

4E

Efficient Electrical End-Use Equipment
International Energy Agency

Implementing Agreement for a Co-operative Programme on Efficient Electrical End-Use Equipment (4E)

Annual Report 2013



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Chair's Statement

Although this edition of 4E's Annual Report is the last in 4E's first five-year term, I am happy to say that there will be further editions. In response to a unanimous decision by the existing members to continue our collaborative work, the IEA Governing Board has acknowledged 4E's contribution by granting an extension to 2019.

The decision to continue 4E has not been taken lightly, in part because member countries face competing demands on limited resources. However, the evaluation of our first term revealed that participation in 4E was considered highly cost-effective and in several countries actually reduced members' costs.



4E's influence extends beyond its members, since the majority of the 189 individual reports published by 4E from 2008 to 2013 are freely available. Equally, many of the 56 presentations, 94 workshops and technical or policy exchanges have engaged a far broader group than just the 4E membership. The complete revamp of our website in 2013 now provides easy access to all 4E's previous publications and presentations to all interested parties.

Of course, these are only a means to an end and the most gratifying sign of 4E's impact has been the numerous examples where our analysis has been used to support the development of local policy development.

Although the focus of this report is on the many achievements in 2013, it is difficult not to look forward to the next five years. 4E's research and analysis is now recognised as making a unique contribution to national policy development and the energy efficiency policy debate and this provides us with a great platform to be more ambitious.

This intention is reflected in our new strategic plan, which positions 4E to develop initiatives over a broader range of appliances and equipment covering not just electricity. Already in 2013 we have launched an exciting new Annex to provide leadership in the rapidly growing field of electronic devices and networks.

It has been noticeable during 2013 that not only are governments using 4E to develop smarter policies, but 4E work is now used by standardization bodies and industry figures. In the second term we will therefore extend our sphere of influence by forging new strategic links with related organisations and industry groups.

As the first chapter in 4E's history closes, this report shows the importance of its achievements and demonstrates why 4E members believe that there is much more that can be done by working collaboratively.

Mike Walker

Mike Walker
Chairman 4E
June 2014

The benefits of investing in energy efficiency have been extensively documented.

The world needs more energy.

The cleanest and least expensive source is to use the energy we produce more efficiently.

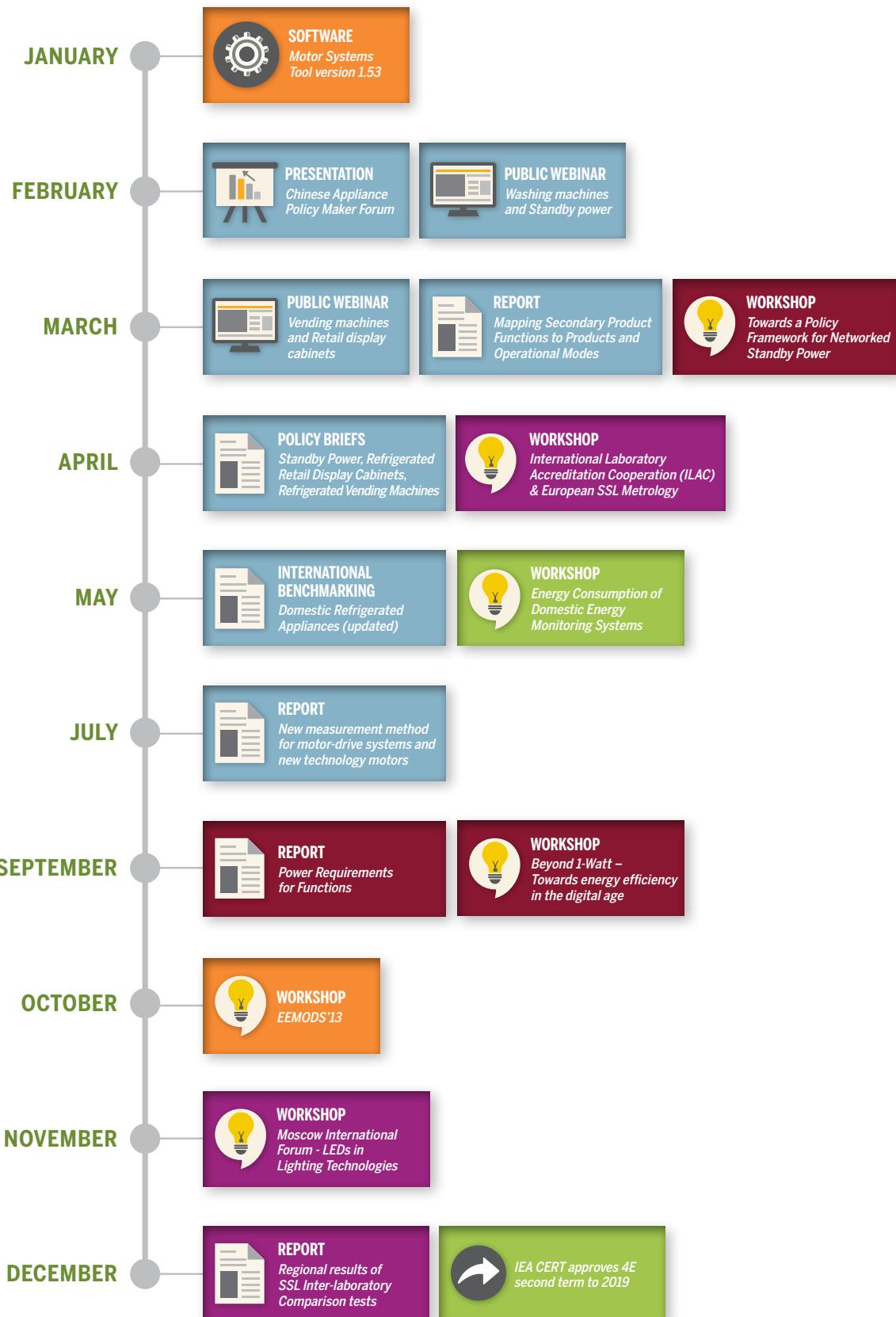
Promoting energy efficiency will realize massive new investment opportunities in developing and developed countries.

It can support economic growth, generate new jobs and increase global resource productivity.

Energy efficiency is a win-win for people and the planet.

Ban Ki-moon
Secretary-General of the United Nations,
Copenhagen, Denmark, 23 October 2013

Key 4E achievements in 2013



The Co-operative Programme on Efficient Electrical End-Use Equipment (4E)

In 2008 4E was established as an International Energy Agency (IEA) Implementing Agreement to support government policy efforts designed to increase the production and trade in efficient electrical end-use equipment. Since this time government ambitions in the field of energy efficiency have grown substantially, making the role of 4E as a forum for international collaboration even more necessary.

It is now widely recognised that successful climate change mitigation strategies not only require a step-change in the rate of energy efficiency improvement across all sectors, but that investment in energy efficiency will deliver economic growth. Analysis by the International Energy Agency shows that a ramping-up of energy intensity to 2.6 times the rate of the last 25 years will not only halve energy demand, but will boost economic output by \$18 trillion by 2035.

Several countries are responding to the urgent need for action by accelerating their energy efficiency policy efforts. For example, President Obama issued the goal of cutting the energy wasted by US homes and businesses by 50% over the next 20 years in the 2013 State of the Union Address.

However, as noted by the IEA, G8, APEC and the Clean Energy Ministerial, meeting these challenges for globally traded products requires co-ordination between governments so that economies of scale are utilised to maximise efficiency improvements and to prevent the dumping of less efficient stock.

With a membership of twelve major governments spanning North America, Europe and the Asia-Pacific region, 4E's co-ordination role is increasingly important. So too is 4E's research into potential new approaches and policy measures designed to accelerate the rates of innovation for appliances and equipment.

