

Lessons learned and best practices: Climate change policy measures in industry Swedish experience

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Industrial energy systems – a Swedish context

- Swedish industrial energy use is about 155 TWh/year.
- Swedish industrial electricity use is about 55 TWh/year.
- For Swedish industry, significant energy price increases, not the least electricity price increases has taken place the last decade due to the EU market deregulation.
- The historically low electricity prices in Sweden has, in general, made the Swedish industry use more electricity than its European competitors.
- The Swedish industry is using exceptionally high levels of bioenergy.

Major energy end-use efficiency policies in Sweden¹

- *The electricity certificate system (ECS).*
- *Energy and carbon dioxide taxes.*
- *The European Emission Trading Scheme (EU ETS).*
- *The Programme For improving Energy efficiency in energy-intensive industries (PFE).*
- *The energy audit program.*
- *The Swedish Environmental Code.*

• ¹ According to the Swedish Energy Agency (2013)

Other policies of interest - regional and local policies affecting industry

- ***KLIMP (Climate Investment Program)***
- => Example Xylem's excess heat bore hole storage, the world's first high temperature excess heat bore hole storage was enabled through KLIMP. Klimp was a governmental investment subsidy. Company has reduced bought heat to 29 kWh/m².
- ***Local Authority Energy Consultants***
- => Every municipality receives funding to have a local authority energy consultant to support companies and citizens with advices regarding climate mitigation- and energy conservation issues.

Programme for Energy Efficiency in Energy Intensive Industry (PFE)

- Voluntary agreement since 2004
- Aims to increase energy efficiency in industry
- Tax reduction 0,5 € / MWh_{el}
- Commitment: *“Programme for Improving Energy Efficiency Act”* (2004:1196)



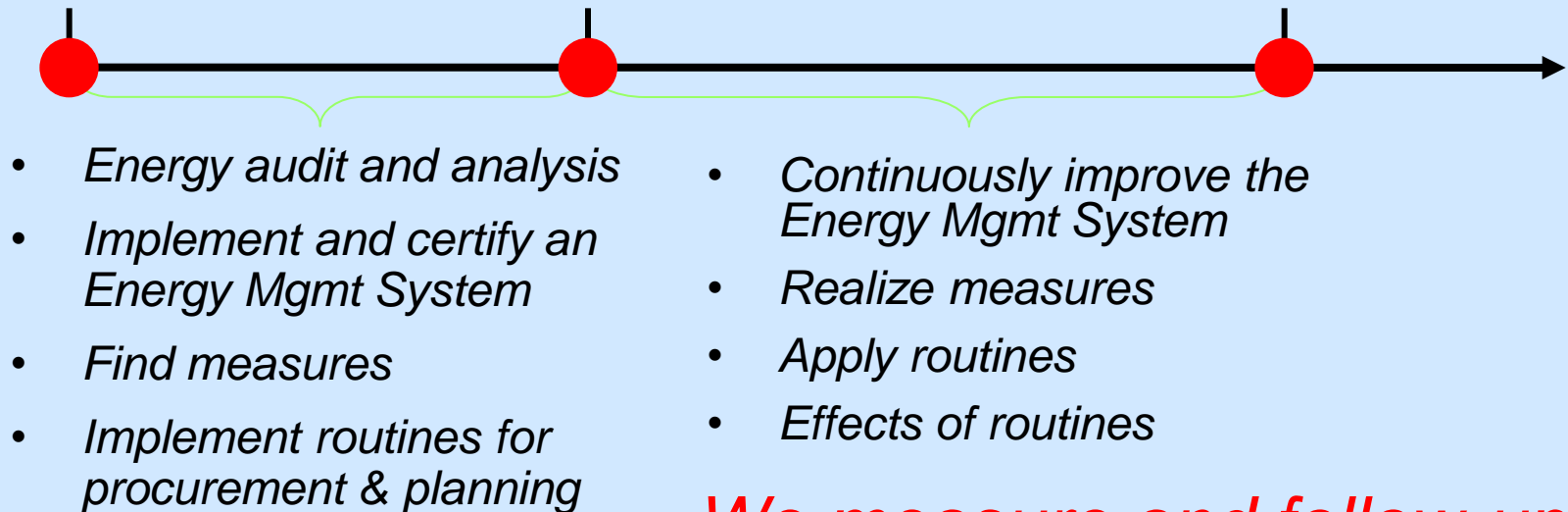
A five year program for participating companies



Program start

2 years
Report to the
Swedish Energy Agency

5 years
Final report to the
Swedish Energy Agency



We measure and follow-up

The programme for improving energy efficiency in energy-intensive industries (PFE)

