Energy Efficiency Networks – a new policy instrument to improve Energy efficiency in various countries

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Overview

- Present economic efficiency potentials –
  a snap-shot of present technology and energy price levels
- Major obstacles and unused constructive factors (within the energy using company)
  - the focus on risk, “robust” management rules (80/20%) , procurement by insufficiently specified tenders; motivation and responsibilities of machine/plant operators or apprentices
- Energy efficiency networks as one answer for SMEs and larger companies
- the diffusion of the energy efficiency networks as a policy instrument in different policy frameworks

Profitable energy efficiency potentials of industry and services until 2020

The case - Germany:

- Economic potential 2014 to 2020 : 500 PJ (- 2.2% per year)
- Reduced energy cost: 11 Billion € in 2020 (-12%)
- reduction of CO_2 emissions : around 45 Mill. Tonnes (-5% of Germany's GHG)
- additional net 45.000 new jobs (0.1%, induced by a 30 Billion € investment)
- slight net increase in gross domestic product (+ 3 Billion € in 2020)
- smaller capital losses to energy producers by reduced energy imports

Can these potentials be realised?

Source : Jochem u.a. energiewirtschaftliche Tagesfragen, 64(2014)1/2, S.81-85

Why are present profitable efficiency potentials not fully realised**?**

A selection of existing obstacles – the traditional view

- lack of knowledge and sufficient market survey of energy managers, particularly in SMCs, consulting engineers, architects, installers, bankers
- high transaction cost of the energy manager (for searching solutions, tendering, decision making, installation)
- lack of own capital, fear of lending more capital for investments of off-sites
- technology producers or whole sale often pursue their own interests opposing the possible innovation steps of efficient solutions
- 80% of companies using only risk measures (payback period), but not profitability indicators (e.g. internal interest rate) for their decisions

One of the major company-internal obstacles of resource efficiency

Payback time requirement (in years)	Internal rate of return in % per year[1)] — Useful life of plant (in years): 3	4	5	6	7	10	12	15
2	24%	35%	41%	45%	47%	49%	49,5%	50%
3	0%	13%	20%	25%	27%	31%	32%	33%
4		0%	8%	13%	17%	22%	23%	24%
5			0%	6%	10%	16%	17%	18,5%
6	unprofitable			0%	4%	10,5%	12,5%	14,5%
8						4,5%	7%	9%

1) Continuous energy saving is assumed over the whole useful life of the plant

(red) Profitable investment possibilities eliminated by a four-year payback time requirement

Source: FhG-ISI

As long as 80% of technology producers and suppliers do not calculate internal interest rates and life cycle cost, most of the profitable efficiency investments will not be realised – an example how decision routines have to be changed

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in addition – often unused supporting factors

consider the motivations of the actors of the innovation system

- Opportunities from the social science perspective: (not just "homo oeconomicus")

- first movers well informed, risk taking (as tec producers or tec users)

⇨ support of first movers (information, training, R&D&D, financially)

- social prestige of CEOs or companies (green image, member of the Green Dow Jones, leaders who are responsive to societal needs or regional chances)

⇨ establish efficiency awards, a selected company group of top efficient companies at the national level (e.g. Climate protection companies)

- professional career of energy managers and acknowledgement of workers by unexpected high savings of energy cost, by motivation, advice to the controller. etc.

⇨ establish best practice information, local efficiency networks, ask your supplier for carbon foot prints, etc.

®LEEN - Local Energy Efficiency Networks –
reducing the transaction cost by mutual exchange of experiences

- How do the networks operate with 10 to 15 local companies ?

  - Phase 1. - energy audit, a report, a list of measures with economic evaluation
    - a joint efficiency and mitigation target

  - Phase 2: - four meetings per year, professionally prepared and moderated,
    - a site visit included
    - one technology (or organisational measure) each meeting, external expert
    - yearly monitoring, by participant (confidential) and for the network,
    - hot line for the participants,

- Results :
  - many obstacles get reduced, often unused supporting factors are applied
  - doubling of efficiency progress compared to average of industry or branch
  - average results per participant: 180.000 €/a energy cost savings per site and 10 to 20 €/t CO_2 profits

- *More in the following paper*

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How does it work?

Timeframe 3 to 4 years

PHASE 0
(3 to 9 months)

Acquisition Meetings:
LEEN-Concept
- organization
- process
- costs
- profit

Letter of Intent / Contract

Official start of network

PHASE 1
(5 to 10 months)

Identification of profitable energy savings:
- data collection sheet
- site inspection
- energy review report

Target agreement
- energy reduction
- CO_2 reduction

PHASE 2
(2 to 4 years)

continuous network meetings
(3 to 4 meetings per year)
content:
- site inspection
- lecture on an efficiency topic
- presentation of realized measures
- general exchange of experiences