“ The degree of global investment in energy efficiency and the resulting energy savings are so massive that they beg the following question: Is energy efficiency not just a hidden fuel but rather the world’s first fuel? ”

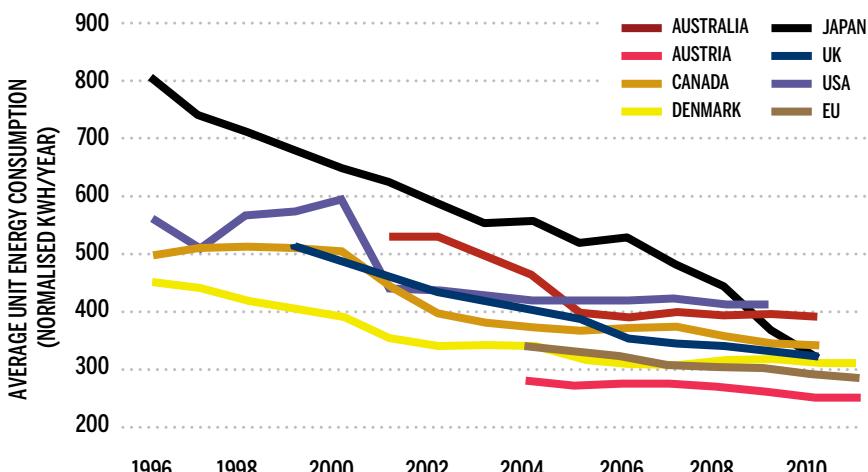
IEA Executive Director Maria van der Hoeven

4E activities concerning the international alignment of policy measures are a further example of the benefit of collaboration amongst governments. Improved alignment will not only maximise energy savings through the reduction of barriers to trade and compliance costs, but also through improved access to a greater range of policy measures and greater confidence in setting ambitious performance requirements.

Many 4E projects involve analysis of the impact of past and current policies in order to better understand how to design and implement better policies in the future. This area of work is vitally important so that governments can ensure a stable framework that supports industry investment in ever more efficient products.

The Co-operative Programme on Efficient Electrical End-Use Equipment (4E)

Figure 1: Normalised unit energy consumption of refrigerator/freezer combinations



Evidence from its first five years demonstrates that the energy efficiency policies implemented by 4E member countries have benefited from the ability to transfer experiences and expertise. In addition, 4E countries have been able to access more comprehensive and authoritative information at a lower cost than would otherwise be available.

Based on this foundation, the new Strategic Plan will see 4E continue through to 2019 in order to take advantage of the huge opportunities for end-use energy efficiency identified by the World Energy Outlook and other analysts. In 2014 4E will extend its scope to non-electric appliances and equipment and form closer partnerships with other key intergovernmental organisations and industry fuelled by non-electric so that it can more closely reflect the policy needs of members countries.

Executive Committee

4E is managed by an Executive Committee (ExCo) comprising one voting delegate from each participating country. Like all IEA Implementing Agreements, participation is open to all countries. The executive group meets twice yearly to manage the work programme of 4E, including the dissemination of 4E's research results. Secretariat functions for the ExCo are provided by the Operating Agent, funded by annual membership fees.

The 11th and 12th meetings of the Executive Committee (ExCo) were held during 2013. These were convened in Nice (30-31 May 2013) and Washington, DC (12-13 November 2013). Attendance at these meetings is shown in Table 1.

Future ExCo meetings will be as follows:

- ▶ 15-16 May 2014, 13th ExCo meeting – Utrecht, Netherlands
- ▶ 5-6 November 2014, 14th ExCo meeting – Jeju Island, Republic of Korea

Table 1: Attendance at 2013 ExCo Meetings

CONTRACTING PARTY	11TH EXCO - NICE	12TH EXCO – WASHINGTON DC
Australia	✓	✓
Austria	✓	✓
Canada	✓	✓
Denmark	✓	✓
France	✓	✓
Japan	✓	✓
Republic of Korea	✓	✓
Netherlands	✓	✓
Sweden	✓	✓
Switzerland	✓	✓
United Kingdom	✓	✓
United States of America	✓	✓
Observers	IEA	EC, SEAD

During 2013 a mechanism to provide a formal link between 4E and SEAD was discussed that would facilitate further co-ordination. Under the agreement (approved in May 2014) SEAD representatives may attend 4E ExCo meetings as non-voting but fee-paying members and SEAD representatives that are not 4E members may participate in 4E Annex meetings. It is envisaged that this will provide access to 4E work to a wider range of governments.



**If action is not taken before 2017,
all the allowable CO₂ emissions
would be locked-in by energy
infrastructure existing at that time.
Rapid deployment of energy
efficient technologies would
postpone this lock-in to 2022,
buying time to secure a
**much-needed global agreement
to cut greenhouse-gas emissions.****

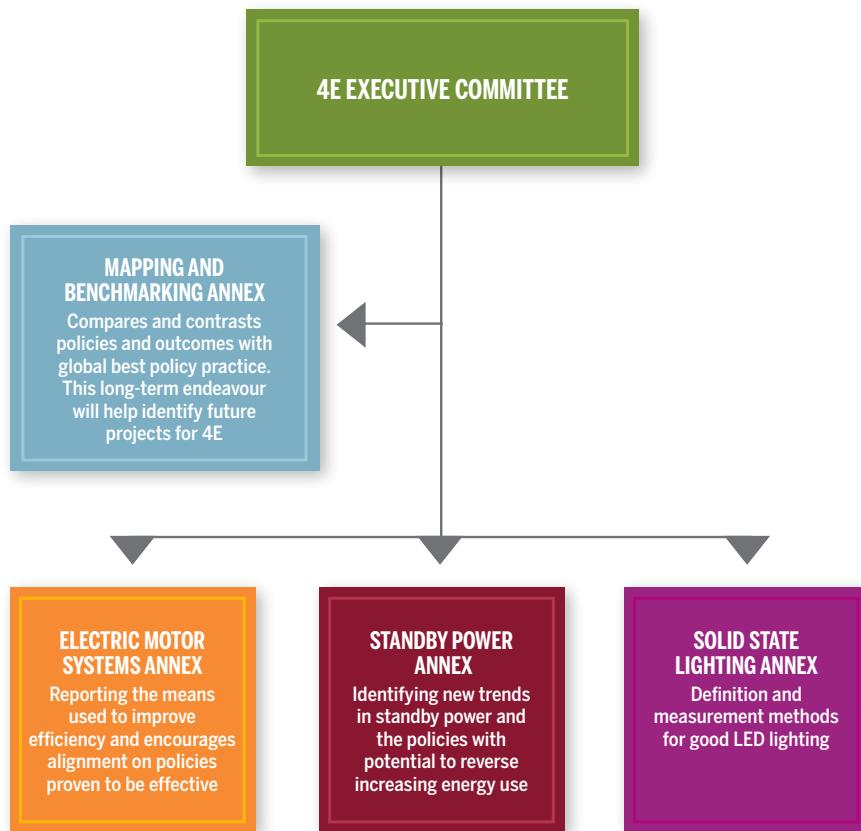
IEA World Energy Outlook 2012

4E Annexes

The main collaborative research and development activities under 4E are undertaken within our Annexes, each of which has a particular project focus and agreed work plan. These work plans, and their respective budgets, are typically set for a three year period and are negotiated amongst the participating countries.