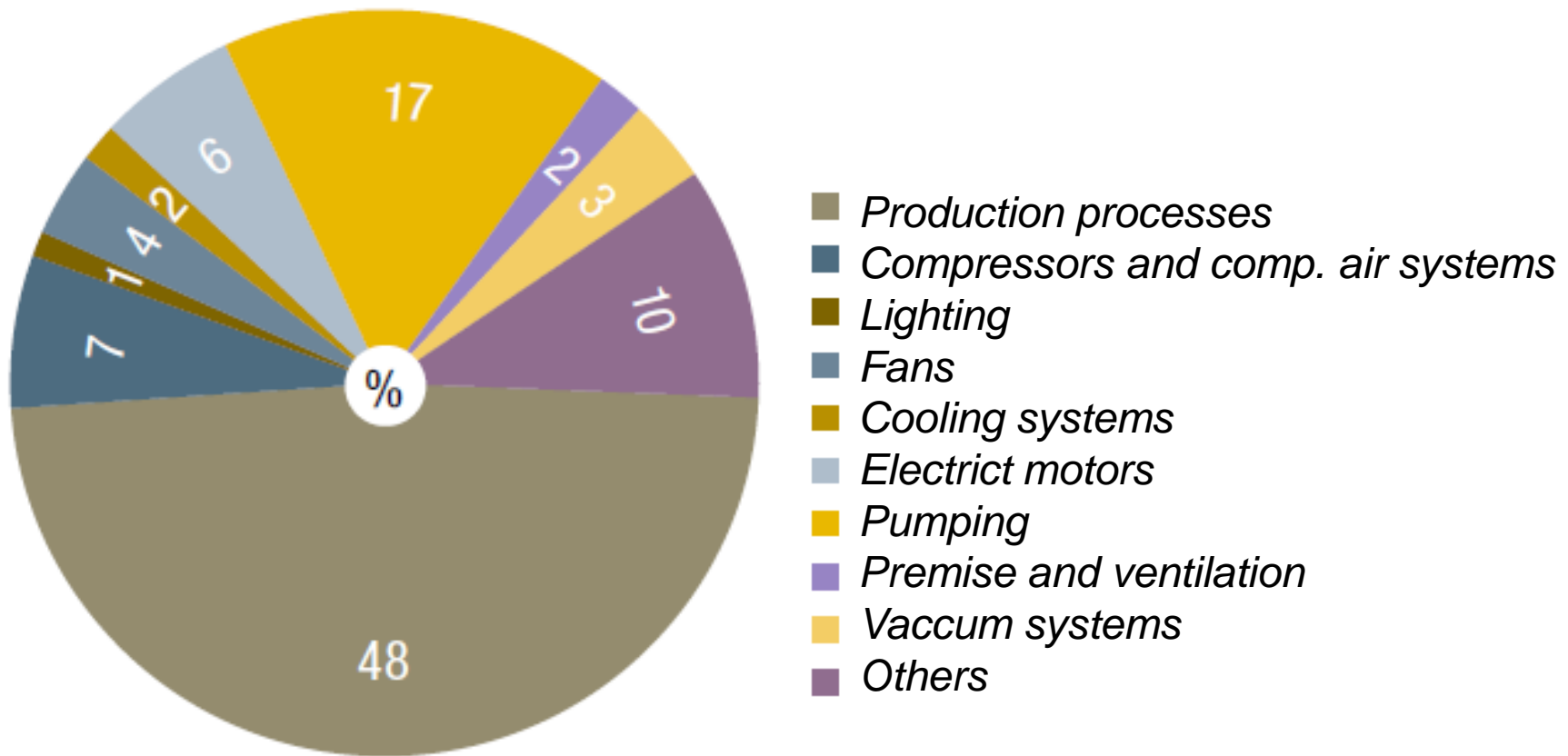
Impact evaluation¹:

- Gross electricity savings (end-use, not primary): The about 100 participating companies saved 1.45 TWh/year of electricity.
- Additionally, 950 GWh/year was saved from other energy carriers (heat and fuel).
- Free-rider co-efficient is 0-0.5.
- Total investments: 70.8 MEUR.
- Administrative cost, companies: 13 MEUR.
- Administrative cost, government: 4.2 MEUR.
- Annual tax rebate: 15 MEUR/year.

Results of the PFE exceeded ex-ante estimations by about 2.5 !

The programme for improving energy efficiency in energy-intensive industries (PFE)¹

Savings of implemented measures per process type in percent (%)



Energy audit program 2010-2014

- Companies with an energy use of more than 500 MWh/year can apply, maximum 30 000 SEK.
- Approx 1 000 companies have applied.
- Approx 700 GWh/year of energy efficiency improvements.

The Swedish Environmental Code

- Came in 1988 and address improved energy efficiency as a key aspect, BAT (Best Available Technologies) or BP (Best Practice) should be implemented.
- The Code has newly received increased attention when environmental permits to industrial companies are issued.
- The Country Administrative Board have legal rights to use the Code both when issuing permits, but also when monitoring the companies.
- It has so far been slow, and only in recent years started to be practiced.
- No impact evaluation of the effects has been done.

(Johansson et al., 2007).

Policy measures in theory

Thollander P, Palm J, 2013. Improving energy efficiency in industrial energy systems - an interdisciplinary perspective on barriers, energy audits, energy management, policies & programs. Springer. ISBN 978-1-4471-4161-7.

A roadmap for 2020 for Swedish industry

Psychiatry and communication – Transactional Analysis

- Three roles: Adult, Parent, Child.
- Successful relation is adult to adult communication.
- Boosting the industrial energy efficiency potential means moving from Parent –to- Child-relationship to Adult-to-Adult between the government and industry.

Thanks for your attention



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For further reading, please see e.g.:

Swedish Energy Agency, www.energimyndigheten.se

Peterson and Ottosson, 2007's paper at ECEEE Summer Study

Stenqvist and Nilsson, 2012's paper in Springer's Energy Efficiency

Stenqvist, 2014's dissertation: <https://lup.lub.lu.se/search/publication/4220512>

www.liu.se