Advancing *energy efficiency*
on the global agenda

Activity report 2009-19
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About IPEEC
The International Partnership for Energy Efficiency Co-operation (IPEEC) is an autonomous partnership of
17 governments, including the European Commission, committed to ensuring that the energy services consumers
require are delivered in the most efficient and cost-effective manner possible. For IPEEC members, this means
capturing the economic value and social benefits associated with optimising the production and use of energy
resources.

As a platform of member governments, IPEEC supports the co-ordination of international efforts to unlock
substantial energy demand reduction, thereby also lowering energy-related greenhouse gas (GHG) emissions. It
also promotes understanding of additional, non-energy benefits linked to energy efficiency, such as its ability to
support energy security, environmental protection and economic productivity, that can significantly increase the
attractiveness of energy efficiency measures.

Governed by a Policy Committee (PoCo) and an Executive Committee (ExCo),¹ IPEEC carries out its work through
technical Task Groups that are formed to address specific challenges, some of which apply to a given sector while
others are cross-cutting in nature. A dedicated Secretariat facilitates IPEEC activities and communication among
members and with the broader energy policy community.

¹ The PoCo governs IPEEC’s overall framework and policy initiatives; it also evaluates the progress within the context of broad strategic
priorities. The ExCo adopts the proposals of member countries and examines membership requests. It also develops proposals for task
groups, monitors their progress, approves the annual programme of work and the budget, and provides guidance to the Secretariat.
Past trends linking economic growth, rising energy demand and higher emissions expose the need to design and build future systems that deliver energy services much more efficiently. While most countries have implemented some form of energy efficiency policy, there is now broad recognition that a proactive global approach is needed to maximise impacts.

Since its inception, IPEEC has been the voice for international energy efficiency collaboration and has built strong international partnerships that advance global progress on efficiency across all sectors. IPEEC and its members believe that strongly pursuing higher energy efficiency is in the best interest of every country and, indeed, every consumer.

In highlighting IPEEC’s successes and evolution over the past decade, this report also probes the question of what comes next. This is a query that diverse stakeholders will need to answer together.

Energy efficiency now seen as underpinning a 1.5°C future

The proven potential for energy efficiency as a major contributor to global sustainable development and to promoting human prosperity goals - while helping to mitigate climate change - has driven IPEEC activities since its inception in 2009. Ten years on, it is timely to ask whether the message has been received and to what effect.

In October 2018, we saw this message amplified when the International Panel on Climate Change (IPCC) released a Special Report in which the Low Energy Demand (LED) Scenario delivered the fastest results in the most efficient manner. This scenario requires strategic action across four areas; reducing global energy demand; accelerating decarbonisation of energy supply; increasing renewable energy; and large-scale afforestation (IPCC, 2018). Clearly, energy efficiency plays a central role in the LED Scenario, with reduction in demand also lowering energy-related emissions.

Energy efficiency gained global attention in other key fora. The UN Sustainable Development Goal #7, adopted in 2015, sets the ambitious target to double the rate of improvement for energy efficiency, within the wider goal to achieve universal access to clean, affordable energy by 2030 (SEFORALL, 2015). Additionally, it was shown that energy efficiency measures can deliver almost half of the 2030 greenhouse gas (GHG) emissions reduction target set out in the agreement reached by the 21st Conference of the Parties (COP21) to the UN Framework Convention on Climate Change (UNFCCC), known as the COP21 Paris Agreement (UNFCCC, 2018).

Since 2009, IPEEC has helped the Group of 8 (G8) and Group of 20 (G20) governments strengthen their commitment to energy efficiency; it now co-ordinates the G20 Energy Efficiency Leading Programme (EELP). As these economies represent more than 80% of global energy use and more than 80% of GHG emissions (OECD, 2015), their actions will shape the global future.

As these examples highlight, the perception of energy efficiency has changed dramatically over the past decade: it has emerged from being ‘the hidden fuel’ to become recognised as ‘the first fuel’ (see ‘It’s Time to Fuel the First Fuel’ [page IV] and ‘Foundations and Fundamental Shifts’ [page 5]). Yet, huge ‘resources’ of energy efficiency remain untapped around the world.
The enormous potential for energy efficiency to reduce pressure on energy supply systems, deliver cost savings to people and business, and reduce emissions associated with energy production and use is well recognised. However, while the slogan of energy efficiency being ‘the first fuel’ has taken hold, it has not yet been taken to heart in a way that translates into action on the scale needed.

In leading IPEEC over the past five years, I’ve pinpointed three overarching ‘disconnects’ that should drive the next ten years of energy efficiency co-operation: low understanding beyond sector stakeholders, insufficient investment and lack of vision.

**Disconnect #1 • Low understanding:** Without question, sector stakeholders recognise energy efficiency as the quickest, greenest and most cost-effective way to address the challenges of energy security and climate change while also ensuring economic growth. This is often not the case, however, for individuals who rely on energy for their daily lives or to operate small businesses or global corporations, even though adopting new technologies and behaviours could bring them considerable near-term benefits that would increase over time. Perhaps more importantly, non-energy policy makers who could influence the decisions of individuals and corporations do not yet grasp how lower energy demand at the national level can enable meeting their commitments to international agreements such as the COP21 Paris Agreement.

**Disconnect #2 • Insufficient investment:** Generally, key players do not yet consider energy efficiency as a ‘resource’; as a result, the level of investment – across all areas – is extremely low. Historically, key actors have accepted that economic development requires reliable supplies of energy. Each time a new source has been discovered (such as coal, oil, natural gas, nuclear and renewables) governments have made substantive investments to support research and development (R&D) to create ‘market push’ for new technologies. Indeed, governments have recognised the need to invest in human, institutional, technical, legal and financial capacities. In turn, when this infrastructure is in place, it creates sufficient ‘market pull’ to convince private investors of the opportunity for attractive returns.

**Disconnect #3 • Lack of vision:** A type of ‘short-termism’ has become associated with energy efficiency due to perceived ‘quick wins’. In reality, these sometimes lead to sub-optimal action and marginal improvements. The large-scale benefits shown in scenario modelling require strategic action over long-term horizons. Importantly, sector stakeholders need to take action that will convince investors to accept the prospect of larger paybacks over these longer time frames.

Looking at the above, I recognise that frank criticism is only marginally helpful if it does not also come with suggestions for change. Thus, I draw your attention to the Outlook section of this report, which examines six additional ‘Ds’ that could be game changers: making energy efficiency desirable while acknowledging that disruptive action is required in four vital areas – decoupling, decarbonisation, decentralisation and digitalisation.

My message underscores one central point: for energy efficiency to become the first fuel, we need to fuel it first. This tenet has become a pillar of IPEEC’s mission and vision over the past decade. In the following pages, I invite you to learn more about what this has meant in practice.

Benoît Lebot
Executive Director, IPEEC
Advancing energy efficiency

Five key questions

Why does energy efficiency matter?
Without energy efficiency improvements, the world would have used 12% more energy in 2016 – equivalent to the consumption of the entire European Union (IEA, 2017).

What is ‘in it’ for us?
Energy efficiency delivers benefits for people, the economy and the climate. The advantages it brings are inclusive, and in line with most nations’ strategic interests: economic prosperity and competitiveness, reduced pollution, better health, and energy security, to name a few.

What is the opportunity?
Significant energy efficiency potential still remains untapped: across sectors, energy demand could be reduced by 60% to 80% through economically viable measures (IEA, 2017).

Why is it challenging?
Barriers to the uptake of energy efficiency include lack of awareness, the complexity and scale of the challenge – including the range of sectors involved – and uncertainty regarding costs and returns on investment.

What does energy efficiency need?
Energy efficiency requires specific human, institutional, legal, technical and financial capacities. Without support to develop and deploy such capacity, it will be impossible to implement energy efficiency measures. Multiple studies show that the upfront costs will deliver huge benefits to society, far exceeding the returns of any other investments in the energy sector.
Advancing energy efficiency

Foundations and Fundamental Shifts

Energy efficiency emerges from the ‘hidden fuel’...

Energy efficiency – the concept of using less energy while keeping people and economies active and growing – came to the fore in the 1970s in response to the oil crises experienced by Western industrialised countries. It quickly became associated with the ideas of ‘tightening one’s belt’, ‘avoiding excess’ and ‘taking a financial hit’. Whether for better boilers in homes or large industrial equipment, people and businesses perceived expenditure on energy efficiency as a cost that undermined household budgets or commercial profits. It was, at the time, a fair perception: the upfront costs were high and any potential returns were over a payback period far too long to be attractive.

As energy prices fell in the 1980s, rates of economic and social development recovered, and energy efficiency faded from view.

As the world moved into the new millennium, energy and the need to use it more efficiently resurfaced, this time on the global agenda rather than in national contexts. The UNFCCC published solid evidence about the impacts of GHG emissions on our planet. In parallel, the International Energy Agency (IEA) estimated that energy production and consumption accounted for two-thirds of total GHG emissions and 80% of carbon dioxide (CO₂) emissions (IEA, 2018).

These initiatives heightened the challenge of ‘more energy with less emissions’, effectively demanding that all stakeholders collaborate to find ways to break the trend of gross domestic product (GDP) and energy consumption growing in parallel – with higher emissions being considered an unavoidable by-product. In short, disruptive change was needed.

The need for an international body dedicated to energy efficiency

With the emergence of the global economy and greater recognition of the global systems that sustain life on Earth, the need for (and value of) co-ordinated international action has become clear across many sectors and for cross-cutting challenges. International bodies had long existed for traditional energy sources and the International Renewable Energy Agency (IRENA) was established in 2009 as a centre of excellence and repository of knowledge for this rapidly evolving sector.

The G8 countries recognised the need for a similar entity to raise the profile of energy efficiency and bring a strategic approach to international action. IPEEC was launched in 2009, with four primary objectives:

- Support accelerating energy efficiency improvement in IPEEC member economies.
- Influence the design and success of energy efficiency policies and programmes.
- Serve as an internationally recognised and respected provider of practical energy efficiency policy and programme information.
- Facilitate the application and on-ground implementation of energy efficiency projects.

To a large degree, the mission set out for IPEEC was to change mindsets about energy efficiency. This meant it would have to deliver solid answers to the five overarching questions (see page 5). It would also need to consider that diverse stakeholders – policy makers, industry and end consumers – would only engage if answers were relevant to them.
... to become the ‘first fuel’ and the cornerstone of the energy transition

At the time of IPEEC’s launch, several ‘big questions’ constrained interest in energy efficiency. How to measure ‘the negative’ of energy not used and make it relevant to data on consumption and trade of other fuels? How could policy support the development and deployment of energy efficient technologies? And, critically, how to stimulate investment in a sector that promised economic benefits from cost savings, rather than through more traditional methods of generating revenue?

