EU-MERCI

EU coordinated **ME**thods and procedures based on **R**eal **C**ases for the effective implementation of policies and measures supporting energy efficiency in the **I**ndustry

Fostering the growth of energy efficiency in the EU industry

A review of EU policies supporting Energy Efficiency in Industry and recommendations and factsheets for external stakeholders

Final Conference: Good Practices of Energy Efficiency in the European Industry

Vlasios Oikonomou, JIN

London, 23/1/2018

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 693845

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Contents

- Overview of energy efficiency policies in industry in the EU and key findings
- Policy recommendations on a general and sector specific level

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Industrial energy efficiency policy framework

- EU Climate and Energy Policy Framework
- Energy Efficiency Directive
- Industrial Emissions Directive
- EU Emissions Trading Scheme

Next to EPBD, Energy Labelling Directive, Eco Design Directive, RES Directive and Energy taxation Directive

Complemented also by Resource Efficient Europe (2011), Industrial Policy for the Globalisation era (2012), Innovation Union (2010), Agenda for the skills and jobs (2011)

This complex environment requires the adoption of a series of policies in industry

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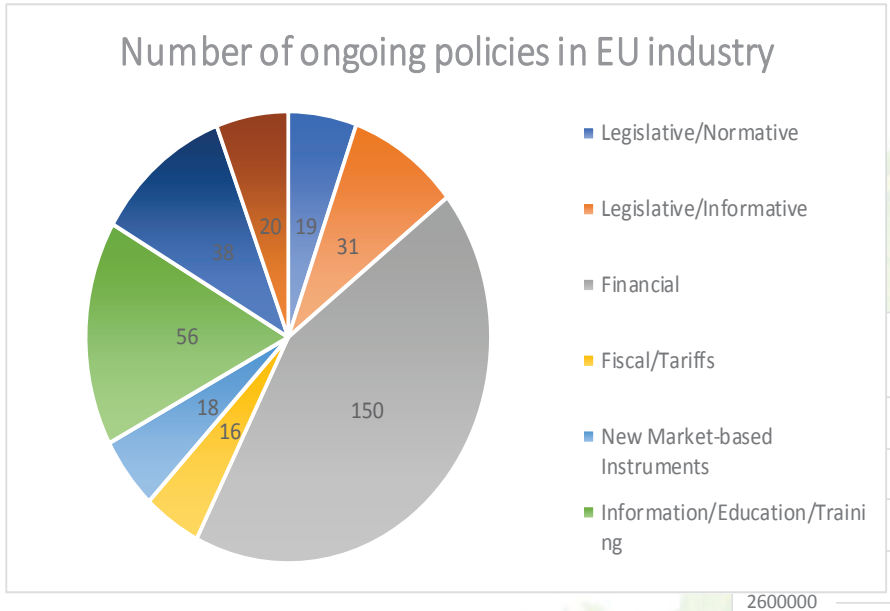
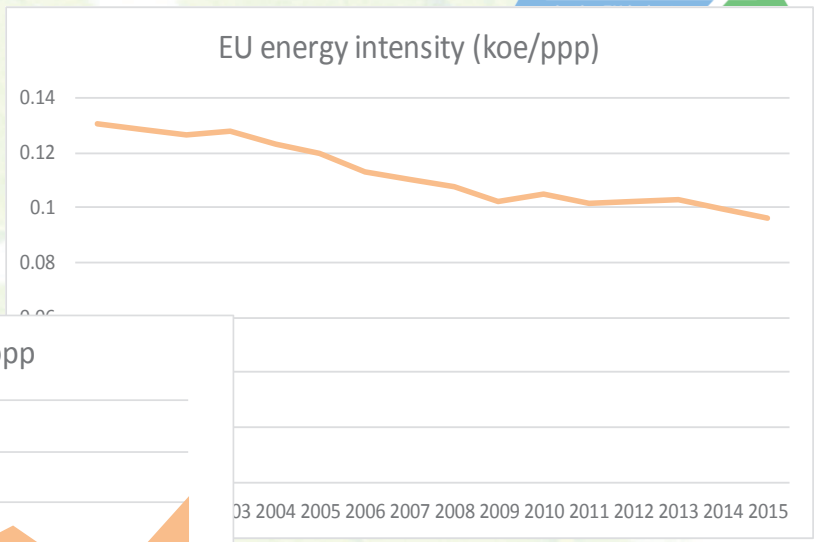
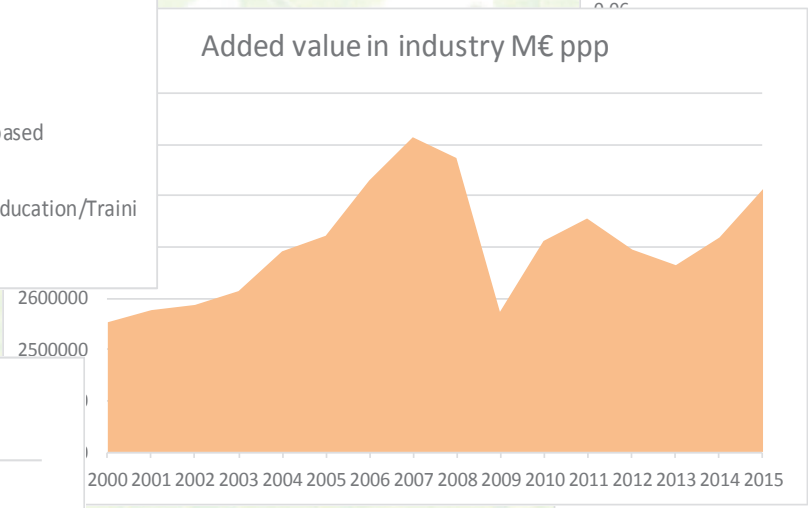
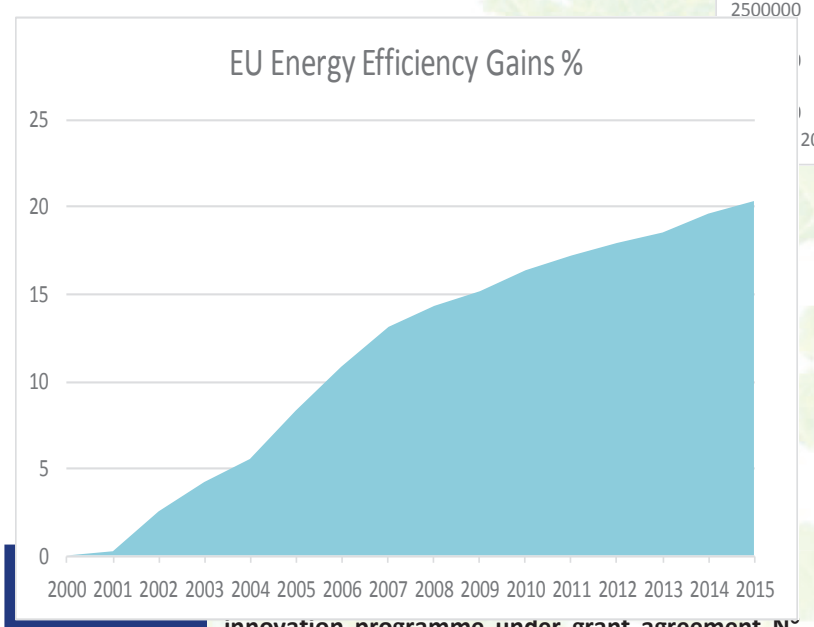
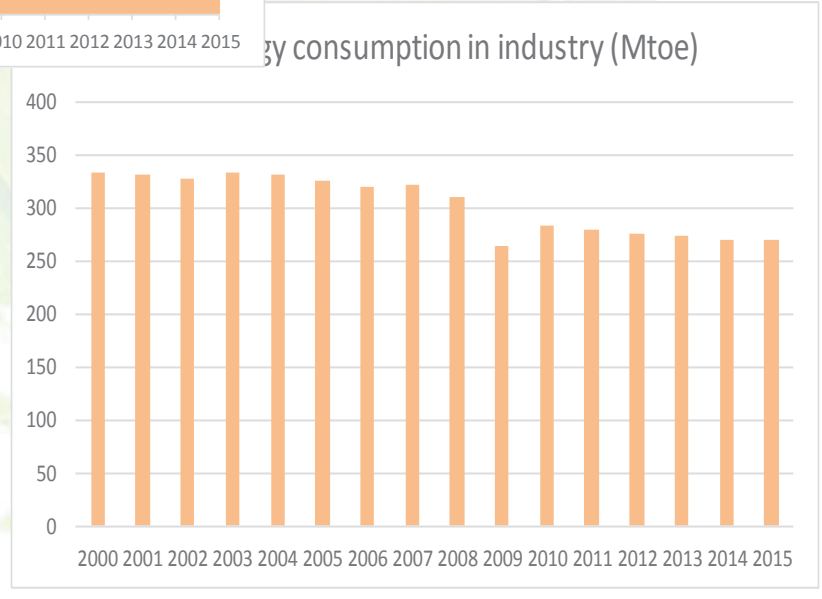
Main policies and trends on industrial energy efficiency











