



Report on the G20 Energy Efficiency Action Plan Voluntary Collaboration on Energy Efficiency

Report to the G20
on 2015 Outcomes of Work Streams



Foreword

Energy efficiency helps drive economic productivity, strengthens energy security, creates employment and delivers positive environmental outcomes, while also helping to cut costs for businesses and households.

Recognising the importance of energy efficiency, G20 Leaders agreed to an Action Plan for Voluntary Collaboration on Energy Efficiency (referred to hereafter as ‘the Action Plan’) at the 2014 Summit (15-16 November, Brisbane, Australia).

The International Partnership for Energy Efficiency Cooperation (IPEEC) was given the honour of coordinating the voluntary implementation of the G20 Energy Efficiency Action Plan in 2015.

Throughout this year, participating G20 countries, with the support of International Organisations, have worked closely together to further this important agenda. In the space of only a few months, they have produced impressive work – both in quantity and quality.

Together, they have defined extensive programmes of work, conducted rigorous analyses and led broad consultations. They have held extensive discussions and heated debates on ideas, solutions and options. In many cases, they have reached a consensus on options put forward. We note, however, that some countries do not endorse all options contained in the report.

Most importantly, through this voluntary plan of collaboration, they have learned from one another’s experiences and best practices.

This extensive body of work has given rise to well-founded options to further advance energy efficiency in participating G20 countries. Consistent with the Leaders’ mandate and the Action Plan, they have formulated options and possible next steps for G20 consideration.

I commend Turkey for its remarkable leadership and hard work, and as preparations for China’s G20 Presidency intensify, I am confident that the Task Groups are well placed to continue the good work started this year.

These solid foundations are the building blocks through which energy efficiency can realise the level of recognition that is needed to meet today and tomorrow’s pressing energy challenges.

On behalf of Task Groups, I ask you to welcome the achievements made by participating countries in 2015, and provide further support and the required resourcing for a successful continuation of the Action Plan next year.

I wish you all a productive meeting in Istanbul,



Santiago Creuheras
Chairman, IPEEC Policy Committee
Director General for Energy Efficiency and Sustainability,
Ministry of Energy, SENER (Mexico)



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Executive Summary

The G20 Energy Efficiency Action Plan encompasses 6 areas of energy efficiency work for ongoing collaboration and knowledge sharing among G20 members and other participating countries (see below).

This report details the key achievements in 2015 across each work stream, and possible next steps for G20 consideration (see [Attachment F](#)).

During this first year of implementation, participating countries have accomplished a large volume of work, and have: engaged with over 60 government agencies; held over 100 teleconferences with private and public organisations; consulted over 320 different entities; published six substantive reports; ran 13 workshops; and developed 28 best practice case studies.

Work stream	Key achievements in 2015
Vehicles	Under the lead of the U.S., 13 countries joined this new Task Group, which: <ul style="list-style-type: none"> • Published two reports on policy options and opportunities to improve the efficiency of heavy and light duty vehicles in participating and other interested G20 economies. • Exchanged best practices on relevant national standards in participating nations. • Proposed providing technical assistance to develop or strengthen HDV and LDV standards in participating and other interested countries in the coming years.
Products	Under the lead of the U.K. and the IEA, 9 countries and private sector established a collaborative Alliance, which: <ul style="list-style-type: none"> • Agreed to a vision and goal to drive energy efficiency improvements in connected devices for participating countries. • Defined a set of Voluntary Definitions, Design Principles, and Policy Principles for participating countries. • Established a Centre of Excellence, and an Awards scheme that will support and promote future initiatives in this field.
Finance	Under the lead of France and Mexico, 14 countries joined this new Task Group which: <ul style="list-style-type: none"> • Developed the Voluntary Energy Efficiency Investment Principles for G20 Participating Countries to enhance capital flows towards energy efficiency investments in industry, SMEs and buildings in participating countries; • Consulted the leading experts on identified barriers and solutions through five workshops held in Europe, the United States and China; • Published a substantive technical report summarising key insights, and possible solutions for participating governments and businesses.
Buildings	Under the lead of the U.S. and Australia, countries worked together, and <ul style="list-style-type: none"> • Published two major reports on energy efficiency in buildings which: 1. analyse building code implementation; and 2. compare building energy data for major G20 economies; • Launched a new web portal for exchange of information among building experts.
Industrial energy management	Under the lead of the U.S. and Japan, 13 countries worked together to advance existing working groups, and: <ul style="list-style-type: none"> • Encouraged dissemination of energy management best practices, such as the ISO50001 standards through a new certification scheme for auditors, policy exchanges, and case studies, and the hosting of a workshop on energy management in Small and Medium Enterprises; • Launched a new initiative, the <i>ISO 50001 Collaborative</i>, to accelerate adoption of internationally accepted energy practices, focusing on the ISO50001 standards, and to increase collaboration between the public and private sector.
Electricity generation	Under the lead of Japan, 6 countries worked together, and: <ul style="list-style-type: none"> • Hosted two workshops on technology, policy and financial issues of coal electricity generation, as well as a site visit to a coal-fired electricity generation plant.

Introduction

The G20 Energy Efficiency Action Plan states that:

“The Action Plan is a practical plan to strengthen voluntary energy efficiency collaboration in a flexible way. It allows countries to share knowledge, experiences and resources by choosing, on an opt-in basis, preferred activities that best reflect their domestic priorities¹.”

It is in this spirit that countries have come together throughout 2015 to implement the voluntary Action Plan. Together, a number of G20 economies have researched, developed and formulated possible voluntary options for participating countries - to address the identified barriers to greater energy efficiency.

As per the Action Plan², all G20 countries remain free to join or withdraw at any point from Task Groups - depending on their national circumstances, priorities and domestic developments. This flexibility implies that non-participating countries are not bound by the work of the Task Groups they are unable to join.

As a logical corollary, only participating countries are asked to advise on, and validate the work of the Task Groups they contribute to. As such, the report is a synthesis of the work achieved by individual Task Groups to forward energy efficiency internationally, rather than a reflection of G20 views as a whole.

Most importantly, this flexibility ensures that participating countries fully support the work of their Task Groups, and that motivated countries can advance rapidly together towards goals of mutual interest.

Together, throughout 2015, participating countries have indeed achieved concrete progress, and developed solid options across six work streams – thus, once again demonstrating the high value of international collaboration on energy efficiency.

