



european  
council for an  
energy efficient  
economy

# Workshop summary: Is efficient sufficient?

## Exploring progressive efficiency specifications for appliances and buildings

Report of an event organised 18 May 2010 by the European Council for an Energy Efficient Economy (eceee) supported by the Swedish Energy Agency and the European Climate Foundation.

**eceee**

31 August 2010



## Workshop 18 May 2010: Summary

Version as of 31 August 2010

# Is efficient sufficient? Exploring progressive efficiency specifications for appliances and buildings

Report of an event organised by the European Council for an Energy Efficient Economy (ecee) supported by the Swedish Energy Agency and the European Climate Foundation.

This event, held on 18 May 2010 at the Bibliotheque Solvay, Brussels, was attended by around 65 professionals from stakeholder organisations with an interest in energy efficiency and climate change. Representatives attended from at least 10 different countries and included stakeholders from government and related bodies, national energy agencies, industry, energy regulators, environmental NGOs, ‘think tanks’, consultancies, academia and others.

The event was conducted under ‘Chatham House rules’ so the names of contributors other than the published speakers are not included here.

The workshop built on a report commissioned by ecee entitled “Is efficient sufficient?”. This report and all workshop presentations are available at <http://www.ecee.org/sufficiency>.



### Context

Energy efficiency is identified by governments throughout the world as one of the key policy areas for tackling climate change. Yet energy efficiency policies have, so far, been successful only in reducing the average amount of energy consumed by energy-using buildings, machines and appliances to perform a given service. Total consumption has continued to rise, driven by the growth in population, the number and variety of machines and appliances in use and the falling cost of operating those appliances (the ‘rebound effect’). Even the most successful of energy efficiency policies (for example those applied to fridges and freezers) have been effective only insofar as they have restrained the growth in total energy demand.

According to the IEA, energy efficiency will have to contribute over 50% of the CO<sub>2</sub> emission savings required to meet 2030 international climate targets. It is clear that energy efficiency policies as they are currently practiced will not deliver savings of this magnitude, indeed they may not deliver any overall savings at all.

In acknowledgment of these facts, the European Council for an Energy Efficient Economy (ecee) organised this seminar in order to bring together experts in this area

and to discuss the way ahead. Key to the debate were notions of ‘progressive energy efficiency’: the introduction of policies designed to cut total – not just average - energy consumption; and ‘energy sufficiency’: the maximum reasonable energy usage by a type or category of product.

The main aim of eceee was for the workshop to explore areas of consensus and contention in terms of these ideas.

### Introduction and backdrop

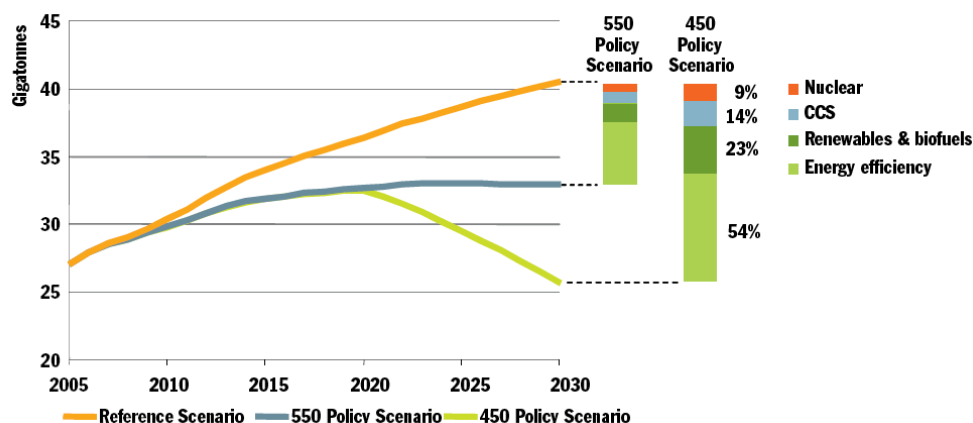
Climate change is probably the most urgent issue facing human-kind today. Governments throughout the world have agreed to an objective of restraining the average temperature rise to two degrees Celsius which, according to the scientific consensus, means limiting the amount of carbon dioxide (CO<sub>2</sub>) present in the atmosphere to 350 parts per million (ppm) to be on the safe side.

