

Energy Efficiency Innovation Review

**Household Sector—
Final Report**

December 2005

Energy Efficiency Innovation Review

Foreword

- This document summarises the findings of the Energy Efficiency Innovation Review (EEIR) for the Household sector. It is intended as a report to Government, and is based on work carried out under the oversight of a steering group comprising representatives from Defra, HM Treasury, Energy Saving Trust and Carbon Trust.

Energy Efficiency Innovation Review

Summary

- 1. Significant cost-effective savings remain in the household sector, but there are barriers to increasing energy efficiency**
- 2. The current Climate Change Programme household package has developed a good foundation, but will need to face new challenges in the future.**
 - The key changes to meet the new challenges are to :
 - Enhance support to facilitate consumer action and demand for energy efficiency measures, and to strengthen the current EEC, which could include white certificate trading.
 - Consider an energy supplier cap and trade scheme as potentially more suitable to the challenges of the next decade.
 - Strengthen product policy.
 - Tighten and enforce building regulations and drive innovation.

Next Steps.

- 3. Key actions have been identified in order to implement the recommendations.**

Energy Efficiency Innovation Review

Summary

1. Significant cost-effective savings remain in the household sector, but there are barriers to increasing energy efficiency

2. The current Climate Change Programme household package has developed a good foundation, but will need to face new challenges in the future.

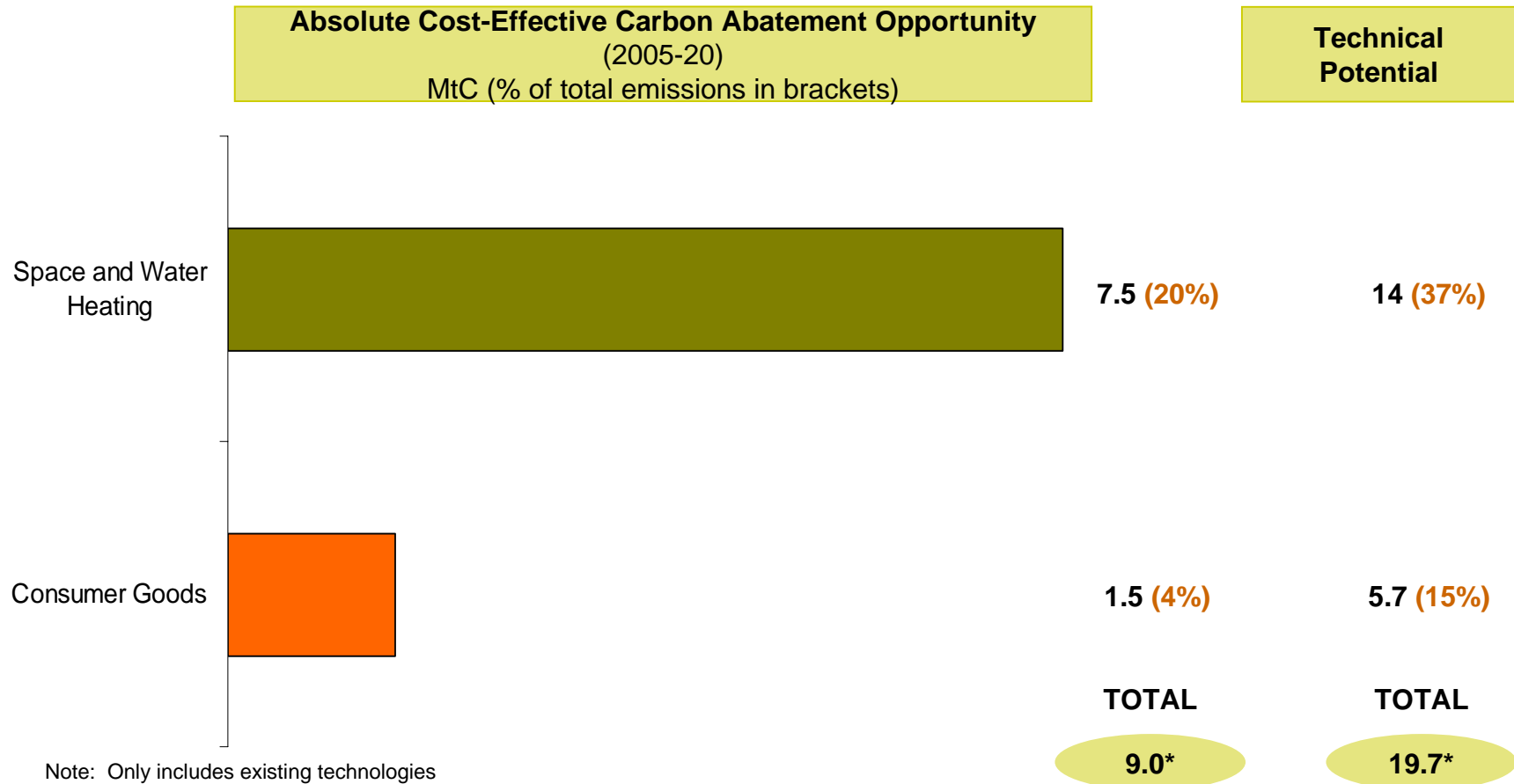
- The key changes to meet the new challenges are to :
 - Enhance support to facilitate consumer action and demand for energy efficiency measures and to strengthen the current EEC, which could include white certificate trading;
 - Consider an energy supplier cap and trade scheme as potentially more suitable to the challenges of the next decade.
 - Strengthen product policy.
 - Tighten and enforce building regulations and drive innovation.

Next Steps.

3. Key actions have been identified in order to implement the recommendations.

Energy Efficiency Innovation Review

Significant abatement opportunity exists in both space and water heating, and consumer goods



Note: Only includes existing technologies
 •Because of interaction between measures (such as the heat replacement effect, and interaction between heating and insulation measures) the real savings available will be rather less than the sum of individual contributions.

Energy Efficiency Innovation Review

About half of cost effective measures require a specific decision to improve energy efficiency

Household Carbon Abatement Potential (2005-20) (7% discount rate)

Type 1
No requirement for expenditure other than for energy efficiency

Loft insulation to 300mm	1.23		1.28		£1,389 ^x
Post-76 cavity insulation - Insulated cavity	0.71		0.71		-
Pre-76 cavity insulation - Insulated cavity	1.91		1.91		-
Hot water cylinder insulation to >75mm	0.17		0.17		-
Improved heating controls*	0.46		0.46		-
90% draught proofing	0.00		0.21		£308
Insulated solid wall	0.00		4.19		£59
Solar water heating - 5m2 Surface Area	0.00		2.18		£1,620
Floor insulation**	0.00		1.38		£229
Sub Total	4.48	(47%)	12.50	(63%)	

Type 2
Regular / routine purchase

90% efficient gas boiler	2.98		2.98		-
Low-e double glazing	0.00		1.68		£1,997
Energy efficient appliances	1.50		1.90		£307 ^x
Energy efficient lighting	0.59		0.59		-
Sub Total	5.07	(53%)	7.16	(37%)	
Total	9.56***		19.66***		

^x Average of non-cost effective measures in group

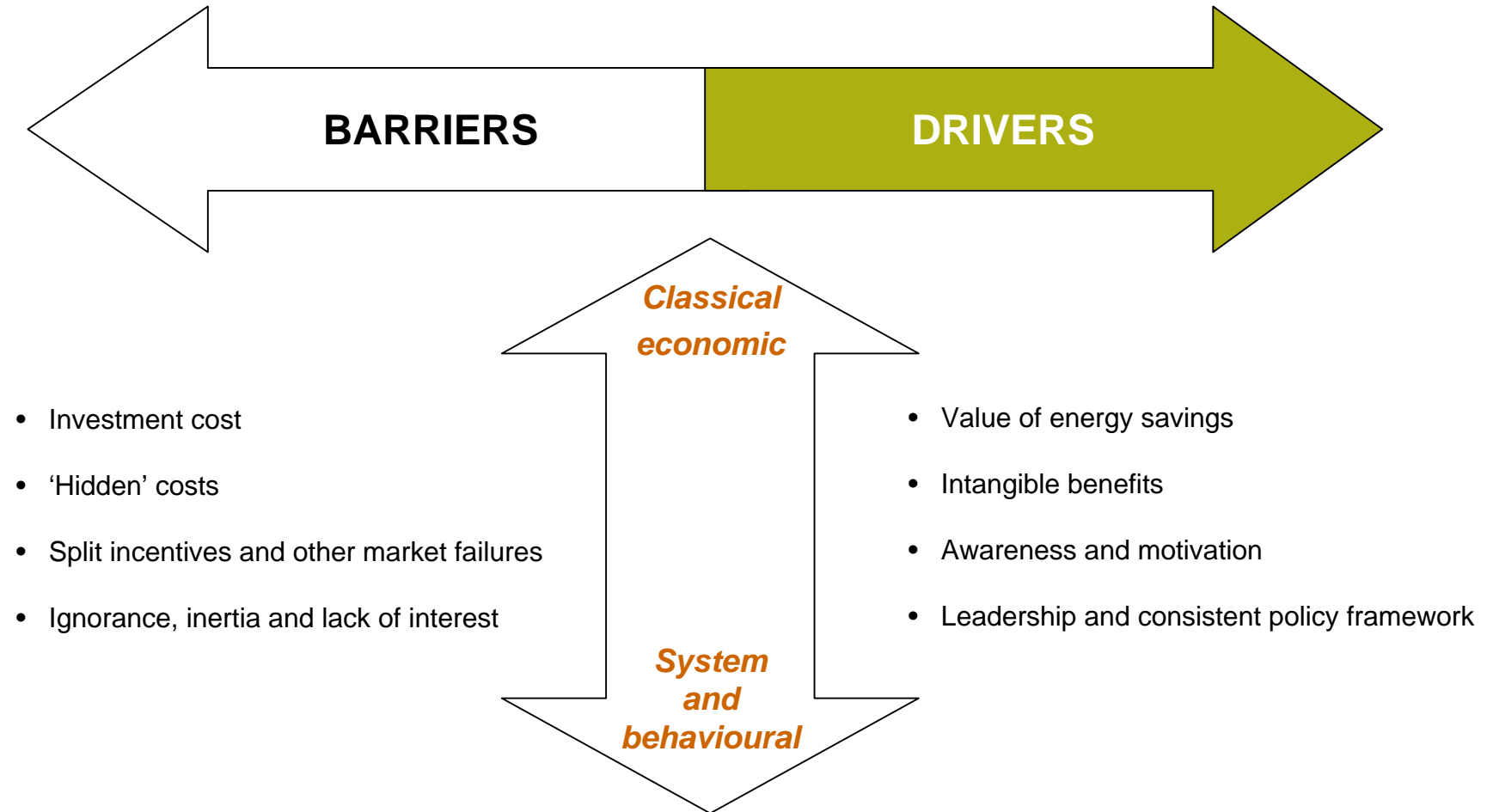
*Programmer, room stat, tank stat, TRVs

**In properties with raised timber floors

***Because of interaction between measures (such as the heat replacement effect, and interaction between heating and insulation measures) the real savings available will be rather less than the sum of individual contributions.

