

SUPPORTING ENERGY EFFICIENCY IN MAJOR ECONOMIES

G7 Hamburg Initiative for Sustainable Energy Security

Energy Efficiency Networks – An effective policy to stimulate energy efficiency

This paper has been prepared by the International Partnership for Energy Efficiency Cooperation in response to the mandate from G7 Members following the G7 Energy Ministerial in May, 2015.

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1. Introduction

1.1 G7 context

Energy efficiency is a crucial pillar in achieving the G7's goal of building and reinforcing resilient energy systems that are economically and ecologically sustainable. Thus Ministers at the G7 Energy Ministerial in May 2015 agreed to collaborate on three concrete energy efficiency initiatives, namely on networks in industry, products' market transparency and innovative financial instruments.

1.2 Purpose of study

Within the context of Germany's G7 Presidency in 2015, the German Federal Ministry for Economic Affairs and Energy (Bundesministerium für Wirtschaft und Energie, BMWi) and German industry worked together to introduce and discuss the concept of energy efficiency networks (EENs) in Germany at an international level.

The proliferation of EENs in Germany, triggered by a promotional program funded by the Federal Government, has brought many benefits to participating companies. This led the Federal Government to create a joint initiative together with 20 industry and business associations, which aims to initiate 500 energy efficiency networks of companies until end of 2020.

The German G7 Presidency has proposed to take the international exchange on energy efficiency networks one step further¹. This report takes stock of existing EENs across G7 and non-G7 countries, and highlights their best practices and success factors. This will serve as an inquiry into the potential development of international best practices and guidelines for EENs in order to lead the scale up of EENs internationally.

Two workshops – to be organized by IPEEC in 2016 – will provide a platform for exchange between policy-makers and potential network initiators, as well as an opportunity to further discuss design options of networks.

¹ <https://www.bmw.de/DE/Themen/Energie/Energieeffizienz/initiative-energieeffizienz-netzwerke.html>

1.3 Energy efficiency

Energy efficiency contributes to enhanced energy security and economic competitiveness, in addition to providing numerous social, environmental and economic benefits. According to the International Energy Agency (IEA)², energy efficiency will contribute 50 per cent in carbon dioxide (CO₂) emissions reductions for the world to be on track for the 2°C trajectory. The global investment in energy efficiency, which in 2014 was estimated to be between USD 310 billion and USD 360 billion with the need to quadruple in size, further validates its place as the world's first fuel³.

Optimising energy use in industry is essential to improve industrial competitiveness and to make progress towards energy security, economic recovery and development, climate change mitigation and environmental protection. In 2008, the IEA submitted 25 Energy Efficiency Policy Recommendations to the Gleneagles G8 Plan of Action. One of these recommended improvements to energy management capability in the industrial sector⁴.

Furthermore, the IEA estimates that there are substantial opportunities to improve industrial energy efficiency, with overall potential energy savings in the industrial sector in 2010 amounting to at least 26 Exajoule (EJ) per year by 2030 - which is equivalent to the current annual electricity consumption of the United States and China combined. These potentials are, however, not being fully realised due to a multitude of factors, including a lack of awareness, knowledge, inability to invest and institutional support within companies. Companies have a wide variety of priorities to cater to in running their day-to-day business, which means that economic energy efficiency potentials are often left unexploited⁵.

² IEA (2015) World Energy Outlook Special Report on Energy and Climate Change.

³ IEA (2014) Energy Efficiency Market Report.

⁴ IEA (2008 updated 2011) 25 Energy Efficiency Policy Recommendations.

⁵ Koewener et al. (2007) Energy efficiency networks for companies – concept, achievements and prospects.

2 Energy Efficiency Networks

2.1 Key aspects of energy efficiency networks

There is no single definition of EENs. Countries have established EENs in various forms and with various functions to address the many barriers to energy efficiency.

Common functions include: knowledge-sharing, capacity-building, consultation with experts, as well as uniting companies with a common interest. These networks can also help define and achieve voluntary goals for participating companies.

Most EENs share the common objective of increasing energy efficiency and reducing the environmental impact of companies. Yet they may differ in how they reach this objective through their function, institutional structure, scope, and services offered.

Table 1: Key aspects of energy efficiency networks

| | |
|--------------------------------|---|
| Purpose | EENs differ in their purpose. Conventionally, many networks focus both on identifying energy saving potential and supporting the process of implementing an appropriate savings programme. Some aim to share expertise in a given sector. Moreover, there are networks that focus on the training and certification of energy managers and consultants. Finally there are also networks that are established to play an advocacy role and liaise with government institutions towards improved energy efficiency policy design. |
| Institutional structure | EENs can be facilitated and funded by government institutions, industry associations, and groups of companies, chambers of commerce, or NGOs. The institutional structure depends on a variety of factors, including government structure, economic structure as well as overall level of awareness of energy efficiency. Some EENs follow a more centralised, top-down structure, while others are established from bottom-up. |
| Scope | EENs can operate at the local, regional, national and international levels. Networks at the international level typically engage in high-level policy dialogue and the exchange of best practices, whereas the local and regional networks work directly with businesses and provide consulting services to realise their energy efficiency potential through targeted energy auditing and guidance through implementation. Other aspects defining the scope of EENs, include the industrial sector, and size of companies ⁶ . |
| Services offered | Energy efficiency networks can offer a range of services and information on: <ul style="list-style-type: none"> - Energy audits and energy management systems (ISO 50001); - Identification of energy saving solutions; |

⁶ <http://www.ageen.org/index.php/netzwerk-typen>

| | |
|--|---|
| | <ul style="list-style-type: none">- Platform for the sharing of experiences;- Guidance through implementation of project;- Monitoring and evaluation;- Support to R&D to drive energy efficiency innovations and increase competitiveness in the region;- Measures to improve access to finance;- Training and certification of energy managers and consultants;- Awareness-raising and capacity-building;- Policy advocacy and visibility of energy efficiency as an issue area; and- Provision of information on policy, regulatory and/or business developments. |
|--|---|

2.2 Benefits of energy efficiency networks

Raising awareness for energy efficiency potentials and capacity building

Apart from energy-intensive industries, energy efficiency rarely is seen as a priority for companies. Many companies, where energy consumption does not represent a major cost component, do not have a clear view on their energy consumption, missing lucrative opportunities to optimize energy use. The participation of company representatives in EENs raises the awareness of efficiency potentials within companies as well as on corresponding investment opportunities. This holds particularly true when companies engage in a long-term process over several years. As part of this process, common efficiency goals are set and participants are guided by competent energy consultants.

Reducing energy costs

Companies participating in EENs can achieve significant energy efficiency improvements. In Germany, for example, companies participating in EENs have been shown to double their energy productivity progress compared to the industry average. The networks as a whole were able to reduce their energy consumption by roughly 10 per cent over 4-5 years, resulting in significant financial savings⁷.

Similarly, a study on the impact of the Norwegian Industrial Energy Efficiency Network (IEEN) estimates that, for the period between 1996 and 2004, approximately 6 Petajoule (PJ) per year have been saved through the provision of advisory services and implementation of an energy management system through the IEEN. Put in perspective, 6PJ represent around 2 per cent of the average annual total energy consumption of the Norwegian on-shore industry sector in this period⁸.

⁷ Koewener et al. (2007) Energy efficiency networks for companies – concept, achievements and prospects.

⁸ Modig, G. (2006) Evaluation of the Industrial Energy Efficiency Network in Norway – a project executed within the framework of the Energy Intelligence for Europe program.

Improving productivity and competitiveness

In addition to energy savings, energy efficiency measures deliver significant benefits in enhancing competitiveness, profitability, production and product quality, and improving the working environment, while also reducing costs for operation and maintenance, and for environmental compliance.

