

Foundrybench D12

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Foundrybench

Foundry Energy Efficiency Benchmarking

Intelligent Energy – Europe (IEE)
SAVE – Industrial Excellence in Energy

D12 Benchmarking questionnaire

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1. BENCHMARKING QUESTIONNAIRE “ENERGY CONSUMPTION IN CASTING INDUSTRY”

The title of the benchmarking questionnaire is “Energy consumption in casting industry”.

The questionnaire was developed in English. To facilitate the answering it was translated into the following seven languages: French, Spanish, Polish, German, Finnish, Swedish and Italian. Only the English version of the questionnaire is included in this report.

The first part of the survey focuses on the energy use of foundries on a general level. The results from this part of the survey will be used to put forward statistics in the Foundrybench project and will be used to calculate energy related key indicators.

The second part of the survey aims at evaluating the energy use of the foundries at a more detailed level. It also investigates how foundries work with energy issues (policies, if energy audit has been made, etc.).

The third and final part of the survey is about how foundries look at barriers and driving forces with regard to energy efficiency.

2. SECTIONS

The questions are divided into eight sections.

2.1. SECTION 1 “COMPANY CODE”

In order to keep the foundries’ confidentiality but still have a possibility to contact them to get completing answers or to give them feedback on their answers, each foundry is given a unique “Company code”.

The company codes are managed by each country, i.e. the cross-list that is needed to identify the foundries is only known by the Foundrybench contact person/s in the respective countries.

2.2. SECTION 2 “OUTPUT MATERIALS”

To be able to relate the energy consumption of the foundries to their production quantity, the foundries are asked to state their amounts of output materials.

2.3. SECTION 3 “NUMBER OF FURNACES”

In section 3 of the questionnaire the numbers of different oven types are asked for.

2.4. SECTION 4 “PRODUCTION AND ENERGY”

To be able to calculate relevant key indicators and EEI “Energy Efficiency Index” the foundries are asked to give information regarding their annual turnover, number of employees, heated/cooled space area etc. The number of different types of productions lines is also asked for.

In this section the foundries should also state their total consumption of different types of energy (electricity, oil, coke, biofuels etc.).

2.5. SECTION 5 “ENERGY SERVICES”

This part of the questionnaire collects information regarding whether the foundries have a long term energy strategy or not, if they have performed an energy audit etc.

2.6. SECTION 6 “QUANTIFIED USE OF ENERGY”

In section 6 “Quantified use of energy” the foundries are asked to state how much energy they use for each type of process as well as the estimated amount of ventilation.

2.7. SECTIONS 7 AND 8 “DRIVING FORCES FOR AND BARRIERS AGAINST ENERGY EFFICIENCY”

The foundries are asked to value how a number of factors impact the implementation of cost-effective energy efficiency measures at their company.

3. DISTRIBUTION AND EXPECTED ANSWERS

The benchmarking questionnaire will be distributed to a minimum of 800 foundries. The approximate minimum targets for completed, returned questionnaires are as follows:

Country	No. of answers
Finland	15
Germany	25
Sweden	25
Poland	10
France	20
UK	10
Spain	10
Italy	10
Other EU- countries	10
Total	135

4. QUESTIONS

The questions of the questionnaire follows.

Energy consumption in casting industry

1. Company code

The company code is only known by your national association on and will not be used in presentations of the survey results. The company code will help you if you want to get into contact with us in order to get individual feedback or if you have questions regarding this survey.

1. Please fill in your company code

Energy consumption in casting industry

2. Output materials

If you need some help or information, please contact:

...

1. * Cast iron - Good casting

Type of alloy?

Grey iron [ton/year]

Ductile iron [ton/year]

CGI [ton/year]

Other [ton/year]

2. * Cast iron - Melted metal

Type of alloy?

Grey iron [ton/year]

Ductile iron [ton/year]

CGI [ton/year]

Other [ton/year]

3. * Cast steel - Good casting

Type of alloy?

Low alloyed steel
[ton/year]

High alloyed steel
(stainless steel) [ton/year]

Other [ton/year]

4. * Cast steel - Melted metal

Type of alloy?

Low alloyed steel
[ton/year]

High alloyed steel
(stainless steel) [ton/year]

Other [ton/year]

5. * Copper - Good casting

Type of alloy?

Brass [ton/year]

Bronze [ton/year]

Other [ton/year]

6. * Copper - Melted metal

Type of alloy?

Brass [ton/year]

Bronze [ton/year]

Other [ton/year]

Energy consumption in casting industry

7. * Aluminum - Good casting

Type of alloy?

AlSi [ton/year]

AlMg [ton/year]

AlCu [ton/year]

Other [ton/year]

8. * Aluminum - Melted metal

Type of alloy?

AlSi [ton/year]

AlMg [ton/year]

AlCu [ton/year]

Other [ton/year]

9. * Magnesium - Good casting

Type of alloy?