Hans Nilsson (FourFact Sweden and Chair of IEA’s DSM programme) provided attendees with an overview of the latest climate science and the need for new policies to tackle its causes. He said that greenhouse gas emissions are already well in excess of the 350ppm ‘safe’ limit. The industrialised countries are grossly exceeding their ‘fair share’ of emissions per capita. Emissions of CO<sub>2</sub> in Europe are now about ten times the sustainable or ‘fair share’ level and we are currently well above the desired trajectory as stated in the political intentions for Europe. Mr Nilsson said that we have quite a task.

To meet the ambitions that the IEA has set (450 ppm) for 2030 some 30% of greenhouse emissions savings have to come from changes in energy supply, 10% from nuclear, 10% from carbon capture and storage and more than 50% from end-use efficiency.

Mr Nilsson said that extreme technical options - ‘geo-engineering’ – have been proposed but should be avoided at almost any cost. The focus must be on radical improvements in energy efficiency allied with advances in energy generation. Rather act ‘in and before the pipe’ than at the end and beyond.

### REDUCTIONS IN ENERGY-RELATED CO<sub>2</sub> EMISSIONS IN THE CLIMATE-POLICY SCENARIOS



Source: [http://www.iea-4e.org/files/otherfiles/0000/0056/4E\\_Bright\\_Spark\\_Issue1\\_OctFinal\\_2210-small.pdf](http://www.iea-4e.org/files/otherfiles/0000/0056/4E_Bright_Spark_Issue1_OctFinal_2210-small.pdf)

### Is efficient sufficient?

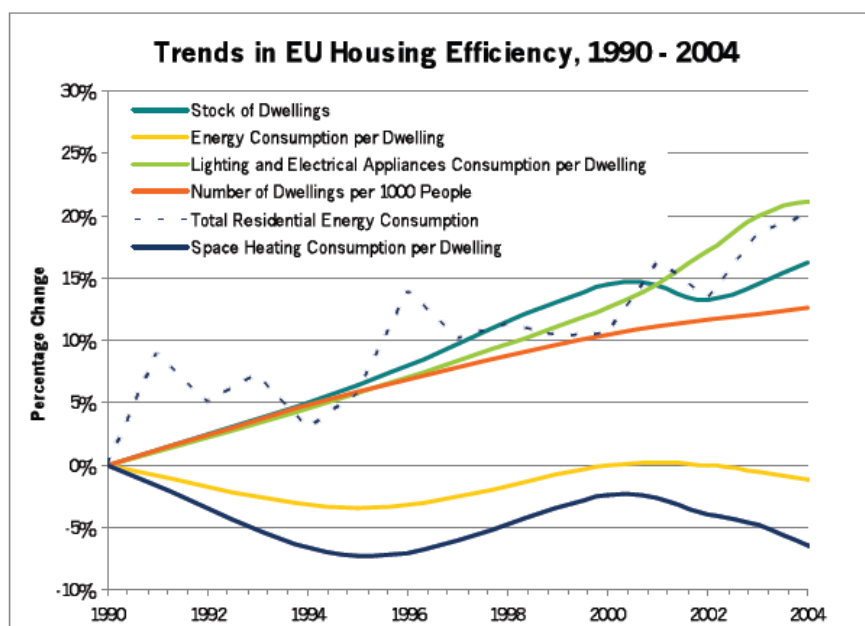
Chris Calwell of Ecos Consulting has prepared the report “is efficient sufficient?” for eceee. (Available for download via: <http://www.eceee.org/sufficiency> )

Traditional energy efficiency, he said, is about doing more with less. It is about cutting the relative amount of energy used per unit of service delivered. Traditional policies, however, have failed to deliver reductions in total energy use. Efficiency is, clearly, not sufficient in the face of the urgent threat of climate change.

Even if the best examples are taken this is the case. Refrigerators are one of the most successful energy efficiency stories available and efficiency has improved fast but sales are rising and the average size of fridges is going up. More people own second fridges than ever before. Advances in energy efficiency have been offset by growing sales and refrigerator size with the result that total energy consumption by refrigerators has been more-or-less flat in Europe.

In the EU housing sector, average energy consumption per dwelling is now a little below 1990 levels but total consumption has risen – even though average demand for space heating has fallen more sharply – driven by a rise in the number of dwellings (swelled by falling average occupancy rates) and fast increases in the amount of electrical and lighting appliances per dwelling. (See chart below).

