Accelerating Transition by Energy Efficiency

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Agenda

- Transition of European industry since 2008– acceleration needed
- Obstacles and supporting factors
- energy efficiency and climate protection networks –
  - the effective format
  - Surveys, qualitative results
- socio-psychological supporting factors and reduced transaction cost: doubling the efficiency progress
- A closer look to statistical analysis to explain net impact
- Conclusions

IREES research for future.

Past and future CO2 emissions by the European Manufacturing Sector

Year	Emissions Mt CO2 equiv. /a	
2008	1.039	
		- 18,4 Mt/a average
2021	800	
		- 55 Mt/a -Corona
2022	745	
		- 51 Mt/a - Ucraine
2023	694	
		- **25.7 Mt/a ?**
2050	0 ?	

Is decrease to zero GHG-emissions in 2050 possible?

- Strucural change to less energy intensiv industries?
- Supported by resource efficiency and circular economy !
- Increased diffusion of energy efficient & non fossil technologies in industry?
  - Exhaustion of low hanging fruits?
  - Long re-investment cycles of production sites of basic products?
  - Sufficient electricity and H2 in place?
  - **Sufficient knowledge and motivation of energy managers and consultants?**

Large profitable potentials of energy efficiency and change to electricity and bioenergy today, however: severe obstacles

- Obstacles of long term investments in energy efficient and substituting solutions
  - Focus on risks (payback time), neglecting the high profitability (internal rate of return)
    Two thirds of companies decide with this preference today (the answer: VALERI)
  - Lack of knowledge and market survey by the energy managers
    not sufficient professional training for knowledge and implementation (the answer: ?)
  - High transaction costs of the energy manager and little acknowledgement
    how can the transaction costs be reduced and the acknowledgement be increased? (the answer: ?)
  - The energy manager has additional tasks (e.g. environmental protection, safety)
    How to set priorities in every day work? (the answer: ?)

The answer: Energy Efficiency and Climate Protection Networks in a specified format

How does an industrial Energy Efficiency & Climate Protection Network operate ?

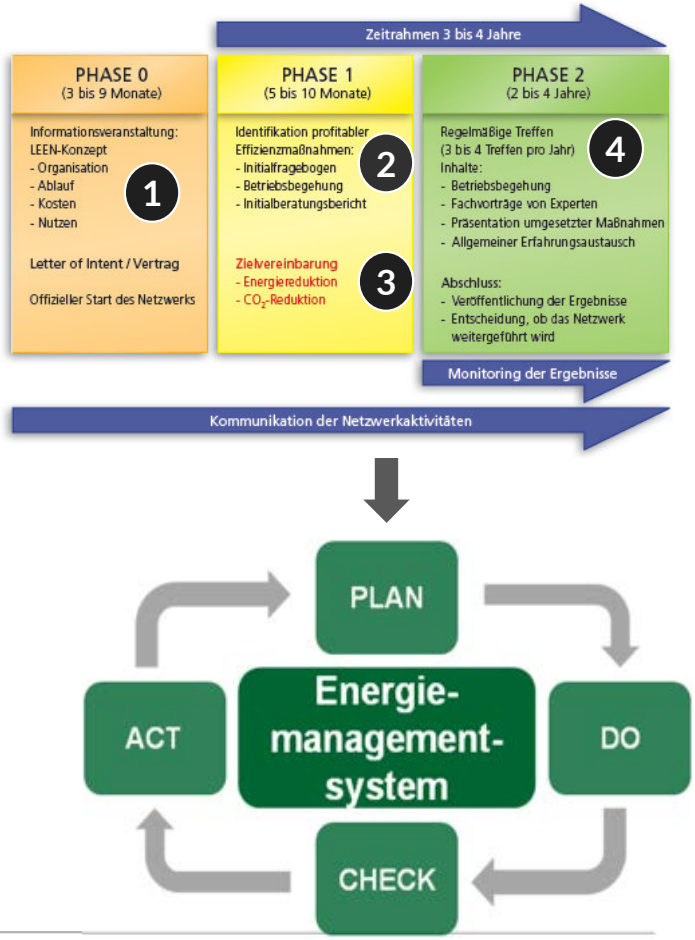
1. **Initiation**
   Acquisition of companies, letter of Intent and first meeting (with press and local media attention); the most cumbersome step

2. **Energy Audit**
   Data collection, on site investigation, report with list of recommended measures performed by a certified consulting engineer (e.g. ISO 50 001)

3. **Target setting, per site and per network**
   Joint targets for Energy Efficiency and CO2 mitigation

4. **Network meetings** with mutual exchange of experiences, 4 times per year
   Including site visit of the inviting participant and presentation of newly available technologies; moderated by a specifically trained moderator

