

EU MERCI

EU coordinated **ME**thods and procedures based on **Re**al **C**ases for the effective implementation of policies and measures supporting energy efficiency in the Industry

Fostering the growth of energy efficiency in the EU industry



“European Industrial Energy Efficiency good Practices (EIEEP) platform”

Anna Realini – RSE & Livio De Chicchis– FIRE

EU-MERCI Final Conference

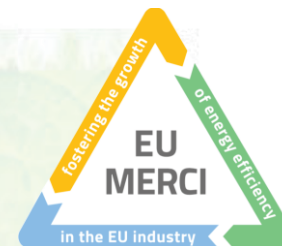
London, January 23rd, 2018



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

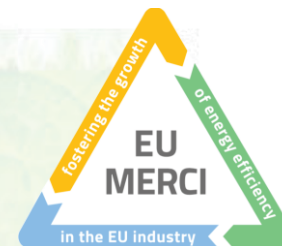


Contents



- Portal Structure
- Analysed sectors
- Data Collection
- Database
 - Download
 - Visualization
 - Queries
- Library
 - Introduction
 - Best Practices and Good Practices
 - Good Practices selection process
 - Technical Analyses and Country Analyses
 - Factsheets
- Surveys

Portal Structure

[HOME](#)[DATABASE](#)[LIBRARY](#)[SURVEYS](#)

Welcome to the European Industrial Energy Efficiency good Practices platform

The platform dedicated to energy efficiency "Good Practices" in the main industrial sectors

EU-MERCI project, aimed at fostering and facilitating the implementation of energy efficiency projects in the manufacturing industry sectors by selecting and disseminating technological and policy best practices.

EU-MERCI developed a web database of the implementation of energy efficiency projects in industry.

EU-MERCI created also a document library, containing the schematics of the processes and the reports describing the EU-MERCI selected "Good Practices" and the "Best practices" from literature for each specific sector and process.



Database



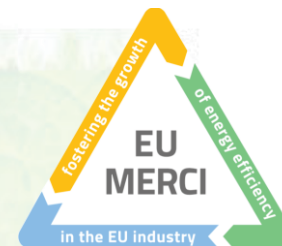
Library



Surveys

Link: <http://www.eumerci-portal.eu/>

Portal Structure



EU-MERCI DATABASE

With raw information on the Energy Efficiency measures analysed in EU-MERCI.

EU-MERCI LIBRARY

With the «Best Practices» from literature and the «Good Practices» identified in EU-MERCI project.

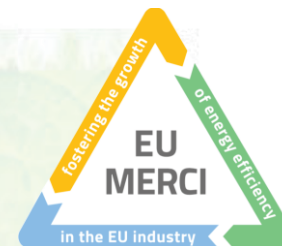


EU-MERCI SURVEYS

With the results of the Surveys conducted with different stakeholders (Companies, ESCOs, sector associations) for the characterization of Energy Efficiency in Industry.



The analysed sectors



Sectors have been chosen by ranking them through the following parameters:

