[GERMANY] Energy Efficiency Networks Initiative

Initiative Energieeffizienznetzwerke

About the measure

Policy instrument	Sector	Starting date and status
Cooperative	**Industry + Tertiary**	**2014 – on-going until 2020**

An Energy Efficiency Network (EEN) is a group of companies or public institutions whose energy managers **meet regularly** to share experiences on energy savings and to implement solutions. Switzerland developed and implemented the concept of Energy Efficiency Networks (EENs) in the 1980s and 1990s to foster profitable energy savings in the industry and the commercial sector.

The concept of EEN was first transferred and adapted to Germany in 2002 in a first pilot network, which was financially supported by the Ministry of Environment of Baden-Württemberg. After a second pilot phase with four networks, a network management system was developed. From 2008, the "30-Pilot-Networks" project (Mai et al. 2016) introduced the so-called Learning Energy Efficiency Networks (LEEN) concept. LEEN are groups of 10 to 15 participants, companies or public institutions, which meet around four times a year over the course of three to four years, as agreed upon in a first contract.

Consequently, the concept of EEN has gained a growing interest in other countries (Mai et al. 2016 and IPEEC 2017).

In 2014, the Federal Ministry for Economic Affairs and Energy and the Federal Ministry for Environment introduced the **Energy-Efficiency-Networks Initiative (IEEN)** as a **voluntary agreement** scheme. The German Government and industrial associations and organisations will support the creation of **500 new EENs until 2020**. **No direct financial support** is paid to the participants by the federal government, however three (of 16) state governments do offer financial support schemes for EENs on their own. The German Energy Agency (Deutsche Energie-Agentur – dena) is the head office of the IEEN since December 2015. The IEEN plays the role of a national and neutral entity for EENs in Germany. As of August 22nd 2018, 190 EENs have been registered. This includes LEEN-networks as well as other models, like REGINEE or adapted Ökoprofit-Clubs.

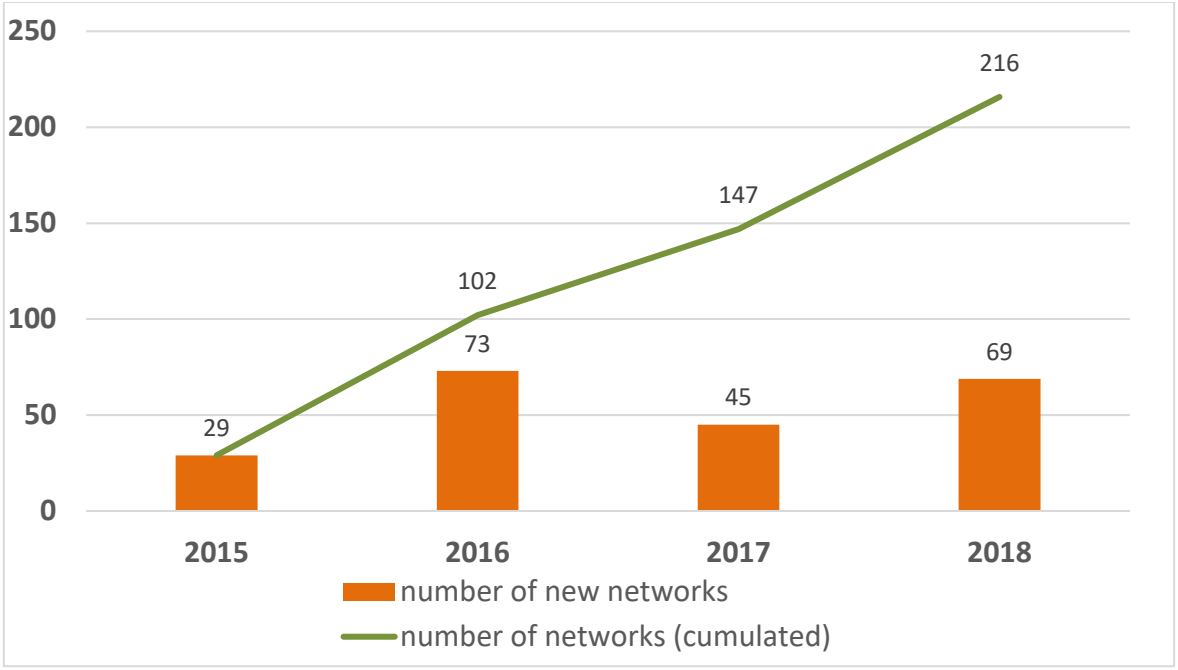
For registration at the IEEN, EENs have to fulfil the following minimum criteria:

