

Doubling the progress of energy efficiency in industry by learning energy efficiency networks

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Agenda

- Fraunhofer Society and ISI (Institute for Systems and Innovation Research)
- The concept of the Learning Energy Efficiency Networks (LEEN)
- Evaluation of 30 pilot networks – 366 production sites
- Results of the 30 pilot networks
- Outlook to 2030 : 900 energy efficiency networks and 10,000 companies in Germany

Fraunhofer Society / ISI /

Fraunhofer Society (founded in 1952)

- 67 Institutes of applied research (1972: 25 institutes)
- about 23 000 employed people ,
- basic 25% funding by Fed. & Länder governments

Fraunhofer Institute of Systems and Innovation Research
7 Competence Centers (250 employed people)

- CC Energy Technologies and Energy Systems
 - since 2002 developing the „learning energy efficiency network“ management system LEEN
 - In co-operation with its spinoff „Institute of Resource Efficiency and Energy Strategies (IREES);

LEEN limited – a joint spinoff of Fraunhofer ISI an IREES

- training of consulting engineers and moderators
- supporting initiators and network operators in countries, interested in the networks

The concept of the Learning Energy Efficiency Networks (LEEN)

developed between 2002 and 2014

(100 elements and 20 calculation tools of the network system)

How does an industrial Energy Efficiency Network operate ?

1 Initiation

Akquisition of companies, Letter of Intent and first meeting (with press and local media attention)

2 Energy Audit

Data collection, on site investigation, report with list of recommended measures performed by a certified consulting engineer

3 Target setting

Joint targets for Energy Efficiency and CO₂-mitigation

4 Network meetings with mutual exchange of experiences

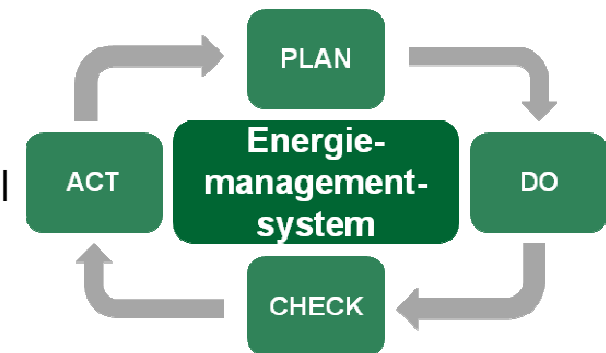
Checking the performance by yearly **Monitoring** of individual participants (confidential) and the network (public)

Vorteil :