Introducing multiple benefits can help to better align energy efficiency with strategic business priorities, thereby strengthening the business case for investment. The value of the productivity and operational benefits derived can be up to 2.5 times (250%) the value of energy savings (depending on the value and context of the investment). Including such productivity outcomes in financial cost assessment frameworks can substantially reduce the payback period for energy efficiency investment, in some cases from four years to one year⁹.

Increasing transparency about energy use and data

Rigorously implemented benchmarking and monitoring and reporting (M&R) measures within some EENs greatly enhance availability and transparency of data on energy use. Some networks decide to disclose data either throughout the project via a web-based database or presented at the end of the network or project period, allowing for comparison and competition between companies towards higher energy savings.

Ensuring compliance with legal requirements

EENs provide a cost-effective channel for companies to comply with legal requirements.

In Europe, for example, the EU Energy Efficiency Directive (2012/27/EU referred to as EED) Article 8 requires mandatory and regular audits for large companies. Pooling together financial resources to pay an energy consultant to advise companies on their compliance obligations, for example, can help lead to significant financial savings for companies¹⁰.

These energy audits required by Article 8 EED represent the starting point of the network process in Germany.

Fostering innovation

Moreover, EENs can facilitate innovation by bringing together different companies to not only share best practices, but also to explore together new perspectives on effective energy management practices. Some networks actively engage in dialogue and cooperation with a wider range of stakeholders, including research institutions

⁹ IEA (2014) Multiple benefits of energy efficiency.

¹⁰ <http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52013SC0447&from=EN>

and different levels of government, to develop and implement innovative technologies, practices and business models¹¹.

Other co-benefits

Other co-benefits may include: regional business and employment growth¹², improved brand image, productive business-to-business relationships, increased information sharing (through the development of reports), and improved knowledge about energy management. These in turn can lead to new projects with advanced savings opportunities.

Key insights

The key aspects of EENs demonstrate their versatility as a policy instrument to improve energy efficiency. They allow EENs to adapt to different contexts and cater to different needs through defining a set purpose, institutional structure, scope and services offered.

Participating in EENs has been shown to lead to higher awareness of energy efficiency potentials and to capacity building within companies. Results of network participation are often significant energy savings for companies as well as added positive impact through increased competitiveness, transparency, innovation, positive environmental impact and other socio-economic benefits.

Promoting the creation and effective implementation of EENs is thus a cost-effective means for catalysing and scaling up energy efficiency improvements, while delivering multiple other benefits.

An analysis of the best practices and factors driving the success of EENs could help further increase the impact of EENs and their scale up both nationally and internationally.

¹¹ UNIDO (2011) Policy Options to Overcome Barriers to Industrial Energy Efficiency in Developing Countries.

¹² *ibid*

3 Case studies

The following section outlines the main EENs in G7 countries and non-G7 countries. It classifies them according to the key aspects presented above (section 2.1) and which are most commonly observed in EENs.

3.1 G7 countries

3.1.1 Germany

Introduction of Energy Efficiency Networks in Germany

In 2002, the idea of EENs, which originated in Switzerland in 1987, took root in Germany. Since then, many EENs have been established, with 80 networks currently in operation in the country¹³. Most notably, a consortium of research institutes and companies initiated a “30 Pilot Networks” project in 2008 funded by the German government¹⁴. Goal of the pilot project was to demonstrate the benefit EENs and to establish a management system - the Learning Energy Efficiency Networks system (LEEN) - for their operation at high standards. The LEEN management system comprises a set of tools for energy consultants to guide companies through the network approach (identification of efficiency potentials, auditing and energy management protocols, monitoring and verification, etc.). Energy consultants using the LEEN standard have to be certified.

The project covering 360 companies in 30 networks was funded by the BMUB (Ministry for the Environment, Nature Conservation, Building and Nuclear Safety)¹⁵. Membership fees of LEEN networks usually range between EUR. 4.500 to 7.000. For companies participating in pilot networks the membership was free. The service includes: 16 full-day network meetings, 3 monitoring inspections, exchanges on latest information on energy efficiency within the EEN facilitated by a qualified moderator, and accessible energy-technology advice.

Scope of networks: Each network consists of 10 to 15 regionally based companies from different sectors that share their experiences in energy efficiency activities through moderated meetings. The pilot networks comprised companies with energy costs between EUR 0,2 and 40 million p.a. The LEEN management system is primarily suitable for participating companies with energy costs between EUR 0,5 and 50 million p.a. There are also management systems for networks comprised of

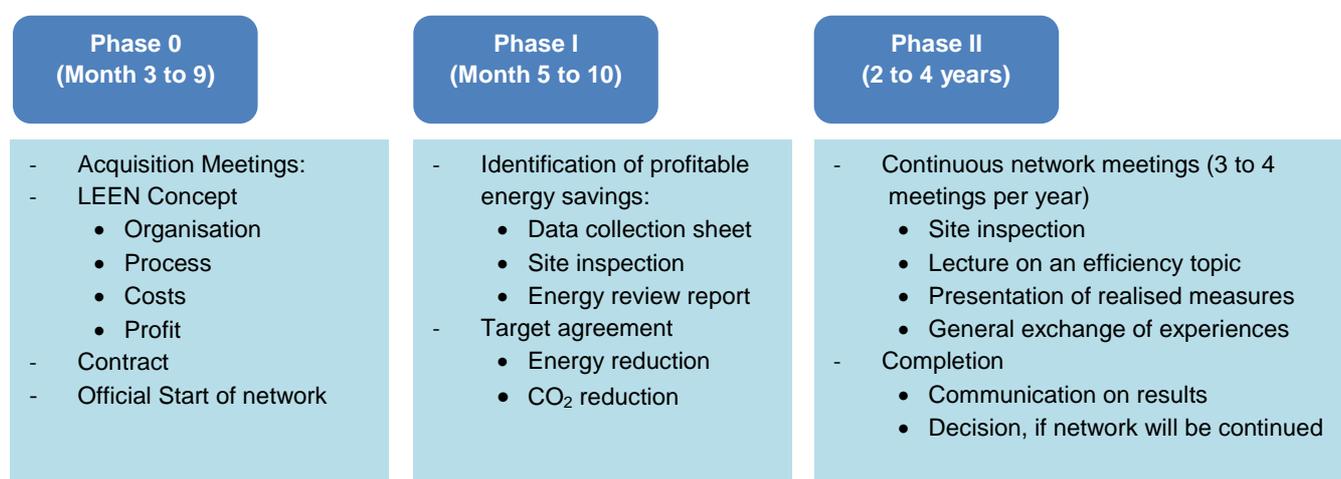
¹³ <http://www.ageen.org/index.php/die-netzwerkidee-de/netzwerke-in-d>

¹⁴ Koewener et al. (2011) Energy efficiency networks for companies – concept, achievements and prospects, *ECEEE 2011 Summer Study: Energy Efficiency First – the Foundation of a Low Carbon Society*.

¹⁵ Koewener et al. (2007) Energy efficiency networks for companies – concept, achievements and prospects.

SMEs (Marie Mach's richtig: Energieeffizienz – Do it right: energy efficiency). FID (Fördermittel Initiative Deutschland) has set up a pilot project based on an EEN for communes¹⁶.

Network process: The LEEN network process can be divided into three periods. In phase zero, acquisition meetings take place, agreements are made on administrative matters and the network is officially launched. In the first phase profitable energy efficiency potential is identified in each company, and all participants decide upon a joint energy efficiency and CO₂ reduction target over three to four years. During phase two, continuous network meetings take place with around 3-4 meetings a year. Companies share best practices with each other, while information on new energy efficient solutions is provided by experts. The performance of each company is monitored on an annual basis by the consultant. A typical network period contains up to 16 meetings, after which the companies decide whether or not the EEN should be continued¹⁷.



Impact: The “30 Pilot Networks” resulted in an average energy cost saving per company per year of EUR 200.000 (10% of energy costs) and 1.000 tonnes of CO₂ reduction per year after 4 to 5 year network duration. A positive side-benefit was the increased awareness of companies on energy efficiency, which led to regular checks of their own product portfolio for efficiency potential or developing new products and systems.