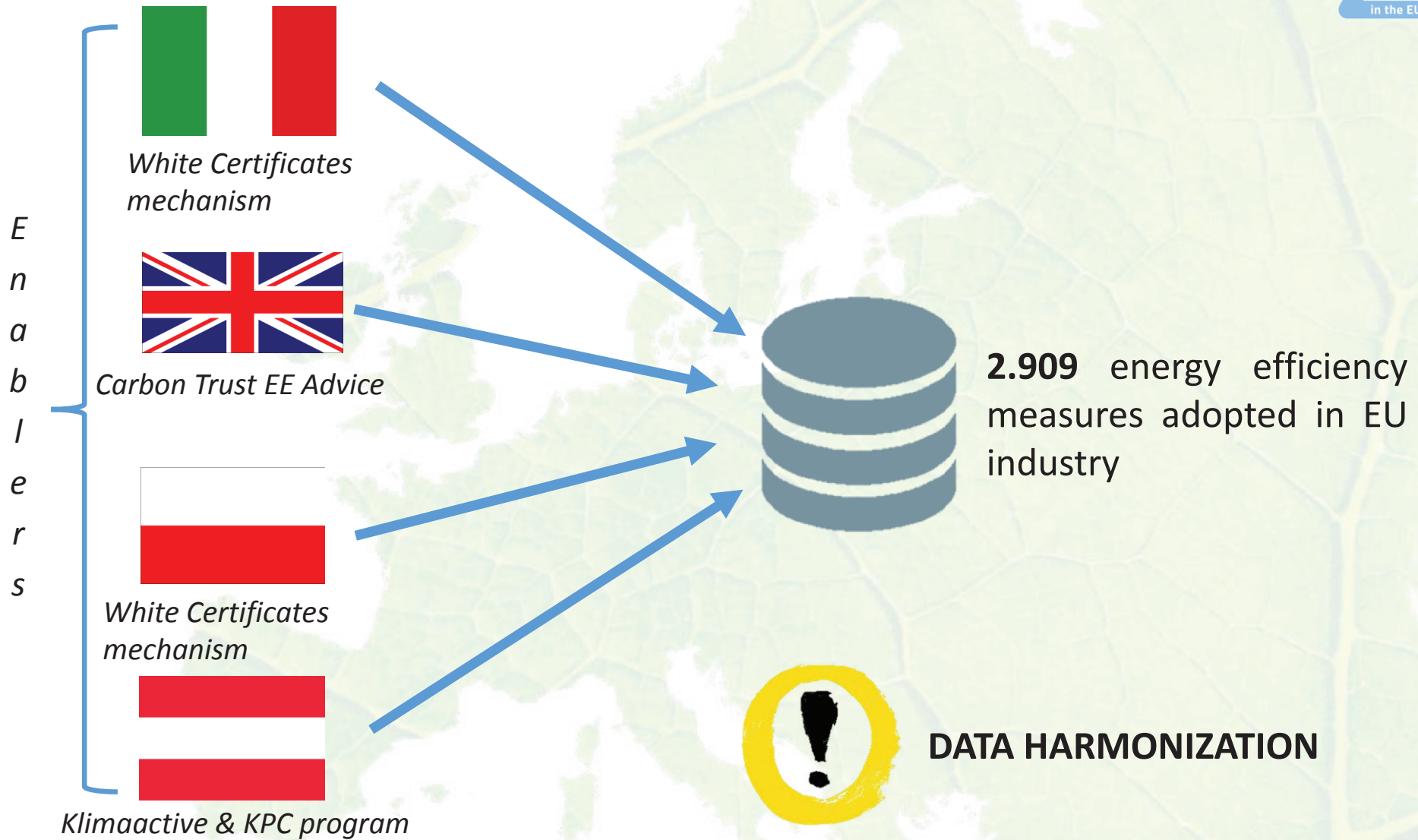
1. Final Energy Consumption;
2. Energy cost per added value unit;
3. Number of employed persons;
4. Gross Added Value;
5. Economic energy efficiency potential (PBT <5 years);
6. Technical energy efficiency potential.



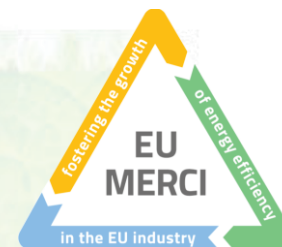
- ☐ Food and Beverage – NACE C10-C11
- ☐ Pulp and Paper manufacturing– NACE C17
- ☐ Coke and Petroleum – NACE C19
- ☐ Chemical products production– NACE C20
- ☐ Non-metallic minerals production and manufacturing – NACE C23
- ☐ Metallurgy – NACE C24
- ☐ Machinery – NACE C25-28



Data collection



Database: fields available for download



TOTAL RECORDS: 2909, SHOWING PAGE 1 OF 582										
Size	Year	Ref. Scheme	GP	Country	L3A	L3B	L3C	L3D	NACE	Id
Large	2013	White Certificates	Yes	Italy	UN L2, L3, L1=Service Technology	Evaporators	UN L2, L3, L1=Service Technology	Process instrumentation and control systems	10.91	1000000
Medium	2012	White Certificates	N/A	Italy	UN L2, L3, L1=Service Technology	Air compressors	-	-	10.73	1000001
Medium	2011	White Certificates	Yes	Italy	Drying (liquid / solid)	Heat recovery by heat exchanger	-	-	10.62	1000002
Small	2012	White Certificates	N/A	Italy	UN L2, L3, L1=Service Technology	Heat recovery by heat exchanger	-	-	10.39	1000003
Large	2011	White Certificates	N/A	Italy	UN L2, L3, L1=Service Technology	Heat recovery by heat exchanger	Packaging	Heat recovery by heat exchanger	10.3*	1000004