Energy audit report + list of measures are



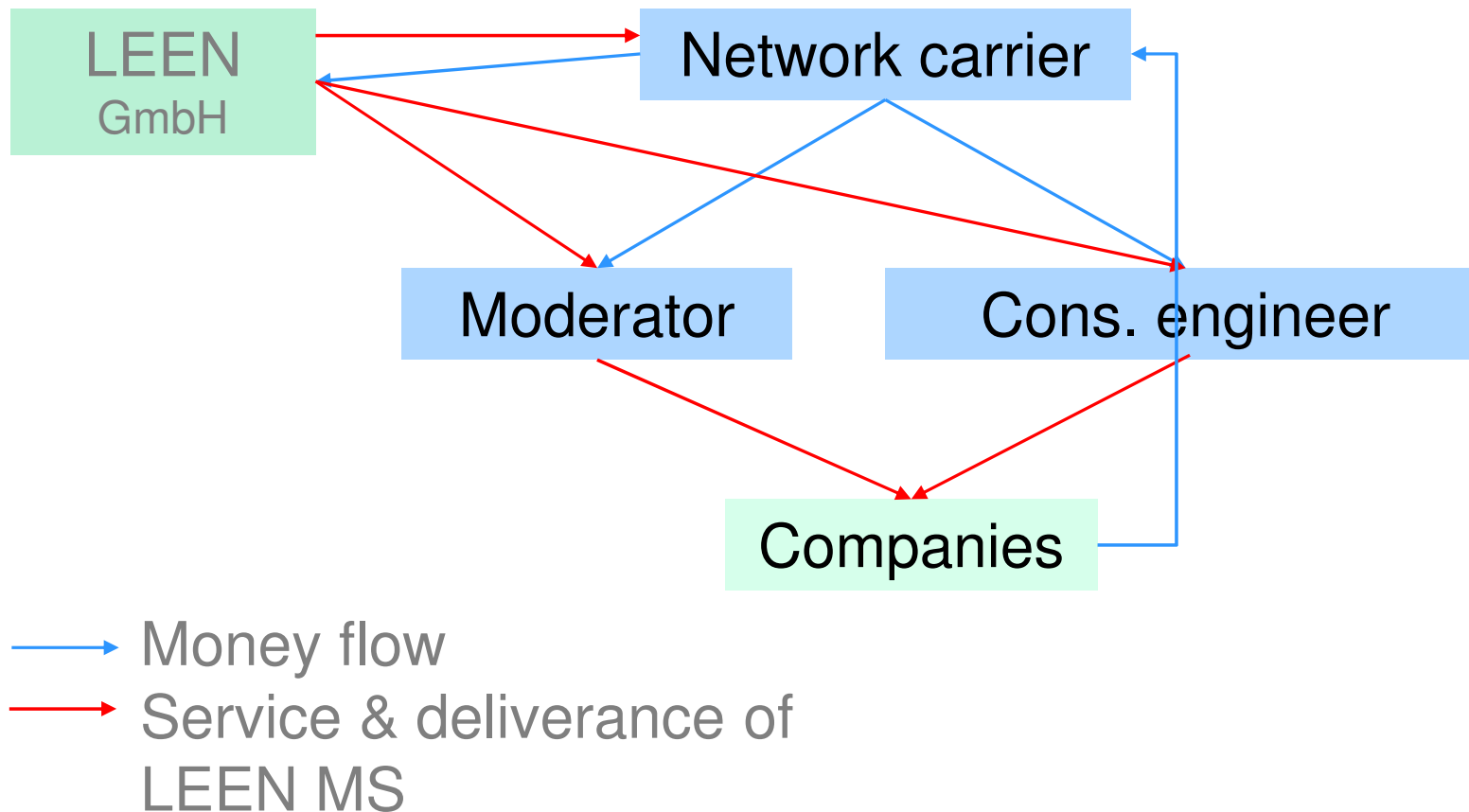
ISO 50001 conform and auditable according EN 16247



Why a specific standard is called LEEN?

- LEEN are Learning Energy Efficiency Networks:
a group energy managers of 10 to 15 companies are working together for at least three to four years
- The participants of a LEEN Network
 - Invest more in profitable energy efficient solutions than non participants
 - Increase their energy efficiency on average twice as fast as the average of their branch
 - Comply with essential parts of standards such as ISO 50001 or EN 16247
- LEEN networks are suited for companies / production sites operating at yearly energy costs of
 - 500,000 € to 50 Mill. € (classic)
 - 50,000 € to 500,000 € (SMEs, Mari:e)

Organisational structure of the EnergyEfficiency Networks



The core of the network's success

Exchange of experiences among colleagues (10 to 15)

- 4 times per year a daily meeting over at least 3 - 4 years
- well prepared, moderated and taken minutes by the moderator
- including a site visit and presentation of an expert on a chosen topic
- Topics: cross cutting technologies or organisational measures
- Financial options, present efficiency policies



