 February	<p>In accordance with Article 2 of Royal Decree 56/2016, the obligation to perform an audit is applicable to companies that employ a minimum of 250 people and to those that, although not fulfilling this requirement, have an annual turnover in excess of EUR 50 million and, at the same time, an annual balance sheet in excess of EUR 43 million. Similarly, an audit is applicable to corporate groups — defined according to Article 42 of Spain's Commercial Code — which, taking into account the aggregate size of the corporations that form the consolidated group, meet the large enterprise criteria.</p>



	<p>These large enterprises or corporate groups must undergo an energy audit every four years, counted from the date of the previous energy audit, which covers at least 85 % of the total final energy consumption of the group of facilities located within national territory and which form part of the industrial, commercial and service activities that those enterprises and groups manage in conducting their business.</p> <p>The implementation of an energy or environmental management system, which must be certified by an independent body according to the relevant European or international standards, will be considered equivalent to the above obligation, provided that the management system implemented includes an energy audit performed in accordance with the minimum energy audit criteria established.</p> <p>The audits must be conducted by properly qualified energy auditors.</p> <p>On May 23, 2017, information has been received on 15.476 energy audits performed at 2.659 companies.</p>
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Italy: Energy audits	
Legal references	Short description
D.lgs 102/2014	<p>Legislative Decree 102/2014 made energy audit mandatory by December 5, 2015 for large companies and energy intensive companies. The following three criteria must be respected at the same time to define an energy intensive company:</p> <ul style="list-style-type: none"> <li>• use of at least 2.4 GWh of electricity in the reference year;</li> <li>• ratio between the actual cost of electricity and turnover of at least 2%;</li> <li>• a prevalent NACE code referred to manufacturing activity.</li> </ul> <p>Qualified subjects, even if not certified (at least until July 2016), can perform the audit: they are ESCO (Energy Service Company), Energy Management Experts (EGE), energy auditors.</p> <p>“On 31st December 2016, 15.154 audits were transmitted to ENEA, corresponding to 8.130 enterprises. Thanks to this result, Italy is positioned at the top of the list of more virtuous EU member states in implementing article 8 of EED and its obligation to energy-intensive and large industries. In the rest of EU, indeed, at the end of the first obligation period on December 2015, 13.000 audits were elaborated, 7.000 of which represented by audit Declarations” (Source: ENEA, ENERGY EFFICIENCY ANNUAL REPORT 2017).</p> <p>From the 1<sup>st</sup> of January 2018, requirements to be considered as energy intensive company changed (D.M. 21<sup>st</sup> December 2017): minimum threshold of 1 GWh of electricity consumption, admission for specific NACE sectors only (some manufacturing activities have been excluded), restrictions due to specific economical and energy indexes.</p>



Poland: Energy audits	
Legal references	Short description
Act of 21 November 2008 on the support for thermomodernisation and repairs  Energy Efficiency Law (EEL)  The Act of 29 August 2014 on the energy performance of buildings	<p>Currently, the Polish legislation provides for three basic types of documents aimed at permitting entities interested in the improvement of energy efficiency to assess the level of energy intensity of buildings and installations, and to identify sources of possible energy savings and costs involved in the introduction of pro-efficiency solutions. These solutions include:</p> <ul style="list-style-type: none"><li>- <i>Energy audits</i> Act of 21 November 2008 on the support for thermomodernisation and repairs</li><li>- <i>Energy Efficiency Audit</i> Energy Efficiency Law (EEL) This is a study including an analysis of energy consumption and specifying technical conditions of a premises, technical appliances or installations, including a list of projects undertaken/to be undertaken in order to improve energy efficiency of the premises, appliances or installations, as well as an assessment of their economic profitability and energy savings capable of being achieved. An energy efficiency audit is prepared in order to obtain a support in the form of white certificate.</li><li>- <i>Energy performance certificate of a building</i> The Act of 29 August 2014 on the energy performance of buildings This is a document which determines the amount of energy (in kWh/m<sup>2</sup>/year) necessary to meet different needs related to the use of a building, and to indicate construction works, feasible to carry out,</li></ul>



<p>Energy Efficiency Law (EEL) (2016)</p> <p>PN-EN 16247</p>	<p>which would improve in a profitable way the energy performance of a building.</p> <p>The fact that three types of energy audits are indicated above does not mean that any other audits are not acceptable. The only difference is that they are not regulated on a statutory basis and it is now a general practice by enterprises to commission comprehensive energy audits to reduce energy costs of their business activities. Entities which carry out energy audits, are required to be accredited and certified.</p> <p>Detailed rules of preparation of energy efficiency audits are provided in the EEL (Chapter 5, art. 36-38) and decree following from the EEL. The subjects to an energy audit are entrepreneurs in the meaning of the Act of 2 July 2004 on the Freedom of Economic Activity (Journal of Laws of 2016 item 1829, as amended), with the exception of those running small and medium-sized enterprises in the meaning of Articles 104 to 106 of this Act. These enterprises are obliged to carry out an energy audit every four years or to have such an audit performed. Enterprises that are implementing an energy or environmental management system in compliance with the relevant European Standards are exempted from this requirement.</p> <p>An energy audit is to be carried out by an independent entity which has knowledge and professional experience in performing this type of audits. If the energy audit of an enterprise is carried out by experts from the audited enterprise, they may not be directly involved in auditing the activities of that enterprise.</p> <p>Energy audits of an enterprise are to cover detailed and validated calculations for the proposed measures which are designed to improve energy efficiency, and to provide information on potential energy savings.</p> <p>An energy audit of an enterprise:</p> <ol style="list-style-type: none"><li>1) is to be carried out on the basis of up-to-date, measured, and traceable data on energy consumption and, (for electricity) load profiles;</li><li>2) should comprise a detailed review of the energy consumption profile of buildings or groups of buildings, in industrial installations, and in transportation, corresponding to a total of at least 90% of the total energy consumption by the company;</li><li>3) should be based, whenever possible, on life-cycle cost analysis (LCCA) instead of Simple Payback Periods (SPP) in order to take account of long-term savings, residual values of long-term investments and discount rates.</li></ol> <p>Operators are to be required to keep the data used in energy audits for a five-year period, for control purposes.</p>
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<b>France: Energy audits</b>	
Legal references	Short description
French transposition of Art 8 of the Energy Efficiency Directive published in December 2012	Companies that are not SMEs (more than 250 people or those whose annual turnover exceeds 50M € and the balance sheet total exceeds 43M €). Companies that have implemented an ISO 50001 certified Energy Management System (EMS) are exempted from the regulatory energy audit.

### 2.1.11 Energy management systems

<b>Spain: Energy management systems</b>	
Legal references	Short description
ISO 50001	In Spain in the industrial sector there are three recognized entities to certify energy management systems according to the standard UNE-EN ISO 50001:2011.

<b>Italy: Energy management systems</b>	
Legal references	Short description
ISO 50001	ISO 50001 has been acknowledged by UNI (Italian standardization body) in 2011. The certificate must be released by one of the licensed certification bodies.

<b>Poland: Energy management systems</b>	
Legal references	Short description
PN-EN ISO50001:2012	In Poland there are few entities to certify energy management systems according to the standard PN-EN ISO 50001:2012. Based on our research there are about 60 certified companies.

<b>France: Energy management systems</b>	
Legal references	Short description
ISO 50001	The ISO 50001 standard was published on June 15, 2011



### 2.1.12 Promotion of efficiency in heating and cooling

Spain: Promotion of efficiency in heating and cooling	
Legal references	Short description
Royal Decree 56/2016, of 12 February	<p>This Royal Decree regulates the assessment of the potential of high efficiency cogeneration and urban heating and cooling systems that must be carried out, in order to provide information on national development plans and contribute to a stable and favourable environment for investments.</p> <ul style="list-style-type: none"><li>- Every five years, the Ministry of Industry, Energy and Tourism will carry out and notify the European Commission, a full evaluation of the potential for the use of high efficiency cogeneration and efficient urban heating and cooling systems.</li><li>- Autonomous regions and local entities may adopt policies that encourage analysis at the local and regional level of the potential for the use of efficient heating and cooling systems, particularly those that use high efficiency cogeneration.</li><li>- The policies of promotion of energy efficiency in the production and use of heat and cold, must always respect the provisions of article 14.1 of Law 24/2013, of December 26, of the Electricity Sector, and in Article 59.2 Law 18/2014, of October 15, approving urgent measures for increase, competitiveness and efficiency.</li><li>- The Ministry of Industry, Energy and Tourism will carry out a cost-benefit analysis covering the Spanish territory, taking into account the climatic conditions, the economic viability and the technical suitability. This analysis should allow the determination of the most efficient solutions in relation to resources and more profitable in relation to costs.</li><li>- In cases in which the planned evaluation and the analysis carried out determine the existence of potential, appropriate measures will be taken to develop a heating and cooling infrastructure efficient urban and/or to enable the development of a high efficiency cogeneration and the use of heating and cooling from waste heat and renewable energy sources.</li></ul>

Italy: Promotion of efficiency in heating and cooling	
Legal references	Short description
D.M. 26 June 2015	Minimum energy efficiency requirements for warehouses are required for new buildings or in case of relevant renovation interventions or energy efficiency interventions; fiscal incentives are envisaged.



<b>Poland: Promotion of efficiency in heating and cooling</b>	
Legal references	Short description
Energy Law	Already implemented in the Energy Law. There is a system for supporting high-efficient cogeneration – “red” certificates for all fuels except gas, and “yellow” certificates for gas and small-scale cogeneration units. Preparation of the heat/cool map has been outsourced and completed in 2015. The methodology that was adopted is in line with the general rules provided in art. 14 and Annex VIII of the EED.

<b>France: Promotion of efficiency in heating and cooling</b>	
Legal references	Short description
Law of 12 July 2010.	<ul style="list-style-type: none"><li>• Art 3: Obligation to improve the energy performance of tertiary buildings</li><li>• Art 4: New thermal building regulations (RT 2012) to limit the primary energy consumption of new buildings to 50 kWhpe / m<sup>2</sup> / year</li><li>• Art75: mandatory GHG balance sheet for companies with more than 500 employees</li></ul>

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<http://www.idae.es/>
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<http://www.idae.es/ahorra-energia>
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7. Ustawa z dnia 10 kwietnia 1997 r. Prawo energetyczne (tekst jedn.: Dz.U. z 2012 r. poz. 1059 ze zm.), <http://prawo.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20120001059>,
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### 3 Benchmarking studies on the different energy service contracts and the role of ESCOs

Energy efficiency measures are characterized by some barriers that limit their development, especially in SMEs.

Generally speaking, the more an industrial company is bigger, the more internal energy consumption (expressed in kWh or natural gas Sm<sup>3</sup>) is numerically high and the more it has an interest in investing in trying to reduce them. That’s why big industries are the ones more interested in such investments and it is in this perspective that EU has issued many regulatory rules dedicated in particular to large companies (eg the 2012/27/EU Energy Efficiency Directive).

Even though in small and medium-sized companies the energy consumptions, and therefore energy costs, are not so high in absolute terms, they can represent significant quotas in percentage terms of increase in production costs.

Another barrier for spreading energy efficiency actions in SMEs, for obvious dimensional and organizational reasons, could be the gap in internal expertise for evaluation of measures to be taken (sometimes improvement measures are even not considered at all).

In this context ESCOs could play an important role, accompanying companies in the processes and supporting required investments for energy efficiency.

#### 3.1 The role of the ESCO: the current situation at national level

##### 3.1.1 ESCOs Certification Schemes

Country	Presence of ESCO certification scheme	Legal basis for ESCO certification	Mandatory certification
Spain	Yes	-UNE-216701	AENOR certifies Energy Service Providers (PSE) distinguishing them with a classification - audit/consulting, exploitation and/or investment
		-ESEplus Certified Classification of ANESE	No, it's a private certification
Italy	Yes	UNI CEI 11352	Only for specific services (energy audits, projects for white certificates)
Poland	No	N.A.	N.A.
France	No	N.A.	N.A.



### 3.1.2 Diffusion of ESCOs

Country	Number of certificated ESCO	Number of ESCO associations	Number ESCOs registered in the associations	Number of ESCO are in the partner's stakeholder list
Spain	17	3 (ANESE, A3e, AMI)	158	19
Italy	358 <sup>1</sup>	2 (AssoEsco and FederEsco)	125 (71 AssoEsco + 54 FederEsco) <sup>2</sup>	13
Poland	N.A.	0	N.A.	29 <sup>3</sup>
France	N.A.	1 <sup>4</sup> ("Club S2E" (Club of Energy Efficiency Services) with the support from ADEME)	N.A.	19

### 3.1.3 Commercial approach of ESCOs toward their clients: initial considerations

Spain	An ESCO offers the possibility of carrying out an energy efficiency project with no cost to the client, and ESCO also ensures energy savings by contract.
Italy	In Italy there are two main ways in which ESCOs intercept customers. 1. Energy audit At an early stage, the Esco can provide consultancy to make the energy audit of the sites. In Italy, the energy audit is compulsory for large companies and energy-intensive companies that have been registered by CSEA (a government society created to manage incentives for energy intensive companies). For all not energy intensive SMEs there is no obligation, but there are calls for funding for energy audits. The ESCo can offer the energy audit as:

<sup>1</sup> 01/08/2018 – Source FIRE (Italian Federation for Energy Efficiency)

Italian Valid UNI CEI 11352 certifications at 02/08/2018 are 904 – Source Accredia (Italian Accreditation Body)

<sup>2</sup> 31/08/2018 – Source AssoEsco and FederEsco

<sup>3</sup> There is a total number of ESCOs identified in Poland and placed in project stakeholder list, but not for all of them activity as an ESCO is a core business.

<sup>4</sup> ESCOs can be divided into different professional federations according to their field:

- Manufacturers of electrical and monitoring-control equipment (GIMELEC)
- Professional federation of equipment providers and installers (SERCE, UCF/FFB, UFE)
- Association of heating and cooling operators (FEDENE)
- Managers of equipment, energy and environment services (FG3E)

Since 2005 they decided to create the "Club S2E" (Club of Energy Efficiency Services) with the support from ADEME. This club wants to promote energy efficiency services through customers of its members, with in turn leads to the publication of methodological guidelines.



	<ul style="list-style-type: none"> <li>• a standalone paid service;</li> <li>• a free service to be considered preparatory to an improvement cycle of energy efficiency actions (ESCOs services can concern project, implementation, management and/or maintenance of the plant , incentives request etc.).</li> </ul> <p>Energy audit is often also proposed by multi-utility companies that rely on ESCOs. Today, we are witnessing a strategy of merging the large Esco companies with the main Italian multi-utility companies (eg: in 2017 A2A, one of the biggest multi utility in Italy acquired Consul System - the main Italian ESCO).</p> <p>2. White certificates</p> <p>The ESCo - if certified UNI 11352 - is one of the subjects entitled to request white certificates on behalf of the Customer who has carried out an energy efficiency intervention.</p> <p>White certificates are a system that provides an incentive proportional to the energy savings measured against an energy efficiency measure performed by a public or private entity.</p> <p>ESCO deals with the administrative practice and the measurement and verification plan of savings that must be approved by the GSE.</p> <p>Largest companies in Italy developed themselves by offering this service.</p>
<b>Poland</b>	<p>Currently, there is no system which could be used for continuous monitoring and obtaining accurate statistical data regarding the ESCO market in Poland. ESCO companies operate in different sectors for different clients. ESCO clients may include the public sector, the commercial sector, the energy sector, industry, small and medium-sized enterprises, and even households which taken together constitute a significant potential for reducing energy consumption. There are significant opportunities for the development of the ESCO model in the public administration sector. Even though in the recent years the volume of projects for the public administration sector decreased, this sector remains one of the more important segments of ESCO market in Poland.</p> <p>Division of ESCOs according to the services they provide: Advice and energy audits are the most popular and most frequently provided services. In most cases, they comprise the preparation of expert reports which define the potential areas for energy savings, and then recommendation of specific (technical, organisational) solutions, including an estimation of their cost-effectiveness. The next step involves providing advice on potential investments likely to ensure more rational energy management. The next largest group are companies which deal with broad-ranging heating and cooling, energy efficiency in buildings, lighting, cogeneration and generation and distribution of electricity or heat.</p> <p>According to estimates quoted by the Environmental Economy Institute, in 2011 the lower boundary value of turnover on that market in Poland was PLN 40 million, while the upper boundary value was PLN 100 million.</p>
<b>France</b>	<p>ESCOs offer a wide range of energy solutions whose main purpose is to achieve energy savings. They perform an in-depth analysis of the site, design and</p>



	implement solutions and maintain the system in place to ensure energy savings throughout the contract linking it to their customers. It is the savings in energy costs that are often used to repay the investment for a period ranging from five to twenty years (energy performance contract, energy savings certificates, etc.).
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### 3.1.4 Diffusion of EPC contracts (Energy Performance Contract): initial consideration

<b>Spain</b>	EPC contracts are usually used by ESCO in Spain, specifically the most used is the shared savings contract.
<b>Italy</b>	<p>In Italy the EPC has not yet become widespread, apart from specific solutions such as cogeneration or lighting.</p> <p>In fact the most used financing method by customers is the equity.</p> <p>This is probably because there are some barriers to the development of the EPC, such as low market confidence in ESCOs, the difficulty of measuring and checking energy savings benefits and the fact that projects with short return time are preferably accepted (&lt;5 years) .</p> <p>To meet these needs, various tools have been activated at european level (eg EEFIG, Investor Confidence Project, dedicated projects such as GuarantEE, etc.). ENEA (the Italian National Agency for New Technologies, Energy and Sustainable Economic Development) is planning to define guidelines for EPC contracts with the aim to improve the definition of contracts, clarifying the methods for assessing benefits, managing risks and managing the service in line with the needs of the various stakeholders (end users, ESCOs, technology providers, banks and financial entities).</p>
<b>Poland</b>	Poland has not yet seen a significant development of energy performance contracting (EPC) and EPCs are mostly used in the public sector (local authorities ).
<b>France</b>	<p>In France the EPC contracts are still not widespread, especially in the industry<sup>5</sup>. This is a relatively new device that has struggled to develop. Currently there is better information and an improvement in their use. EPCs are still mostly used in the public sector (local authorities ...) and still little in the industry.</p> <p>The offer of EPCs, however, is starting to grow among manufacturers, particularly in terms of lighting, compressed air and energy monitoring solutions. EPCs are a good alternative for financing equipment renewals when the company does not have the financial capacity to invest.</p> <p>The main current obstacles remain: the lack of knowledge of these solutions, the lack of confidence in the EPC offer of ESCOs, the difficulty of measuring and controlling the energy savings actually achieved and the fact that only projects with short return time are retained by manufacturers (&lt;5 years).</p>

<sup>5</sup> In France, an observatory of Energy Performance Contracts was launched in May 2016 to capitalize on the experiences learned from the first projects and to contribute to the promotion of this kind of approach



### 3.1.5 Sources

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1. ANESE, Spanish Association of enterprises of Energy Services. <http://www.anese.es/>
2. AENOR, entity dedicated to the certification of management systems, products and services, and responsible for the development and dissemination of UNE standards. <https://www.aenor.com/>

#### Italy

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3. Guidelines Establish a reference situation: [http://oreges.auvergnerhonealpes.fr/fileadmin/user\\_upload/mediatheque/cpe/Documents/Autres\\_documents/CS2E\\_2011\\_Etablir\\_situation\\_de\\_reference.pdf](http://oreges.auvergnerhonealpes.fr/fileadmin/user_upload/mediatheque/cpe/Documents/Autres_documents/CS2E_2011_Etablir_situation_de_reference.pdf)
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5. Analysis of the french market in energy efficiency services: [http://www.ademe.fr/sites/default/files/assets/documents/marches\\_see\\_synthese.pdf](http://www.ademe.fr/sites/default/files/assets/documents/marches_see_synthese.pdf)
6. French observatory of Energy Performance Contracts: <http://www.cstb.fr/assets/documents/ocpe-2017-chiffres-cles-fr-200617.pdf>



### 3.2 References and contents of consolidated national studies on ESCOs

Despite the fact that ESCOs are now active in all European countries, the differences from country to country regarding their diffusion, their operational reality and their market are still strong.