Diverse international bodies stepped up to the challenge of gathering data that would support evidence-based policy recommendations to address these questions. In 2013, for example, the IEA began producing the Energy Efficiency Market Report series (IEA, 2013), which provided data on how much more energy would have been used in the absence of energy efficiency efforts, providing a basis for measuring the negative (Figure 1).

Knowing the end goals, a range of agencies have modelled scenarios that reveal what technologies could allow energy efficiency to fulfil its role in the clean energy transition, as well as the level of investment needed.

At national level, a hopeful trend emerged: some countries were successfully decoupling economic growth from energy demand – i.e. GDP was rising more quickly than energy demand, with the gap projected to increase over time.

This helped establish the ‘business case’ for energy efficiency. In 2018, the IEA estimated the global market for energy efficiency (both technologies and services) to be USD 236 billion (IEA, 2018). While such figures grab the attention of investors, financial institutions are still seeking guidance on how to calculate risks and returns in this sector – another area in which IPEEC is playing a vital role.

Energy efficiency is now recognised as a fuel: in contrast to fossil fuels, which require extraction and carry the risk of depletion, energy efficiency holds potential to deliver more, year after year. Reduced energy demand means less need to extract or capture other resources, less investment needed for infrastructure to generate and distribute energy, and lower GHG emissions from the production and use of energy. In sharp contrast to the cumulative costs and impacts of other energy sources, with each year that passes, the cumulative value of ‘savings’ from energy efficiency increases.

These traits are what warrant thinking of energy efficiency as ‘the first fuel’. The next big challenge (see page 36) is to make energy efficiency systemic, an undertaking that G20 governments are ready to lead.

Figure 1 • Savings or reduced demand from energy efficiency measures in IEA-11 countries, 1973-2011

IPEEC’s role in raising the profile of energy efficiency

The primary mandate of IPEEC is to facilitate international co-operation, such that proven energy efficiency initiatives can be rolled out quickly at national and subnational levels (for details, see ‘About IPEEC’, page II).

Over the past decade, IPEEC Task Groups (see pages 10-11) have brought together diverse institutions, on a voluntary basis, to share good practices and information on technology solutions, thereby building collective knowledge. With the ultimate aim of accelerating, in a cost-effective manner, the design and deployment of energy efficiency solutions, IPEEC has focused on four main areas of activity.

High-level dialogue, decision making and policy action

From its inception, IPEEC has upheld the principles of ‘equal voice’ and ‘equal footing’ for all member countries. This ensures that member interactions, including those by the PoCo and ExCo, are frank and fruitful, and that decisions regarding the programme of work are made by consensus. The policy progress seen to date reflects an effective model by which the Secretariat identifies energy efficiency themes of strategic importance and facilitates interactions – conferences, meetings, webinars, etc. – that encourage dialogue, information sharing and decision making. While the themes are international in scale, this approach encourages countries to take ownership of initiatives and lead context-appropriate roll-out at national level.

Collaborative action, targeting key sectors

Technical co-operation and rigorous analytical work underpin the roll-out and evaluation of energy efficiency solutions, and are vital to assessing the efficacy of policy actions. Within the IPEEC structure, ten dedicated Task Groups co-ordinate this activity, each comprising a network of international organisations, NGOs and private stakeholders in specific sectors.

Information exchange, through international bodies

The IPEEC Secretariat has been collaborating with more than 40 international organisations that have vested interests in energy efficiency. Over time, participants have come to better understand one another’s unique roles and strengths, as well as areas in which they fulfil complementary functions and could achieve more through collaboration.

Communications and outreach

In addition to hosting high-profile activities at which members can interact in person or online, IPEEC works diligently to disseminate information about energy efficiency. The IPEEC Secretariat accepts invitations to present at events, produces articles, reports and newsletters, and enhances visibility of IPEEC’s work through a much-enhanced web platform and social media channels.

Thanks to the voluntary effort of hundreds of people representing dozens of organisations, the IPEEC network has delivered impressive results – on numerous fronts. In addition to mainstreaming energy efficiency in key business sectors, including the finance sector, it has brought related challenges and opportunities to the international agenda through the G20, G8 and UNFCCC initiatives and to numerous regional platforms.
IPEEC’s ability to quickly establish close connections with a broad range of stakeholders has delivered value across the energy efficiency sector. With many partners and collaborators to mention, we provide an extensive list in Annex 1 (page 39). When G20 governments agreed, in 2014, to formalise their commitment to energy efficiency, the existence of this network made IPEEC a natural choice for a lead partner.

G20 advisory role: Leading the way for large-scale, high-impact action

In 2014, G20 governments agreed to an Energy Efficiency Action Plan (EEAP), thereby securing a position for energy efficiency on the international agenda. They selected IPEEC to play the lead role in coordinating action. Two years later (2016), G20 members adopted the enhanced Energy Efficiency Leading Programme (G20 EELP), again with IPEEC co-ordinating.

With a time frame to 2030, the EELP requires ongoing co-ordination, which IPEEC is well-prepared to undertake, given its diverse networks and achievements to date. In this role, IPEEC and its nine G20 Task Groups work closely with the rotating G20 Presidencies to promote the energy efficiency agenda and report on progress to the Energy Transition Working Group (ETWG).

Sustained collaboration within the G20 is crucial to ensure that energy efficiency measures are implemented widely, quickly and cost-effectively by countries, institutions and businesses. IPEEC leadership has proven essential in building consensus among all G20 members; as a result, its capacity to facilitate the implementation of collaborative energy efficiency activities has been ‘welcomed’ in G20 Energy Communiqués.

2019 • Japan: Promoting energy efficiency as a key component to achieve energy transitions that support sustainable growth. Focusing on innovation as a way to spur inclusive energy transitions.

2018 • Argentina: Continued to emphasise energy efficiency as a top priority, including the implementation of the G20 EELP. Promoted critical aspects that contribute to the success of energy efficiency policy options, such as behaviour change initiatives.

2017 • Germany: Approved the G20 Climate and Energy Action Plan for Growth, showing support to the COP21 Paris Agreement. Stressed the importance of stronger international energy efficiency collaboration.

2016 • China: Adopted the G20 EELP, which extended the areas of collaboration under the Action Plan to include super-efficient appliances, best available technologies and best practices, district energy systems, energy end-use data and energy efficiency metrics, and knowledge sharing.


2014 • Australia: Adopted the G20 EEAP, setting the stage for voluntary energy efficiency co-operation in the areas of transport, finance, buildings, industrial energy management, networked devices and electricity generation.

2015 • Turkey:

2016 • China:

2017 • Germany:

2018 • Argentina:

2019 • Japan:

Figure 2 • Evolution of G20 action on energy efficiency
Source: IPEEC, 2019.
Task Groups tackle efficiency challenges across key sectors

As its name suggests, the intent of IPEEC has always been to establish partnerships for co-operation, with the Secretariat playing a co-ordinating role to ensure basic principles are upheld, including equality among members and balance of public- and private-sector stakeholders, and to identify issues of strategic importance to specific sectors.

Ten years on, IPEEC Task Groups² have demonstrated the very best of international collaboration: how countries can come together, decide together and act together to tackle challenges – big or small – of global importance.

**Power**

1% efficiency improvement in global thermal power generation would reduce CO₂ emissions by 340 Mt annually.

**High Efficiency Low Emissions Task Group (HELE)**

Advancing the deployment of HELE technologies in target countries where coal continues to be a primary energy source.

**Transport**

Efficiency standards for LDVs and HDVs could save 15 Million barrels of oil per day, and reduce the cost of energy for transport by USD 86 million.

**Transport Task Group (TTG)**

Seeks to reduce the energy and environmental impacts of motor transport, especially heavy-duty vehicles (HDVs).

**Cross-sector**

53 EJ could be saved by 2050 through implementation of effective energy efficiency policies – equivalent to the energy consumption of all buildings in China, France, Germany, Russia and the UK.

**Energy Efficiency Finance Task Group (EEFTG)**

Provides guidance for G20 countries to scale up energy efficiency investments and to progress voluntary principles.

**Improving Policies Through Energy Efficiency Indicators Task Group (IPEEI)**

Supports improved policy frameworks in developing economies by creating networks for information exchange.

**Top Ten Energy Efficiency Best Practices and Best Available Technologies Task Group (TOPTENS)**

Identifies and promotes best available technologies (BATS) and best practices (BPs) for energy efficiency in industry and buildings.

² Task Groups are voluntary partnerships of IPEEC member countries that seek to accelerate the adoption of energy efficiency policies and practices in diverse sectors. The Task Groups design and implement technical work programmes on a range of energy efficiency topics, with the input and support of non-IPEEC members, including international organisations, NGOs and private-sector partners.
While the energy sector is vast and complex, sometimes tiny details require thoughtful debate. And while the sector is characterised by a great deal of competition, co-operation in some areas allows everyone to advance more efficiently towards shared goals.

Over time, the number and mandate of Task Groups has evolved. Some achieved their aims and were dissolved; others were formed recently. At present, there are ten, each with a specific mandate and all showing willingness to jointly tackle cross-cutting challenges. The following pages highlight recent activities, future plans and concrete impacts of each Task Group. A Retrospective box recaps facts and figures that tell an impressive story.

**Super-Efficient Equipment and Appliance Deployment Initiative (SEAD)**
Promotes innovation for energy-efficient appliances to lower energy costs for consumers while increasing the sustainability of economies.

**Network Devices Task Group (NDTG)/Connected Devices Alliance (CDA)**
Ensures high energy efficiency standards are upheld as network-connected technology advances.

**Buildings Energy Efficiency Task Group (BEET)**
Supports the development and implementation of effective building energy efficiency policies through collaborative research and information exchange.

**Energy Management Working Group (EMWG)**
Promotes ISO 50001 standards to reduce energy use in industrial and commercial buildings at international, national or regional level.

**Energy Management Action Network (EMAK)**
Helps policy makers design and implement impactful energy management policies by offering a platform for exchange and interaction with industry stakeholders.

Appliances
If 14 billion connected devices were more efficient, energy costs could be reduced by USD 80 million annually.

Buildings
Save 3,700 TWh of electricity consumption by 2030 through energy efficiency improvements in buildings.

Industry
If 50% of the industry and service sector used energy management systems, USD 700 million could be saved by 2030, in addition to reducing primary energy demand by 105 EJ and emissions by 6,500 Mt.