innovation programme under grant agreement N° 693845

Source: ODYSSEE-MURE

Overview: types of measures (Art. 7 EED)

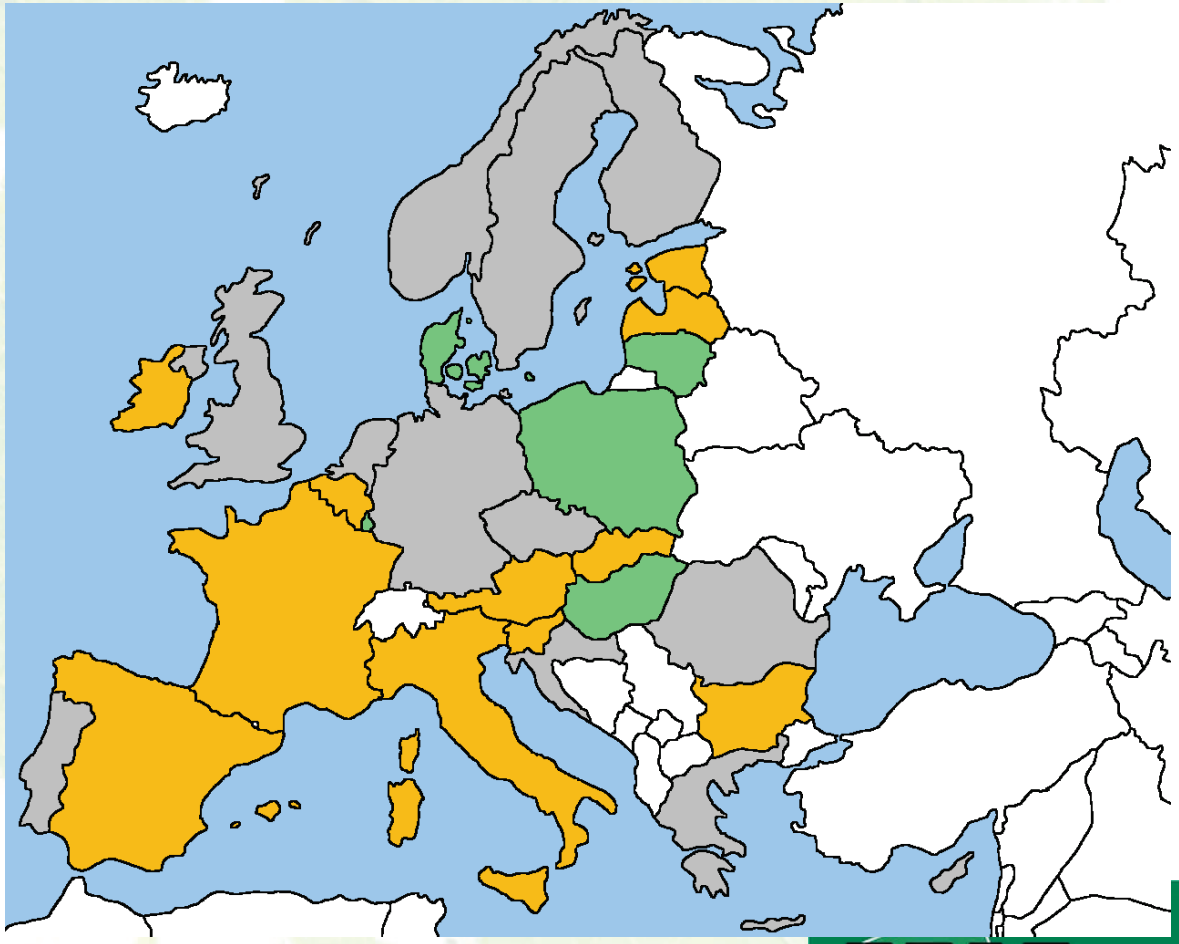
For the 29 countries, in total 71 key measures have been identified.