- have been founded after December 3rd, 2014
- agree to at least 2 years running time,
- have at least 5 participating companies or company sites in Germany
- be supported by qualified moderators and internal or external energy consultants
- define a common energy saving target (at the latest one year after foundation), and
- participate in the monitoring process of the IEEN

Expected energy savings in 2020	Benchmark
75 PJ/y (20.8 TWh/y) primary energy savings and 5 Mt CO_2-eq./y in cumulated annual savings in 2020 from actions implemented over 2014-2020.	21% of German NEEAP (NAPE) immediate action savings target (350 PJ/y primary Energy in cumulated annual savings in 2020)

The EPATEE project has received funding from the European Union's Horizon 2020 Research and innovation programme under grant agreement No 746265.

Means and outputs



Note: 2018 data are based on a prognosis from 43 networks as of August 23rd, 2018.

Figure 1: number of new networks and cumulated number of networks 2015-2018. Target: 500 networks until 2020.

The figure shows the number of established networks in the years 2015 to 2017. Although the programme started in December 2014, no network was fully founded until January of 2015.

The bars show the new networks each year. The line shows the cumulated networks in place each year. The goal is to achieve 500 networks in place by 2020.

The average number of companies per network was 12 among the large companies and 10 among the SMEs. The **216 networks** founded until 2018 included about **2300 companies**.

Since the Energy Efficiency Networks Initiative is not a financial incentive programme, **no costs to the public hand are evaluated**. Administrative costs of the networks are financed by the network participants, who can in some regions or federal states apply for financial support in separate programmes. **Network participation costs vary between 1000 and 5000 Euros per company and year**. Each network has organised an average of **four meetings per year** for which network moderators invested about 20 working hours per meeting.

Data about energy savings

Unit	Main source of data
Cumulated annual primary energy savings [PJ] for targets;	Intermediate monitoring report of the Energy Efficiency Network Initiative (2018, unpublished); Durand et al. (2018)

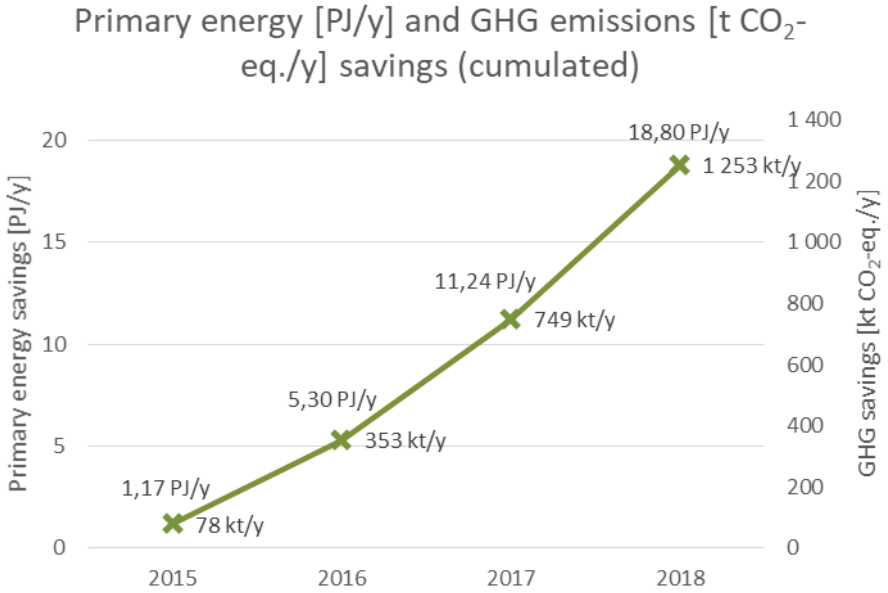


Figure 2: Primary energy [PJ/y] and GHG emissions [t CO2-eq./y] savings (in cumulated annual results) based on network-defined targets.