There are no consolidated benchmark studies at European level yet, and one of the objectives of the EE-METAL project was to start a comparative analysis among the partner countries to understand the dynamics under way.

As we will see later, within the project a first survey has been developed to investigate the market of ESCOs and workshops on the topic have been organized.

The starting point was the analysis of studies and research already conducted, mainly at the national level. In several countries, in fact, there have already been drafted reports, studies or analyses, in some cases also of wide scope, which, however, in most cases only look at the national context.

Below is a list of numerous studies carried out in different countries on the ESCO market, with available links and a brief summary of the contents, which can be extremely useful for understanding the ESCO market.

1. **Nathalie Sabbatucci, Nicola Labanca, *National Report on the Energy Efficiency Service Business in Italy, 2009*, eERG - Politecnico di Milano - Energy Department, Milan.**

#### Original language

Italian

#### Link

[http://www.fire-italia.org/prova/wp-content/uploads/2014/04/Task2\\_1\\_Italy\\_Final.pdf](http://www.fire-italia.org/prova/wp-content/uploads/2014/04/Task2_1_Italy_Final.pdf)

#### Summary of contents

The report is one of the output of the European project Change Best: Promoting the development of an energy efficiency service (EES) market – Good practice examples of changes in energy service business, strategies, and supportive policies and measures in the course of the implementation of Directive 2006/32/EC on Energy End-Use Efficiency and Energy Services. A project supported by the Intelligent Energy Europe Programme of the European Commission (IEE/08/434/SI2.528383).

“In Italy, the market for energy efficiency services has developed following an uneven pattern because energy service providers have always privileged large project-sizes as they are more profitable, thereby leaving out large potentials of energy savings existing in smaller realities such as small and medium companies, or households. This type of market evolution is strongly reflected in the results illustrated in the report. In particular we will see that because large projects were always favoured over smaller ones, the sector where most interventions on energy efficiency have taken place is the public sector, starting from healthcare. The private sector is presently much less developed, especially in the residential case, precisely because of small project sizes. Energy efficiency in industry is growing though it is constrained by financial issues.” The report is based on information available in the existing literature and on the insights



provided by 5 experts of the Italian EES market and 15 representatives of ESCOs and energy companies that have been interviewed.

**2. Energy&Strategy Group, Energy Efficiency Report – *la filiera dell’efficienza energetica in Italia (the energy efficiency chain in Italy), Collana Quaderni AIP, Politecnico di Milano – Dipartimento di Ingegneria gestionale, 2017, Milano, ISBN: 978-88-98399-19-2***

**Original language**

Italian

**Link**

<http://www.energystrategy.it/report/eff.-energetica.html>

**Summary of contents**

This report is published every year and the last release refer to 2016. The report illustrates data and analysis about the energy efficiency situation in Italy, in particular:

- ESCOs and energy efficiency services providers: the evolution of the last five years
- The energy efficiency market in Italy
- The Energy Efficiency Certificates: the balance 2016 and new guidelines
- Energy efficiency market in Italy: forecast 2020.

A relevant section of the report investigates the role of the ESCOs in Italy and their relationship with Utility Companies. In 2016, certified ESCOs increased by almost 90% compared to 2015. Despite the increase in number, the revenues of ESCOs decreased by 10% between 2012 and 2016, from 3.4 billion in 2012 to 3 billion in 2016. In 2016, the ESCOs made investments for a value of 836 million; in the industrial sector, 1 euro invested in energy efficiency every 4 is the prerogative of the ESCOs.

**3. FIRE – Federazione Italiana per l’uso Razionale dell’Energia (Italian Federation for Energy Efficiency), *Indagine sulle ESCO in Italia (SURVEY ON THE ESCO IN ITALY), 2008.***

**Original language**

Italian

**Link**

<http://fire-italia.org/indagine-sulle-esco-in-italia/>

**Summary of contents**

This study has been commissioned by RSE (Ricerca Sistema Energetico) and it provides a statistical analysis about Energy Service Companies in Italy in 2008. In order to write this report, answers of surveys provided by 151 ESCOs were processed.

Note that in Italy criteria for accreditation as ESCO in 2008 were less restrictive than now because UNI CEI 11352 certification is compulsory for Energy Service Companies just from July 2016.

This overview of national situation of ESCOs includes:

1. General information about the sample  
Location of ESCOs in geographical areas, years of activity in energy sector, annual turnover, number of employees and their education level, corporate structure.
2. Services and activities



Core business of the company and services portfolio, allocation of customers per activity sector (industry, residential etc.), economical indexes usually preferred for projects evaluation, most common areas of energy efficiency actions, magnitude of energy savings.

### 3. Contracts and business models

Composition of capital in energy efficiency actions, potential incentives, contracts duration, requirements for accreditation of the company as ESCO (according to Energy Service Company requirements before July 2016).

According to this analysis in 2008 almost 75% of ESCOs were recently established (less than 4 years of activities), they had usually less than 10 employees and a total turnover not exceeding 1 M€.

At that time energy efficiency was just an emerging topic, but with brilliant future growth prospects. The most common offered services were energy auditing (74% of companies offers this service), plant supplying and installation (63%), design process (60%), management and maintenance of plants (51%). Typical customers of this companies were industrial sector, public administrations and services sector. Actions on renewable sources drove the energy sector, thanks especially to a generous incentive system for photovoltaic power plants.

### 4. **Espejo Lague P.L., Briano J.I., COUNTRY REPORT ON THE ENERGY EFFICIENCY SERVICES MARKET AND QUALITY, 2018, CEARA – Energy Experts**

#### **Original language**

English

#### **Link**

[https://qualitee.eu/es/wp-content/uploads/sites/12/QualitEE\\_2-04\\_CountryReport\\_SP\\_2017.pdf](https://qualitee.eu/es/wp-content/uploads/sites/12/QualitEE_2-04_CountryReport_SP_2017.pdf)

#### **Summary of contents**

The objective of this report is to compile evidence to inform the development of European & national quality criteria and the implementation of quality assurance schemes for energy efficiency services (EES). This report has been developed as part of the "QualitEE – Quality Certification Frameworks for Energy Efficiency Services" project supported by the EU's Horizon 2020 programme. The QualitEE project aims to increase investment in EES and improve trust in service providers.

### 5. **Asociación de Empresas de Servicios Energéticos (ANESE) in collaboration with Universidad Politécnica de Madrid, *Observatory of energy efficiency 2016. The market of energy services companies, 2018.***

#### **Original language**

Spanish

#### **Link**

<http://www.anese.es/observatorio/>



### Summary of contents

The objective of the report is to provide a rigorous diagnosis of the ESE market in Spain, to know its contribution in the energy sector and, above all, to analyze the role of the ESE market within the impact of energy efficiency in the energy sector.

**6. Institute of Environmental Economics, *The ESCO market in Poland. Current status and development prospects, 2012*(Rynek ESCO w Polsce. Stan obecny i perspektywy rozwoju”, Instytut Ekonomii Środowiska, marzec 2012)**

### Original language

Polish

### Link

[https://depot.ceon.pl/bitstream/handle/123456789/13572/ies\\_raport\\_esco\\_pl%20%285%29.pdf?sequence=1&isAllowed=y](https://depot.ceon.pl/bitstream/handle/123456789/13572/ies_raport_esco_pl%20%285%29.pdf?sequence=1&isAllowed=y)

### Summary of contents

The information presented in this report showing the development level of the Polish ESCO market, is based on the results of the first two stages of research from a three-stage research procedure implemented by consultants of the Institute of Environmental Economics and the Institute for Market and Public Opinion Research. The report also uses the information gathered in the research carried out by the IEŚ team in 2011.1 The completed stages allowed for the initial estimation of the entire market size, evaluation of ESCO activity in particular sectors and barriers to the development of the ESCO market. IEŚ plans to devote another stage of research to the development prospects of the ESCO market and detailed aspects of its functioning in the public sector.

**7. S. Aleksandrow, *ESCO FINANCING MODEL AS A MEAN OF ENERGY EFFICIENCY IMPROVEMENT WITHIN PUBLIC SECTOR*, Acta Innovations, 2016, No.19, s.5-15, ISSN 2300-5599**

### Original language

Polish

### Link

<http://bazekon.icm.edu.pl/bazekon/element/bwmeta1.element.ekon-element-000171492938>

### Summary of contents

Paper presents the possibilities of investments financing scheme within energy efficiency using ESCO financing model, in the context of obligations related with Directive 2006/32/EC. The purpose of this paper is to analyze ESCO model as a part of public-private partnership (PPP). Article discusses benefits and potential risks associated with ESCO model investments. Cited are also good practices.

**8. S.Pasierb, *New possibilities of financing energy projects. What is ESCO?* FEWE, 2003 (S. Pasierb, Nowe możliwości finansowania przedsięwzięć energetycznych. Co to jest ESCO?) Fundacja na rzecz efektywnego wykorzystania energii, Katowice 13.03.2003**

### Original language

Polish

**Link**

<http://www.energia.wse.edu.pl/data/uploads/poradnik3.pdf>

**Summary of contents**

On the basis of the article you can find out about:

- What is ESCO
- How does ESCO earn money
- What makes ESCO stand out in the project
- The strengths and weaknesses of the ESCO
- ESCO's perspectives

In summary, the author writes that "The market for ESCO companies is a young and growing market in Poland, but it is already sufficient for the development of the activity of several dozen or so companies. The business of ESCO is a business with a large scale of risk, it can be minimized but it will always be greater than other commercial activities. ESCO companies and its clients are a couple connected for good and bad during the contracting period (up to 10 years and even more). Mutual trust and credibility of contractors is the basis of success in this business".

**9. "ESCO in Poland" website****Original language**

Polish

**Link**

<http://www.escowpolsce.pl/vademecum.html>

**Summary of contents**

Broad scope of information about ESCO

**10. A. Gula, E. Hoff, J. Ciesielska, M. Zaborowski, RECOMMENDATIONS ON SHAPING ESCOS' DEVELOPMENT IN POLAND****Original language**

English

**Link**

[http://bellona.org/assets/sites/3/2015/06/fil\\_ESCOs\\_In\\_Poland1.pdf](http://bellona.org/assets/sites/3/2015/06/fil_ESCOs_In_Poland1.pdf)

**Summary of contents**

Bellona invited the most important Polish ESCO stakeholders to share their views and come up with constructive recommendations on how to shape the ESCOs development in Poland. This publication presents barriers to ESCO market development in Poland, challenges to ESCO development in Poland and recommendations for how to overcome them.

**11. Project Deliverables of guarantEE project (Building Energy Services in Europe), Horizon 2020 Grant Agreement No. 696040****Original language**

English

**Link**



<https://guarantee-project.eu/knowledgebase/>

#### **Summary of contents**

Within guarantee, 14 experienced partners will develop innovative business and financing models for performance-based ESCO projects. For rented facilities, the aim is to develop and test solutions adequately sharing costs and benefits between user, building owner and ESCO (triple-win approach). With a special focus on private sector building owners, EPC contract variants providing enhanced flexibility will be developed.

### **12. ADEME/GALLILEO Business Consulting - ETAT DES LIEUX ET ANALYSE DU MARCHÉ FRANÇAIS DES SERVICES D'EFFICACITÉ ÉNERGÉTIQUE (SYNTHÈSE) - 2016**

#### **Original language**

French

#### **Link**

[http://www.ademe.fr/sites/default/files/assets/documents/marches\\_see\\_synthese\\_vdf.pdf](http://www.ademe.fr/sites/default/files/assets/documents/marches_see_synthese_vdf.pdf)

#### **Summary of contents**

Accomplished in the continuity of the study conducted in 2014, this analysis of the French energy services and energy efficiency (SEE) market was carried out in order to feed the National Energy Efficiency Action Plan 2017 of France (PNAEE 2017).

### **13. Groupe Xerfi, LE MARCHÉ DES SOLUTIONS D'EFFICACITÉ ÉNERGÉTIQUE. QUELLES STRATÉGIES POUR LIBÉRER ET EXPLOITER LES GISEMENTS DE CROISSANCE?, 2017**

#### **Original language**

French

#### **Link**

[https://www.xerfi.com/presentationetude/Le-marche-des-solutions-d-efficacite-energetique\\_7SCO25](https://www.xerfi.com/presentationetude/Le-marche-des-solutions-d-efficacite-energetique_7SCO25)

#### **Summary of contents**

The study contains:

- The 3 exclusive scenarios on the evolution of the energy efficiency solutions market
- Description of innovative business models of companies in the market
- Analysis of the strategies of traditional and technological players to boost their long-term competitiveness
- Many case studies of concrete initiatives implemented by stakeholders
- The detailed competitive panorama of the five categories of actors
- A report of the most salient results of the study live to prolong the debate and confront the ideas



### 3.3 Analysis on the role of ESCOs in SMEs of the metalworking industry

#### 3.3.1 Methodology

The EE-METAL consortium analysed the role of ESCOs, with a focus on the SMEs of the metalworking sector, following 3 different steps:

*Step 1:* PP's involved ESCOs and ESCO associations, informing them about the results of energy analysis conducted in SMEs of metal working sector. ESCOs most interested in the EE-METAL project have been involved in the following steps

*Step 2:* CSMT has set up a rather detailed questionnaire, which aimed to gather direct information from the ESCOs. The questionnaire has been filled by at least 3 different ESCOs in each country, with the objective to understand the main activities of the ESCOs and their mode of operation.

*Step 3:* EE-METAL consortium analysed results of the questionnaire and feedbacks collected during the workshops organized in each country with the aim to connect ESCOs and companies (D 6.9).

#### 3.3.2 Results

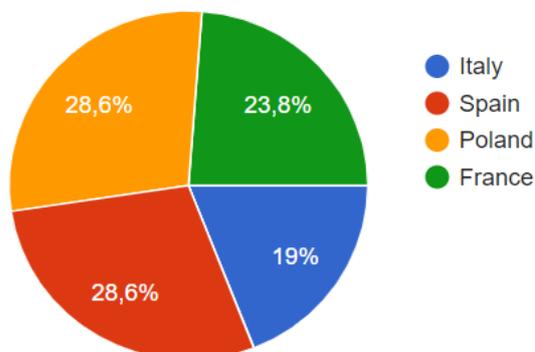
##### 3.3.2.1 The questionnaire results

21 questionnaires were collected. The following paragraph reports proposed questions and overall results. Answers are referred to the 2015-2016-2017 three-year period.

Since for some answers a multiple selection is allowed, for each question number of respondent ESCOs is reported between brackets, beside number of received answers.

##### 1. COUNTRY

21 answers (21 ESCOs)





## 2. NAME OF THE ESCOS INTERVIEWED

19 answers (19 ESCOs)

SIGNIFY-PHILIPS LIGHTING SPAIN

SUMERSOL S.L.

GAMMA SOLUTIONS, S.L.

EVERIS INGENIERÍA S.L.U.

EDF Solar

PREDA Jacek Walski

PROWATT ENERGIE 3

ENGIE COFELY

EQINOV

ENERGIENCY

GULPLUG

A2A Energy Solutions

TEA Servizi

STRATENERGY SLU

Lumix LED Sp. z o.o.

Lars Lighting Sp z o.o.

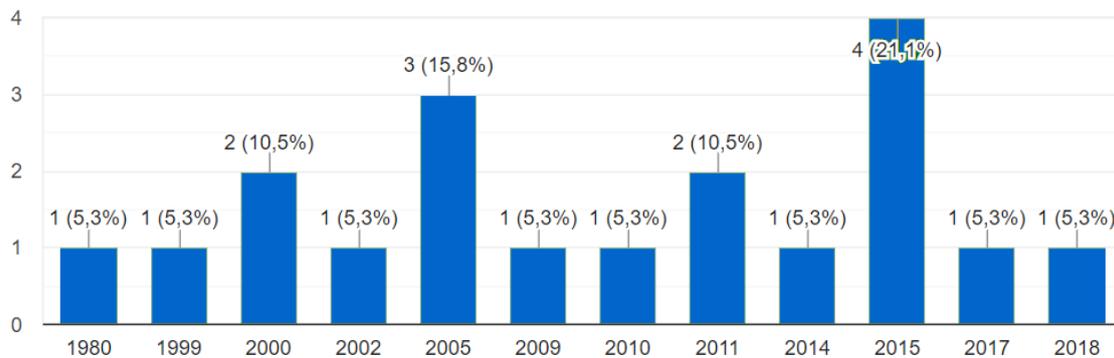
PREDA sp. z o.o. sp.k

Polska Efektywność Energetyczna Sp. z o.o.

Hydrochem DGE S.A.

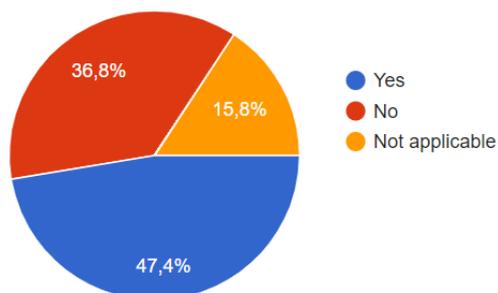
## 3. FROM WHICH YEAR IS ACTIVE THE ESCO?