Energy Efficiency Innovation Review

Both barriers and drivers affect the take-up of energy efficiency measures



Energy Efficiency Innovation Review

Drivers and barriers fall into four main categories that define the scope and targeting of policy

Issue	Definition	Examples	Policy Options
Financial cost / benefit	Ratio of investment cost to value of energy savings	<ul style="list-style-type: none"> • More expensive but more efficient equipment 	<ul style="list-style-type: none"> • Economic instruments that reduce equipment cost or finance cost, or increase energy prices • Direct legislative drivers on energy / emissions
Expanded cost / benefit (intangible, transaction and transition costs)	Cost or risk (real or perceived) of moving (or not moving) to more energy-efficient practices, including not captured above	<ul style="list-style-type: none"> • Costs of accessing information • Disruption costs / hassle factor 	<ul style="list-style-type: none"> • Services providing information, technical support • Packaged energy service contracts • Standards to avoid transaction costs • Labelling • Other supply side obligations
Market misalignment (split incentives, system failures regulatory failures)	Market structure and constraints that prevent consistent tradeoff between specific energy efficient investment and the societal energy saving benefits	<ul style="list-style-type: none"> • Landlord / tenant split • Cash constraints • Distrust of supply system • Low / no value attributed to benefits 	<ul style="list-style-type: none"> • Accreditation of supply base • Product standards • Other supply side obligations • Skills and training
Behaviour and motivation (inertia, awareness, materiality)	Internal issues of behaviour linked to awareness, motivation and the need to get people to take action	<ul style="list-style-type: none"> • Inertia, lack of interest • Tendency to ignore small opportunities 	<ul style="list-style-type: none"> • Campaigns, local action support • 'Attention raising' instruments, eg. fiscal changes, levies

Energy Efficiency Innovation Review

Summary

1. Significant cost-effective savings remain in the household sector, but there are barriers to increasing energy efficiency
2. **The current Climate Change Programme household package has developed a good foundation, but will need to face new challenges in the future.**
 - The key changes to meet the new challenges are to :
 - Enhance support to facilitate consumer action and demand for energy efficiency measures and to strengthen the current EEC, which could include white certificate trading;
 - Consider an energy supplier cap and trade scheme as potentially more suitable to the challenges of the next decade.
 - Strengthen product policy.
 - Tighten and enforce building regulations and drive innovation.

Next Steps.

3. Key actions have been identified in order to implement the recommendations.

Energy Efficiency Innovation Review

The current Climate Change Programme household package has developed a good foundation, but will need to face new challenges in the future

Current CCP Package

- EEC has driven the take-up of insulation measures in social housing and supported the increased take-up of energy efficiency lighting and appliances underpinned by existing support programmes e.g. Energy Saving Recommended (ESR)
- Despite compliance issues with some parts of 2002 building regulations, those parts are responsible for only a small share of overall carbon savings. Condensing boiler market share has increased very rapidly.
- Product policy (standards / labelling), together with EEC, has driven lighting and appliance take-up and mitigated some of the key baseline risks in consumer electronics

New challenges

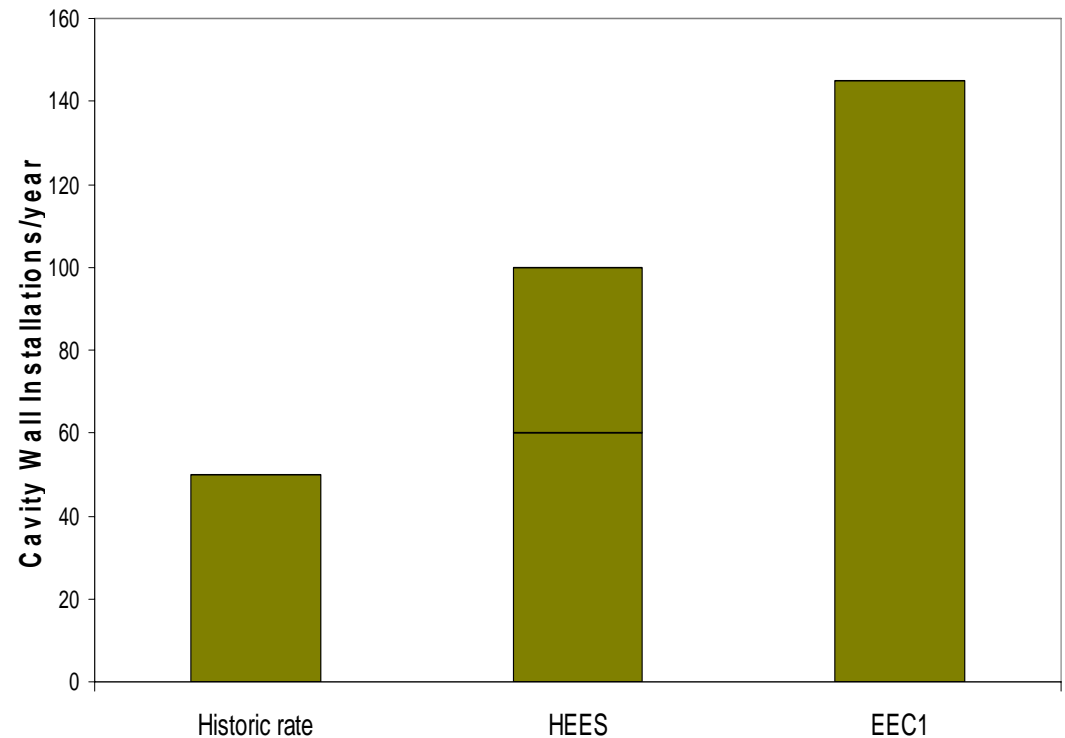
- Achieve greater penetration of insulation measures in owner occupier and private rented sector
- Continue to increase appliance efficiency as EEC 2 has reduced the incentive for high-efficiency appliances compared to insulation, and address the growing consumer electronics area
- Drawing in new physical measures and exploitation of behavioural measures to maintain the rate of energy efficiency improvement as current physical measures are saturated in early to mid next decade

Energy Efficiency Innovation Review

EEC has driven the take-up of insulation measures in social housing, especially cavity wall insulation

- Average historic rate (1985-95) c50,000/y
 - Local Authority/Registered Social Landlord own investment
- Increased rate under New HEES (1998-2001) c60-100,000/y
 - Largely funded by HEES
- Average rate under EEC1 c145,000/y
 - Funded 50:50 by Social Housing Providers and Energy Suppliers

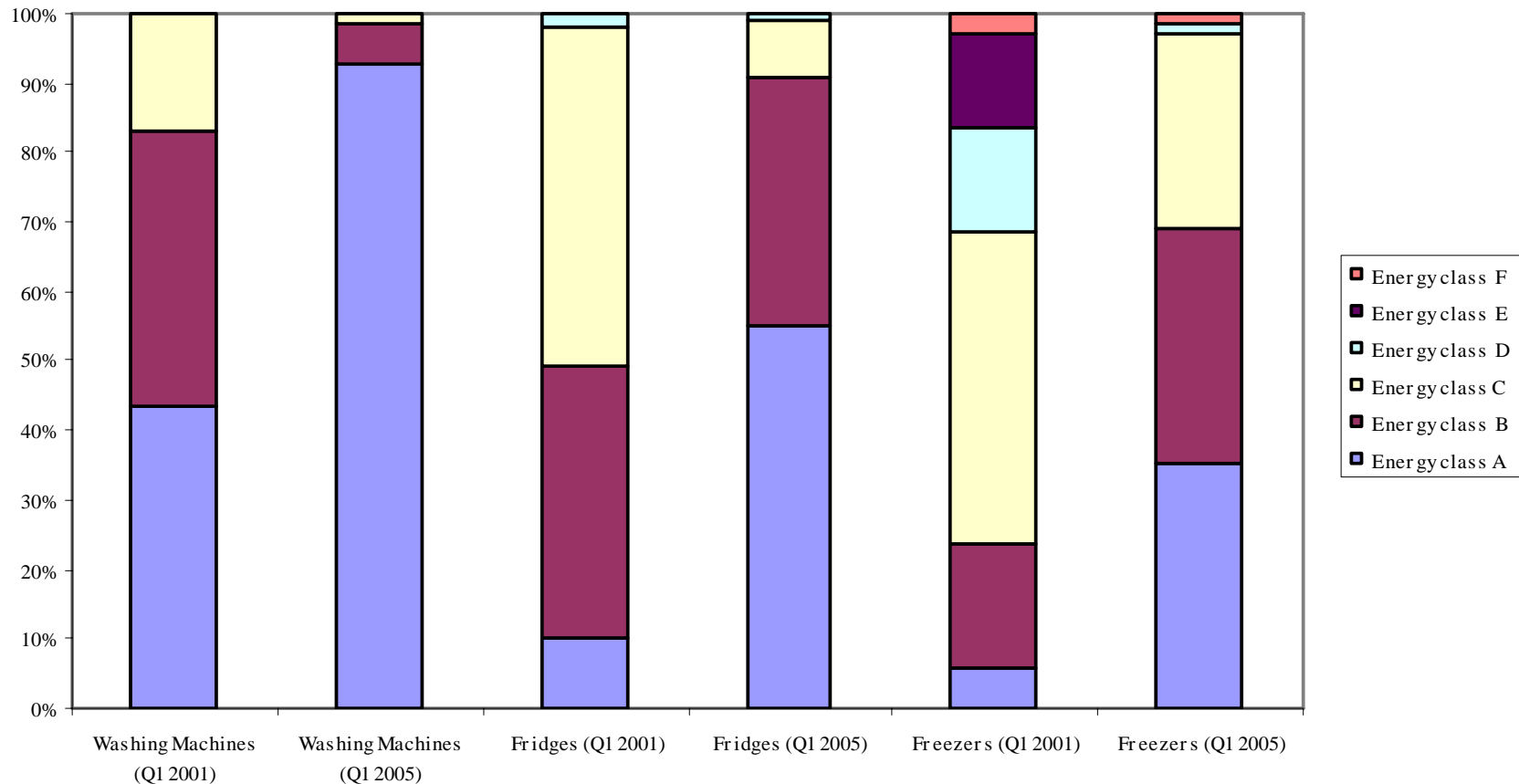
Rate of Cavity Wall Insulation Installation



Energy Efficiency Innovation Review

EEC and product policy, e.g. Energy labelling and Energy Saving Recommended, have supported the increased take-up of energy efficiency lighting and appliances

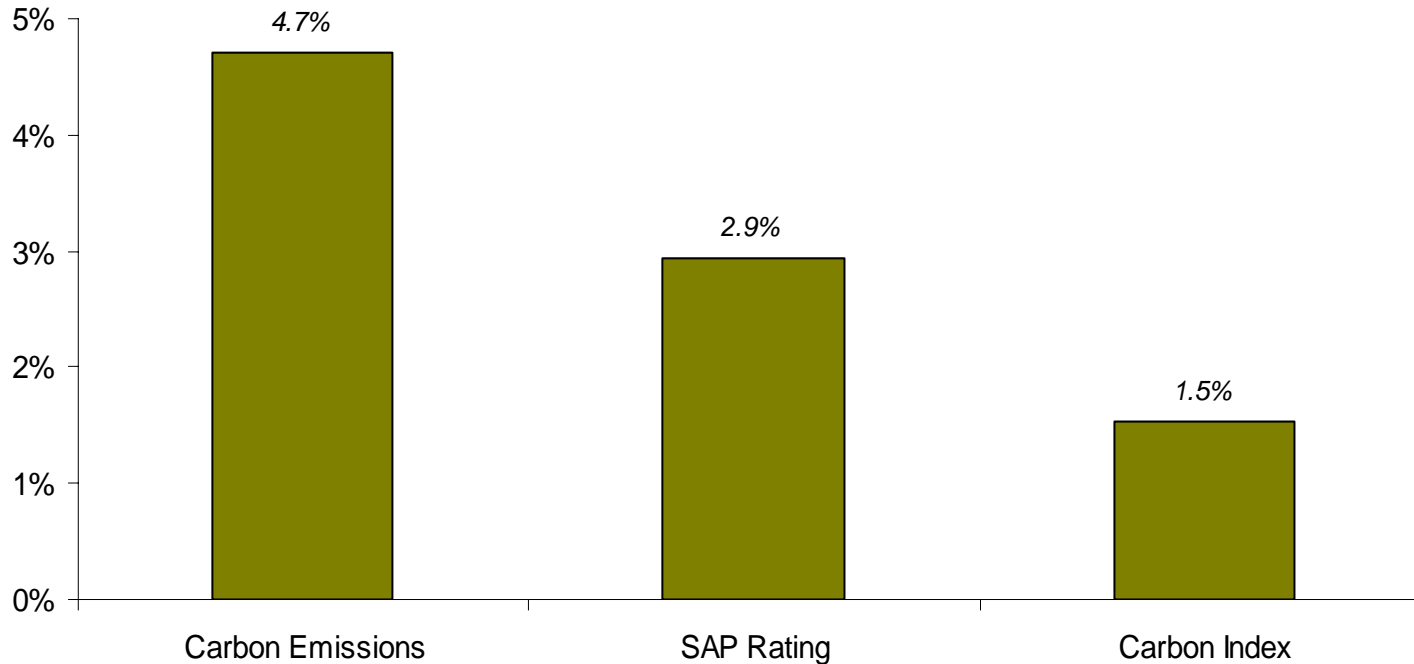
Change in the mix of appliance sold by energy efficiency rating, Q1 2001-Q1 2005