## EU Houses Getting More Efficient, But Total Home Energy Use Keeps Rising



Chris Calwell proposed that:

- A sufficiency limit for the power consumption of a product should be set beyond which it may not increase regardless of product size or functionality
- Energy efficiency levels should get progressively more efficient in the most luxurious or largest products in order to stay below that limit

This would, he suggests, have the effect of focusing consumer, retailer and manufacturer attention on absolute consumption and on ways to reduce it through efficiency, product sizing, usage and so forth.

He outlined the recent proposals for Energy Star rating for televisions in the US (Energy Star 5.0) which establish the idea of progressivity in energy efficiency, introducing the idea of ‘sufficiency’ at an energy use level of about 120 Watts. Previously (Energy Star 3.0 and 4.0) energy ratings have been applied in a more linear fashion; the larger the screen size the higher the ‘benchmark’ for good energy performance.

### Speaker Proposals

*Hans-Paul Siderius* (NL Agency, Chair of IEA’s 4E agreement) explained that the total yearly energy consumption of appliances is a function of the number of households, the number of appliances in use and the average consumption of those appliances. The focus of current appliance policy is all on power consumption but not on the number of

households or on the number of appliances. This puts an unrealistic level of expectation on energy efficiency to deliver overall energy savings.

He argued that there are a number of ways out of this dilemma, all of them difficult:

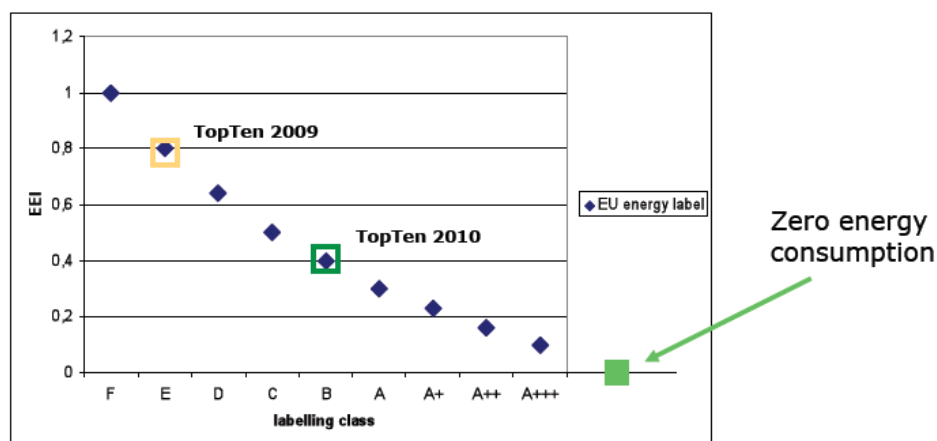
- Setting ‘sufficiency’ at the total/household consumption level (caps or taxes or rations)
- ZEAP: zero energy-using appliance policy (inspired by net zero energy buildings and carbon-neutral transport)

There are a number of ZEAPs already on the market (wind-up radios, solar mobile phones etc). Mr Siderius set out some ‘guiding principles’ for moving towards ZEAPs. These would include cutting energy use by eliminating all unnecessary energy consumption, using extremely efficient components and implementing power management. It would also be achieved by increasing the energy production of the appliance by using ambient heat, solar input and mechanical power and by the introduction of very efficient grid-backed storage systems.

Mr Siderius pointed to the ‘Top Ten’ improvements in televisions and some cold appliances as being on a trajectory towards zero energy use.

## Towards ZEAp: examples I

### EC proposal labelling classes televisions



In her presentation *Lena Neij* (International Institute for Industrial Environmental Economics at Lund University) said that the potential savings resulting from the Energy-using Products (EuP) Directive are large (approx 12% of electricity consumption of the EU in 2007) but that the EuP process is too slow and standards setting could be more ambitious.

She argued that the Directive provides few incentives for innovation amongst the front-runners, that the trend towards increasing appliance size is not addressed and that the energy embedded in materials production is not adequately considered.

Ms Neij recommended that there should be improved coordination between European Directives with an impact on energy efficiency (Eco-Design, Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment - RoHS ; and Waste Electrical and Electronic Equipment Directive - WEEE) and that processes need to be accelerated. There should be a greater focus on life-cycle assessment, innovation and the introduction of new technologies (such as LED lighting).

*Sophie Attali* (SoWatt Consulting and Top Ten Europe) provided two examples of voluntary initiatives that have been introduced with a progressive element. These were the Energy+ scheme (from 2000 to 2004), a technology procurement project, and the Top Ten programme which has operated in the EU since 2006.