- 16 countries have implemented **industry-relevant EEO**,

of which most have combined this with alternative measures.

In 5 countries (Denmark, Hungary, Lithuania, Luxembourg and Poland) the EEO is the sole relevant EE measure for industry

13 countries implement alternative measures only



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Main lessons from policies (EEOs)

- Some EEOs only households focus (e.g. UK), but many include industry (16)
- Example: Italy's white certificate obligation scheme
  - Obligation on electricity/gas distributors >50,000 end users
  - All end use sectors (i.e. including industry)
  - All types of technologies and measure eligible*
  - Target savings: 16.03 Mtoe (cumulative 2014-2020)

*Some countries set limits, e.g. in France only investments in hard technologies eligible.

Highly succesful, within 5 years possible to capture a great deal of industrial savings, generate stable trends of energy savings

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Main lessons from policies (financial and other schemes)

- 19 countries have implemented financial support schemes, some examples:
  - Cyprus: governmental grants/subsidies schemes
  - Slovenia: Eco Fund's financial contribution scheme
  - Germany: KfW investment support programmes
    - Criterion for financial support: energy consumpion at least 30% lower than mean consumption of last three years
    - Target energy savings: 123.2 PJ (2014-2020)
- **Information/training**: Austria's energy efficiency improvement of companies in the framework of the klimaaktiv program (PR materials, tools, and training)
- **Fiscal**: Sweden's energy taxes and CO_2 taxes
- **Legislative/regulatory**: Bulgaria's mandatory industrial audits for energy efficiency
- **Voluntary agreement**: Netherlands' voluntary agreements on energy efficiency with ETS/non-ETS businesses

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Costs of policies in industry

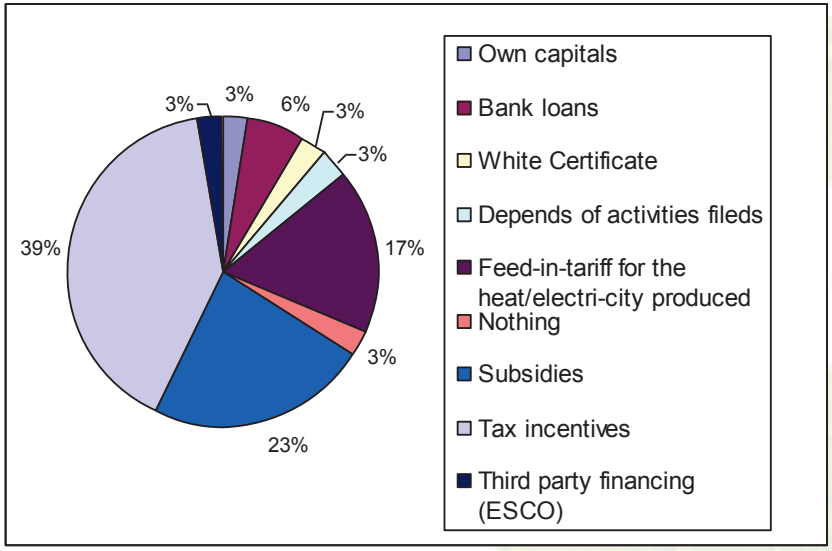
Country	Obliged party costs (M E/year)	Administration costs (%)
UK	1,052	0.2
Denmark	185	0.3
France	390	0.4
Italy	700	1.4 (and tax deductions <1%)
Austria	95	
The Netherlands	N/a (MJA), 1.5 M E (MEE)	15.3 M E (MJA 3)/ 19.5 (MEE)
Transaction costs 3-8% of total investment costs in industrial policies		
The cost of the implementation of these schemes is almost one fifth of the total average energy bill received by the industrial sectors, which, if compared to the overall savings is a quite low amount. Indicatively, in Denmark the cost of the EEOs as a share of the energy bill is 5% and in Austria 0.9-1.4% assuming a 100% cost pass through to the industry. In general, EEOs have a leverage factor of 2-3 for energy savings in industrial sectors		

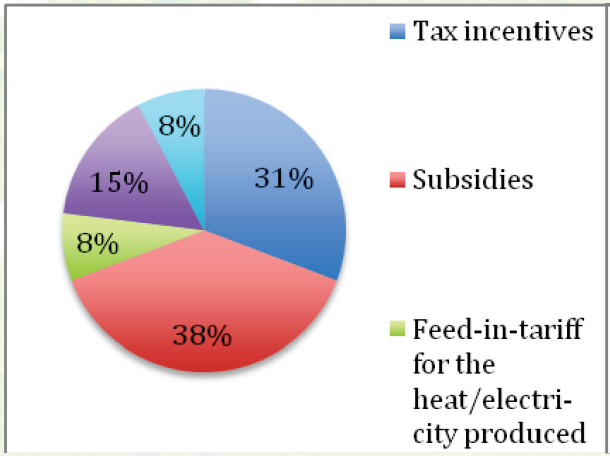
Cost recovery options of policies in industry