In addition to the pilot project the utility EnBW initiated roughly 30 networks since 2006. EnBW reported similarly positive impacts with energy demand reduction by an average 6 to 8 per cent per company per year after a three-year network participation.

¹⁶ <http://www.fid-deutschland.de/portfolio/energieeffizienz-netzwerk-fuer-kommunen/>

¹⁷ Koewener et al. (2007) Energy efficiency networks for companies – concept, achievements and prospects;
<http://www.effizienznetzwerke.org/ablauf-der-netzwerkarbeit/die-netzwerkarbeit-schritt-fuer-schritt/>

The Energy Efficiency Networks Initiative

Upon the positive results of the 30 network pilot project, the German government decided to cooperate with 20 industry and business associations (covering nearly all sectors of German industry) to scale up EENs through the “Energy Efficiency Networks Initiative”. Associations motivate companies for the participation in EENs. Thereby industry associations play an important role in positioning EENs as an established model for companies to optimize their energy use.

The initiative is one of the key measures of the National Action Plan on Energy Efficiency (NAPE) and was announced in December 2014. The ambitious Goal of the initiative is to initiate 500 networks until the end of 2020. Minimal criteria for networks (in order to be counted towards this goal) were identified. Networks can be formed on a regional basis (across sectors), sector-specific and as internal networks (e.g. different sites of a corporation working together).

Within the realm of the initiative EENs are self-sufficient entities without financial support from the government and fully funded through membership fees of the participating companies. Network initiators can apply the LEEN management system or other systems. As a consequence a wide range of network management providers and energy consultancies has evolved who initiate networks in cooperation with industry associations and other organizations (utilities, energy agencies, cities, technology provider, ESCOs and others). Membership fees range between 2.500 and 7.000 EUR per company per year.

The federal government is proactively supporting the creation of networks mainly through the provision of information services. It finances a secretariat for the initiative that provides advices and serves as a facilitation hub.

Other stakeholders in the wider network structure: To better support the establishment of EENs, research institutions, consultancies and associations have formed a working group called AGEEN (Arbeitsgemeinschaft Energieeffizienz-Netzwerke Deutschland)¹⁸. AGEEN supports networks in the acquisition of members, advises on funding opportunities, and provides a knowledge hub of network activities.

Lastly, the BDI (Federation of German Industry) plays an advocacy role for EENs. As part of the G7 negotiations, the BDI led the development of a B7 (industry associations of the G7) Communiqué to the German Chancellor Angela Merkel, which included a statement of support for the spread of EENs¹⁹.

¹⁸ <https://www.ffgmbh.de/kompetenzen/energiemanagement/471-info-ageen>

¹⁹ http://bdi.eu/media/presse/publikationen/globalisierung-maerkte-und-handel/B7-Communique_DE.PDF

Key insights

The German EENs have been **highly effective** by adopting a **standardised Management System towards establishing and implementing EENs**.

In Germany, EENs have developed into a **mature system of networks**. Within this system, different EENs exist and specialise in a range of services from advice provision, support for member acquisition and access to financing, information sharing etc., thereby catering to the entire chain, from network initiation and implementation of the network process through to network monitoring and impact assessment.

With the Energy Efficiency Networks Initiative the Federal Government has decided to cooperate with industry and business associations in conveying the benefits of energy efficiency networks. After the pilot project, EENs were made **self-sufficient** by setting up a scheme of membership fees. By eliminating the dependency on government funding the initiative presents EENs as an effective vehicle to reduce energy costs and to fulfil social responsibility in the context of the German Energy Transition. .

The initial networks – EENs in Switzerland

The idea for the German energy efficiency networks originates in Switzerland, where companies have established and collaborated through networks since 1987. The first Swiss network was the 'Energy Model Zurich', which brought together 8 of the largest electricity consumers in Zurich to explore solutions to save energy.

The network would set energy savings targets for both itself and its individual member companies. The Swiss Energy Agency for Industry would then act as an intermediary in the negotiation of target agreements on CO₂ reduction between companies and the federal government. As an incentive, companies which reduced energy-related CO₂ by the negotiated target according to monitoring results of annual evaluations, would be exempted from a surcharge on fossil fuels in stationary applications of CHF 25/tonne CO₂²⁰.

Following the success of this initiative, a more systematic approach towards network-building was adopted by the Energie-Agentur der Wirtschaft (EnAW). It now works closely with the Swiss Department of Energy to: develop a methodological approach to networks; agree on service provision; and provide financial support.

The first phase of this new Swiss approach, which lasted from 2000 to 2007, was voluntary and involved highly motivated energy intensive companies. It led to the establishment of about 80 networks in the vein of the original 'EnergyModel' network, and an estimated 20 per cent reduction in CO₂ compared to 2000 levels among participating companies.

Network projects in this first phase of the initiative ran for four and five years and were financed by the participating companies. An evaluation by Koewener et al. (2011) has shown an average reduction of annual energy costs of EUR 110.000 per company.

A number of factors led to the success of this initiative: a) linking energy efficiency to CO₂ emissions, b) **buy-in from management**, c) **tools and standards that lowered implementation costs and ensured high quality**, d) use of concrete, cost-effective measures, e) **innovation, experience-sharing and motivation** through networks, f) **visible success and leveraging the competitive drive between companies through standardised monitoring**, as well as g) good branding and reputation for the company²¹.

²⁰ Jochem, E., Gruber, E. (2007) 'Local learning-networks on energy efficiency in industry – Successful initiative in Germany', *Applied Energy*, No. 84, pp. 806 - 816

²¹ Eberle, A. Presentation – Energie-Agentur der Wirtschaft

3.1.2 Japan

Purpose: In Japan, energy efficiency policies and programmes are coordinated by the Ministry of Environment, Trade and Industry (METI). METI issues regular reviews of its energy efficiency measures. In the *2015 Winter Energy Conservation Measures*, published in October 2015, the Ministry strongly encouraged cooperation between companies and industrial associations to implement energy conservation measures. The document specifically states that ‘industry groups and businesses – even those that have not committed to the plan [for a low-carbon society] – should cooperate to implement these energy efficiency improvement measures at the earliest opportunity, and continue to do so both in voluntary ways and through the plan until such time as it is complete’²².

Institutional structure: Japan has so far initiated and engaged in a number of EEN projects, both domestically and internationally. Domestically, EENs are established and implemented namely in the form of Energy Conservation Neighbourhood Associations (ECNA)²³ and Voluntary Associations of Designated Energy Management Factories (DEMF). Internationally, Japan leads the international task group called Energy Management Action Network (EMAK)²⁴, established under the IPEEC, and the Energy Conservation Centre Japan (ECCJ)²⁵. Given Japan’s strongly centralised form of government, most networks generally follow a top-down approach, whereby the programme is initiated by the government, and industry organisations and associations perform the role of program office and implementing agencies.

Scope: EENs in Japan vary in scope. The ECNA and DEMF are defined by a regional scope, whereas EMAN specialises in providing training and international cooperation on energy management practices. Furthermore, there are a number of sectoral associations that also function as networks, including the Japan Iron and Steel Federation (JISF), Petroleum Association of Japan (PAJ), and Japan Cement Association (JCASSOC).

Services: ECNAs follow a similar approach to the German EENs. As a first step there is a free energy efficiency diagnosis in participating companies. As a second step, the results of the diagnosis are shared and relevant energy conservation measures are agreed upon. These are followed by liaison meetings, whereby ECNAs receive advice from the ECCJ and other relevant institutions, and participants exchange information. At the final stage, meetings are held and companies report on their progress. ECNAs work at a regional level and are well connected, and provide an effective way for companies to share information on the most cost effective measures for energy efficiency.