Calculation tools for investments supporting the energy audits

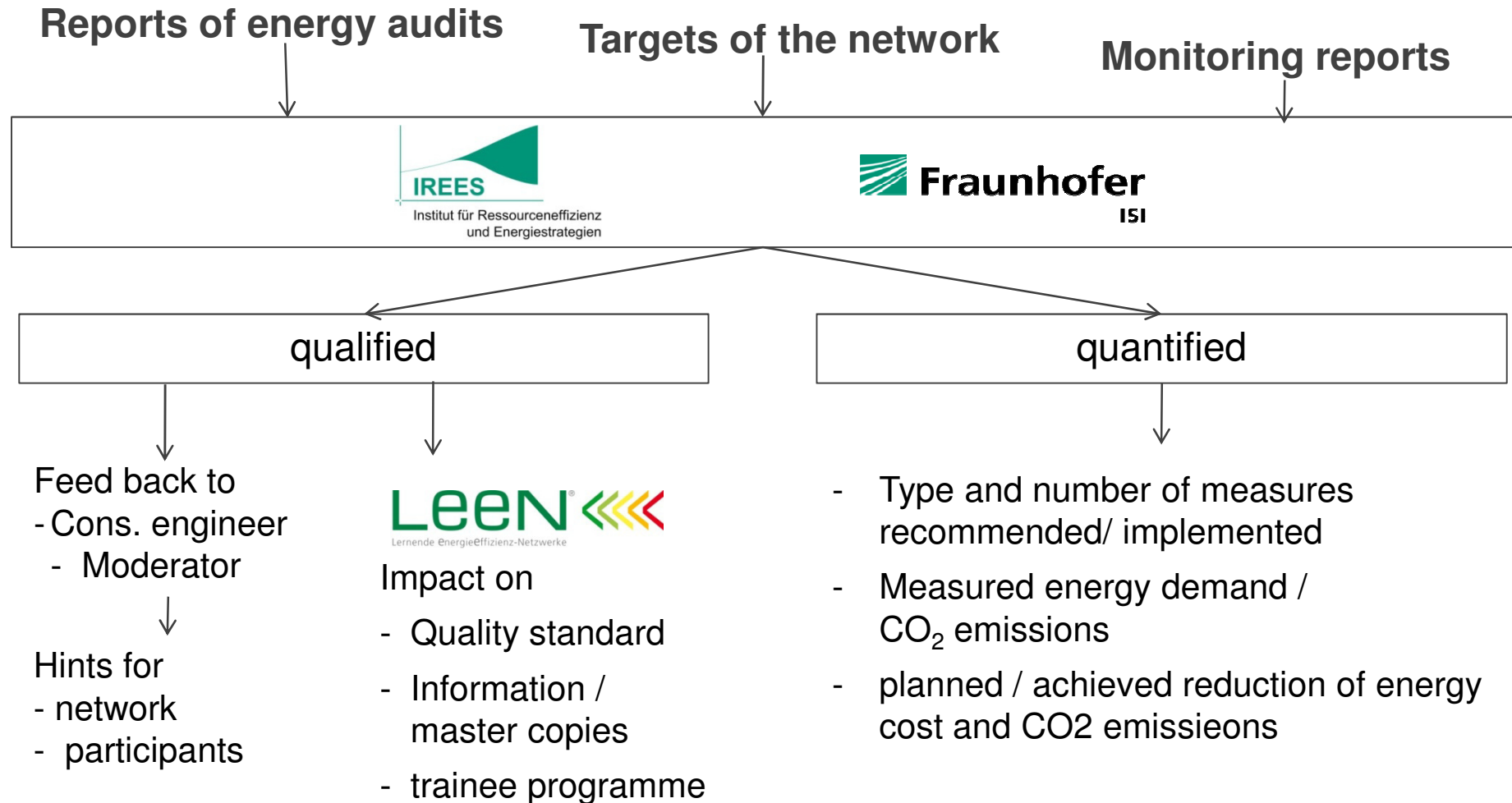
- 100 measures to be identified and calculated by means of 15 calculation tools
- **Flexibility und time savings** in applying them
- **Userfriendly surface**
- **Full documentation available**