Figure 3: Task Group mandates align with challenges and opportunities in energy efficiency Source: IPEEC, 2019.
**Objectives**

An initiative of the Clean Energy Ministerial (CEM) and an IPEEC Task Group, SEAD is a voluntary collaboration among governments working to promote worldwide the manufacture, purchase and use of energy-efficient appliances, lighting and equipment.

Three key programme strategies enable SEAD to accelerate market transformation:

- Research and analysis: Providing member governments with access to high-quality research and expertise on a variety of product areas and market transformation policies.
- Implementation and training: Driving high-quality, high-efficiency products into markets by creating tools and launching campaigns, and by testing and awarding products for efficiency.
- Dialogue and collaboration: Fostering peer-to-peer exchange among policy makers to drive collaboration and the sharing of policy best practices and technical information.

### 2018 • Seizing energy savings in widely used equipment

SEAD’s most significant accomplishments in 2018 include:

- Executed the Global Appliance Testing Costs Analysis project to help stakeholders understand product testing costs, prepare comprehensive plans and determine appropriate resource allocation for compliance programmes (see page 13).
- Concluded a study on Baseline Evaluation and Policy Implications for Air Conditioners in Indonesia to help increase energy savings from the country’s standards and labelling (S&L) programme.
- Delivered the SEAD Policy Exchange (SPEx) Forum, *The Road to Low-Carbon Heating Systems: Key Barriers to Overcome*.
- Announced the successful accomplishment of the Global Lighting Challenge, exceeding the campaign goal to deploy 10 billion energy-efficient lighting products worldwide. The success of the campaign and its retirement were announced by the Swedish Energy Minister at the 9th Clean Energy Ministerial (CEM9).
- Developed the new Terms of Reference document as a strategic guide for SEAD moving forward, including details on the new, more collaborative leadership team.

### 2019 • Sharing information to support targeted action

To continue addressing the efficiency potential of appliances, SEAD plans a number of activities for 2019:

- Increased emphasis on member-led, project-based work and greater member engagement.
- Continue to provide technical assistance and analysis to Argentina, Indonesia and Mexico, through in-kind funding from the United States government for the Lawrence Berkeley National Laboratory to conduct this work.
- Host SEAD Policy Exchange Forum (SPEx) webinars.
- Host International Steering Committee meetings.
- Continue to support dialogue around and collect information on national or regional product databases and registries for appliance energy efficiency, as well as S&L policies for appliance energy efficiency.
- Continue communications and outreach towards SEAD members and partners.

**Membership**

**Lead Members:** Canada • European Commission • India • United Kingdom • United States

**Participants:** Argentina • Australia • Brazil • Chile • China • Germany • Indonesia • Mexico • Republic of Korea • Russia • Saudi Arabia • South Africa • Sweden • United Arab Emirates
Impact: **Addressing the high cost of assessing high-impact appliances**

Testing the energy performance of appliances is an essential part of certification, monitoring and enforcement (compliance) frameworks. It is also vital to reducing end-user energy demand and expenses, and to building consumer trust. However, product testing can be very costly and is often under-resourced.

In 2018, SEAD conducted the Global Appliance Testing Costs Analysis project to gather information on and analyse global appliance testing costs for high-impact appliances – including the costs of building and operating a testing laboratory and testing products.

Understanding product testing costs helps policy makers and compliance authorities prepare comprehensive testing plans and determine the best solutions for where to conduct testing: for example, in existing national or foreign for-profit accredited test laboratories or whether to invest in their own government-run accredited test facility. However, data on testing prices, as well as the costs of building a laboratory, are often scarce or difficult to access.

Information published within this project aims to demystify the full testing costs, thereby empowering governments and compliance authorities to prepare appropriate compliance policies and programmes. In addition to delivering a catalogue of product testing prices, the project provides information on test lab set-up, operations and country-specific maintenance costs. It also suggests resource allocation options and alternatives to setting up new test laboratories.

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**Shining the light on energy efficiency**

SEAD has achieved several important milestones since its establishment in 2010, including:

- Launching and promoting the Global Lighting Challenge, resulting in commitments to deploy more than 14 billion high-efficiency, high-quality and affordable lighting products.

- Providing the SEAD Street Lighting Tool, which helped Canada, India and Mexico evaluate quality, efficiency, technical compatibility and lifetime cost of different lighting products.

- Launching and executing, since 2012, the Global Efficiency Medal competition to identify innovative technologies that push the boundaries of efficiency and slash energy consumption. Seven award cycles have recognised more than a dozen companies and awarded over 50 products.

- Launching the India Mobile Application to improve appliance energy efficiency programmes and support consumer awareness of energy-efficient products.

- Generating savings in South Africa by collaborating with local partners to address major energy shortfalls. With minimum energy performance standards recommended by SEAD, the country could save 46% of energy consumed by water heaters – adding up to 3.8 TWh of electricity by 2030.
Networked Devices Task Group (NDTG)/Connected Devices Alliance (CDA)

Objectives

The NDTG is a platform for international co-operation among governments, experts and industry to develop innovative solutions to the challenge of increasing energy consumption by networked devices. To boost reach to the industry sector, this group conceived the Connected Devices Alliance (CDA), with substantial contributions from the Electronic Devices and Networks Annex of the IEA Energy Efficient End-use Equipment Technology Collaboration Programme (IEA 4E TCP). The CDA now comprises 350+ government and industry participants that collaborate on the energy efficiency opportunities provided by connected devices.

2018 · Advancing towards low standby energy when network connected

Electrical devices that are connected to networks – often referred to as ‘intelligent devices’ – have a challenging feature: the need to stay ‘on, online and available’ even when not performing their primary functions. As a result, the rapidly growing number of network-connected devices is expected to drive up energy consumption associated with being in ‘network standby’ mode. Awareness of the problem has spurred evolution of the technologies to curb growth in their energy demand; still, developing appropriate policies in this area remains crucial and requires global input from industry, government, NGOs and academia.

Throughout 2018, the CDA encouraged international collaboration on connected devices through:

• Organising an industry/government workshop (Stockholm, Sweden / Nov 2018), with the IEA 4E TCP, to study the potential for policies that could lead to connected devices using zero energy to maintain network connectivity.

• Promoting the CDA Voluntary Principles for Energy Efficient Connected Devices, which are officially supported by numerous governments and industry groups (see page 15).

• Expanding the CDA Centre of Excellence, an online library that provides free access to in-depth, expert papers on ways to develop energy-efficient smart devices.

• Significant input to several IEA 4E TCP technical reports concerning energy use of connected devices.


• Regularly distributing newsletters to the >350 CDA membership base, outlining the work of the CDA and the IEA 4E TCP.

2019 · Implications of a network-connected future

In 2019, the CDA will continue to explore ways to raise awareness and educate industry stakeholders and policy makers on the energy implications of a connected world, as well as possible options for managing the energy consumption associated with connected devices. This will include four key activities:

• Responding to the IEA 4E TCP request to analyse policy options that could prompt connected devices to use zero energy while maintaining network connection.

• Expanding the CDA Centre of Excellence online library and promoting the CDA Voluntary Principles for Energy Efficient Connected Devices.

• Continued promotion of the CDA Voluntary Principles for Energy Efficient Connected Devices.

• Conducting outreach to industry and CDA members to highlight the Task Group activities.

Membership

Lead Members: Canada • the Netherlands • Sweden • United Kingdom with the support of the IEA

Participants: Australia • Austria • China • Denmark • European Union • France • Germany • Japan • Republic of Korea • Mexico • Singapore • Spain • Switzerland • Turkey • United States
Achievements/Appliances

Impact: Principles to achieve efficiency of connected devices and low-energy network standby

With CDA participating members representing all sectors and all major economies, the potential to initiate change is substantial. Thanks to their collective effort, the CDA Voluntary Principles for Energy Efficient Connected Devices offer an energy efficiency blueprint for designers of products, protocols and policies.

The principles serve vital roles for two complementary stakeholder groups:

• Providing guidance on key features of energy-efficient connected devices, networks and communications protocols, which can be applied by designers, manufacturers and protocol authors.

• Encouraging a common global framework for developing government policies and measures, which can accelerate action by policy makers.

Supporters of CDA Voluntary Principles for Energy Efficient Connected Devices include:


Next challenge: Accelerate action on ‘intelligent efficiency’ to ensure the rapidly growing number of connected devices does not become a massive energy burden.

Paving the way for innovation

Launched in 2015 under the Energy Efficiency Action Plan, the NDTG/CDA has successfully led globally co-ordinated action on connected devices. A major initiative was developing the CDA Voluntary Principles for Energy Efficient Connected Devices, which provides valuable guidance for policy makers and industry on key elements of the sector. The principles are now supported by 11 governments, 4 NGOs, and numerous major international device manufacturers and/or industry associations.

The Task Group also helped launch the Super-efficient Equipment and Appliance Deployment (SEAD) Connected Efficiency Award, which recognises the most energy-efficient communications protocols used within connected devices. In addition, the NDTG/CDA launched the CDA Centre of Excellence, an online library with 70 relevant policy papers in the area of connected device energy use. In 2017, the Group also contributed to the Clean Energy Ministerial (CEM) Roundtable discussions on ‘Digitalisation of the Energy Sector to Enhance Energy Productivity and Renewables Integration’.

Retrospective
**Objectives**

BEET is a collaborative platform for countries to research, inform and support the development and implementation of effective building energy efficiency policies, with a core focus on building rating systems and building codes. With a strong emphasis on comparing international policies and approaches on a wide range of building energy efficiency issues, and examining the practical implementation aspects of these approaches, BEET strengthens networks and expands knowledge at a pragmatic level.

**2018 • Building consensus around zero-energy buildings**

In 2018, BEET published *Zero-Energy Building Definitions and Policy Activity: An International Review (BEET 7)*, which is expected to be a key reference for future government policy activity in the sector. Zero-energy buildings (ZEBs) generally refer to highly efficient buildings that use renewable technology to produce as much energy as they consume annually. The ZEB designation, however, can vary in different countries and economies, as different metrics are used to establish ‘zero’ energy or emissions, or to define energy consumption and production boundaries. Such factors make it difficult to perform direct comparisons. To address this issue, the *BEET 7* report:

- Provides an overview of relevant definitions covering all types of ZEBs; describes regulatory policies and implementation approaches; and highlights sector-wide market progress. It also summarises lessons learned from IPEEC member countries and other leading national and subnational governments.
- Offers energy and building policy makers an easy way to better understand and navigate the many definitions on standards for measuring building energy consumption, and thus make the most appropriate policy choices.
- Emphasises the importance of supporting and incentivising ZEB policies at all levels of government in order to achieve desired growth and progress.