²² http://www.kanto.meti.go.jp/data/shou_ene_2015w.pdf

²³ <http://eneken.ieej.or.jp/data/4756.pdf>

²⁴ Noda, F. (2013) *The Networks for Energy Management Activity around the World*, The Institute for Energy Economics, Japan.

²⁵ <http://www.asiaeec-col.eccj.or.jp/index.html>

Each district association of the DEMF is in charge of its own activities, which commonly involve: factory tours, seminars, lectures, and case study meetings held several times a year. A general meeting is scheduled once a year for each association to report on its activities to an audience of other association representatives, the METI-Kanto regional bureau, and the ECCJ. In addition, regular newsletters update members on the latest information on energy management and conservation measures. As of August 2012, the Voluntary Associations count 823 members^{26 27}.

The Energy Conservation Seminars are particularly popular, and help spread knowledge about: a) general awareness of energy conservation and climate change; b) overview of latest regulations, including the Energy Conservation Act; and c) available energy conservation-related support measures implemented by the national government and recommended to industry support organisations, financial institutions (FIs), industrial associations, and local government.

Moreover, the DEMF runs an Energy Conservation Commendation²⁸, which is an award scheme that promotes distinguished achievers in energy management and business operators for excellent in energy management²⁹.

Impact: No formal studies [available in English] have been found to measure the impact of network activities, in Japan and internationally.

Key insights

Government is a strong driver in initiating EENs, which consequently follow a **top-down structure**.

ECNAs follow a rigorous approach towards improving energy efficiency through networks, similar to Germany's EENs.

There is a good mix of cooperative activities, including knowledge-sharing, training, capacity-building, and communication through commendations (similar to US and Canadian Leadership awards³⁰).

To overcome cost-barriers for SMEs, the government subsidises many activities.

Much of the support is targeted at SMEs, which have been identified as most in need of assistance.

²⁶ http://www.kanto.meti.go.jp/seisaku/shoene/3-1shoene_chikukai.html

²⁷ METI (2013) Presentation: METI – Kanto's Efforts to Promote Energy Conservation, <http://www.eneken.ieej.or.jp>

²⁸ Similar to US and Canadian Leadership programmes.

²⁹ <http://eneken.ieej.or.jp/data/4756.pdf>

³⁰ See CIPEC Leaders Award scheme.

3.1.3 Canada

Natural Resources Canada (NRCan), the agency administering energy policy and activities in Canada, set up the CIPEC (Canadian Industry Program for Energy Conservation) in 1975³¹.

Purpose: CIPEC is a unique partnership between industry and government, whose mission it is ‘to promote effective voluntary action that reduces industrial energy use per unit of production, thereby improving economic performance while participating in meeting Canada’s climate change objectives’³².

Institutional structure: CIPEC is coordinated by the Office of Energy Efficiency within NRCan. It follows a top-down institutional structure, whereby the CIPEC Executive Board determines broad strategic directions and activities. CIPEC Sector set targets and develop action plans for improving energy efficiency in more than 22 industrial sectors.

Scope: The CIPEC works through 27 ‘task forces’, which consist of a number (from 12 to several hundreds) of companies and trade associations³³. These task forces are organised by sectors: aluminium, brewery, cement, chemicals, construction, dairy, electrical and electronics, electricity generation, fertiliser, food and beverage, forest products, foundry, general manufacturing, lime, mining, oil sands, petroleum products, pipelines, plastics, steel, transportation equipment manufacturing, upstream oil and gas³⁴. CIPEC activities currently encompass more than 2,400 companies and more than 50 trade associations.

Services: CIPEC provides a range of services, including:

1. Communication and awareness through:
 - the CIPEC Leadership Awards that promote and reward leaders in energy efficiency in 5 award categories. These include: 1. corporate stewardship; 2. process and technology improvements; 3. energy performance management; 4. employee awareness and training; 5. integrated energy efficiency strategies.
 - regular newsletters of 10,500 subscribers.
2. Active member acquisition: The CIPEC Task Force Council and sector task forces continuously work together to broaden participation.
3. Information platform: At the sectoral task force level, members share information and identify common needs and best practices.
4. Workshops, including on the following topics:
 - a. ‘Dollars to \$ENSE Energy Management Workshops’ which are workshops designed to help companies develop energy efficiency goals and action plans. They provide training on energy management planning, identification of

³¹ <http://www.nrcan.gc.ca/energy/efficiency/industry/cipec/5153>

³² CIPEC Annual Report 2014.

³³ <http://www.nrcan.gc.ca/energy/efficiency/industry/opportunities/5233>

³⁴ <http://www.nrcan.gc.ca/energy/efficiency/industry/opportunities/5253>

- energy savings opportunities, identification of energy efficiency financing mechanisms, energy monitoring, energy management information systems, and the ISO 50001 energy management systems standard.
- b. 'Process integration' training workshops, which provide training on platforms for data collection, project definition, energy performance assessments, waste heat recovery from utility systems, and tools to optimise the use of industrial process heat.
5. Free monthly webinars on similar topics to those mentioned above³⁵.
 6. Technical support through technical guidebooks, benchmark studies, benchmark tools, and opportunities to network.

Impact: Members participating in CIPEC task forces represent 28 per cent of Canada's gross domestic product (GDP). Between 1990 and 2012, CIPEC members reduced their combined energy intensity by 11.2 per cent³⁶, at an average rate of 9.5 per cent per year. Such improved energy efficiency measures enabled CAD 3.3 billion in energy savings in 2012 alone – the equivalent of powering 4.4 million Canadian households for one year.

Through CIPEC, the mining, manufacturing and construction sectors have voluntarily met and exceeded annual targets to reduce their energy intensity. Between 1990 and 2012, they improved energy intensity by an average of 1.3 per cent per year, compared to the voluntary commitment of 1 per cent³⁷.

Key insights

Canada's EENs, coordinated through CIPEC, follow **an effective and clear top-down structure**, with all services and training centrally provided through CIPEC.

CIPEC networks follow a sectoral approach.

CIPEC's success stems from a **proactive training programme**, which entails both workshops and webinars. These are complemented through **technical guidebooks, benchmark studies and tools**.

CIPEC has a **strong outreach and communications programme**, with monthly newsletters, webinars, and leadership awards, which **help build the reputation of the networks**.

CIPEC's members are primarily large companies which limits the programme's inclusiveness and reach.

³⁵ CIPEC Annual Report 2014.

³⁶ The CIPEC Annual Report 2014 provides a detailed breakdown of each of the energy intensity reductions by sector.

³⁷ CIPEC Annual Report 2014.

3.1.4 United Kingdom

The UK's energy efficiency activities are guided by the UK National Energy Efficiency Action Plan (UK NEEAP) and are administered by the Department of Energy and Climate Change (DECC). The UK NEEAP responds to the EU Energy Efficiency Directive, and entails measures that the UK will implement in order to achieve the EU energy saving target of 20 per cent by 2020. There are a number of horizontal measures involving energy audits and management systems, availability of qualification, and accreditation and certification, which are designed and implemented through institutions focused on training³⁸.

Activities through networks are few in number. Those that do exist primarily focus on stakeholders in energy provision and end-use households. Networks for actors in the energy supply chain include the Low Carbon Networks Fund. The Local Energy Efficiency Network (LEEN – not to be confused with the German LEEN)³⁹ and DECC's Big Energy Saving Network⁴⁰ project both focus on end-use households. The lack of industry networks can be explained by the UK's economic structure, which is dominated by the service sector.

One network operates in a similar way to other EENs across the G7, which is the **Industrial Energy Efficiency Accelerator (IEEA)**⁴¹. This programme is designed and implemented by the Carbon Trust – a not-for-dividend company. It seeks to engage trade associations and their industry members primarily. The Carbon Trust runs online SME and public sector carbon networks that aim to increase the sharing of best practices and stimulate ideas between SMEs looking to reduce carbon emissions from their estate and operations.