Energy Efficiency Innovation Review

Despite compliance issues with some parts of 2002 building regulations, those parts are responsible for only a small share of overall carbon savings

Percentage Difference Between 'As Designed' and Observed Details



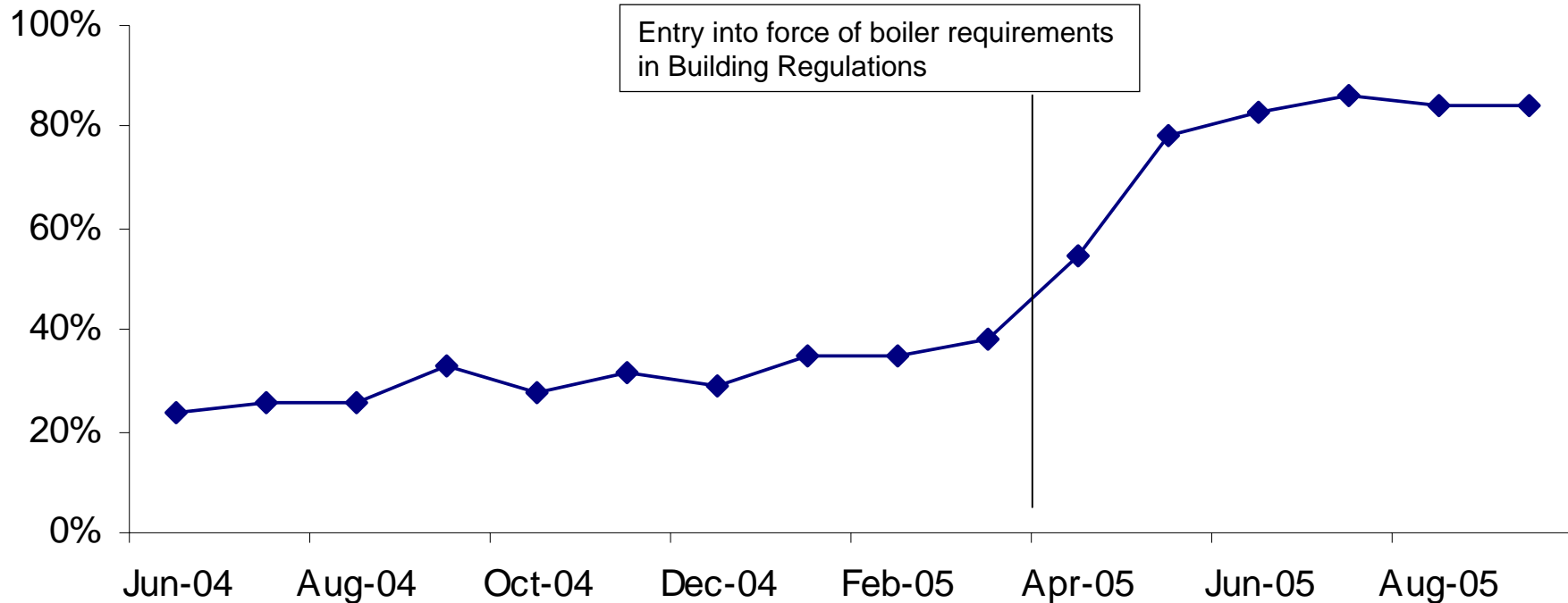
- Study conducted in 2004 on 99 dwellings, including 36 flats, 31 terraced, 21 semi-detached and 11 detached properties
- Out of the 99, one third (32%) failed to achieve the recommended maximum level of 10m³/h/m² or better for air permeability
- There is a very low level of compliance to provide information about energy ratings of new homes and to display SAP ratings

Energy Efficiency Innovation Review

Condensing boiler market share has increased very rapidly due to support from EEC, ESR and the new building regulations

- Condensing boiler market share up from 10% in April 2002
- Effective support programmes allowed mandatory requirements to be introduced resulting in market transformation

Condensing boilers: percentage of total boiler sales

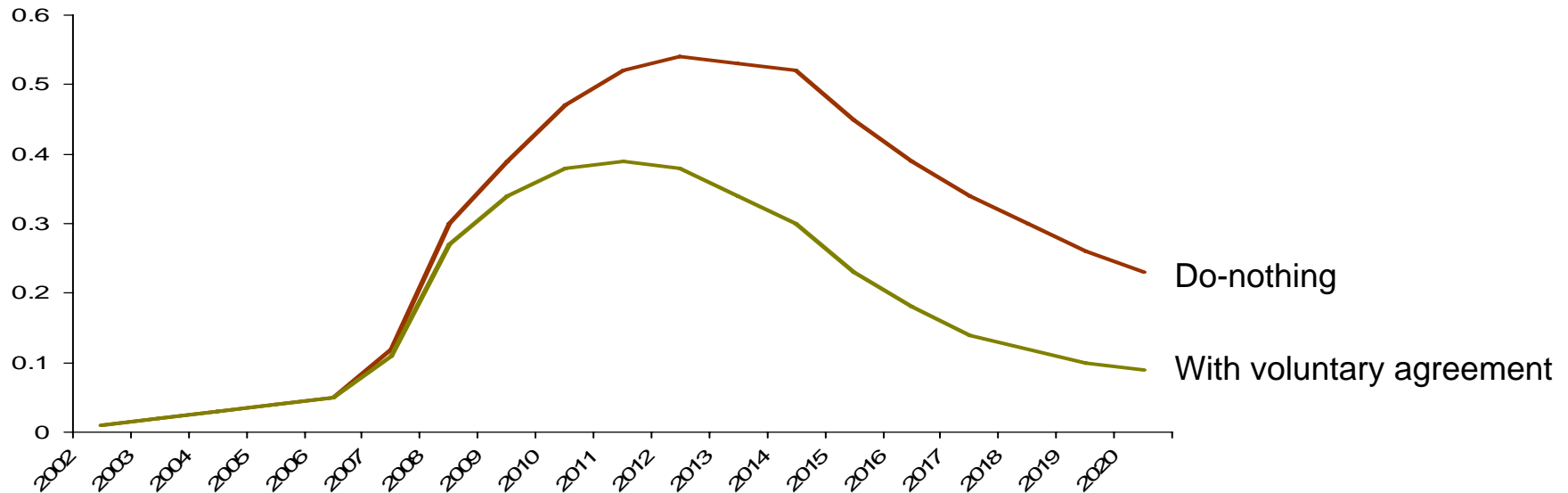


Energy Efficiency Innovation Review

Product policy has mitigated some of the key baseline risks in consumer electronics.....

- For example, the EU voluntary agreement on Digital TV Services on its own is expected to save the UK c0.2MtC by 2010, and substantially more thereafter, compared with the “do-nothing” alternative. Whilst this reduces the projected increase in baseline carbon emissions, it does not contribute directly to the 2010 carbon reduction target.

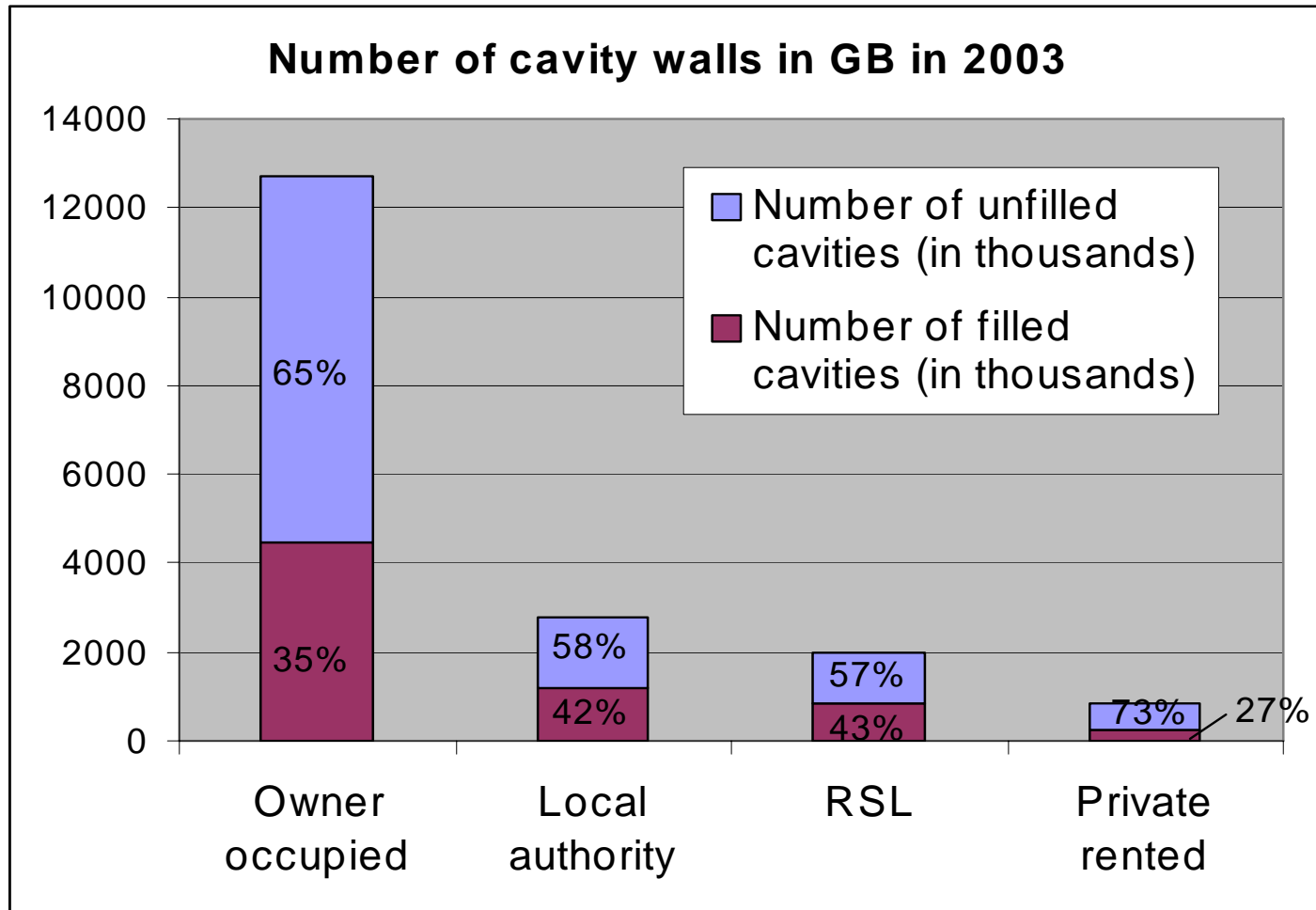
Projected emissions from set-top boxes, 2002 – 2020 (MtC)



.... as well as supporting EEC in the delivery of more energy efficient lighting and appliances