The Energy+ programme was a cooperation between ADEME, STEM and NOVEM and included a range of initiatives to encourage improved efficiency in fridges and freezers brought to the European market. This voluntary initiative was successful in bringing a large number of products complying with the progressively improved specifications to market. The initiative was mostly positively received by the affected industry players.

Top Ten works by bringing a selection of the most energy efficient products in each category to the attention of consumers. Its aim is to convince manufacturers that a sufficient demand exists for very efficient products to justify investment in continual improvements. There has been an increase in tension between Top Ten and manufacturers who say that the tables do not reflect the growing consumer demand for larger products and appliances but they have continued to cooperate with the scheme. (See [www.topten.info](http://www.topten.info))

*Rod Janssen* (ecee board member responsible for buildings policy) explained that buildings consume 40% of our energy and are responsible for 36% of our total greenhouse gas emissions. He said that the average house in the United States has more than doubled since the 1950s and average occupancy rates are dropping. These are difficult trends; more, big homes increase the demand for heating and cooling (as well as for products and appliances).

Mr Janssen outlined a number of options for progressive interventions in the buildings sector:

- Progressive building codes
- Progressive labelling of buildings
- Zero energy buildings
- Personal carbon allowances
- A 2000-Watt society

Aspects of each of these will be needed to meet the energy challenge we face, he said.

In the 2,000 Watt Society (a vision originated by the Swiss Federal Institute of Technology in 1998), each person in the developed world would cut their overall rate of energy use to an average of no more than 2,000 watts by the year 2050 (i.e. 17,520 kWh per year of all energy used, not just electricity), without lowering their standard of living.

Two thousand watts is approximately the current world average rate of total energy use. This compares to current averages of around 6,000 watts in W. Europe and 12,000 in the US, 1,500 watts in China, 1,000 watts in India, and 300 watts in Bangladesh. (See: [http://en.wikipedia.org/wiki/2000-watt\\_society](http://en.wikipedia.org/wiki/2000-watt_society))

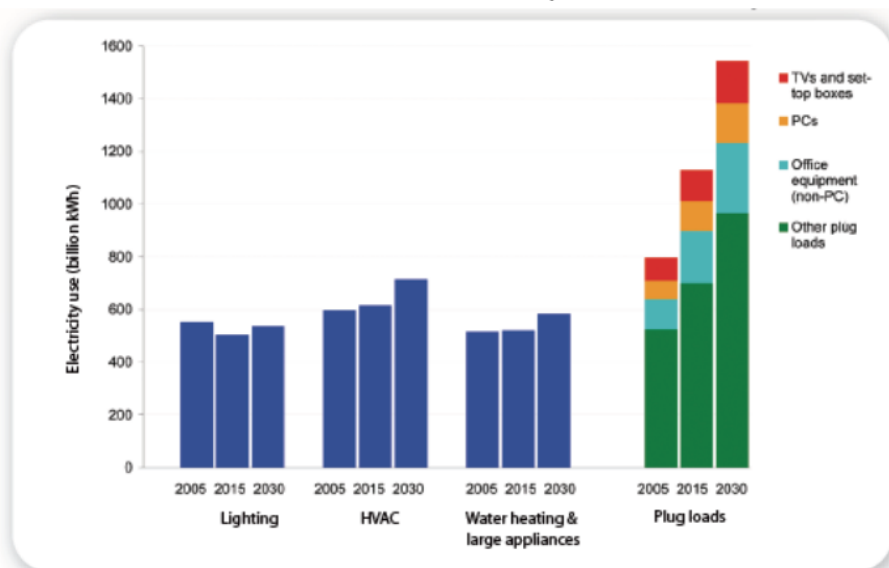
### **Breakouts and debate**

Two separate debates focused on 'Plug loads' (ie demand from plug-in appliances) and energy demand from commercial and residential buildings.

#### ***Plug loads***

Plug load is the fastest growing area for residential and commercial electricity use; the result of the growth in size, range and number of plug-in appliances in use.

## Plug Loads Are the Fastest Growing Piece of Residential and Commercial Electricity Use



In this breakout (facilitated by Frauke Rogalla of Department of Housing, Energy and Environment for the Federation of German Consumer Organisations) participants agreed that the introduction of progressive efficiency measures in this area is not a ‘silver bullet’ but, nevertheless, they are a potentially key part of the policy mix.

Some debate focused on the introduction of financial indicators in order to strengthen consumer labelling and to help consumers to better understand the financial implications of their energy-using decisions. However, a number of problems were acknowledged here: financial measures change frequently and need regular updating; cost considerations may not be significant and, even if they are, demand for the services from plug-in appliances tends to be inelastic to price. There is also no consistent agreement on how financial indicators can be applied across product ranges.