This report documents the outcomes and conclusions resulting from collaboration in 2015 and possible next steps for G20 consideration, through the Energy Sustainability Working Group (ESWG).

In the lead up to the G20 Chinese Presidency, countries will further consider potential areas for future voluntary collaboration³, in line with their domestic circumstances and priorities and the Presidency’s interests.

It has been coordinated by the International Partnership for Energy Efficiency Cooperation (IPEEC), with input from participating countries and other International Organisations (IOs) - for consideration by the ESWG at its third meeting, on 1-3 September 2015, in Izmir, and by G20 Energy Ministers on 2 October 2015 in Istanbul.

¹ Page 2, para 1.2

² Page 10, para 5.2

³ These may include continued collaboration on energy efficiency best practices and best available technologies under the existing IPEEC TopTens Task Group.

1. 2015 Outcomes of Work Streams' Activities under the G20 Energy Efficiency Action Plan

VEHICLES

1.1 Rationale for continued collaboration: The economies of the G20 account for over 90 per cent of global vehicle sales and a substantial share of global fuel consumption. Therefore, the policies of G20 members largely determine the energy efficiency, fuel consumption, air quality and climate impacts of the global road transport sector. There are clear opportunities for the participating countries of the Transport Task Group, and other G20 countries, to progress further towards world-class, domestic vehicle and fuel regulation improvements and programmes

Heavy-duty vehicles (HDVs) – including trucks, buses and other large vehicles that are mostly diesel-powered – are a prime target for particular focus because of the positive benefits that would derive from action among G20 countries. Policy solutions that the Transport Task Group identified include continued sharing of best practices and technical assistance among participating countries to accelerate policy and program design, development, and implementation to spur action in the vehicle sector, including for heavy and light duty vehicles. Continued cooperation among participating countries would help achieve these identified solutions.

1.2 Outcomes in 2015: In 2015, the United States led the establishment of a new Transport Task Group with the shared goal of reducing the energy and environmental impacts of motor vehicles. The Task Group is made up of 13 countries from the G20⁴. It is supported by a Steering Committee (bringing together the European Union, Italy, Mexico, and the United States), and expert International Organisations, including the International Council on Clean Transportation (ICCT) and the Global Fuel Economy Initiative (GFEI).

During 2015, countries participating in the Task Group have worked together to:

- Identify policy options to reduce the energy and environmental impacts of motor vehicles, particularly for HDVs, through an international assessment of existing national regulations and programmes;
- Publish a foundational briefing paper (*Policies To Reduce Fuel Consumption, Air Pollution, And Carbon Emissions From Vehicles In G20 Nations*⁵) which summarises these identified opportunities for policy action on clean fuels and vehicles by participating countries, including:
 - Improving fuel quality by reducing fuel sulfur levels to near-zero;
 - Introducing stringent tailpipe emission national standards;

⁴ See [Attachment E](#) for the list of participating countries.

⁵ Please see the report for further information. This paper has been elaborated by the International Council on Clean Transportation at the request of the Transport Task Group. It is solely for informative purposes of the participating countries.



- Adopting fuel efficiency national standards; and
- Establishing national and regional green freight programmes.
- Exchange experiences and best practices on relevant national standards;
- Conduct outreach to participating and other interested countries and the private sector to:
 - Enhance capacity for domestic HDV policies;
 - Generate support for collective action in participating countries and other interested G20 economies; and
 - Provide technical support to individual countries to develop new HDV standards and/or programmes.
- Highlight opportunities for participating G20 countries to improve light-duty vehicle fuel economy, with the support of the Global Fuel Efficiency Initiative (GFEI)⁶.

1.3 Proposed way forward: Beyond 2015, the Transport Task Group has established additional goals and follow-up activities for 2016 and after, consistent with available resources. The long-term goal of the initiative is to assist G20 countries participating in the Task Group, and other interested countries, with policies and programmes to reduce the energy and environmental impacts of motor vehicles. Participating countries are invited to report on country progress on policy roadmaps and interim milestones to achieve world-class, domestic clean vehicle and fuels national policies and programmes by September 2016.

Potential 2016 actions of the Transport Task Group include:

- Conducting a **Survey** of participating and other interested G20 nations to collect information about institutional needs and technical challenges associated with developing options for **Policy Roadmaps**;
- Facilitating development of options for Policy Roadmaps in each participating and other interested G20 countries, including through hosting a series of **Policy Exchanges** (webinars, direct outreach) and **Information Campaigns** for each interested country. These would aim to share information on latest policy and programme developments, as well as lessons learned from **strengthening compliance and enforcement**;
- Engaging actors from the **Global Financial Community** to provide guidance to those G20 nations that are seeking financing and investments for domestic oil refinery updates to produce low-sulfur fuels;
- Seeking to hold a **Training Workshop** for nations interested in establishing policies to improve the energy efficiency of passenger vehicles;
- Exploring the creation of an annual **Certification of Achievement** for participating and other interested G20 nations that exhibit the greatest commitment and progress in the area of clean fuel and vehicle standards; and

⁶ See the *LDV fuel economy and the G20* report for further information.



- Sharing experiences on **mobility-related issues**, on using **sustainable alternative fuels** (natural gas, electricity, hydrogen, and biofuels), and on other long-term measures **to reduce the Greenhouse Gas (GHG) intensity of transportation** to achieve long-term climate change mitigation goals.

NETWORKED DEVICES

1.4 Rationale for continued collaboration: Network-connected technologies, such as broadband connectivity, wireless mobility, cloud computing, e-commerce, social media, sensors and the “Internet of Things” are rapidly transforming the world in which we live. Network connectivity already touches many aspects of daily life, and advanced technologies are creating new services and benefits permeating all areas including communication, entertainment, security and health.

While some of these services have the potential to improve the way we manage energy consumption in the future, networked devices consume some energy in order to maintain network connectivity. The challenge to both the developed and developing world is to maximise the network-enabled energy management opportunities while also minimising the additional energy consumption from networked devices and their traffic.

In its 2014 publication *More Data, Less Energy*, the International Energy Agency (IEA) estimated that there will be 100 billion networked devices by 2030 consuming more than 6 per cent of current final global electricity consumption, and that uptake of best available technologies could reduce the energy demand of these devices by up to 65 per cent.

