

Results from benchmarking study

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Benchmarking study - Goals

- Gather technical data to allow calculation of key indicators regarding the energy use – make comparisons e.g. between different foundry types and countries.
- Evaluate the influence of management issues on energy efficiency
- Investigate the foundries' view on:
 - barriers against energy efficiency
 - driving forces for energy efficiency

The questionnaire

- Production (tons/year)
- Number and type of furnaces, number and type of moulding lines
- Company data : number of employees, area
- Energy data: annual use of different energy sources
- Management issues (energy audit, long term energy strategy etc.)

The questionnaire

- Detailed energy usage (energy for specific processes)
- Driving forces for energy efficiency
- Barriers against energy efficiency

Distribution and response rate

- The questionnaire was sent out electronically to 831 foundries in 11 countries.
- 81 answers from 7 countries
- Response rate 9,7 %

Country	Iron	Steel	Metals
Sweden	10	3	10
Finland	6	1	3
Germany	11	2	2
Italy	2	1	0
Poland	7	0	2
Spain	2	4	1
France	7	4	3
Total = 81	45	15	21

Response rate

- Low response rate can be explained by:
 - Foundry business leaving a recession and focusing on increasing production
 - Many foundries seem to have relatively little interest in and knowledge of their energy use
 - Extensive questionnaire (but parts of the questionnaire were voluntary)

Evaluation

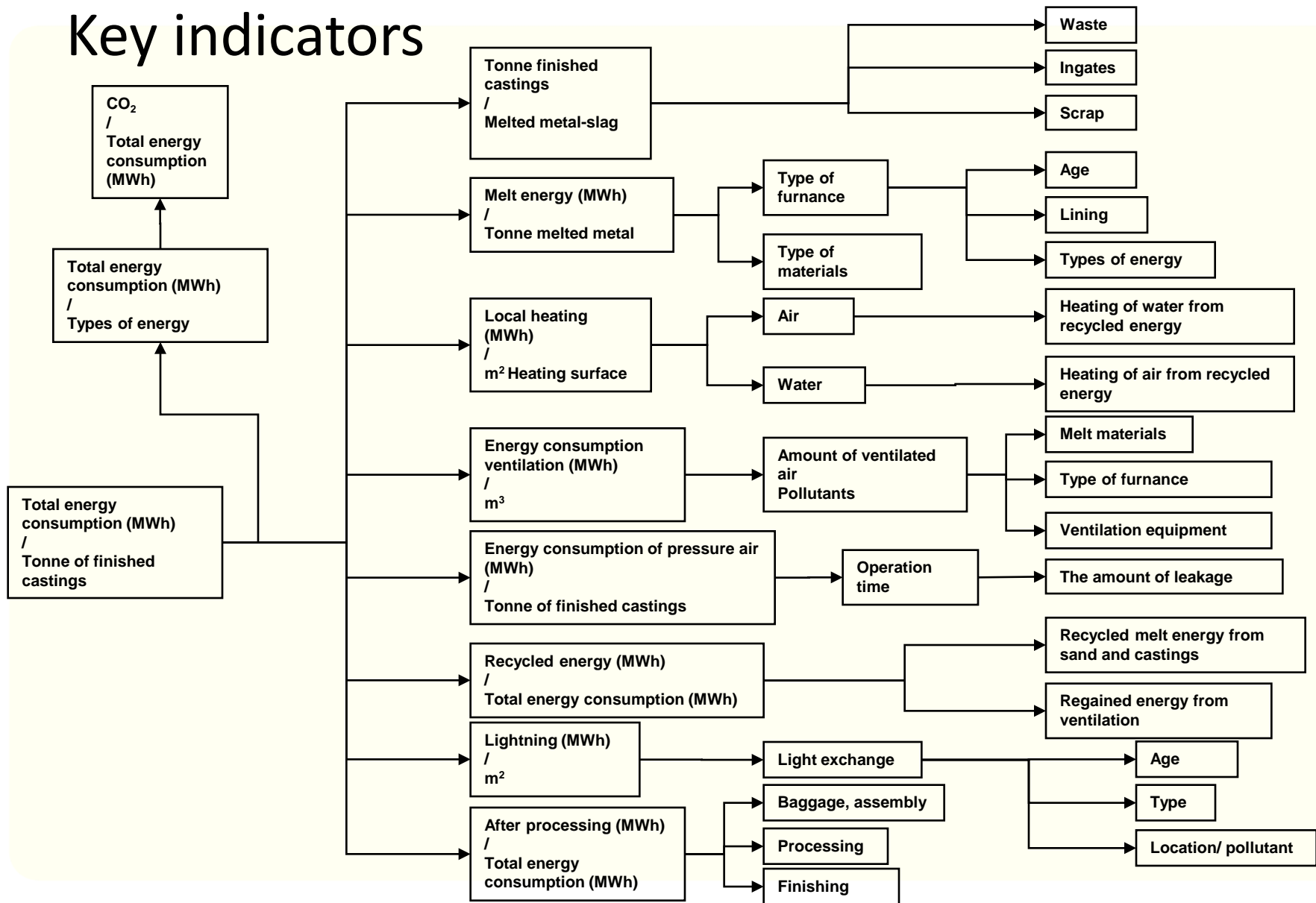
- Low response rate gives limited possibilities to evaluate in depth.
- However, certain detailed information regarding production could be used to check validity of some energy data.
- Low reliability and quality of collected data makes it impossible to draw firm conclusions.