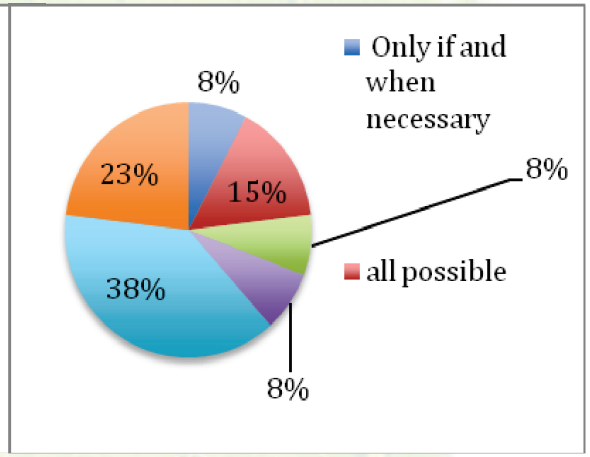
Country	Cost recovery (or funding) mechanism
Explanations	*are obligated parties allowed to recover their expenses due to the scheme? (and how?)*
Austria, Poland, Slovenia, Spain, UK, Ireland	Liberalized energy market and suppliers can recover costs through increasing energy prices
Bulgaria	Not defined yet, which is likely one of the main reasons of the low achievements so far
Croatia	Cost recovery with regulated price of energy distribution which will take into account additional costs due to the scheme (possibly industries will be exempted from increase of prices)
Denmark	The cost is recovered by supplement to revenue cap (power, gas) or by inclusion in tariff (district heating), with the exception of oil companies that cannot carry costs to consumers
Estonia	not defined yet (would likely be through energy tariffs, under supervision of the Competition Authority)
France	Liberalized energy market and suppliers can recover costs through increasing energy prices. Special rules applied for the energy suppliers with regulated energy prices.
Greece	Liberalized energy market and suppliers can recover costs through increasing energy prices. Special rules applied for the energy suppliers with regulated energy prices.
Italy	Tariff reimbursement for obligated parties depends on previous years market values (since 2013, previously on standard fuel price mix trend). Cost for savings measures in electricity/gas can be included in regulated operator's tariff, whereas this is not possible for transport measures. The Adjustment is under discussion to allow inclusion in gas tariff, or to recycle costs into the transport sector.
Latvia	There is a provision to increase energy tariffs for cost recovery
Lithuania	Not yet defined
Luxembourg	Liberalized energy market and suppliers can recover costs through increasing energy prices. To avoid distortion between energy types, non-obligated suppliers may have to pay a special tax. The obligation is defined as a mission of public service. This allows the scheme to be partly funded by the public budget.
Malta	The cost recovery option is through the electricity tariffs increase

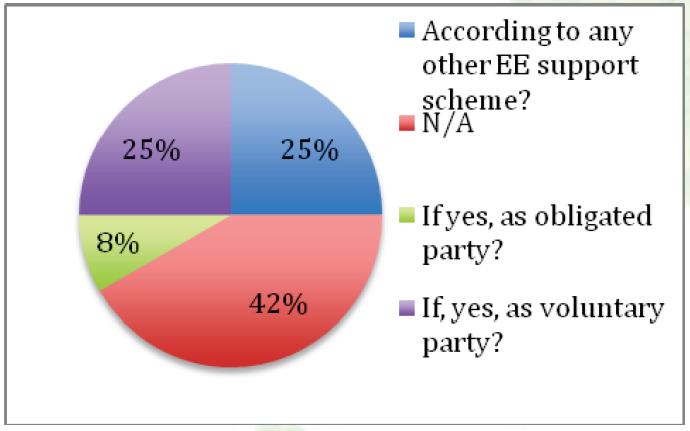
Industry and SMEs perceptions to policies

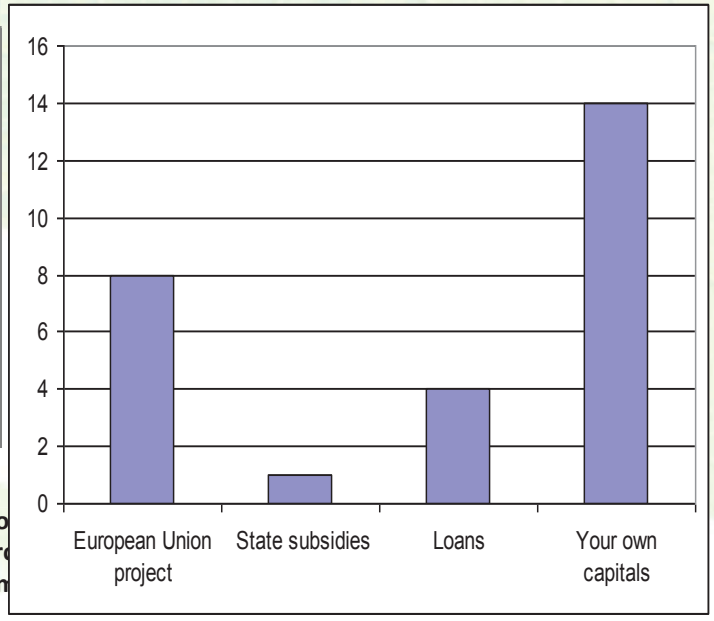
Energy audits have taken place everywhere!











Subsidies are considered as preferred but difficult to get with a high risk of upfront costs and too low payback period in an EE investment!

Procedures, time and costs for receiving a grant are a determining factor!

5-10% energy cost reduction

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Energy saving calculations

Methods:

- Deemed savings (ex-ante defined, standard values based on previous monitoring)
- Metered savings (ex post recording of the actual use of energy reductions)
- Scaled savings (based on engineering estimates)

For EEO schemes, several countries use deemend savings

- For more complex technologies, deemed savings is not appropriate
- Common: combined approach
  - Example of Italian EEO scheme
    - Deemed savings for simple projects
    - Simplified monitoring for more complex projects (scaled savings based on partly metered savings)
    - Metered savings for most complex projects

For financial and other measures, metered savings are uncommon

- For most financial schemes: scaled savings (or even only deemed savings)
- For alternative measures often very simple scaled savings
  - Germany's support programmes: linear energy saving value per amount of investment

Monitoring and verification of savings

- Monitoring of EEO schemes and voluntary agreements in most countries occur annually (in the form of an energy audit or summary report); in Hungary and Poland every 4 years, in France only random checks
- Audits mostly carried out and verified by accredited experts (mostly external)
- Financial measures in most countries either monitored annually (via reporting or auditing) or by random checks or sampling. In Greece every 6 months, in the UK every 2 years, in Sweden every 4 years.
- Diversified range of bottom up methods with values for free-riders for financial schemes
- Clear monitoring procedures from the initialization of a policy and definition of actions of auditors.