Energy Efficiency Innovation Review

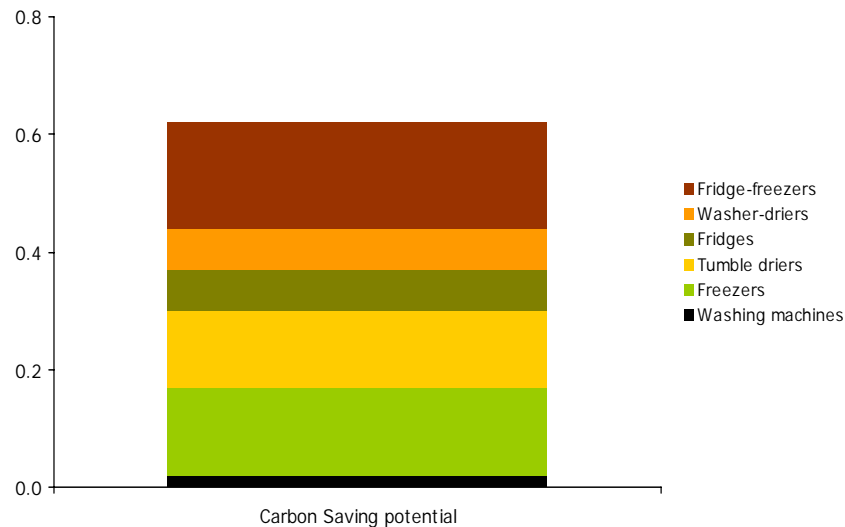
The UK needs to achieve greater penetration of insulation measures, particularly among owner occupiers and the private rented sector



Energy Efficiency Innovation Review

Taking the next step in appliance up-rating will require strengthening of products standards and labelling

- UK has a significant opportunity to take a next step in appliances, for example by encouraging the switch to A+ (chest freezers) and A++ (upright freezers, fridges, and fridge freezers)
- This has a potential to save c0.6Mt/year vs. today's usage patterns

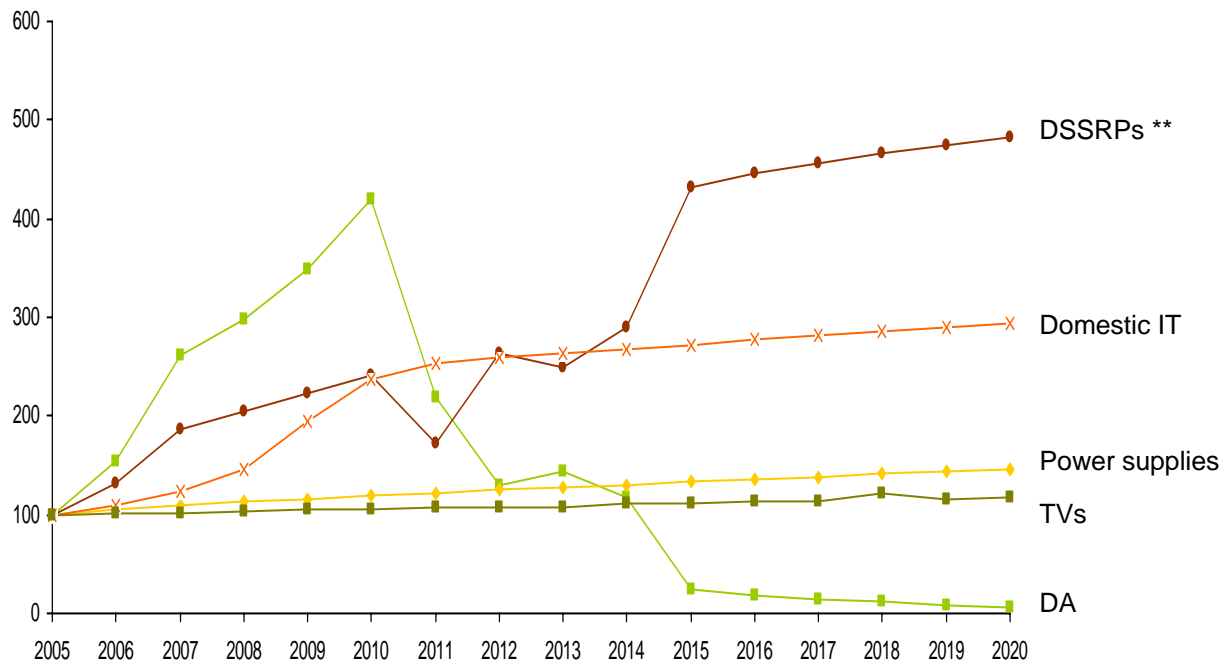


- In EEC 2, appliances are less attractive measures and are therefore likely to be a less important part of the mix
 - The appliance uplift has been removed, (although A+ and A++ receive an innovation incentive)
 - The stock average has improved
 - Heat replacement effect has been introduced

Energy Efficiency Innovation Review

Substantial growth for key consumer electronics presents a risk which needs to be addressed

Unit Sales Index (2005 = 100)



Defra's Market Transformation Programme predicts a steady rise in digital adapter sales to 2012 as the UK switches over to digital transmission. Sales will continue at a lower pace as extra boxes are purchased for secondary TVs and videos but will eventually fall to near zero as the limitations of the technology and the provision of new satellite or cable subscription packages increase. Satellite/cable technologies will then slowly come to dominate.

DSSRPs = Digital Service System Reception Platform

Energy Efficiency Innovation Review

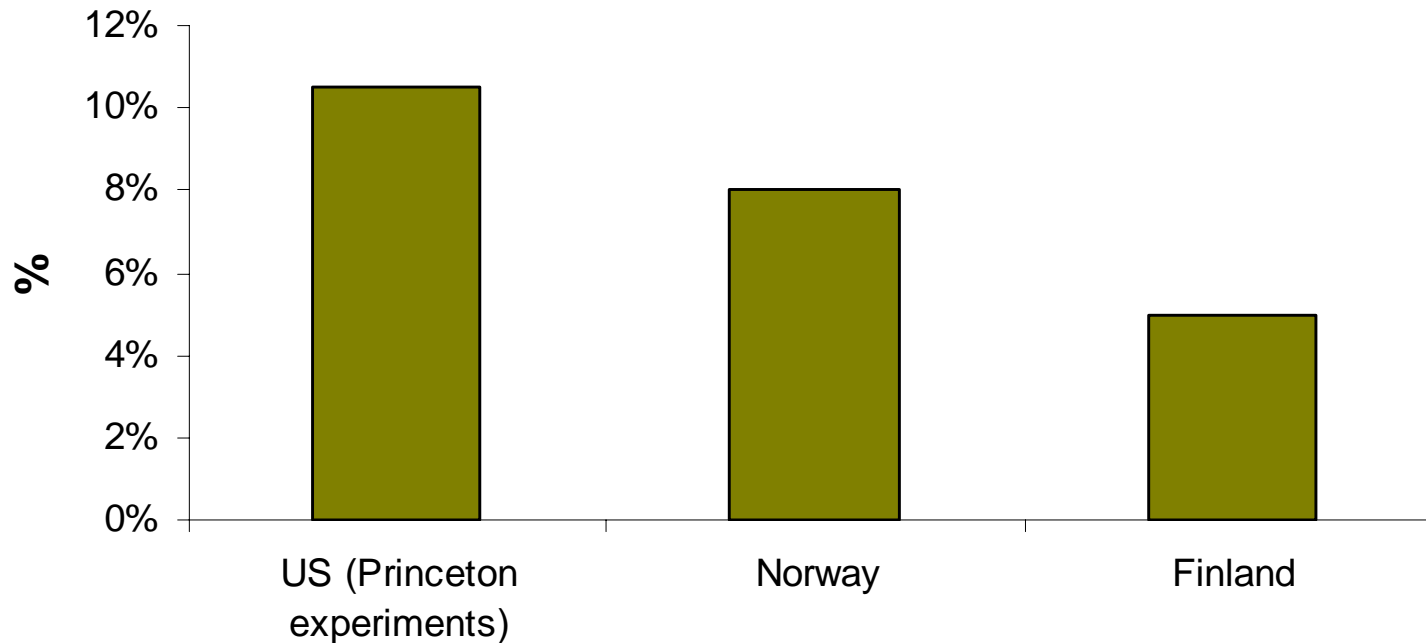
There is a need to draw in new physical measures and exploit behavioural measures

- Solid wall insulation is the major near to cost-effective measure (4MtC carbon saving potential, average cost c.60£/tC, though external more expensive than internal), although a product with customer appeal has not yet been developed
- Low carbon / high insulation products in particular those used within modern methods of construction (e.g. leaf walls, Insulated roof coverings, triple glazing,etc.), heat pumps, micro-chp and micro-renewables, and other technologies e.g. OLEDs/LEDs
- Behavioural measure in homes to reduce waste (e.g. reduce use of windows to control central heating/room temperatures, reduced internal temperature, lower lighting consumption and more efficient appliance usage) with scope to reduce consumption by c.10% if fully utilised
- An example of a method to exploit behavioural measures (as well as physical measures) is to provide consumption feedback to consumers. Studies indicate that this can generate a 5-10% reduction in energy consumption
- The Climate Change Communications Programme has a major role to play, particularly at the local level

Energy Efficiency Innovation Review

Energy savings between 5-10% are achievable through the installation of smart metering devices

Reduction in energy use due to Consumption Feedback



Princeton experiments: Daily feedback on household electricity consumption

Norway and Finland: Shift from annual to bi-monthly meter

Energy use was reduced by **13%** when meters indicating the consumption of each appliance were provided to households

Energy Efficiency Innovation Review

Summary

1. Significant cost-effective savings remain in the household sector, but there are barriers to increasing energy efficiency
2. The current Climate Change Programme household package has developed a good foundation, but will need to face new challenges in the future.
 - The key changes to meet the new challenges are to :
 - **Enhance support to facilitate consumer action and demand for energy efficiency measures and to strengthen the current EEC, which could include white certificate trading;**
 - **Consider an energy supplier cap and trade scheme as potentially more suitable to the challenges of the next decade.**
 - Strengthen product policy.
 - Tighten and enforce building regulations and drive innovation.

Next Steps.