Technical factors - Key indicators

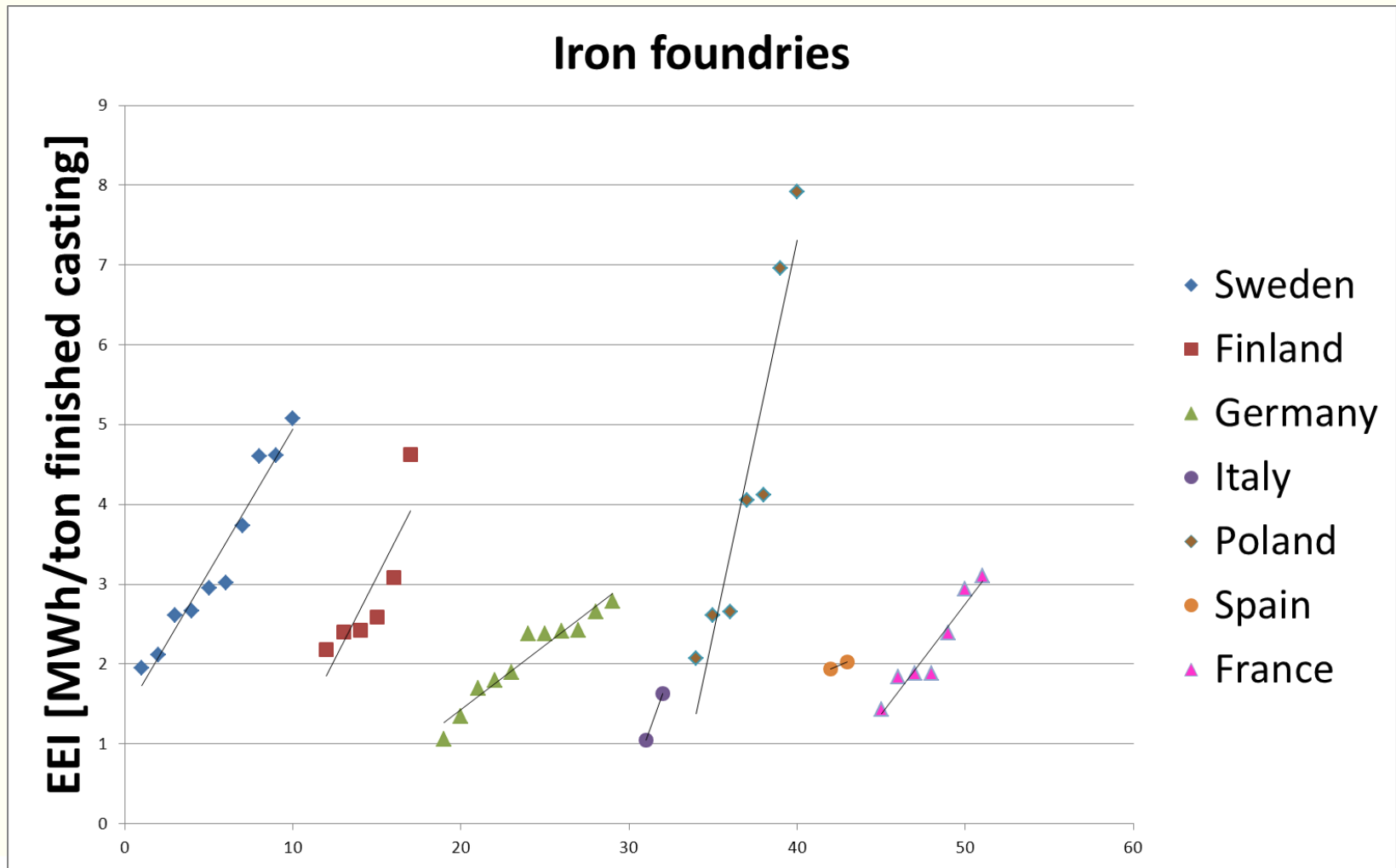
Overall key indicator – Energy Efficiency Index