Some fields of the database are available for download either in .xls or .pdf format:

- Company size (based on the number of employees)
- Year in which the EE measure has been implemented
- Reference incentives scheme
- Good Practice (YES/NO)
- Country
- Generic and Specific Level 3 taxonomy (for single and combined measures)
- Reference sector
- NACE Code

“Sorting” of the information by field

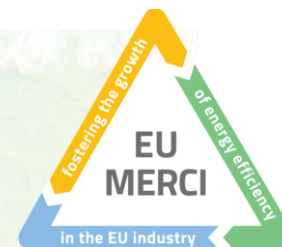


Download of the information in .xls and .pdf format:



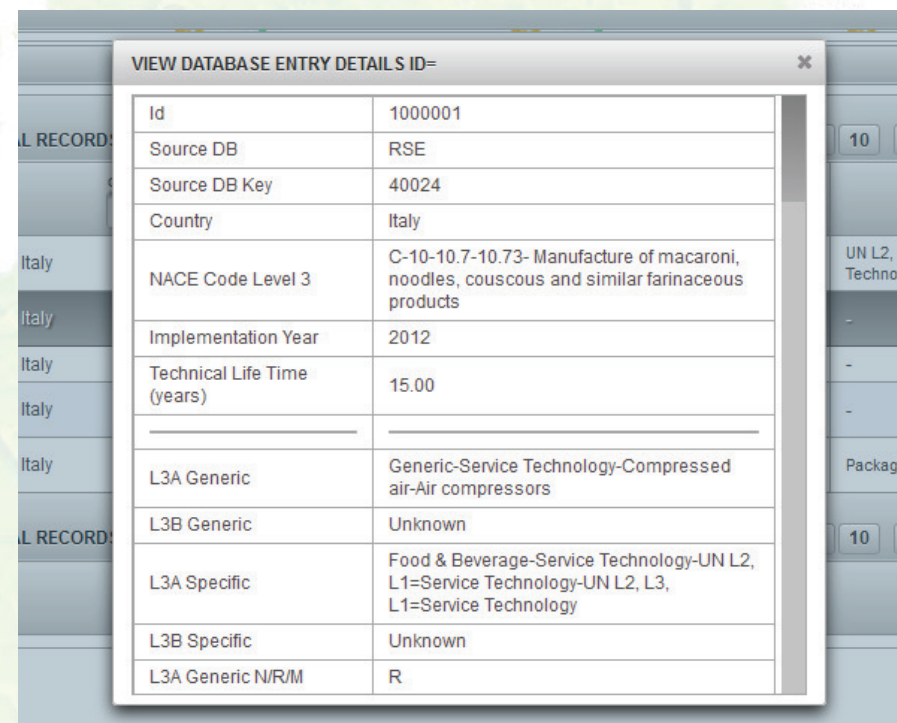
- Shown records (5 per page);
- All records (2909)

Database: fields available for visualization



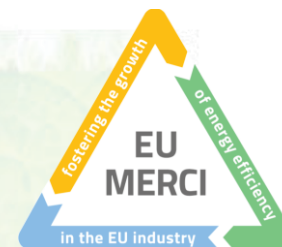
For single records, it is possible to read a larger data-set, that contains the info available for download, and some more specific ones, like:

- Technical life of the installed equipment;
- Detailed description of the project, both in local language and in English;
- “saved” energy carrier(s);
- Baseline consumption and savings (for each energy carrier);
- Performances, calculated through the use of KPIs.



VIEW DATABASE ENTRY DETAILS ID=	
Id	1000001
Source DB	RSE
Source DB Key	40024
Country	Italy
NACE Code Level 3	C-10-10.7-10.73- Manufacture of macaroni, noodles, couscous and similar farinaceous products
Implementation Year	2012
Technical Life Time (years)	15.00
<hr/>	
L3A Generic	Generic-Service Technology-Compressed air-Air compressors
L3B Generic	Unknown
L3A Specific	Food & Beverage-Service Technology-UN L2, L1=Service Technology-UN L2, L3, L1=Service Technology
L3B Specific	Unknown
L3A Generic N/R/M	R

Database: queries



Through the **queries** it is possible to **read and download** the part of the database that follows the following criteria:

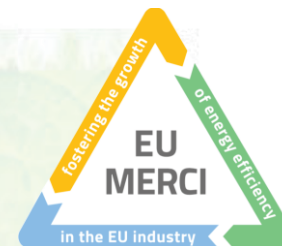
- Company Size;
- Implementation Year;
- Reference scheme;
- Country;
- Level 3 Generic Taxonomy;
- Level 3 Specific Taxonomy;
- Good Practice (YES/NO);
- Reference sector (NACE).