Completion:
- communication on results
- decision, if network will be continued

Monitoring of results

Communication on network activities

Measures summary –
the same tool: energy audit and yearly monitoring

	New measure · Conversion to MWh · Delete measure Name of measure	Purchased electricity	Light fuel oil	Wood chips	Time of use	Investment eff.	Additional investment (eff.)	Net present value (10%)	Internal rate of return i*	Static amortisation time	Dyn. amortisation time (10%)
	Energy savings [Unit]	[MWh/a]	[MWh/a]	[MWh/a]	[a]	[€]	[€]	[€]	[%]	[a]	[a]
	Investment today eff. (profitable measures)					110.000					
	Sum profitable measures	290	600	-290	15		120.000	370.000	54,0%	1,8	2,1
	Sum all measures	290	600	-190	20		340.000	330.000	23,0%	4,3	6,0
E03	Reducing electricity consumption (Base load)	65,0			10	2.000	2.000	41.065	350%	0,3	0,3
V01	free outflow of waste air via roof during summer	15,0			10	500	500	9.438	323%	0,3	0,3
L01	Retrofitting: mirror reflector/ clear screen cpping	30,0			10	3.000	3.000	16.876	108%	0,9	1,0
E04	Retrofitting:Eff1-drives	70,0			10	7.300	7.300	39.077	103%	1,0	1,1
H05	Biomass: Reduction the flow temperatur in the heating circuit		500,0	-500,0	15	25.000	25.000	126.643	80%	1,3	1,4
CA02	Reduction of the pressure in the compressed air network	38,0			10	7.000	7.000	18.176	58%	1,7	2,0
E02	Using standby set to reduce peak loads				10	3.000	3.000	7.446	56%	1,8	2,0
E01	Reduction of peak load				10	5.000	5.000	8.211	42%	2,3	2,8
OR01	Installation of an energy management system	50,0	14,0	11,0	15	20.000	20.000	29.618	32%	3,1	3,8
H06	Utilisation of waste heat from the injection moulding			200,0	10	10.000	10.000	9.137	29%	3,2	4,1
CA01	Retrofit heat recovery for compressor AM-37		85,0		10	15.000	15.000	13.158	28%	3,3	4,2
L02	Retrofitting of energy efficient lamps with electronic ballast	20,0			10	12.000	6.000	4.178	25%	3,6	4,7
C01	Insulation of refrigerant pipes and fittings	1,0			10	500	500	163	17%	4,6	6,5
C02	Utilisation of waste heat from cooling processes		259,0		10	68.000	68.000	17.798	16%	4,9	7,0
REN01	Installation of a photovoltaic system (PV)				20	120.000	120.000	-27.202	7%	11,0	-1
H02	Insulation of burner plate		1,0		10	500	500	-169	1%	9,3	27,5
BG01	Energy-efficient refurbishment of shed roof			100,0	40	150.000	100.000	-83.882	-1	60,7	-1

Energy Efficiency Networks – from an idea of an engineer to an accepted policy instrument

- Switzerland

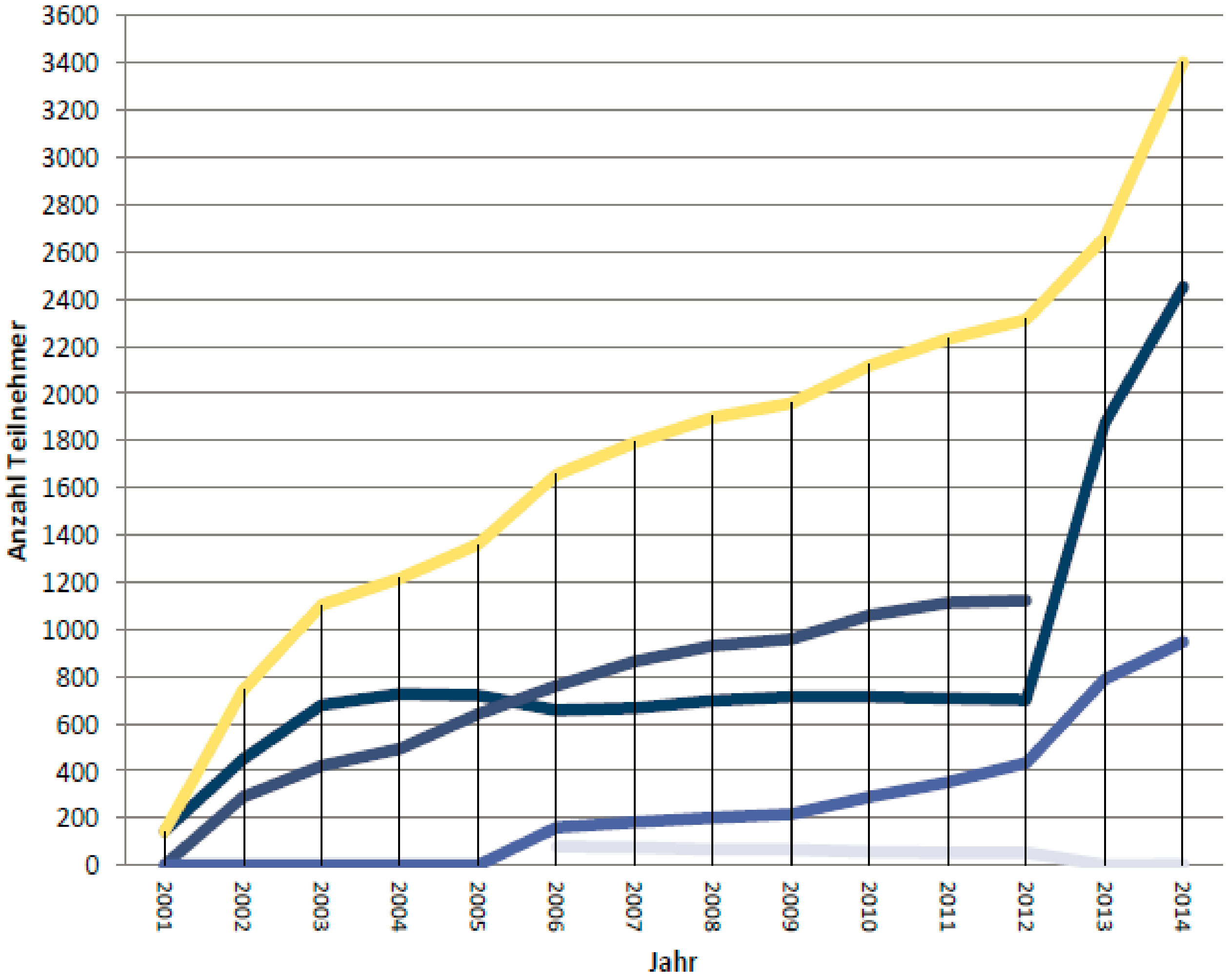
1987: First network in Switzerland (Zurich), invented by Thomas Bürki, a Swiss consulting engineer