EEI = Total energy use MWh/ton finished casting

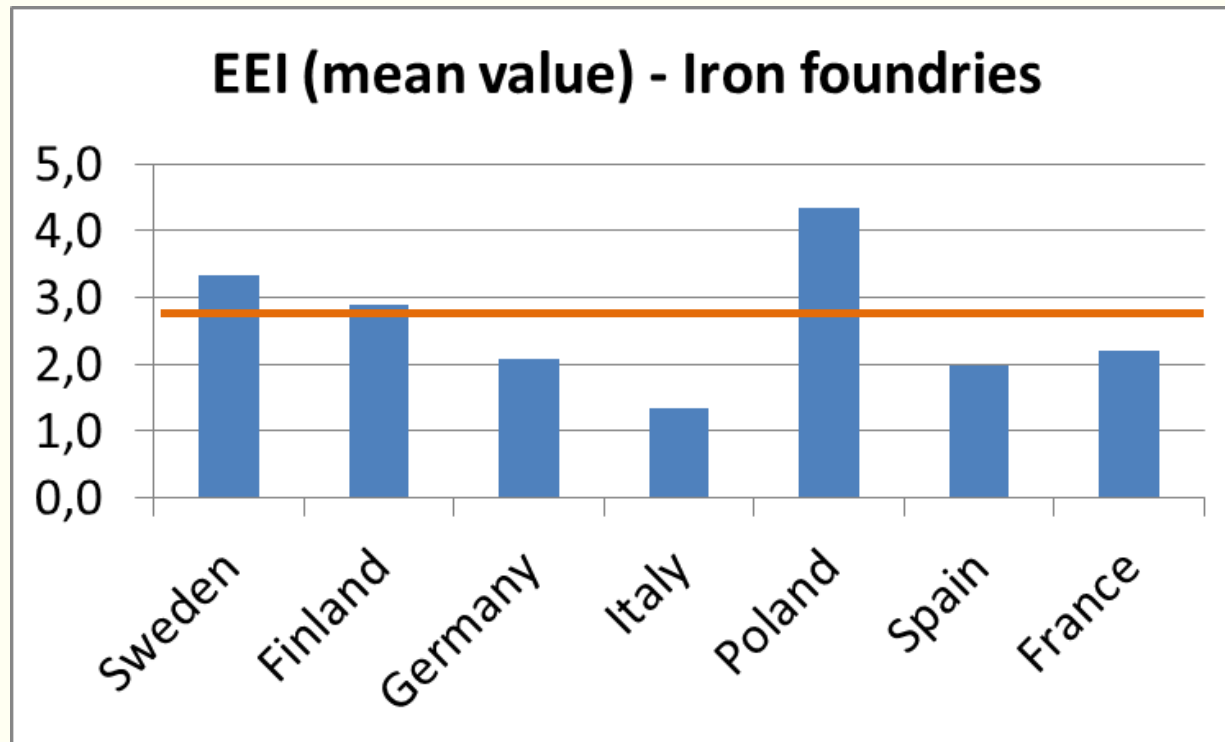
Key indicators



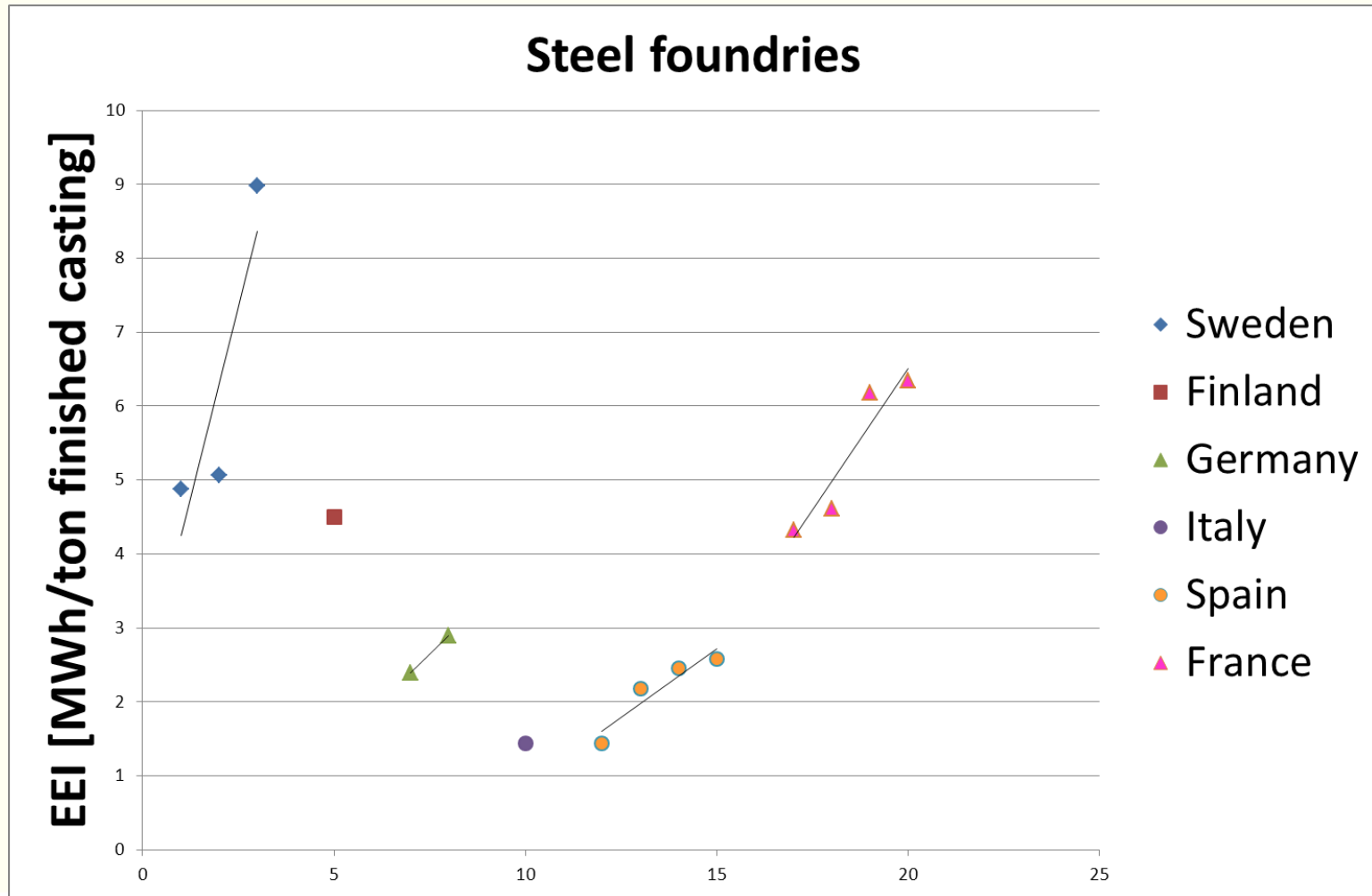
Result – Iron foundries



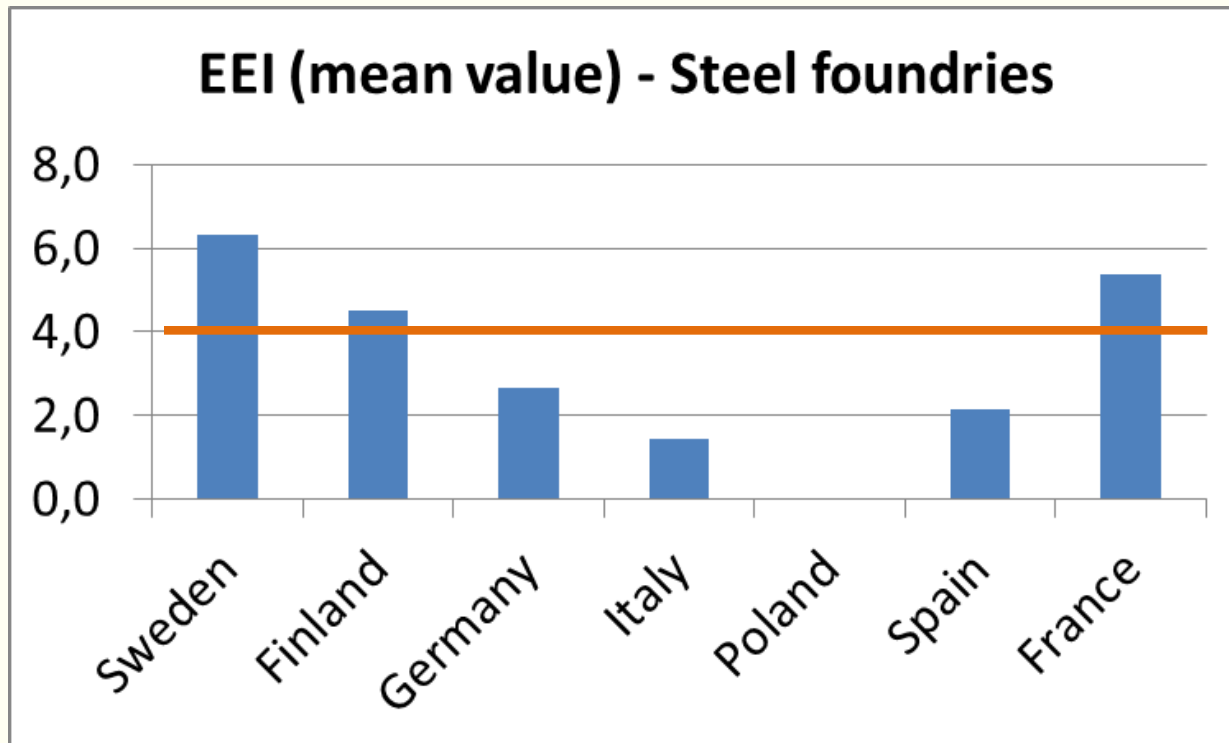
EEI – Iron foundries



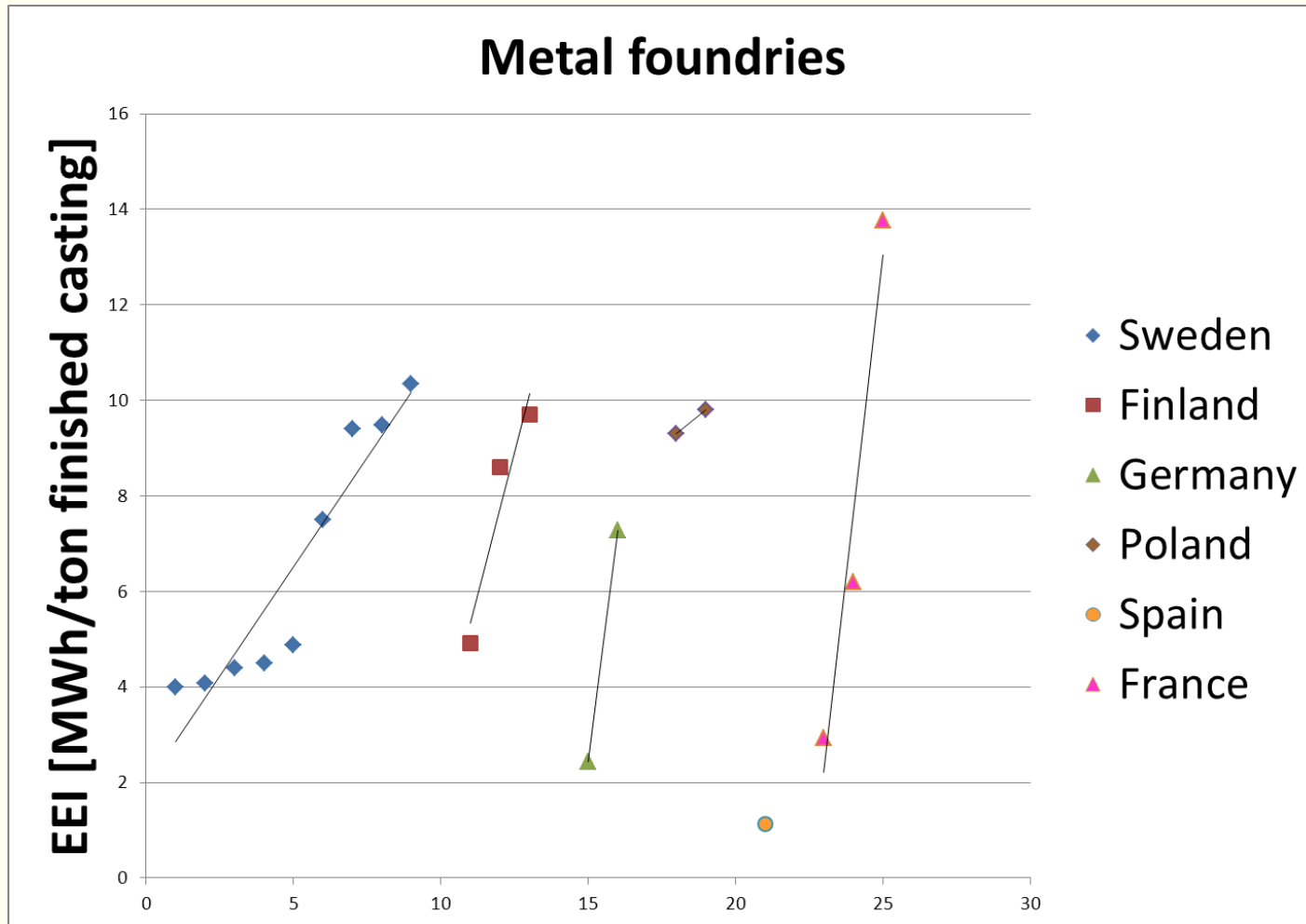
Result – Steel foundries



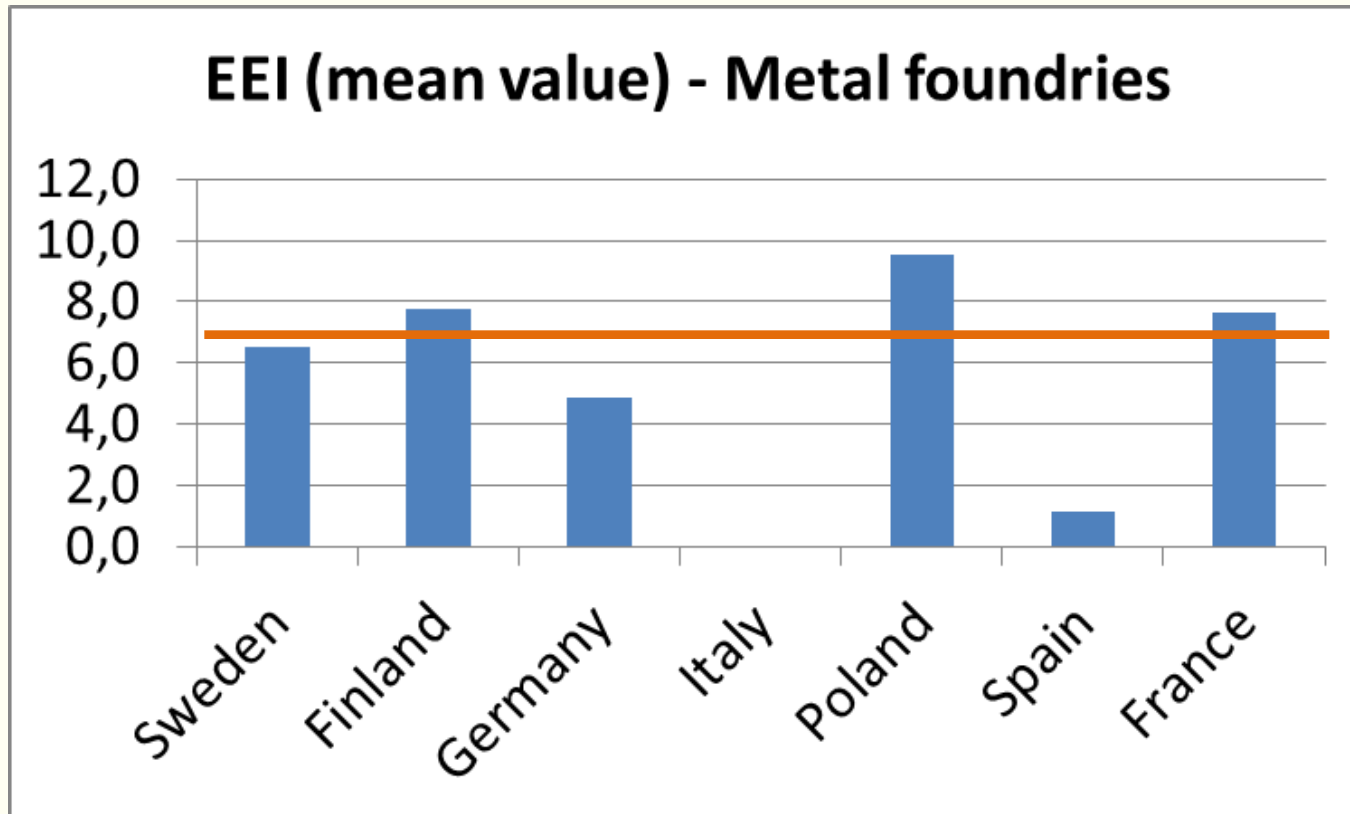
EEI – Steel foundries



Result – Metal foundries



EEI – Metal foundries



Result – EEI mean values

Country	Iron	Steel	Metals
Sweden	3,3	6,3	6,5
Finland	2,9	4,5	7,7
Germany	2,1	2,6	4,9
Italy	1,3	1,4	No data
Poland	4,3	No data	9,6
Spain	2,0	2,2	1,1
France	2,2	5,4	7,6
Average (all countries)	2,8	4,0	6,7

Comment: The EEI-values are uncertain because of limited data. Especially very low EEI-values (< 2) can be questioned.

EEI – Conclusions

- Foundries have much to gain by increasing their awareness of their energy use.
- New project on energy, economy and management issues could help the industry to be more competitive.
- Foundrybench partners have increased their knowledge in these areas and can continue the work in their own nations.
- Some of the collected data could be of use in other projects in the future.