The IEEA is not a permanent network, but rather an online network, which provides best practice guidelines developed in close collaboration with trade associations, sector companies and technology providers to deliver CO₂ reductions from sector-specific industrial processes. A project may engage with a single company or a consortium.

Key insights

No business-to-business EENs exist in the UK, as it is predominantly a service based economy.

Some networks exist, but are targeted at the energy sector and end-use households.

There is, however, an **extensive structure for training, accreditation and certification** of energy professionals.

³⁸ UK DECC (2014) UK National Energy Efficiency Action Plan.

³⁹ <http://www.localenergy.org.uk/about-local-energy/local-energy-efficiency-network-2014/>

⁴⁰ <https://www.gov.uk/government/publications/big-energy-saving-network-grant-offer-fund>

⁴¹ <https://www.carbontrust.com/resources/reports/technology/industrial-energy-efficiency/>

3.1.5 United States

Rationale and context: In the United States, energy efficiency falls under the Office of Energy Efficiency and Renewable Energy of the Department of Energy. The US leads a number of domestic and international activities. Most notably there are the Regional Energy Efficiency Organisations (REEOs), of which there are six in total across the US⁴² (Midwest, northwest, southeast, northeast, southwest, south-central).

Definition: REEOs in the US are networks that bring together policymakers, efficiency program administrators and industry to advance policy and program innovations that deepen, broaden, and accelerate efficiency in homes, buildings and industry on a regional scale.

Network mechanism: REEOs provide technical assistance to states and municipalities to support efficiency policy development and adoption, along with program design and implementation. There is a strong focus on bringing stakeholders together and align it with public policy interests.

These networks operate in the following order: stakeholder engagement; research, analysis and tracking; long-term goals; regional strategies and guidance; technical support, tools and training; visibility and outreach; and regional and national coordination⁴³. Technical assistance is provided by issue area, for which specific working groups have been established: lighting, heat pumps, and energy conservation codes amongst others.

Institutional arrangements: The REEOs work through funded partnerships with the U.S. Department of Energy (DOE), as well as with utilities, third-party program administrators, public officials, various advocacy groups, businesses and foundations⁴⁴. Therefore, it works with a range of stakeholders and not only stakeholders from industry⁴⁵.

Other stakeholders in the wider network structure: Other networks include the Industrial Energy Efficiency Network⁴⁶, which is a regionally focused peer-to-peer network that brings together energy management personnel from the manufacturing sector. Through quarterly meetings and web-based communication tools, the network highlights best practices and project implementation, promotes energy efficiency opportunities, links industry to key financial and technical resources, and helps members understand shared struggles and successes. There is no fee and no formal membership program as this program has been set up as a resource to manufacturing personnel who want to learn from fellow peers.

⁴² <http://www.neep.org/network/regional-energy-efficiency-organizations-network>

⁴³ http://www.neep.org/sites/default/files/resources/2015%20NEEP%20Overview_FINAL_0.pdf

⁴⁴ <http://www.neep.org/network/regional-energy-efficiency-organizations-network>

⁴⁵ http://www.neep.org/sites/default/files/resources/2015%20NEEP%20Overview_FINAL_0.pdf

⁴⁶ http://www.industrialee.org/About_Us.html

Key insights

In the US, each regional network is organized by **issue area**, with one working group per issue area.

Regional networks primarily provide **technical assistance** to stakeholders, as well as bringing them together to **share best practices and information**.

3.1.6 France

The main initiative in France that aims to promote links between industrial energy efficiency actors is the Strategic Committee for the Eco-Industrial Sector (COSEI).

Purpose: COSEI's goals are two-folds. Firstly, it seeks to enable France's energy transition which aims to reduce final energy consumption by 50% in 2050 compared to 2012. Secondly, it aims to support France's export industry and competitiveness.

Institutional structure: The COSEI was created in 2008 as a partnership between the private sector, represented by the French association for the promotion and international development of eco-companies, and the Government, represented by the French Ministry of the Economy, Industry and ICT, and the Ministry for Ecology, Sustainable Development and Energy. COSEI is organised in four working groups (renewable energy, energy efficiency, water and waste).

Scope: The energy efficiency group is sub-divided into four groups, including on industrial energy efficiency, energy efficiency and innovation, building energy efficiency, and energy efficiency in electricity networks.

Services: From 2013 to 2015, COSEI's energy efficiency working group brought together a series of private sector actors which reviewed all opportunities to boost France's energy efficiency performance in the industrial sector investments. This led to the development of a plan of action agreed to in April 2015 by the Government and private sector COSEI representatives.

The action plan builds on four pillars of activities.

1. Consolidating the sector by:
 - a. establishing a label that would give visibility to retailers that meet their energy efficiency obligations, called "Responsible retailer";
 - b. producing a map of the companies based in France and active in this field; produce a map of the existing opportunities for energy savings.

2. Boosting innovation by:
 - a. improving collection of energy efficiency data;
 - b. shifting public investments towards energy efficiency through reviews and development of public procurement guidelines to support energy efficiency; improvement of information on opportunities; identification and mitigation of barriers to public sector investments; sharing experiences between local government;
 - c. supporting access by SMEs to innovative approaches for energy efficiency, by for example, welcoming SMEs in research centres, or innovative industries during a week to learn *in situ*.

3. Increasing competitiveness by:
 - a. supporting energy efficiency investments;
 - b. encouraging export of French energy efficiency technologies.

4. Building capacity by:
 - a. developing and running training and certification programs for energy auditors;
 - b. encouraging initiatives aimed at educating staff on energy efficiency opportunities in their companies.

Impact: Given the recency of this action plan, and that many of the measures are to commence in 2016 only, now information is available on its impact yet.

Key insights:

The action plan resulted from a **joint effort** between the private sector and the public sector, and was **agreed at a high-level** Ministers and CEOs. This should provide strong momentum for its implementation.

It is a pragmatic document which sets the broad lines and priority areas, and allows for flexibility in its implementation. It also includes a **review mechanism** and **criteria to assess** its impact.

The action plan which aims to increase **industrial energy efficiency and economic competitiveness**, is supported by both the Ecology and Economy Ministries. This provides strong incentives for action.

Besides the provision of green loans, it is **unclear what resources have been made available** for its implementation.

3.1.7 Italy

The primary initiative in Italy is a partnership between the leading industry organisation Confindustria and the National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA).

Purpose: The purpose of the ENEA is to encourage the uptake of energy efficiency, by working closely with central and local Public Administration, enterprises and citizens. It does so primarily through technical advice and education programs, leveraging off its 30 years' expertise and research capabilities in the energy field.

In 2010, ENEA signed a Memorandum of Understanding with Confindustria, is the main association representing manufacturing and service companies in Italy (with around 150,000 companies). The MoU encourages the ENEA to provide Confindustria enterprises with its expertise to create different and advanced scenarios, services, technological addresses, and to participate in projects aimed at a sustainable economic development. This service is not free.

Institutional structure: In 2008, the Government officially made the ENEA the Italian National Agency for Energy Efficiency, through its Technical Unit for Energy Efficiency (UTEE), in accordance with the implementation of the EU Directive EC/2006/32, to support the formulation and implementation of governmental policies.

Scope

The ENEA works at a national and regional level through 9 research centres all over the territory. It works closely with both public administrations and businesses, through the Confindustria.

Services: In addition to its role in supporting Government, the ENEA also provides a range of services to companies, including

1. Information, analysis and evaluation related to regulations incentivizing energy efficiency and renewable energy sources, and to technologies to be invested upon.
2. Advanced energy and technology audits, identifying opportunities for enterprises in the fields of energy efficiency and technological innovation.
3. Development and transfer of technologies where the ENEA's areas of expertise.
4. Access for SMEs and energy-producing industries to research on advanced technologies for energy efficiency.
5. Testing of products developed by businesses where the ENEA has expertise
6. Training, addressed to different professionals, mainly on energy efficiency.
7. Communication activities (conferences, WebTV, brochures) and managing the website⁴⁷ which provides detailed technical information by sector sectors (building, industry, transport, agriculture and distributed generation).