3. Key actions have been identified in order to implement the recommendations.

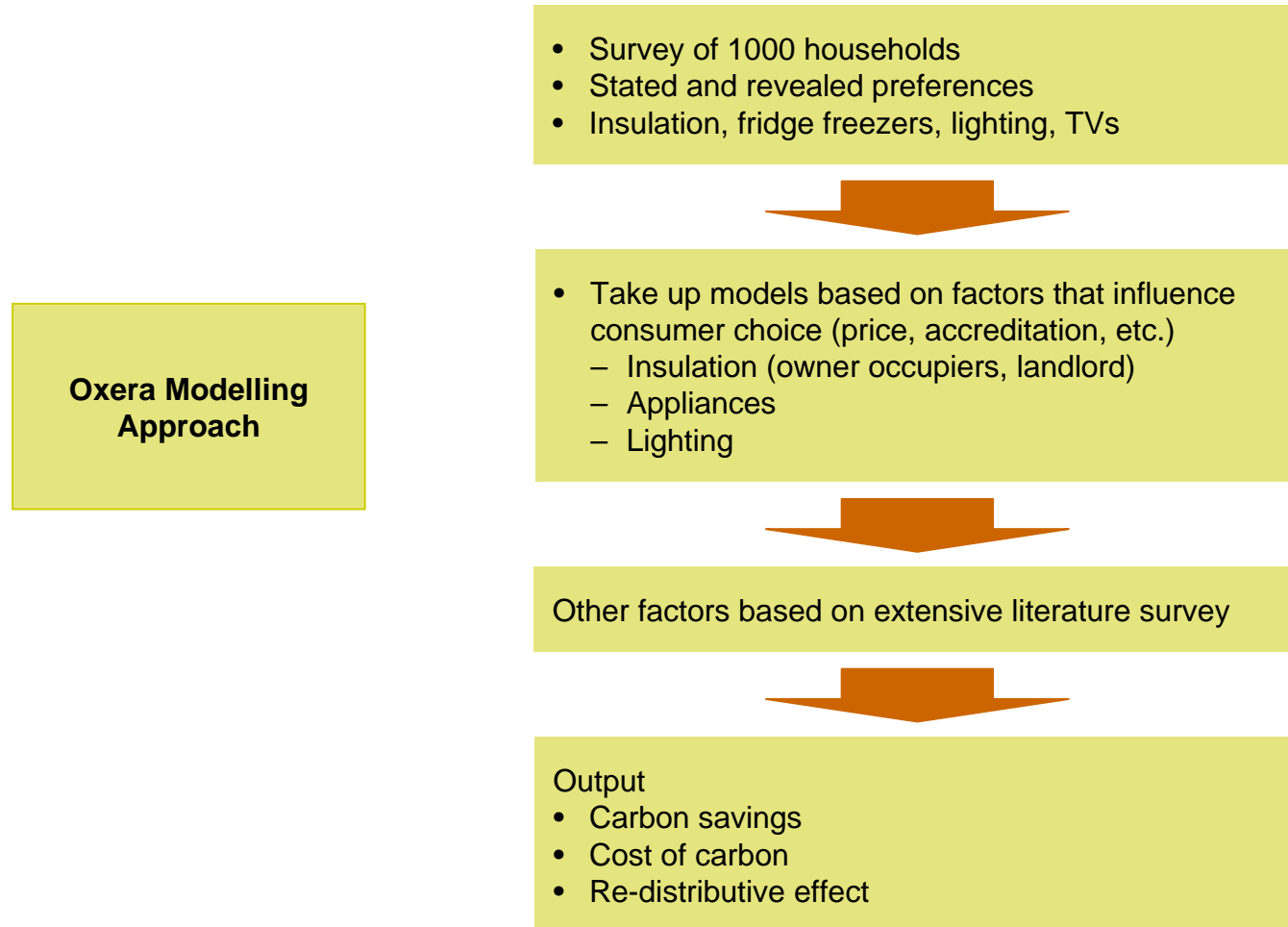
Energy Efficiency Innovation Review

There is scope to increase EEC 2008-11, with a supplier cap and trade potentially more suitable to the challenges of the next decade

- Obligating energy suppliers, together with information and advice support programmes, is the most effective route to drive energy efficiency take-up, particularly for housing fabric measures
 - Access to consumers is a key factor in delivering carbon savings
 - Only suppliers have both regular access to consumer and are likely to be engaged on energy efficiency
- A tripling of EEC1 as the EEC 3 target, appears feasible provided that activity is channelled to address key market failures
 - Market failures exist around cost perception gap and distrust of the installation supply chain
 - It is difficult for individual suppliers to deal with either of these issues alone
 - A combination of innovative supplier schemes (such as Centrica's Council Tax rebate scheme in Braintree) and further support programmes (probably with a strong local focus) are required to address these market failures
 - Investigation of the potential for White Certificate trading to deliver more cost-effective carbon savings
- Consider migrating to a supplier cap and trade scheme at the end of the decade
 - Supports a services approach to deliver carbon/ energy savings (more focus on owner occupiers and behavioural measures)
 - Social and competition issues will need further study and potential barriers to energy services resolved
- Direct regulation of private landlords may be necessary as incentive based scheme has proven relatively ineffective, although the carbon savings are relatively modest

Energy Efficiency Innovation Review

Most of our modelling is based on a consumer preference survey

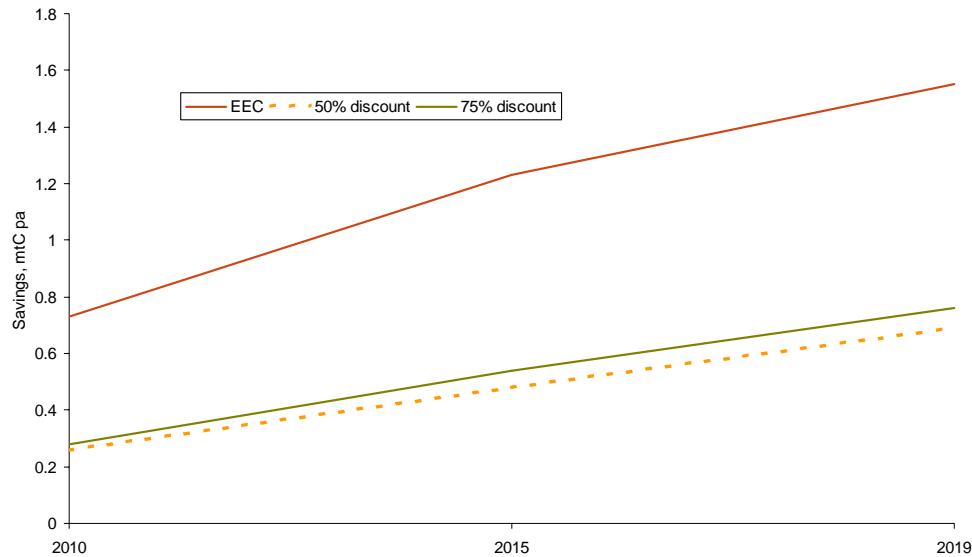


Energy Efficiency Innovation Review

Access to consumers is a key factor in delivering carbon savings Example: Insulation measure in owner occupied dwellings

- Oxera modelling shows that EEC has a much greater carbon saving impact than the equivalent worth given as financial discount
- Therefore it is the awareness or marketing aspect of EEC that drives carbon saving. Access to consumers appears to be crucial.

Projected carbon savings from insulation measures for owner occupiers



- Key variables in the model
 - Disruption days
 - Frequency of offer
 - Cost perception gap
 - Installation cost
 - Recommendation
 - Accreditation of suppliers
- EEC is based on full delivery of targets (at EEC 2 rate)
- EEC delivers its impact mainly through marketing programmes, rather than observed discounts (offer frequency, etc.)
- In Price Discount Cases, the only change is to installation cost – other parameters as needed to model historical take-up rates

Energy Efficiency Innovation Review

Only energy suppliers have both regular access to consumers and are likely to be engaged on energy efficiency

- Supplier clearly have regular marketing access to consumers and are a legitimate entity on whom to place an obligation
- Based on our interviews, it seems unlikely that other players (who are used to influencing consumers) will be attracted into providing energy efficiency services and these can not be legitimately obligated under the current legal framework

Industry Feedback on Providing Energy Services

- “...we do not believe energy prices and climate change are yet high enough on their agenda to make the ESCO proposition attractive to a sufficient number”
- “[ESCO] is unlikely to enhance our business proposition”
Building society
- “Business Case is flimsy”
- “Offer is complex – customer tariffs will go up but their bills will go down”
*Financial services**
- “Model of costs and benefits do not stack up”
*Financial services**

Energy Efficiency Innovation Review

A market failure exists around the cost perception gap - only 16% of consumers have the information that would lead them to install loft insulation

Breakdown of population according to knowledge of the costs and benefits of installing loft insulation

		Benefits				
		Pessimistic	Well-informed	Optimistic	Don't know	Sub-total
		Costs	Pessimistic	4.7	8.9	6.9
Well-informed	7.8		8.7	3.1	5.4	25.0
Optimistic	2.9		3.5	0.7	2.1	9.2
Don't know	3.5		4.1	2.1	30.8	40.5
Sub-total		18.9	25.2	12.8	43.0	100

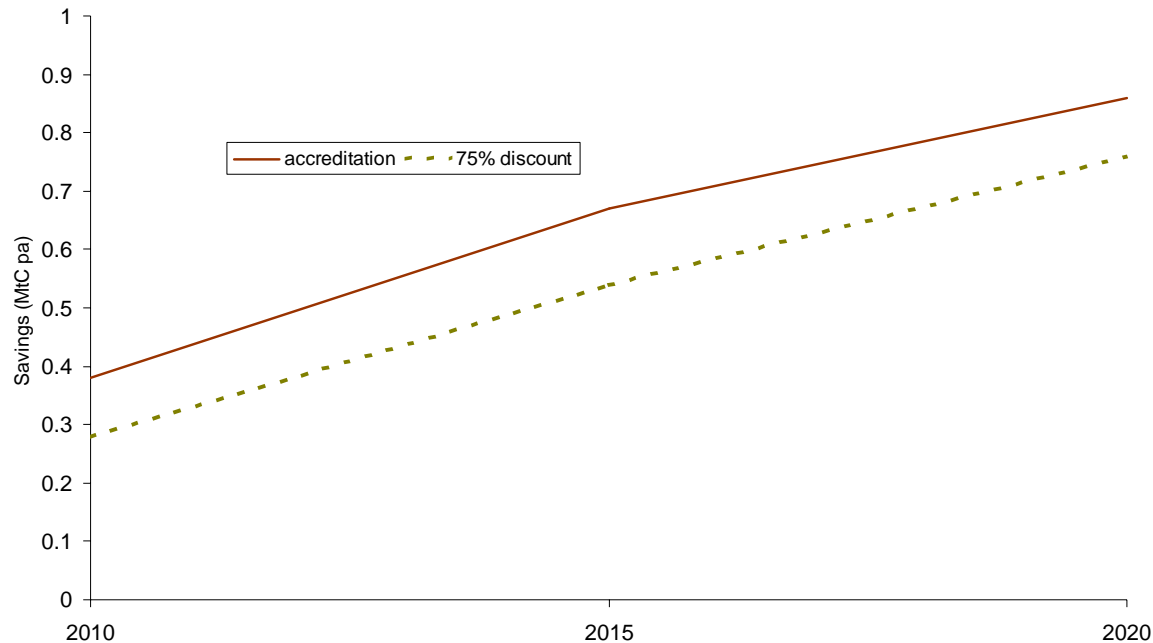
For cavity wall insulation the figure is 12% of consumers

Energy Efficiency Innovation Review

Distrust of the installation supply chain appears to be a material market failure

- Oxera's survey and modelling shows that trust of installers appears to impact on insulation take-up, greater than the impact of a 75% price discount.
- It appears that only 8% of consumers are aware of the current accreditation scheme and that increasing awareness may satisfy consumers concerns about the quality of installers

Carbon savings through accreditation compared with 75% discount



Energy Efficiency Innovation Review

Individual suppliers are poorly placed to deal with either the cost perception gap or the distrust of the installer supply chain