Barriers and drivers

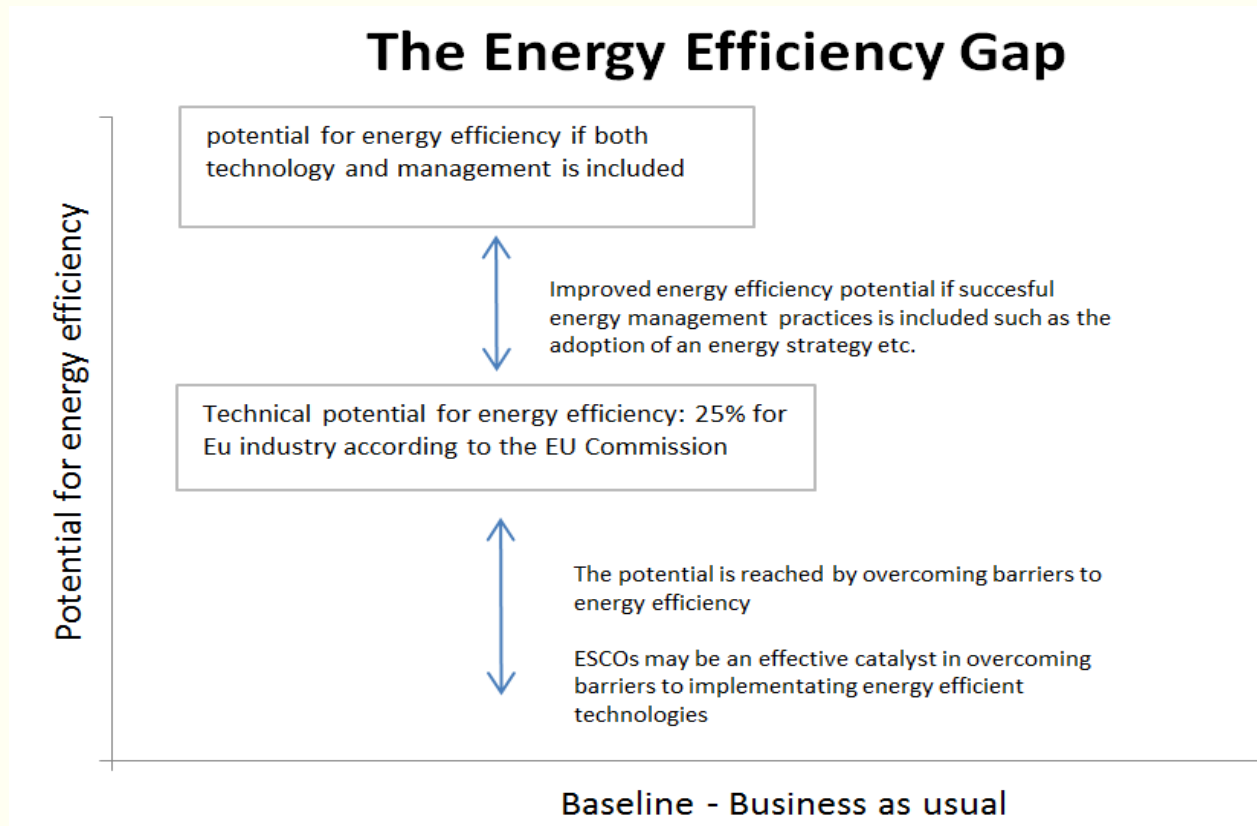


Figure 1: Explaining the energy efficiency gap (Thollander, 2011).

Number of answers of survey – Barriers and drivers

- 49 answers regarding barriers and drivers

Italy: 4

France: 9

Finland: 3

Germany: 10

Poland: 5

Spain: 4

Sweden: 14

Iron: 25

Steel: 11

Cu: 2

Al: 11

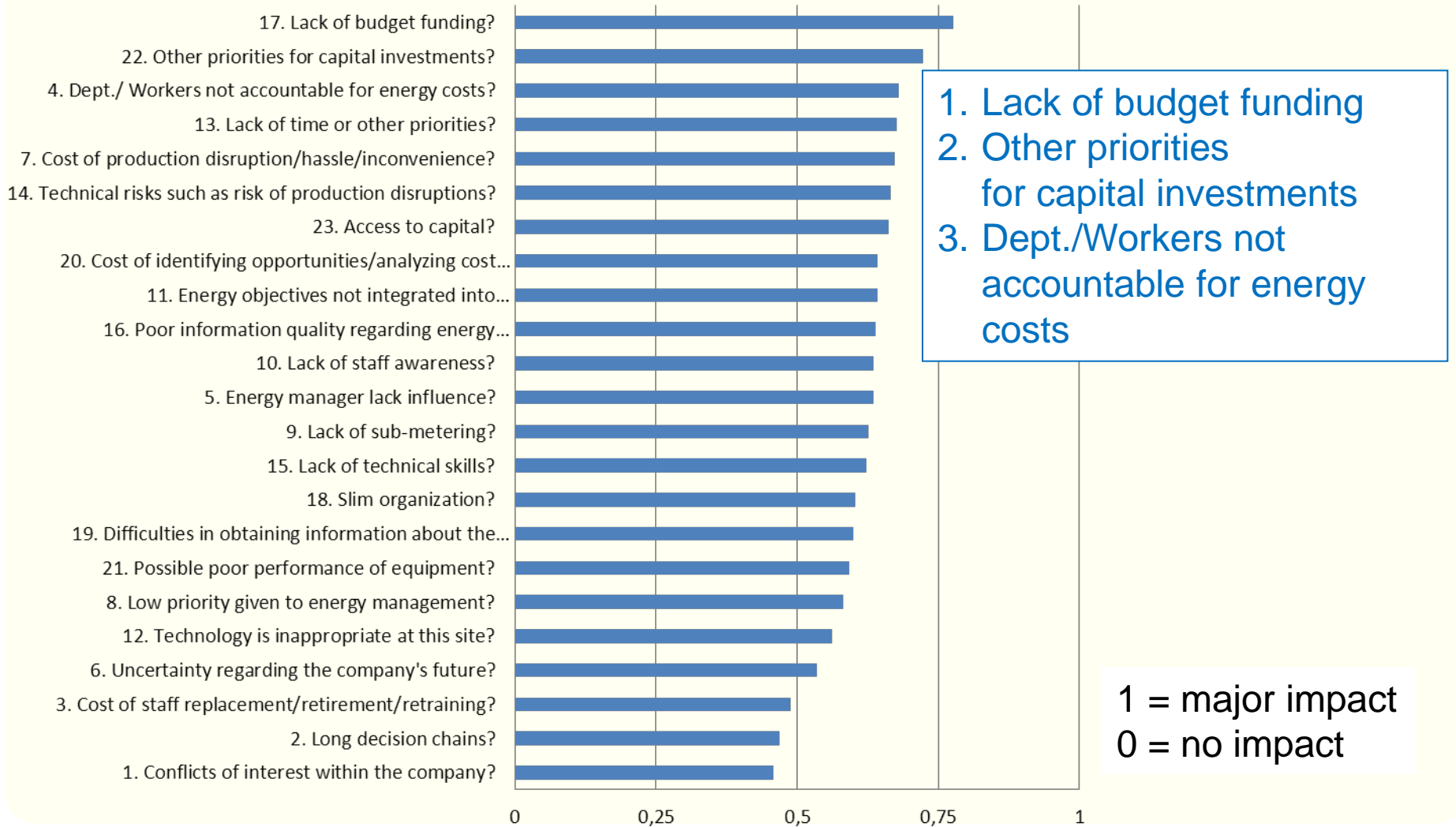
Evaluated in collaboration with
Linköping University

Questions regarding barriers to energy efficiency

Barrier
1 Conflicts of interest within the company?
2 Long decision chains?
3 Cost of staff replacement, retirement, retraining?
4 Dep./workers not accountable for energy costs?
5 Energy manager lack influence?
6 Uncertainty regarding the company's future?
7 Cost of production disruption/hassle/inconvenience?
8 Low priority given to energy management?
9 Lack of sub-metering?
10 Lack of staff awareness?
11 Energy objectives not integrated into operating, maintenance or purchasing procedures?
12 Technology is inappropriate at this site?
13 Lack of time or other priorities?
14 Technical risks such as risk of production disruptions?
15 Lack of technical skills?
16 Poor information quality regarding energy efficiency opportunities?
17 Lack of budget funding?
18 Slim organization?
19 Difficulties in obtaining information about the energy consumption of purchased equipment?
20 Cost of identifying opportunities, analysing cost effectiveness and tendering?
21 Possible poor performance of equipment?
21 Other priorities for capital investments?
22 Access to capital?