the 1990s: replication and improvement of the Modell Zürich as EnergieModell Switzerland, funded by the Fed. Office of Energy

2002: The Law on the CO2 surcharge: companies with target obligations, confirmed by the EnAW, are exempted from the surcharge
surcharge: 2008: 12,- CHF to 2016: 72,- CHF per tonne of CO2

2015 : 90 networks and in addition 900 small and medium sized companies, totalling to 3500 production sites

Energy Efficiency Networks – from an idea of an engineer to an accepted policy instrument



90 networks a la „Zürich“ with 900 participating companies

900 SMEs in the SME-Model

Total: 3,500 production sites

Benchmark Model was stopped in 2013 in favour of SME-Model

Transport networks were labelled as normal networks in 2015

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Energy Efficiency Networks – from an idea of an engineer to an accepted policy instrument

- **Germany**

2002: first energy efficiency network in the region of Hohenlohe

2006 – 2008: 5 pilot efficiency networks in five regions of Germany

2006 – 2014: Development of the "Learning Energy Efficiency Network" Management System (LEEN MS) (100 supporting documents, 20 calculation tools) establishment of 30 pilot networks with 366 companies funded by the Federal Ministry of environment

2014: foundation of the association of energy efficiency networks in Germany (AGEEN) www.ageen.org

- Dec. 2014: voluntary agreement between Fed. Government and 20 associations of industry to initiate 500 networks until 2020 (expected savings: 50 PJ fin.en)

2015: about 80 energy efficiency networks operating or already finished, involving about 850 production sites

Energy Efficiency Networks – from an idea of an engineer to an accepted policy instrument

- Austria

2012: first energy efficiency network (LEEN) in Vorarlberg

April 2014: 2nd LEEN network in Austria operating (ENAMO)

July 2014: legislation passed the Austrian Parliament demanding a "measure-based" prove that the customers of energy suppliers have reduced specific energy demand by 1 % per year

August 2015: five energy efficiency networks operating

- Easy diffusion of the policy instrument (all supporting elements of the network management in German, high pressure on the energy suppliers)

Energy Efficiency Networks –
the case of China 2011 to 2015

- China:
  - Chinese delegations visited the Fraunhofer Institute and EnAW in 2011 and 2012
  - Invitation for training 50 consulting engineers and 50 moderators in 2012 and 2013
  - all trainee courses in China over three weeks were professionally shooted

- Chinese efficiency legislation: of 2012   the State Grid Company has to prove an energy efficiency improvement of their customers of at least 1% per year
- The State Grid Company decided to generate some 500 energy efficiency networks within 3 years.
- In 2014, 525 networks were in operation.
- However, little competence and poor performance

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Energy Efficiency Networks –
- an accepted policy instrument

➢ Outlook

- 2015: interest in the energy efficiency networks in
  - Sweden (Energy Agency)
  - Belgium (regional institution)
  - Mexico (regional instituion)
  - Brasil (consulting engineering company)

➢ EU-Proposal pending (Poland, UK, Belgium, Spain, etc.)

➢ Target groups for network operators in the case of market situation :

large utilities; energy agencies,

but also: city governments, Chambers of Commerce, consulting engineers, applied research institutes

Thanks

for contributing to a

sustainable development in the global context !

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