**Download of
data in .pdf**

Home Explore Tables Explore database entries About			
CompanySizeN:	<input type="text" value="All"/>	ImplementationYear:	<input type="text"/>
ReferenceSchemeN:	<input type="text" value="All"/>	Country:	<input type="text"/>
L3 Generic	<input type="text" value="All"/>	L3 Specific	<input type="text" value="All"/>
GoodPracticeN:	<input type="text" value="All"/>	NACECodeLevel3:	<input type="text" value="All"/>

Library: introduction



EU-MERCI LIBRARY

Country analysis

Detailed analysis of industry in different EU Countries.

Technical analysis

Technical analysis of the processes in the selected sectors

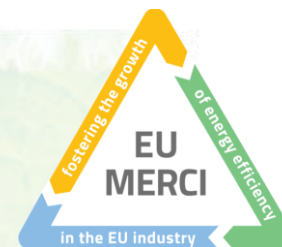
Process schematics with BP and GP

Process schematics of the selected sectors with links to “Best Practices” and “Good Practices”

Factsheets

Infographic information of top GPs, findings in the selected sector, statistics recommendations and policies.

Best Practices and Good Practices



“**Best Practices**” included in the portal have been selected through a literature analysis, using different sources.

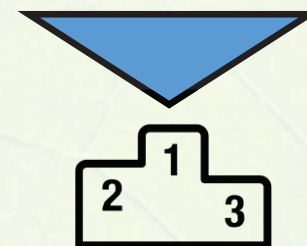


The selected “**Good Practices**” satisfy the following criteria:

- ✓ Energy Efficiency;
- ✓ Technical Feasibility;
- ✓ Economic sustainability.



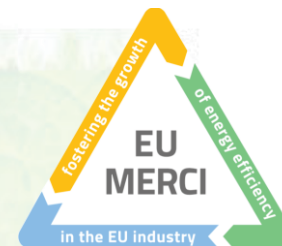
1. Database Statistical analysis;
2. Technical experience;
3. KPI use (technical, economic, advanced)



Sector	IETD	Energy star	BREF	Other*
Food and beverage			x	x
Coke and Petrochemical		x		
Glass	x	x	x	
Cement	x	x	x	
Ceramic			x	x
Aluminium			x	
Copper			x	
Iron and steel	x	x	x	
Chemical	Ammonia		organic, inorganic	x
Pulp and Paper	x	x	x	
Machinery				

**Scientific paper, data from trade associations*

Good Practices Selection process



2909 DATABASE RECORDS

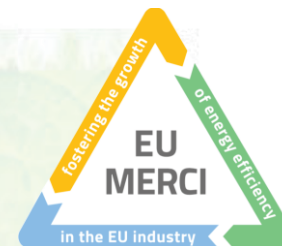
Statistical Analysis

KPI Ranking

Engineering Expertise

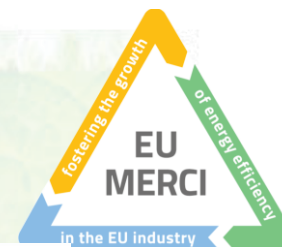
157 “GOOD PRACTICES”

Best Practices and Good Practices



Sector	N° Best Practices	N° Good Practices	Good Practices = Best Practices
Food and Beverage	86	27	3
Coke and Petrochemical	33	11	2
Glass	59	12	8
Cement	56	16	4
Ceramic	34	8	1
Aluminium	19	7	0
Copper	24	3	0
Iron and Steel	125	21	4
Chemical	51	11	0
Pulp and Paper	102	31	14
Machinery	24	10	0
Total	613	157	36

Let's surf the website!