**2019 • Enabling ambition for ZEBs**

Rapidly expanding adoption of best policy and regulation practices can quickly lead to more efficient new and existing buildings on the global scale. In support of this, BEET has identified three areas for future activities:

- Conduct research and develop resources and tools to help countries at different levels of development and ambition apply specific recommendations to advance building energy policy. Specifically, BEET will investigate how obligation schemes (including white certificate schemes for buildings) can help fund the promotion of energy efficiency in existing buildings.
- Highlight and exchange best practices, experiences and analysis on major building policy tools such as building codes, ratings and disclosure programmes.
- Co-operate with international organisations and initiatives to leverage knowledge and raise awareness.

**Membership**

**Lead Members:** Australia • United States

**Participants:** All IPEEC member countries, plus Indonesia • New Zealand • Saudi Arabia • Singapore • Spain • Turkey
Impact: Accelerating policy activities for ZEBs

As ZEB policies and initiatives have been rolled out by IPEEC member countries and other national and subnational governments, several challenges have emerged. The wide range of ZEB definitions, regulated loads included/addressed, and boundaries for energy consumption or emissions undermine efforts to design a global framework for ZEBs – as well as supporting tools and innovative solutions.

Recognising the value of drawing lessons from international practices to accelerate policy activities, Chapter 4 of the BEET 7 report summarises leading ZEB policies and initiatives. In Europe, for example, the recast Energy Performance of Buildings Directive (EPBD) provides a framework definition for buildings that are nearly ZEBs. The Government of Japan has created guidelines and standards for net ZEBs, and has committed up to USD 4.5 million for financial subsidies for ZEBs.

As BEET members represent more than three-fourths of cumulative global potential for energy saving in buildings, the policy choices they make will have substantial impact on curbing the growth of energy consumption in buildings. The BEET 7 report can serve as an important resource for policy makers looking to promote zero buildings energy or emissions.

Next challenge: Help actors identify ‘trigger points’ at which building renovation is the most cost-effective.

Retrospective

Action to help make every building more efficient

Established in 2012, BEET has led various activities that provide industry experts and policy makers with considered and relevant context and analysis regarding leading practices in global energy efficiency. In 2016, the Task Group hosted a training webinar on stakeholder engagement to support adoption and implementation of building energy codes. It has also produced a series of studies, including:

- Existing Building Energy Efficiency Renovation: International Review of Regulatory Policies (BEET 6)
- International Review of Residential Building Energy Efficiency Rating Schemes (BEET 5)
- Building Energy Performance Metrics: Supporting Energy Efficiency Progress in Major Economies (BEET 4)
- Delivering Energy Savings in Buildings (BEET 3)
- Building Energy Efficiency: Opportunities for International Collaboration (BEET 2)
- Building Energy Ratings (BEET 1)
Objectives

The HELE Task Group aims to support energy efficiency improvements in conventional electricity generation, particularly by highlighting the potential of HELE technologies to also lower emissions, thereby contributing to a low-carbon future.

The Task Group achieves its mission through three main actions:

- Improving understanding and deployment of HELE technologies (e.g. ultra-supercritical and integrated gasification combined-cycle power plants) and other environmental equipment that can reduce air pollution.
- Developing best practices in operations and maintenance (O&M), including integrating the Internet of Things for smart systems.
- Promoting exchanges on technical roadmaps and policies that facilitate greater uptake of HELE technologies among Task Group members.

2018 • Boosting awareness about the potential of HELE technologies

Increasing public awareness of how HELE technologies can support the low-carbon energy transition and reduce GHG emissions is critical, particularly in countries that seek to use large coal resources. Participants representing diverse countries and international organisations examined this challenge at the most recent HELE Task Group meeting (Tokyo, Japan / Sept 2018). Topics included:

- Updates on coal-related energy policies and the position of coal in the energy mix plans of different countries.
- Briefings on outcomes of the 27th Clean Coal Day International Symposium (Japan / Sept 2018), followed by the exchange of opinions among members on the role of HELE technologies.
- Discussion on next steps of the HELE Task Group, with agreement to develop a short policy report.
- Developing and circulating a short report to obtain endorsements on the important role of HELE technologies and thermal power generation.
- Hosting technical tours and workshops to facilitate discussion on HELE technologies and related policy options. Potential topics include: financing of technologies, digitalising O&M of coal-fired power plants, and the role of environmental equipment in power generation.
- Developing the basis for common measurement of GHG emissions reduction through O&M improvements in participating countries.
- Expanding communication and outreach efforts, and encouraging further collaboration to overcome technical and financial barriers to greater uptake of HELE plants.

2019 • HELE technologies in the energy transition

Securing wider recognition by society regarding the role of HELE technologies in the energy transition is vital to the upcoming G20 Ministerial Meeting on Energy Transitions and Global Environment for Sustainable Growth (June 2019, under the G20 Presidency of Japan). The HELE Task Group aims to achieve this by:

Membership

Lead Member: Japan

Participants: Australia • China • India • Indonesia • Russia • South Africa • Turkey
Impact: Securing a future for HELE technologies

As society gains awareness of the links between energy production and consumption and climate change, a critical challenge emerges; several countries projected to see rapid energy demand growth have large coal endowments.

The HELE Task Group recognises that international co-operation is important to increase public awareness of technologies that can improve efficiency and reduce GHG emissions at thermal power plants. At the workshop in 2018, participants from eight countries (Australia, China, Indonesia, Japan, Russia, South Africa, Turkey and the United States) deliberated on ways to convey the role of HELE technologies during the energy transition. Besides improved efficiency and reduced emissions, HELE technologies can provide flexible backup generation to intermittent renewables, thereby helping to stabilise power systems – a key role as more energy demand is shifted to electricity (e.g. electric vehicles, electric home heating).

A vital next step is to ensure that HELE technologies get appropriate recognition in multilateral discussions, in particular at upcoming G20 meetings.

Next challenge: Bring more plants in line with latest HELE plants in Japan, which show energy efficiency improvement of 43% and emissions reduction of 17%.

Site visits provide opportunity to demonstrate and discuss

HELE has organised several workshops and site visits since its creation in 2009 as the Global Superior Energy Performance Power Task Group. These events typically bring together many G20 members, private-sector leaders, multilateral development banks and international organisations, such as the IEA, the Organisation for Economic Co-operation and Development (OECD) and the Organization of the Petroleum Exporting Countries (OPEC). While often covering topics such as research, development, finance and barriers to deployment of HELE technologies, some events have had very specific themes or core activities:

- 2016: Workshop on facilitating HELE technologies, followed by site visits to two thermal power plants (Tokyo and Yokohama, Japan).
- 2015: Two workshops on clean coal technology and barriers to its deployment (Ankara and Istanbul, Turkey).
To date, vehicle efficiency and emissions performance standards are the most successful policy measures to achieve deep cuts in on-road vehicle energy use and associated pollutant emissions. Set up by the G20 in 2015, the TTG has a three-prong mandate to:

• Build domestic support and enhance capability for action to reduce the energy and environmental impacts of motor transport, especially heavy-duty vehicles (HDVs).
• Identify best practices on implementing cost-effective energy efficiency and emissions control measures in transport, and exchange these among G20 countries.
• Conduct analysis and outreach to assess the opportunities, barriers, costs and benefits of HDV energy efficiency action; subsequently, recommend a course of action for participating G20 countries.

2018 • **Increasing uptake of world-class heavy-duty vehicle standards**

Vehicle efficiency and emissions performance standards set by G20 economies largely determine the evolution of the global on-road vehicle fleet, including for HDVs, the most energy- and emissions-intensive subsector. Yet these policies are not uniform across the G20. In 2018, the TTG continued its efforts to reduce this disparity by facilitating knowledge sharing about policy and technical issues and building capacity to support wider adoption of world-class standards. Three main activities marked the year:

• Carrying out a ‘deep dive’ (an in-depth, focused policy project) on the measurement and certification of HDVs and their components to help countries develop HDV efficiency standards and labelling programmes.

• Conducting policy exchanges, via webinars, on topics such as the European Commission proposal for HDV CO₂ standards, Argentina’s HDV efficiency programmes and the United States’ HDV Phase 2 GHG standards.

• Convening its first in-person meeting to take stock of important progress made in improving the energy efficiency and environmental performance of HDVs in G20 economies, and to engage in strategic discussions on vision and activities for the coming years.

2019 • **Aligning action with desired outcomes**

Going forward, TTG activities will be shaped around four work streams:

• Policy exchange: Organising regular policy exchanges on the development and implementation of HDV efficiency programmes and emissions standards, as well as other transport issues, to allow members to share and learn from one other. TTG has introduced a new platform to enhance communication on policy topics, including behaviour change.

• Deep dives: Providing direct knowledge transfer, via technical webinars and technical assistance, to G20 countries interested in developing relevant HDV policy frameworks and associated technical expertise.

• Research activities: Addressing knowledge gaps and research questions associated with desired developments in transport.

• G20 engagement: Reflecting G20 priorities in the TTG work plan and providing updates to delegates.

**Membership**

**Lead Members:** European Commission  
• United States

**Participants:** Argentina  
• Australia  
• Brazil  
• Canada  
• China  
• Germany  
• India  
• Italy  
• Japan  
• Mexico  
• Russia  
• United Kingdom
Impact: Diving deep into HDV efficiency standards

HDVs, such as trucks and buses, are a small fraction of the on-road vehicle fleet but account for 40% of its energy use and CO₂ emissions, as well as a large portion of particulate matter and ozone precursors from transportation. Developing new HDV efficiency and/or CO₂ standards is an intensive process, which requires a combination of technical tools, skills and institutional capacity.

In 2018, the TTG launched its landmark project – called the Deep Dive – to help interested countries accelerate the development of robust HDV efficiency standards. Through a series of technical webinars (seven to date) and in-person workshops, participating countries are learning how to acquire and adapt existing tools, skills and methods required to define and certify minimum HDV standards while also building institutional capacity to oversee their implementation. In addition, participants have been introduced to new techniques on how to apply established testing procedures and simulation tools for HDV efficiency measurement in different regions.