The participants agreed a step-wise approach towards progressive energy efficiency:

*Step one:* Voluntary labelling (eg Energy Star, Eco-label)

*Step two:* Mandatory labelling, which should be based on energy metrics and not size

*Step three:* Mandatory standards under which energy use is the core issue (not size or other product attributes)

It was suggested that there is room for progressivity in currently tabled revisions to Energy Star (US) and the European Eco-label, the latter through the process of the Energy Label Directive.

The group’s discussion reflected the fact that different product groups require different treatments. Some groups (fridges and water heaters for example) are more difficult where there is differentiation between markets.

There may be a need to widen the scope of the debate in terms of discussions about energy efficiency to consider areas, perhaps, more akin to philosophy and well-being. Recent UK research (ref: ‘The Spirit Level’, Wilkinson and Pickett) shows that most of the important indicators of both individual and societal well-being are more closely related to relative than absolute levels of consumption. The implication of that research is that human well-being and environmental security are more likely to be realised at lower – but significantly more equal – levels of consumption. This provides an academically-based philosophical underpinning for the movement to ‘Contraction and Convergence’ ideas, such as the ‘2000 Watt society’.

It was widely acknowledged in the group that there is an urgent need to revisit the fundamentals of product-related energy efficiency policy if we are going to have a chance of meeting the climate targets.

### ***Commercial and residential buildings***

The breakout session on the buildings sector highlighted the need for a mandate from consumers; pressure for change in terms of energy efficiency needs to be pushed from the bottom-up.

The issue, explained facilitator Rod Janssen, is ‘emotional’ for consumers; policies need to go ‘with the grain’ of that emotion.

The building energy performance certificate should play a bigger role. Labels themselves need to be more useful (dynamic?) and the associated non-energy benefits of good energy performance should be highlighted.

While the financial savings associated with cutting energy use in buildings is clearly important, it is far from the only motivating factor and there is also the problem of the ‘rebound effect’; financial savings may be exchanged for greater levels of comfort.

While low or zero-carbon new-build housing is on the horizon, the main climate impacts will continue to come from emissions from the existing housing and commercial building stock and tackling these should be a priority.

There should also be a strong focus on strengthening and enforcing the building codes.

There is also a need to strengthen communication about the issues involved to all stakeholders but, in particular, to politicians. Parliamentarians want to know more about the solutions but they are not even clear about the problems.

Overall, the group concluded, a multi-faceted approach will be required to tackle the problem of buildings’ energy use.

### **Summary and Conclusion**

In concluding the Workshop, Hans Nilsson asked a participant in each of the breakout groups to provide feedback on the discussions in the final plenary session. The main points of discussion are summarised above.

Mr Nilsson said that in trying to ensure that energy efficiency can deliver what is needed to meet climate targets, nothing should be ‘out of bounds’; there should be no ‘holy cows’. The situation is pressing and vital.

Some draft recommendations from the Workshop included:

- The sketching of a ‘road-map’ for moving from voluntary labelling to progressive mandatory standards for appliances
- The need to re-vamp Energy Star and other mechanisms to encourage progressive energy efficiency
- Seeking to detect and, perhaps, control the introduction of new products with significant energy use implications
- The research and maintenance of a list of innovative, progressive energy saving policies that have worked
- Further consideration of a proposal to hold workshops under Chatham House rules with key decision and policy makers to ensure that there is a shared understanding of the issues at stake. Also to explore with them ways of explaining and ‘selling’ the necessary solutions to the public



european  
council for an  
energy efficient  
economy

## **Annex**

Speakers and facilitators at the eceee event held on 18 May 2010 at the Bibliotheque Solvay, Brussels included:

Sophie Attali, SoWatt Consulting and TopTen Europe (facilitator)

Nils Borg, Executive Director, eceee

Chris Calwell, Ecos Consulting, Author of a report commissioned by eceee “Is efficient sufficient?”

Lena Neij, The International Institute for Industrial Environmental Economics at Lund University

Hans Nilsson, FourFact and the IEA DSM programme

Rod Janssen, eceee board member, responsible for buildings policy (facilitator)

Frauke Rogalla, Department of Housing, Energy and Environment for the Federation of German Consumer Organisations. eceee board alternate. (facilitator)

Hans Paul Siderius, NL Agency, Chair of IEA’s 4E agreement