5. **Checking the performance and target by yearly monitoring**
   of individual participants (confidential) and the network (public)



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Observed Outcomes of Energy Efficiency and Climate Protection Networks

Results :

- **doubling of efficiency progress on average** compared to average efficiency progress of individual energy management (gross effect)
- **220.000 €/a energy cost savings per site (ca. 10 %, average)** and **15 to 25 €/t CO2 profits** (gross effect)
- **A bit more than doubling of CO2 emissions due to minor substitution of final energy** (incl. waste heat)
- **reducing the transaction cost in the phase before the decision is made** due to:
  - mutual exchange of experiences among the participants and the consulting engineer

INITIATIVE ENERGIEEFFIZIENZ NETZWERKE

Targets of a voluntary agreement of the German industry (22 associations with the Fed. Gov.):

- Initiate 500 Networks, mitigate 5 Mill. t CO2 /a, save 50 PJ/a final energy between 2014 and 2020

Results: 300 networks initiated, 5 Mill. t CO2 mitigation and 40 PJ/a saved (20 % missing) (all gross effects)

History of the Energy Efficiency and Climate Protection Networks

- 1987: first energy efficiency network in Zürich, Switzerland
- 2002: first energy efficiency network in Germany (moderator in addition to energy engineer)
- 2008-2014 : Learning Energy-Efficiency-Networks (LEEN) 30 pilot project (in D)
- 2011-2014: Evaluation of 10 Energy-Efficiency-Networks for Swedish SMEs
- 2014-2018 : "LEEN 100 Plus" project as an extension of pilot project (in D) (roll out of format)
- Dec. 2014 Energy-Efficiency-Networks Initiative with a target of 500 new EENs until end of 2020 (reducing the standard of the LEEN format: shorter duration, no yearly monitoring)
- Prolongation of the voluntary agreement 2020 to 2025 (evaluation is expected in 2026)
- During the last 10 Years: Austria (10), Sweden (40). Belgium (a few), China (520), Algeria, Tunesia, Mexico, Brazil, Ucraine, Nigeria

Long-term impacts of the early EENs

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

Experience of the Learning Energy Efficiency Networks (LEEN):
330 companies of 28 Learning EENs

Results:

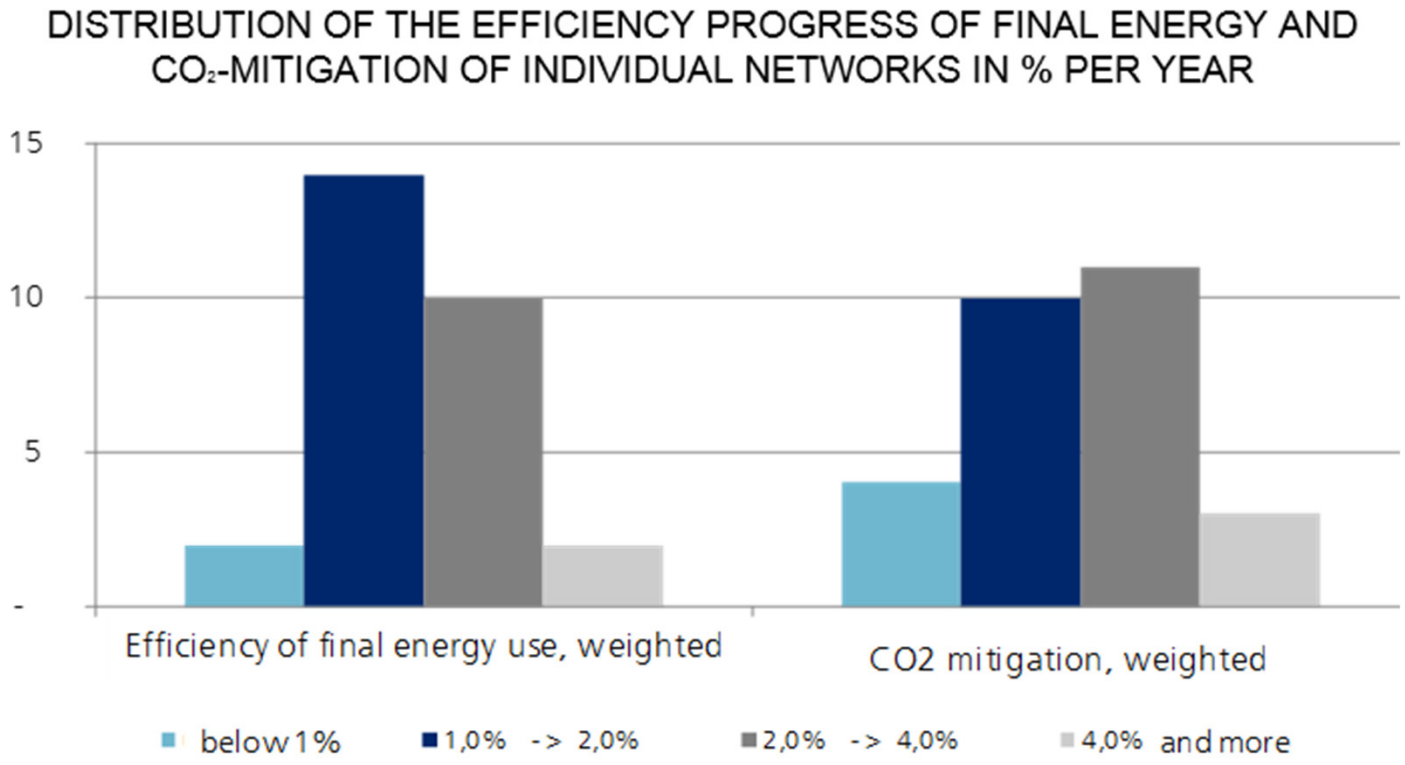
After 4 years:

- energy savings on average to 2.3 % /a (gross effect)
- CO2 emission reduction 2.4 % /a (gross effect)

However: substantial variation
(see Figure)

best results: about 55 % efficiency improvement after 15 years in several large and small sites

longest operation of networks:
12 to 19 years in the same region



(source: Fraunhofer ISI and IREES 2015):

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A closer look to the acceptance and impact of the networks

- Initiation of energy efficiency networks is cumbersome: companies do not know about the benefits of moderated mutual exchange of experiences in energy efficient solutions
- After 3 or 4 meetings, most companies are very satisfied with the impact of the network
- Almost 80 % of the participants took up ideas for investments or organisational measures

How do the following statements apply to your company?	yes	no	I can not say	no answer
Suggestions from the energy efficiency network were implemented in investments or organizational measures	78 %	14 %	5 %	4 %
Some of the implemented efficiency measures would not have been implemented without participation in network	45 %	40 %	11 %	5 %
The energy consultancy had a significant impact on the selection of measures to be implemented and the level of investment	34 %	53 %	9 %	4 %

Source: Chassein et al. 2018

- almost 50 % admit that they realised measures only due to their participation in the network,
- one third of the companies said that the selection and the amount of investments were influenced by the network

Why are energy efficiency and climate protection networks (EECP) so effective?

➢ Participants reduce their energy cost twice as fast as non-participants: average: 2,1 % per year

- ✓ Faster gains by collective intelligence and social learning
  - Hands on efficiency investments realised at the production sites visited,
  - Presentations by experts focused on the questions of participants
  - Open exchange of (good and bad) experiences among colleagues
- ✓ Trust and co-operation among the energy managers ,
  (closed group of 10 to 15 participants for many years), mutual consulting
- ✓ Friendly competition and motivation by mutual acknowledgement
- ✓ Improved position (and motivation) of the energy manager in the company

➢ **Additonal observations**

- ✓ reduced energy cost increases available capital in the following years
- ✓ CO_2 mitigation leading to a „green image“ at the side of customers, the staff, and their social groups
- ✓ Participating companies have taken their own initiatives to improve their products’ energy efficiency
- ✓ Highest market share of operating EECPs in D: an industrial association (VEA) consulting SMEs

Uncertainties about the **net effect** of the networks – results all **as gross effect**

★★★

What is the contribution of other policy instruments used by the participants due to their participation in the network?

- **Public financial incentives for consultation, climate protection plan, and investments**
- **professional training courses, new regulation like ecodesign standards**

No information of these possible effects is available at company level

Statistical Analysis

- Too many companies and information of their performance and product structure needed to identify the net impact of network participation
- Surveys do not allow quantitative impact analysis

the impact of well-trained and highly motivated moderators and consulting engineers of the network teams ? Measurable by the duration of an operating network ? 8 to 15 years? Not just 3 !

Conclusions

- Energy efficiency and climate protection networks implemented in many industrialised and emerging countries, however in different settings, do **accelerate transition in participating companies.**
- **Boundary conditions vary substantially:** exemption of CO2 surcharge (CH), voluntary agreement of industry to avoid regulatory policies (D), accepted substitution to deliver CO2 reductions (China)
- **Evaluation of the instrument EECP-networks trying to explain their additional (net) impact**
  - Surveys among the participants allow qualitative explanations of the additional savings and mitigation.
  - Statistical analysis identifying the net impact of the network needs around 1,000 data sets of participating and not participating companies
  - Major explanations of the success of EECP-networks (with a strict setting): socio-psychological reasons, reduced transaction cost of the participants, and qualified & motivated moderators and consulting engineers.