Networked devices and network technologies are evolving at a rapid pace, and policy-making in this environment is further complicated due to the diversity of stakeholders throughout the value chain that influence their design and operation. Since most networked devices are traded globally, the establishment of on-going voluntary collaboration amongst participating G20 governments and with industry is vital to achieve solutions that are effective. Acting on their own, most governments will not have the capacity to develop the knowledge base in this changing environment, interact with the diversity of industries involved and develop appropriate policy responses to address this issue.

1.5 Outcomes in 2015: In 2015, the United Kingdom and the IEA co-ordinated an on-going dialogue between representatives from participating governments⁷ and global industry to identify and agree preliminary options that will improve the energy efficiency of networked devices into the future.

The impetus provided by participating G20 countries in 2015 led to the establishment of the Connected Devices Alliance – a network of 300 governments and organisations across the many key sectors have come together to address the challenge of the energy consumption of network-connected devices and networks.

The involvement of governments has been extended beyond the participating members of the G20 Networked Devices Task Group through the IEA’s Energy Efficient End-use Equipment (4E) Implementing Agreement, the Super-efficient Equipment and Appliance Deployment (SEAD) initiative of the Clean Energy Ministerial (CEM), and IPEEC.

During 2015, the Connected Devices Alliance tracked developments in technology, research and voluntary industry initiatives⁸. A series of dialogues between industry and representatives from

⁷ See [Attachment E](#) for the list of participating countries.

⁸ Please see the ‘*Technical Report in Support of Recommendations to G20 Governments*’ for further information on the work of the Alliance in 2015.



participating governments led to a greater understanding of the issues, including the need to take co-ordinated action amongst participants in order to:

- Realise a world where devices and networks optimise energy management while delivering increased energy productivity across all sectors; and
- Maximise network-enabled⁹ energy savings and minimise the energy consumption from all networks and network-connected devices.

To achieve these goals, deliverables from the Alliance since January 2015, include the following voluntary initiatives that provide non-binding guidance and information to participating governments and industry:

- A set of **Definitions** that will underpin the development of policies and initiatives in this field;
- **Voluntary Design Principles** to provide guidance on the key features of energy efficient networked devices, networks and communication protocols for designers, manufacturers and authors in participating G20 countries¹⁰;
- **Voluntary Policy Principles** to encourage a common framework for the development of government policies and measures¹¹;
- A **Centre of Excellence**, “Connected Devices By Design”, to provide participating and other interested G20 governments and industry with an accessible source of information on best practices and energy savings opportunities in networked devices and networks; and
- The development of **Awards** to recognise significant achievements in technical protocols, industry initiatives and policies through the SEAD ‘Global Efficiency Medal’¹².

1.6 Proposed way forward: The work undertaken in 2015 has significantly increased the understanding of the potential energy implications of the increasingly connected world, as well as potential options to manage the related energy consumption. It is clear, however, that the rapid evolution of technologies central to the connected world will require longer-term attention by governments.

The Connected Devices Alliance provides a solid platform for further collaboration between industry and participating governments. It is proposed that through the Alliance, participating G20 governments support the development, delivery and implementation of a work plan in pursuance of the stated goals.

This support would enable the continued monitoring of the impacts of networked devices and their networks, and the expansion of the Alliance to include wider representation from key organisations and participating governments.

With sufficient support, the Alliance would aim to deliver the following new initiatives, aimed at encouraging voluntary uptake amongst participating governments and organisations. These provide the framework necessary for governments to understand the issues and their options; and to determine their own responses based on national circumstances:

⁹ The use of information and communication technologies (ICT) to facilitate the efficient control of energy-using equipment/networks, leading to system-wide and cross-sectoral energy savings.

¹⁰ See Voluntary Principles in [Attachment B](#)

¹¹ See [Attachment B](#)

¹² <http://superefficient.org/Global-Efficiency-Medal.aspx>



- **Voluntary Targets:** Develop appropriate network standby targets for different categories of end-user products to encourage improved efficiency and harmonisation;
- **Voluntary Principles for Energy Efficiency in Digital Devices¹³:** Promote the Principles to device manufacturers, authors of technical standards/protocols and policy makers;
- **Centre of Excellence:** Populate and promote the online ‘Connected Devices By Design’ site;
- **Awards:** Launch recognition awards through the SEAD ‘Global Efficiency Medal’;
- **Energy Aware Devices:** Encourage appliances and equipment to become ‘smarter’, such that they provide or display real time information on their energy consumption;
- **Voluntary Protocols and Standards:** Accelerate technical protocols and standards that enhance the efficiency of networked devices through identifying the technical gaps, promoting Principles to standards developers, network architects and authors of technical standards/protocols, and awards for these organisations¹⁴; and
- **Intelligent Efficiency:** Stimulate the use of information and communications technologies (ICT) for improved energy management; this could be achieved by disseminating information through the Centre of Excellence, developing measurement methodologies and identifying supportive government policy options for instance.

FINANCE

1.7 Rationale for continued collaboration: Large energy efficiency gains across all sectors of G20 economies remain untapped, due to lack of capital and finance flows. To deliver the multiple benefits of energy efficiency, including enhanced access to energy, public and private resources used for energy efficiency investments need to dramatically increase. The IEA projects that energy efficiency investments need to increase by a factor of five¹⁵ in its current policy scenario and as much as eight times under its 2 degree scenario¹⁶. In conjunction, recent United Nations’ estimates show that as much as US\$560 billion in investments are needed between now and 2030 to reach the United Nations’ universal access to energy goal¹⁷.

Through the removal of barriers and enhanced policy support, participating countries can support the delivery of this goal. Indeed, work in 2015 led by the Energy Efficiency Finance Task Group (EEFTG, ‘Finance Task Group’)¹⁸ has shown that governments and financial institutions are willing to support larger investments in energy efficiency. However, numerous technical and policy barriers to these investments still remain.

While these barriers, and the policies to address them, vary from country to-country, there are common themes which unite the participating countries. These common themes to enhance energy efficiency investment can be addressed through coordinated actions among participating and other interested G20 countries, as described in the Finance Task Group’s ***Voluntary Energy Efficiency Investment Principles for G20 Participating Countries***.

¹³ See [Attachment B](#)

¹⁴ See [Attachment B](#)

¹⁵ From 2014-2035 in aggregate terms.

¹⁶ By 2020.

¹⁷ *Progress Towards Sustainable Energy 2015, Global Tracking Framework Key Findings 2015*.

¹⁸ See the *2015 EEFTG Technical Report* for further information on the work of the Task Group in 2015.