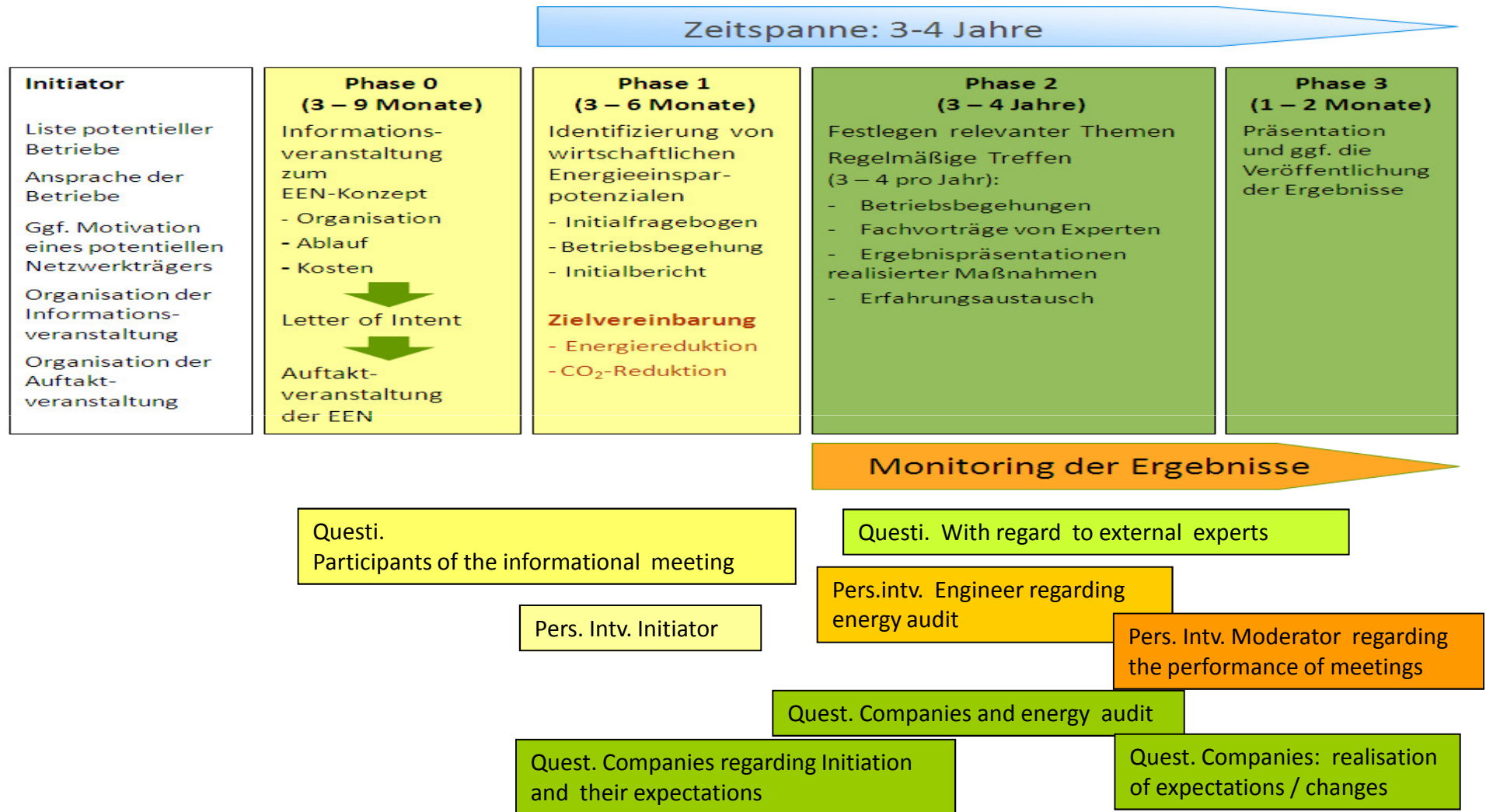
Investitionsberechnungshilfe (Tool)	Anzahl Einzelmaßnahmen
Öl-/gasgefeuerte Warm- und Heisswasserkessel	8
Öl-/gasgefeuerte Dampfkessel	10
Motor-BHKW	2
Holzgefeuerte Warm- und Heisswasserkessel	2
Elektr. Wärmepumpe	3
Brauchwarmwasserbereitung	5
Thermische Solaranlage zur Warmwasserbereitung	1
Abwärmenutzung aus Prozessen (ohne Stromerzeugung)	4
Raumluftechnik	7
Beleuchtung	7
Druckluft	23
Kälteerzeugung	8
Freie Kühlung	3
Elektr. Antriebe - Motoren	2
Elektr. Antriebe - Regelung von Pumpen und Ventilatoren	5
Wärmedämmung von Rohrleitungen, Luftkanälen, Behältern, Armaturen usw.	2
Baulicher Wärmeschutz	4

Evaluation of 30 pilot networks – 366 production sites

Energy demand, CO₂-Emissions, Measures



Personal interview (Pers.Intv.) and Questionnaires (Questi)



Results of the 30 pilot networks

Average figures of an average participant

Measures per production site

Ø 19 Measures, of which



Ø 10 profitable ($i \geq 12\%$) mit

- Ø 2.700 MWh/a Energy savings
- Ø 940 t/a CO₂ reduction
- Ø 580.000 € Investment
- Ø 180.000 € yearly energy cost savings