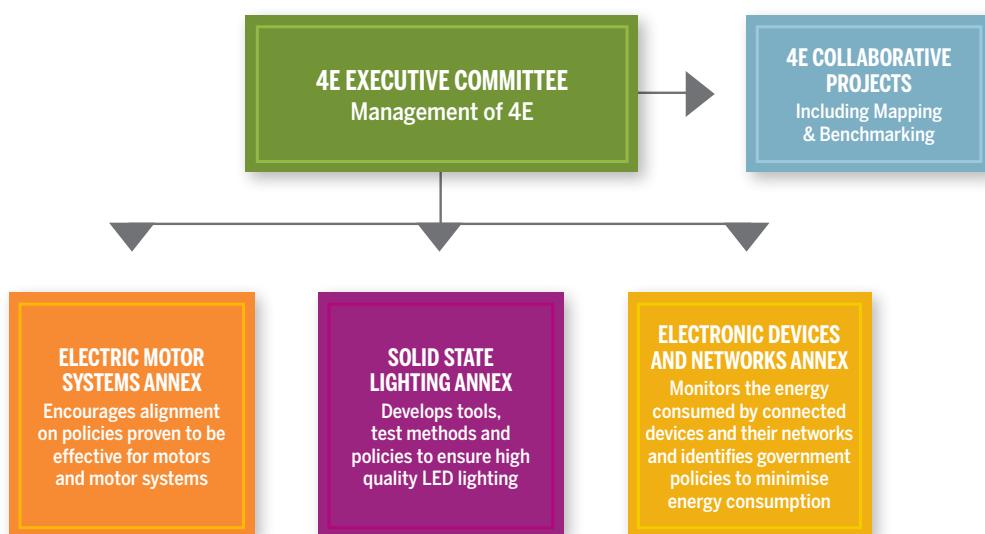
- ▶ **Electric Motor Systems Annex (EMSA)**, launched in October 2008 and led by Switzerland.
- ▶ **Mapping and Benchmarking Annex**, launched in April 2009 and led by the United Kingdom.
- ▶ **Standby Power Annex**, launched in April 2009 and led by Australia.
- ▶ **Solid State Lighting (SSL) Annex**, launched in June 2010 and chaired by Sweden.

Reports on each of these four Annexes are included in the following section of this report.



4E Annexes

During 2013, discussions on the development of the Strategic Plan for 4E's second term led to proposals for a number of structural changes to 4E. These include the incorporation of Mapping and Benchmarking work on a project basis under direct control of the ExCo from 2014, to replace the current M&B Annex. On a similar timescale, the Standby Power Annex will not be renewed but its coverage will expand under a new Annex for Electronic Devices and Networks (EDNA).



4E PROJECTS

4E members initiate projects into areas of research relevant to policies for efficient end-use equipment. These may be particular one-off activities or result in the development of an Annex or other avenues for pursuing more in-depth consideration.

Energy Consumption of Domestic Energy Monitoring Systems

The benefits of smart grids have been widely promoted and many countries have embarked on ambitious rollout programs. To complement this, 4E has drawn attention to the energy consumption of the smart meter itself and associated infrastructure, so that policy makers are aware of the issues that need to be solved to ensure that smart grids result in net energy savings for consumers and electricity networks.

Following research throughout 2012 and 2013, 4E brought together 30 policy makers and experts from 14 countries in May 2013 to highlight what policies are needed to optimise the energy benefits from smart monitoring technologies. Attendees at this unique workshop in Nice included participants involved in many global and regional initiatives, such as the International Smart Grid Action Network (ISGAN) and the Demand Side Management (DSM) agreement.

4E's work on domestic energy monitoring systems is on-going.

4E Annexes

Policy Driven Innovation (PDI)

During 2013, 4E has launched PDI as an internationally co-ordinated policy framework that focuses on lifting the efficiency of stocks of energy consuming technologies through accelerating the market entry of new technologies and the retiring of the older less efficient technologies.

PDI responds to the substantial evidence that government policies are very effective in lifting the average efficiency of technologies in the market where consistent policy has been imposed for many years. As a result, world leaders, experts and intergovernmental agencies have called for a rise in national energy productivity and dramatic changes in how we produce and use energy.

PDI comprises three basic concepts:

- ▶ Global energy performance benchmarks for individual categories of appliances and equipment that define energy performance trajectories to 2030. These may be used:
 - By industry to plan cost-effective product design investments and product launches, and
 - By Governments as the basis for intermediate policy measures.
- ▶ Intermediate policy measures to include suites of internationally-recognized performance levels, with levels of performance ambition to reflect different national circumstances and policy intentions.
- ▶ Internationally recognized methods of testing the energy performance of appliances and equipment.

Global energy performance benchmarks provide the essential framework for international co-operation towards gaining greater improvements in product efficiency. Based on performance levels achievable only through the introduction of new technologies and levels that are not now cost-effective but are reasonably expected to become so before 2030, these benchmarks provide security for industry investment and a target for national government policies.

The PDI mechanism allows individual economies to select the intermediate performance benchmarks (e.g. every 5 years) that are most appropriate and cost-effective for their situation, from a suite of limited options. This reduces the number of possible variations in performance requirements globally, enhancing trade, cutting compliance costs for industry and minimizing implementation problems for governments.

The PDI framework also supports further complimentary policy measures, such as industry development strategies or market incentive schemes.

4E will continue to promote PDI through relationships with key intergovernmental organisations throughout 2014.

4E Annexes

International Standardisation

Methods of testing products for energy performance underpin most energy efficiency policies, (such as minimum standards, labels, awards and financial incentives) and therefore 4E encourages the use of test procedures and efficiency metrics that are:

- ▶ **Repeatable** (i.e. the same product measured repeatedly in the same test laboratory will produce the same results)
- ▶ **Reproducible** (i.e. the same results will be recorded if the same product is tested in different laboratories, assuming the laboratories have been accredited to do the test)
- ▶ **Representative** (i.e. the results measured under the test are representative of the average of what would be expected when the product is used *in situ*)
- ▶ **Affordable** (i.e. the cost of doing the test is not prohibitive)
- ▶ **Viable** (i.e. practicable and not unduly burdensome but also being enforceable in such a way that their intent and prescriptions cannot be readily circumvented).

4E also encourages the use of international test standards for appliances and equipment, where they are available and fit for purpose, as this reduces compliance costs for industry and allows the greater international comparability of energy efficiency policies.

For some products, the inclusion of informative performance classes or thresholds within international standards can also serve as a useful guide by national policy makers to inform their national regulatory performance requirements.

During 2013, 4E Annexes have worked closely with key international bodies, such as the International Electrotechnical Commission (IEC) and International Organization for Standardization (ISO), to improve the coverage of standards for motors, lighting products and standby power.

Building on this work, 4E has also joined with the IEA and SEAD to promote the development of high quality international standards that meet the needs of policy makers in our representative governments. Recognising that governments are important users of international standards, the IEC and ISO have welcomed the emergence of a group able to present the views of national policy makers.

CO-ORDINATION WITH OTHER ORGANISATIONS

In many instances 4E's objectives are best met through working with other organisations, that have particular areas of expertise or influence, and therefore 4E has developed strategic partnerships with a wide range of organisations.

4E has a particularly close relationship with the International Energy Agency (IEA) and provides expert input contributions to many IEA publications on end-use energy efficiency. In 2013 these included "*Electricity in a Climate Constrained World – Data and Analysis*" and "*Energy Technology Transitions for Building, Strategies and Opportunities to 2050*".

4E Annexes

4E also provides regular progress reports to IEA member governments and in March 2013 the 4E Chair made a personal presentation to the End Use Working Party on the work of 4E. The IEA's Energy Efficiency Division provides a report to each 4E ExCo meeting, and is often represented at these meetings.

4E engages with other Implementing Agreements studying energy use within buildings through the IEA Energy Technology Network, as noted elsewhere in this report.

The International Partnership on Energy Efficiency Co-operation (IPEEC) and the Clean Energy Ministerial (CEM), provide 4E with further opportunities to brief senior government politicians and officials on issues relating to the efficiency of alliances and equipment.

Some 4E members also participate in the Super Efficient Appliance Deployment (SEAD) initiative, a project under both the CEM and IPEEC, as this brings opportunities to address similar objectives and to maximise effectiveness through joint activities. Following a joint workshop with SEAD in Washington DC in November 2013, a new memorandum of understanding that allows SEAD to become a member of 4E will give developing countries greater access to 4E work from 2014 onwards.

4E also engages with many industry sectors through the work of our Annexes and participation in international standardisations activities. 4E's role in the development of more effective policies to encourage end-use energy efficiency is widely recognised by industry:

"ERA considers the 4E programme to be immensely valuable for providing a non partisan source of performance data which covers different geographies. This is useful when validating data from other sources (e.g. in our role as Independent Inspector of Imaging Equipment) and also highlighting possibilities for improvements in performance beyond business as usual arising from the sometimes major differences that have been found in different regions. The work on standards is also important as enforcement or demonstration of compliance becomes very messy without reproducible test methods."