Working together, participating countries can continue to develop the relevant knowledge base, tools, good practices and data throughout participating countries and other interested G20 economies that are needed to stimulate greater private and public investments in energy efficiency.

1.8 Outcomes in 2015: On 13 March 2015, France and Mexico, as co-chairs, established the Finance Task Group with the support of 13 (now 14) participating G20 countries¹⁹ and the participation of the Organisation for Economic Co-operation and Development (OECD), the United Nations Environment Programme Finance Initiative (UNEP FI), the United Nations Sustainable Energy for All (UN SE4All), the Clean Energy Ministerial's Clean Energy Solutions Center initiative, the European Bank for Reconstruction and Development (EBRD), and the Energy Charter, as well as other International Organisations.

During 2015, the Finance Task Group has:

- Developed policy options, including the proposed ***Voluntary Energy Efficiency Investment Principles for G20 Participating Countries*** (see [Attachment C](#)) – which are aimed at re-prioritising energy efficiency investments in the built and industrial environments globally. These Principles can deliver the required positive action in participating countries to enhance capital flows to energy efficiency. They can provide a strong signal on collaborative action among participating G20 countries going into COP21 and beyond.

To develop these Principles, the Task Group had conducted extensive analysis and consultation throughout 2015, and it:

- Engaged with each individual participating country to identify the core technical issues which impact the demand for and supply of energy efficiency investments in industry, small and medium sized enterprises (SMEs) and buildings²⁰;
- Held five consultation workshops to identify and develop technical solutions to enhance capital flows to energy efficiency in a regional and national context. These were held in New York, Washington, Merida, Paris and Beijing, and brought together between 26-60 participants, among which some of the world's leading energy efficiency investors, expert stakeholders and policymakers;
- Drawn from the formal submission by the European Commission of two years of the collaborative work of the Energy Efficiency Financial Institutions Group (EEFIG) - which brought together 120 participants and 100 organisations from 28 EU member states to address similar issues.

The proposed Principles are supported by the 13 participating governments and the leading investors, banks and development institutions with whom the Finance Task Group has been able to engage. Through implementing these Principles, participating and other interested G20 countries can help create the investment environment that is needed for increased energy savings, and enhanced economic, social and environmental benefits. These Principles will further allow participating countries to build upon and replicate effective and scalable investment models that already exist for energy efficiency investments.

¹⁹ See Attachment E for the list of participating countries.

²⁰ See the 2015 EEFTG Technical Report for further information.



In parallel, a *G20 Energy Efficiency Investor Statement* has been developed and endorsed by major private sector investors. Global investors, through the Principles for Responsible Investment (PRI) initiative which focuses on improving the sustainability of the global financial system, support the statement alongside the UNEP FI. With 1400 members, the PRI represents US\$59 trillion of assets under management. Through their support to the Statement, they recognise the key actions that are required to fully embed energy efficiency into investment processes.

1.9 Proposed way forward: The *Voluntary Energy Efficiency Investment Principles for G20 Participating Countries* constitute an important first foundation, and create a framework for future engagement with participating G20 countries.

For 2016 and beyond, countries participating in the Finance Task Group propose to:

- Use the Principles to build policy frameworks in participating countries at the national and regional level which can scale-up energy efficiency investments and deliver their multiple benefits to the economies of the Finance Task Group members;
- Continue to work closely with private and public sector banks and investors in participating countries, and other G20 interested economies, to prepare the ground for them to contribute to the significant increase in energy efficiency investments by 2020. The adoption and endorsement of compatible principles by these institutions would complement the *Voluntary Energy Efficiency Investment Principles for G20 Participating Countries* and accelerate energy efficiency investments in each sector;
- Collaborate with International Organisations on the implementation of a series of work streams to support the application of the *Voluntary Energy Efficiency Investment Principles for G20 Participating Countries* in the countries of the Task Group, and other G20 interested economies. This collaboration would lead to the replication of sound finance solutions in various sectors (such as, buildings, industry, and SMEs); and
- Continue to work closely with participating countries, other interested G20 economies, and the finance industry to develop, implement and execute the *Voluntary Energy Efficiency Investment Principles for G20 Participating Countries* - through further technical engagement workshops and capacity building activities.

Anticipated activities include: dissemination of lessons learned through good practice toolkits, information packs, online tutorials, and direct engagement with governments through selected existing platforms, including the Clean Energy Ministerial's Clean Energy Solutions Center²¹ initiative; facilitation of the dialogue between the energy efficiency community and financial institutions; and identification of issues for energy efficiency investment finance, and appropriate policy options and market approaches to overcome these issues.

BUILDINGS

1.10 Rationale for continued collaboration: Currently, buildings account for over 30 per cent of global final energy consumption. Looking ahead, the wide deployment of best available technologies and energy efficiency policies could yield annual savings in buildings' final energy use of roughly 53

²¹<https://cleanenergysolutions.org>



exajoules by 2050—equivalent to the combined building energy use in China, France, Germany, Russia, the United Kingdom and the United States in 2012. It is estimated that G20 countries alone could account for three-fourths of the cumulative global building energy savings potential from 2015 to 2050.

International collaboration can help realise this potential through the exchange of best practices and experiences, helping deliver a range of important benefits: lower electricity and fuel costs for businesses and households; greater reliability in meeting energy demand without costly infrastructure and disruptions; and reductions in emissions of heat-trapping greenhouse gases and other pollutants that pose a threat to human health.

1.11 Outcomes in 2015: In 2015, Australia and the United States led further collaboration among participating G20 countries²² on building energy code implementation and building energy performance metrics, two priority areas to be addressed in order to improve the energy efficiency of buildings globally.

In partnership with the IEA, the Global Buildings Performance Network (GBPN) and the Pacific Northwest National Laboratory, the Building Energy Efficiency Task Group (BEET) has produced two major reports and developed a web portal to facilitate collaboration among participating countries on building energy efficiency:

- The *Delivering Energy Savings in Buildings* report which found that effective building energy code implementation is key to realising the massive energy savings potential of the building sector and that the benefits generated by building codes can be enhanced through further international collaboration.
- The *Building Energy Performance Metrics* report which provides important comparisons of country-level historic building energy metrics data for all major economies; includes estimates of energy savings potential for the buildings sector; and highlights the need for smart efficiency policies to curb the growth of energy consumption in buildings.
- The portal on building codes, referred to as the ‘BEET codes portal’, hosted by the GBPN, which provides a platform for sharing approaches to building code implementation that can accelerate improvements in energy performance and deliver greater cost savings for households and businesses.

