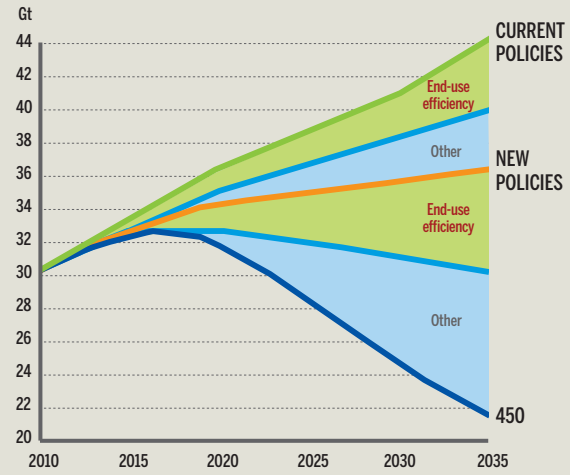
Policy Driven Innovation for Efficient Electrical Energy End-Use Equipment

The New Energy Challenge

To avoid the most serious consequences of climate change, 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.

- 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 half energy demand, but will boost economic output by $18 trillion by 2035[1].
- *"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."* [2]



Source: World Energy Outlook 2011, 2012

- In the 2013 State of the Union Address, President Obama issued the goal of cutting the energy wasted by US homes and businesses by 50% over the next 20 years[3].

Responding to the New Challenge

If these dramatic changes are to be realised, cutting energy consumption from globally traded end-use equipment such as heating, air conditioning, lighting, televisions, computers and motors is a priority.

These technologies consume approximately 18,000 terawatt hours (TWh) of electricity and 375,000 petajoules (PJ) of primary energy each year and contribute to electricity growth rates of 2.5%-2.8% p.a. to 2035, growing faster than all other non-renewable stationary energy sectors.

Policy Driven Innovation (PDI) is a new initiative from 4E that responds to calls for increased energy productivity by accelerating the rates of efficiency gains in the end-use technologies that are deployed in the global marketplace.

PDI locks in large gains in efficiency over many years to come by using coordinated action by interested governments retiring the older less efficient products while also ensuring the continuous development and market entry of new technologies.

Progress by National Governments

To spur the development and adoption of new, more efficient appliances and equipment, many economies support a range of research, market incentives, procurement and regulatory initiatives. These different types of policies are designed to act on separate elements of the product cycle, from encouraging better designs through to stimulating market uptake[4].

Experience has shown 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[5].

Over the past 20 years, appliance and equipment industries have demonstrated that they can meet performance targets set by national governments at a lower cost than forecasted[6]. Equivalent products now are more energy efficient than ever before, and they are also cheaper.

---

1 IEA World Energy Outlook 2012 p.297.
2 Ibid., p.25.
3 http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf
4 For example, fuel economy standards have provided clearly defined performance targets and well-coordinated deployment programs, including regulations, can help drive/accelerate technology development, market entry and adoption.
5 Analysis of refrigerator performance over many years demonstrates the effectiveness of policies designed to encourage the design and adoption of more efficient technologies. See 4E international benchmarking report (http://mappingandbenchmarking.iea-4e.org/shared_files/162/download) and http://energy.gov/articles/proof-pudding-how-refrigerator-standards-have-saved-consumers-billions
6 In the US, average prices for appliances covered by energy efficiency standards have fallen by $12 – far less than the predicted average increase of $148 (see http://aceee.org/research-report/e13d). A similar impact has been noted in many other major economies and is partly attributed to the 'learning by doing' effect (see http://www.iea.org/publications/freepublications/publication/Appliances_Ellis-1.pdf)

Efficient Electrical End-Use Equipment
International Energy Agency

As a result, governments are expanding policy coverage to more equipment types and targeting those transformative technologies that could have major impacts on end-use energy efficiency.

Industry and governments also recognize that the poor performance of some examples of emerging technologies can seriously delay market acceptance. Therefore policy measures can also provide quality assurance frameworks to protect the interests of consumers and speed up deployment[7] .

Current Limits to Progress

The range of efficiencies exhibited by products providing equivalent services that are currently on the market suggests the need for a more integrated and focused approach to the use of policies that ensure the effective coordination between technology development and market deployment.

Much of the energy consumed by end-use technologies flows through mass-manufactured products traded globally and therefore the lack of co-ordination between governments is preventing the use of economies of scale to maximize efficiency improvements and prevent the dumping of less efficient stock upon the developing world.

Industries have continually demonstrated innovation across a broad range of technologies, which provides governments with confidence that they can meet the new challenges and lift efficiency rates[8]. However, the absence of formal structures to coordinate internationally consistent actions by individual governments toward common benchmarks means that many countries are not able to systematically access the most efficient products.

The Need for Internationally Co-ordinated Policy Driven Innovation

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.

Under PDI, governments can implement energy efficiency policies that recognize their own circumstances but provide a consistent signal to the global market.

There are three key elements to this approach:

- 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.

PDI provides the framework for further complimentary policy measures, such as industry development strategies or market incentive schemes.

For further information contact:

Mike Walker, Chair 4E: mike.walker@defra.gsi.gov.uk
Shane Holt, Project lead: shane.holt@ret.gov.au
Mark Ellis, Operating Agent: mark@energyellis.com

7 For example, the work of the 4E Solid State Lighting Annex is designed to prevent poor examples of emerging lighting technologies, which offer significant efficiency improvement, from entering markets.
8 For example, in 2005 G8 ministers adopted the IEA standby power target of 1 Watt or less in electronic devices. 4E analysis shows that by 2011 industry has met this challenge for most types of equipment.