The G20's continued support of this project is instrumental in accelerating the development of world-class HDV efficiency standards and delivering benefits to the group and beyond.
Energy Management Action Network (EMAK)

Objectives

EMAK aims to promote improvement of energy efficiency and energy savings in industry and commercial buildings. Established in 2009, it is as a forum for participants to discuss policy issues related to energy management and share the best practices of each country, region and industry. EMAK integrates two networks: one comprises policy makers responsible for promoting best practice policies for energy management; the other is made up of industry stakeholders focused on the real-world application of energy management systems (EnMS). The networks achieve their mission by supporting exchanges on proven and innovative practices and through capacity building.

2018 • Strategic action to capture benefits of energy management

EMAK member countries account for around 40% of the global energy supply, which emphasises the importance of increasing uptake of EnMS by governments and other stakeholders. In 2018, the Task Group continued to fulfil its role as a high-level international forum for discussion, consultation and exchange of information on the role of EnMS in addressing energy efficiency challenges worldwide. This was achieved mainly by:

• Gathering stakeholders from diverse fields under the theme ‘Sharing Energy Management Knowledge and Good Practices’ to promote the uptake of EnMS and efficient technologies across industry and commercial buildings sectors at the ninth annual EMAK workshop (Brazil / Nov 2018).

• Publishing the Action Guide on Electricity Peak Cuts and Savings as an effective tool for demand management and demand response in the Brazilian context. This guide highlights the potential of EnMS to support significant behaviour change in industrial and commercial buildings, and provides advice for both business operators and households on how to improve energy efficiency. Additionally, this tool opens a path towards enhancing the implementation of EnMS through the use of behavioural sciences.

• Helping member countries identify and prioritise key challenges in the energy management sector, such as how to systematically achieve efficient energy use without negative impacts on economic growth, while sharing recommendations on solutions to promote efficient EnMS.

• Exploring opportunities to co-operate with other IPEEC Task Groups, namely TOP TENs and EMWG.

2019 • New themes, new collaborations

In 2019, EMAK will build on its existing work to:

• Host additional workshops to facilitate exchange on EnMS best practices among policy makers and energy managers. Participating countries will explore potential themes and/or topics for future workshops, which could focus on a specific region or geographic area.

• Take efforts to publicise the Action Guide on Electricity Peak Cuts and Savings for regional and global use among EMAK members and for broader audiences. This Action Guide can help EMAK members and other interested stakeholders participate in electricity saving schemes with a special focus on businesses and households.

• Continue identifying options (tools and best practices) available for implementing EnMS to overcome energy efficiency barriers, both through workshops and by sharing workshop outcomes and reports.

• Encourage greater private-sector involvement in EMAK activities, in addition to enhancing co-operation and partnerships with other IPEEC Task Groups and international organisations.

Membership

Lead Member: Japan

Participants: Australia • Brazil • Canada • China • India • Indonesia • Mexico • Russia • Saudi Arabia • United States
Impact: Facilitating information exchange within the energy management field

EMAK’s 2018 workshop (EMAK9), ‘Sharing Energy Management Know-How and Good Practices’, aimed to support the application of EnMS, particularly in the industrial sector. With participants showcasing improvements in EnMS and sharing information on best practices in energy efficiency and energy savings, the event contributed to the overall propagation of knowledge on energy management best practices as well as to strengthening the network among participants from public and private organisations. The workshop was held in Brazil, with 72 participants gathered at the venue while other interested members (from seven countries including Brazil) joined the live broadcast. Together, they discussed the importance of continuing to build EnMS networks through both in-person and online interaction.

Workshop participants also made efforts to enhance the creation and dissemination of presented EnMS and best practices in energy efficiency. They identified effective mechanisms that can further boost awareness of the merits of best practices in EnMS. Finally, the workshop considered the upgrade and expansion of EnMS to supply chains based on EnMS for single companies, and called for links with national public-private networks in each region.

By supporting the exchange of information and best practices about measures that significantly improve energy efficiency on sectoral and cross-sectoral bases, such events help participants realise their energy savings potential. They also help facilitate transfer of efficient technologies and capacity building in developing countries.

Next challenge: Support the launch and ongoing refinement of award schemes for energy management practices, including public-private co-operation and linking to targets.

Retrospective

Addressing key topics for key players in energy management

Across nine workshops and two webinars organised since 2009, EMAK has facilitated the sharing of experiences on the design and implementation of energy efficiency policies and programmes among diverse stakeholders, including central and local governments, industry, private banks, and research institutions.

With a focus on increasing the uptake of EnMS in industry and buildings, topics covered by EMAK include energy efficiency in small- and medium-sized enterprises, waste heat recovery measures, the role of energy services companies in EnMS, energy management best practices and award programmes.

In publishing the main findings from each workshop, EMAK creates a valuable resource for policy makers and stakeholders looking to develop energy management policies and programmes.
Energy Management Working Group (EMWG)

Objectives

The EMWG aims to optimise global energy use and minimise emissions across industrial facilities and commercial, public sector and institutional buildings, largely by encouraging sector stakeholders to pursue continuous energy efficiency improvements through implementation of energy management systems (EnMS), such as the ISO 50001 standard.

In parallel, the EMWG works with the private sector, NGOs, accreditation bodies, and international and regional programmes to strengthen and support cohesive national and regional energy and climate strategies. Often, this involves facilitating development of policies and programmes that address implementation barriers and improve access to technical resources.

2018 · Policy best practices and practical action for energy management

With a strong focus on global ISO 50001 energy management system trends, the EMWG boosts global awareness of the benefits of EnMS and their potential to reduce costs, energy use and CO₂ emissions. In 2018, the EMWG:

• Held the third round of the Energy Management Leadership Awards, which drew entries from 50 organisations from around the world. Three Award of Excellence winners were recognised during the 9th Clean Energy Ministerial (CEM9) (Copenhagen, Denmark / May 2018).

• Continued to enhance Energy Professionals International ISO 50001 Lead Auditor Certification, a globally available credential for ISO 50001 Lead Auditors.

• To help countries to estimate energy and emissions savings, promoted use of the ISO 50001 Impact Estimator Tool developed by the EMWG’s ISO 50001 Global Impacts Research Network.

• Encouraged integration of latest technical developments and policy best practices in national programmes; launched Phase II of the North American Energy Management Pilot Programme, led by the Commission for Environmental Co-operation; and concluded the Asia-Pacific Economic Cooperation (APEC) project, Enhancing Regional Conformity Assessment to Ensure Successful ISO 50001 Standard Outcomes.

• Executed an EMWG strategy review to evaluate member priorities on energy management and identify new areas of work for the Task Group.

• Disseminated information on the ISO 50001 standard by publishing case studies, hosting webinars, training workshops and other events, and presenting at international conferences.

2019 · Strengthening awards, accreditation and certification

In addition to advancing its ongoing initiatives, in 2019 the EMWG will focus on:

• Evaluating and awarding the 2019 Energy Management Leadership Awards competition, adding to more than 120 award-winning case studies describing ISO 50001 use and benefits in sites across 100 countries and economies.

• Supporting development of the International Accreditation Forum database of ISO 50001 and other management system certifications, largely by engaging with certification and normalisation bodies and by developing recognition programmes to prompt organisations to seek certification.

• Facilitating ongoing dialogue among member (and non-member) governments, the private sector, standards bodies, and other partners through member webinars and international events such as the CEM10 meeting, G20 events through IPEEC, and ISO Technical Committee 301 meetings.

Membership

Lead Members: Canada • United States

Participants: Argentina • Australia • Chile • China • Denmark • European Commission • Germany • India • Indonesia • Japan • Mexico • Republic of Korea • Saudi Arabia • South Africa • Sweden • United Arab Emirates
Impact: Energy Management Leadership Awards deliver global recognition

Experts estimate that if 50% of projected global industrial and services sector energy consumption were managed under ISO 50001 by 2030, it would generate cumulative primary energy savings of 105 EJ, deliver cost savings of nearly USD 700 billion and reduce emissions by 6.5 billion tonnes of CO₂ (MtCO₂). The avoided CO₂ emissions in 2030 alone would be equivalent to removing 210 million passenger vehicles from the road.

Through the annual Energy Management Leadership Awards Programme, the EMWG recognises leaders in the industrial, commercial and institutional sectors for improving energy performance across their organisations by implementing ISO 50001.

In 2018, the EMWG recognised 50 organisations across 103 countries. Each organisation developed a case study that shared valuable insights on best practices, successes and other benefits achieved by meeting the ISO 50001 standard in one or more facilities. Collectively, they reported annual energy cost savings of USD 383 million and emissions reduction of 4.3 MtCO₂ – equivalent to taking 916,000 passenger vehicles off the road.

In preparation for 2019 awards, the EMWG refined programme requirements and awards criteria to reflect lessons learned and incorporate updates from the ISO 50001:2018 standard.

Next challenge: By 2020, achieve 50,001 certifications globally for ISO 50001, thereby providing greater reliability of outcomes.

Retrospective

Building a solid foundation for EnMS

The EMWG has multiple achievements to boast since its establishment in 2010. Fundamental to its work has been the Energy Management Campaign, which aims to reach 50,001 certifications to the ISO 50001 standard globally by 2020. The Working Group has secured voluntary commitments to take action that promotes and accelerates ISO 50001 implementation from governments (including one municipality), companies and international organisations. Partners also endorsed the EMWG’s key principles for quality implementation of ISO 5001, and agreed to track and share progress toward their commitments.

In parallel, the EMWG created the Energy Professionals International ISO 50001 Lead Auditor Certification, which establishes a standardised, high level of knowledge and skills. Improved competency of ISO 50001 auditors boosts confidence in ISO 50001 certification outcomes and ensures that companies, governments and other end-users have robust ISO 50001 systems in place. The Working Group also provided recommendations to the International Accreditation Forum.
Cross-sector

Energy Efficiency Finance Task Group (EEFTG)

Objectives

The EEFTG aims to enhance capital flows for energy efficiency investments in G20 economies by supporting countries to build robust, investment-grade policy and investment frameworks and by engaging with financial institutions to build their capacity, instruments and interest in energy efficiency. It also serves as a forum for G20 policy makers to share best practices in policies and financial instruments through peer-to-peer workshops and direct engagement with members of the private and public finance community, industry, and international organisations.

Cross-sector Membership

Lead Members:
- France
- Mexico

Participants:
- Argentina
- Australia
- Brazil
- Canada
- China
- European Commission
- Germany
- India
- Russia
- South Africa
- South Korea
- United Kingdom
- United States

2018 • New tools to boost investment in energy efficiency

Substantial increases in energy efficiency financing are required to meet the goals of the COP21 Paris Agreement. At the G20 Energy Ministerial in June 2018, Energy Ministers encouraged “significant scale up [of] public and private investments and financing in energy efficiency across all sectors to help achieve energy transitions” (G20, 2018). To advance this objective, the EEFTG led four main initiatives in 2018:

• Promoted and disseminated findings from its landmark publication, the G20 Energy Efficiency Investment Toolkit, which presents voluntary options to scale up energy efficiency investments, progress towards implementing G20 voluntary energy efficiency principles (see below), and best-in-class approaches for investments from public and private financial institutions in participating G20 economies.