1.12 Proposed way forward: Through its work in 2015, the BEET has identified priority areas for further work to advance building energy performance in the cities, states and countries of participating G20 economies, including:

- Under building energy codes: code compliance checking systems; measuring performance against code-required design; compliance software and tools; and incentives, with collaboration facilitated through the BEET codes portal.
- Under building energy metrics: improving data quality; developing and tracking additional metrics; and modelling future energy use.

The Building Energy Efficiency Task Group may also consider undertaking work on building national energy rating schemes and disclosure, data quality and availability, building components, and education and capacity building.

²² See [Attachment E](#) for the list of participating countries.



INDUSTRIAL ENERGY MANAGEMENT

To encourage greater uptake of efficiencies in the industrial sector, participating G20 countries are promoting energy management best practices through:

1. Energy Management Working Group (EMWG) led by the United States²³; and
2. Energy Management Action Network (EMAK) led by Japan and China.

1.13 Rationale for continued collaboration: The industrial and commercial buildings sectors together account for over 50 per cent of global energy use. Many industrial processes are energy-intensive, and improvements to these can bring about large energy savings. Through expanded participation in the EMWG and EMAK, countries can continue to build capacity through wider sharing of tools and best practices on the use of energy management systems.

Greater uptake of energy management systems, such as the ISO 50001 and other national or international standards²⁴, can also help achieve significant energy efficiency benefits. The ISO 50001 standard for example helps organisations use energy more efficiently, through the development of internal policies and procedures that ensure systematic tracking, analysis, and planning of energy use leading to continual improvement in energy performance. By conservative estimates, implementation of the ISO 50001 standard across the industrial and commercial sectors could drive cumulative energy savings of approximately 80 exajoules by 2025 which would equate to the annual output of 40 typical coal-fired power plants, and save US\$820 billion in energy costs.

Increased dialogue and collaboration between the private sector and participating countries - especially those experiencing rapid economic growth- on key technical issues of energy management can improve the effectiveness of practices.

Further technical exchanges among participating countries, and other G20 interested economies, on national and international standards, such as ISO 50001 for instance, can help ensure greater uptake of efficient energy management systems globally.

1.14 Outcomes in 2015: In 2015, under the leadership of the United States and Japan, participating countries²⁵ have worked together to take forward the existing work of the EMWG and EMAK.

Recognising the benefits that energy management systems can bring, the EMWG (led by the United States) has focused on fostering technical exchanges and designing collaborative solutions among participating countries to support greater uptake of good energy management practices. In 2015, the EMWG has:

- Established a **global certification scheme for ISO 50001 auditors** to provide greater consistency in the implementation of ISO 50001;
- Hosted a series of **Policy Exchanges** (webinars, bilateral meetings) to share information on the latest policy and programme developments, and explored areas for new joint activities under the EMWG;

²³ The Energy Management Working Group is also an initiative of the CEM, and was formerly known as the Global Superior Energy Performance Partnership (GSEP).

²⁴ The ISO 50001 is an internationally-accepted standard for energy management systems, developed by over 50 countries, and adopted the majority of G20 countries.

²⁵ See Attachment E for the list of participating countries.



- **Published 16 practical case studies** that present real-world data and experiences of early adopters of Energy Management Systems; and
- Launched a new initiative aimed at accelerating the adoption of ISO 50001, working closely with the private sector. This new initiative, called **ISO 50001 Collaborative**, is supported by Canada, Mexico and the United States to date²⁶.

In 2015, building on the existing work conducted under EMAK, Japan hosted a workshop in New Delhi, India, on 25 February, focusing on energy efficiency in small and medium sized enterprises (SMEs) and waste heat recovery measures. Participants included central and local governments, the industrial sector from both large and SMEs, private banks and government institutions.

The workshop served as a good interface for stakeholders, especially policy makers and industry practitioners responsible for energy management in their current operations. The workshop also revealed that there continue to be barriers to enhancing energy efficiency actions in India, such as insufficient information, skills gaps, and lack of access to finance. These barriers are commonly observed in developing countries as a whole.

1.15 Proposed way forward: In 2015, participating countries identified further work required for broader uptake of energy management practices through the EMWG and EMAK. This would entail, for instance, further work by participating countries through the EMWG's ISO 50001 Collaborative on:

- Defining key voluntary principles for promoting the ISO 50001 standard, and obtain commitments from a wide range of partners;
- Estimating the potential impacts of the ISO 50001 standard and work with partners to measure progress toward this potential;
- Facilitating ongoing industry dialogue on ISO 50001 and other national/international standards as relevant;
- Developing areas of critical technical cooperation to ensure robust and consistent implementation of the standard by participating countries, and in other interested economies; and
- Under the lead of Japan, EMAK plans to host a workshop on the role Energy Services Companies in energy management systems (scheduled for 20 November 2015 in Moscow).

EMWG and EMAK will continue to define activities for 2016 in order to fully seize the energy efficiency opportunities that are available in participating countries.

ELECTRICITY GENERATION

1.16 Rationale for continued collaboration: Global electricity generation expanded approximately 1.6 times over the 20 years to 2012, with fossil fuels accounting for the largest share of this growth. According to the IEA *World Energy Outlook* (2014), this trend is projected to continue with fossil fuels, including coal, continuing to dominate a large share of total power generation (61 per cent) in 2040. It is widely recognised that, in the medium- to long-term, a global transition to reduce CO₂ emissions

²⁶ See *ISO 50001 Lead Auditor Certification Program* and *Energy Management Leadership Awards* documents for further information on the work of the EMWG in 2015.



from fossil-fuel (including coal) power generation technologies will be essential achieving the necessary cuts in global greenhouse gas emissions to limit global warming²⁷.

Therefore, improvements to the energy efficiency of (supply-side) conventional electricity generation technologies, including through the introduction of high-efficiency, low-emissions (HELE) power plants would be a pragmatic measure to reduce GHG emissions - particularly in a country where fossil fuels, including coal, continue to be a major source of power generation. For instance, a one per cent improvement of the efficiency of thermal power generation worldwide would reduce 340 Mt of CO₂, which is equivalent to one third of total CO₂ emissions of Japan²⁸.