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General recommendations on policies (EEOs)

- Efficient cooperation with EEOs and knowledge sharing schemes (From large companies diffusing to smaller ones)
- Adjustment of the level of target and obligation based on industry's energy saving potential and needs
- Link EEOs to compensation mechanisms (such as certificate markets), as larger players have the capacity to run in the market
- Focus EEOs on process related interventions in industry rather than any form of softer measures (the latter are a product of the already high awareness and technology specific knowledge)
- EEOs must: a) start with a modest level of savings, b) increase ambition over time (in 5 years time), c) learn from early phase and enhance the cooperation with incumbent financial policies
- Use stakeholders right from the beginning to develop the lists of eligible technology solutions

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General recommendations on policies (financial and other)

- Financing schemes must target large investments in industry with a high cost effective potential and focus on the main process phases (modernization of energy intensive processes in a plant)
- Financing schemes cover plenty of short term solutions/measures, while EEOs tend to focus on longer timeframe (and steady energy savings)
- Policies must also trigger at bridging the gap between technology providers and financial institutions
- Policies must gradually remove energy subsidies and focus on energy efficiency pricing (in the form of a real pricing up to tax incentives/rebates)
- Energy management (Art. 8 updating system every 4 years) – Experience shows that the obligation should be there (with a threshold of energy bills >2.5ME/annually) and 2 years are required for setting up a system
- Knowledge sharing policies trigger low savings but high efficiency in the short run
- Always use the most positive interactions!

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Recommendations for SMEs

- EEOs with a main focus on subsidizing energy audits for SMEs (very important barrier)
- Knowledge sharing and training based schemes can enable the adoption of standard replicable low cost technologies
- Policies for energy performance benchmarking information to be accessed by SME
- EEOs combined with grants or subsidies should reduce the administrative cost and transaction costs to SMEs (for participating in tenders)
- Policies also to target aggregators of SMEs (especially for standardized measures) as this can pool projects and investments, and trigger also in parallel the financial interest of ESCOs or technology providers

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Specific recommendations for 5 sectors

- There are scarce sectoral policies, but industry wide ones (this trend must continue)
- Fit policies based on the size of the sector (and its companies) – i.e. complex policies hinder SMEs from participating (e.g. food and beverage) – SIMPLIFY!
- EEOs can provide a better level playing field for SMEs rather than very large companies that can enlarge their dominant position
- Transparency in energy saving technologies can hinder large companies from participating – where possible AGGREGATE or increase confidentiality (e.g. with less but larger participants under voluntary agreements)
- Where standard measures too expensive (e.g. iron and steel or chemical sectors), preferable policies are voluntary agreements with financial support
- Focus also on by-products (e.g. coke and petroleum sector that also use refinery gas) can generate extra substantial energy savings
- Energy intensity performance of the plants can be reduced (e.g. pulp and paper) with bioenergy as by-product.

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Sectoral fact sheets

EU MERCI — fostering the growth of energy efficiency in the EU industry

Energy efficiency in European industry

Iron & Steel sector

Statistics EU iron and steel sector

Iron and steel*: 18.6% of EU industry energy consumption

Introduction to the iron and steel sector

The iron and steel industry covers most of NACE sector code C24 (*"Manufacture of basic metals"*). The EU is the world's second-largest steel producer, after China. The key subsector is C24.1 (*"Manufacture of basic iron and steel and of ferro-alloys n.e.c."*). The about 2,400 enterprises in this subsector employ more than 300,000 persons, and are responsible for 73% of the total final energy consumption of the sector.

In contrast to most other industrial sectors, the energy c… the iron and steel sector is expected to keep growing … decades. Energy intensity is expected to improve only ma… steel production is projected to increase.

GP High-speed burner for ladle heating

Pre-heating burners are used to keep the empty ladles warm before filling the ladles with molten metal. This process is carried out in order to avoid thermal shock when molten metal is poured. The high- speed burners allow the use of kinetic energy of high-speed gas to produce heat and thus drastically… consumption while maintaining the same temperature of … new burner guarantees the uniformity of the ladle tem… reducing the pollutant emissions produced.

This practice is an easy and cheap option, with implemen… €40,000 and payback time of 6 months. In the case in Italy … practice was implemented, 195 *toe* per year were saved, … baseline energy consumption of 439 *toe* (44% energy saving…

GP New type of nozzle for water descaling

The replacement of nozzles that deliver water for descaling can lead to energy savings. The change of the nozzles allowed to reduce the load on the pumps and to switch-off a second pump. In an example situation in the finishing process of basic iron and steel manufacturing, there were three pumps for water transportation. In the ex-ante situation one pump was used as backup and the other two were working in the standard conditions. In the ex-post situation it was able to switch off one of the working pumps leaving two of them as a backup and only one working in the standard conditions. This cheap measure (€10,000) immediately led to energy consumption improvement of 45%, which meant that the payback time was a matter of only a few days. more info

Energy efficiency in European industry

Food & Beverage

Introduction to the food & beverage sector

The food and beverage industry covers NACE sector codes C10 (*"Manufacture of food products"*) and C11 (*"Manufacture of beverages"*). F&B is the EU's biggest manufacturing sector in terms of jobs. As the sector is very diverse, there is a high variety of processes in the sector. In terms of overall energy consumption, the key categories in food processing are process heat (29% of energy use) and refrigeration (16%).

GP Mechanical Vapour Recompression for concentration

Concentration is a process used in food industry in order to reduce the amount of water contained in a product. In the analysed case, the ex-ante configuration is a multiple effect evaporator where the solution is concentrated in a series of stages, each of which uses the steam coming from the previous one, in order to reduce steam consumption.

54% energy savings

This process can become more efficient with the introduction of Mechanical Vapour Recompression (MVR), that uses water evaporated from the product and then recompressed to increase the amount of steam. This implies a reduction in steam (produced by burning a fossil fuel) consumption. MVR can be used for example for whey concentration, starch concentration, or milk serum concentration.