<http://www.eumerci-portal.eu/web/guest/library/tutorial>

LIBRARY

SURVEYS

Select a sector

Sector technical analysis

Country analysis

Factsheets

TUTORIAL SECTORS

Aluminium

Ammonia and Chemistry

Cement

Ceramic

Coke & Petroleum

Copper

Food & Beverage

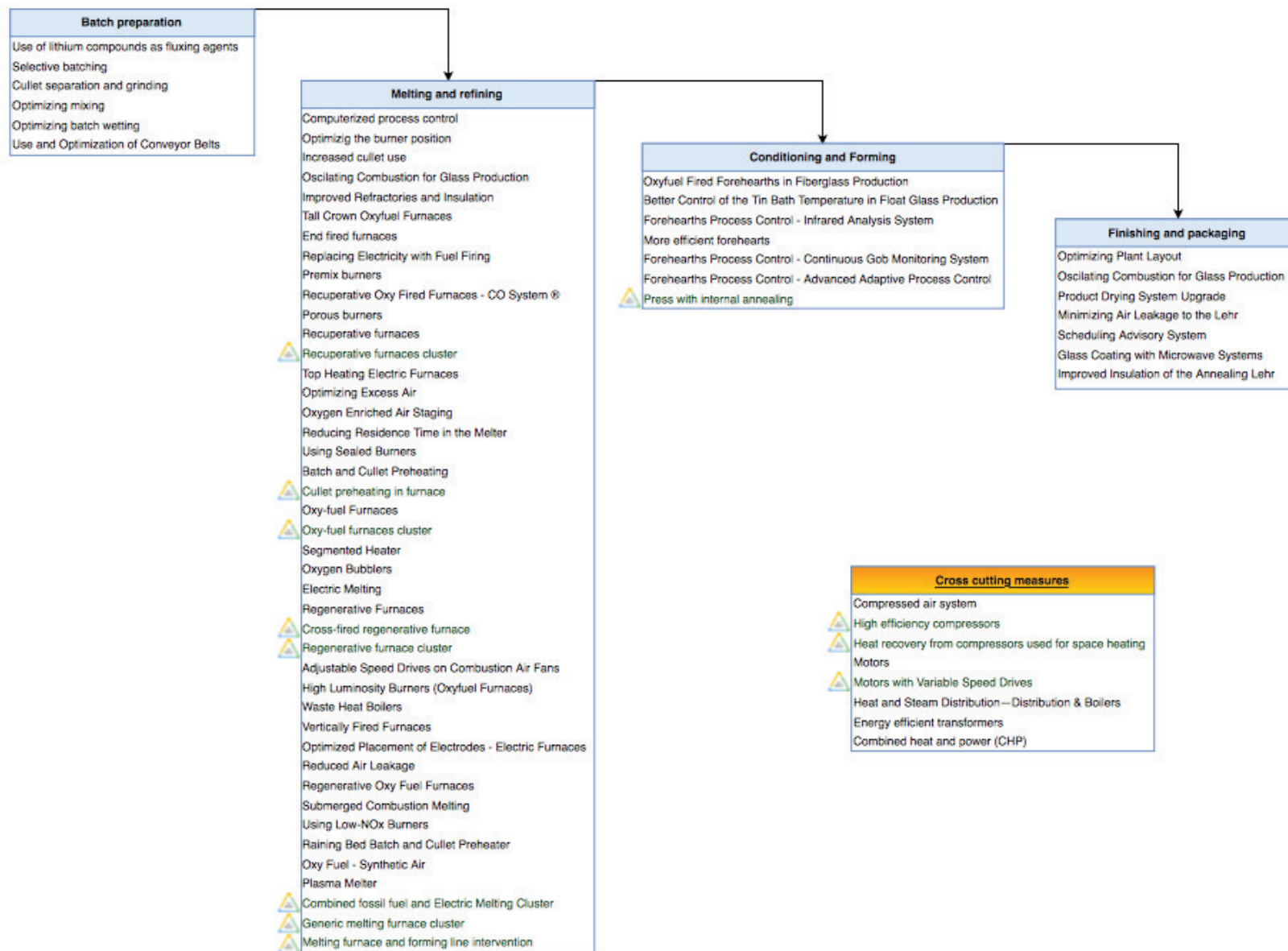
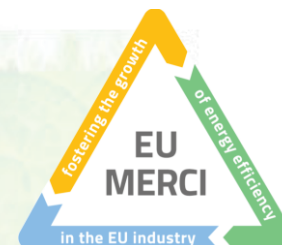
Glass