19 answers (19 ESCOs)



## 4. IS THE ESCO CERTIFICATED?

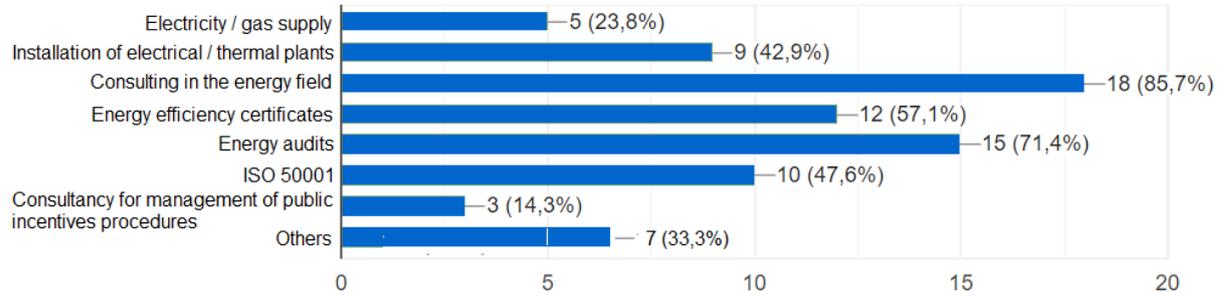
19 answers (19 ESCOs)





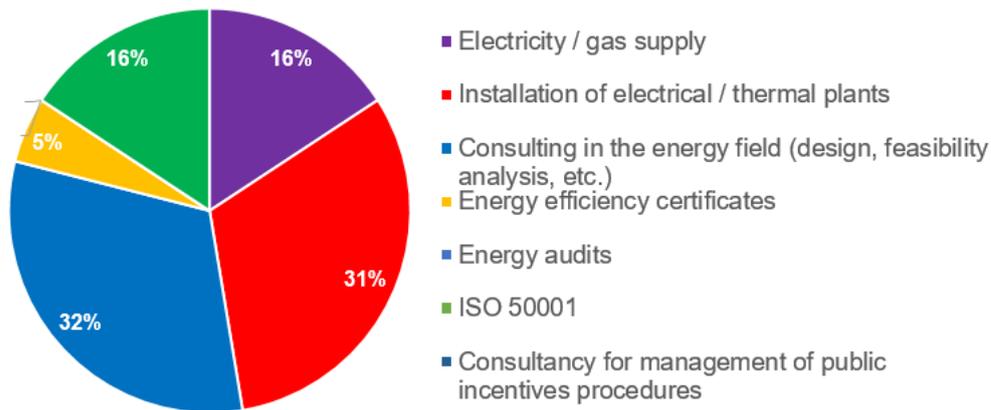
### 5. IN WHICH SECTORS DOES THE ESCO OPERATE?

79 answers (21 ESCOs)



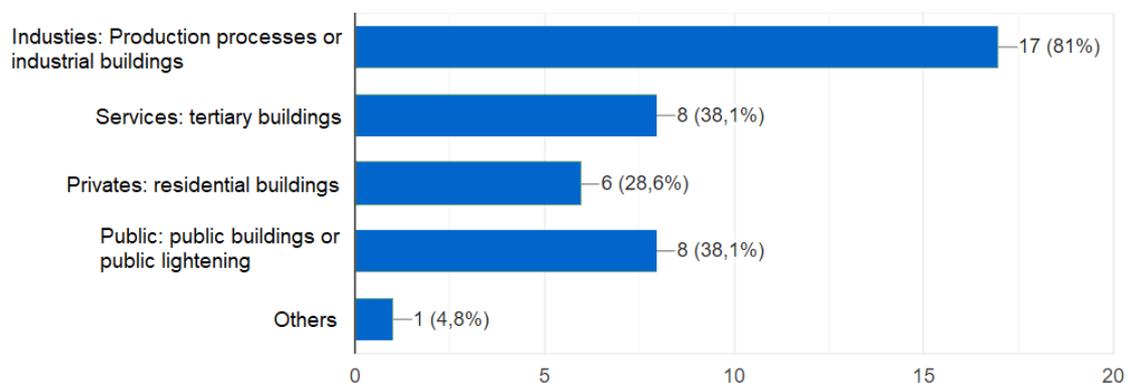
### 6. WHICH, AMONG THE PREVIOUS ONES, IS THE ACTIVITY THAT REPRESENTS THE CORE BUSINESS OF THE ESCO?

19 answers (19 ESCOs)



### 7. WHICH ARE THE ESCO'S CATEGORIES OF CLIENTS?

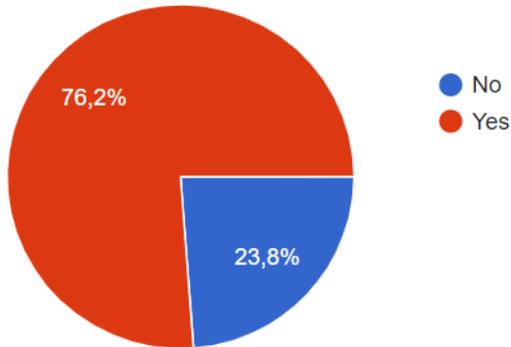
40 answers (21 ESCOs)





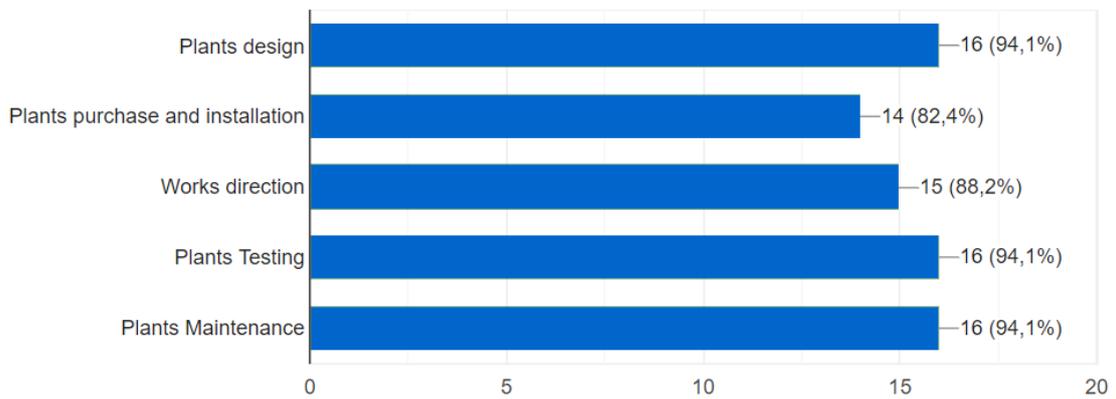
8. DOES THE ESCO MANAGE THE IMPLEMENTATION PHASE OF ENERGY EFFICIENCY INTERVENTIONS (E.G. PLANT DESIGNING, WORKS DIRECTION ETC.)?

21 answers (21 ESCOs)



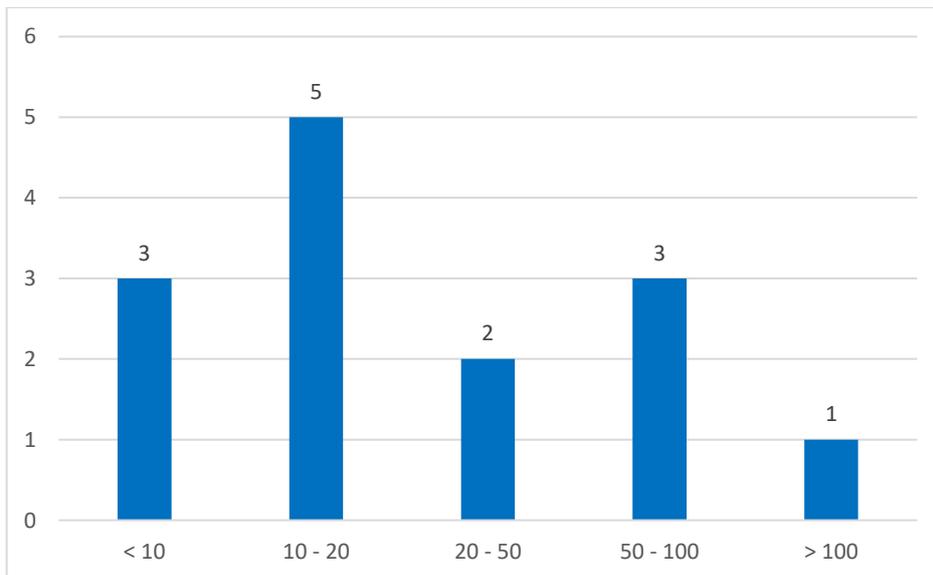
9. IF SO, WHAT ACTIONS ARE CARRIED OUT DIRECTLY BY THE ESCO?

77 answers (17 ESCOs)



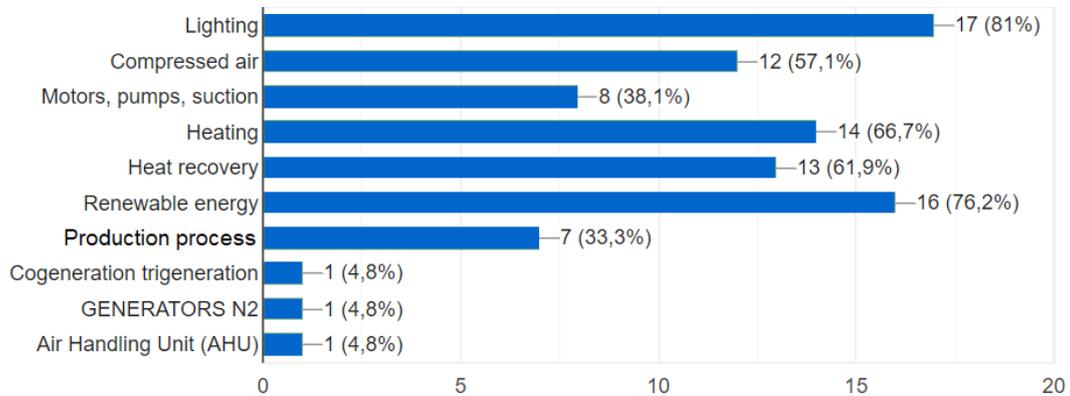
10. HOW MANY ENERGY EFFICIENCY INTERVENTIONS HAS THE ESCO CARRIED OUT?

14 answers (14 ESCOs)



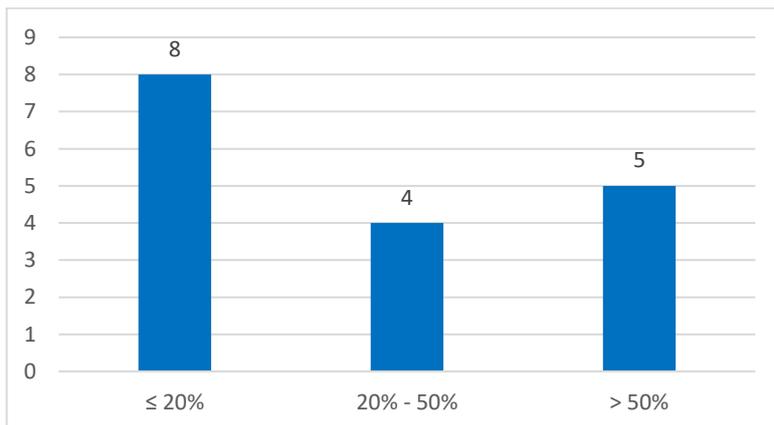


**11. AMONG THE FOLLOWING, IN WHICH PLANT SECTORS HAS THE ESCO BEEN INVOLVED?**  
90 answers (21 ESCOs)



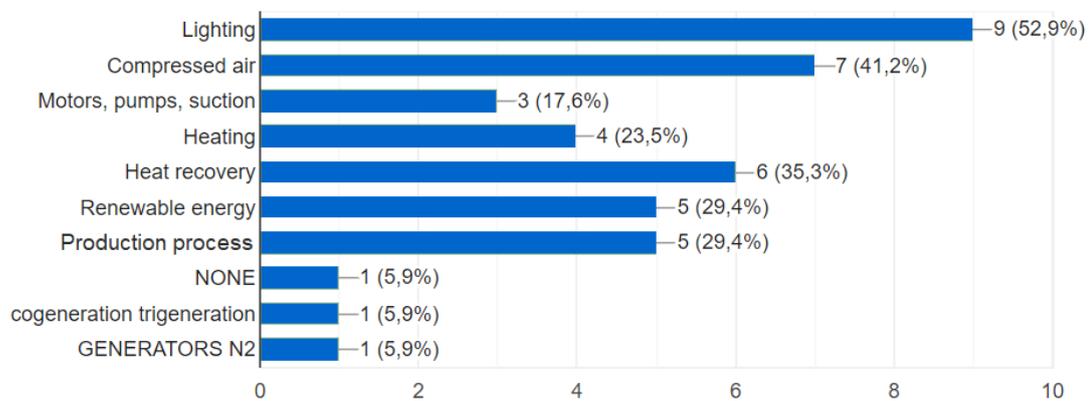
**12. HOW MANY OF THE CLIENTS WHERE INTERVENTIONS HAVE BEEN CARRIED OUT ARE SMES (PERCENTAGE OF TOTAL)?**

17 answers (17 ESCOs)



**13. WHICH TYPES OF INTERVENTIONS HAVE BEEN CARRIED OUT IN COMPANIES IN THE METALWORKING SECTOR?**

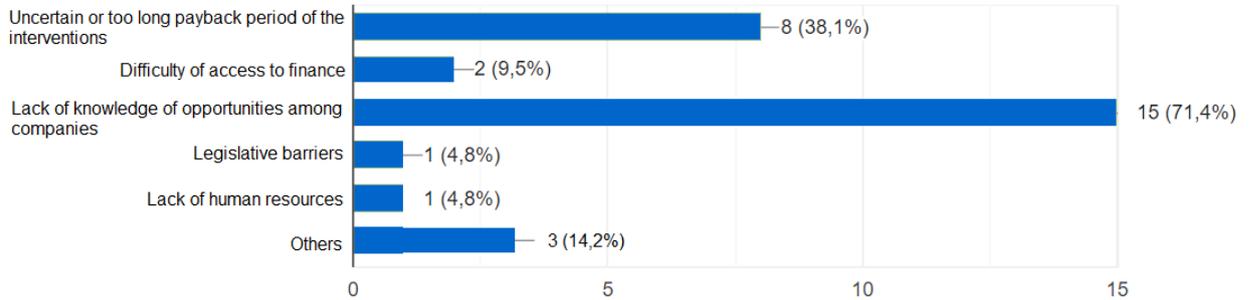
42 answers (17 ESCOs)





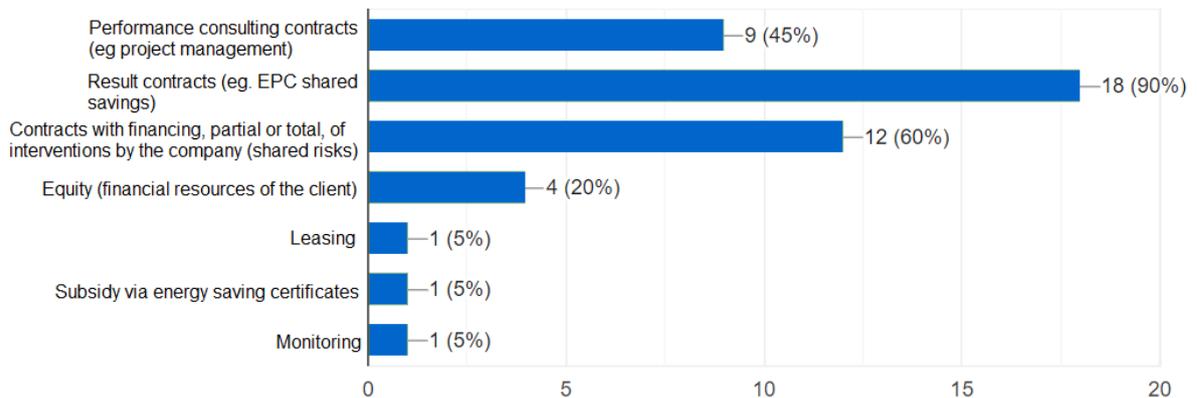
### 14. IN YOUR OPINION, WHICH ARE THE MAIN BARRIERS TO IMPLEMENTING ENERGY EFFICIENCY MEASURES IN SMEs?

30 answers (21 ESCOs)



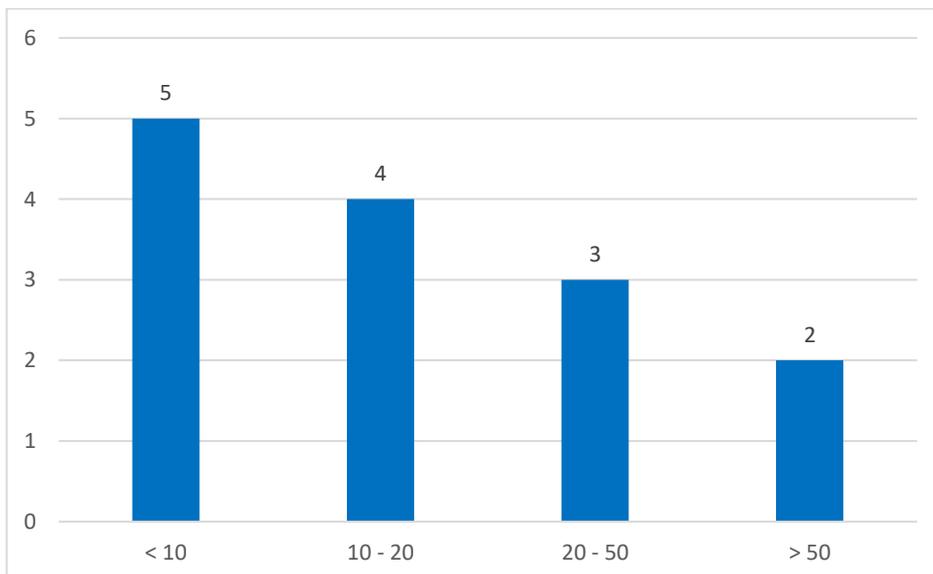
### 15. WHICH CONTRACT TERMS ARE PROPOSED BY THE ESCO TO ITS CLIENTS?