The EU-MERCI database contains 12 cases where MVR has been applied in Italy. The measure led on average to energy savings of 54%. Where available, the payback time varied from 0.9 to 9.3 years, indicating that the potential for MVR depends largely on the individual cases. more info

GP Refrigeration systems

The EU-MERCI database contains 93 records of applications related to refrigeration systems. Various of these applications have been identified as 'good practices', including a refrigerant under-cooling system, inverter installation, and heat recovery.

The average energy use improvement is 16%, and payback time is in most cases less than a year. Energy efficiency in refrigeration systems is easily replicable. more info

Recommendations: standard measures

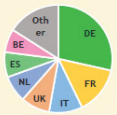
The food and beverage sector is a diverse sector with many different subsectors. However, in many cases the processes are relatively simple, and the sector shows high potential for standard measures such as heat recovery and refrigeration systems, that are easily replicable across subsectors.

Because of this, programmes supporting companies with training and knowledge as well as raising awareness on energy efficiency achieve generally good results in the food and beverage sector, also because the costs of interventions are usually low (per unit of energy saved). However, such programmes may only work for a short period, as saturation of the sector with such measures is reached quickly.

Energy efficiency in European industry

Chemical industry

Statistics EU chemical sector



The seven countries mentioned in the diagram cover 84% of the EU's chemicals production value. More than a quarter of chemicals is produced in Germany

Introduction to the chemical sector

The chemical sector consists of the NACE sector code C20 (*"Manufacture of chemicals and chemical products"*), and often also C21 (*"Manufacture of basic pharmaceutical products and pharmaceutical preparations"*). Some of the subsectors in the chemical industry are highly energy-intensive, mainly the subsectors of petrochemicals and basic inorganic chemicals.

Statistics for chemical and pharmaceutical industry combined:

- 32,400 enterprises
- 1.58 million people employed
- Gross added value € 190 billion
- Final energy consumption: 51,495 ktoe per year (18.9% of EU industry energy consumption)

As one of the few industrial sectors, the energy consumption from the chemical sector is expected to continue to increase. Global demand for chemicals is forecast to grow on average by 4.5% annualy until 2030, and the EU, as a key exporter, is expected to support this need. Energy intensity is however expected to decrease only marginally.

GP Nitrogen generation and recovery

In plants for nitrogen production, as well as other chemical installations in which nitrogen is produced as a by-product, significant energy savings are possible. In situations where nitrogen is needed as a feedstock, traditionally liquid nitrogen is transported to the location. By construction a gaseous nitr… production plant 'on site', transport is avoided and nitr… phase changes do not take place.
In installations where nitrogen is produced as a by-product … dispersed into the atmosphere, nitrogen recovery ca… applied. The recovered nitrogen (in gaseous state … subsequently compared to a pressure of 16 bar and deli… through the distribution network designed in order to reduc… consumption of liquid nitrogen.
In the nitrogen generation and recovery examples as report… the EU-MERCI database, it is shown that these practices can … to substantial energy consumption improvements of more … 50%, and in some cases even up to 80%. more info

GP Replacement of mercury-cell electrolysis

Under the Best Available Techniques conclusions of the … Industrial Emissions Directive, mercury-cell electrolysis in … chlorine-alkali industry had to be phased out by December … The EU-MERCI database contains two examples of … replacement of mercury-cell electrolysis by membrane … electrolysis.

This substitution results not only in the elimination of me… release into the environment, but also in energy savings. O… one hand, for membrane-cell electrolysis more hot stea… needed, resulting in an increase of natural gas consump… However, this is more than compensated by a signif… decrease in electrical energy use. The average aggregate e… consumption improvement as a result of introducing membr… cell electrolysis has been 36%. more info

Energy efficiency in European industry

Pulp & Paper sector

Statistics EU pulp & paper sector

Pulp, paper, printing*: 12.6% of EU industry energy consumption

Statistics for the pulp and paper industry sector (NACE code C17):

- 19,400 enterprises
- 588,000 people employed
- Gross added value € 42 billion
- Final energy consumption: 34.265 ktoe per year (12.6% of EU industry energy consumption)*

Europe accounts for about 24% of world pulp production, with more than 60% of Europe's production taking place in Sweden and Finland alone. 26% of the world paper/board production takes place in Europe, led by Germany (25%), Finland, Sweden (11% each) and Italy (10%).

The upstream activities in the sector are the most energy-intensive, with 73% of energy use in subsector C17.1 (*"Manufacture of pulp, paper and paperboard"*) and most of the rest in subsector C17.2 (*"Manufacture of articles of paper and paperboard"*).

* The energy consumption statistics cover both the pulp and paper industry (C17) and the printing sector (C18). However, the pulp and paper industry accounts for over 90% of energy use.

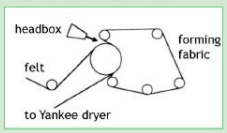
Introduction to the pulp and paper sector

The pulp and paper sector consists of the NACE sector code C17 (*"Manufacture of paper and paper products"*). In many sources, the related printing sector C18 (*"Printing of reproduction of recorded media"*) is included in the same analysis. In the European Union, about 19,400 enterprises are active in the pulp and paper industry. The printing sector consists of many more, but often smaller, businesses: 109,100.

GP Single-header headbox

The headbox is the equipment that carries the pulp into the forming section, and has the function to distribute uniformly and with regular thickness the pulp onto the wire. The proposed intervention involves a modification to the headbox from a dual-header to a single-header one, with also a replacement of the forming fabric, in order to increase the consistency of the pulp and reduce the pulp flowrate, so reducing pressure drops and power consumption. This also allows to remove one of the two fan pump/selector systems, without decreasing paper production.

At the production site in Italy where this intervention has been applied, it has led to 54%. energy savings. The payback time of the measure was less than one year. more info



GP Mechanical pulping teethed defibration plate

This efficiency improvement is applied to the mechanical pulping process (groundwood grinding). The intervention consists of the realisation of a new grinding plate with teethed surface, with improved cutting qualities, thanks to a new geometry that allows the pulp to be distributed on the sides of the grinder. The reduction of electricity consumption is linked to the reduction of the need for re-grinding. The design of the plate is customized to a specific Italian plant, making it a unique case. However, the benefits of this solution can be replicated in other plants. In the Italian case, the intervention led to direct energy savings of 20%, with implementation costs of €326,000, leading to a payback time of only 6 months. more info

Recommendations: low costs, limited savings

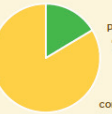
The five Good Practices included on this factsheet are all relatively cheap interventions with low payback times (on average about 6 to 12 months). This shows that in the pulp and paper sector, various 'quick wins' are possible that directly lead to energy savings and financial benefit, especially in the pressing and drying sections of the papermaking process.