⁴⁷ www.efficienzaenergetica.enea.it

8. Information programmes: National Website on Energy Efficiency, blog on White Certificate scheme, campaign for Energy Performance Contracts dissemination in the network of real estate agencies, etc.

Impact No information the impact of the ENEA's activities in support of Confindustria is available.

Key insights:

The ENEA benefits from a long-standing experience in energy efficiency, that it has put to the benefit of Confindustria. The MoU model allows to bring together in a lean way the major industry stakeholders, as well as technical experts.

It shares close ties with the Government, that has entrusted it with the role of National Agency for Energy Efficiency.

However, the ENEA's advisory services to Industries are not free.

3.2 Non-G7 countries

3.2.1 Sweden

Purpose: Sweden uses different policy instruments to improve energy efficiency in industry. These include the overarching Swedish Environmental Code (SFS 1998:808), which is a law, and a number of end-use policy instruments, such as the Program for Improving Energy Efficiency in Energy-Intensive Industry (PFE), and the Swedish Energy Audit Program (SEAP). The former is a voluntary agreement between actors in the most energy intensive industrial sectors, while the latter is a program for subsidised energy audits in industries with energy consumption above 500MWh annually.

Institutional structure: Complementing these policies and programmes, the Swedish Energy Agency (SEA) has also initiated several networks for energy managers aimed at facilitating energy efficiency in industry.

Scope: Energiintensiven consists of 100 companies from the major-energy intensive sectors, which all participate in the PFE. In addition, there are a number of sector-specific EENs.

Services: One example is the Joint Network for Aluminium enterprises (GENIAL), which was founded in 2011 with the support of the SEA. GENIAL is an interesting example of EENs, because it has not only applied a sectoral focus, but has also systematically included companies across the whole **aluminium life cycle process**. By analysing companies from raw material production, upgrading, production of parts for automotive and building industry, foils, boats and finally aluminium recycling, this network allows for optimisation and innovation within the whole value chain of aluminium.

The network works in two phases. In the first one (2011 to 2013), energy use within companies were mapped with the goal to identify the areas with the highest impact on energy use and environment, common challenges in terms of energy losses and finding joint focus areas for implementation. Aluminium production was identified as the area of highest impact. The use and recycling phase of aluminium was identified as high impact compared to other materials. In the second phase, which began in 2013 and lasted until the second half of 2015, several subgroups were to focus on identifying energy saving potentials. At the same time, energy management systems were slated to be introduced in innovative companies willing to adopt energy efficiency measures. The results of these measures, which are yet to be reported, will be shared with the other companies together with the energy saving potentials identified. The third phase is as yet undecided⁴⁸.

⁴⁸ Ivner, J. et al. (2014) Swedish energy manager networks for energy-intensive industry as a driver for improved energy efficiency, *ECEEE Industrial Summer Study – non-peer-reviewed paper*.

Impact: There are no ex-post studies currently available, as the companies have not started implementation of measures yet.

Key insights

A **life-cycle approach can be effective** in identifying the areas in the value chain of a specific sector that allows for the **most cost-effective and impactful energy efficiency improvements**.

As a pilot project, GENIAL's **first and second phase** which were primarily assessment based, **took four years**, with an implementation period that is still uncertain. In contrast, the German LEEN network process, from initiation and assessment to implementation, lasts four years in total. Guidelines and stricter timeframes could be useful to fast track energy efficiency improvements.

3.2.2 Norway

Industrial Energy Efficiency Network (IEEN) is an industry-led energy efficiency programme funded through grants by the government. It was established by the Ministry of Petroleum and Energy (MPE) in 1989 in an effort to stimulate energy efficiency measures in industry. The program was administered by an independently established agency called ENOVA. By its conclusion in 2004, the IEEN's membership counted 900 companies and 600 SMEs from 13 energy intensive industry sectors.

Institutional structure: Membership was free for the industry, and the Institute for Energy Technology⁴⁹ was contracted by the MPE to operate daily management and secretariat services. The IEEN was 100% funded by the MPE with a budget of EUR 2.1 million in the period from 1989 until 2001⁵⁰. This included both operational costs and grants to member companies. EUR 1.2 million of this money is used for grants to member companies. The remaining EUR 0.9 million covered the benchmark analysis, documentation of demonstration projects and operational costs. From 2003, administration of the project was shifted to ENOVA, which is a public enterprise owned by the MPE. All of its activities, including the IEEN are financed by the Energy Fund, which receives revenues generated by a levy of EUR 0.001/kWh on grid tariffs.

Scope: Industrial firms from all sectors were allowed to participate in this voluntary scheme, and the network members represented approximately 63 per cent of total industrial energy consumption in Norway.

⁴⁹ The Institute for Energy Technology is an independent energy research institute.

⁵⁰ SAVE II Project AUDIT II, Country Report Norway, June 2002,
http://www.motiva.fi/files/1937/CR_Norway.pdf

Services: Through their membership in the network, the companies were offered various forms of assistance. There were two phases.

The first phase consisted of: 1. educating and training all employees on energy policy and management; 2. Conducting an initial energy analysis; 3. establishing an energy monitoring system (hard- and software). In this phase, the government supported the company with training for key personnel and covered part of the consultant fees.

In the second phase, the company underwent a more in-depth energy audit. After identifying the energy saving potential, companies committed to set up an implementation plan, analysed personnel and financial resources to execute the project, and reported the achieved results against the benchmark set. For this purpose, a web-based benchmarking system was set up for members to allow for monitoring and comparison of members' energy performance.

In the first phase, companies which are a part of the IEEN could receive:

1. up to 90 per cent of grants from a total budget limited to EUR 3.750 to undertake audits
2. a 50 per cent grant limited to EUR 12.500 to establish an energy monitoring system.

In the second phase, companies were able to seek another 50% grant limited to EUR 25.000 to undertake audits.

Impact: The ex-post study⁵¹ covering the period of 1996 to 2004 shows that IEEN members achieved cumulative energy savings of approximately 6PJ per year over the course of the study period⁵². These are directly linked through the actions as a result of the advisory and energy management services delivered through the industrial network. This represents 2% of total annual energy consumption of the Norwegian industrial sector⁵³. According to the same study, the companies that failed to implement the energy saving measures provided by consultants was less than 10 per cent, despite it being a voluntary programme, and can be considered a success.

The annual financial costs for the government were EUR 1.62 million. The ratio between the cost for the government and the energy savings is close to 0.03 EUR cent/Megajoule (MJ). For the network members, the ratio between costs and savings is EUR 0.6 million / 6 PJ, which is 0.01 EUR cent/MJ⁵⁴.

⁵¹ Modig, G. (2006) Evaluation of the Industrial Energy Efficiency Network in Norway – a project executed within the framework of the Energy Intelligence for Europe program.

⁵² SAVE II Project AUDIT II, Country Report Norway, June 2002, http://www.motiva.fi/files/1937/CR_Norway.pdf

⁵³ This is 2/3 the way of reaching the overall targets set by the MPE, which is to reach 9PJ/y of energy savings from industry by 2010 (Modig 2006, p. 5).

⁵⁴ Modig, G. (2006) Evaluation of the Industrial Energy Efficiency Network in Norway – a project executed within the framework of the Energy Intelligence for Europe program.

Key insights

Norway's IEEN was **fully funded by the government** throughout the project and entirely free for companies. A majority of the grant was provided through the Energy Fund that derives its revenue through a levy on the grid tariff. This is an interesting model, but **may not be transferrable** as it works on the basis of available government budget, and trust that companies will implement the advice given by consultants.

Benchmarking was key to ensure transparent and rigorous monitoring and reporting, highlighting the importance of data and monitoring.