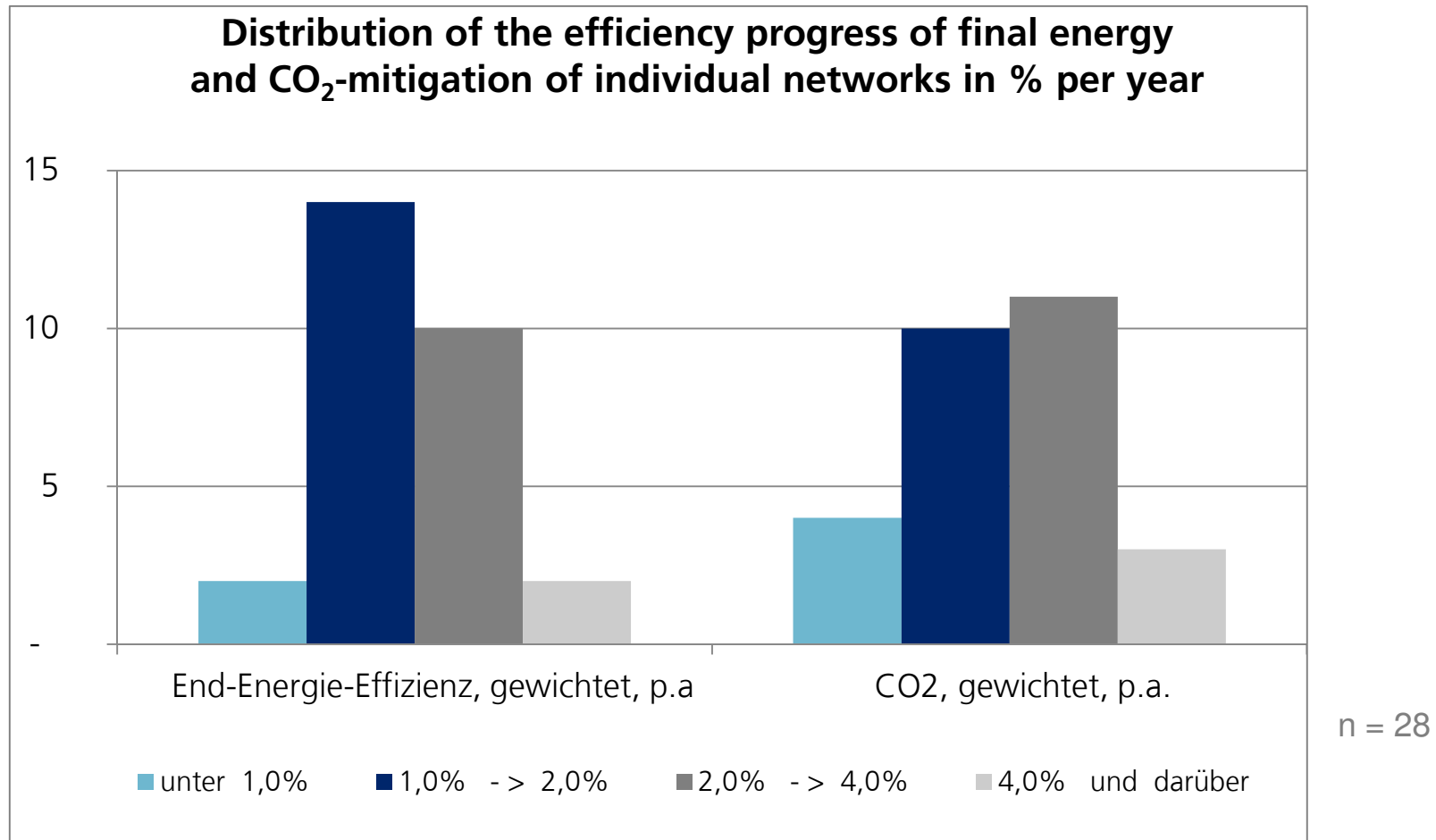
Ø rate of internal return of all profitable measures 31%



CO₂reduction with substantial profits not with losses

Datenbasis 366 Initialberatungsberichte

Networks double the progress of energy efficiency compared to the average of non-participants