These 'quick wins', however, in many cases lead to relatively limited energy savings, of about 10 to 20%. These interventions will therefore need to be complemented by more far-reaching and complex measures in the future, in order to contribute to the European Union's decarbonization targets.

Energy efficiency in European industry

Petroleum & Coke sector

Statistics EU petroleum sector



Coke and petroleum: 16.4% of EU industry energy consumption

- 412 enterprises
- 37,000 people employed
- Gross added value € 3 billion
- Final energy consumption: 44.7 Mtoe per year* (16.4% of total EU industry energy consumption)

The number of enterprises, persons employed, and value added in the coke and petroleum sector are much lower than in other key industrial sectors, such as iron & steel, pulp & paper, the chemical sector, and the food & beverage industry. However, the energy consumed by the sector is similar to that in these other sectors, as the petroleum sector is the most energy intensive industrial sector.

The production capacity of petroleum refineries is spread fairly evenly across the EU Member States. The coking subsector (C19.1) however is heavily concentrated in Poland.

The sector is dominated by large companies. Over 90% of total production value in each analysed country comes from large enterprises. The average turnover per company is higher than in other sectors.

Introduction to the coke and petroleum sector

The coke and petroleum industry often refers to exploration, extraction, refining, transporting, and marketing of coke and petroleum products. This fact sheet focuses specificilly on the refining (manufacturing) activities, i.e. NACE sector code C19 (*"Manufacture of coke and refined petroleum products"*). The key subsector is C19.2 (*"Manufacture of refined petroleum products"*), with the remainder formed by C19.1 (*"Manufacture of coke oven products"*).

GP Intervention in the H_2S absorption plant

…lamine) that comes out … gas cleaning is usually … could be potentially re-… our gases. The re-use of … the other gas cleaning … tity of MDEA that needs … ng the steam consumption of the reboilers of …

0.3 years payback time

…and, when saturated, it is transferred to the … solution is recycled and regenerated to be … ber, while concentrated H_2S leaves the … d H_2S can then be converted into sulphur via … plant in Italy where this practice has been … nsumption improvement has been 17%, while … months. more info

…ntions

…e been identified related to … petroleum sector. … recovery systems on the … lant and the fluid catalytic … bottom of the fractionator … ked Naphtha (HCN) circuit, in … er feed water (BFW) … d Catalytic Cracking (FCC) CO … pressure steam system with … um column heavy distillate to … residue. … ecovery steam generator.

Recommendations: by-products

For its energy needs, the coke and petroleum industry uses high volumes of by-products produced in its own processes, such as refinery gas. These are generally less expensive fuels, and investments in energy savings in such fuels are often not financially beneficial.

A high share of savings reported have been with regard to energy carriers such as electricity and natural gas, rather than with regard to by-products, which also shows that the petroleum industry has more (price) incentives to invest in energy efficiency for these energy carriers.

Policies focused specifically on energy savings with regard to these by-products would be needed in order to encourage more substantial energy savings, and common policies such as energy taxes are ineffective.

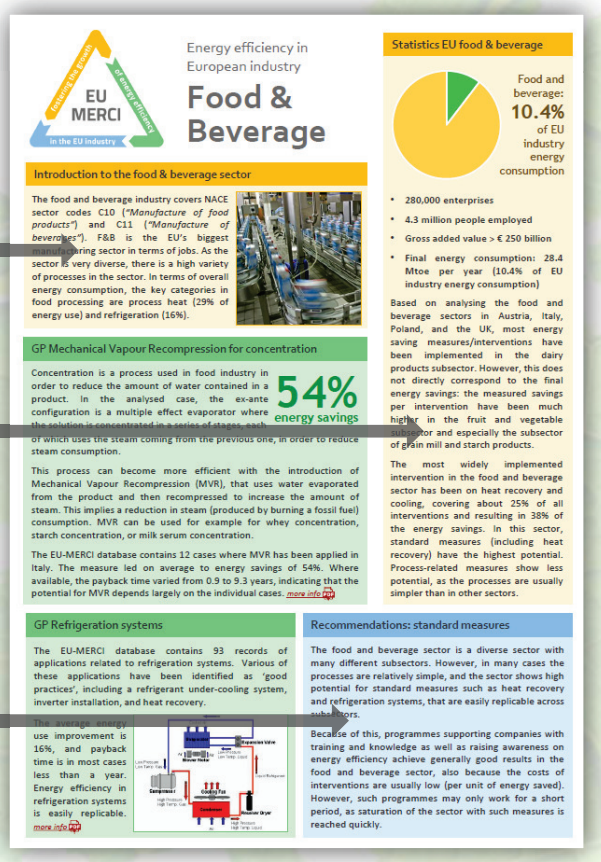
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 693845

Fact sheet example: food & beverage sector

Introduction

Statistics

Recommendations



Energy efficiency in European industry

Food & Beverage

Introduction to the food & beverage sector

The food and beverage industry covers NACE sector codes C10 (*"Manufacture of food products"*) and C11 (*"Manufacture of beverages"*). F&B is the EU's biggest manufacturing sector in terms of jobs. As the sector is very diverse, there is a high variety of processes in the sector. In terms of overall energy consumption, the key categories in food processing are process heat (29% of energy use) and refrigeration (16%).

Statistics EU food & beverage

Food and beverage: **10.4%** of EU industry energy consumption

- 280,000 enterprises
- 4.3 million people employed
- Gross added value > € 250 billion
- Final energy consumption: 28.4 Mtoe per year (10.4% of EU industry energy consumption)

Based on analysing the food and beverage sectors in Austria, Italy, Poland, and the UK, most energy saving measures/interventions have been implemented in the dairy products subsector. However, this does not directly correspond to the final energy savings: the measured savings per intervention have been much higher in the fruit and vegetable subsector and especially the subsector of grain mill and starch products.