- 0 No impact
 ↓ Almost no impact
 Neutral
 ↓ Some impact
 1 Major impact

Barriers to energy efficiency

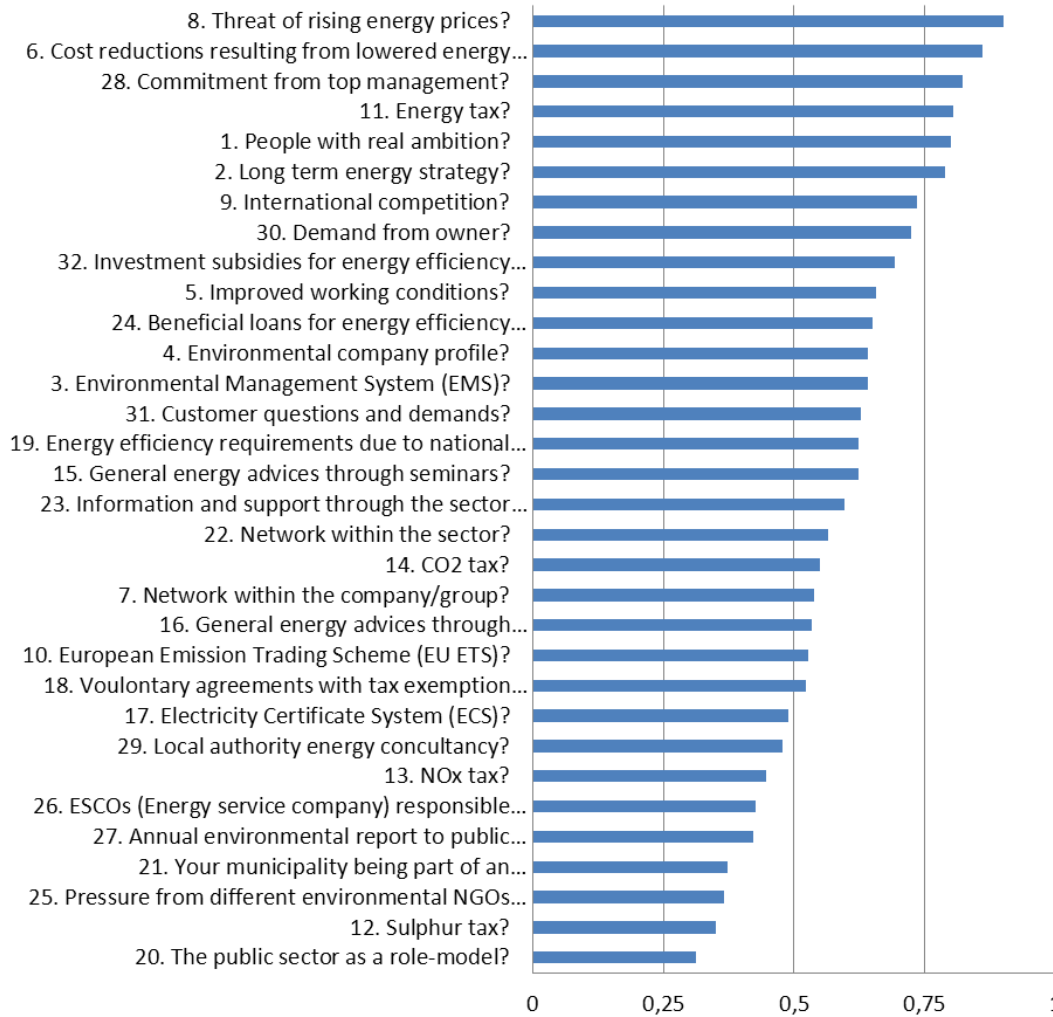


Questions regarding drivers to energy efficiency

Driver
1. People with real ambition?
2. Long term energy strategy?
3. Environmental Management System (EMS)?
4. Environmental company profile?
5. Improved working conditions?
6. Cost reductions resulting from lowered energy use?
7. Network within the company/group?
8. Threat of rising energy prices?
9. International competition?
10. European Emission Trading Scheme (EU ETS)?
11. Energy tax?
12. Sulphur tax?
13. NO _x tax?
14. CO ₂ tax?
15. General energy advices through seminars?
16. General energy advices through journals/booklets?
17. Electricity Certificate System (ECS)?
18. Voluntary agreements with tax exemption (PFE)?
19. Energy efficiency requirements due to national environmental codes by governmental administration?
20. The public sector as a role- model?
21. Your municipality being part of an energy/climate efficiency program?
22. Network within the sector?
23. Information and support through the sector organization?
24. Beneficial loans for energy efficiency investments?
25. Pressure from different environmental NGOs?
26. ESCOs responsible for operation and maintenance of the buildings?
27. Annual environmental report to public administrations?
28. Commitment from top management?
29. Local authority energy consultancy?
30. Demand from owner?
31. Customer questions and demands?
32. Investment subsidies for energy efficiency technologies?