Each network defines a **savings target** upon foundation. That target should be achieved in a set timeframe, normally between **two and four years**. The Energy Efficiency Network Initiative requires a minimum of two years of network operation. However, more specific types of network like LEEN set a longer timeframe (3 years). The Working Group of Energy Efficiency Networks in Germany recommends a minimum operation time of 3 years. While the number of years is defined initially, many networks continue network operation after the set timeframe. Additional targets may be defined. Sometimes, network participants may step out of an EEN or be replaced by another company for a second iteration of the network.

Figure 2 displays cumulated gross annual primary energy and CO_2 savings targets of networks established between 2015 and 2018.

Average savings targets per network were 31.8 GWh/y of final energy which corresponds to 0.15 PJ/y primary energy (PE Factor 1.334) per network. 76 % of energy savings targets were under 25 GWh/y, 17 % between 25 and 100 GWh/y and 7 % over 100 GWh/y as shown in Figure 3.

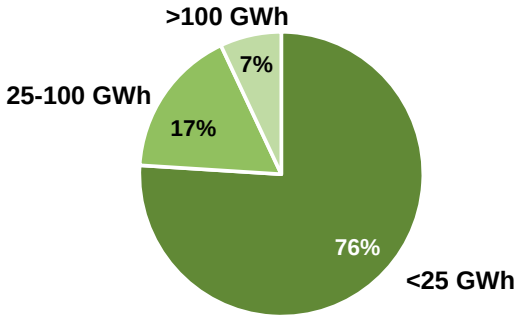


Figure 3: Energy saving targets distribution (GSIEEN 2017)

Under the assumption that the initiative successfully initiates 500 networks until **2020**, the current average energy savings target would lead to cumulated annual energy savings of **76 PJ/y** and therefore would surpass the policy target of 75 PJ/y. Applying a CO_2-Factor of 66.667 t CO_2-eq. per PJ of primary energy shows emissions savings of **5.1 Million tonnes of CO_2-eq./y** surpassing the policy target of 5 Million tonnes per year.

Sources of uncertainties about energy savings

The mentioned savings are likely **underestimating the actual savings** because it is safer for network participants to set the ex-ante target lower than possible to not miss it. In a second step of evaluation after predefined network operation time, companies are evaluated for network achievement. The participant companies are **surveyed for their energy savings** using an extensive questionnaire including description of energy efficiency action, status before implementation, savings calculation and baseline calculation, energy source with reduced consumption, newly implemented energy source in case of a change in energy sources. Actual savings are then compared with network savings targets. Preliminary results of a first sample group point towards an **average target achievement of 110%** of the predefined network target. Under the assumption of the successful institution of 500 networks until 2020, the 75PJ/y policy target will be considerably surpassed.

The mentioned survey method bears uncertainties because no physical on-site measurements are performed. Hence, submitted savings cannot be easily verified. To limit this uncertainty, a **verification** is performed for **randomly selected 10 percent** of the participants. Of these companies, documentation like audit reports or project documentation is requested. However, the verification occurs document based. No on-site measurements are performed.

Evaluation of the energy savings

Calculation method(s) and key methodological choices

- Gross cumulated annual final energy savings are set as **network targets**.
- Final energy savings are surveyed after network operation time. Participants can use **metered energy savings** (Method 1 or Method 2) or **deemed savings** (Method 3 or Method 4) or **scaled savings** (Method 5)
- The baseline is either **minimum standards** or **before** energy consumption or, whichever is higher. In case of a new installation, a **minimum standard** is used. When not available **market averages** are used. No adjustment factors are applied.
- Additionality in the sense of the EED is addressed using the baseline of minimum standards to avoid double counting with existing minimum requirement policies.