Through international collaboration and joint efforts with the private sector, participating countries can further enhance their understanding of HELE technologies, and facilitate developing and disseminating best available technologies including Ultra Super Critical, Integrated Gasification Combined Cycle, and Carbon Capture and Storage (CCS), as well as well-managed operation and maintenance practices, that contribute to lowering CO₂ emissions without harming economic growth.

1.17 Outcomes in 2015: The Electricity Generation Task Group organised two workshops in 2015 under the Global Superior Energy Performance Partnership (GSEP) Power Working Group to implement the G20 Energy Efficiency Action Plan. The first workshop focused on clean coal technology and was held in Istanbul, Turkey, on 25 May, at the margin of the second ESG meeting. It included the participation of many G20 members as well as international organisations such as IEA, OECD, IPEEC, the Organization of the Petroleum Exporting Countries (OPEC) and the Asian Development Bank (ADB). The workshop served as a forum for gaining a better understanding of clean coal technologies, as well as policies and financial instruments that could promote them. A range of issues were discussed, including research and development, and finance.

The second workshop covered a wide range of HELE technologies in the power sector and was held on 30 July in Ankara, Turkey, with several G20 member countries and various experts in the private sector participating. The workshop provided practical opportunities to share knowledge on HELE technologies and to discuss various aspects, related to HELE technologies, including barriers to deployment. A site-visit of a coal-fired power plant was also conducted in conjunction with the workshop. The participants of the site-visit exchanged information and views on best practices of operation and maintenance on the basis of a real-life example, and identified various detailed approaches to further enhance the efficiency of existing power plants without undergoing major retrofits.

1.18 Proposed way forward: The Electricity Generation Task Group recommends that participating countries work through the GSEP Power Working Group and consider:

- Further promoting the development and dissemination of best available HELE technologies particularly in a country where fossil fuels, including coal, continue to be a major source of power generation;
- Collaborating towards a better understanding the technical, financial and environmental aspects of such technologies;
- Undertaking research project to develop a common basis to measure CO₂ emissions reductions through improved operation and maintenance practices.

²⁷ According to the Intergovernmental Panel on Climate Change.

²⁸ See Reference, <http://www.enecho.meti.go.jp/en/reports/others/150525/pdf/annex.pdf>



The Task Group has invited interested G20 members to join the activities of the GSEP Power Working Group in 2016, or other relevant international initiatives, and consider the options stated above.

2. Cooperation with Expert International Organisations

In 2015, the Action Plan fostered a productive dialogue among International Organisations (IOs) on energy efficiency, illustrating the benefits of enhanced cooperation among expert entities.

As per the G20 Energy Efficiency Action Plan, IPEEC cooperated this year with a range of IOs in the implementation of the Action Plan, including: the IEA, the International Energy Forum, the OECD, the Organization of the Petroleum Exporting Countries (OPEC), the United Nations Sustainability for All initiative, the World Bank, the Energy Charter, the United Nations Environment Programme Finance Initiative, the Clean Energy Solutions Center Initiative, the European Bank for Reconstruction and Development (EBRD), the International Council for Clean Transport, the Global Fuel Economy Initiative, and the Global Buildings Performance Network – among others.

IPEEC provided regular updates and consulted relevant organisations on the Action Plan, and has:

- Held continuous discussions, correspondence, and meetings between subject matter experts from G20 countries, Task Groups, the IPEEC Secretariat and various IOs;
- Participated in numerous conferences, workshops and events hosted by G20 countries, Task Groups, the IPEEC Secretariat, and IOs across the world;
- Hosted of dedicated teleconferences²⁹ by the IPEEC Secretariat to provide progress updates and to explore opportunities for collaboration;
- Published in IPEEC newsletters, website, and social media of dedicated content on the Action Plan.

The above activities proved to be beneficial to stakeholders: by drawing from IOs' available specialist resources, countries were able to add expertise to their work. At the same time, the activities provided participating IOs with the opportunity to discuss with countries areas where they could further add value, and identify concrete ideas for collaboration.

Through these exchanges, countries, IPEEC and IOs identified areas of potential synergies that could be explored and consolidated in the future under the Action Plan.

²⁹ Held in July and August 2015.



3. Attachments³⁰

Attachment A - Voluntary Recommendations of the Participating Countries of the G20 Transport Task Group

One of the priorities from the G20 Energy Efficiency Action Plan was for participating countries to work together to improve vehicle energy efficiency and emissions performance, particularly for heavy duty vehicles. In 2015, this work includes developing recommendations, for G20 consideration, including for strengthened domestic standards in participating and other interested G20 countries in as many areas as possible related to clean fuels, vehicle emissions and vehicle fuel efficiency, and for green freight programs³¹.

Recognising the significant potential to reduce air pollution, enhance energy security, improve public health, and mitigate climate change, participating G20 countries commit to adopt or strengthen policies and programmes to improve fuel quality and the emissions performance and energy efficiency of motor vehicles in our markets.

Participating G20 countries will promote coordination among relevant authorities to develop roadmaps – with interim milestones as needed – to achieve world-class, domestic clean vehicle and fuels policies and programmes, taking into consideration national circumstances and the recommendations in the IPEEC Transport Task Group Briefing Paper, “Policies to reduce fuel consumption, air pollution, and carbon emissions from vehicles in G20 nations³².”

The roadmaps are to include, inter alia, efforts toward the nationwide introduction of ultra-low sulfur fuels (10-15 ppm), world class light- and heavy-duty vehicle air pollution emission standards, regulatory approaches to improve light- and heavy-duty vehicle fuel efficiency, and green freight programs.

Participating G20 countries are invited to report on progress on the elaboration of these roadmaps by September 2016. Countries interested in technical assistance are invited to make a request to the IPEEC Transport Task Group.

Participating G20 countries recognise the importance of further engagement and experience-sharing on additional topics related to the road transport sector, including the potential role of sustainable alternative fuels, such as natural gas, electricity, hydrogen, and biofuels, in achieving energy and environmental goals, information campaigns to raise awareness among stakeholders about the benefits of fuel efficiency, strengthening compliance and enforcement, and long-term measures to reduce the GHG intensity of transportation to achieve long-term climate change mitigation goals. The G20 Transport Task Group will consider including these topics in future work plans.

³⁰ The recommendations, options and possible next steps for G20 consideration under each work stream were approved by, and are applicable to participating countries of each respective Task Group only.

³¹ See page 3, G20 Energy Efficiency Action Plan

³² This paper has been elaborated by the International Council on Clean Transportation at the request of the Transport Task Group. It is solely for informative purposes of the participating countries.