APEC, the World Bank, the World Economic Forum, Sustainable Energy for All, international standards organisations and industry groups are amongst an expanding number of public and private sector groups with an interest in end-use energy efficiency. Recognising the unique contribution that each is playing in the development of public policy, 4E continues to engage these organisations to promote a better understanding of issues relating to the efficiency of electrical end-use equipment.

² Chris Robertson, ERA Technology Ltd, UK

Mapping and Benchmarking Annex

The **Mapping and Benchmarking Annex** was established in April 2009 to provide policy makers with a single source knowledge-base on product performance and associated policy tools employed by economies across the world, thus addressing the need for easy-to-understand, credible and reliable information for informing policy-making at national and regional levels.

This is achieved through:

- ▶ Mapping of the changing energy efficiency performance of electrical products in specific countries/regions over a number of years, with an indication of the policies and other drivers that contribute to the evolving product efficiency over that time.
- ▶ Benchmarking of product efficiency within individual countries/regions compared against others to identify differences in product performance over time, and the potential causes of these differences, and to outline the energy saving potential through policy promotion of better performing products in individual, regional and global markets.

MAJOR ACHIEVEMENTS DURING 2013

- ▶ **Analysis:** Completion of an updated domestic refrigerated appliances analyses with the publication of benchmarking report along with policy briefs for standby power, refrigerated retail display cabinets and vending machines. By the end of 2013, the Annex had issued over 130 publications.
- ▶ **Outreach:** Continuation of the Annex's webinar series in which the results of analyses are presented to stakeholders invited by participant countries. Webinars were held on international comparison of the energy performance of washing machines, standby power, vending machines and retail display cabinets. Recordings of these webinars can be viewed at the Annex website.
- ▶ **Participant Outreach example:** The Australian Government ran a White Good Consultation Forum early in February 2013 to consider potential future Australian product policy options. The event was attended by over 50 whitegoods industry and trade association members, NGOs and policy makers and featured four separate presentations on Annex outputs (refrigerated appliances, washing machines, dishwashers and laundry dryers).
- ▶ **Support for policy development:** Again this year, annex participants have used the analysis outputs to inform national and regional policy development. Interestingly, the Annex outputs have also started to be used in policy development beyond participating countries. The Refrigerated Appliance Benchmarking report caused the Chinese government to re-assess its plans for revised performance requirements since the report demonstrated that the proposed Chinese regulations could be strengthened. This resulted in a further review and consideration by China to adopt the newly developed IEC test method for refrigerated appliances.

There has also been extensive cooperation with SEAD/CLASP on a number of products, notably refrigerated appliances (domestic and commercial) and transformers, that has led to significant synergies and rapid development of technical and policy development recommendations.

Mapping and Benchmarking Annex

PUBLICATIONS IN 2013

NAME	DATE IN 2013	ACCESS
Mapping reports for Domestic refrigerated appliances in Republic of Korea	April	Public
Policy brief for standby power	April	Public
Policy brief for refrigerated retail display cabinets	April	Public
Policy brief for refrigerated vending machines	April	Public
Domestic refrigerated appliances benchmarking report	May	Public
Outcomes of the IEA 4E Mapping and Benchmarking policy discussions (update 1)	September	Restricted to members
Product definition for Distribution Transformers	October	Public
Mapping reports for dishwashers in Australia, Austria, Canada, Denmark, Republic of Korea, Switzerland, UK, USA and the EU	December	Public
Four Quarterly management reports	February, May, August, October	For annex participants only



Mapping and Benchmarking Annex

OUTREACH IN 2013

EVENT	DATE IN 2013	LOCATION	PARTICIPANTS
Chinese Appliance Policy Maker Forum	February	Beijing, China	Range of Chinese policy makers and participants in an EU expert group supported by TopTen
Annex arranged online seminars presenting the analysis results for: ► Washing machines ► Standby power ► Vending machines ► Retail display cabinets	February February March March	Online	Policy makers, trade associations, consultants, industry representatives and academia from more than 10 countries
Presentation of comparisons of Australian white good standards with those modelled by 4E	October	Melbourne, Australia	50 whitegoods industry and trade associations, NGOs and policy makers
Expert review meeting of set-top box benchmarking analysis	November	Online	Technical experts on set-top boxes

MANAGEMENT/EXPERTS MEETINGS HELD IN 2013

NAME	DATE IN 2013	LOCATION
15th Annex management meeting	February	Teleconference
16th Annex management meeting	May	Nice, France
17th Annex management meeting	August	Teleconference
18th Annex management meeting	November	Washington, USA

OUTREACH PLANNED FOR 2014

EVENT	DATE IN 2014	LOCATION	INTENDED AUDIENCE
Annex arranged online seminars presenting the analysis results for: ► Domestic refrigerated appliances ► Dishwashers ► Distribution Transformers	February April May	Online	Policy makers, trade associations, consultants, industry representatives and academia

Mapping and Benchmarking Annex

EXPERTS MEETINGS PLANNED FOR 2014

NAME	DATE IN 2014	LOCATION
19th Annex management meeting	February	Teleconference
20th Annex management meeting	May	Utrecht, Netherlands

ANNEX PARTICIPANTS

Australia, Austria, Canada, Denmark, France, Japan, Republic of Korea, Netherlands, Sweden, Switzerland, United Kingdom, United States of America

LEAD COUNTRY	UNITED KINGDOM
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Electric Motor Systems Annex (EMSA)

The **Electric Motor Systems Annex (EMSA)** focuses on improving the efficiency of motors and the core motor system. The latter includes pumps, fans, compressors and any auxiliary components to which they may be attached, including variable speed drives, gears, transmission belts and brakes. Through working with government policy makers, motor manufacturers and original equipment manufacturers (OEMs), and motor system users, EMSA's goal is to increase the worldwide energy efficiency of motor systems by 20% to 30% within 20 years. As electric motor systems are responsible for over 40% of global electricity use, this represents a significant potential saving.

Launched in October 2008, EMSA has played a unique role in assisting the development and implementation of policies for motors and motor systems:

- ▶ The co-operation and exchange between EMSA countries reduces the costs of designing motor system policies and increases the chances of successful implementation. Through its outreach and publications, EMSA makes governments around the world aware of policy opportunities and the latest motor system policy developments in different regions (such as Australia, China, Europe, Japan, USA).
- ▶ EMSA's involvement in the international standards development process helps to ensure that technical standards are sufficiently robust to support replication and enforcement. This is complemented by work to build testing capacity and performance amongst EMSA's network of public and private laboratories around the world.
- ▶ EMSA's work encourages industry to direct more attention to the issue of motor systems efficiency. Efficient motor systems not only save energy but also reduce the risks and costs of production through optimising processes, reducing waste, lowering emissions and improving equipment performance. High profile businesses create jobs and improve the competitiveness of national economies.
- ▶ EMSA makes the larger professional community aware of necessary changes and the implications of energy efficiency in the industrial sector.

MAJOR ACHIEVEMENTS DURING 2013

- ▶ EMSA was clearly recognised as an important international group in the field of motor systems efficiency at the global EEMODS'13 forum.
- ▶ EMSA provided extensive input to the specification for the SEAD Global Efficiency Medal Competition, which also required tests to be conducted according to the EMSA Guide to IEC 60034-2-1:2007.
- ▶ EMSA representatives influenced the IEC standards for new motor efficiency classes in IEC 60034-30-1 and testing standards for motors fed by converters in IEC 60034-2-3.
- ▶ EMSA is advising the European Commission on the updating of motor regulations.
- ▶ EMSA is working with the US Department of Energy on strategies to harmonise US IEEE, NEMA and global IEC standards for motor testing and efficiency classes.

Electric Motor Systems Annex (EMSA)

PUBLICATIONS IN 2013

NAME	DATE IN 2013	ACCESS
Motor Systems Tool version 1.53	January	Public
EMSA Newsletter* 1/2013	April	Subscribers & Public
EMSA Newsflash	September	Subscribers & Public
Proposed new measurement method for motor-drive systems and new technology motors	July	Public
EMSA papers for EEMODS'13	October	Public
Newsletter for Testing Centres Network members	October	Public

* The EMSA Newsletter is published in English, Chinese, Japanese, Russian and German and goes to 3900 readers worldwide.