46 answers (20 ESCOs)



### 16. HOW MANY EPC HAS THE ESCO SIGNED UP?

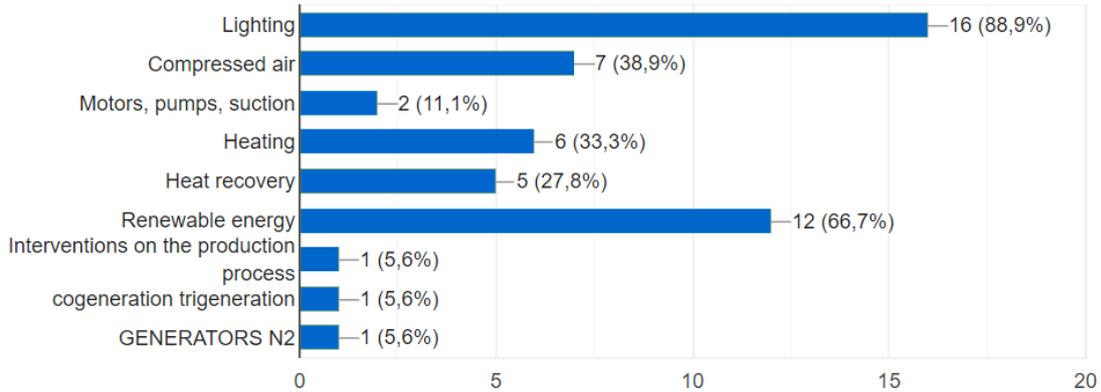
14 answers (14 ESCOs)





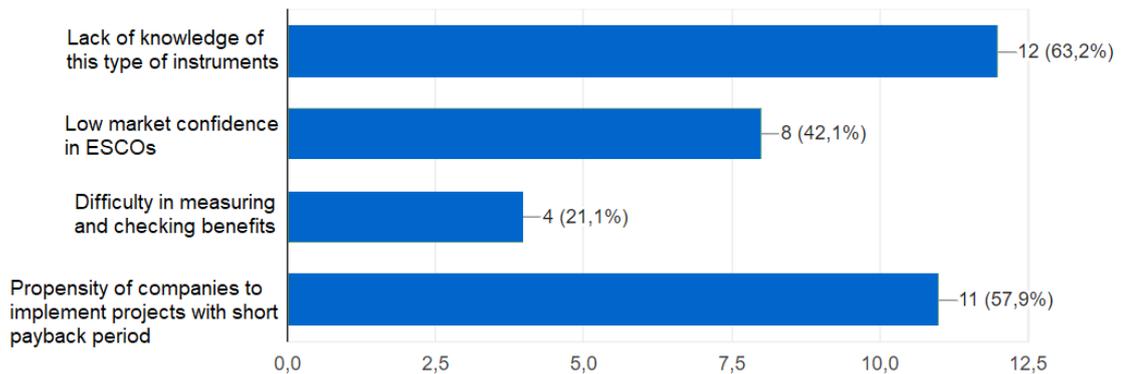
17. FOR WHICH TYPE OF INTERVENTIONS HAS THE ESCO SUBSCRIBED EPCS?

51 answers (18 ESCOs)



18. IN THE ESCO OPINION, WHICH ARE THE MAIN BARRIERS TO THE USE OF EPCS?

35 answers (19 ESCOs)



19. S.W.O.T. ANALYSIS: PLEASE INDICATE BRIEFLY STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS OF THE DIFFUSION OF FINANCIAL INSTRUMENTS FOR FINANCING OF ENERGY EFFICIENCY PROJECT IN THE INDUSTRIAL SECTOR (the data as collected with the surveys are shown below, although the respondents did not in many cases correctly apply the SWOT analysis criteria)

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Cost savings, security in operation, kidnapping of co2.</li> <li>• Risk reduction customer.</li> <li>• Cost reduction customer</li> <li>• Introduction of innovative solutions</li> <li>• Cash advance</li> <li>• Enable energy efficiency projects to be carried out</li> </ul>	<ul style="list-style-type: none"> <li>• Little known tools and weak proposal</li> <li>• Complexity of implementation</li> <li>• Data requirements</li> <li>• Team motivation</li> <li>• Circumvents the substantive question on the objective of the project</li> <li>• Consideration of the esco by the customer, relations with the installers, long times</li> </ul>



<ul style="list-style-type: none"> <li>• Single window = integration of the engineering and financing offer</li> <li>• Appraisal</li> <li>• Clear targeting</li> <li>• Triggers the project</li> <li>• Facilitates roi</li> <li>• Dynamism of the esco and knowledge of market opportunities</li> <li>• Equity esco</li> <li>• Financial and technological risks in charge to the esco</li> <li>• Integrated and multidisciplinary approach</li> <li>• Financial domain of potential users of financing</li> <li>• The possibility to exchange lighting without the costs by entrepreneurs</li> <li>• Dedicated financial resources</li> <li>• Lack of investor's resources</li> </ul>	<ul style="list-style-type: none"> <li>• Credit check</li> <li>• Financing</li> <li>• Financial stability</li> <li>• Needs that structure the projects</li> <li>• Lack of knowledge, fear of enterprises about signing long-term contracts</li> <li>• Low redemption rate</li> <li>• Lack of trust in the esco institutions</li> <li>• Difficulty in determining savings</li> <li>• No decision to conclude a contract before undertaking inventory work</li> </ul>
<p><b>Opportunities</b></p>	<p><b>Threats</b></p>
<ul style="list-style-type: none"> <li>• Great national and foreign market</li> <li>• Apply energy efficiency measures in production chains.</li> <li>• Perform investment financing facilities</li> <li>• Process management</li> <li>• Less profitable energy savings</li> <li>• Transposing what is done in the tertiary sectors</li> <li>• Significant energy savings potential</li> <li>• Rising energy prices</li> <li>• Datascience opens other axes</li> <li>• Awareness of the performance lever that this brings to manufacturers</li> <li>• Possibility of minimizing risks through insurance coverages</li> <li>• Move company equity on core business</li> <li>• Increasing sensitivity on the topic</li> <li>• Improve competitiveness</li> <li>• Development of projects blocked by lack of financing</li> <li>• Greater awareness of entrepreneurs concerning ecology and cost reduction</li> <li>• Increasing availability</li> <li>• Reducing costs</li> <li>• Reducing the emission of harmful substances to the environment</li> </ul>	<ul style="list-style-type: none"> <li>• Energy price stabilization</li> <li>• Client default</li> <li>• Profitability of the operation over the long term</li> <li>• Generation of little clear proposals as an alternative to existing financing</li> <li>• Customer's late or non-payment</li> <li>• Use for the simplest, low-effective investments</li> <li>• Funding under projects from regional operational programs or environmental protection fund, etc.</li> </ul>



### **3.3.2.2 Conclusions**

Sample of 21 collected surveys cannot be considered as statistically representative because it is composed by a small number of ESCOs. Anyway it provides an interesting photograph of ESCOs market and activities and can represent a very good starting point for future analysis.

For some questions, not all ESCOs provided the required information.

Answers from the first part of questionnaires shows that Energy Service Companies sector is relatively young, with around 70% of considered ESCOs that started their energy activities after 2004 and around 50% after 2009. This trend could be an index of an increasing attention of industries and companies towards energy topics during the last two decades.

However certification scheme for ESCOs is not yet mandatory in all EU country; for this reason only one in two companies has achieved a certification standard. Almost all companies offer services of energy consulting (design of plants, feasibility analysis etc.) while a significant percentage operates in energy audits, request of energy efficiency certificates and implementation of ISO 50001 management system.

Due to the complexity of the theme, electricity/natural gas supply are proposed only by a limited number of ESCOs. Because of the specific required know-how, this kind of activity often represents also the company core business.

Considering 19 answers to surveys, the main activity of the ESCO is consulting in energy field for 32% of companies, sharing the victory with installation of electrical/thermal plants.

So it is no coincidence that 76% of the 21 ESCOs declares to manage the implementation process of energy efficiency interventions (plant maintenance, design and testing above all, but also works direction and purchase/installation phase).

On the other hand, energy efficiency certificates, management of incentives, energy audits and implementation of ISO 50001 management system are optional services that can be useful for successful customer acquisition and loyalty.

Large majority of ESCOs (81% of the sample) have customers in industrial sector, which represents the most active and dynamic field for energy activities. Other secondary areas are tertiary buildings (38%) and public buildings or lighting (38%).

Referring to number of interventions, only one-third of the 14 companies declares to have carried out more than 50 energy efficiency while remaining part can count on less case studies, maybe because of their young age or because energy efficiency actions do not represent their core business.

Most common interventions focus on auxiliary services (lighting, renewable energy, heating, heat recovery and compressed air) while efficiency actions on process equipment more seldom occur perhaps because of inherent difficulties due to possible direct interferences with manufacturing process, high specialization know-how, warranty of machinery and work safety problems.

Similar results are obtained if only metalworking sector is considered, with a relevant share for lighting (53% of ESCOs carried out interventions on it), compressed air (41%) and heat recovery (35%). However, in MMA industry, actions on production process seem to be more widespread. About dimension of companies where energy efficiency actions are carried out, for 8 ESCOs in 17, large enterprises represents at least 80% of customers and only for 5 ESCOs SMEs are more than half of total customers.



According to surveys results, scarce knowledge represents one of the main barrier to implementation of energy efficiency measures in SMEs for 71% of interviewed ESCOs. In this regard, 38% of the sample sees as important also to the uncertain and long payback period of the investment.

Analysis of surveys shows shared savings as the most widespread type of contract in ESCOs portfolio (90% on 20 ESCOs). Shared risks mode (contracts with financing, partial or total, of interventions by the company) is offered by 12 in 20 (60% of sample) while performance consulting contracts (i.e. project management) are proposed by 45% of ESCOs.

Market of EPC contracts seems to be still limited: 9 ESCOs in 14 declared to have signed no more than 20 EPCs while only 2 Energy Service Companies have signed more than 50 EPCs.

In 89% of cases, interviewed ESCOs have subscribed EPC contracts for lighting plants, 67% for renewable energy and 39% for compressed air. More complex projects, such as cogeneration/trigeneration plant or actions on production process are limited to 6% maybe because high technical specialization and important financial capacity are required for design and implementation of this kind of measures.

Leaving aside the matter of financial capacity of ESCOs for EPCs, that in surveys is not handled, lack of knowledge of this type of instruments, together with propensity of companies towards projects with short payback time, is identified by around 60% of sample (19 ESCOs answered this question) as the main barriers to the use of EPCs. Low market confidence in ESCOs is considered an essential issue for 42% of sample.



### **3.4 Innovative contractual models for overcoming the commercial and market barriers to the penetration of ESCOs in the metalworking sector**

In the current state, the ESCOs are moving on the market operating essentially on three types of contract, described briefly below<sup>6</sup>:

#### ***a) Energy Supply Contracting***

The subject of this contract type is the supply of energy, typically in the form of heat, whereby the ESCO undertakes installation works and supplies energy to the client. The focus of energy supply contracting is the reduction of supply costs rather than demand-side efficiency gains, with energy efficiency measures being typically limited to the energy supply and transformation side. These measures include the optimisation of the equipment (e.g. purchase of heat produced by a biomass boiler), production of electricity from cogeneration plants, etc. The energy supply contracts require longer terms (10-30 years) and are best suited for centralised systems such as heating and cooling. Once the ESCO completes the installation, it is paid for the quantity of energy supplied over the term of the contract. In France, this is also known as "chauffage" model which has been in use for more than 60 years. Under this type of contract, the costs of all equipment upgrades, repairs etc. are borne by the ESCO, while ownership typically remains with the customer. The customer pays a fee which is based on its existing energy bill minus a percentage savings (often in the range of 3-10%) or a fee based on the conditioned floor space.

Table 1 - Key characteristics of EPCs and ESCs compared.

#### ***b) Build-own-operate-transfer***

Under a build-own-operate-transfer contract, the ESCO designs, builds, funds, owns and operates the scheme for a defined period of time and then transfers the ownership across to the customer. Customers enter into long term supply contracts and are charged according to the service delivered. The service charge includes capital and operating costs recovery and project profit. The contract type has been found to be more applicable when including large energy generation assets e.g. combined heat and power engines.

#### ***c) Energy Performance Contracting***

Under an energy performance contract, an ESCO undertakes a project to deliver energy efficiency improvements in the premises of the client, and uses the stream of income from the cost savings to repay the costs of the project. The approach is based on the transfer of technical risks from the client to the ESCO based on performance guarantees given by the ESCO. The savings that are achieved are used to partly or fully pay for the investments that were made. After the end of the contract, the cost benefits brought about by the energy savings remain with the customer.

Once the installation of the energy efficiency measures is complete, the project moves to evaluation of new performance phase. The specific nature of service provided will depend upon the contract. Energy savings are a key benefit that should be achieved as the EPC service is paid

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<sup>6</sup>

This information has been obtained from the JRC Science for policy report of the European Commission, entitled "Energy Service Companies in the EU", dated 2017.



by realized energy cost savings. The contract between the ESCO and client contains guarantees for cost savings and takes over financial and technical risks of implementation and operation for the entire project duration of typically 5 to 15 years.

ESCOs use many Types of Energy Performance Contracting. Some of the most common models are:

#### 1. Guaranteed Savings:

Under a guaranteed savings EPC-based project, the ESCO designs and implements the project and guarantees the energy savings, thus shielding the client from any performance risk (including technical and implementation risks). If the savings are less than the guaranteed level, the ESCO covers the shortfall. If the savings exceed the guaranteed level, the additional savings are shared between the ESCO and client.

- Typically used if customer provides upfront investment through financial tools offered by a third part different from ESCO (for example undersigning a loan with financial institutions). ESCO can help customer in funding process;
- ESCO is appointed by customer for plant management and maintenance operations. Customer pays a fee for these services;
- A minimum target for energy saving is agreed between customer and ESCO;
- ESCO assumes performance risk since if threshold target is not reached a compensation is due by ESCO to customer. Loan instalments may optionally (even if it is very uncommon) be indexed to effective energy-savings (pay from saving option).

#### 2. Shared Savings:

Under a shared savings EPC-based project, the savings are split in accordance with a pre-arranged percentage: there is no 'standard' split as this depends on the cost of the project, the length of the contract and the risks taken by the ESCO and the consumer. The differences between the two approaches relate also to the payment arrangements, the primary technical focus, and the allocation and apportionment of energy savings.

- Customer and ESCO agree to share investment cost and/or energy savings. Many options in this sense are possible but usually ESCO bears the whole investment cost (or the main part) with its own resources or through third part financial tools. Benefits of energy savings are shared between customer and the ESCO itself;
- Contractual clause about minimum threshold for annual plant operating hours can be included for protection of ESCO;
- Contractual clause about guaranteed minimum threshold efficiency of the plant can be included for protection of the customer.

#### 3. First out:

- It is a particular variant of shared saving EPC in which ESCO pays the whole investment cost and, according to the contract, economic benefits of energy savings are entirely retained by ESCO for a certain duration. Then customer takes full ownership of the plant and also of energy savings.

#### 4. Energy Plus:



- Energy performance contract focused on reduction of primary energy index for winter heating, with investment cost paid by ESCOs. It is perfectly suited for large buildings with high heating consumption (condominiums, hospitals, public administrations etc.).

#### 5. Chauffage:

- Customer appoints ESCO for management operations of plants;
- ESCO pays bills for energy supply;
- ESCO receives by customer a total amount corresponding to energy bills before improvement action, less an agreed discount.

In any case, with an EPC contract, even if ESCO has paid for improvement actions, when contract expires, usually customer becomes full owner of the plant.

A further advantage of EPC, for both public and private clients, is to have a single interlocutor taking all the responsibility during both realization and exploitation phases. As a matter of fact, internal lack of human resources to manage energy efficiency project can be a barrier for SMEs.

It is important to remember that most of SMEs assign available resources for investments on their core business activities first, considering energy as a low priority topic that can be shelved.

A modern approach is to support the company in a global performance approach implemented gradually according to its energy maturity. From consumption analysis and monitoring to the financing projects and to the installation of SCADA equipment.

An innovative EPC contract (2nd generation) is the one that integrate the whole environmental performance, not only the energy dimension.

The new EPC contracts propose 2 paradigm changes:

1. the proposed solutions are moving towards energy efficiency services instead of being in possession of equipment;
2. moreover, in some new EPC contracts, the industrialist buys a service (eg. intensity of the light flow) and the ESCO will provide primarily this service and not the equipment or the energy savings.

In this new contracts, one important parameter is the maintenance: the savings will be provided by the new equipment (technology) and also by the maintenance optimization, included in the contract.



	<b>EPC Guaranteed savings model</b>	<b>EPC - Shared Savings model</b>	<b>Energy Supply Contracting (ESC)</b>
<b>Service provider</b>	ESCO/EPC provider	ESCO	Energy Supply Provider Company (ESPC)
<b>Key elements</b>	Implementation of energy saving measures with on-going monitoring & verification services to provide guaranteed energy savings.	Implementation of energy saving measures (mainly demand side) to provide cost savings associated with the overall energy/utility bill.	Efficient supply of useful energy such as heat, steam or electricity is contracted, measured and delivered in physical units.
<b>Energy savings to be achieved</b>	High - comprehensive and detailed approach covering both supply and demand side.	High - primary focus and incentive is for cost savings with technical operation requirements as secondary.	Usually low - limited to the supply side (boilers, chillers, etc.) without regard to demand-side equipment.
<b>Guarantees</b>	Yes. The ESCO guarantees the performance related to the level of energy saved throughout the contract life (i.e. to energy cost savings in constant prices).	Not as standard. However, the ESCO may guarantee a minimum performance related to cost of energy saved in current prices throughout the contract life.	May include incentives related to energy use reduction on the supply side, but without assuming any risk in case the expected efficiency improvement is not reached.
<b>Payment</b>	Payment derived from the energy savings achieved in constant prices of the base year.	Payment linked to the achieved change in energy costs.	Payment of a fixed rate/tariff, normally without energy performance requirements.
<b>Provider's risk</b>	Assumes technical design, implementation and performance guarantee risks.	Assumes performance risk, risk of energy price change (depends on current prices) and customer credit risk.	Usually does not assume technical or financial risk.



### ***The risks of EPC contracts***

It is clear that the most virtuous and promising contractual model, is Energy Performance Contract, as it encourages investments by companies reducing their risks.

Nevertheless, the stipulation of an EPC contract between an ESCO and an SME implies, starting from the initial phase of the execution of the contract, a series of risks associated with the energy efficiency system.

Risks can arise both before and after the implementation of the energy saving measure and are classified by type of effect, according to the following categories:

1. Patrimonial Risks
2. Financial Risks
3. Economic Risks

#### ***1. Patrimonial Risks***

Patrimonial risks consider those events that produce effects on assets of companies (both ESCO and SMEs), going to hit

- The assets that make up the tangible fixed assets: This group includes the material damage to the plant, which compromise the functionality or the ability to generate energy efficient.