MgAl [ton/year]

Other [ton/year]

10. * Magnesium - Melted metal

Type of alloy?

MgAl [ton/year]

Other [ton/year]

11. * Zink - Good casting

Type of alloy?

ZnAl [ton/year]

Other [ton/year]

12. * Zink - Melted metal

Type of alloy?

ZnAl [ton/year]

Other [ton/year]

13. * Titanium - Good casting

Type of alloy?

Other [ton/year]

14. * Titanium - Melted metal

Type of alloy?

Other [ton/year]

Energy consumption in casting industry

3. Number of furnaces

1. * Number of...

Cupola furnaces	<input type="text"/>
Rotatory drum furnaces	<input type="text"/>
- Oil	<input type="text"/>
- LNG (Liquefied Natural Gas)	<input type="text"/>
- LPG (Liquefied Petroleum Gas)	<input type="text"/>
Shaft furnaces	<input type="text"/>
- Oil	<input type="text"/>
- LNG	<input type="text"/>
- LPG	<input type="text"/>
Crucible furnaces	<input type="text"/>
- Electrical	<input type="text"/>
- Oil	<input type="text"/>
- LNG	<input type="text"/>
- LPG	<input type="text"/>
Electric arc furnaces	<input type="text"/>
Induction furnaces	<input type="text"/>
- in combination with oxyfuel	<input type="text"/>

Energy consumption in casting industry

4. Production and Energy

1. * Annual turnover

EUR

2. * Number of employees at the foundry...

In total

- Workers

- Office

3. * Annual yield...

(Ton good castings/Ton of melted metal)

%

4. * Annual production hours (in the main production lines)...

hours/year

5. * Annual average temperature (at the location of the foundry)...

°C

6. * Annual average indoor temperature (in the foundry)...

°C

7. * Heated space area...

m²

8. * Cooled space area...

m²

9. * Heated space volume...

m³

10. * Cooled space volume...

m³

11. * Ventilated air from processes...

m³/year

Energy consumption in casting industry

12. * Number of...

Mechanical moulding lines	<input type="text"/>
- Share of production [%]	<input type="text"/>
Hand moulding lines	<input type="text"/>
- Share of production [%]	<input type="text"/>
High pressure die casting	<input type="text"/>
- Share of production [%]	<input type="text"/>
Low pressure die casting	<input type="text"/>
- Share of production [%]	<input type="text"/>
Investment casting	<input type="text"/>
Gravity casting	<input type="text"/>
Centrifugal casting	<input type="text"/>
Core shop and type	<input type="text"/>
- Cold	<input type="text"/>
- Warm	<input type="text"/>
- Share of external production [%]	<input type="text"/>
Fettling internally	<input type="text"/>
Shot blasting machines	<input type="text"/>
Heat treatment furnaces	<input type="text"/>
Sand reclamation and type	<input type="text"/>
- Mechanical	<input type="text"/>
- Thermal	<input type="text"/>
- Thermal/Mechanical	<input type="text"/>

13. * Annual electricity use...

MWh/year	<input type="text"/>
EUR/MWh	<input type="text"/>

14. * Annual use of diesel...

m ³ /year	<input type="text"/>
EUR/m ³	<input type="text"/>
If other unit (please state both figure and unit here)	<input type="text"/>

15. * Annual use of oil...

m ³ /year	<input type="text"/>
EUR/m ³	<input type="text"/>
If other unit (please state both figure and unit here)	<input type="text"/>
- Type (e.g. No.1 fuel oil)	<input type="text"/>

Energy consumption in casting industry

16. * Annual use of LPG (Liquified Petroleum Gas)...

m³/year

EUR/m³

If other unit (please state
both figure and unit here)

17. * Annual use of LNG (Liquefied Natural Gas)...

m³/year

EUR/m³

If other unit (please state
both figure and unit here)

18. * Annual use of cutting and welding gases...

m³/year

EUR/m³

If other unit (please state
both figure and unit here)

19. * Annual use of district heating...

MWh/year

EUR/kWh

If other unit (please state
both figure and unit here)

20. * Annual use of coke/coal...

ton/year

EUR/ton

If other unit (please state
both figure and unit here)

21. * Annual use of biofuels...

ton/year

EUR/ton

If other unit (please state
both figure and unit here)

22. * Annual use of other fuels...

Please state both figure,
unit and type of fuel here

23. * Annual use of water...

m³/year

EUR/m³

If other unit (please state
both figure and unit here)

24. * Annual use of new sand...

ton/year

Energy consumption in casting industry

5. Energy Services

1. * Does your industry have a long term energy strategy?

Yes

No

2. * If so, what time frame (years) do you normally have for decisions concerning the energy strategy?

3. * Have you conducted an EPC (energy performance contracting) to reduce your energy consumption?