Ex-post verifications and evaluations

Evaluation and implementation are strictly separated. While the implementation and rough assessment is performed by the head office of the IEEN (DENA), the evaluation at the end of the predefined network runtime is performed by an independent institute (Fraunhofer ISI) that is not involved with the implementation of the network initiative.

The evaluation follows a three-step method. The first step is a rough assessment and is performed by the IEEN head office. Savings targets that are defined by the networks upon initiation are used for the rough assessment of savings. Distinction between SMEs and large companies is possible at that stage. After the end of the network operation time, a detailed evaluation is performed using a survey to participating companies. Actual energy savings are collected and compared with the savings targets. For verification of the survey responses, a randomly selected sample of companies is required to deliver documentation for savings. However, no on-site physical measurements are performed by neither the IEEN head office nor the evaluation institute.

Other indicators monitored and/or evaluated

Indicator	Explanations
Number of companies per network	Network categories by number of companies
Network runtimes	Categories <24 months, 24-29 months, ≥ months
Network location	By German federal states
Network type	Distinction between sector-internal networks and inter-sector networks
Company size per network	Large (>250 employees), medium (50-250 employees), small (<50 employees)
Type of savings data source	ISO 50001, Alternative energy management systems, EMA, Energy audit according to DIN EN 16247-1
Savings on company level	Savings calculation per participant company
Savings per company size	Savings calculation per company size
Energy efficiency actions	Type of energy efficiency action (e.g. lighting, heating, motors...)
Savings per action	Savings calculation per action type

Other aspects evaluated

The head office of the IEEN frequently runs a survey among network participants to improve the programme and administration process (GSIEEN 2017).

In the end of 2016, 48 EEN operators, 41 moderators and 53 companies were interviewed by telephone. Some selected results of the IEEN-survey are presented in Figure 4 below. The key results are as follows: 73 % of companies are exceptionally or very satisfied with their network and 94 % of companies would recommend network participation to other companies. Consequently, a large majority of the companies (83 %) evaluate cost-benefit ratio of network participation as good or very good.

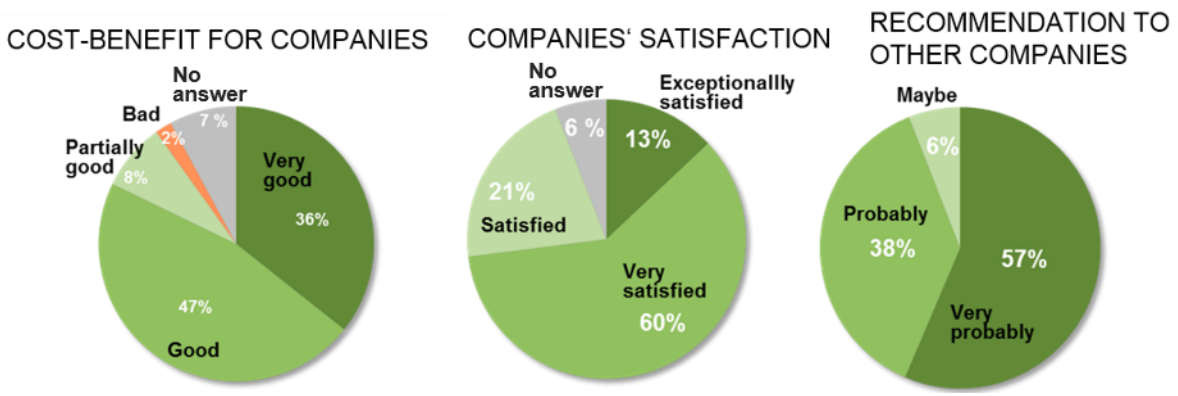


Figure 4: Company opinions on cost-benefit ratio, company satisfaction and recommendation to other companies (n= 53 companies) (GSIEEN 2017).

Due to the **good results** and **positive experiences**, more and more EENs decide to **continue their work after an EEN-cycle**. This means, after having completed all EEN-phases (foundation, operation and monitoring) within the agreed running time, EENs decide to perform all EEN-phases again within a new running time. In this case, EENs have the possibility to register again at the IEEN as a new network.