Electric Motor Systems Annex (EMSA)

OUTREACH IN 2013

EVENT	DATE IN 2013	LOCATION	PARTICIPANTS
Dutch Workshop with motor suppliers and service companies	October	Utrecht, Netherlands	Motor suppliers and service companies
EMSA presentations at EEMODS'13	October	Rio de Janeiro, Brazil	Global motor experts
EMSA Extended Product Approach workshop at EEMODS'13	October	Rio de Janeiro, Brazil	Motor experts

EEMODS: International Conference on Energy Efficiency in Motor Driven Systems

MANAGEMENT/EXPERTS MEETINGS HELD IN 2013

NAME	DATE IN 2013	LOCATION
9th EMSA meeting	May	Nice, France
10th EMSA meeting	October	Rio de Janeiro, Brazil

OUTREACH PLANNED FOR 2014

EVENT	DATE IN 2014	LOCATION	INTENDED AUDIENCE
Motor Systems Tool training	May	Utrecht	Motor systems users
EMSA presentations at eceee Industrial Summer Study	June	Arnhem	Global motor experts
EMSA Policy Guidelines	October	Zurich	Global motor and policy experts
Motor Summit 2014	October	Zurich	Global motor experts
EMSA Workshop Policy	October	Zurich	Policy makers and experts
EMSA Workshop Technology	October	Zurich	Standards developers, motor testing experts

Electric Motor Systems Annex (EMSA)

EXPERTS MEETINGS PLANNED FOR 2014

NAME	DATE IN 2014	LOCATION
19th Annex management meeting	February	Teleconference
20th Annex management meeting	May	Utrecht, Netherlands

ANNEX PARTICIPANTS

Australia, Austria, Denmark, Japan*, Netherlands, Sweden*, Switzerland, United States of America

* Observers

LEAD COUNTRY	SWITZERLAND
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Standby Power Annex

The overarching aim of the **Standby Power Annex** is to support the development, alignment and implementation of policies that address the issues of energy wasted in low power modes for both stand-alone and networked products, and ensure the effective communication of work undertaken by the Annex. Promoting the key outcomes and recommendations to policy makers and key stakeholders will optimise the likelihood of harmonisation and implementation.

These objectives are achieved through the following key areas of work:

- ▶ **Horizontal Policy Approach** - to provide both the information and an implementation procedure for a central repository of standby performance tiers covering a range of equipment and functions.
- ▶ **Network Standby** - the development, promotion and implementation of a cohesive policy framework to tackle energy wasted by networked products in low power modes.
- ▶ **Data Collection and Dissemination** – develop international measurement methodology for network standby, and share national and regional data in order to evaluate policy success and monitor changes in technologies and the market.
- ▶ **Communication** - assist policy makers and stakeholders to make optimum decisions by keeping them up to date with the latest facts and research on standby power.

MAJOR ACHIEVEMENTS DURING 2013

- ▶ In 2013 the Annex was able to increase engagement with industry on the topic of energy efficiency in networks. In collaboration with the IEA and SEAD, the Annex held two workshops focusing on networks, policy and energy efficiency. Industry, represented by both associations and individual product and component manufacturers, expressed support for this collaborative approach and appreciated the fact that they could engage simultaneously with all three international bodies (IEA, 4E and SEAD). This engagement provided great insight and in depth understanding of technical and process issues which need to be considered when developing solutions to energy waste in networks. The engagement also resulted in industry groups providing input to Annex documents.
- ▶ During 2013 the Annex developed and refined content for two major reports that aim to bring global attention to the energy waste in networks and identify pathways to minimise energy wastage. The Annex report *Beyond Network Standby: A Policy Framework and Action Plan for Low Energy Networks* and the joint IEA and 4E Standby Power Annex report *More Data Less Energy* will be published in 2014. These reports are companion pieces designed to offer a complete picture covering the enormity of the issue; the technical complexities and possibilities; policy pathways and actions required to address the problem.
- ▶ Annex delegates thoroughly evaluated the impact of the Annex over the last 5 years and contemplated the potential future of the Annex. The Annex considered that much of the original intent of the Annex had been successfully completed especially in the area of 'simple' standby. Additionally, as a result of the research undertaken by the Annex it was clear a need exists for broader consideration of how energy use and efficiency could be managed in the new and developing areas of electronic devices and networks. With this in mind, it was decided not to renew the Standby Power Annex in 2014 but members developed the terms of reference for a new Annex that could incorporate standby power issues into a broader platform of work. The new Electronic Devices and Networks Annex (EDNA) will begin in 2014.

Standby Power Annex

PUBLICATIONS IN 2013

NAME	DATE IN 2013	ACCESS
Mapping Secondary Product Functions to Products and Operational Modes	March	Public
Standby Power Annex Status report	March	Public
Policy Brief Network Standby: Finding Solutions to Energy Waste	April	Public
Policy Brief Tackling Standby Power Wastage with a Horizontal Policy Approach	April	Public
Policy Brief "Basket of Products" - A global approach to measuring standby power	April	Public
Policy Brief Measuring Success: Evaluation Methodology for Standby Power Policies	April	Public
Power Requirements for Functions	September	Public
Load Down Newsletter Edition 13	September	Public
Standby Annex Status report	October	Public



Standby Power Annex

OUTREACH IN 2013

EVENT	DATE IN 2013	LOCATION	PARTICIPANTS
4E/IEA/NRCAN Workshop: Towards a Policy Framework	March	Toronto, Canada	Government, experts and industry
4E/IEA Workshop: Beyond 1-Watt – Towards energy efficiency in the digital age	September	Paris, France	Government, experts and industry

MANAGEMENT/EXPERTS MEETINGS HELD IN 2013

NAME	DATE IN 2013	LOCATION
7th Standby Annex Management Meeting	May	Nice, France
Interim Management Meeting	October	Teleconference

Standby Power Annex

OUTREACH PLANNED FOR 2014

The Annex work program will be completed in early 2014.

EXPERTS MEETINGS PLANNED FOR 2014

NAME	DATE IN 2014	LOCATION
8th Annex Meeting (Final)	May	Utrecht, Netherlands

ANNEX PARTICIPANTS

Australia, Austria, Canada, Denmark, Republic of Korea, Netherlands, Sweden, Switzerland, United Kingdom, United States of America

LEAD COUNTRY	AUSTRALIA
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Solid State Lighting Annex

Solid state lighting (SSL) has the potential to provide artificial lighting more efficiently than more prevalent current technologies, at competitive lifetime costs. However the wide variation in performance of SSL sources currently in the market severely threatens consumer confidence in SSL lighting, thereby delaying market acceptance and slowing down penetration rates.

Launched in June 2010 with a four year life, the goal of the new SSL Annex is to develop simple tools to help governments and consumers easily identify which SSL lighting products have the necessary efficiencies and quality levels to effectively reduce the energy currently consumed by artificial lighting. The SSL Annex works internationally to support the work that is being carried out on a national level to address the main challenges with SSL technologies.

The three main tasks of the SSL Annex are to:

- ▶ **Develop SSL quality assurance** by working to clarify the SSL market worldwide, to reduce the risks in using SSL and to provide governments and consumers with recommendations that they can trust when investing in SSL products.
- ▶ **Harmonize SSL performance testing** by working with global testing laboratories to increase the quality and confidence of SSL laboratory test results; working to assess a range of existing SSL test procedures; and building a system of testing that is manageable, robust and acceptable to a broad range of stakeholders.
- ▶ **Develop standards and accreditation infrastructure** by working with existing accreditation bodies to develop a structure for world-wide interim reliability of SSL testing laboratories' performance data.