Yes, we financed it ourselves

Yes, it was subsidized

No

4. * Have you conducted an energy audit?

Yes, we financed it ourselves

Yes, it was subsidized

No

5. * Have you used third-party financing to finance any energy efficiency investment?

Yes

No

6. * By what percentage do you estimate that your industry could reduce its energy use?

7. * How many of those percent could be reduced by consulting an ESCO (Energy service company)?

8. * How long time can you accept as a payback period for investments in energy efficient solutions and technology?

< 1

< 2

< 3

< 4

> 5

Energy consumption in casting industry

9. * Further comments to incentives for and/or restraints against improving energy efficiency?

	5
	6

Energy consumption in casting industry

6. Quantified use of energy - Optional

1. Annual use of hot water...

m³/year

EUR/m³

2. Annual energy use for...

Melting [MWh]

Holding [MWh]

3. Annual energy use for...

Core making [kWh]

Moulding [kWh]

Sand preparation [kWh]

Ventilation [kWh]

Lighting [kWh]

Compressed air [kWh]

Cooling pumps [kWh]

Space heating [kWh]

Space cooling [kWh]

Hot water [kWh]

Cleaning/sand-blasting [kWh]

Annealing [kWh]

Ladle pre-heating [kWh]

Office and lab equipment [kWh]

Other [kWh]

4. Working cost/ton good castings...

EUR/ton

5. Exhausted ventilation air...

Melting [m³/h]

Moulding [m³/h]

Fettling [m³/h]

Other [m³/h]

6. Estimated amount of natural ventilation...

[m³/h]

Energy consumption in casting industry

7. Driving forces for energy efficiency - Optional

Successful industrial energy management is characterized by a number of factors, external as well as internal. According to the aggregated experience in your company, how do you value the following factors impact on the implementation of cost-effective energy efficiency measures at your company?

1. People with real ambition?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

2. Long term energy strategy?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

3. Environmental Management System (EMS)?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

4. Environmental company profile?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

Energy consumption in casting industry

5. Improved working conditions?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

6. Cost reductions resulting from lowered energy use?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

7. Network within the company/group?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

8. Threat of rising energy prices?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

9. International competition?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

Energy consumption in casting industry

10. European Emission Trading Scheme (EU ETS)?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

11. Energy tax?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

12. Sulphur tax?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

13. NOx tax?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

14. CO2 tax?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

Energy consumption in casting industry

15. General energy advices through seminars?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

16. General energy advices through journals/booklets?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

17. Electricity Certificate System (ECS)?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

18. Voulontary agreements with tax exemption (e.g. PFE for Sweden)?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

19. Energy efficiency requirements due to national environmental codes by governmental administration?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

Energy consumption in casting industry

20. The public sector as a role-model?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

21. Your municipality being part of an energy/climate efficiency program?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

22. Network within the sector?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

23. Information and support through the sector organization?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

24. Beneficial loans for energy efficiency investments?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

Energy consumption in casting industry

25. Pressure from different environmental NGOs (non-governmental organizations)?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

26. ESCOs (Energy service company) responsible for operation and maintenance of the buildings?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

27. Annual environmental report to public administrations?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

28. Commitment from top management?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

29. Local authority energy consultancy?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

Energy consumption in casting industry

30. Demand from owner?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

31. Customer questions and demands?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

32. Investment subsidies for energy efficiency technologies?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

Energy consumption in casting industry

8. Barriers against energy efficiency - Optional

According to the aggregated experience in your company, how do you value the following barriers impact on the implementation of cost-effective energy efficiency measures at your company?

1. Conflicts of interest within the company?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

2. Long decision chains?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

3. Cost of staff replacement/retirement/retraining?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

4. Dept./ Workers not accountable for energy costs?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

Energy consumption in casting industry

5. Energy manager lack influence?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

6. Uncertainty regarding the company's future?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

7. Cost of production disruption/hassle/inconvenience?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

8. Low priority given to energy management?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

9. Lack of sub-metering (lack of detailed metering)?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

Energy consumption in casting industry

10. Lack of staff awareness?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

11. Energy objectives not integrated into operating/maintenance or purchasing procedures?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

12. Technology is inappropriate at this site?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

13. Lack of time or other priorities?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

14. Technical risks such as risk of production disruptions?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

Energy consumption in casting industry

15. Lack of technical skills?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

16. Poor information quality regarding energy efficiency opportunities?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

17. Lack of budget funding?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

18. Slim organization?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

19. Difficulties in obtaining information about the energy consumption of purchased equipment?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

Energy consumption in casting industry

20. Cost of identifying opportunities/analyzing cost effectiveness and tendering?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

21. Possible poor performance of equipment?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

22. Other priorities for capital investments?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact

23. Access to capital?

- No impact
- Almost no impact
- Neutral
- Some impact
- Major impact