0 No impact
↓ Almost no impact
Neutral
↓ Some impact
1 Major impact

Driving Forces for energy efficiency



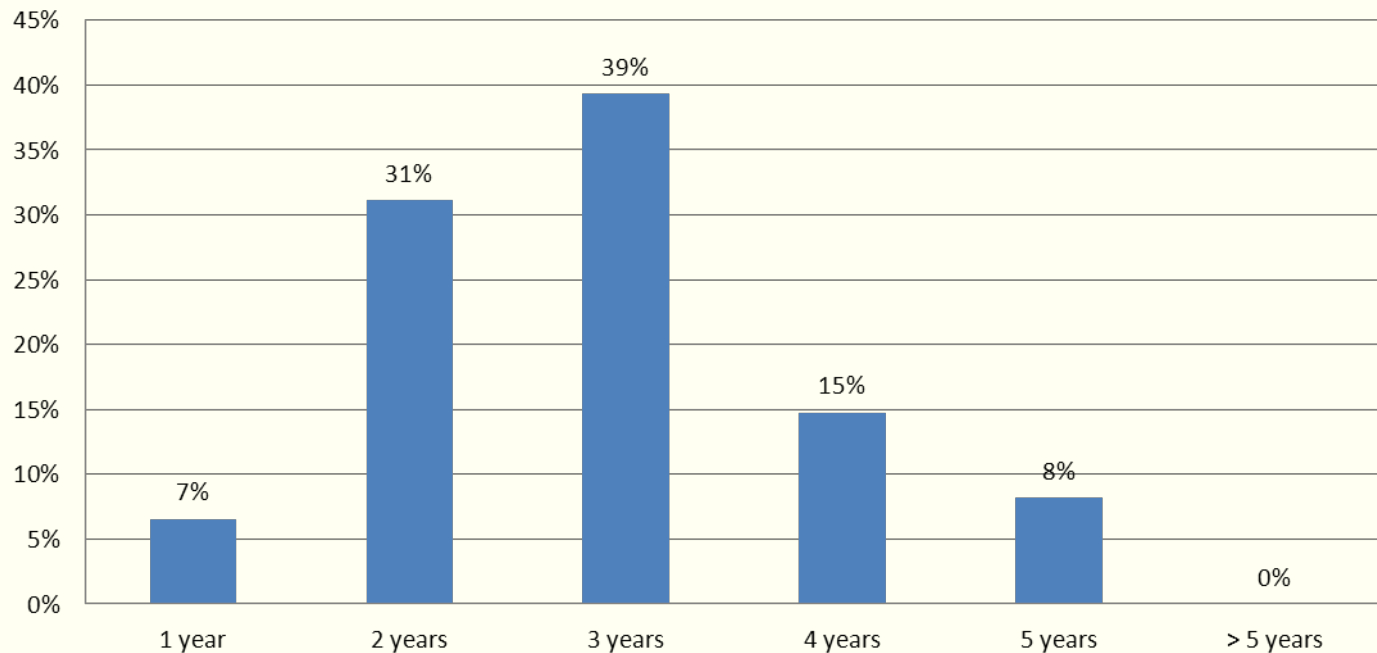
1. Threat of rising energy prices
2. Cost reductions resulting from lowered energy use
3. Commitment from top management

1 = major impact
0 = no impact

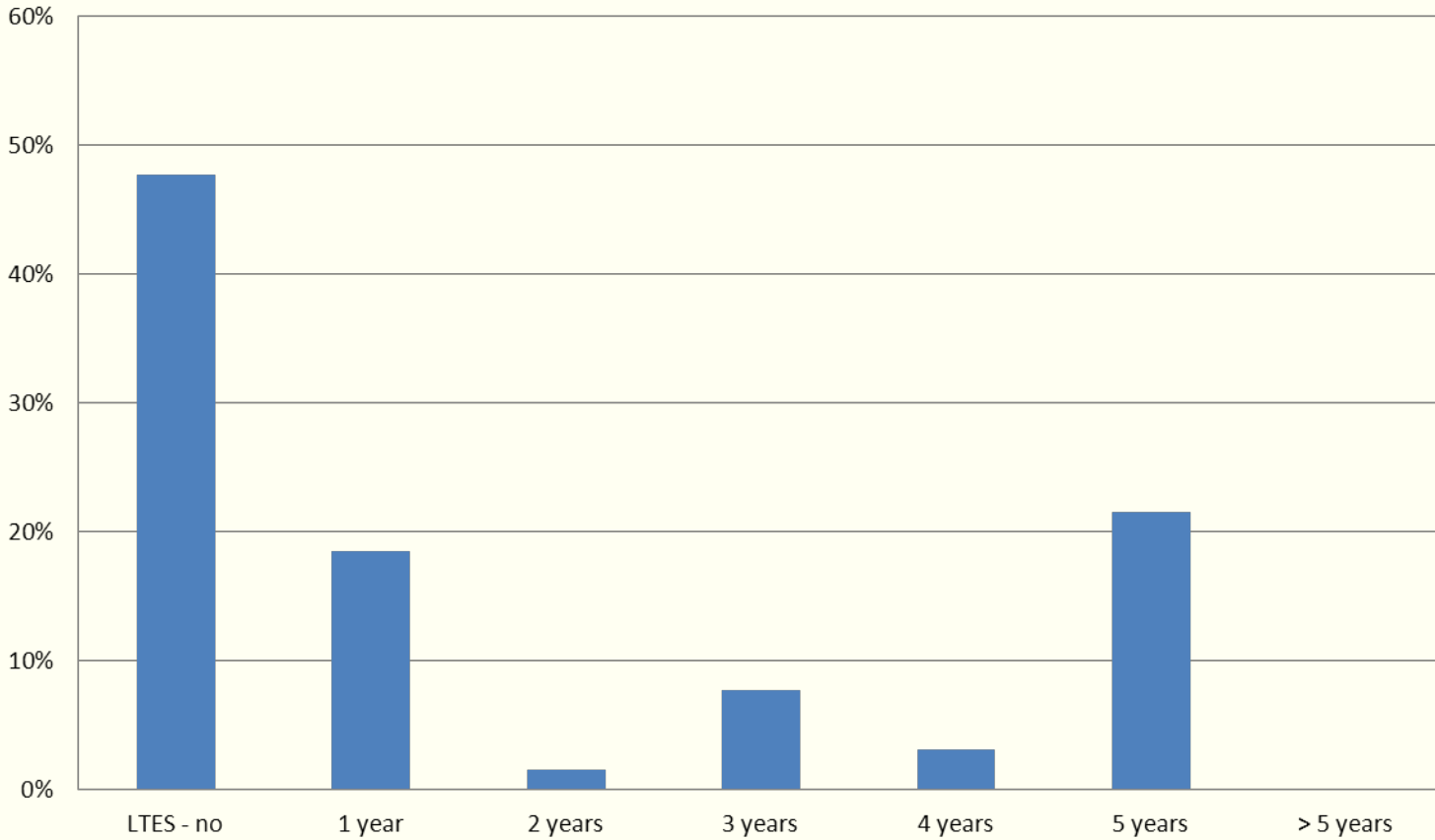
Barriers & drivers - Conclusions

- Limitation: Difficult to make comparisons between countries because of few answers
- Economic factors ranked as having crucial importance (as expected)
- Organizational and behavioural factors are ranked to have large importance – major improvement potential