Cost perception gap

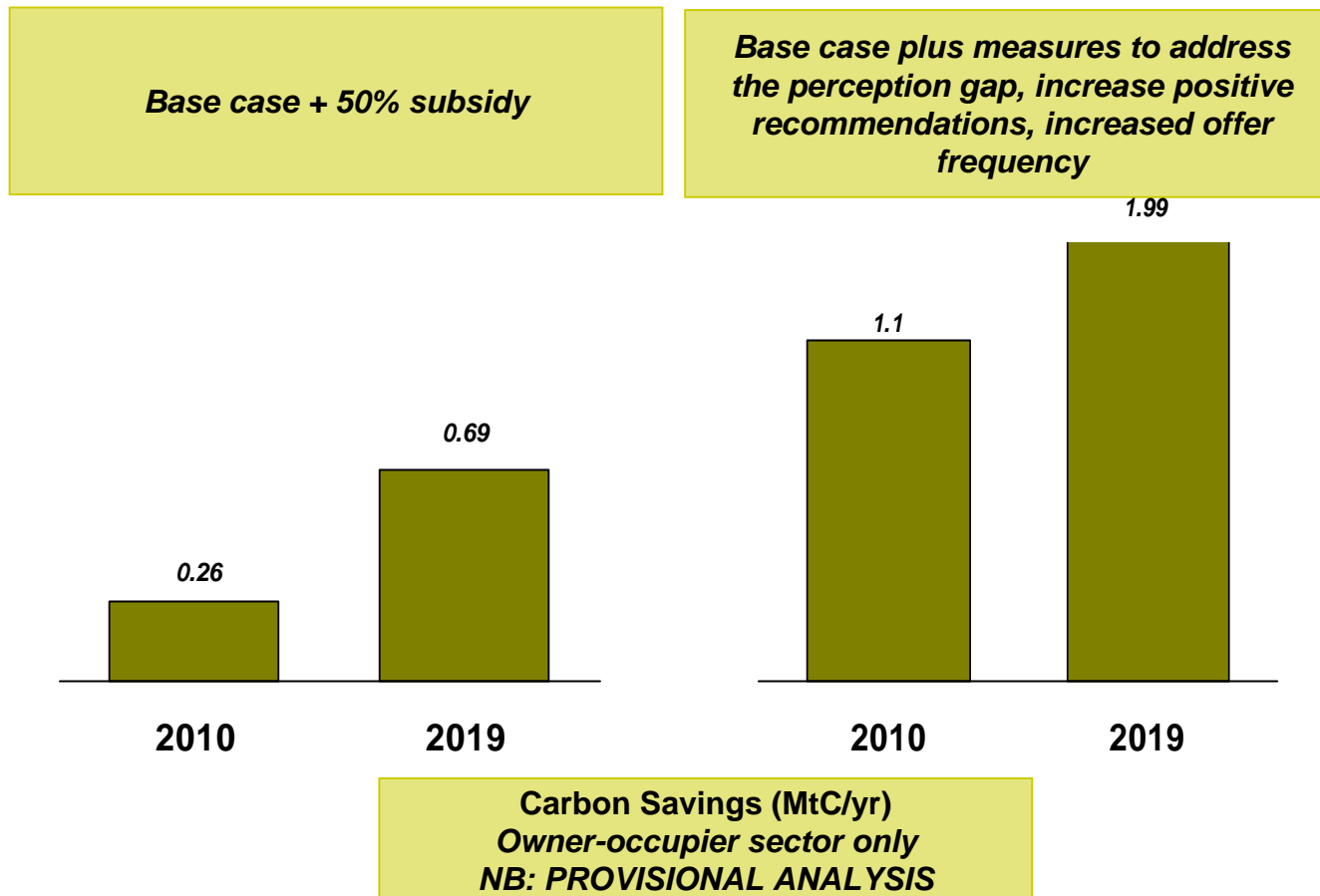
- Suppliers have little incentive to address the cost perception gap
- If one supplier invests in improving consumers understanding of the costs and benefits on insulation measure, his competitor will almost certainly get a 'free-ride'

Distrust of the installer supply chains

- Suppliers are clearly perceived as part of the installer supply chain
- Although they have a clear role (and incentive) to improve the consumer satisfaction performance of installers, they are less well placed to provide credible quality endorsement

Energy Efficiency Innovation Review

A tripling of EEC1 as the EEC 3 target, to generate total savings of around 1 MtC by 2010, appears feasible providing that additional support can address key market failures



- Currently there are some innovative suppliers' schemes which seek to address the market failures, notably Centrica's Council Tax rebate scheme in Braintree, Essex.
- These are unlikely to prove sufficient to address the market failures on their own and should be underpinned by further support activity which could deliver significantly more carbon savings than any realistic level of direct subsidy.
- Support activity would need to deliver very specific effects i.e.
 - closing the perception gap
 - generating recommendations from trusted sources e.g. friends and family; and
 - increasing offer frequency for key measures

Energy Efficiency Innovation Review

White certificate trading may be able to increase the cost-effectiveness of carbon saving under EEC but key issues need to be addressed

Potential benefits include:

- Secures objectives at least cost
- Allows flexibility over investment decisions
- Price transparency
- Allows obligated bodies to spread risk
- Provides a continuous incentive to increase energy efficiency delivery
- Opens the market to new players who:
 - Could be more innovative in delivering and promoting energy efficiency improvements
 - Are more trusted by/have better access to consumers

Potential issues include:

- Legal basis
- Property rights & placement of obligation
- Accreditation of measures/schemes
- Transaction costs
- Supplier market power
- Coverage and impact on priority group
- Monitoring, settlement & compliance periods
- Market features
 - Buy-out price and recycling
 - Banking, borrowing
- Interface with other energy efficiency policies and trading schemes

Further work is already underway to assess the potential and practicalities of white certificate trading

Energy Efficiency Innovation Review

By supporting a services approach directly focussed on carbon and energy outcomes, a supplier cap & trade scheme could overcome some of the problems identified under the EEC

EEC Features

- Current system is based in installing measures, whereas Government objectives are improved energy efficiency and lower carbon emissions
- At least three factors erode notional carbon savings from measure installation
 - Technical performance in the field is not always as predicted
 - Comfort taking appears higher than assumed
 - Income / rebound effects
- Current scheme militate against behavioural actions which may be cost effective
- Current market structure provides limited incentive for services approach and has, so far, not generated significant action among owner occupiers

Impact of Supplier Cap & Trade Scheme

- Focuses delivery directly on the desired results. Could be framed either as a reduction in
 - Energy or
 - Carbon
- Alters market structure to incentivise suppliers to use most effective measures
- Likely to support a switch from commodity sales to an energy service based approach

Energy Efficiency Innovation Review

The supplier cap & trade scheme appears a practical mechanism, but social and competition issues will need further study

Issue	Possible Solutions
Security of supply	<ul style="list-style-type: none"> • Provide buy-out • Adjust the cap for temperature variations or allow climatic variations to be met by EUETS purchases
Customer cherry picking	<ul style="list-style-type: none"> • Market would provide solutions for high energy users such as tariffs that increase unit prices or increasing demand
Impact on fuel poor and vulnerable	<ul style="list-style-type: none"> • Likely to be socially progressive – fuel poor customers on pre-pay meters will be more attractive • Allow higher allowances for those on benefits?
How to allocate the cap/competition impact	<ul style="list-style-type: none"> • Based on average usage per household. Allocation moves with household if they change supplier • May require regulatory changes to further enable services contracts
How to incentivise suppliers to take action rather than buy-out	<ul style="list-style-type: none"> • Set buy-out at supply margin and include a fine and recycle system • Extend ESCO pilot so suppliers can ‘capture’ reductions
Interaction with supply side	<ul style="list-style-type: none"> • Initially, scheme should be focused on demand side • Could be aspired into a wider scheme that incentivises low carbon electricity and gas at a later stage
Smart metering is a prerequisite	<ul style="list-style-type: none"> • Smart metering is helpful but suppliers have sufficient information in aggregate to manage

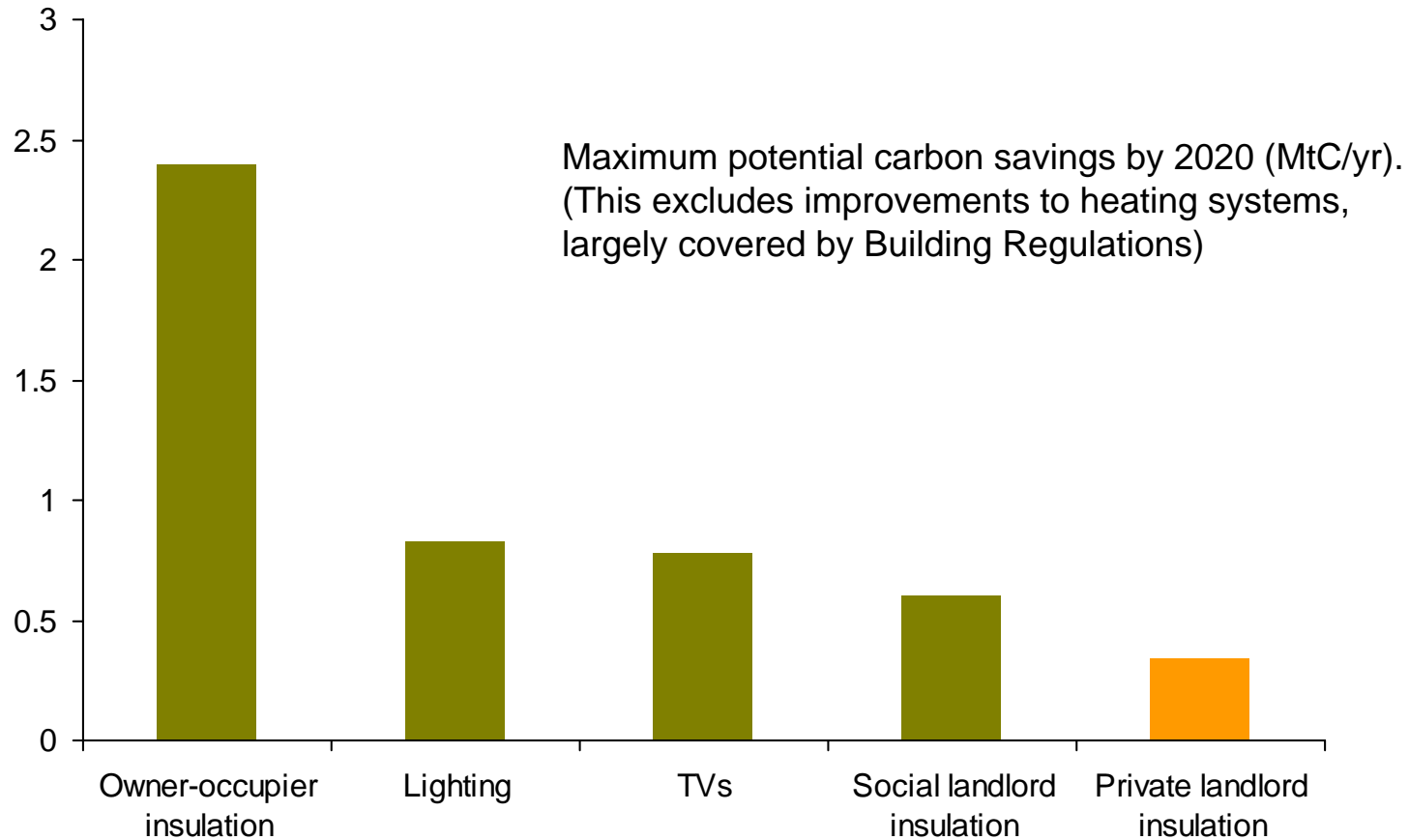
Energy Efficiency Innovation Review

The supplier cap & trade scheme appears to be a practical mechanism, but there are key issues that need to be addressed

- A supplier cap and trade scheme would rely more on effective delivery of energy services than the existing EEC, and would require the removal of the barriers to the provision of energy services.
- It will be more difficult to include the use of some of the most effective approaches in EEC that target customers across a range of suppliers such as landlord schemes, retailer schemes, manufacturer schemes and area based schemes.
- Suppliers do not have much control over behaviour that affects energy use (as opposed to supporting energy efficiency investment) although such an approach would be helpful in encouraging greater involvement.

Energy Efficiency Innovation Review

Direct regulation of Private Landlords may be necessary as incentive based schemes have proven relatively in-effective. The carbon savings potential from privately rented dwellings are relatively modest



Energy Efficiency Innovation Review

Summary

1. Significant cost-effective savings remain in the household sector, but there are barriers to increasing energy efficiency
2. The current Climate Change Programme household package has developed a good foundation, but will need to face new challenges in the future.
 - The key changes to meet the new challenges are to :
 - Enhance support to facilitate consumer action and demand for energy efficiency measures and to strengthen the current EEC, which could include white certificate trading;
 - Consider an energy supplier cap and trade scheme as potentially more suitable to the challenges of the next decade.
 - **Strengthen product policy.**
 - Tighten and enforce building regulations and drive innovation.

Next Steps.