MAJOR ACHIEVEMENTS DURING 2013

- ▶ The SSL Annex completed the world's largest ever interlaboratory comparison of LED lighting products in 2013. The annex conducted the Interlaboratory comparison testing of over 50 laboratories worldwide and by linking the results to laboratories from the NIST and APLAC testing schemes formed a dataset of 110 laboratories.
- ▶ Based on the results of the 2013 Interlaboratory Comparison program, the Annex prepared and issued reports for all participating laboratories so that they are able to correct any deficiencies in their testing of LED lighting products.
- ▶ In 2013 the Annex published quality performance tiers for outdoor street lighting. In addition, the Annex updated the quality performance tiers for non-directional lamps, directional lamps, downlights and fluorescent lamp tubes.
- ▶ The SSL Annex organised two major expert meetings, in Paris and Seoul, where national SSL Experts debated the outputs and application of the Annex.
- ▶ The Annex presented to many key fora for industry and policy makers in order to explain its role in supporting government efforts to realise the potential energy savings from solid state lighting.

Solid State Lighting Annex

PUBLICATIONS IN 2013

NAME	DATE IN 2013	ACCESS
ECEEE Summer Study Paper: On the bright side of life: International efforts to accelerate market adoption of LEDs while avoiding the pitfalls of CFLs	June 2013	Public
Update of SSL Annex web site	July/August 2013	Public
Solid State Lighting Annex: Product Quality and Performance Tiers: Outdoor Lighting (Street Lighting)	October 2013	Public
Individual IC13 Result Reports for each participating lab in group Asia 1	October 2013	Restricted to participating labs
Regional IC13 Interim Report: Asia 1	October 2013	Restricted to participating labs
Proposal for Annex second term (2014-2019) submitted to MC, then to ExCo.	November 2013	Restricted to Annex MC and ExCo
Individual IC13 Result Reports for each participating lab in group Asia 2	December 2013	Restricted to participating labs
Regional IC13 Interim Report: Asia 2	December 2013	Restricted to participating labs
Individual IC13 Result Reports for each participating lab in group Americas	December 2013	Restricted to participating labs
Regional IC13 Interim Report: Americas	December 2013	Restricted to participating labs



Solid State Lighting Annex

OUTREACH IN 2013

EVENT	DATE IN 2013	LOCATION	PARTICIPANTS
LED conference and World Sustainable Days	1 March 2013	Wels, Austria	Practitioners, policy makers, NGOs
SSL Annex and global stakeholder organisation workshop	7-8 March 2013	Tokyo, Japan	Lighting industry, CIE and IEC decision makers
International Laboratory Accreditation Cooperation (ILAC) meeting	15-17 April	Cape Town, South Africa	Accreditation Bodies; Standardisation Bodies
European SSL Metrology Meeting	24-25 April 2013	Teddington, UK	Lighting Metrologists; Laboratories; Accreditation Bodies
Eceee 2013 Summer Study – paper presentation	3-8 June 2013	France	Global energy-efficiency community; policy makers
International Conference on LED Lighting Promoting Policy (KEMCO)	3 September 2013	Seoul, Korea	SSL Market; energy experts; policy makers
Moscow International Forum - LEDs in Lighting Technologies	3 November 2013	Moscow, Russian Federation	SSL industry energy experts; policy makers

MANAGEMENT/EXPERTS MEETINGS HELD IN 2013

NAME	DATE IN 2013	LOCATION
Management Committee Conference Call	17 January 2013	Teleconference
Management Committee Conference Call	2 April 2013	Teleconference
IEA 4E SSL Annex 6th Experts Meeting	10-12 April 2013	Paris, France
Management Committee Conference Call	14 May 2013	Teleconference
Management Committee Conference Call	25 June 2013	Teleconference
Management Committee Conference Call	20 August 2013	Teleconference
IEA 4E SSL Annex 7th Experts Meeting	4-6 September 2013	Seoul, Korea
Management Committee Conference Call	16 October 2013	Teleconference
Management Committee Conference Call	3 December 2013	Teleconference

Solid State Lighting Annex

OUTREACH PLANNED FOR 2014

EVENT	DATE IN 2014	LOCATION	INTENDED AUDIENCE
Light + Building	4 April 2014	Frankfurt, Germany	Lighting sector; energy-efficiency experts
CIE 2014 Lighting Quality and Energy Efficiency, a Special Session on Quality Assurance and Standardisation for LED lighting – Regional and International Efforts	April 23 - 26, 2014	Kuala Lumpur, Malaysia	Lighting standardisation experts and scientists
14th International Symposium on the Science and Technology of Lighting (LS14)	22-27 June 2014	Lake Como, Italy	Lighting researchers; Lighting scientists
Global Efficient Lighting Forum, United Nations Environment Programme, en.lighten initiative	November 2014	Beijing, China	Policy makers; energy-efficiency financers, lighting sector

EXPERTS MEETINGS PLANNED FOR 2014

NAME	DATE IN 2014	LOCATION
Management Committee Conference Call	20 January 2014	Teleconference
Management Committee Conference Call	24 February 2014	Teleconference
Management Committee Conference Call	25 March 2014	Teleconference
IEA 4E SSL Annex 8th Experts Meeting	7-9 April 2014	Delft
Management Committee Conference Call	May 2014	Teleconference

Solid State Lighting Annex

ANNEX PARTICIPANTS

Australia, China (Expert Member only, no Management Committee seat), Denmark, France, Japan, Netherlands, Republic of Korea, Sweden, United Kingdom, United States of America

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TASK LEADERS	Georges Zissis Yoshi Ohno Koichi Nara

4E Outreach and Communication

4E's outreach activities are designed to ensure that the results of our analysis are communicated clearly and to the appropriate audience in order maximise their potential impact. As 4E's research activities continue to provide valuable information and insights, the number and scope of 4E publications, workshops and presentations is also growing year by year.

Guided by the framework of the 4E Communications Strategy, 4E's broad range of communication activities are undertaken by members of the Implementing Agreement, the various Annexes and those employed to undertake analysis by 4E.

WEBSITES

4E operates a group of linked websites: a main site and one for each Annex, and these are the hub of 4E's communication activities both to a wider audience and, through the restricted areas, amongst ExCo delegates. These websites allow access to all 4E publications, give notification of events and provide background information.

Collectively, 4E websites received 26,000 visits during 2013. The location of 4E's site traffic is geographically diverse, with visitors from around 150 separate countries (see Figure 4). Significant use is made of the information contained on the websites by non-member countries, with 60% of website traffic coming from countries that are not current members of 4E.

The design of the 4E main site has served us well but, after 5 years without change, it has been dramatically updated in 2013 with a fresh look to give easier access to 4E's publications, events, news and research findings. At the same time, technical improvements have been incorporated that improve the visibility of the sites on mobile devices.

Spang Media have been maintained as the host and to provide expert advice and assistance where required.



4E Outreach and Communication

Figure 2: Number of visits to 4E websites, 2013

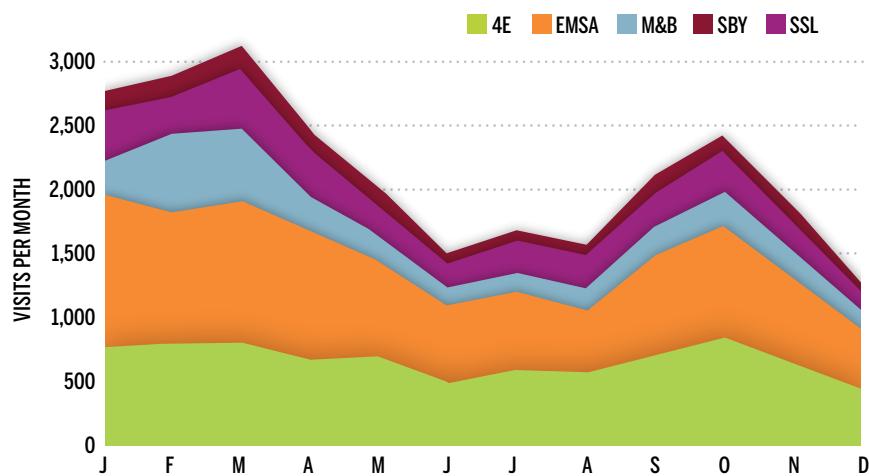
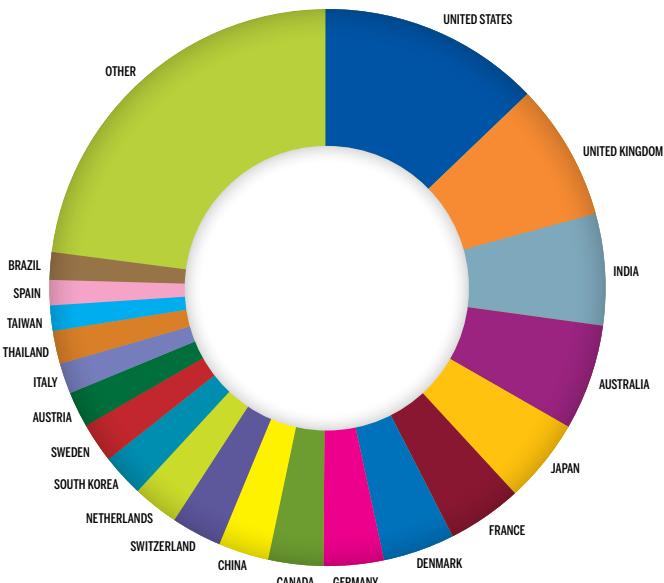