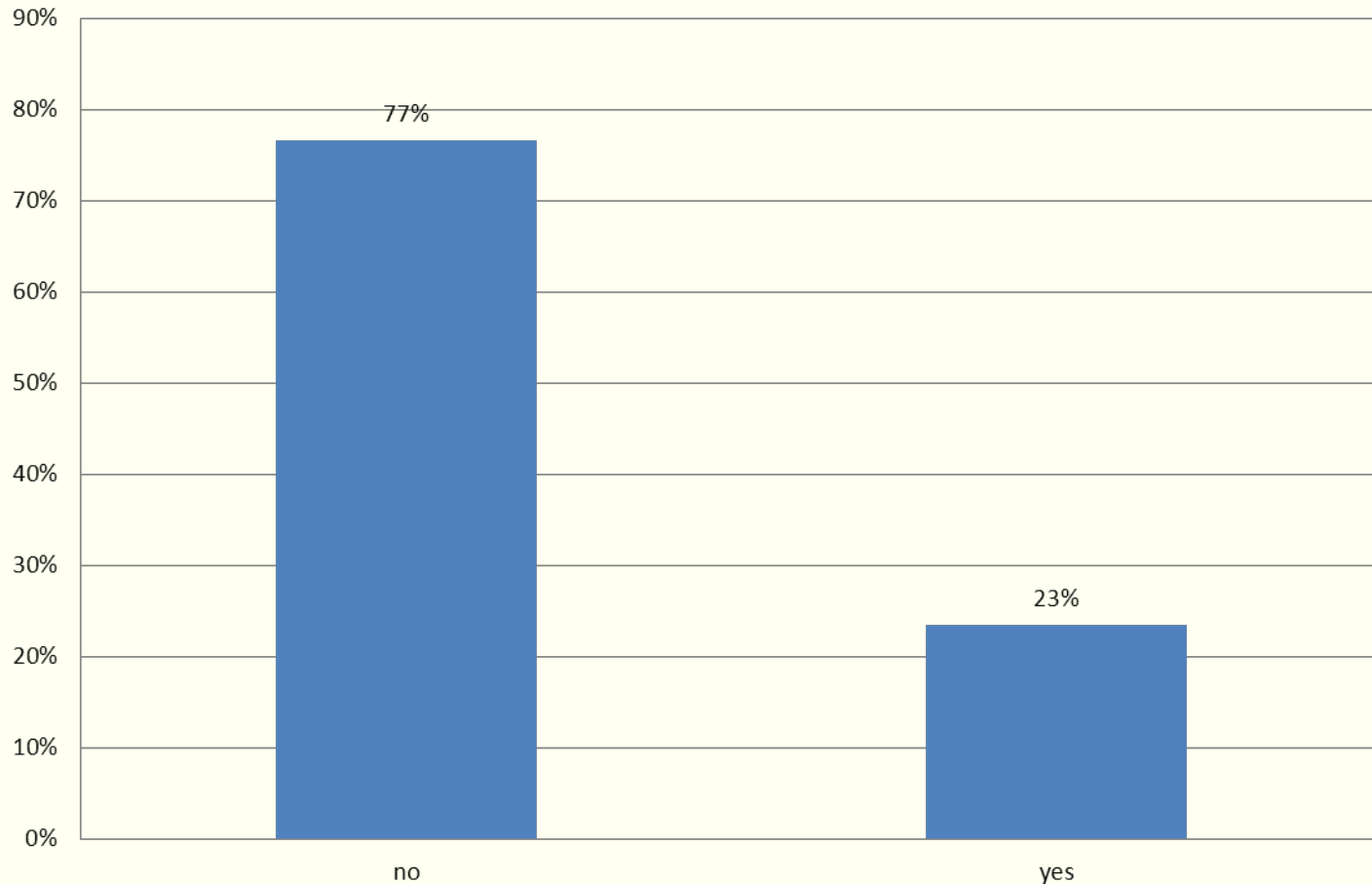
Payback criteria regarding energy efficiency investments



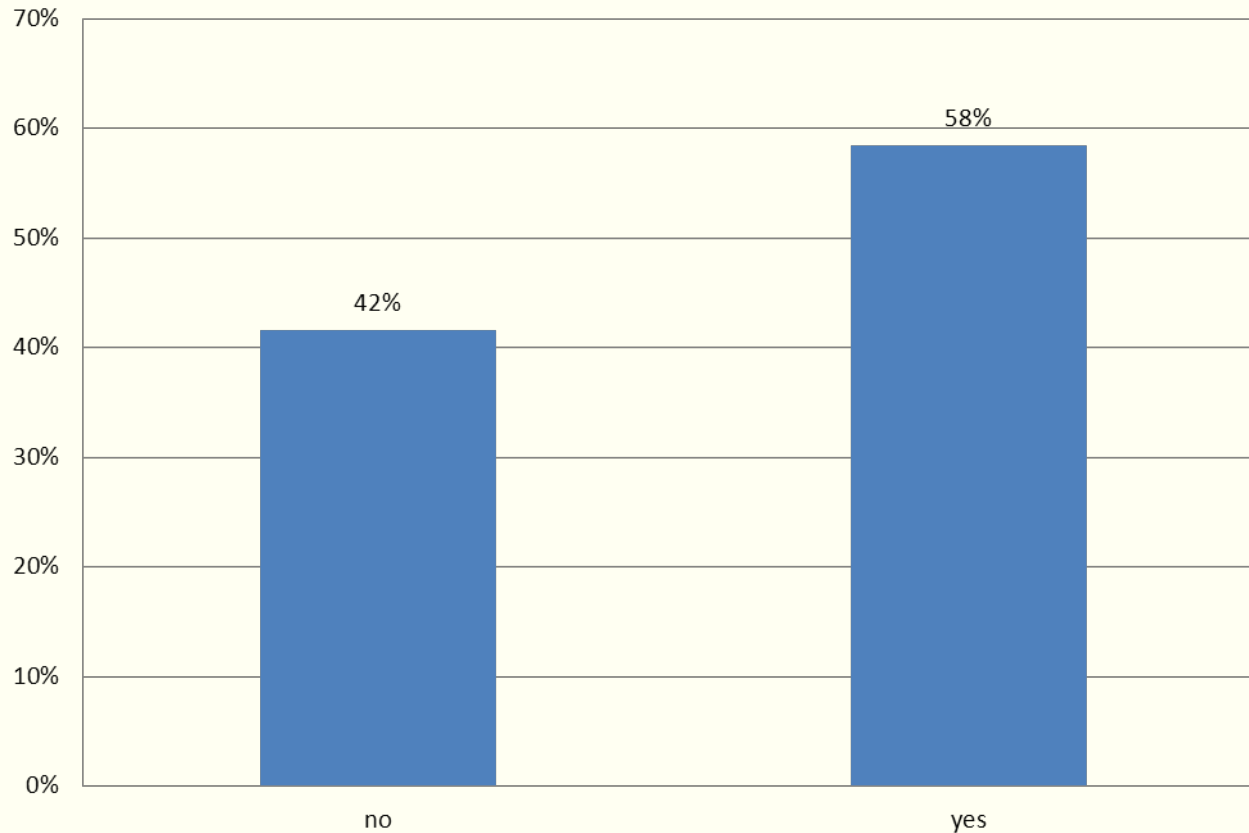
Existence of a Long Term Energy Strategy



Adoption of Energy Performance Contracting (EPC)



Conducted Energy Audits



The use of energy audits among the studied countries' foundry industries

Nation	AUDIT - yes	AUDIT - no
Italy	25%	75%
Spain	60%	40%
France	40%	60%
Germany	75%	25%
Poland	33%	67%
Sweden	70%	30%
Finland	50%	50%

Management issues – Conclusions

- Large potential to improve energy efficiency by for example:
 - implementing Long Term Energy Strategy
 - performing Energy Audit
 - using Energy Performance Contracting
 - changing pay-back criteria

Thank you!