Material damage may be due to exogenous factors (natural events, socio-political events, fire, sabotage, etc.) or to endogenous factors (system failure). In both cases the value of the plant and its integrity come compromises and must be replenished.

- Corporate assets: This category includes all risks associated with commitments or actions which the ESCO or the SME must meet civilly or contractually. We enter the sphere of Civil Responsibility, which includes:

- Damages caused to third parties
- Damage caused by faulty system
- Damage due to incorrect design
- Damage from Operation & Maintenance operations
- Malfunctions of the control instruments (Smart Meters)

#### ***2. Financial risks***

Financial risks are related to the contractual and regulatory obligations (solvency or execution) signed by the ESCO or the SMEs through the EPC contract

#### ***3. Economic risks***

These are the most delicate risks, because they are associated with incapacity of the energy efficiency measure to generate the benefits obtainable on paper:

- a) Cost reduction in energy supply
- b) Generation of revenues

There are two types of economic risks:

- Failure to make the system according to the project specifications: If the system operates, but in the final balance, there is less savings obtained, the market offers a dedicated solution that protects the ESCO from the contractually undertaken commitment. These are solutions borrowed from financial parametric products, which protect the ESCO from an excess of lower savings achieved.



- Failure or reduced system operation due to external factors: A total or partial stop of the plant without having suffered a material damage, or in the presence of an intact system, configures the so-called "Non-Damage Business Interruption", or a loss of revenue or increased costs resulting from non-circumstances attributable to the plant itself.

This is the case, for example, of regulatory changes or impositions by the authorities that limit or prevent the correct running of the system.

### **Innovative contractual models involving insurance company**

An innovative risk reduction model linked to the EPC contract is offered by the insurance market. Insurance companies intervene to cover risks, making it easier for both companies and ESCOs to sign an EPC contract.

Insurance can operate to cover all kind of risks:

#### *1. Patrimonial Risks*

In relation to TANGIBLE ASSET, the insurance market offers dedicated coverage for Property Damage (c.d. Property) through a wide range of solutions customizable for cost and breadth of guarantees.

As far as corporate asset concerns, there are insurance coverage to protect the civil liability (Liability), with ample availability of conditions and levels of protection.

Attention to define correctly:

- ESCO-SME cross-protection mechanisms
- Possible responsibilities assumed contractually (not always insured).

#### *2. Financial risk*

The form of protection offered by insurance markets is the contract of Guaranty (Bond), for which there are several companies active and available to lend a wide range of solutions. As an alternative to insurance sureties, it is also possible to stipulate similar contracts with banking institutions: the disadvantage is characterized by a commitment of bank credit lines.

Particular attention must be paid to the text of the guarantee, some formulations may involve very restrictive commitments often not accepted by Banks or Insurance Companies.

#### *3. Economic risk*

The lower revenue generated by the energy saving measure can be guaranteed compared to the potential capacity according to the specifications of the machine. These are innovative solutions recently implemented by customize according to EPC contract specifications, with an anchor limited range of insurance partners.

Regarding risk of failure or reduced system operation due to external factors, the insurance market is today developing targeted solutions not yet accessible.

The market will soon be ready to offer these solutions and that in a short future they will be able to represent for a useful tool for insurance transfer.



## **Combining contracts guaranteed energy performance (EPC) with other related initiatives**

### **Energy**

“In the case where a client has to fulfil energy management / energy audit requirements (according to EED) parallel to an EPC project, or even more, the client is engaged in an ISO 50001 process, synergies can be exploited and decrease the total project costs.

The following activities are being performed by a contractor in EPC projects that are at the same time standard activities of an energy audit or of an ISO 50001 certification process:

- System data acquisition (analysis of the current state)
- Data acquisition and evaluation of historical energy consumption
- Definition of key performance indicators and threshold values
- Energy monitoring: monthly and/or annual collection and evaluation of energy consumption [...]. Experience of the 2015 audits shows that approx. 50% of the auditor's effort is for energy data collecting in the consulted companies. If an ongoing energy monitoring is established in EPC client facilities for verification of achieved savings (M&V), most of the data required for the energy audit will be readily available for the auditor. Thus, in a combined service of EPC and energy audits several periodical audits can be offered at a price (almost) equal to the price of a single energy audit of high quality.

[...]If an EPC client aims to implement an energy management system according to ISO 50001, the preparation of the certification can be offered as an additional service by the ESCO. Objective of an energy management system (EMS) is the proactive, organized and systematic coordination of procurement, conversion, distribution and use of energy to meet the requirements, taking into account environmental and economic objectives. If an ongoing energy monitoring is established in EPC client facilities for verification of achieved savings (M&V), parts of the existing infrastructure and available energy data could be the fundament for the design of energy policy, energy action plan, implementation and operation, performance audits and management reviews and though decrease the costs of ISO 50001 implementation.” (source: Model processes for combining Energy Performance Contracting (EPC) with other energy-related actions, Deliverable D2.7, gurantEE project, Horizon 2020 Grant Agreement No. 696040)



## 4 Benchmarking studies on the different financial products for energy savings investments

Alongside the development of the role that ESCOs can play in facilitating investment in energy efficiency by companies, there is a need to set up innovative financing schemes in order to create the conditions for adequate supply of private finance for energy efficiency investments.

One of the objective of the EE-MEATL project has been the analysis, in the different countries, of the availability of interesting and convenient financial instruments usable and accessible by the SMEs on MMA sector to finance the efficiency projects that an independent energy diagnosis as necessary.

### 4.1 References and contents of consolidated national studies on financial instrument to finance energy efficiency in industries

In analogy with what has been done to investigate the ESCOs market, the first step in the analysis was the search for the available bibliography, which unfortunately resulted as quite limited. Below is a list of some studies carried out about the energy efficiency financing, with available links and a brief summary of the contents.

1. (European Level) Steven Fawkes, EnergyPro Ltd, **EEFIG UNDERWRITING TOOLKIT - Value and risk appraisal for energy efficiency financing**, Energy Efficiency Financial Institutions Group (EEFIG), © European Union, 2017, ISBN: 978-1-5272-1107-0

#### Original language

English

#### Link:

[http://www.unepfi.org/wordpress/wp-content/uploads/2017/06/EEFIG\\_Underwriting\\_Toolkit\\_June\\_2017.pdf](http://www.unepfi.org/wordpress/wp-content/uploads/2017/06/EEFIG_Underwriting_Toolkit_June_2017.pdf)

#### Summary of contents

“The Toolkit is designed to assist financial institutions to scale up their deployment of capital into energy efficiency. It was compiled with several objectives in mind:

- to help originators, analysts and risk departments within financial institutions better understand the nature of energy efficiency investments and therefore better evaluate both their value and the risks.
- to provide a common framework for evaluating energy efficiency investments and analysing the risks that will allow training and capacity building around standardised processes and understanding.
- to help developers and owners seeking to attract external capital to energy efficiency projects to develop projects in a way that better addresses the needs of financial institutions.
- to foster a common language between project developers, project owners and financial institutions.



Although the focus is on value and risk appraisal, additional material on the size of the potential market, methods of financing and the project life cycle have been included to give a fuller picture and help build capacity within financial institutions. The sections of this EEFIG Toolkit have been designed with several specific audiences in mind:

## **2. DE-RISKING ENERGY EFFICIENCY PLATFORM (DEEP) website**

### **Original language**

English

### **Link**

<https://deep.eefig.eu/overview>

### **Summary of contents**

The Energy Efficiency Financial Institutions Group (EEFIG) was established in 2013 by the European Commission Directorate-General for Energy (DG Energy) and United Nations Environment Program Finance Initiative (UNEP FI). It created an open dialogue and work platform for public and private financial institutions, industry representatives and sector experts to identify the barriers to the long-term financing for energy efficiency and propose policy and market solutions to them. EEFIG has engaged 120 active participants from 100 organizations to deliver clear and unambiguous messages.

The EEFIG de-risking project is now addressing the fundamentals of energy efficiency investments in the buildings and corporate sectors through:

- Creation of an open source database for energy efficiency investments performance monitoring and benchmarking
- Interpretation of gathered data and development of a investments risk/performance modelling methodology
- Development of common, accepted and standardized underwriting and investment framework for energy efficiency investing.

The platform is an open-source initiative to up-scale energy efficiency investments in Europe through the improved sharing and transparent analysis of existing projects in Buildings and Industry.

It provides detailed analysis and evidence on the performance of energy efficiency investments to support the assessment of the benefits and financial risks.

The projects in DEEP are not a statistically representative sample of all energy efficiency projects in Europe. They are a collection of implemented projects with at least a minimum data set made available to us by our data providers, which give useful insights into the market. Any reported economic indicators reflect the individual situation of the included projects.



### 3. Guarantee Project – Building Energy Services in Europe, Website

#### Original language

English

#### Link

<http://guarantee-project.eu/>

#### Summary of contents

Guarantee is project funded by the European Union's Horizon 2020 research and innovation programme. Its main target is support, promotion and development of Energy Performance Contracts (EPCs) as action tool for energy efficiency in both public and private sector.

Guarantee Project website provides interesting documents about financial instrument for energy efficiency:

- Report on the European EPC market – Deliverable D2.2
- Brochure of Guarantee Project – Deliverable D2.5
- Flexibility Options for Energy Performance Contracts (EPC) – Deliverable D2.6
- Model processes for combining Energy Performance Contracting (EPC) with other energy-related actions – Deliverable D2.7

### 4. Ministry of Economy, *Analysis of benefits and limitations using financial engineering as an instrument to support investment projects in the field of energy, 2012* (Ministerstwo Gospodarki, *Analiza korzyści i ograniczeń przy zastosowaniu inżynierii finansowej jako instrumentu wsparcia projektów inwestycyjnych z zakresu energetyki, Raport końcowy Warszawa, 14 grudnia 2012*)

#### Original language

Polish

#### Link

[https://www.pois.2007-2013.gov.pl/AnalizyRaportyPodsumowania/Documents/ECORYS\\_inzynieria\\_finansowa\\_17012013.pdf](https://www.pois.2007-2013.gov.pl/AnalizyRaportyPodsumowania/Documents/ECORYS_inzynieria_finansowa_17012013.pdf)

#### Summary of contents

The conclusions are as follows: "The relatively wide availability of subsidies has an impact (often fundamental) on the choice of the area in which public investments are made. On the other hand, in the case of investments carried out by public institutions, in the combination of grant instruments with private institutions, where a subsidy is applied, only simple instruments are used to finance own contribution, mainly loans (it is practically impossible to use ESCO)

### 5. A. M. Graczyk, *A guide to good practices in energy management in a microenterprise, 2011* (A. M. Graczyk, *Poradnik dobrych praktyk gospodarowania energią w mikroprzedsiębiorstwie, Wyższa Szkoła Ekonomiczna w Białymstoku, 2011*)

#### Original language

Polish

#### Link

<http://www.energia.wse.edu.pl/data/uploads/poradnik3.pdf>



### Summary of contents

The guide attempts to prove to entrepreneurs that saving energy can pay off for them. Not every entrepreneur knows that reducing energy consumption in companies by 20% can be achieved without investing in it. A lot of savings can be obtained thanks to the introduction of rational actions in the company, including the change in the habits of employees as energy consumers.

### 6. Conseil Français de l'Énergie, LES CONDITIONS D'EFFICACITÉ DES CONTRATS DE PERFORMANCE ÉNERGÉTIQUE EN FRANCE, 2012

#### Original language

French

#### Link

<http://www.wec-france.org/DocumentsPDF/RECHERCHE/62-rapportfinal.pdf>

### Summary of contents

This study was financed by the French Energy Council (contract CFE-62). It was carried out in the Chair of Public Private Partnerships Economics of the IAE of Paris by Eshien Chong, Aude Le Lannier and Carine Staropoli, Researchers at the EPPP Chair.

The framework of analysis that we propose in this study constitutes in itself a result, which will have to call others, once the CPEs will have been really implemented on a large scale in France. It will then be time to discuss not only the conditions of effectiveness of the CPPEs but also the choice of the appropriate legal vehicle (between MPPE-CREM and the CPPE) and the opportunity for a contracting authority to carry out an internal CPE (with the question of "doing" rather than "doing-doing"). This last solution will inevitably raise the question of the powers and expertise of the contracting authority and discuss the effectiveness of incentive mechanisms in a purely public context. The question of the effectiveness of Energy Performance Contracts is therefore an open question for which much remains to be done. There is no doubt that in the coming years, the generalization of these contracts will make it possible to advance in the understanding of the mechanisms and in the contractual design.

### 7. Ademe, CERTIFICATS D'ÉCONOMIES D'ÉNERGIE : DISPOSITIF 2015-2017, June 2015

#### Original language

French

#### Link

<http://www.ademe.fr/sites/default/files/assets/documents/certificat-economie-energie-dispositif-2015-2017-8430-201506.pdf>

### Summary of contents

The purpose of this document is to inform companies of developments in the white certificates framework for the implementation of the third period 2015-2017. This document is divided into two parts: the first describes the principles of the device, the second offers some advice for a company that wants to use white certificates in the context of a project of energy management. You will also find a practical sheet gathering all the steps to make to file a file.



**8. Yannaël BILLARD et Emmanuel JULIEN, ENEA Consulting, FINANCEMENT DE PROJETS INDUSTRIELS PRODUCTIFS SOBRES ÉNERGÉTIQUEMENT, November 2016**

**Original language**

French

**Link**

<http://www.enea-consulting.com/wp-content/uploads/2016/12/Financement-de-projets-industriels-productifs-sobres-energetiquement-Synthese-publique13.pdf>

**Summary of contents**

In the coming years, strengthening the competitiveness of industrial activities calls for structuring investments, in particular those with leveraging effect on energy performance. The subject of financing large industrial investments, incorporating the latest technological innovations to achieve a significant break in terms of energy consumption or aiming at an incremental improvement in energy performance, seems today to be an obstacle to the development of these projects. ADEME, Axens, ENEA Consulting, GRDF and GRTgaz have decided to finance and carry out this study to explore the brakes and levers of French industry on energy efficiency, the modalities of energy efficiency financing in industry in France and to establish ideas for improving this financing of industrial energy efficiency.

**9. ATEE with the support of ADEME, ETAT DES LIEUX DES SOLUTIONS DE FINANCEMENT ET DE GARANTIE DE LA PERFORMANCE ÉNERGÉTIQUE DANS L'INDUSTRIE, March 2017**

**Original language**

French

**Link**

[http://atee.fr/sites/default/files/guide\\_pratique\\_-\\_cpe\\_et\\_tiers\\_financement\\_de\\_lee\\_webv2.pdf](http://atee.fr/sites/default/files/guide_pratique_-_cpe_et_tiers_financement_de_lee_webv2.pdf)

**Summary of contents**

This study aims to establish a typology of Energy Performance Contracts (EPCs) and Third Party Financing (TPF) solutions in the field of industry. An inventory of energy efficiency in the industry and associated investments is also detailed in this guide.

The objectives of the study are:

- Clarify the notion of CPE and Third Party Financing in companies
- Establish the typology of the CPE and third-party financing solutions in the field of industry
- Identify the obstacles to their development and the potential levers of development



## 4.2 List of financial products for energy efficiency projects offered by major banking institutions

A second step was a recognition at national level, conducted by individual partners, of some of the financial instruments made available by banks to finance energy efficiency projects. A list of the financial products identified is shown in the table below, with the identification of the main characteristics of the instrument. From the data it emerges that the financial products available are for the most part quite generic and not specifically studied for particular types of interventions. The only exception are many instruments dedicated to the energy efficiency of buildings.

Country	Bank	Name of the financial product	Amount Financed [min-max €]	Duration [min-max year]	What can be funded	Financing conditions
SP	Línea ICO IDAE	Energy Efficiency Loan ICO IDEA 2017-2018	< 3.000.000	0 - 10	Investments to reduce carbon dioxide emissions and final energy consumption	<ul style="list-style-type: none"><li>• up to 100%</li><li>• fixed / variable rate</li></ul>
SP	TRIODOS BANK	Loan	< 100.000.000	0-15	Only project that provides mediambiental benefits to the society	<ul style="list-style-type: none"><li>• up to 80%</li><li>• fixed / variable rate</li><li>• especial conditions depends on the company</li></ul>
SP	SANTANDER	BEI Loan	< 12.500.000	2 - 3	Every type of industrial project	<ul style="list-style-type: none"><li>• fixed / variable rate</li><li>• especial conditions depends on the company</li></ul>
SP	BANKIA	Loan	< 100.000.000	0 - 15	Every type of industrial project	<ul style="list-style-type: none"><li>• up to 70%</li><li>• fixed / variable rate</li><li>• especial conditions depends on the company</li></ul>
SP	ASCRI	Venture capital fund	< 10.000.000	0 - 2	Efficiency energy projects	<ul style="list-style-type: none"><li>• Up to 25%</li></ul>
SP	BBVA	Business loan	< 50.000	0 - 7	Every type of industrial project	<ul style="list-style-type: none"><li>• fixed / variable rate</li><li>• especial conditions depends on the company</li></ul>