• Held the first EEFTG Roundtable for private financial institutions (Tokyo, Japan / Nov 2018), which gathered private banks, insurance companies and asset management firms to exchange existing best practices for energy efficiency finance in Japan, Europe and the wider G20.

• Organised and participated in 34 international events involving more than 2 500 policy makers, financial institution representatives and other stakeholders, including a High-Level Roundtable on Financing Energy Efficient Buildings at EE Global (Copenhagen, Denmark / May 2018) and two side events at COP24 (Katowice, Poland / Dec 2018).

• Expanded co-operation with other international initiatives such as the Global Alliance for Buildings and Construction and the United Nations Environment Programme – Finance Initiative (UNEP FI) Energy Efficiency Platform.

2019 • Targeting investment towards specific sectors and regions

In 2019, the EEFTG will work with its members and stakeholder networks to:

• Extend the dialogue on energy efficiency investments to explore specific sectors and topics, possibly including buildings and innovation finance, during the G20 Presidency of Japan in 2019.

• Organise technical engagement workshops to collect energy efficiency finance best practices from financial institutions and government agencies, with a particular emphasis on Japan and the Asian region.

• Conduct further outreach activities around the G20 Energy Efficiency Investment Toolkit to support the scale up of energy efficiency investments.
Impact: **Demonstrating the value of ‘green’ investment**

Scaling up energy efficiency investments to the levels needed for successful global energy transitions involves meeting multiple requirements. These include creating markets that are sizeable enough (demand), market opportunities that are predictable enough (policy and regulation), and accessing pools of capital and finance that are ready to deploy (supply).

Drawing on the expertise of its industry and government stakeholders, the EEFTG held a High-Level Roundtable in the margins of COP23 (Bonn, Germany / 2017) to collect insights for further action to enhance energy efficiency finance for different stakeholder groups. Participants identified four key needs (among others), including to:

- Better define the taxonomy of energy efficiency investments to enable greater flows and tracking of finance.
- Strengthen the policy and institutional framework through systematic harmonisation of policies across sectors, recognising the cross-cutting nature of energy efficiency.
- Overcome lack of awareness and drive support among financial institutions for energy efficiency by attaching green attributes to assets and loans on bank balance sheets. This can provide greater transparency on the ‘value of green’ to banks and financial regulators for de-risking purposes.
- Provide greater capacity building for local banks on evaluation criteria, market screening and market assessment tools linked to energy efficiency, which are often beyond the skill set of bank staff.

Such findings build the collective body of knowledge developed by the EEFTG and underscore the value of multiple stakeholder groups coming together to address common challenges.

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**Systematically building the case for investment in energy efficiency**

Leveraging its unique network of government and industry stakeholders, the EEFTG has delivered key achievements since its establishment (2014) as the first international initiative focusing on energy efficiency finance:

- **To enhance capital flows to energy efficiency investments through policy and private action,** released (2015) the G20 Voluntary Energy Efficiency Investment Principles for Participating Countries.


- **Conducted (2016)** a finance investment survey on implementing the G20 voluntary principles, which secured new commitments from banks and investors to the energy efficiency finance statements.

- **Developed and launched (2017)** the G20 Energy Efficiency Investment Toolkit, which contains commitments from 122 banks from 42 countries, long-term asset managers handling USD 4 trillion worth of assets and leading public financial institutions. The Toolkit was acknowledged by G20 Leaders through direct reference in the G20 Climate and Energy Action Plan for Growth.
Improving Policies through Energy Efficiency Indicators (IPEEI)

The IPEEI Task Group supports implementation of energy efficiency monitoring methods in member countries by assessing national energy efficiency action plans (NEEAPs), delivering cross-country comparison of energy efficiency trends, and providing training and capacity building on energy efficiency indicators.

2018 • Advancing energy efficiency in Latin America and the Caribbean

Energy efficiency indicators are a vital monitoring tool to assess and benchmark sectoral or national impacts of energy efficiency policies and targets. They are essential to establish reliable datasets and support effective policy exchange among diverse jurisdictions and countries.

In 2018, the IPEEI played a key role in three areas related to indicators:

• Extending country coverage and developing national reports (15) on energy efficiency monitoring under the BIEE programme (Base de Indicadores de Eficiencia Energética) of the United Nations Economic Commission for Latin America and the Caribbean (UN-ECLAC). This included implementing web-interactive energy demand and efficiency databases in four countries (Argentina, Brazil, Mexico and Uruguay); developing evaluation tools for NEEAPs for Latin America and Caribbean (LAC) countries; and launching an energy efficiency policy database for the region along with a dedicated database for Caribbean countries.

• Continuing a bilateral programme with Mexico on energy efficiency monitoring. A comprehensive report on energy efficiency trends has been carried out and presented to a large audience. In addition, several webinars and video recordings on energy efficiency policy implementation have been produced.

• Participating in activities of the G20 Energy End-Use Data and Energy Efficiency Metrics (EUDEEM) initiative in collaboration with the IEA, including ensuring synergies with IPEEI’s regional and bilateral activities.

2019 • From data to decision making

In 2019 and subsequent years, the IPEEI plans to:

• Propose a dedicated tool to use indicators to monitor NEEAPs (on a voluntary basis).

• Continue the BIEE initiative in Latin America under the new Regional Observatory for Sustainable Development (ROSE) programme, launched by UN-ECLAC, with comprehensive reporting of results obtained using additional indicators and expand current benchmark efforts to include more countries.

• Potentially explore developing a LAC database on national energy efficiency policies, in partnership with the Latin American Energy Organization (OLADE) and UN-ECLAC.

• Continue participation in the EUDEMM initiative by hosting a workshop and publishing a guidebook.

Membership

Lead Members: France

Participants: Argentina • Aruba • Barbados • Bolivia • Brazil • Chile • Colombia • Costa Rica • Cuba • Dominican Republic • Ecuador • El Salvador • Honduras • Mexico • Nicaragua • Panama • Paraguay • Peru • St. Lucia • Trinidad and Tobago • Uruguay • Venezuela
Impact: Strengthening energy efficiency monitoring in Mexico

Building on the energy efficiency indicators developed with the support of IPEEI, the Energy Efficiency Agency of Mexico (CONUEE) published its first in-depth report on national energy efficiency trends. Based on the availability of this information and past analysis, CONUEE carried out its first comprehensive energy efficiency scenario.

The scenario results show a wide gap between current development of energy efficiency and targets included in the Energy Transition Law, highlighting the need to implement additional policies. The capacity-building efforts undertaken by CONUEE, supported by the work of IPEEI, will accelerate progress towards fulfilling the legal requirements set out in the Law.

In addition, Mexico has developed a benchmark process to track its energy performance against other countries (mainly G20 economies).

Next challenge: Support roll-out of the G20 EUDEEM initiative to enhance the collection, analysis and use of data in policy-making processes.

Retrospective

Policy frameworks and indicators set stage for rapid advancement

Since its establishment in 2015, the IPEEI has achieved a number of important milestones, including:

• Improving energy efficiency policy frameworks across the LAC region by creating a network of 20 countries to exchange information on policy development, implementation, monitoring and evaluation.

• Carrying out the BIEE programme jointly with Agence de l’Environnement et de la Maitrise de l’Energie (ADEME), Agence française de développement (AFD), Gesellschaft für Internationale Zusammenarbeit (GIZ) and UN-ECLAC, including developing databases and co-publishing – with national governments – reports on energy efficiency indicators (15 reports).

• Initiating bilateral projects:
  > on capacity building for energy efficiency monitoring, between France and Mexico (supported by the AFD).
  > to evaluate energy efficiency policies in Brazil, between the electric energy research company (EPE) and ADEME.

• Contributing to the development and launch of the G20 / EUDEEM initiative, led by France and the IEA.
Objectives

The TOP TENs Task Group aims to help policy makers and businesses make informed decisions regarding deployment of energy saving solutions that are practical, cost-effective and scalable. To this end, its efforts focus on identifying best available technologies (BATs) and best practices (BPs) for energy efficiency, recognising that some are most relevant to specific national contexts while others could be applied internationally.

2018 • Refining what it takes to be ‘best’

The use of energy-efficient technologies and implementation of energy-efficient practices is vital to reducing energy demand and related emissions, particularly in the large energy consuming sectors of buildings and industry. TOP TENs aims to inform policy makers and sector stakeholders on BATs and BPs, and to foster investment opportunities.

In 2018, the Task Group advanced its objectives through three main initiatives:

• Developed the second round of domestic TOP TENs lists, documenting BATs and BPs in the participating countries of China, France, Japan and the United States. In each case, the lists were promoted through multiple media channels, including the websites of IPEEC and related government departments of each participating country, and various social media platforms.

• Organised expert panels to elaborate a strategy to assess and develop the second international BAT and BP lists.

• Attended the 12th China-Japan Comprehensive Forum on Energy Saving and Environmental Protection to present the TOP TENs achievements to government officials, researchers and experts (among others) of the two countries.

2019 • New lists, new energy saving potentials

In 2019 and beyond, TOP TENs plans to:

• Develop the second round of the international TOP TENs lists for buildings and industry.

• Implement a communication strategy to establish brand awareness and accelerate deployment of featured BATs and BPs. This will involve releasing the international TOP TENs lists at important multilateral meetings (e.g. G20 Energy Transition Working Group meeting and IPEEC Policy Committee meeting), and inviting national and international media to report on the lists and technologies nominated in each country.

• Facilitate integration of TOP TENs into the agenda of bilateral or multilateral energy efficiency co-operation by organising technical exchange activities (to enhance technical transfer and trade) and through high-level events (e.g. the BRICS* Energy Efficiency Working Group meeting, the 13th China-Japan Comprehensive Forum on Energy Saving and Environmental Protection, the China-US bilateral energy efficiency activities, and the China-Russia Energy Efficiency Working Group meeting).

*Brazil, Russia, India, China and South Africa

Membership

Lead Members: Australia • China

Participants: Canada • France • Japan • Republic of Korea • United States
Impact: Supporting China-Japan and China-Russia bilateral co-operation on energy efficiency

TOP TENs lists represent the most energy-efficient technologies and practices to reduce energy demand and emissions in participating countries. Development of the TOP TENs lists has facilitated energy efficiency co-operation across regions, which can accelerate delivery of significant social, economic and environmental benefits to shape a more sustainable future.