The **survey results** also showed that (Durand et al., 2018):

- 24 % of EEN operators and moderators are energy supply companies, 21 % are associations of different economic and industry sectors, 16 % are energy consultants, 14 % are chambers and the rest are organizations of different kind,
- common topics in EEN meetings are: experience exchange, energy efficiency measures development, expert presentations, site visits, Energy Management System (EMS), regulatory frameworks, cross-sectional technologies, founding programs, measurement concepts and energy supply,
- around 4 working days (on average) are required to convince a company to join an EEN,
- on average, 4 network meetings are organized per year,
- EEN moderators need 20 working hours to prepare an EEN meeting on average, and
- network participation cost for companies varies between 1,000 and 5,000 Euro per year.

Focus on participation barriers and data protection

The Energy Efficiency Network Initiative (IEEN) is based on a voluntary agreement of companies participating in an Energy Efficiency Network. One of the important issues for voluntary agreements is the barriers to participate. A policy like the IEEN that is so highly placed in the government's energy efficiency action plan (NEEAP) and with an ambitious target of founding 500 networks in six years should try to avoid barriers to participation as far as possible.

The IEEN therefore deviates from existing (regional) EEN methodologies like LEEN in setting less requirements and tries to **reduce barriers** using the following means:

- Lower minimum network runtime
- Lower minimum number of companies per network
- Flexibility with minimum requirements
- Limitation of extensive evaluation to one time only after the network runtime
- No penalties for missing the target
- Possibility to exchange participants during the runtime and adjustment of network targets
- Strict guarantees of confidentiality of sensitive data

Energy efficiency actions are often very fundamentally ingrained in business operation. Hence, network activity necessarily includes the disclosure of sensitive business information. The participants have an interest to know their data to be secure and not disclosed to other companies, nor a federal ministry of other public offices. It implemented a secure way to **guarantee data safety**:

- The evaluation institute is strictly separated from the head office. Employees in charge of the IEEN evaluation cannot be part of LEEN or other organisations.
- Raw data from the head office are not shared with the evaluation institute except for anonymised data immediately necessary for the evaluation.
- Each network has a network moderator that organises the meetings and serves as a contact person for the head office and the evaluation institute. The moderator can be an independent entity, but there are no limitations.
- The moderator is contacted by the evaluation institute about savings data.
- The moderator then collects them from the participant companies and checks them for completeness and formalities.

- Data are then transferred to the evaluation institute.
- Only verified employees who are in direct contact with the project have access to the database.
- At no point is raw data transferred to other companies, networks or public institutions.
- Most of the data collection and introduction to the database is automatic.

Figure 5 displays the **organisation structure** of the Energy Efficiency Network Initiative that guarantees data protection.