The IEEN was **fully voluntary** and participating members were interested in the established network and motivated primarily to reduce energy costs (85% of participants stated this in a survey).

The **consultants**, which were provided by the agents directly subcontracted by the MPE, were considered **good or very good** by the members and drivers of the process.

The IEEN worked through a **standard two-step approach** and specific **guidelines on benchmarking, monitoring and reporting**. However, there was no active exchange between companies through the network.

3.3 Further networks

In recent years EENs have also been applied in multiple emerging economies, from Latin America, over South Asia to South Africa. All of which have received support from GiZ. This section will provide an overview of EENs in Mexico, India, and in South Africa and pay particular attention to the transferability of EEN models in industrialised economies and needs for adaptation to the context of emerging economies.

Mexico

In Mexico GiZ financed the PRONASGEEn project (Programa Nacional para Sistemas de Gestión de la Energía - National Program for Systems to save Energy) with CONUEE (Comisión Nacional para el Uso Eficiente de la Energía), which is building EENs in order to introduce Energy Management Systems (EnMS) according to ISO 50001 in energy-intensive SMEs.

The focus on SMEs has been chosen in Mexico, because 99% of all companies in Mexico are SMEs and together contribute to 52 per cent of GDP. Since the cost of energy in Mexico is relatively high compared to international standards, energy efficiency therefore becomes an important measure to increase the profitability and competitiveness of Mexican companies.

PRONASGEEn broadly follows the German LEEN approach, but includes a **stronger capacity building component**. In addition to energy audits and the exchange between companies within a network facilitated by a trained consultant, an energy manager within each company will be identified, trained and supported during the introduction of the EnMS⁵⁵. The first set of workshops has been concluded in October 2015.

South Africa

The Energy Efficiency Leadership Network (EELN) is a partnership under the National Business Initiative. A total of more than 40 businesses, government departments and agencies, as well as business associations make up the signatory network. GiZ is a key partner. EELN was founded over ten years ago and offers a forum where government and business share energy efficiency best practices, develop energy strategies and responses to changes in policy.

⁵⁵ <http://blog.energy-consulting-allgaeu.de/eca-engagiert-sich-bei-der-einfuehrung-von-energiemanagementsystemen-in-mexiko/>
http://www.conuee.gob.mx/pdfs/ManualGestionEnergia_V2_1.pdf

To this end the EELN helps its members stay abreast of legislative changes, technology and market developments in energy efficiency, through peer learning. The EELN keep its members up-to-date on new government regulations and incentives, and fosters conversations between private and public sector on their implications. A **rapidly evolving policy framework** in the South African context has thus to a great extent defined the purpose of the EELN network⁵⁶.

India

The Resource and Energy Efficiency Network (REEF) in Pune was initiated by WIKA Instruments India Pvt. Ltd. Pune, which is a wholly owned subsidiary of the German multinational WIKA Alexander Wiegand SE & Co. KG. Due to WIKA's strong interest in industrial environmental protection, it teamed up with five other companies in the REEN, which have collectively so far saved 12.000 tons of greenhouse gases⁵⁷.

Over a period of two years, participating companies worked together with Arqum to improve their environmental standards and generate cost savings by implementing energy and resource efficiency measures. The main components of REEF Pune consisted of a series of group workshops and individual onsite consultancy sessions. Workshops focus on specific energy and resource issues, while the onsite consultancy sessions aim to identify energy savings opportunities, and assist in developing, implementing and reviewing an energy efficiency program. Energy savings totalled 47million kWh by the end of the two year programme⁵⁸.

The REEF project benefited from strong **leadership by WIKA** and willingness of other large companies to participate, which were mostly subsidiaries of German companies.

Vietnam

GiZ is inquiring the possibility to transfer its LEEN model of networks in other countries and has conducted a sub-sector analysis about the market potential for EENs in Vietnam. Significant market potential exists and it is feasible to apply the LEEN model. However, it was found that the acquisition of companies as network participants will require significant awareness-building in the first place, as companies are completely unfamiliar with the idea of energy management systems⁵⁹.

⁵⁶ <http://www.nbi.org.za/focusarea-energy.html>

⁵⁷ http://www.wika.co.in/company_resource_and_energy_efficiency_network_pune_en_in.WIKA.

⁵⁸ WIKA, Arqum & DEG (2012) Resource and Energy Efficiency Network Pune.

⁵⁹ BMWi & GiZ (2015) Energy efficiency networks in Vietnam – Introducing EE Technologies and Services in Developing Economies: A Sub-Sector Analysis
https://www.inefficiency-from-germany.info/ENEFF/Redaktion/DE/Downloads/Publikationen/Laender_und_Maerkte/subsector-analyse-vietnam-2015.pdf?__blob=publicationFile&v=3

Key insights

In emerging and developing countries, such as Vietnam, knowledge about energy management in companies is low and therefore **greater focus needs to be placed on capacity building**.

Some emerging countries, such as South Africa, have a rapidly evolving policy framework. In order for companies to respond in timely manner, EENs in these kinds of contexts may have to play a more important role in sharing the **latest information on changes in the policy framework** as well as best practice responses.

EENs in emerging economies can benefit from strong leadership. For this, often subsidiaries of leading multinational companies can be the champion and driver for the creation of EENs.

Awareness about energy management in these countries **tends to be low**, therefore prior and during the acquisition process there has to be significant awareness building activities.

4 Conclusion: Success factors for energy efficiency networks

The case studies from G7 as well as non-G7 countries have demonstrated that energy efficiency networks can take the shape of many different types of networks, depending on their purpose, institutional structure, and scope. Nevertheless, there are a number of factors that can be identified as driving the success of energy efficiency networks.

These include⁶⁰:

1. **Developing a system of networks** to cover the full range of complementary services demanded by companies to address energy efficiency barriers, i.e. information sharing, access to financing, energy auditing, implementation, and monitoring and reporting (see Germany, Canada, Japan). This system of networks can be organised through a centralised structure or multiple networks in a horizontal structure. Figure 1 below explains the range of various services provided by networks.
2. **Providing tools and standardised guidelines** to lower implementation costs, transaction costs, and ensure high quality in the delivery of energy savings (see Germany, Switzerland and Canada).
3. **Mandating standardised measures for monitoring and reporting** to demonstrate visible success and leveraging the competitive drive between companies (see Switzerland and Norway).
4. **Devising a clear timeframe** for network activity, with dedicated phases for initiation, assessment, and implementation to avoid unnecessary delays in implementing solutions (compare Sweden with Germany).
5. **Creating a platform with effective mechanisms and strong communication channels** for experience sharing, engagement and innovation, for example through annual conferences, workshops, seminars, webinars, and newsletters (see Canada and Japan).
6. **Providing high-quality training to network managers/moderators/consultants**, as they are crucial drivers of network activities and build trust from participating companies (see Norway).
7. **Delivering training to staff in participating companies** to ensure the success of the projects initiated through EENs, as well as internalising awareness for

⁶⁰ Each of these factors is linked to case studies presented earlier in the report.

continuous energy efficiency improvements beyond engagement within the network (see Canada, Germany and Norway).

8. **Building the good reputation of networks** to attract new members, generate positive branding value for participating companies (see Switzerland, Germany and Norway), and ensure buy-in at the right level of the company to ease member acquisition for networks.
9. **Developing a sustainable business model** for networks that reduces their dependency on government subsidies to enable long-term sustainability of networks and scale up (see Germany).
10. **Using government support and incentives to overcome difficult barriers where necessary**, for instance in SMEs (see Japan and Switzerland).

These key success factors resonate well with the discussions between stakeholders from governmental institutions and industry at the IEA-IPEEC Joint Workshop on Industrial Energy Efficiency in Paris on September 16th 2015. Each of the discussion points raised is matched with a corresponding success factor.