To promote technology exchange between China and Japan, the second batch of China’s domestic TOP TENs lists were presented at the 12th China-Japan Comprehensive Forum on Energy Saving and Environmental Protection (Beijing / 25 Nov 2018). This gave officials, researchers and enterprises from both countries a chance to showcase and discover recent innovations, and to discuss proposals on how to promote the lists.

In addition, China and Russia established the China-Russia Energy Efficiency Working Group in 2017. At the first working group meeting (Moscow / 25 Apr 2018), promoting the best energy-efficient technologies was agreed upon as an area of bilateral co-operation and signed in the meeting minutes.

Next challenge: Accelerate deployment of energy saving solutions that are practical, cost-effective and scalable.

Retrospective

Reducing energy demand and emissions of large consumers

TOP TENs was established in 2013; since 2016, it has been included as a new area of collaboration under the G20 Energy Efficiency Leading Programme (EELP).

To advance energy efficiency, the Task Group has developed an agreed methodology to assess BPs and BATs in specific sectors both domestically and internationally, which takes into consideration environmental, health, safety and technical maturity perspectives.

The methodology helped the Task Group organise (in 2015) the first round of domestic lists and an international list for the industry sector. Participating countries included Australia, China, Japan and the United States. The second round (2018) of domestic lists, covering both industry and buildings, was also developed based on the methodology, with China, France, Japan and the United States participating.

Application of these BATs and BPs can substantially reduce energy demand and emissions for large energy consumers in both sectors. To spur greater uptake, the lists have been promoted through a wide range of communication channels and activities.
A clever, yet meaningful, way to frame strategic action for energy efficiency in the future is to think of it as the ‘2-Es that need 6-Ds’. A global transition that supports universal access to modern energy services while also achieving the emissions reduction targets of the COP21 Paris Agreement implies reaching an outcome that is agreed to be desirable while acknowledging it will require disruptive action in the following areas: decoupling, decarbonisation, decentralisation and digitalisation.

IPEEC’s achievements over the past decade show that ongoing, strategic co-operation among major economies, whether developed, emerging or developing, can contribute in meaningful ways to boosting energy efficiency. Yet it is also clear that much of the full potential remains unfulfilled.

Looking ahead to the next decade of international energy efficiency collaboration, an accelerated pace of progress will be critical. As governments work to deliver on their national and international goals for energy and the climate, it is perhaps helpful to think of international collaboration as having characteristics similar to energy efficiency itself. As more countries engage and known solutions are deployed more broadly, the cumulative value of IPEEC’s early achievements will increase rapidly. Additionally, the networks established will continue to ensure that the complexity of energy efficiency is tackled through the best efforts of stakeholders who can truly integrate the ‘6Ds for EE’.

Capturing the full potential of energy efficiency

Decoupling economic growth from energy demand

Sustainable development can only be achieved if countries find ways to boost economic output without pushing up demand for carbon-emitting energy sources. Together with renewables, energy efficiency can deliver the solution. Since 2000, around the world at least 21 countries have reduced their annual GHG emissions while achieving economic growth (Aden, 2016). While these are primarily developed economies, examples from beyond G20 economies such as Romania, Spain, Ukraine and Uzbekistan demonstrate that it is possible even during extended periods of economic hardship or emergence from regimes that showed low concern for environmental impacts of economic growth.

Yet numerous studies indicate that large shares – 60% to 80% – of the potential for energy efficiency remain untapped across all end-use sectors (industry, transport, power generation and buildings) and across all economies (Aden, 2016). Capturing these opportunities will reduce the cost of producing and delivering goods and services, thereby providing better profit margins for companies and potentially lower costs to consumers. For governments, reducing energy expenditures would enable directing more funds into programmes that deliver greater value to society.
**Decarbonisation**

Energy efficiency is vital to decarbonising energy supply and demand: in many economies, the prospect of lower emissions and less environmental impacts, particularly local air pollution, is a key driver for action by policy makers, private industries and individual consumers.

In signing onto the COP21 Paris Agreement, governments acknowledge that decarbonising energy is central to reducing emissions across all sectors of their economies. Yet analysis of Nationally Determined Contributions (NDCs) submitted to date shows a substantial gap between individual commitments and the Agreement’s shared goals.

In its ‘Bridge Scenario’, the IEA shows that ambitious action in energy efficiency – simply through widespread deployment of existing policies and technologies – could deliver 57% of the emissions reduction needed in the near term. The analysis also identifies sectors and geographic regions in which energy efficiency can deliver the greatest emissions reduction. Over a longer time horizon, the Low Energy Demand (LED) scenario in the latest IPCC report presents the most efficient and cost-effective pathway to meet the COP21 Paris Agreement. The LED recognises the need to deploy energy efficiency on both demand and supply sides.

In effect, we know who needs to do what, and where: the challenge then, is to unlock inertia. After three years of being stable or declining, in 2017 global emissions showed an uptick. With further innovation expected in energy efficiency, no doubt future technologies will have lower demand and economies will show reduced energy and emissions intensity. But it is economically and socially counterproductive to adopt an ‘act later’ approach when we are already having to ‘pay now’ in terms of expanding energy infrastructure, securing larger energy supplies than would be needed under reduced demand, and covering health and social costs associated with high emissions.

**Decentralisation**

Decentralisation has become a core aim in terms of expanding access to energy in developing and emerging economies and to optimising smart technologies in industrialised economies. The tremendous potential for energy efficiency in both contexts has not been fully grasped.

Considering energy efficiency as the first fuel highlights the fact that – like renewables – it is a domestic fuel (which can enhance energy security) and a local fuel. Thus, expansion of energy supply through locally situated renewables, which brings production closer to consumption, creates new opportunities for efficiency. Off-grid systems must be efficient while people gaining access to energy services need efficient devices to keep such services affordable and reliable. Local supply for local demand can also reduce the burden that undermines efficiency of centralised systems.

Recent experience through IPEEC Task Groups highlights the reality that while national energy efficiency policies and programmes are important, support for local implementation is vital. Policies and actions that have proven most successful are those in which a national policy framework empowers implementation at municipal, business, community or individual level. Growing involvement of local authorities (cities, municipalities, regions) in the energy transition is welcome; yet, a better articulation of the interface between national policies and local implementation is needed to motivate energy efficiency stakeholders to invent solutions or instruments that are optimal for local situations.

It is also important to create mechanisms to decentralise the roll-out of energy efficiency. Much of the work – from development and deployment of policy and technologies to data collection, knowledge building, skills development and financing – will need to be appropriate to local contexts.
Doing more to change mindsets and behaviours

Much of the success of IPEEC’s work in the past decade has stemmed from fostering exchange among governments to implement new policies and businesses to deploy new technologies. Despite progress, considerable room for improvement exists in all economies.

The gap can often be attributed to the adage that ‘old habits die hard’; there is now greater recognition that for energy efficiency to fulfil its role in a sustainable future, more effort is needed to promote change in the way individuals and societies operate on a daily basis (IPEEC, 2018). This implies better public understanding of how we produce, transport and use energy – and the potential to do each more efficiently without negative impact on lifestyles, economic growth or social development.

Additionally, improving energy efficiency is an ongoing – one might even say ‘never-ending’ – process. Energy efficiency is intimately linked to innovation: as technology evolves, it opens opportunities to achieve greater savings. Keeping pace with rapidly changing technologies and human habits is vital for energy efficiency to progress.

IPEEC members are now exploring ways to harness knowledge in the sphere of behavioural science to incorporate the behaviour of energy users into the design of policies, technologies and business models. Effective initiatives, such as labelling schemes that encourage consumers to purchase efficient appliances, equipment or vehicles, can be applied more broadly. Financial incentives, awareness-raising and education, energy price mechanisms, and other options have proven successful in some contexts and warrant greater investigation. This implies bringing into the IPEEC network – which currently comprises experts in policy, economics and engineering – a range of new professions such as sociologists, psychologists, anthropologists and behavioural economists.

Digitalisation

The push for digitalisation across the energy sector (and indeed all sectors) holds enormous potential for disruptive change in energy efficiency. In the past, collecting end-use data on energy consumption was a difficult, complex and costly exercise: now inexpensive sensors, remote control and metering systems can help harvest huge amounts of indispensable data on which to build knowledge and base decisions. In short, digitalisation can deliver the evidence – across several dimensions – to establish baselines and monitor change, thereby supporting strategic decision making in a cost-effective manner.

Digital tools can help design energy systems (for a city, a building, an industrial plant or a transportation network) that integrate energy efficiency in substantive ways, including automating optimal operation of basic equipment or complex systems. Building information modelling (BIM), for example, creates digital representations of physical and functional characteristics of a facility (Wiki, 2019). Artificial intelligence has been shown capable of reducing the energy demand of anything from a single air conditioner to a 50-storey building or a 1-hectare factory.

Work carried out by IPEEC’s EMWG reports that EnMS provide organisations with a structure and methodology to discover opportunities, implement projects and maintain practices that save energy (Wang, 2018). Further, by automating data collection, integrating analysis of energy and manufacturing process information – thereby enabling data-driven process control – EnMS can help customers continually increase energy savings.

Finally, digitalisation can support behaviour change: access to databases can support evidence-based decision making for energy efficiency or installing an ‘app’ on a smartphone can remind people to do things differently – or just do it for them, eliminating the reality that human behaviour is often unreliable and irrational.
Additional benefits of energy efficiency

Aside from economic and environmental gains from energy efficiency, IPEEC’s work has helped all stakeholders become more aware of other societal benefits. Ongoing collaboration in these areas is vital to better understanding the full value energy efficiency can deliver to economies.

Energy productivity: is a core benefit, both locally and globally. By boosting the economic output for each unit of energy input (i.e. the value added for every kilowatt-hour), energy efficiency directly contributes to prosperity. Using a calculation of actual GDP and the notional level of GDP that would be generated if energy intensity remained unchanged – i.e. the ‘energy productivity bonus’ – the IEA estimates that GDP per unit of energy can be 18% higher in 2040 than under the more standard New Policies Scenario (IEA, 2017b).