3. Key actions have been identified in order to implement the recommendations.

Energy Efficiency Innovation Review

Strengthen product policy as price subsidies less effective

- Modelling has shown that price subsidies for white goods, appliances and consumer electronics may not always be effective, therefore strengthening product policy at EU and UK level is the best way forward

Influencing EU

- Up-rate labelling and standards for cold and wet appliances where headroom has diminished
- Establish action under the EuP Framework* for consumer goods to both ensure appropriate performance indicators are available to consumers and put in place standards. The issue of standby power should be addressed as a priority for early attention.
- Target better consumer information and establishment of mandatory standards in lighting
- Work with relevant authorities to tighten the tolerances on labelling and standards

Global Action

- For example, via the International Marrakech Task Force – to drive underlying innovation rates through more coherent and vigorous labelling and standards development for internationally traded goods and services. E.g. IEA ‘1 Watt’ initiative for stand-by; lighting, digital TV, ITC equipment, air conditioning etc.

UK action

- For some rapidly growing consumer goods the UK should establish a voluntary labelling scheme
- Underpin by voluntary agreements with retailers focusing on both consumer electronics and lighting (areas of maximum risk / potential)
- Establish scale of compliance issues and formulate actions to address

* Eco-design of Energy Using Products Framework Directive

Energy Efficiency Innovation Review

In consumer goods, labelling appears an effective incentive, cost savings alone do not

Factors Influencing Consumer Choice			
	Fridge / Freezers	TVs	Light Bulbs
Important	Price	Price	Price
	A-rated	Recommendations	Attitude to labelling
Minor	Brand	Flat screen	Lifetime
	B-rated	Cost savings ¹	Cost and energy savings
Very minor / insignificant	<i>Frost-free</i>	<i>Brand</i>	<i>Provision of advice²</i>
	<i>Shelving</i>		

¹ High degree of variation in responses – may indicate consumer confusion

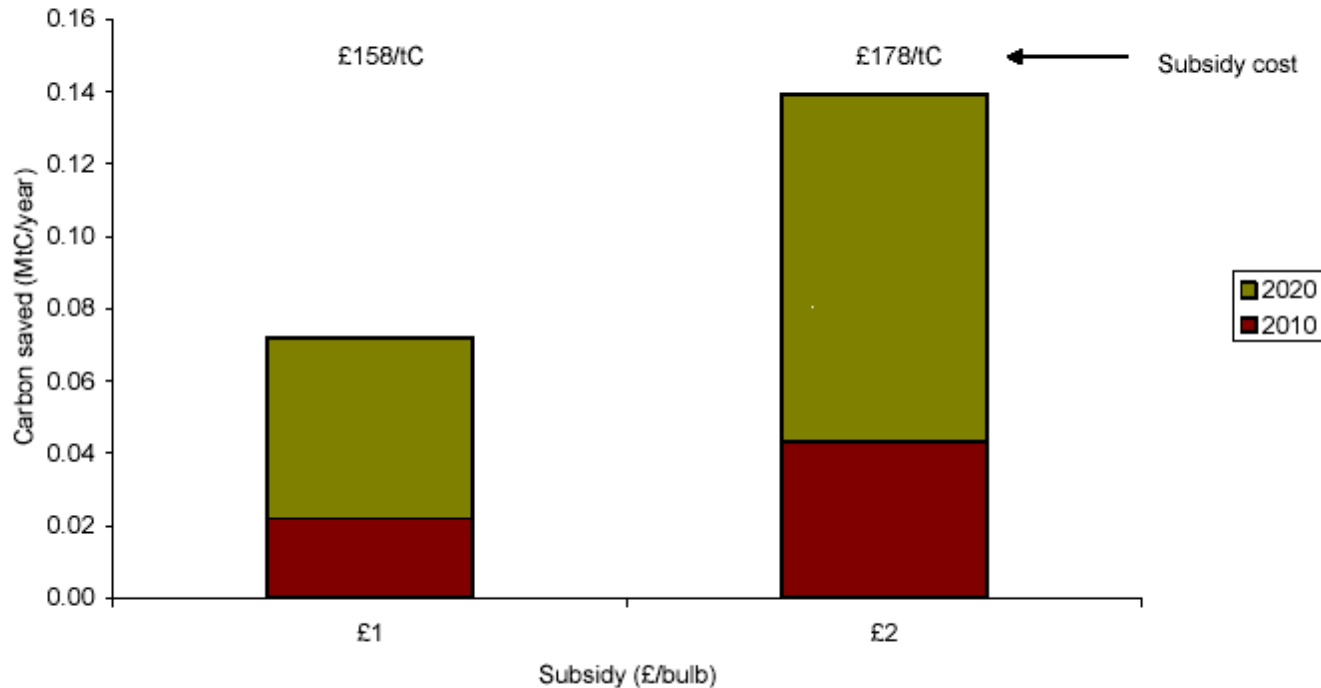
² Result of provision of advice initially masked by 'self-motivators'. Sub-group subsequently re-tested were less interested in energy efficiency.

Energy Efficiency Innovation Review

Modelling has shown that price subsidies for appliances may not be very effective

- Price increases on incandescents are likely to be more effective than subsidies of CFLs

Figure 6.8 Carbon savings generated by discounts for efficient lighting, 2020



Source: Oxera calculations.

- Modelling suggests that subsidies for white goods are also likely to be relatively ineffective unless priced near to the cost differential between product categories

Energy Efficiency Innovation Review

Standards appears highly cost-effective

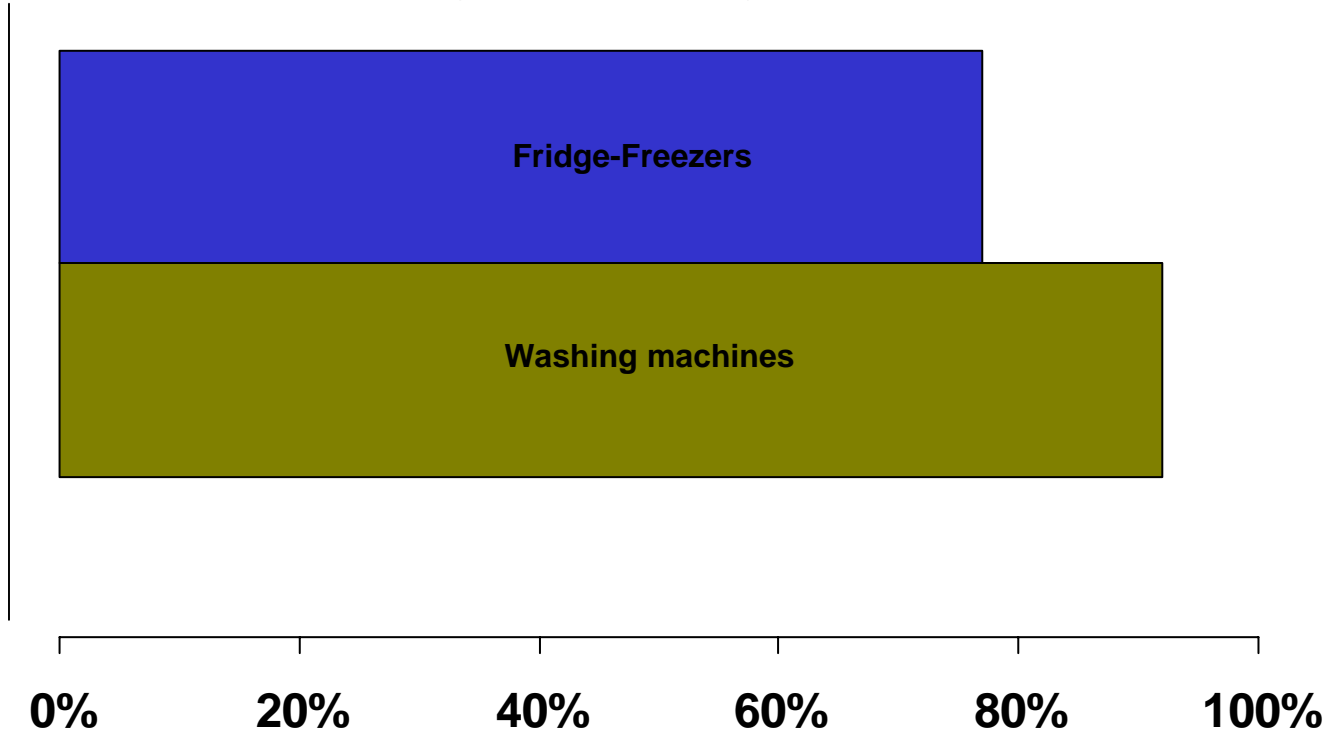
- If manufacturers are given sufficient time (typically 2-5 years depending on product class), costs can be absorbed within product development cycles
- Cost to Government involve informing negotiations and influencing supply chain
- There is no evidence of additional costs passed to consumers
- Energy savings represent a benefit to consumers
- Climate Change Programme Review evaluation estimated that appliance standards had positive benefits of £390-650/tonne carbon, and minimum standards for lighting had net positive benefits of £610/tc.

Energy Efficiency Innovation Review

Need to up-rate labelling and standards for cold and wet appliances where headroom has diminished

- Example: Washing Machines and Fridge-Freezers

Market share of A class washing machines and fridge freezers (Q1 2005)



- High market share of A-rate appliances limits the scope for improvement within the current labelling system
- Up-rating the labels (e.g. some current A-class appliance become B or C-class) will increase scope for energy efficiency improvement

Energy Efficiency Innovation Review

Establish action under the EuP Framework* for consumer goods to ensure performance indicators are available to consumers and put standards in place

- At present there is a very limited amount of information on the environmental and carbon performance of consumer goods readily available to consumers.
- Providing such information is likely to have an impact on both the demand side and the supply side.
- The evidence for demand side impact is mixed especially as the unit energy savings for consumer goods are typically low. However, energy labels in white goods appear to be perceived as an indicator of quality, thereby influencing consumer choice more than might otherwise be predicted.
- There is also evidence that labels effect the supply chain. In particular retailers appear to dislike having goods rated below B on display. This generates competition in the remainder of the supply chain.
- Once performance indicators are in place then standards can be put in place.
- Evidence indicates that standards are highly effective in carbon terms.

* **Eco-design of Energy Using Products Framework Directive**

Energy Efficiency Innovation Review

Target better consumer information and establishment of mandatory standards in lighting

- Lighting a significant opportunity for carbon savings by 2020
- Lighting products are international traded, with several global manufactures; therefore product policy action is likely to be most effective at EU level
- At present there is no product policy action at the EU level
- In the UK, Energy Saving Recommended is used to link with EEC in relation to CFLs but is more limited for other lighting
- Eco-design of Energy Use Products Framework Directive provides an approach to tackle the lack of information to consumers and the absence of any form of mandatory standards

Energy Efficiency Innovation Review

For some rapidly growing consumer goods the UK should establish a voluntary labelling scheme

- For rapidly growing consumer goods (e.g. digital set-top boxes) EU programmes may be too slow to be effective (i.e. the time to create EU standards may be longer than the time for the product to achieve significant penetration in the UK market)
- In these circumstances prompt action at UK level is also necessary
- Action should involve:
 - Establishing testing and evaluation methods
 - Setting an endorsement standard
 - Agreeing a voluntary labelling scheme
- Even if consumer impact is low (and evidence is mixed), this is likely to have a supply chain impact

Energy Efficiency Innovation Review

Underpin by voluntary agreements with retailers focusing on both consumer electronics and lighting (areas of maximum risk / potential)

- Once a voluntary labelling scheme is established, its effectiveness could well be enhanced by a Voluntary Agreement (VA) with retailers
- The VA would focus on a very limited number of products in consumer goods and lighting which either provide a significant opportunity to save carbon against the baseline or mitigate material risks to the baseline
- The form of the VA, whether an absolute standard or a fleet average standard, would be selected to fit the circumstances of the product involved
- Retailers are highly influential in the whole supply chain and are, in turn, more influence-able by the UK Government than manufactures (who are typically international and based outside the UK)
- VAs would help exploit opportunities for significant energy and carbon saving from the use of best available technology component (e.g. power supply units), but which are currently rarely used because of (modest) extra cost (of the order of 50p - £1 on a £30-50 product)

Energy Efficiency Innovation Review

Summary

1. Significant cost-effective savings remain in the household sector, but there are barriers to increasing energy efficiency
2. The current Climate Change Programme household package has developed a good foundation, but will need to face new challenges in the future.
 - The key changes to meet the new challenges are to :
 - Enhance support to facilitate consumer action and demand for energy efficiency measures and to strengthen the current EEC, which could include white certificate trading;
 - Consider an energy supplier cap and trade scheme as potentially more suitable to the challenges of the next decade.
 - Strengthen product policy.
 - **Tighten and enforce building regulations and drive innovation.**

Next Steps.