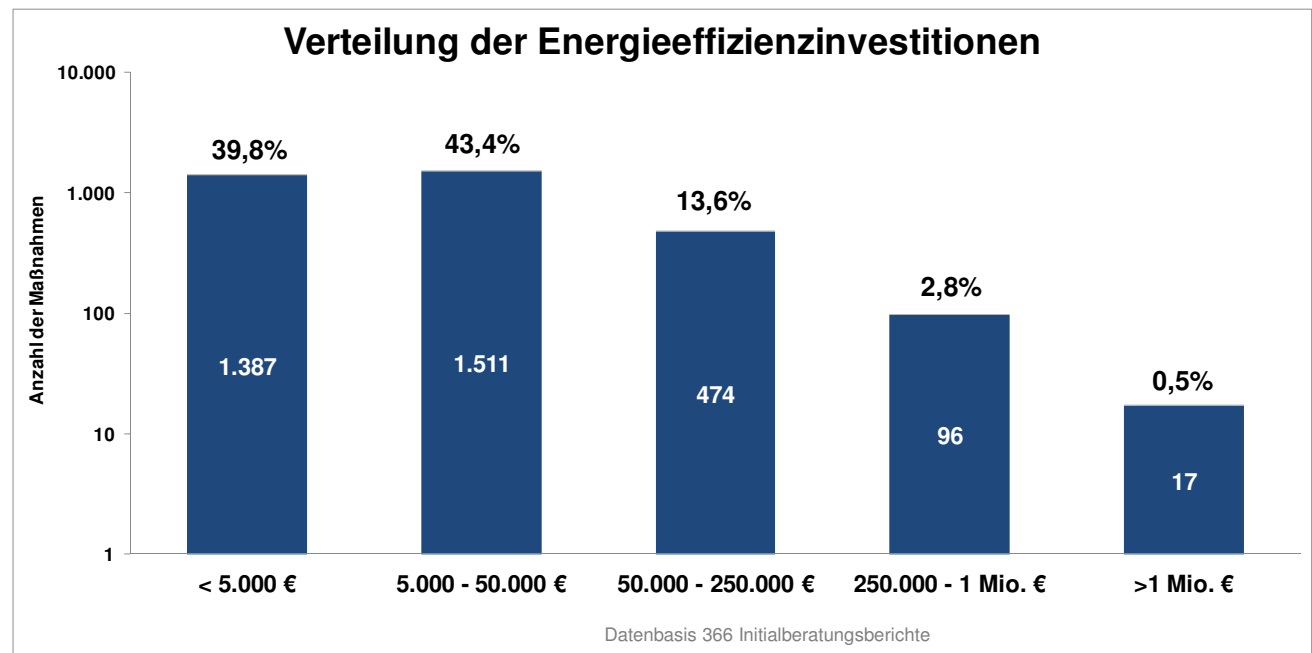


Investments in energy efficiency as a chance for banks

- Obstacles of long term investments in energy efficient solutions
 - Focus on risks (payback time), neglecting the high profitability (int. rate of return)
 - Preferential financing from cash flow (which is often used for strategic investments)

- Financing energy efficient solutions is **a chance for contractors and banks, however:**

- expectation on the minimum size of the investment is higher than 50.000 €
- if contractors and banks are not flexible, citizen funds and crowd financing will occupy this market of small investments



Results / experiences from 30 pilot networks

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

- ✓ Faster gains in additional knowledge
 - Hands on efficiency investments realised by the production site visited,
 - Presentations by experts focused on the questions of participants
 - Exchange of experiences among colleagues
- ✓ Trust and co-operation among the energy managers (closed group of 10 to 15 participants)
- ✓ Idealistic competition and acknowledgement among each other

➤ **Observations**



- ✓ Improved position of the energy manager in the company
- ✓ reduced energy cost increases available capital in the following years
- ✓ CO₂ mitigation (**average: 2,4% per year**) leading to a „green image“ at the side of customers, the staff, and their social groups

Outlook: Potentials of the energy efficiency networks for medium sized companies in Germany until 2030

Switzerland has 90 energy efficiency networks today;
Germany is ten times as big as Switzerland –
i.e. also the potential of the energy efficiency networks should be tenfold

- 900 networks and 10.000 production sites in 2030 under similar framework conditions like in Switzerland
 - at 25 billion € yearly energy cost and cost reductions due to efficiency of some 2.3 billion € /a
 - with investments needed of 8 Billion € and 10 Mill. tonnes/a less CO2 emissions

Impacts:

- lower energy cost  more competitiveness of the company
- more demand for innovative products from manufacturers  more exports

Energy Efficiency Networks

a policy instrument of industry for industry



Further information :

www.energie-effizienz-netzwerke.de

www.marie.streks.org

www.leen.de/en/

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