Iron & Steel

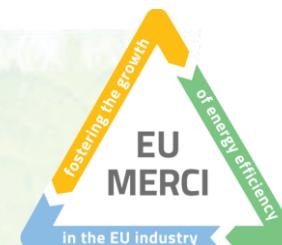
Machinery

Pulp & Paper

Example of schematics



Example of a Good Practice file



GOOD PRACTICES OF IMPLEMENTATION OF ENERGY EFFICIENCY MEASURES IN INDUSTRY

SHEET Nr. 116

Title: <i>Efficient potato sorting system</i>
Sector: <i>Food and Beverage (10, 11)</i>
Process: <i>reception and material preparation</i>
Sub-Process (Phase): <i>sorting/selection, classification, cleaning and treatment</i>
System Technology: <i>optical sorting system</i>
EE Measure description <p>Damages and dark spots on the potatoes are detected by an optical sorting system and removed by compressed air from the process. In this process, small-damaged potatoes are completely sorted out and not returned to the process. In the course of the measure, a new sorting system is installed, which also identifies the damaged potatoes by an optical sensor, but cuts out the defective areas and leaves the remaining part of the potato in the process. The conversion not only saves raw material, which leads to an increased product yield, but also energy savings. Reduced use of raw materials requires less heat for steam peeling (saturated steam), reducing natural gas consumption and compressed air requirements.</p>
Sketch – Pictures <p>(see below)</p>
Details on technology <p>One of the major components of a food processing plant is separating good food products from bad ones. Machine vision systems have automated this crucial process step. These machines, called sorters, typically accelerate product to a high speed and inspect the product via high speed cameras. The imaged data is analyzed real time, determining what's a product and what isn't and then whether a product passes various criterion. If a chunk of product does not, it is removed from the product stream, typically by blasting it out of the product stream using high pressure air.</p> <p>The system to remove the defect fries consist of two components: Tegas and ADRs. Tegas sort the fries (good or bad) and ADRs actually attempt to remove the defect from the fry.</p> <p>The Automated Defect Remover (ADR) is a machine specialized for the fry sorting industry in particular. Rather than just throw away a fry because it had a little deficit on it, the defective portion of the fry is cut out ("nubbins") and are mechanically removed from the product stream.</p>



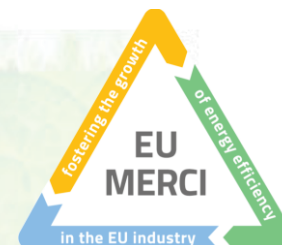
Energy saving	
66.1 toe	
Reference baseline	
N/A	
Monitoring and measurements	
Saving calculations are derived of the national audit reports and rely on the saving calculation of the energy auditor.	
Other Key Performance Indicators	
Performance indicator	N/A
Energy Consumption Improvement (%)	N/A
Energy Intensity - Consumption reduction per unit product (toe/k€)	0.43
Pay-back time (years)	19.8
Cumulative Cash Flow (€)	-326,174
Share of Project Cost Subsidized	8%
Cost of Carbon Savings (€/tonCO ₂)	3,931
Cost of Energy Savings (€/toe)	9,980
Renewable Energy Use (REU) (%)	0%
Costs of implementation	
660,000 €	
Payback time	
19.8 y	
Reference scheme (e.g. White Certificates)	
National Support Scheme	
Subsidies	
Subsidies were received, approximately 55 976 Euro	



Measure identified through external audit (Art.8 EED)
Not probable
Recurrence in the merged data set
Unique measure
Recurrence in different countries
Unique measure
Exportability in other sectors
This process can be adapted and exported to other sectors, that use such kind of sorting systems