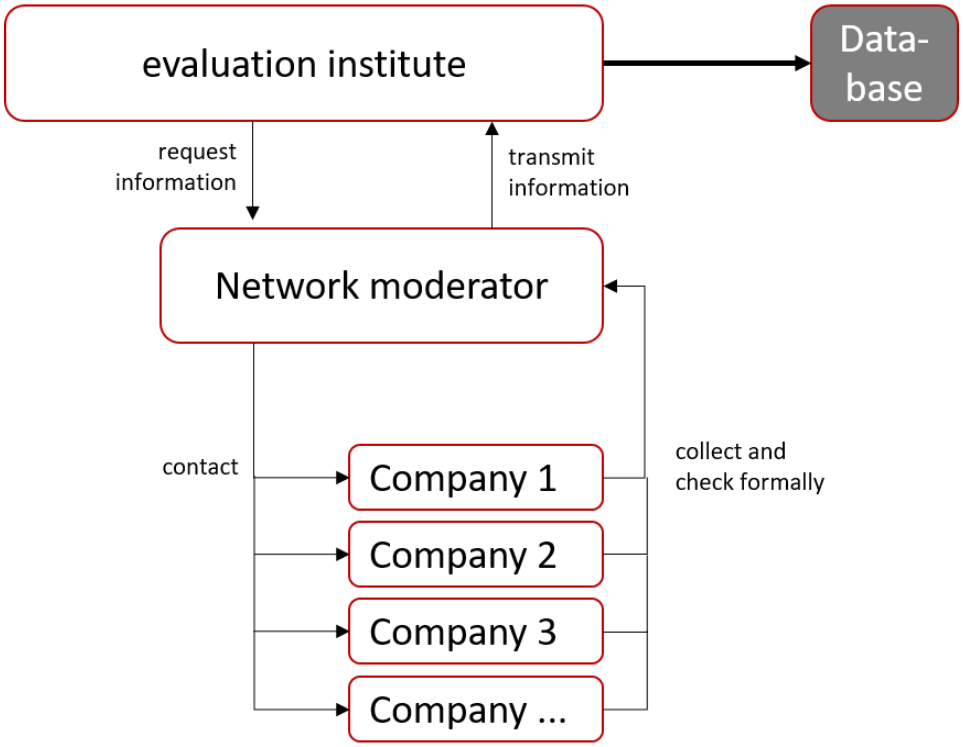


Figure 5: Organisation structure of IEEN

Experience feedback from stakeholders

1. What is your role in the implementation and evaluation of the networks initiative? What is your professional background?

I am working in the networks project administration. We register the networks and verify that they meet the minimum requirements. At the latest one year after registration, each network has to define an energy savings target. Using these targets we estimate the network impacts bottom-up. Frequently each network transmits aggregated data about actual savings to us. Finally, we forward these data to an independent monitoring institute for target achievement. Furthermore, they analyse a sample of 10% in more detail.

2. What is the role of evaluation in the management of the networks initiative? Which overarching goal is being followed? What is the relation to monitoring activities?

The monitoring institute does not get in direct contact with the network participants to guarantee the independent evaluation. Administrative costs are not central to the evaluation because they are relatively low.

However, networks are considered a crucial instrument for climate protection that requires evaluation and consequently requires participants to hand in proofs of savings. Due to the large size of the networks initiative, reporting obligations to the EU in EED Article 7 are in place.

Furthermore, in the political arena, critical inquiries arrive from the press, societal organisations and the general public.

3. What were the main lessons learnt from the evaluation of the networks initiative? What impacts of the programme could be observed and what could be improved?

The initiative was founded in December 2014 and will (for now) run until the end of 2020. The administrative agency has been commissioned in 2015. The monitoring is running since autumn 2017. The first reliable data for network performance will hence only be available towards the end of the network action period. Until now, the sample size for evaluation is small, but it will be larger in the next evaluation round.

In the full aggregate, the networks are a relatively successful instrument. It is based on voluntary participation and does not offer financial incentives to participants. It is destined at companies whose focus of activity is on other things than energy efficiency. Therefore, 160 established networks to date can be seen as quite a success. It needs stronger growth to reach the targeted 500 networks, but each network consists of over 10 companies bringing the overall number of participant companies up to well above 1000.

The self-defined targets are often relatively low which leads to a tendency towards over-achievement rather than under-achievement. While the target number of 500 networks may not be reached until 2020, the 75PJ (20.8 TWh) savings target is within reach making the networks initiative among the most successful policies in the NAPE (National Action Plan for Energy Efficiency) policy set.

The bandwidth of large and small networks is very wide. The formers are considerably increasing the average savings per network on the aggregate. Apart from that, networks can enter a second round and achieve additional energy savings. If such a second round can be counted as a second network, then achieving the 500 networks may become feasible.

One criticism is the low number of requirements and the varying network runtimes. This way networks adjust very much to the necessities of the participants, which can on the one hand reduce barriers to participate and lead to more savings, but on the other hand, it gives away control about the governing of the network initiative. This trade-off can probably be called the biggest challenge.

Each year, a survey is conducted among the network administrators and the participants and the

feedback from both sides is almost exclusively positive once they are part of the programme. That is good news for the continuation of the initiative.

4. What were the lessons learnt in terms of evaluation practices? What has proven good or not so good?

From an efficiency and effectiveness point of view, the evaluation practice is very good. It requires relatively little effort. However, with a larger base of data more detailed analyses would be possible. These would make it possible to supply participants with benchmarks that could help them to improve the network performance. However, in an inquiry among participants whether they are interested in further data, only about half of the present company representatives showed interest.