Figure 3: Countries of origin – 4E website visitors in 2013



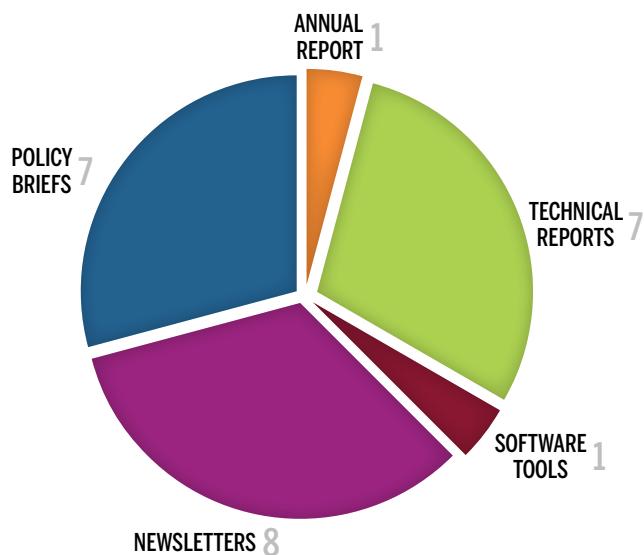
4E Outreach and Communication

PUBLICATIONS

4E has released a total of 21 new publications during 2013, including 5 newsletters and 7 Policy Briefs. To better promote the key recommendations from 4E research activities to a wider audience of policy makers and experts, all policy briefs have also been published in Japanese, Korean, German and French. EMSA newsletters are also published in Russian and Chinese.

Including all translated publications, 4E published a total of 85 documents in 2013, as shown in Table 2.

Figure 4: New 4E publications, 2013



4E Outreach and Communication

Table 2: All 4E Publications, 2013

DATE	SOURCE	TITLE
January	4E	"Bright Spark" Newsletter Issue 4
	EMSA	Motor Systems Tool version 1.53
February	4E	Policy Brief: M&B Annex overview ≈ MB0 (Korean, Japanese, French)
March	4E	Policy Brief: Notebook Computers ≈ MB5 (Japanese)
		Policy Brief: Split and Unitary Air Conditioners ≈ MB3 (Japanese)
April	4E	Policy Brief: Standby power ≈ MB10 (English)
		Policy Brief: Refrigerated beverage vending machines ≈ MB9 (English)
		Policy Brief: Domestic Washing Machines ≈ MB2 (Japanese)
	EMSA	12th EMSA newsletter (English, Chinese, German, Russian)
	Standby Power	Mapping Secondary Product Functions to Products and Operational Modes
May	4E	Policy Brief: Refrigerators and Freezers ≈ MB1 (Korean, Japanese, French)
		Policy Brief: Refrigerated retail display cabinets ≈ MB8 (English)
		Policy Brief: Televisions ≈ MB6 (Korean, Japanese, French, German)
		Policy Brief: Notebook PCs ≈ MB5 (Korean, French)
		Policy Brief: Impact of "Phase-out" on the Lighting Market ≈ MB4 (Korean, Japanese, French)
		Policy Brief: Domestic Washing Machines ≈ MB2 (Korean, French)
		Policy Brief: Split and Unitary Air Conditioners ≈ MB3 (Korean, French)
		Policy Brief: Network Standby: Finding Solutions to Energy Waste ≈ SP3 (English, German)
		Policy Brief: "Basket of Products" - A global approach to measuring standby power ≈ SP6 (English)
		Policy Brief: Tackling Standby Power Wastage with a Horizontal Policy Approach ≈ SP5 (English)
		Policy Brief: Measuring Success: Evaluation Methodology for Standby Power Policies ≈ SP4 (English)
		Policy Brief: Standby Power Global Cooperation in Action ≈ SP1 (Korean, Japanese, French)
		Policy Brief: Standby Power Annex Overview ≈ SP0 (Japanese, Korean, French)
		Policy Brief: Standby Power in Televisions ≈ SP2 (Japanese, Korean, French)
		Policy Brief: Electric Motor Systems Annex Overview ≈ EMSA0 (Korean, French)
		International Benchmarking Report - Domestic refrigerated appliances (updated)
		4E 2012 Annual Report

4E Outreach and Communication

Table 2: All 4E Publications, 2013, continued

DATE	SOURCE	TITLE
June	M&B Annex	Benchmarking Report - Updated Refrigeration & Freezers
July	EMSA	New measurement method for motor-drive systems and new technology motors
September	Standby Power	Load Down newsletter issue 13
		Power Down Requirements for Functions
	EMSA	13th EMSA newsletter (English)
October	4E	Policy Brief: Standby power ≈ MB10 (German)
		Policy Brief: Refrigerated beverage vending machines ≈ MB9 (German)
		Policy Brief: Refrigerated retail display cabinets ≈ MB8 (German)
		Policy Brief: Standby Power Global Cooperation in Action ≈ SP1 (German)
		Policy Brief: Standby Power Annex Overview ≈ SP0 (German)
	EMSA	Performance Tiers for Outdoor Lighting (Street Lighting)
	Standby Power	Standby Power Status Report
	EMSA	Testing Centres Network newsletter
November	4E	Policy Brief: Refrigerators and Freezers ≈ MB1 (German)
		Policy Brief: M&B Annex Overview ≈ MB0 (German)
		Policy Brief: Standby power ≈ MB10 (Korean, Japanese, French)
		Policy Brief: Refrigerated beverage vending machines ≈ MB9 (Korean, Japanese, French)
		Policy Brief: Refrigerated retail display cabinets ≈ MB8 (Korean, Japanese, French)
		Policy Brief: Notebook PCs ≈ MB5 (German)
		Policy Brief: Measuring Success: Evaluation Methodology for Standby Power Policies ≈ SP4 (Korean, Japanese, French, German)
		Policy Brief: Network Standby: Finding Solutions to Energy Waste ≈ SP3 (Korean, French)
		Policy Brief: Electric Motor Systems Annex Overview ≈ MB0 (German)
		Policy Brief: Tackling Standby Power Wastage with a Horizontal Policy Approach ≈ SP5 (Korean, French, German)

4E Outreach and Communication

WORKSHOPS & CONFERENCES

4E organised, or made presentations at, 23 workshops, conferences or specialist meetings of policy makers and scientific experts held in Europe, North America and the Asia-Pacific during 2013 (see Table 3).