Example of a Best Practice file



Cross-cutting technology



BEST PRACTICES OF IMPLEMENTATION OF ENERGY EFFICIENCY MEASURES IN INDUSTRY

Food&Beverage (NACE 10-11) - "BEST PRACTICE" n° 77

Title: <i>Fiber dewatering</i>
Sector <i>Food and beverage (10-11)</i>
Process <i>Starch manufacturing</i>
Sub-Process (Phase) <i>Size reduction processes, mixing and mold</i>
System Technology <i>Cutting, slicing, chopping, pulping, grinding and pressing</i>
EE Measure description Single screw presses are currently used almost exclusively to mechanically dewater fiber, though twin screw presses are available. Fiber enters each of the presses with an 80 to 90% moisture content and leaves the screw process with about 60%. Each has a recommended maintenance period of once per year. Capacity for single screw presses is 20,000 to 75,000 bu/day using 40 to 125 HP. Twin screw press capacity is less on both accounts, just 13,333 to 40,000 bu/day, using 50- 150 HP. Twin roll presses and solid bowl centrifuges have also been used.
Sketch – Pictures
Details on technology and process
Estimated savings, additional benefits, replicability and recommendations The British Sugar Beet Factory at Wissington (UK) operates six presses and three rotary dryers to dry its pulp. Water is expelled from wet beet pulp by a mechanical screw press at 8.69 kg/s, consuming energy at a rate of 23 kJ/kg of water (10 Btu/lbs). Then the dryers remove 6.88 kg/s, consuming energy at a rate of 2,907 kJ/kg of water (1,250 Btu/lbs). Using mechanical dewatering saved 55.8% in primary energy use. Applicable only to ethanol-producing plants.
Reference list <ul style="list-style-type: none"> Energy Efficiency Improvement and Cost Saving Opportunities for the Corn Wet Milling Industry - An ENERGY STAR Guide for Energy and Plant Managers



BEST PRACTICES OF IMPLEMENTATION OF ENERGY EFFICIENCY MEASURES IN INDUSTRY

Cross-cutting technologies

The cross-cutting technologies are special technologies or measures that can be adopted by several sectors. Many industrial sectors, for example, have fans or pumps where you can install an inverter, the illumination is a service that basically exists everywhere and allow these sectors to install LED.

A non-exhaustive list of these measures is: CHP, standard and condensing economiser, multiple effect evaporator, advanced process control, gas turbine retrofit, compressed air system, energy efficient transformers and many others.

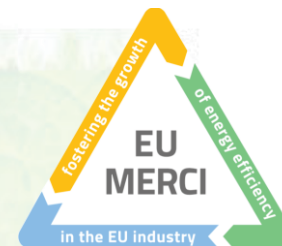
Sector *Mostly all the industrial sectors*

Reference list

You can find a lot of information about these "cross cutting technologies" looking for them on internet. Anyway, the following sources represent a very large background to start.

- Industrial efficiency technology database (IETD) - www.ietd.iipnetwork.org
- Energy efficiency improvement and cost saving opportunities – An Energy Star guide for Energy and Plant Managers - <https://www.energystar.gov/buildings/facility-owners-and-managers/industrial-plants/improve/energy-guides>
- Best Available Techniques (BAT) Reference Document - www.eippcb.jrc.ec.europa.eu/reference/
- ICF international 2015: study on energy efficiency and energy savings potential in industry and on possible policy mechanisms – https://ec.europa.eu/energy/sites/ener/files/documents/151201%20DG%20ENER%20Industrial%20EE%20study%20-%20final%20report_clean_stc.pdf

Technical Analyses and Country Analyses



Technical Analyses: technical analysis of the main processes in the selected sectors, with information on energy consumption of the different phases.

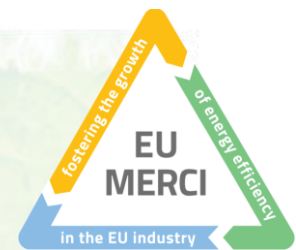
Country Analyses: collection of statistical data about Industry in different EU Countries, with the main economic results of the selected sectors.



All documents are downloadable in .pdf format.



Factsheets



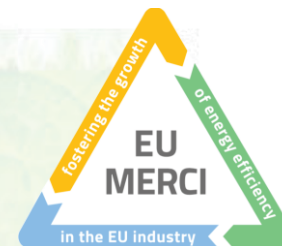
Summary of the findings in the selected sector, with statistics about it, presentation of the top Good Practices, recommendations and policies.



All documents are downloadable in .pdf format.



Surveys



Graphic representations of the results of the **survey** about Energy Efficiency measures in industry, from 3 different types of stakeholders:

- Companies;
- ESCOs;
- Sector associations.



The detailed analysis is available on the main website of the project <http://www.eumerci.eu/> (section «Deliverables»)



EU MERCI

EU coordinated **M**ethods and procedures based on **R**eal **C**ases for the effective implementation of policies and measures supporting energy efficiency in the Industry

Fostering the growth of energy efficiency in the EU industry



Thank you!



info@eumerci.eu



anna.realini@rse-web.it



dechicchis@fire-italia.org



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