Attachment B - Voluntary Principles for participating countries of the Networked Devices Task Group

Design and operation principles

1. Networked device design should follow standards-based communication and power management protocols to ensure compatibility and interoperability, and should take advantage of standards and protocols that actively support energy efficiency.
2. Networked devices should not impede the efficient operation of a network (for example by injecting bottlenecks or faults, or impeding power management activities in other devices).
3. Network-wide energy efficiency optimisation should be a primary development consideration. Network power management should coordinate with individual device power management techniques to achieve this.
4. Connection to a network should not impede a device from implementing its internal power management activities.
5. Networks should be designed such that legacy or incompatible devices do not prevent other networked devices on the network from effective power management activities.
6. Networks and networked devices should have the ability to scale power levels in response to the amount of the service (level of functionality) required by the system.
7. Edge devices without networking functionality should enter network standby, if appropriate³³, after a reasonable period of time when not being used. Edge devices with networking functionality should provide power management capabilities for each function consistent with that function's role in the network³⁴.
8. Networking and networked infrastructure devices should not autonomously go to network standby mode. These devices should support power scaling.
9. Consumers should be informed about and have control over device power management, when applicable, including networked device low power modes that may affect the user experience.
10. The design and operation of networked devices should be compatible with, and promote the positive effects of, using consumer electronics and information and communication technology (ICT) to enable energy to be used more efficiently, often referred to as "Intelligent Efficiency."

Policy principles

1. Participating Government and industry should seek harmonised policy approaches that benefit the global marketplace for consumer and commercial technology products and services, and the enhanced productivity and efficiencies achieved via networks
2. Policy, including government procurement and best-practice sharing, should support continued device, network and intelligent efficiency innovation.
3. Energy efficiency requirements should be performance-based and technology neutral. Policy should account for the different capabilities of networked devices.
4. Policy should neither impede the functionality of networked devices or efficiency of the network nor impair the implementation of standards for enabling device or network security.

³³ Appropriate: edge devices whose role is to constantly monitor, would not be considered appropriate for network standby. Edge devices whose role is to complete a task, conduct no other service and can tolerate an extended resume sequence, should autonomously go into network standby.

³⁴ Power management consistent with its role in the network: e.g. an edge device with networking functionality such as a printer with an integrated access point controller may put edge device functionality (printer) into a network standby state while maintaining operation of networking functionality (access point).



Attachment C - Voluntary Energy Efficiency Investment Principles for G20 Participating Countries

Sharing a common understanding of the positive economic and societal benefits of public and private energy efficiency investments, participating countries agree to collaborate and work together, on a voluntary basis, to:

1. Recognise the importance of energy efficiency considerations in all relevant decision making to significantly increase and strengthen energy efficiency investments in our economies in the context of a balanced progression of the three dimensions of sustainable development;
2. Encourage energy efficiency investments and their positive impacts to be systematically considered alongside supply-side investments relating to our energy systems. This can be achieved through consideration of possible reforms relating to decision-making, planning, pricing and regulation of energy and infrastructure investments;
3. Country-level review and consideration of measures and policies which will stimulate demand for energy efficiency investments, including the following:
 - a. The provision of clear regulatory and investment signals to encourage the uptake of energy efficiency investments within the development and upgrade cycles of our infrastructure, consistent with national development priorities and strategies;
 - b. Appropriate national and regional incentives and mechanisms that: stimulate improved energy management; support energy efficient investment choices; and improve awareness of the value of energy efficiency investments with key decision-makers;
 - c. Contribute to, and facilitate national and, where appropriate, regional mechanisms that make the data needed for energy efficiency measures and investments easily accessible to market participants involved in the development of these investments considering in-country communication protocols and clear systems of labels and certificates;
 - d. Support for the appropriate development, packaging, aggregation, standardisation, bundling and provision of tailored financing for energy efficiency investments through multiple national, regional or local retail channels (such as utilities, financial institution branches, and other retail distribution networks), to deliver a change of scale for consumer and SME energy efficiency investing;
 - e. Review and identify policies at the national and local level that help to accelerate the replacement cycle for “worst in class” facilities and buildings with respect of their relative energy performance;
 - f. Build a pipeline of bankable and replicable energy efficiency projects.
4. Encourage collaboration to identify and explore how to unlock barriers preventing the supply of and access to finance for energy efficiency investments in local markets including:
 - a. Reviewing accounting and regulatory treatment for energy efficiency investments, where appropriate, to fairly reflect the net benefits and business risks of these investments;
 - b. Developing national and/or regional standards and policies that will support energy efficiency investment processes in key market segments consistent with regional and national priorities and conditions;
 - c. Developing finance mechanisms, where relevant, that can enhance the creditworthiness of the repayment streams to energy efficiency investments, such as including these repayments within existing payment collection mechanisms;



d. Simplifying public support programmes, where relevant for energy efficiency, to enable their efficient combination with and mobilisation of private finance streams to maximise overall funding flows and delivered benefits;

e. Involving public financial institutions, where appropriate, to help formulate lending policies to prioritise and mobilize private capital toward energy efficiency investments in the respective countries.

5. Build greater internal energy efficiency investment awareness within public and private financial institutions, expand their use of tailored approaches to structure and facilitate energy efficiency investments, and develop their capacity through the pro-active sharing of good practice. This can be achieved through support for financial institutions which adopt their own systems based upon voluntary energy efficiency investment commitments. These would aim to appropriately govern their own internal decision-making processes, investments in, and interventions to mobilise greater investment in energy efficiency.



Attachment D – Chairmen’s Summary of Electricity Generation Task Group Workshop (25 May 2015, Istanbul)

Under the G20 Energy Efficiency Action Plan, the Electricity Generation Task Group held a workshop on Clean Coal Technology on 25 May 2015 in Istanbul, hosted by Japan and Australia. Key take-away messages from the active discussion include:

1. Policy : Coal continues to play major role in global power mix, Highly-Efficient Low Emissions (HELE) technologies is a key

While electricity generation increases significantly in the emerging countries in coming decades, coal continues to be the fuel of choice, in terms of energy security, energy access and economic development, as it is relatively low cost, reliable and often an abundant resource. The Workshop recognised the important work of the IEA which identifies, in order to achieve a sustainable energy future, a broad suite of energy is required including clean use of coal, without which the cost of meeting the G20 goal of “Energy Access for All” will be much higher. Where coal-fired power is used, encouraging the construction and use of highly-efficient low-emissions (HELE) coal power plants is a pragmatic energy policy that offers substantial opportunities to reduce energy-related emissions without harming economic growth.