SP	ING	Loan "Business"	3.000 – 60.000	0 - 5	Every type of industrial project	<ul style="list-style-type: none"> <li>• fixed / variable rate</li> <li>• especial conditions depends on the company</li> </ul>
SP	Microbank	Company microcredit	< 25.000	0 - 6	Intended for SMEs. Process or product improvement, or R&D projects.	<ul style="list-style-type: none"> <li>• up to 100%</li> <li>• fixed / variable rate</li> </ul>
SP	Sabadell	Loan, renting, Leasing	3.000 min.	2 - 7	Turnkey projects (Installation, maintenance, etc.)	<ul style="list-style-type: none"> <li>• Depends on the credit rating of the companies (Rating).</li> </ul>
IT	BPER	Life4Energy	40.000 - 5.000.000	3-15	<ul style="list-style-type: none"> <li>* energy efficiency building interventions and renovation</li> <li>* energy efficiency</li> <li>* District heating</li> <li>* Heat recovery plant</li> <li>* Public lightening</li> </ul>	* The loan is guaranteed by the EIB (European Investment Bank) thanks to the project «Private Finance For Energy Efficiency (PF4EE)» under the LIFE PROGRAMME.
IT	CREDIT AGRICOLE	Energeticamente Business	25.000 - 5.000.000	1,5 - 20	<ul style="list-style-type: none"> <li>* energy efficiency</li> <li>* renewable energy plants (FER)</li> </ul>	<ul style="list-style-type: none"> <li>* up to 100%</li> <li>* fixed / variable rate</li> <li>* bank guarantee</li> </ul>
IT	UNICREDIT	Finanziamenti Innova e Ricerca	50.000 - 5.000.000	2 - 7	<ul style="list-style-type: none"> <li>* intended for SMEs</li> <li>* process or product improvement, or R&amp;D</li> </ul>	<ul style="list-style-type: none"> <li>* unsecured mortgage</li> <li>* up to 80% (100% with Confidi guarantee, up to 500,000 €)</li> <li>* fixed / variable rate</li> </ul>
IT	UNICREDIT	Mutuo Edilizio	> 25.000	2 – 15	* energy efficiency building interventions and renovation	<ul style="list-style-type: none"> <li>* mortgage guarantee</li> <li>* fixed / variable rate</li> <li>* compulsory insurance</li> </ul>
IT	MONTE DEI PASCHI DI SIENA	Energie Pulite	< 1.500.000	3 - 15	* FER installations other than photovoltaic (power <1 MW), including reconstruction	<ul style="list-style-type: none"> <li>* unsecured mortgage</li> <li>* variable rate</li> <li>* with due diligence</li> <li>* insurance policy</li> </ul>
IT	BNL	Green Aziende	< 30.000.000	1,5 - 10	<ul style="list-style-type: none"> <li>* energy efficiency</li> <li>* renewable energy plants (FER)</li> </ul>	<ul style="list-style-type: none"> <li>* up to 80%</li> <li>* unsecured mortgage</li> <li>* fixed / variable rate</li> <li>* Optional policy</li> </ul>
IT	UBI BANCA	Nuova Energia	25.000 - 3.000.000	2 - 18	<ul style="list-style-type: none"> <li>* energy efficiency</li> <li>* renewable energy plants (FER) (in particular photovoltaics)</li> </ul>	<ul style="list-style-type: none"> <li>* up to 100%</li> <li>* unsecured mortgage</li> <li>* Optional policy</li> </ul>



PL	Bank Ochrony Środowiska S.A.	Business climate loan	Up to EUR 12.5 million	Minimum 2 years	The loan with Climate includes financing investments that are part of the Climate Change Action Program, implemented as part of the European Fund for Strategic Investments (EFSI) - one of the pillars of the Investment Plan for Europe under the leadership of Jean-Claude Juncker. The loan with Climate finances activities promoting the reduction of greenhouse gas emissions to the atmosphere, ie investments in the field of renewable energy sources and energy efficiency.	<ul style="list-style-type: none"> <li>- Up to 85% of the investment value</li> <li>- The maximum investment value of EUR 25 million</li> <li>- Investment completion period up to 3 years</li> </ul>
PL	BGŻ BNP Baribas	ENERGO loan for small business	Up to EUR 1 milion	Up to 10 years	Energo loan is offered to micro, small and medium enterprises (SMEs) that meet the definition set out in the European Commission Regulation, have creditworthiness and the available de minimis aid limit.	<ul style="list-style-type: none"> <li>- Non-refundable Bonus up to 15% of the loan amount</li> <li>- Free technical advice</li> <li>- Simple procedures for using the program</li> </ul>
PL	Bank Gospodarstwa Krajowego	A loan for energy efficiency in the housing sector	From PLN 10,000 to PLN 5 million	Up to 20 years	The investment must be located within the administrative boundaries of the Lower Silesia Voivodship. As part of the financial instrument, projects related to comprehensive modernization of energy for multi-family residential buildings based on energy management system will be supported	<ul style="list-style-type: none"> <li>- The value of the Unit Loan is from PLN 10,000.00 to PLN 5,000,000.00.</li> <li>- The maximum deadline for payment of the total amount of the Unit Loan to the Final Recipient is 2 years</li> <li>- The maximum repayment period of the Unitary Loan can not exceed 20 years</li> <li>- The maximum grace period for repayment of the Unitary Loan is 12 months</li> <li>- There are no fees or commissions related to their provision and maintenance from the Unitary Loan funds.</li> </ul>
PL	ING Bank Śląski	Eco loan for companies	From PLN 10,000 to PLN 100,000	From 6 to 120 months	<ul style="list-style-type: none"> <li>- Purchase of lighting,</li> <li>- Energy-saving controllers,</li> <li>- Renewable energy sources</li> <li>- Purchase of central heating boilers that meet the requirements of class 5 according to PN-EN 303-5: 2012 standard,</li> <li>- Purchase of materials for insulation of the basement ceiling, floor, external walls, roof and ceiling</li> </ul>	<ul style="list-style-type: none"> <li>- Commission 2,5%</li> <li>- Interest rate 6% + WIBOR up to 50,000 or 5% above 50 + WIBOR</li> </ul>
PL	Bank Polskiej Spółdzielcz	Joint Loan Renovation with a BGK bonus for	Amounts determined	The repayment	Joint Loans Renovation with a BGK bonus is an investment loan created for the needs of Housing Communities, intended for financing projects:	Funding conditions are set individually



	ości S.A. and Associated Cooperative Banks	housing communities	individually for the enterprise	period is set individually	<ul style="list-style-type: none"> <li>thermos modernization in buildings, local heating networks, local heat sources or change of conventional energy sources to unconventional sources</li> <li>renovation works in multi-family residential buildings, the use of which was started before August 14, 1961</li> </ul>	
PL	PKO BP	Investors credit Nasz Remont with BGK bonus for housing cooperatives or communities	From PLN 10,000 to 100% of the total cost of a thermo-modernization undertaking or renovation project - the bank does not provide information on what amount. The maximum loan amount results from the submitted documentation and the company's creditworthiness.	Up to 20 years	<p>The loan is granted to finance the implementation of projects:</p> <ul style="list-style-type: none"> <li>thermomodernization of buildings, local heating networks, local heat sources or the change of conventional energy sources to unconventional sources - owned by the borrower or managed by the borrower,</li> <li>renovation works in multi-family residential buildings completed before August 14, 1961.</li> </ul>	<ul style="list-style-type: none"> <li>The interest rate is equal to the sum of the reference rate WIBOR 1M, WIBOR 3M or WIBOR 6M and the Bank's margin specified in the loan agreement.</li> <li>Commission for BGK for granting a thermomodernization bonus or renovation bonus, in the amount of 0.6% of the premium, is collected and transferred to BGK on the day of payment of the loan or the first tranche of the loan</li> </ul>
PL	Bank Zachodni WBK S.A.	Investment loans for thermo-modernization projects	up to 80 or 90% of the investment value	Up to 10 years	Possibility to finance thermos modernization projects within the meaning of the Act of 21/11/2008 on supporting thermo-modernization and renovation.	<ul style="list-style-type: none"> <li>Amount of thermomodernization bonuses up to 20% of the amount of credit used, grace period up to 12 months in repayment of capital</li> <li>Possibility to run once or in up to three installments</li> <li>The possibility of opening an account to service loan repayment and interest along with access via the Internet, mobile phone and SMS</li> </ul>
PL	Krakowski Bank Spółdzielczy	Thermo-modernization loan for companies	No limits, the auditor determines the amount	Up to 10 years	The loan is intended for financing thermomodernization projects (insulation of buildings, replacement of heating installations) and repairs. It is granted in cooperation with Bank Gospodarstwa Krajowego and based on the Act of November 21, 2008. on supporting thermo-modernization and renovation	<ul style="list-style-type: none"> <li>Total interest rate 5.42%</li> <li>Preparation fee 0.3% of the requested amount</li> <li>Commission on the loan granted: up to 5 years repayment 2% and over 2.5%</li> <li>Compensation commission from 0.5% to 4%</li> </ul>



FR	BNP PARIBAS	Faciligreen	<75 000	3-5	finance your energy transition work	* preferential rate * cumulative with the "C.E.E. Premiums" * supply of equipment credit
FR	BPI + banking organization	green credit	100 000 to 3 000 000	Max 7	*low-value hardware investments, which enable the optimization of resources and processes, * intangible investments, in the design of products or manufacturing processes, eco-design approaches, the implementation of certification or environmental standards	* company created more than 3 years ago * financially sound * co-financing with Bpifrance and your banking institution
FR	Crédit Coopératif + EIB	AGIR (loan)	40.000 to 5.000.000	3-19 years	Crédit Coopératif offers, in partnership with the European Investment Bank (EIB), an unique financing offer in France for energy performance projects. Given its backing from EIB resources, this financing benefits from a subsidized rate and under the LIFE program a guarantee on 80% of the loan amount.	Subsidized rate and guarantee on 80% of the loan amount.



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## **4.3 Analysis on the role of Financial Institutions for energy efficiency investments in SMEs of the metalworking industry**

### **4.3.1 Methodology**

Finally, the EE-METAL consortium conducted a further analysis on the role of Financial institutions, with a focus on the SMEs of the metalworking sector, following 3 different steps, in analogy with the work done with ESCOs.

*Step 1:* PP's involved Financial Institutions, informing them about the results of energy analysis conducted in SMEs of metal working sector. The financial institutions most interested in the EE-METAL project have been involved in the following steps

*Step 2:* CSMT has set up a rather detailed questionnaire, which aimed to gather direct information from the financial intuitions, with the main objective of understanding the effective use of the instruments made available by the banks by the SMEs, with a focus on the MMA sector. The questionnaire has been filled by at least 2 different financial institutions in each country, with the objective to understand the main activities of the ESCOs and their mode of operation.

It is important to underline the fact that, at a general level, while the involvement of the ESCOs in the survey and in the workshops has been quite easy in all countries, many of the partners have encountered great difficulties in attracting the attention of the financial institutions and involving them in the various phases of the EE-METAL project.

*Step 3:* EE-METAL consortium analysed results of the questionnaire and feedbacks collected.

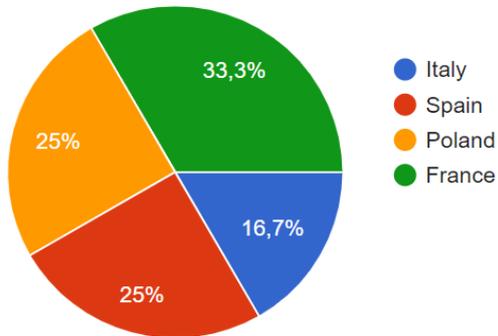
### **4.3.2 Questionnaire results**

12 questionnaires were collected. The following paragraph reports proposed questions and overall results. Answers are referred to the 2015-2016-2017 three-year period.

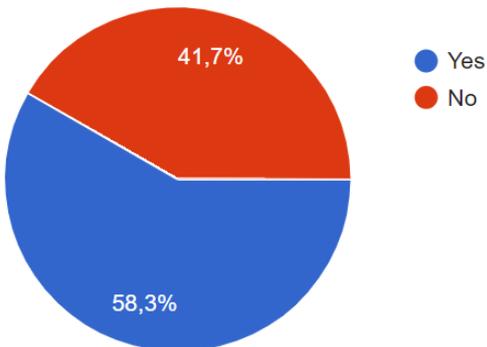
Since for some answers a multiple selection is allowed, for each question number of respondent financial institutions (FIs) is reported between brackets, beside number of received answers.



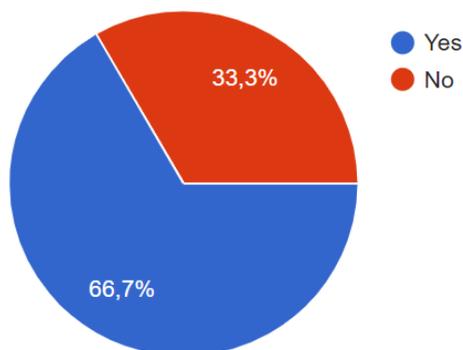
1. COUNTRY  
12 answers (12 FIs)



2. DOES YOUR INSTITUTION OFFER SPECIFIC FINANCIAL PRODUCTS FOR ENERGY EFFICIENCY MEASURES?  
12 answers (12 FIs)



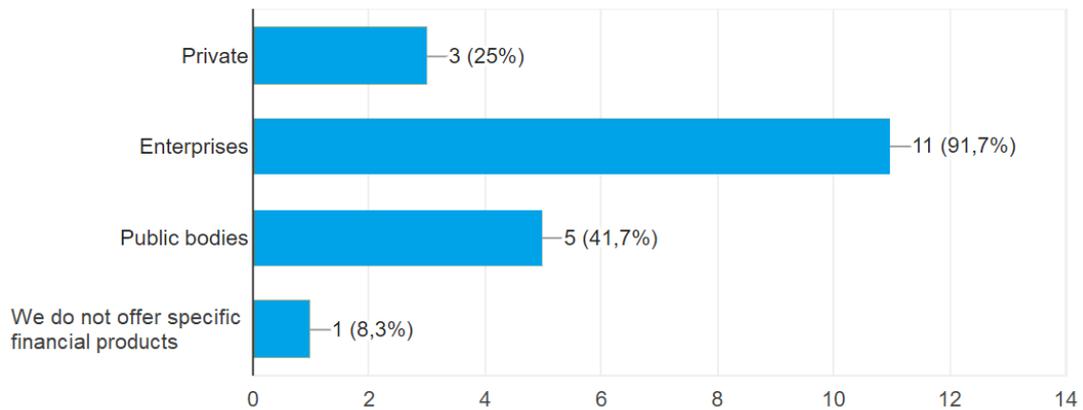
3. IF NOT, DOES THE COMPANY PLAN, IN THE SHORT AND MEDIUM TERM, TO CREATE A FINANCIAL PRODUCT FOR ENERGY EFFICIENCY MEASURES?  
6 answers (6 FIs)





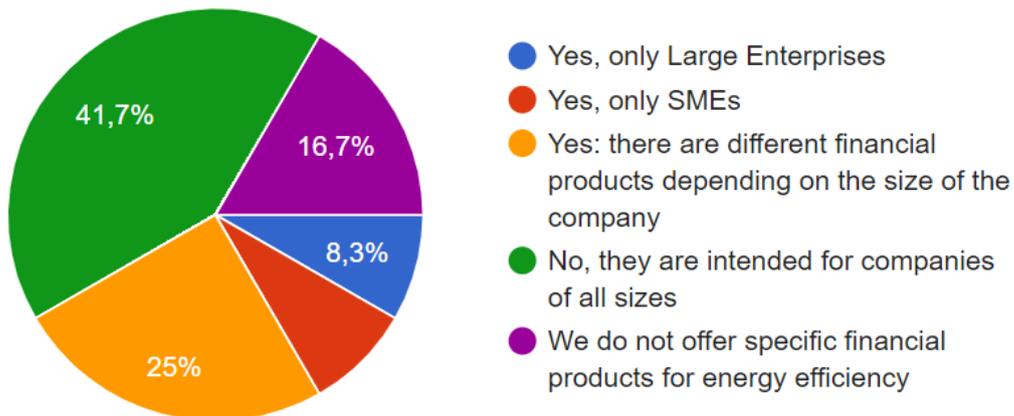
#### 4. WHO ARE THESE PRODUCTS INTENDED FOR?

20 answers (12 FIs)



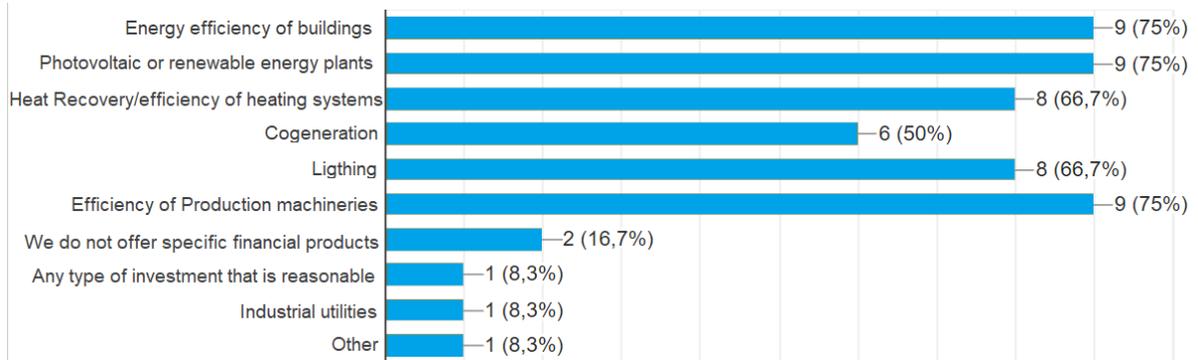
#### 5. ARE PRODUCTS FOR COMPANIES SUPPORTING ENERGY EFFICIENCY MEASURES DEDICATED TO COMPANIES OF SPECIFIC SIZE?

12 answers (12 FIs)



#### 6. WHICH TYPES OF INTERVENTIONS CAN BE FINANCED WITH THESE FINANCIAL PRODUCTS?

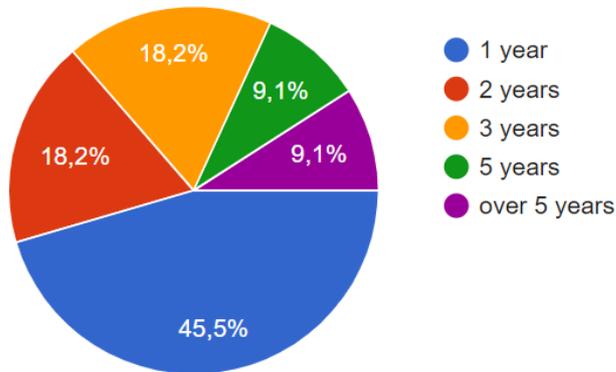
54 answers (12 FIs)





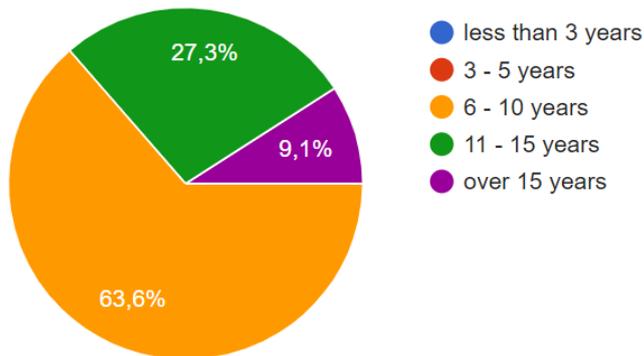
7. WHICH IS THE MINIMUM DURATION OF THE LOAN?