The most widely implemented intervention in the food and beverage sector has been on heat recovery and cooling, covering about 25% of all interventions and resulting in 38% of the energy savings. In this sector, standard measures (including heat recovery) have the highest potential. Process-related measures show less potential, as the processes are usually simpler than in other sectors.

GP Mechanical Vapour Recompression for concentration

54% energy savings

Concentration is a process used in food industry in order to reduce the amount of water contained in a product. In the analysed case, the ex-ante configuration is a multiple effect evaporator where the solution is concentrated in a series of stages, each of which uses the steam coming from the previous one, in order to reduce steam consumption.

This process can become more efficient with the introduction of Mechanical Vapour Recompression (MVR), that uses water evaporated from the product and then recompressed to increase the amount of steam. This implies a reduction in steam (produced by burning a fossil fuel) consumption. MVR can be used for example for whey concentration, starch concentration, or milk serum concentration.

The EU-MERCI database contains 12 cases where MVR has been applied in Italy. The measure led on average to energy savings of 54%. Where available, the payback time varied from 0.9 to 9.3 years, indicating that the potential for MVR depends largely on the individual cases. more info

GP Refrigeration systems

The EU-MERCI database contains 93 records of applications related to refrigeration systems. Various of these applications have been identified as 'good practices', including a refrigerant under-cooling system, inverter installation, and heat recovery.

The average energy use improvement is 16%, and payback time is in most cases less than a year. Energy efficiency in refrigeration systems is easily replicable. more info

Recommendations: standard measures

The food and beverage sector is a diverse sector with many different subsectors. However, in many cases the processes are relatively simple, and the sector shows high potential for standard measures such as heat recovery and refrigeration systems, that are easily replicable across subsectors.

Because of this, programmes supporting companies with training and knowledge as well as raising awareness on energy efficiency achieve generally good results in the food and beverage sector, also because the costs of interventions are usually low (per unit of energy saved). However, such programmes may only work for a short period, as saturation of the sector with such measures is reached quickly.

Good Practices

Policies

GP Use of biomass boilers

A biomass boiler is either a steam or hot water boiler that uses biomass (i.e. wood, animal waste, cooking oil etc.) as fuel. Although biomass boilers are not necessarily more energy efficient than traditional boilers, they are considered low carbon technologies, as the amount of emissions will not exceed the amount absorbed by the biomass over its lifetime.

This measure can be implemented across different applications in the Food & Beverage sector (as well as other sectors) to produce heat for direct use or conversion to electricity. It is also possible to pair the biomass boiler with heat recovery, to recover the flue gas of the boiler and re-use it in the production cycle. more info

GP Use of waste for process heat generation

3.0 years payback time

Many of the by-products used in F&B can be used as fuel for heat generation. The use of waste as a fuel may require additional adjustment of the combustion process. Some wastes can be used with other fuels or can be a substrate for fuel production such as biogas. The waste can be used directly in the combustion process in recuperative boilers fuelled with animal fat and LPG. The new rendering system can be installed together with the intervention. The new rendering system can be installed to increase the thermal energy of the plant.

This practice does not lead to energy savings (only a change of fuels), but can lead to significant emission reductions. Investment in this practice has an average payback time of 3 years. more info

GP Optimisation of vinasse concentration process

Vinasse is a by-product of the yeast production process that can be further processed, through concentration, in order to obtain commercial products for use in zootechnics. The optimisation of the vinasse concentration process was made in 3 actions:

1. before the existing concentrator, a mechanical vapour recompression pre-concentrator has been installed to recover and re-use process vapour after retraining it to a useful pressure;
2. in the pre-concentrator, a pre-heater has been installed in order to increase the vinasse temperature to a value more suitable for the system;
3. at the final stage of the concentration, the re-concentrators (2 single effect evaporators) have been replaced with a triple-effect evaporator that increases efficiency.

The EU-MERCI database contains three cases of this optimisation scenario for the vinasse concentration process. The energy consumption improvement amounted to 36% compared to the reference baseline, based on an investment of about €2,600 per *toe* of energy savings. The observed payback time was 6.7 years. more info

Recommendations: focus on SMEs

More than 95% of companies in the food and beverage sector are SME's (small and medium-sized enterprises). In most countries, large companies still make up the share of the production value. However, for example in Italy 70% of the production value is by SMEs. Policy-makers therefore have to take into account that complexity of policies and support schemes may act as a barrier for energy savings, as this often hinders small companies from participating. It is recommended that procedures for SMEs are simplified, or that additional support is provided for smaller companies with high energy efficiency.

An example of such a programme that is suitable for SMEs is the Carbon Trust Energy Efficiency Advice programme in the United Kingdom. The 'Better business guide to energy saving' shows how to identify measures where energy and cost savings can be easily made with little or no cost. For many SMEs, such low-threshold programmes may be much more useful and therefore more effective than complex EEO schemes or legislative and regulatory measures.

Policies

In many EU Member States, the food and beverage industry is covered by an energy efficiency obligation (EEO) scheme. EEO schemes could provide stable savings over a longer time, and usually also target more expensive process-related innovations with higher energy savings. However, for SMEs these often complex schemes should be complemented with information and financing schemes. Other policy types focused on the F&B sector include voluntary agreements (such as the sectoral agreement in Wallonia), financial support, fiscal incentives, or requiring energy audits.

The sector shows a strong potential for using renewable energy, including biofuels based on food waste. In order to achieve a reduction of fossil energy use and reduction of CO2 emissions, schemes could promote renewable energy in addition to energy efficiency measures.

The EU-MERCI project

EU-MERCI is an EU-funded project aimed at supporting the growth of energy efficiency in industry processes. The project shares good practices of energy efficiency measures, helps industry actors to overcome expected barriers and maximise benefits, and supports policy makers. → eumerci.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 693845.

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EU-MERCI

EU coordinated **ME**thods and procedures based on **R**eal **C**ases for the effective implementation of policies and measures supporting energy efficiency in the **I**ndustry

Fostering the growth of energy efficiency in the EU industry

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