Energy security and capital optimisation: in addition to having a vital role in balancing supply and demand, energy efficiency can support a more diverse energy mix at national level and reduce imports of coal, oil and gas, thereby boosting energy security. The fossil fuel import bills of China and India could drop by a total of almost USD 500 billion by 2040 (IEA, 2017b). In the European Union, a comprehensive building retrofit programme could cut natural gas demand by an amount equal to ~80% of total gas imports (Holmes et al, 2014). In parallel, reduced energy demand can lower the need to expand energy capacity and infrastructure, freeing up capital for other activities.

Improved health and economic status: across industrialised, emerging and developing economies, reduced energy production and consumption – particularly of traditional biomass or fossil fuels – lead to healthier environments and can reduce the portion of household budgets devoted to acquiring energy services. For the 3 billion people that make up the world’s poorest households, LED lighting and cleaner, more efficient cookstoves immediately reduce health risks associated with biomass and kerosene smoke while also freeing up time to pursue economic activity. Globally, by 2040, families could benefit from USD 550 billion in avoided energy spending for home and transportation needs (IEA, 2017a)

Employment: as the market for energy efficiency grows, so will opportunities for employment. A recent study in Australia estimates that 500 000 people (including electricians, architects and engineers) spend part of their time improving the efficiency of homes and businesses, equating to 59 000 full-time equivalent (FTE) positions. Broadening the calculation across the whole economy could quadruple the current employment measure while an ambitious strategy to further improve energy efficiency could create 120 000 FTE job-years of employment (ECC, 2019).
Achieving the Desired Goals

What will it take?

When speaking of energy efficiency or demand reduction, we sometimes focus on the need for technologies or policies and forget the broader picture – i.e. energy that is not consumed does not have to be produced, refined, transported or imported; and, of course, it produces no emissions (IEA, 2012). The case for energy efficiency is immediately apparent when presented this way. Yet current actions still need to be enhanced in four areas: investment, data collection for decision making, market creation and international collaboration.

Scaling up support for energy efficiency to boost investments and action

In 2017, investments in energy efficiency globally reached USD 236 billion. To fulfil the role of energy efficiency delivering 44% of GHG reductions in line with the COP21 Paris Agreement targets, annual global investment needs to double to EUR 584 billion by 2025, then double again to USD 1.3 trillion by 2040. In IEA scenarios, the rate of investment in energy efficiency will need to increase fivefold between now and 2040 – a much higher rate than for the other contributing solutions of nuclear, renewables and carbon capture and storage (CCS) (Figure 4) (IEA, 2014c).

Given recent trends, this scope challenge must not be underestimated: the share of energy-related investment in public research, development and demonstration (RD&D) globally fell by two-thirds from 12% in 1980 to only 4% in 2010 (IEA, 2012). At present, most investment is relatively small in scale, reflecting efforts by private companies and citizens. Reaching the investment needed will require more diverse finance sources and mechanisms and new business models. Much room exists to expand the role of energy service companies (ESCOs), promote green bonds for energy efficiency and develop more attractive repayment plans for financing energy efficiency measures. These must be underpinned by a supporting policy environment that reduces the risk profile; various economies have shown that market-based instruments, such as obligation schemes and auctions, can be effective.

Accounting only for actual energy savings, estimates show that such investments will, on average, repay three times over their asset-lives (IEA, 2018). This calculation does not include the monetary or non-monetary values associated with any multiple benefits society will derive from reduced energy demand and emissions.

To secure this scale of investment, energy efficiency needs – like other energy sources – a vision, key competences and a viable business plan.

Data collection for informed decision making

Ten years ago, everyone was asking how to measure ‘the negative’ of energy savings (see page 7). With advances in digitalisation (highlighted above) much progress has been made in this area: we know better ‘what’ to collect, but we need more entities to do it – and to make the data collected available. Reliable and high-quality energy use data, statistics and information systems are prerequisites for effectively setting goals and objectives, for implementing national action plans, and for evaluating policies and measures.

To deliver the benefits of efficiency in a cost-effective manner, we also need robust data to identify key energy-consuming sectors, analyse the potential for reducing their energy demand and specify which measures are most appropriate. In many cases, it will be players in the private sector who need to invest in and implement energy efficiency measures embedded in policy action; thus, we need data to convince them of the value and benefits.

Critically, more and better data are needed to understand fully how improving energy efficiency at the level required will influence the energy market itself. It may be self-evident, but data are also necessary to secure the scale of investment described above.
Policy frameworks to create energy efficiency markets

Ten years ago, the idea of energy efficiency having a place in energy markets seemed, to many, impossible and/or impractical. Thanks to innovative efforts, its presence has become a reality. Moreover, stakeholders recognise that while the market for energy efficiency has shown steady growth, it remains diffuse and local – and only a fraction of what it could be.

To advance to the next level – in which energy efficiency trades as actively and competitively as other energy resources – governments need to put in place clear national policy frameworks. These need to comprise integrated regulatory, market and voluntary measures (‘policy-push’ activities) while also providing mechanisms to stimulate ‘market pull’. The first stream of activity will need to focus on encouraging data collection, statistics and metrics to establish energy efficiency instruments (such as rating, labelling, standards, codes and certification schemes) for energy systems as well as for equipment and appliances. The latter might include incentives for technology R&D through public-private partnerships and expanded international co-operation. Additional work is needed to ensure the affordability of BATs and the implementation of BPs and to accelerate market uptake overall.

Greater collaboration among more organisations

IPEEC is fully in agreement with a recent assessment that “improving energy efficiency has the clearest impact on saving money, improving business results and fostering economic growth. It touches consumers in many ways, from better refrigerators that cost the same but use less energy; to new vehicle designs that travel further on less fuel; to buildings that require less energy for heating and cooling” (SE4ALL, 2019).

Yet bringing these benefits to society is no easy task. By nature, energy efficiency is complex and granular. Improving the efficiency of buildings involves a myriad of buildings types in wildly diverse climates. Solutions for large-scale factories won’t apply to the exponentially greater number of small- and medium-sized enterprises. And rapidly rising demand for transportation creates new challenges across all modes. Moreover, despite its emergence over the past decade, many facets of energy efficiency remain hidden.

The value of an entity that co-ordinates international collaboration lies in delivering a level of efficiency to stakeholders. By facilitating exchange of information, especially on BATs and BPs, and encouraging – where appropriate – harmonisation of efficiency standards and strategies, data collection protocols, policy instruments and benchmarking tools, IPEEC has been able to save its member countries precious time in the implementation of sound policies and programmes. Not only has IPEEC helped avoid duplication of efforts at many levels, it has enabled countries with lower resources and capacities to advance more quickly.
References


## Acronyms and Abbreviations

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<tr>
<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>BEEI</td>
<td>Baseline Energy Efficiency Indicator</td>
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<td>CO₂</td>
<td>carbon dioxide</td>
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<td>COP</td>
<td>Conference of the Parties (UNFCCC)</td>
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<td>EEAP</td>
<td>Energy Efficiency Action Plan (G20)</td>
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<tr>
<td>EELP</td>
<td>Energy Efficiency Leading Programme (G20)</td>
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<td>ExCo</td>
<td>Executive Committee (IPEEC)</td>
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<td>G8</td>
<td>Group of Eight governments</td>
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<tr>
<td>G20</td>
<td>Group of 20 governments</td>
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<tr>
<td>GHG</td>
<td>greenhouse gas (emissions)</td>
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<td>HDV</td>
<td>heavy-duty vehicle</td>
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<tr>
<td>IEA</td>
<td>International Energy Agency</td>
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<td>IPCC</td>
<td>International Panel on Climate Change (UN)</td>
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<td>ISO</td>
<td>International Organization for Standardization</td>
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<td>LAC</td>
<td>Latin America and Caribbean (region)</td>
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<td>LDV</td>
<td>light-duty vehicle</td>
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<td>LED</td>
<td>Low Energy Demand Scenario (IPCC)</td>
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<tr>
<td>LED</td>
<td>light-emitting diode</td>
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<tr>
<td>NDC</td>
<td>Nationally Determined Contribution</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<tr>
<td>PoCo</td>
<td>Policy Committee (IPEEC)</td>
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<tr>
<td>R&amp;D</td>
<td>research and development</td>
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<tr>
<td>SDGs</td>
<td>Sustainable Development Goals (UN)</td>
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<td>SEFORALL</td>
<td>Sustainable Energy for All (UN)</td>
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<tr>
<td>TG</td>
<td>Task Group</td>
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<tr>
<td>UN</td>
<td>United Nations</td>
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<tr>
<td>UNFCCC</td>
<td>UN Framework Convention on Climate Change</td>
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## Units of Measure

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<tr>
<th>Unit</th>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>EJ</td>
<td>exajoules</td>
<td>million billion joules</td>
</tr>
<tr>
<td>Mt</td>
<td>million tonnes</td>
<td></td>
</tr>
<tr>
<td>TWh</td>
<td>terawatt-hours</td>
<td></td>
</tr>
<tr>
<td>MtCO₂</td>
<td>million tonnes of carbon dioxide</td>
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### IPEEC Members

- Australia
- Argentina
- Brazil
- Canada
- European Union
- France
- Germany
- India
- Italy
- Japan
- Mexico
- People's Republic of China
- Russia
- Russian Federation
- South Africa
- United Kingdom
- United States
- United Nations
- United States

## Networks

### More action, by more actors

By building strong relations with multiple agencies, IPEEC has become involved in multiple interrelated initiatives that together are strengthening the profile of and support for energy efficiency on national, regional and global levels. While not an exhaustive list, our interactions with entities involved in shaping the international energy governance landscape include the following:

- Alliance to Save Energy
- American Council for an Energy-Efficient Economy
- Asia-Pacific Economic Cooperation
- Australian Alliance for Energy Productivity
- China Council for an Energy-Efficient Economy
- The Climate Group
- ClimateWorks Foundation
- ClimateWorks Australia
- Copenhagen Center for Energy Efficiency
- Energy Efficiency Council
- European Alliance to Save Energy
- European Council for an Energy Efficient Economy
- G7, G8 and G20 governments, specifically through:
  - G20 Energy Efficiency Leading Programme (since 2016)
  - G20 Energy Transitions Working Group (formerly Energy Sustainability Working Group)
- Global Alliance for Building & Construction
- Global Alliance for Energy Productivity
- India Alliance for an Energy Efficient Economy
- International Energy Agency
- International Energy Forum
- International Renewable Energy Agency
- Latin American Energy Organization, to develop policy for energy efficiency
- Renewable Energy Policy Network for the 21st Century
- The Energy and Resources Institute
- UNFCCC Technical Expert Meeting on energy efficiency
- UNEP United for Efficiency Programme
- World Energy Council, with a focus on the Trilemma reports, which call for firm engagement on energy efficiency