11 answers (11 FIs)



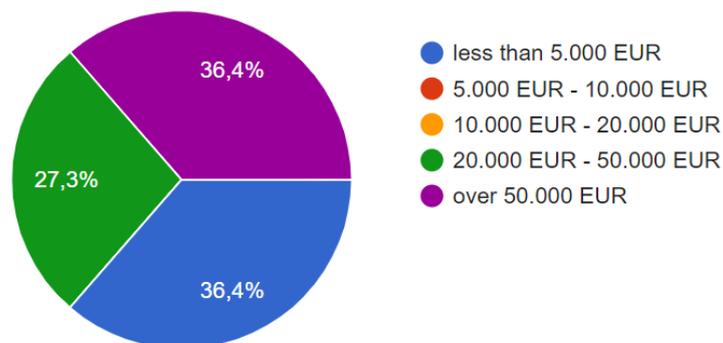
8. WHICH IS THE MAXIMUM DURATION OF THE LOAN?

11 answers (11 FIs)



9. WHICH IS THE MINIMUM AMOUNT THAT CAN BE FINANCED?

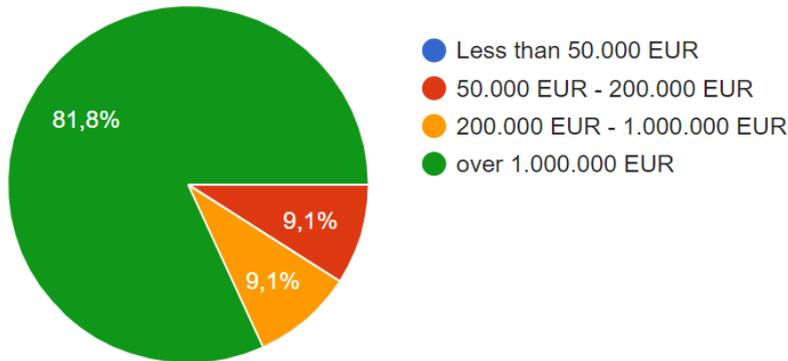
11 answers (11 FIs)





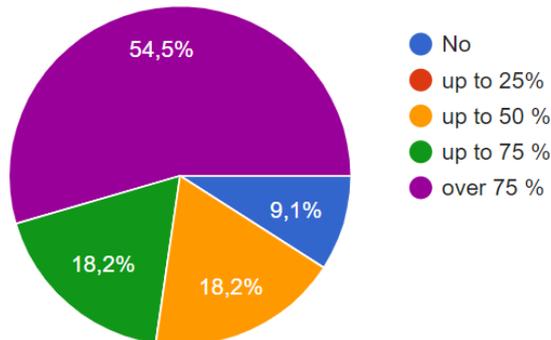
10. WHICH IS THE MAXIMUM AMOUNT THAT CAN BE FINANCED?

11 answers (11 FIs)



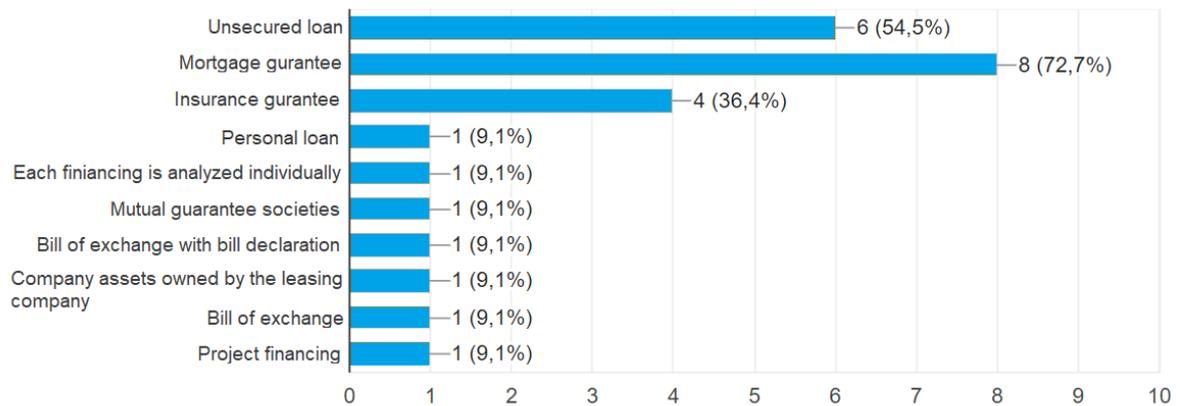
11. IS THERE A MAXIMUM FUNDING PERCENTAGE CALCULATED ON THE TOTAL COST OF THE INTERVENTION?

11 answers (11 FIs)



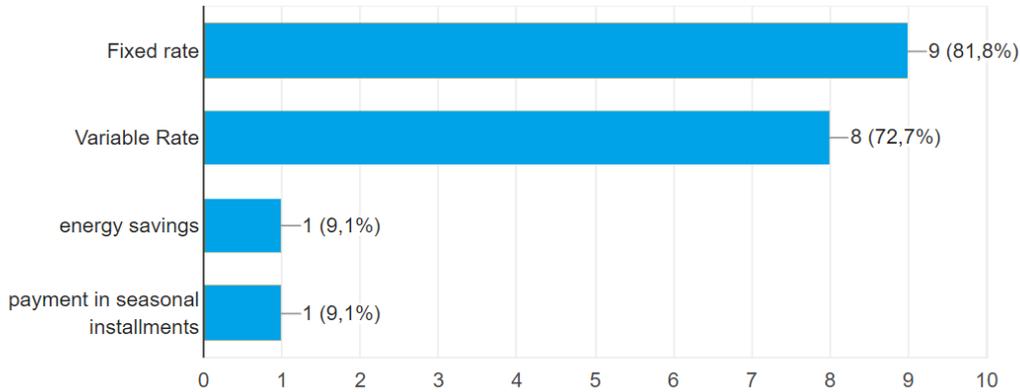
12. WHICH ARE THE POSSIBLE FORMS OF GUARANTEE?

25 answers (11 FIs)

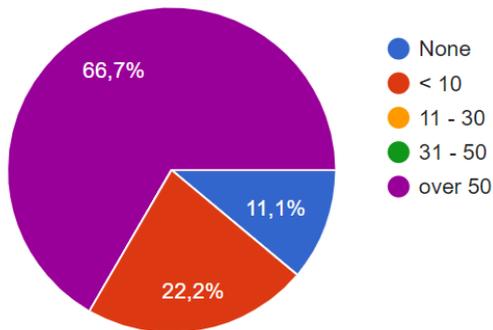




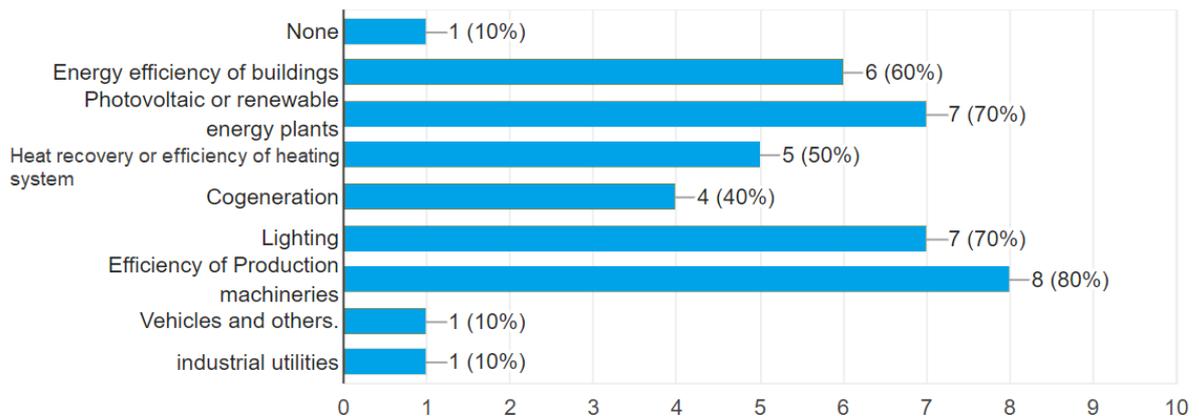
13. WHICH ARE THE POSSIBLE FINANCIAL CONDITIONS FOR THIS TYPE OF PRODUCT?  
19 answers (11 FIs)



14. HOW MANY COMPANIES HAVE USED FINANCIAL PRODUCTS (INCLUDING NON-SPECIFIC ONES) FOR FINANCING ENERGY EFFICIENCY DURING THE THREE-YEAR PERIOD 2015-2016-2017?  
9 answers (9 FIs)



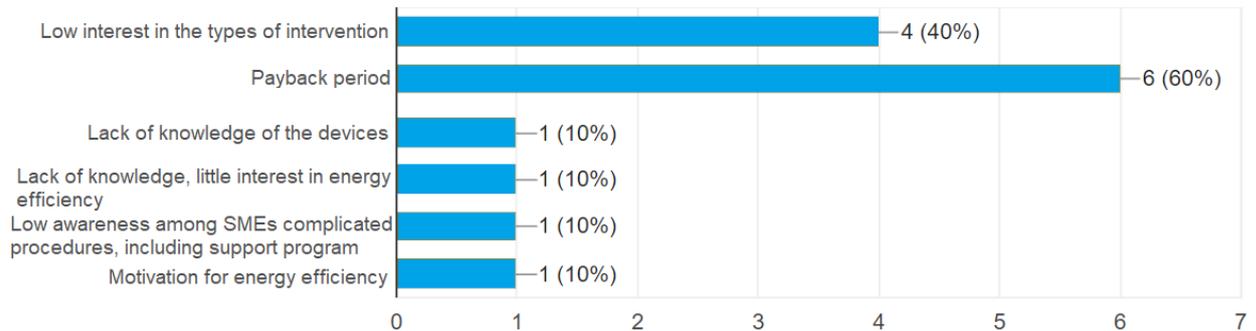
15. WHICH TYPES OF INTERVENTIONS HAVE BEEN FUNDED?  
40 answers (10 FIs)





**16. IN YOUR OPINION, WHICH ARE THE MAIN BARRIERS TO COMPANIES' ACCESS TO FUNDING FOR ENERGY EFFICIENCY MEASURES?**

14 answers (10 FIs)



**17. S.W.O.T ANALYSIS: PLEASE INDICATE BRIEFLY STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS OF THE DIFFUSION OF FINANCIAL INSTRUMENTS FOR FINANCING OF ENERGY EFFICIENCY PROJECT IN THE INDUSTRIAL SECTOR (the data as collected with the surveys are shown below, although the respondents did not in many cases correctly apply the SWOT analysis criteria)**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Saving, marketing, stability.</li> <li>• Future savings for the company.</li> <li>• bonus rate /ease of approach/ lack of guarantee</li> <li>• Financing based on energy saving + subsidies attached to the project</li> <li>• Comprehensive and professional information and promotion campaign of financial instruments in a given region</li> <li>• A high degree of matching instruments to the needs of final recipients (a wide range of investment types that can be financed).</li> </ul>	<ul style="list-style-type: none"> <li>• Little access to information about investment options.</li> <li>• Excessive documentation and audit requirements that may be required.</li> <li>• limited amounts</li> <li>• quantify the need</li> <li>• Complexity of implementation</li> <li>• The reverse nature of instruments is perceived as less attractive by SMEs than subsidies.</li> <li>• lack of simple programs supporting investment in energy-saving solutions</li> <li>• lack of dedicated financial product</li> <li>• Investment not directly productive</li> <li>• Costs</li> <li>• Low demand</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• Innovation, Marketing of product.</li> <li>• bonus rate</li> <li>• few speakers</li> <li>• Deposit of projects not carried out because not financed probably important</li> <li>• Increasing social awareness regarding the possibility of financing investments from "EU loans" (repayable financial instruments);</li> </ul>	<ul style="list-style-type: none"> <li>• Future legal constraints</li> <li>• Rising energy prices</li> <li>• Other instruments available on the market (subsidies) financing similar projects</li> <li>• the possibility of not meeting the EU energy policy goals</li> <li>• under-spending of the funds from the current EU budget for 2014-2020</li> <li>• Specific energy efficiency equipment is more risky for the leasing</li> </ul>



<ul style="list-style-type: none"> <li>• Limited access to non-returnable instruments, ie subsidies (too small allocation in relation to the needs in a given region);</li> <li>• Stimulating enterprises to carry out investments related to broadly defined energy efficiency and RES.</li> <li>• The emergence of new clients with energy efficiency needs. If there are no pressures and needs on the part of customers and the market, then the financial institution does not create special financial products.</li> <li>• Mandatory audit</li> <li>• Offer specialist advice</li> <li>• Fiscal incentives</li> </ul>	<p>institution. In the case of financial problems, the leasing company must sell the machine, devices or equipment.</p> <ul style="list-style-type: none"> <li>• Difficulties in the case of debt collection are often observed.</li> <li>• Competitiveness of the industrial tool</li> <li>• Non-amortization of development costs for new products</li> <li>• Payback time</li> </ul>
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### 4.3.3 Conclusions

Analysis of surveys that consortium received from financial institution shows a first relevant information: 42% of the sample does not offer specific financial products for energy efficiency measures. However 60% of them plans to create specific product for this sector in the short and medium term.

Thus market seems not to be completely mature in this sense and, even if some positive signs are going to appear, this partial lack of financing instruments can act as a brake on SMEs development for implementation of energy efficiency measures.

However, the fact remains that some financial institutes offer products that, although not specifically designed for energy investments, can fit very well for this purpose and have been considered anyway in this study.

Large majority of sample declares to offer specific products for industrial sector and 42% of financial institutions proposes financing solutions that are suitable for companies of all sizes while another 25% has different products depending on customer's size. Otherwise, a small part of financial institution (8%) provides options for large enterprises only or strictly for SMEs (8%). Most common interventions that can be financed by these instruments are energy efficiency actions on buildings, process machinery, lighting and heating plants, heat recovery systems and cogeneration plants.

Collected data highlight a general framework of short and mid term loans, with a minimum duration between one and three years in 82% of interviewed institutions and a maximum duration that, for 64% of sample is between 6 and 10 years and for 27% of surveys is between 11 and 15 years.

Referring to financing amount, market seems to meet several needs of customers, from small investors (one third of surveyed banks can offer products with less than 5.000 € of minimum loan and another third between 20.000 and 50.000 €) to large ones (82% of financial institutions have loan with a maximum cap that exceed 1.000.000 €), in order to satisfy all kind of customers.



A maximum threshold of funding percentage on total cost of intervention is usually fixed but this value is typically high (from 50 to 75% for 18% of sample, over 75% for half of financial institutions, no limits for 9% of sample).

Most widespread forms of proposed guarantee are mortgage (it is offered by 73% of interviewed companies), unsecured loan (55% of sample) and insurance guarantee (36%).

Fixed or variable rate are typical conditions financial institution offers (around 70-80% of interviewed companies can apply them) while energy savings or payment in seasonal instalments are proposed by only one bank.

During three-year period 2015-2017, statistics show an interesting use of these financial products for energy efficiency, with 6 interviewed institutes that provided them more than 50 times. Most common interventions have concerned energy efficiency of production equipment (80% of interviewed financial institutions dealt with this kind of action), lighting (70%), photovoltaic or renewable energy plant (70%), energy efficiency of buildings (60%) and heat recovery or heating systems (50%).

There are many possible reasons about it: investment cost of described measures is typically higher than other actions and financing instruments can help companies in implementation phase; some interventions (such as lighting, photovoltaic plants, heat recovery etc.) have low or medium technical complexity and company can manage itself with slight external support, reducing cost and maximising profit; actions on production process are more compatible with loans (or similar financing instruments) than EPCs because no third parts are involved in production equipment operations (less risks of failures or work safety issues) and, due to its high technical know-how, company can directly manage improving actions with consequent benefits in process confidentiality.

According to surveys results, 60% of sample thinks payback period of energy efficiency actions is one of the most important barriers to companies' access to funding. 40% of interviewed institutions identifies also low interest in types of intervention as another relevant reason.



## 5 EPC contracts and technical measures for energy saving

Energy performance contracts can represent a very interesting tool for implementation of efficiency actions because they can overcome some important barriers that are typical of small and medium size companies: poor awareness of energy contents and lack of economic and human resources to be employed for efficiency actions (priority is given to manufacturing process and its equipment), to mention only a few.

Anyway, EPC contracts are more suitable and attractive when one or more of the following conditions occur:

### 1. High technical complexity

Innovative technologies and complex plant requires special know-how and high skilled company for designing, implementation and management phases.

Since these activities usually cannot be carried out in-house by SMEs, a turn-key solution with EPC mode can be the right solution for the industrial customer, who benefits of energy saving action without spending time in management and maintenance of the plant (especially during commissioning, testing and calibration stages).

Guaranteed saving or shared saving contracts are very common option for this kind of situation (for example cogeneration or trigeneration plant). Also “chauffage” can be offered but it refers to management and maintenance part only.

### 2. High cost investment

Due to limited economical resources, some SMEs cannot face relevant cash outlay for new plants or equipment except for process and manufacturing machineries. In other words, high cost investment is usually admitted, as far as possible, when an increase of the effective manufacturing capacity is required.

Although important energy efficiency actions foster competitiveness of the company, often they are not considered as essential in the SME investment plan, especially if they require a great amount of money. It does not matter whether payback time is low or net present value is attracting: risk of such an action can be too big for financial capacity of the company.

Issue of high cost investment can be solved through guaranteed savings, shared savings or first out options. This way, economic benefits of customer are reduced but he does not have to pay for the new plant and he will become the full owner of it at the end of the contract.

### 3. Actions on auxiliary services

Energy efficiency actions that directly affect process equipment are quite sensitive and complicated. Errors of assessment or planning can bring to product defects, interferences, failures or shutdowns of manufacturing process, with relevant economic consequences for the company. Without forgetting that changes or alterations can also invalidate warranty, another important issue is connected to the respect of work safety rules for machinery and equipment, that can have serious legal and judicial implications.

Moreover, special business secrets or confidential know-how can involve some stages or treatments in manufacturing process and companies are reluctant to show them to a third part.



For all these reasons third part influence through EPC contracts is preferable in auxiliary services (lighting, air compressed system, air extraction plants, boilers, heat or steam generation etc.) where, among other things, improvement action can also increase system reliability: after energy efficiency action, replaced old facilities can be kept in place and used as backup in case of malfunction or maintenance operations of primary system. Often this cannot be done for manufacturing machines because of the complexity of processing chain.

4. Significant working time

Energy efficiency solutions can lead to important benefits for the customer if working time of a certain equipment is appropriate. Working time of certain plant is an essential factor for a satisfactory net present value and a suitable payback time.

For example, in a company with 2 or 3 shift operation, replacement of the old lighting system with LED could be evaluated as interesting solution while, the same improvement action could not be so positive if applied on 8 working hours per day only.