2. Technology : Continuous R&D on Clean Coal Technology

Strong uptakes of cleaner fossil fuels, in particular clean coal technologies can assist address energy access challenges in the longer term in an affordable and reliable manner. CCT includes highly efficient low emission power generation (Ultra Super Critical, Super Critical, Integrated Gas Combined-Cycle, Integrated Gasification Fuel Cell), coal upgrading technology and coal gasification technology, Carbon Capture, Usage and Storage (CCUS). Continued support for R&D on CCT is important. CCUS technologies, if widely deployed, could reconcile the continued widespread use of coal with the need to reduce CO₂ emissions. The prospect is diverse among regions. We should continue to undertake efforts to encourage the uptake of CCUS including reducing costs, raising public acceptance, understanding geological conditions. Some mentioned that new coal-fired power plants should be “capture ready”.

3. Finance : Importance of financial support for Clean Coal Technology

Financing transition to more efficient technology is a pressing issue for developing country. Investors do not always opt for the most efficient plants due to higher up-front capital expenditure, even though more efficient plant technologies often have lower lifetime costs.

Presenters noted that public financing should continue to be available to help introduce high-efficiency coal-fired power plants in developing countries as part of a technology neutral approach. Some participants expressed their views that the availability of public financing should be discussed to benefit not only the OECD member countries but also the developing countries utilizing coal-fired power plants. The OECD delivered a brief introduction of the ongoing discussion on export credits support for coal-fired power plants at the OECD Export Credit Group meeting. A view was expressed that we should limit export credits for coal-fired power plants without CCS. Another view was that making public finance available was critical. The ADB noted that in the absence of public finance a higher emissions future will be locked in particularly in the Asia Pacific region.



Attachment E - Work Stream Participation

	New G20 Work in 2015			Accelerating Existing Work		
	Vehicles	Networked Devices	Finance	Buildings	Industrial Energy Management	Electricity Generation
IPEEC Members						
Australia				●		
Brazil						
Canada						
China						
EU						
France			●			
Germany						
India						
Italy						
Japan					Lead EMAK	●
Korea						
Mexico			●			
Russia						
South Africa						
UK		●				
USA	●			●	Lead EMWG	
Non-IPEEC G20 members						
Argentina						
Indonesia						
Saudi Arabia						
Turkey						
Guests						
Azerbaijan						
New Zealand						
Norway						
Spain						
Singapore						



Attachment F - Possible Next Steps for G20 Consideration by ESWG

Work Streams	Possible Next Steps for G20 consideration
Overarching	<ul style="list-style-type: none"> • Recognise the extensive and quality work achieved in 2015 across all work streams, and welcome the Report on Implementation of the G20 Energy Efficiency Action Plan: Voluntary Collaboration on Energy Efficiency. • Welcome the voluntary options proposed by, and applicable to, participating countries; and agree to provide further support, as well as the required resources, to the existing work streams on finance, products, buildings, vehicles, industry and electricity generation.
Vehicles	<ul style="list-style-type: none"> • Welcome the proposed Voluntary Recommendations of the Participating Countries of the G20 Transport Task Group (Attachment A) that aim to improve motor vehicle energy efficiency and emissions performance in the participating countries of the Task Group, and other interested G20 countries. • Continue to support this work in 2016 and beyond, through the Task Group, with the objective to support participating and other interested countries in adopting or strengthening world-class, domestic policies and standards for vehicles energy efficiency and emissions performance (see Attachment A).
Networked Devices	<ul style="list-style-type: none"> • Recognise the need to collaborate and coordinate efforts to: <ul style="list-style-type: none"> ○ Realise a world where devices and networks optimise energy management while delivering increased energy productivity across all sectors. ○ Maximise network-enabled energy savings and minimise the energy consumption from all networks and network-connected devices. • Encourage further work with the Connected Devices Alliance, to expand and build upon the progress made by the Networked Devices Task Group in 2015, and develop and implement a work plan that will: <ul style="list-style-type: none"> ○ Promote the uptake and implementation of a set of voluntary principles (agreed by participating countries) for the design and operation of connected devices and their networks that has been agreed (see Attachment B), launch the Centre of Excellence and recognise industry leaders in order to encourage best practice. ○ Develop methodologies to measure network-enabled energy savings, establish a transparent baseline and monitor progress in meeting our goals. ○ Identify voluntary network standby targets for different categories of end-user products that support our goals.

Work Streams	Possible Next Steps for G20 consideration
Finance	<ul style="list-style-type: none"> • Welcome the <i>Voluntary Energy Efficiency Investment Principles for G20 Participating Countries</i> of the G20 Energy Efficiency Finance Task Group to enhance capital flows to energy efficiency investments in participating G20 countries (see Attachment C). • Agree to further support this work in 2016 through the Task Group to enact these principles in participating and other interested G20 countries.
Buildings	<ul style="list-style-type: none"> • Commit to improving the way participating countries implement building energy codes and track building sector energy metrics - as articulated in the Building Energy Efficiency Task Group (BEET) reports (<i>Delivering Energy Savings in Buildings</i> and <i>Building Energy Performance Metrics</i>). • Accelerate improvements in energy performance, by exchanging building energy code practices and experiences through the new BEET codes portal.
Industrial energy management	<ul style="list-style-type: none"> • Encourage industry use of international energy management best practices, focusing on the ISO 50001 standard, as key energy efficiency strategies within new or existing member programmes. • Continue to collaborate on ways to support industry uptake of international standards for energy management systems, such as the ISO 50001 standards. • Continue to support global technical exchanges, and promote robust implementation of international standards for energy management systems, such as the ISO 50001 standard.
Electricity generation	<ul style="list-style-type: none"> • Encourage the construction and use of high-efficiency, low-emissions (HELE) technologies, primarily where fossil fuels, including coal, continue to be a major source of electricity generation – as a pragmatic energy policy with substantial opportunities to reduce energy-related emissions without harming economic growth. • Continue to support Research, Development and Demonstration activities aimed at developing HELE technologies, including clean coal technologies and efficient operation and maintenance practices. • Encourage further collaboration on technical and financial barriers and solutions to greater uptake of HELE plants.