Table 2: Discussion points raised by delegates from government and industry

| Discussion point ⁶¹ | Success factor |
|--|----------------|
| Conferences as a platform to bring companies together to share ideas, share experiences, benchmarking, best practices. | 5 |
| Transparency on latest policy developments nationally and internationally. | 5 |
| Guidelines and lists of recommended energy conservation measures. | 1 |
| Database of efficiency technologies and a process for networking in the industry for better awareness and information exchange so as not to fall back on the most lobbied technology (need for transparency in the technical assessment process). | 3 |
| Technical support: lack of sufficient energy data. | 3 |
| EU directives are not implemented in the same way by all members, which implies the existence of different certifications and standards making audits more expensive. There is therefore a need for consistent regulations and standards to lower audit costs. | 2 |
| Certification for companies that implement energy saving measures | 8 |
| Training of more skilled professionals to assist companies with implementation. | 6 |
| Enhancing the quality of energy audits and the credibility/legitimacy of certification. | 2 |
| Increasing confidence in the value of networks. | 8 |

⁶¹ IEA-IPEEC Joint Workshop on Industrial Energy Efficiency in Paris on September 16th 2015, Minutes of Meeting.

These discussion points emphasise:

1. the case for more guidelines in the management of EENs.
2. the need for more standardised practices and methodologies for training as well as service provision (i.e. auditing, energy saving calculations etc.), and certification.
3. the need for scaled up network activity.
4. They also outline new areas of activities for networks.

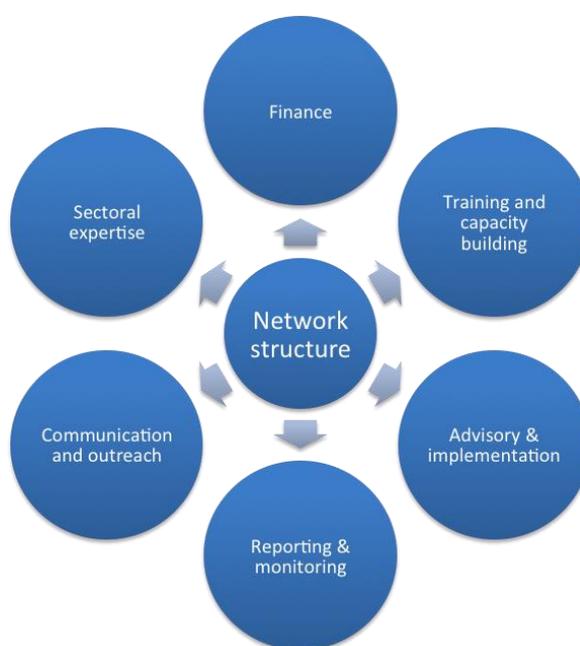


Figure 1: Depicting the categories that need to be covered by networks

5 Recommendations and next steps

Based on the success factors identified, a number of issues, gaps and barriers require a more in-depth dialogue between government institutions and representatives from industry.

The lack of available data points to the fact that further research would be useful to collect information on experiences, lessons learned, success factors and overcoming challenges.

For this purpose, it is recommended to conduct two joint workshops, covering the following discussion topics:

- Purpose and services from EENs that provide value to companies
 - Are any new services in demand?
 - For instance, on finance, could EENs serve as structures for project aggregation to reduce transaction cost and ease access to finance?
- Best practices, guidelines, and toolboxes
 - How can they be best adapted to, and applied in emerging and developing countries?
- Development of international guidelines and best practices for EENs
 - Are partners from government and industry interested in collaborating in this exercise?
 - Who should be tasked to develop and implement international guidelines?
 - Which aspects of the network process should these guidelines cover?
 - How can these guidelines be best integrated with complementary policy tools and initiatives from national authorities and international cooperation, including:
 - Standardised energy efficiency audit schemes;
 - Energy efficiency performance standards, labelling & certification for key technologies;
 - Data collection, common metrics, indicators; and
 - Training and certification of energy professionals.

- Sharing of information and of best practices
 - How can exchanges between networks be supported most effectively?
 - How can best practices be shared most effectively?
- Incentives
 - Which tools and incentives can governments put in place in order to most effectively stimulate network activity?
- Financial sustainability of EENs
 - What can be done to phase out government funding and support?
- Data
 - How can the impact of EENs be measured and reported?
- Member acquisition
 - What measures can be used to facilitate member acquisition?

These workshops could be hosted by IPEEC in partnership with representatives from G7 Governments, industry, other international organisations in 2016. The outcomes, summarized in the form of a short report, could be reported to the G7 - should this be practical and desirable.

6 Annex

6.1 Table of Abbreviations

| | |
|-----------------|---|
| ADEME | Agence de l'environnement et de la maîtrise de l'énergie, France |
| AGEEN | Arbeitsgemeinschaft Energieeffizienz-Netzwerke Deutschland |
| ATEE | Technical Association for Energy and the Environment, France |
| BDI | Federation of German Industries |
| B7 | Industry Association of the G7 |
| BMWi | German Federal Ministry for Economic Affairs and Energy |
| °C | Degree Celsius |
| CAD | Canadian Dollar |
| CEA | Commissariat à l'énergie atomique et aux énergies alternatives, France |
| CEO | Chief Executive Officer |
| CO ₂ | Carbon Dioxide |
| COSEI | Committee for the Eco-Industrial Sector, France |
| CIPEC | Canadian Industry Program for Energy Conservation |
| DECC | Department of Energy and Climate Change, United Kingdom |
| DEMF | Voluntary Associations of Designed Energy Management Factories, Japan |
| DENEFF | German Industry Initiative for Energy Efficiency |
| ECNA | Energy Conservation Neighbourhood Association, Japan |
| ECCJ | Energy Conservation Centre Japan |
| EENs | Energy Efficiency Networks |
| EJ | Exajoule |
| EM | Energy Management |
| EMAK | Energy Management Action Network for Industrial Efficiency |
| EMWG | Energy Management Working Group |
| EnAW | Energie-Agentur der Wirtschaft, Switzerland |
| ENEA | National Agency for New Technologies, Energy and Sustainable Economic Development, Italy |
| EU | European Union |
| EUR | Euro |
| FID | Fördermittel Initiative Deutschland, Germany |
| G7 | Group of Seven |

| | |
|----------|---|
| G8 | Group of Eight |
| GENIAL | Joint Network for Aluminium Enterprises, Sweden |
| GDP | Gross Domestic Product |
| GHG | Greenhouse Gas |
| IEA | International Energy Agency |
| IEEA | International Energy Efficiency Accelerator, United Kingdom |
| IEEN | Norwegian Industrial Energy Efficiency Network |
| IPEEC | International Partnership for Energy Efficiency Cooperation |
| ISO | International Organization for Standardization |
| JCASSOC | Japan Cement Association |
| JISF | Japan Iron and Steel Federation |
| kWh | Kilowatt Hour |
| LEEN | Learning Energy Efficiency Networks |
| Mari:e | Mach's richtig: Energieeffizienz – Do it right: energy efficiency |
| METI | Ministry of Environment, Trade and Industry, Japan |
| MPE | Ministry of Petroleum and Energy; Norway |
| MJ | Megajoule |
| M&R | Monitoring & Reporting |
| MWh | Megawatt Hour |
| NGO | Non-governmental Organisation |
| NRCan | Natural Resources Canada |
| PFE | Program for Improving Energy Efficiency in Energy-Intensive Industry, Sweden |
| PAJ | Petroleum Association of Japan |
| PJ | Petajoule |
| SEAP | Swedish Energy Audit Program |
| SE4All | Sustainable Energy for All |
| SME | Small and Medium-Sized Enterprises |
| SFS | Swedish Environmental Code |
| UK | United Kingdom |
| UK NEEAP | UK National Energy Efficiency Action Plan |
| US | United States |
| USD | United States Dollar |
| UTEE | Technical Unit for Energy Efficiency, Italy |