5. Offer of ancillary and complementary services

From realization and management of innovative and complex facilities, new additional tasks and duties can result. Just to mention a few, mandatory authorization or license for operation (fiscal and tax declaration, permit to release emissions, building permits etc.), procedure to request incentives, required certifications of plant and qualification of personnel to run the installations, insurance policy, maintenance operations, management of plant, supply contracts for fuels or electricity.

Sometimes an SME has not adequate human resources to face all these assignments. So an energy performance contract can include completion of these activities, with a full-service agreement between customer and ESCO.

Some typical examples of energy efficiency actions EPC contracts can be applied to are presented below.

***Cogeneration or trigeneration system***

In cogeneration systems simultaneous combined heat and electricity generation takes place in a unique plant. Cogeneration unit is more simply an electric power generator with additional recovery modules capable to transfer heat from cooling system and exhaust gas to another heat-carrying fluid (water, steam, diathermal oil etc.).

It is a mature and well-developed technology with a high global efficiency level. Considering combined production of both thermal and electrical energy, efficiency of cogeneration process is usually around 90%, resulting relevant energy saving in comparison to a separated generation system.

Following tables, with dimensionless units of measure for energy and realistic value of plant efficiency, exposes the request of total input primary energy (as fuel consumption) for the same quantity of electricity and heat production. Results shows combined or separated generation can certainly give the same output but the first option requires 28% less fuel.



COMBINED GENERATION	Electricity	Heat	Fuel consumption	Efficiency
Cogeneration unit	30	60	100	90 %

SEPARATED GENERATION	Electricity	Heat	Fuel consumption	Efficiency
Heat generator	-	60	63	95 %
Electric generator	30	-	75	40 %
<b>SUM</b>	<b>30</b>	<b>60</b>	<b>138</b>	<b>65%</b>

Usually, three type of generation unit can be used:

- Reciprocating internal combustion piston engines;
- Gas turbines.

The first is typically more suitable for production of hot water or, in some cases, superheated water and can be employed for a wide range of power, from just few tens of kW to few MW of electrical power. Internal combustion engines are usually fuelled with natural gas because it is cleaner and produces less pollutants in exhaust gas than other fuels such as diesel or heavy oil.

This way, respect of rules about emission limits can be guaranteed with less complex flue gas treatment process (in many cases primary reduction measures during combustion process could be adequate) and resulting plant scheme is more simple and cheaper, especially in small size units. In internal combustion engines, heat is recovered from exhaust gas and jacket water, oil and mixture coolers. Thermal energy is used for hot water

Gas turbines are another interesting option for cogeneration unit because they are very flexible in term of size plant (from thousands of MW to few tens of kW) and power modulation. Most common fuels for this application are natural gas, biogas or LPG. Diesel can be used too but, about pollution, the same reasoning as for engines applies. Heat is recovered from flue gas to produce hot or superheated water or, most commonly, steam. For large plant also steam turbines are used (often in a combined-cycle plant).

Thermal energy of cogeneration plants can be exploited as is, for example for heating buildings or for manufacturing process, but it can be also a precious resource for production of chilled water through an absorption refrigeration cycle. Downstream the cogeneration unit, an absorber is installed, and plant can provide at the same time electricity, cooling and thermal energy (trigeneration plant).

Cogeneration and trigeneration units require very high investment cost (hundreds of thousands of euros) and represent the perfect field of application for EPC contracts because of their high technical complexity (special know-how is required for designing phase but also in maintenance and management), relevant working time (cogeneration units are more profitable if they work for thousands hours a year), authorization process (for plant installation and incentives



procedures) and other complementary services (insurance against plant damages or failures etc.). Often cogeneration and trigeneration plants can also be easily by-passed by existing boilers and chillers (used as back-up only) in case of malfunction, with no interruption of manufacturing process.

### ***ORC turbine***

Organic Rankine Cycle Turbine recovers waste thermal energy at low or medium temperature, in order to produce electricity.

Thermodynamic Rankine cycle drives the ORC unit but a special organic working fluid, with lower boiling temperature than water, is employed. This way ORC module is able to exploit low enthalpy heat source that would not otherwise work with a common steam Rankine Cycle.

Typical application of ORC unit in metalworking sector is the exhaust gas of melting furnaces in metallurgical industries.

ORC technology needs relevant investment cost, with high qualified technicians for planning and maintenance operations. It can be easily paired with an EPC formula for all the reasons that have been explained also for cogeneration plants.

### ***LED lighting plant***

LED is one of the most efficient solution for energy efficiency in lighting systems because of its very high level of luminous efficiency.

LED can reduce drastically energy consumption of lamps, but its investment cost is still high because replacement of the whole luminaire could be required. In order to reach reasonable and satisfactory payback time, LED are applied if lighting system works for several hours per day (2 or 3 shift operation or in department with no contribution of natural light). In other conditions LED can usually be accepted for replacement of old end-of-life lamps only.

Total application of LED luminaire to an industrial site could be a very expensive efficiency action and, for this reason, EPCs can give an important financial support to customer.

Unlike cogeneration plant or ORC, once a good technical lighting project is designed and luminaires are installed, maintenance of LED lighting systems is quite simple and no particular or difficult management operations are requested.

In case of lighting's modernization it is possible to use Light as a Service (LaaS). It includes every aspect of a lighting upgrade from start to finish (like data analysis, capital investment, project management, product and installation, measurement and verification, guaranteed savings and maintenance). For the entire duration of the contract the service contractor takes full responsibility, including financial, for modernization of the lighting to the LED technology and for continuous operation of lighting in accordance the agreed lighting standards. The client does not bear any initial/investment costs. There is only a low, fixed monthly subscription, which is entirely covered by the savings made by the client. The service contractor remains the owner of the equipment for the entire duration of the contract, which makes it available to the customer



on a lease basis. The rental cost is included in the subscription fee. At the end of the contract period, the service contractor sells the device to the customer and at this point the customer becomes the owner of the installation.

### ***Thermal plant***

Heat generation systems can represent a relevant use of energy in industrial companies, both for process (hot water or steam production) and space heating. In this sense, lots of different energy efficiency actions can be implemented, with a various range of technical complexity and economic commitment.

For example equipment can be replaced with high efficiency systems (condensation boilers, heat pumps, low consumption burners etc.) and/or fed by different fuel (natural gas instead of diesel or coke). Since this kind of actions are often quite expensive, guaranteed or shared savings, but also first out contracts, can be the right solution in case of efficiency measures on plant equipment because of their financial support to customer. Energy Plus Contract is another particularly appealing option that is tailor made for thermal plant.

Also proper management and adequate maintenance plan are important for plant energy savings and can be offered to customer as stand-alone services (chauffage contract) or additional to conventional EPCs.

Energy efficiency measures on thermal plant can also be completed by natural gas supply contract.

### ***Photovoltaic power plant***

During these last years, cost of photovoltaic power plants has substantially decreased thanks to economies of scale. This technology spread all over the world and became one of the best solution for investment on renewable energies: no particular problems of location due to specific environmental conditions (such as rainfall for hydroelectric source or windiness for wind farms) occur and, contrary to other energy source, small size plants are easy to be implemented and managed, promoting the widespread generation.

Now photovoltaic plants can be interesting and profitable even without incentives, but it should have to be considered as a long-term investment anyway, because payback time up to 8-10 years has to be expected.

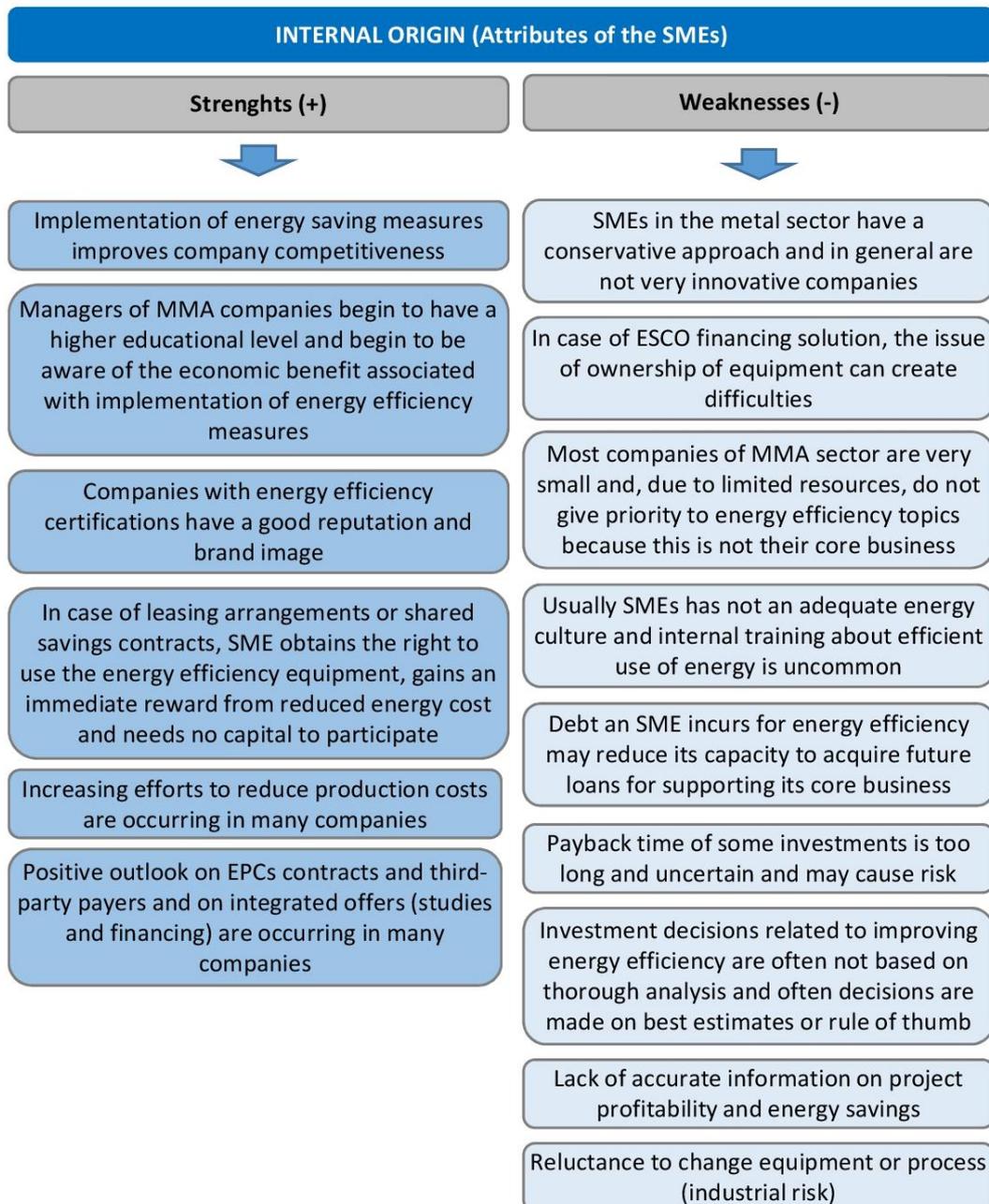
Energy performance contracts for photovoltaic plant could help the company on the financial side (because of high investment cost) but it could be precious also for authorization procedures, incentives request, maintenance and management operations. Minimum threshold of efficiency for plant production could be included in the contract.

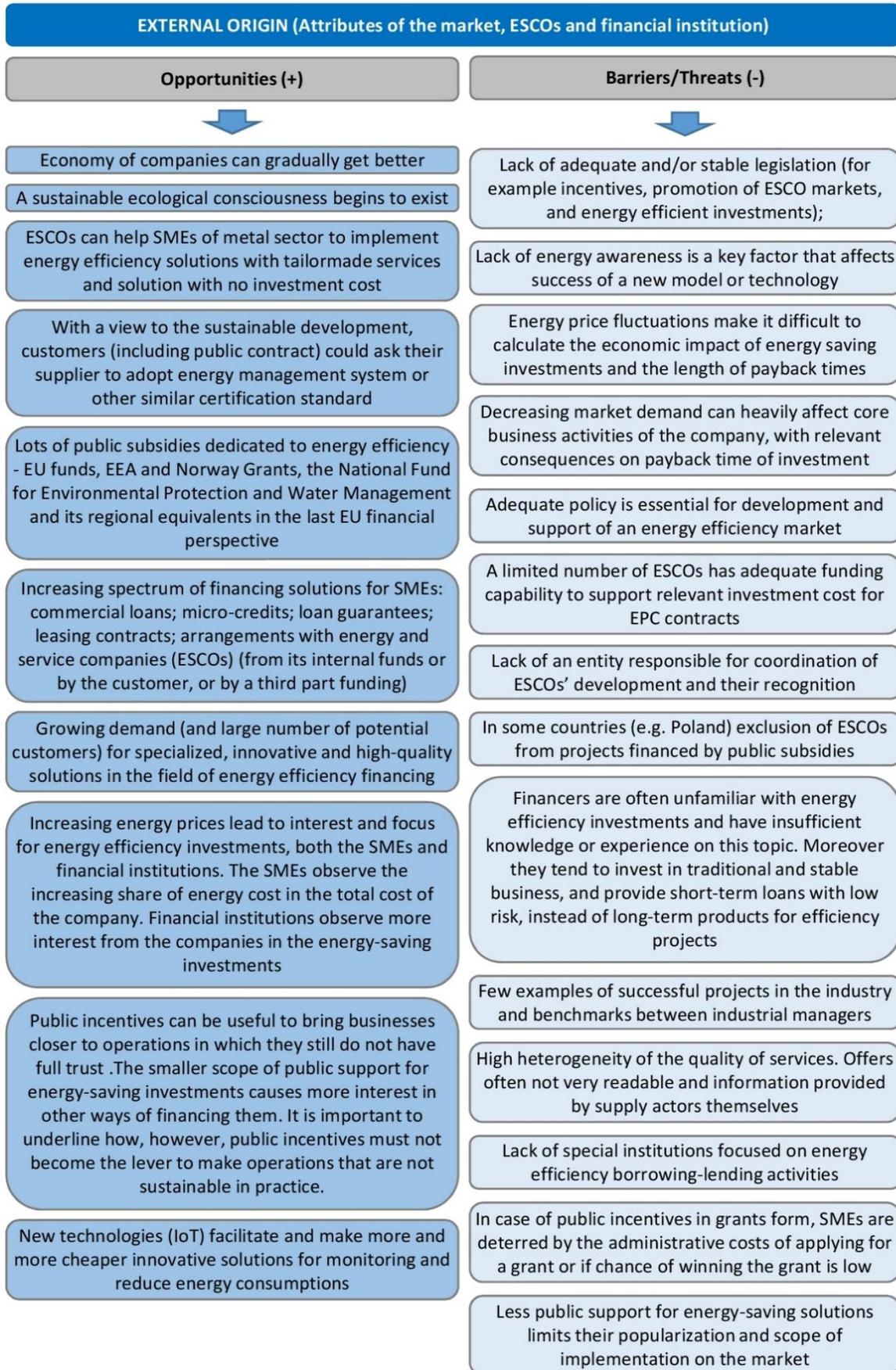


Action	Technical complexity	Cost investment	Complementary services	Suitable EPC contract				
				Guaranteed savings	Shared savings	First Out	Energy Plus	Chauffage
Cogeneration	High	Very high	Insurance, supply contract, incentives, authorization, management and maintenance	✓	✓	✓	✗	✓
Trigeneration	High	Very high	Insurance, supply contract, incentives, authorization, management and maintenance	✓	✓	✓	✗	✓
ORC turbine	Very high	Very high	Insurance, incentives, authorization, management and maintenance	✓	✓	✓	✗	✗
LED	Low	Medium or high	Insurance, supply contract, incentives, management and maintenance	✓	✓	✓	✗	✓
Thermal plant	Depending on the action	Depending on the action	Insurance, supply contract, incentives, authorization, management and maintenance	✓	✓	✓	✓	✓
Photovoltaic power plant	Medium	High, depending on installed power	Insurance, incentives, authorization, management and maintenance	✓	✓	✓	✗	✗

## 6 Conclusions: overcoming barriers for financing energy saving in MMA SMEs

The SWOT analysis methodology has been applied in order to provide some final considerations, which take into account all the work done by the EE-METAL partnership (interaction with the ESCOs and the ESCO associations, collaboration with financial institutions, surveys, bibliographic researches). The S.W.O.T. analysis, which allows to communicate the results of the research conducted in a simple and analytical way, is shown in the following tables.







EE-METAL project permitted to enhance connections between the SMEs involved of the metalworking sector and ESCOs or financial institutions, but a lot of work need to be still done to create greater opportunities to bring energy efficiency actions to the center of the interest and convenience of businesses.

At the current time, some collaborations are rising between the ESCOS and the SMEs in the metal sector, but still little is done at the level of financial instruments.

The SMEs need to improve their competitiveness in order to consolidate their position in the market and furthermore, they are starting to be aware of the importance of the energy efficiency measures implementation. Predictably, this process could be a little slow because in general, companies in the metal sector are not very innovative and they have a very traditional character. By the other hand, financing is a critical point for them and the ESCOS can help them to overcome the barriers for financing the energy saving measures. In addition to, Energy efficiency industry has generated at European level a set of policies, legislation (The Directive 2006/32/EC on the energy efficiency and the Council Directive 93/76/EC on energy services) and actors that are nowadays the main milestone of the energy efficiency sector. The Spanish economic situation is improving gradually, and our society is achieving a greater sensitivity in environmental issues.

Consequently, for all these aspects, ESCOs can play an important role in the energy efficiency sector.



## OVERCOMING BARRIERS FOR FINANCING ENERGY SAVING IN MMA SMES: FINAL RECOMMENDATIONS

Dissemination of special credit lines extend by development banks to local financial institutions, which on-lend the funds to their clients

Development of energy savings insurance, which pays out if the projected value of energy saving is not met as the answer to the lack both the technical capacity to assess the potential of more capital-intensive energy efficiency investments and the confidence that they will pay back

Establishment of sustainable fiscal incentives for SMEs (tax breaks, loan interest rate discounts), without however distorting the evaluation of the real sustainability of the interventions

Dissemination and promotion of energy-efficiency information and investment opportunities, including special financing platforms, energy saving technology and standard databases

Promotion of energy audits to overcome lack of information about energy consumption and possible investments

Establishment of special financial institutions to promote innovation of financing products to perform energy efficiency, including combined green bond issuance to SMEs

Regular organizing of different level trainings and seminars about financing strategies, risk management, technological development, etc.

Combining different financial instruments or to use different instruments for different sub-segments, for example, grants for small enterprises and preferential loans for medium-sized enterprises

Streamlining application processes or providing additional information and guidance in case of applying for a grant

Providing initial capital for energy efficiency projects by an energy supplier, this will be repaid through a debt repayment charge on energy bills