Table 3: 4E workshops and presentations, 2013

DATE	SOURCE	TITLE
February	M&B Annex	Webinar: Washing machines and Standby power
		Chinese Appliance Policy Maker Forum, Beijing
March	M&B Annex	Webinar: Vending machines and Retail display cabinets
	SSL Annex	LED conference and World Sustainable Days, Wels
	Standby Power	SSL Annex and global stakeholder organisation workshop, Cape Town
	Standby Power	Networked Standby Policy Framework Workshop, Toronto
April	SSL Annex	International Laboratory Accreditation Cooperation (ILAC) meeting, Cape Town
		6th SSL Experts Meeting, Paris
		European SSL Metrology Meeting, Teddington
May	EMSA	9th Experts Meeting, Nice
	4E	Energy Consumption of Domestic Energy Monitoring Systems, Nice
June	SSL Annex	European Council for an Energy Efficient Economy Summer Study 2013
September	SSL Annex	International Conference on LED Lighting Promoting Policy, Seoul
		7th SSL Experts Meeting, Seoul
	Standby Power	International Networked Standby Conference, Paris
	4E	Presentation to IEA End-use Working Party
October	M&B Annex	Australian whitegoods forum, Melbourne
	EMSA	EEMODS '13, Rio De Janeiro
		Workshop with motor suppliers and service companies, Utrecht
November	SSL Annex	Moscow International Forum: LEDs in Lighting Technologies
	M&B Annex	Expert review of set-top box benchmarking

4E Group Finances

While 4E and Annex membership fees have not risen from previous years, voluntary contributions increased in 2013, leading to over €2.0 million of cash and in-kind support available for 4E activities during 2013. Cash contributions comprised approximately 40% all 4E resources.

As shown in Figure 5 and Figure 6, the large majority of resources were directed towards research, while expenditure on communication and outreach activities accounted for 20%, down from 2012. The share of resources devoted to administration, including financial management, coordination and member liaison, remains similar to 2012, at 10%.

Figure 5: Allocation of 4E resources in 2013

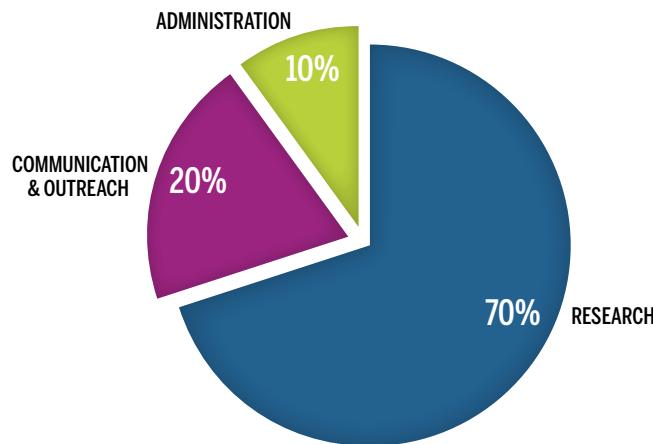
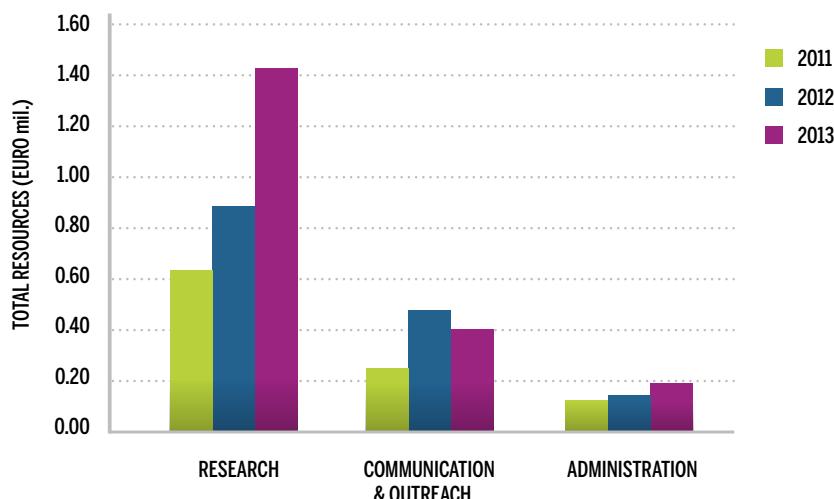


Figure 6: Comparison of 4E resource allocation, 2011-2013



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Membership of 4E Annexes

COUNTRY	M&B	MOTOR SYSTEMS	STANDBY POWER	SOLID STATE LIGHTING
AUSTRALIA	●	●	●	●
AUSTRIA	●	●	●	
CANADA	●		●	
CHINA (EXPERT MEMBER)				●
DENMARK	●	●	●	●
FRANCE	●			●
JAPAN	●			●
REPUBLIC OF KOREA	●		●	●
NETHERLANDS	●	●	●	●
SOUTH AFRICA	●			
SWEDEN	●		●	●
SWITZERLAND	●	●	●	
UNITED KINGDOM	●		●	●
UNITED STATES OF AMERICA	●	●	●	●

Annex Delegates

MAPPING AND BENCHMARKING

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Annex Delegates

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STANDBY POWER

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Annex Delegates

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About the International Energy Agency (IEA)

The IEA was established as an autonomous agency in November 1974. Its mandate is two-fold: to promote energy security amongst its member countries through collective response to physical disruptions in oil supply; and to advise member countries on sound energy policy.

The IEA carries out a comprehensive programme of energy co-operation among 29 advanced economies, each of which is obliged to hold oil stocks equivalent to 90 days of its net imports.

Today, the IEA's four main areas of focus are:

- ▶ **Energy security:** Promoting diversity, efficiency and flexibility within all energy sectors.
- ▶ **Economic development:** Ensuring the stable supply of energy to IEA member countries and promoting free markets to foster economic growth and eliminate energy poverty.
- ▶ **Environmental awareness:** Enhancing international knowledge of options for tackling climate change.
- ▶ **Engagement worldwide:** Working closely with non-member countries, especially major producers and consumers, to find solutions to shared energy and environmental concerns.

With a staff of around 260, mainly energy analysts, modellers and data managers/statisticians, the IEA conducts a broad programme of energy research, data compilation, publications and public dissemination of the latest energy policy analysis and recommendations on good practices.

Energy Technology Initiatives

The IEA energy technology network is an ever-expanding, co-operative group of more than 6 000 experts that support and encourage global technology collaboration. At the head of this network is the Committee on Energy Research and Technology (CERT). Made up of senior experts from IEA member countries, the CERT provides leadership and policy guidance based on expertise provided by four sector-specific working parties and ad-hoc and experts' groups.



At the core of the IEA energy technology network are a number of independent, multilateral energy technology initiatives – the Implementing Agreements (IAs). The IAs encourage technology-related activities that support energy security, economic growth, environmental protection and engagement worldwide. Through a flexible and effective framework, the IA mechanism enables IEA member and non-member countries, businesses, industries, international organisations and non-government organisations to share research and best practice on existing and breakthrough technologies, to fill existing research gaps, to build pilot plants and to carry out deployment or demonstration programmes. To date, more than 1 400 topics have been addressed.

These energy technology initiatives (formally known as Implementing Agreements or 'IAs') function within a framework created by the IEA - the *International Framework for International Energy Technology Collaboration* - in support of energy security, economic growth, environmental protection and engagement worldwide. In these groups, IEA member countries, non-member countries, businesses, industries, international organisations and non-government organisations carry out energy technology-related activities.

This IEA technology collaboration programme is open to IEA member and non-member countries. Typically, participants are:

- ▶ Governmental or energy technology entities representing governments.
- ▶ Research institutes and universities.
- ▶ Energy technology companies.

Each Implementing Agreement has a unique scope and range of activities. There are currently 40 IAs working in the areas of efficient end-use, fossil fuels, fusion and renewables (as of December 2012), examining more than 300 topics (2010-12) and publishing 86 collaborative studies.

International energy technology initiatives provide many advantages to participants, including:

- ▶ Reduced cost and avoidance of duplication of work.
- ▶ Greater project scale.
- ▶ Information sharing and networking.
- ▶ Linking IEA member countries and non-member countries.
- ▶ Linking research, industry and policy.
- ▶ Accelerated development and deployment.
- ▶ Harmonized technical standards.
- ▶ Strengthened national research, development and demonstration (RD&D) capabilities.

Further information is available at <http://www.iea.org/techinitiatives>