The whole monitoring appears to be geared towards simplicity. The survey questionnaire has been shortened because company representatives recommend imposing as little effort as possible to participants. In this light, the two-step evaluation system of monitoring at the administrating agency and an independent evaluation has proven successful.

The development of the evaluation approach is interesting. The yearly conducted telephone survey has shown that the monitoring and the connected effort with supplying the data is becoming less of a barrier than it used to be in the beginning of the scheme.

Data transmission channels are different between the networks and depend on the level of trust within the network. Some participating companies exchange savings and other data between each other, some only transmit them to the administrators. Some companies and networks include an energy consultant as an intermediary for the monitoring commitments.

5. Are there other studies that provided insights about the impacts of the scheme and/or possible interactions with other policies or drivers (or barriers) for energy efficiency?

The network initiative is based on the 30 pilot networks and LEEN 100. Furthermore, in the scope of the NAPE, a top-down estimation of savings has been performed. Recently the concept of energy efficiency networks has been exported to other countries by the German Corporation for International Cooperation (GIZ). In the future, reports may become available from China for example. However, in most countries, the concept is still in a very early stage. In Switzerland, taking part in an energy efficiency network allows the participant to forego paying CO_2-taxes. Swiss networks are frequently evaluated.

6. Do you have further remarks about experiences with the evaluation of the energy efficiency fund that you would like to share

For now, I do not.

To go further

About the measure

- Official website of the initiative (in German): http://www.effizienznetzwerke.org
- MURE database entry:

http://www.measures-odyssee-mure.eu/public/mure_pdf/industry/GER54.PDF

Between 2009 and 2012 within the framework of the National Climate Initiative (NKI), the federal ministry of environment (BMU) supported 30 pilot network - projects. It comprised of 30 learning - energy efficiency networks established in Germany and was subjected to monitoring and accompanied evaluation. The results from these 30 projects demonstrated that the networking leads to an average progress increase of 2.2% in terms of energy efficiency in accordance with the specified quality standard. On the basis of this experience, there is a high potential in Germany for the networking of 400 to 700 large enterprises (with annual energy costs between 0.5 Million and 50 Million euros). Goal is the establishment of around 500 Networks with uniform minimum requirements up to 2020. These minimum requirements provide for conducting energy audits in each company and setting a savings target for each network based on individual corporate goa ls and harnessing potential savings in keeping with the network target. The networks will be assisted by a qualified energy consultant.

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Abstract:

The energy efficiency network (EEN) concept was first developed in Switzerland in the late 1980s and was adopted in Germany in 2002. During a long pilot phase be- tween 2002 and 2013, the lessons from 40 Learning EENs (LEENs) in Germany led to a certain format for regional EENs for SMEs and larger companies. By the end of 2014, the Energy Efficiency Network Initiative (IEEN) was launched as a voluntary agreement between the German government and currently 22 industrial and economic associations, to support the creation of 500 new EENs until the end of 2020. This paper reports on two aspects of EENs of companies in Germany:

1. The results of ongoing evaluations regarding German EENs following different operational formats in terms of duration, number of participants, network energy saving target, etc. The evaluations regard challenges and means to improve EEN-related work as well as first results of a rough assessment of the IEEN impacts regarding energy savings and emission reductions.

2. The long-term impacts on energy use, innovative activities and changed decision routines in participating companies of regional LEENs. This evaluation gives deep insights into achieved energy cost savings within an investment period, into the diffusion of efficiency-related knowledge into subsidiary companies within groups and into the reaction of machinery manufacturers and plant planners to the demand of more efficient solutions by network participants. Finally, this paper concludes with an analysis of the lessons learned from German EENs including barriers and challenges to initiate EENs as well as suggestions to improve EENs' promotion. The main finding is that EENs are not only a successful concept in terms of energy efficiency but it also offers multiple benefits to the participants such as innovative ideas for energy efficient solutions. However, a major challenge is to convince companies to join EENs.

Other useful references

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