3. Key actions have been identified in order to implement the recommendations.

Energy Efficiency Innovation Review

Tighten and enforce building regulations and drive innovation

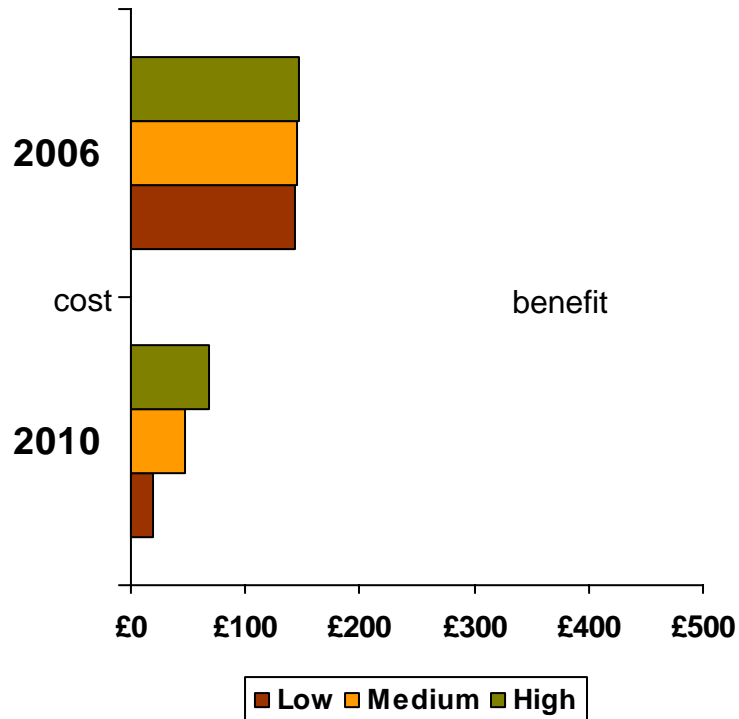
- Work with relevant Departments to mitigate the risk of poor levels of compliance with building regulations
- Tighten building regulations in 2010 (and subsequently) to the limit of cost-effectiveness
- Government Review of what more can be done to improve the energy efficiency of existing buildings is an important opportunity
- Implement the Code for Sustainable Buildings as a basis for introducing policies to speed up the development of the innovative cost effective approaches to reducing the carbon emissions of new homes. This may lead to new carbon savings opportunities for the much larger existing homes market
- Recommend that some minimum standards for energy efficiency above Building Regulations are incorporated into the Sustainable Building Code

Energy Efficiency Innovation Review

Tighten building regulations in 2010 to the limit of cost-effectiveness

Assuming a 25% reduction of carbon emissions

Cost-effectiveness (Net present value per tonne of carbon saved) (£/tC)



Compliance Method

• Insulation only

• Insulation, plus some renewables for electric and oil heated homes

• 2006 B. Regs reduce carbon emission by about 20% compared to 2002 B. Regs.

• For the 2010 B. Regs, modelling shows that a 25% improvement over 2006 B. Regs is possible with relatively cheap insulation for gas heated dwellings.

• For electric and oil heated dwelling (c.20 and 3 % of the total respectively) some renewables are required

• BRE estimate that B. Regs could be tightened without recourse to renewables by ~ 30% for gas heated homes, ~20% for oil heated homes and more than 11% for electric.

• Further work is needed to estimate the costs of low and zero carbon technologies required to make further efficiency improvements

Energy Efficiency Innovation Review

Introduce policies to speed up the development of the innovative cost effective approaches to reducing the carbon emissions of new homes

Innovation Stage	Policy Instruments
R&D	Direct funding
Demonstration	Low Carbon Buildings / CT / EST
Pre-commercial	Potential gap
Supported commercial	Building regs
Commercial	

New instrument is required to fill gap. Options studied are:

- Builders' obligation – Major builders obligated to build a proportion of their output to significantly higher standards, reflecting those of the next BR revision
- Planning gain supplement reduction / planning guidance
- Price change on first sale of a sustainable house

- Energy efficiency should be fully integrated into the Low Carbon Buildings programme and Carbon Trust / Energy Saving Trust programmes
- However, spend in Low Carbon Building (LCB) and other existing programmes alone is probably insufficient to drive down costs of new(er) technologies and build skills / capabilities in the supply chain, e.g.
 - LCB sized to build up to 1500 homes
 - Most optimistic forecast of volume to drive down costs of >2010 building regulation housing is 1000+ units /year

Energy Efficiency Innovation Review

The proposed Code for Sustainable Buildings, plus a Builders' obligation based on the Code, appears to be the most attractive option to drive low carbon innovation in new dwellings

	Builders Obligation	Planning Gain / Guidance	Price Change
Certainty	●	●	<ul style="list-style-type: none"> Fiscal measures can change rapidly ○
Simplicity	<ul style="list-style-type: none"> Extra burden Overlap with EEC? ○	●	<ul style="list-style-type: none"> Admin ○
Do-ability	<ul style="list-style-type: none"> New legislation Targets set / but development more fluid ○	●	○
Carbon delivery	●	<ul style="list-style-type: none"> Voluntary under current system - PGS too early in development cycle? ○	○
Cost effectiveness	<ul style="list-style-type: none"> Market-based scheme ●	○	<ul style="list-style-type: none"> High transaction cost ○

Key – Rating

- High
- ◐ Medium
- Low

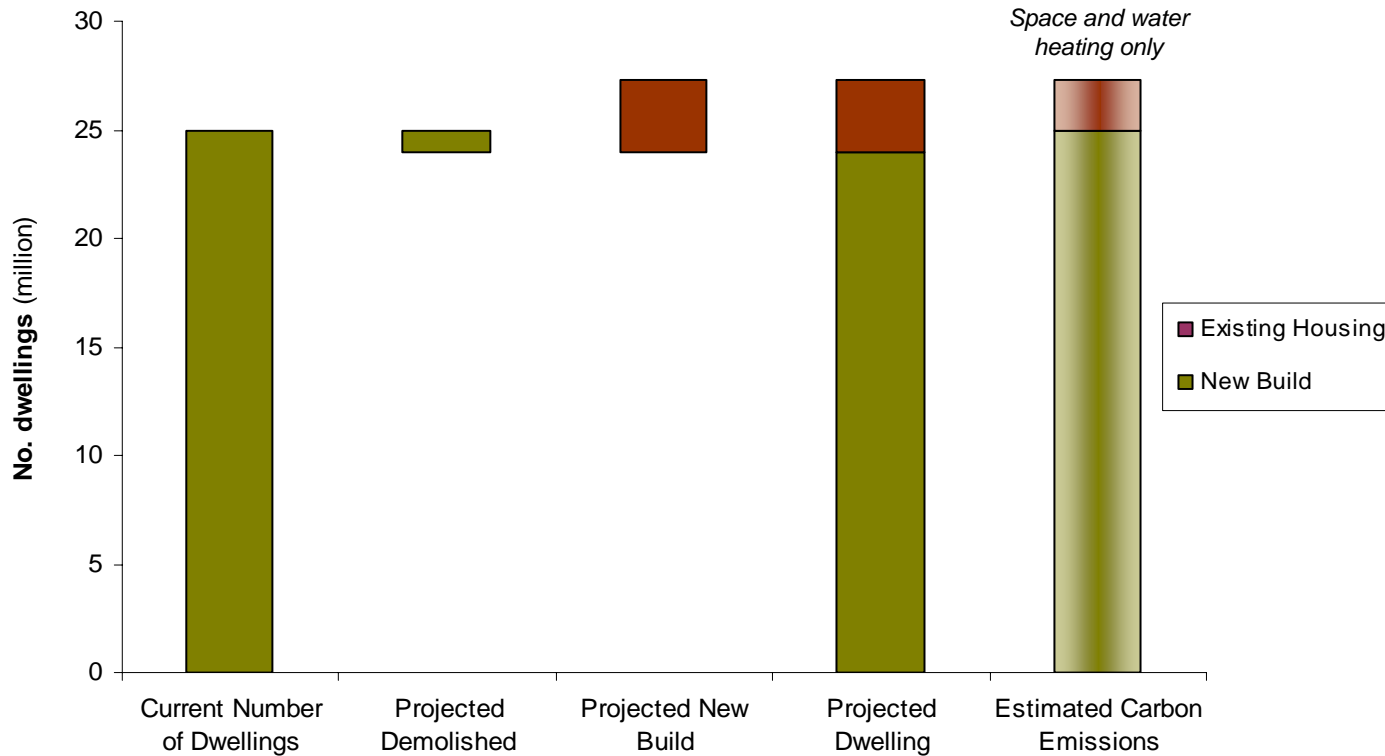
Address supply side barriers

Address demand side barriers

Energy Efficiency Innovation Review

This may lead to new carbon savings opportunities for the much larger existing homes market

Dwelling Numbers and Emissions 2005-20



- Although new build will represent 13% of the housing stock by 2020, assuming projected 2006 Building Regs they will represent less than 9% of emissions

Energy Efficiency Innovation Review

Summary

1. Significant cost-effective savings remain in the household sector, but there are barriers to increasing energy efficiency
2. The current Climate Change Programme household package has developed a good foundation, but will need to face new challenges in the future.
 - The key changes to meet the new challenges are to :
 - Enhance support to facilitate consumer action and demand for energy efficiency measures and to strengthen the current EEC, which could include white certificate trading;
 - Consider an energy supplier cap and trade scheme as potentially more suitable to the challenges of the next decade.
 - Strengthen product policy.
 - Tighten and enforce building regulations and drive innovation.

Next Steps.

3. Key actions have been identified in order to implement the recommendations.

Energy Efficiency Innovation Review

Key actions to deliver the recommendations

1. Encourage innovative suppliers' schemes that seek to address the identified market failures under EEC
2. Work with suppliers and the Energy Saving Trust to develop support programmes to underpin increased supplier obligations (e.g. to test impact of accreditation and closing of the cost-perception gap)
3. Explore the potential for white certificate trading to deliver additional carbon savings and signal possible supplier cap and trade after 2011
4. Additional work to confirm potential of consumption feedback, then implement most cost effective solution
5. Continue to strengthen building regulations and implement the Code for Sustainable Building whilst evaluating options for the introduction of a builders' obligation and measures recommended by the Government's review of energy efficiency in existing dwellings
6. Fully integrate energy efficiency into the Low Carbon Buildings programme
7. Consider the case for further support for energy efficiency RD&D through CSR07
8. Work with Commission and other EU MS to accelerate up-rating of product policy
9. Implement endorsement standards / labelling for key consumer electronics and initiate retailer code of practice discussions
10. Examine options for regulation of private landlords
11. Work with relevant OGDs to ensure appropriate action is taken on enforcement of building regulations and product standards / labelling
12. Integrate the recommendations with those identified in the report 'Appraisal of the Scope for Further CO2 Emissions Reductions from Local and Regional Activity', commissioned as part of the Climate Change Programme Review