Energy Saving Trust

Supplementary Submission to the PIU Energy Policy Review

Towards an

Energy Efficiency Strategy for Households to 2020

Contents

Authored by Sara Eppel, Head of Policy, Energy Saving Trust

EXECUTIVE SUMMARY

The Energy Saving Trust's key recommendation is that the Government should set an energy efficiency target for 2010, and should commit itself to introduce the measures necessary to achieve the target. It should also set an indicative target for 2020. Energy efficiency has a very important role in limiting UK greenhouse gas emissions, and in limiting the need for new capacity in energy supply. We believe that the value of energy efficiency must be reflected in Government policy priorities. A UK Energy Efficiency Strategy is needed to create a policy framework.

With respect to the ***household sector***, we believe ***a target should be set of a 12.5% reduction in energy consumption by 2010*** (from 2000 levels), and for ***2010-202,0 an indicative target of a further 12.5% reduction*** should be set.

Because there is large untapped potential for cost effective savings, this reduction can be achieved without any net costs, and indeed with benefits to the rest of the economy. The EST is very confident about this because the data on the costs and benefits of energy efficiency are not based on forecasts for the future but stem from concrete historical information on energy efficiency measures over a period of years. Evidence of the cost effectiveness of energy efficiency to the UK as a whole is underlined in the report by the National Audit Office on the Energy Efficiency Standards of Performance schemes in 1998.

The benefits of energy efficiency stem from the fact that the initial costs are far outweighed by the benefits of reducing demand for fuel. The average rate of return is over 30% on the energy efficiency measures needed to achieve our proposed 2010 target. In summary:

- The cost of reducing demand is less than the cost of increasing supplies;
- The cost to the economy and the UK of reducing demand is negative. In other words, the initial costs of energy efficiency measures are outweighed by the benefit of lower fuel requirements;
- The cost of reducing carbon emissions to 2010 is negative at - £150 per tonne because carbon emissions can be reduced without costs, and with benefits to the rest of the economy;
- The cost to the Exchequer, of reducing carbon emissions, is small because consumers contribute some of the initial costs, given that there are significant benefits, and because there are measures available to increase energy efficiency without cost to the Exchequer;
- Energy efficiency policies are unique in that they contribute to all the UK's key energy and environment objectives. Energy efficiency reduces carbon dioxide emissions, is the sustainable solution for fuel poverty, reduces consumers' fuel bills, helps conserve indigenous energy supplies, creates employment.

We believe these targets can be met through a range of policy instruments (as currently):

- *Public/private incentives* as in EEC.
    - We envisage that 2/3 of the 12.5% target could be met by increasing EEC by 2.5 times to 2010.
    - Energy services would contribute to meeting this target.
- *Fiscal incentives*: this should include
    - a widening of *5% VAT* to include all energy efficiency products (condensing boilers, compact fluorescent lights, and high performance windows) and to include DIY products. By reducing the purchase price of these products they will be more attractive to the customer.
    - *Tax credits* for householders who take measures to improve the energy efficiency of their homes.
    - *Stamp duty rebates* for householders who improve the energy efficiency of the home they purchase.

- *Regulation :* the Government should
    - Require *new build to be near zero emission from 2012*. A clear signalling of the Building Regulations to achieve this target at 2012 is necessary so the building industry can develop its techniques and technologies to meet the requirement.
    - Agree *minimum standards* with industry so appliances in general, and standby mode in particular, consumes minimal energy.
    - Ensure *Ofgem* makes policy decisions consistent with UK environmental objectives.
- *Changing Consumer Attitudes to energy efficiency*
    - Through a co-ordinated *public awareness raising campaign*, with government, energy suppliers, the energy efficiency industry, retailers, local authorities and housing landlords to alert householders to the environmental benefits, and the savings they will make themselves on their fuel bills.

We have identified a range of cost-effective measures that could be taken. Our assessment shows that if the full range of energy efficiency measures are taken, energy consumption in households will fall by 12.5% or 100TWh of energy per year by 2010. Without these measures energy use in households is set to rise to 2010,and will make it even more difficult to reach the Climate Change target. These policies will also save 7.2MtC/a, allowing the Government comfortably to achieve its Climate Change Target. The electricity component of this reduction alone would be sufficient to meet the shortfall in existing generating plant for the domestic sector (20TWh) in 2010, forecast by the DTI in their *Energy Paper 68*.

Beyond 2010 there will clearly be further technical advances and newer technology, such as domestic combined heat and power (dCHP), could take off more rapidly. Energy efficiency is likely to remain an exceptionally cost effective way of reducing carbon emissions, and it is thus likely to be possible and well worthwhile to secure a further 12.5% reduction in domestic energy demand below 2010 levels by 2020.

1 THE ISSUE

Reducing demand for energy must be a first principle in developing the UK's long term sustainable energy policy. In terms of carbon emissions the residential sector currently contributes 27% to total UK CO_2 emissions, amounting to 39.7MtC (year 2000), of which 20.5MtC is from gas[1]. Household energy use in the UK is projected to rise by 6%[2] to 2010 (before the impact of the climate change programme). Carbon emissions will, therefore continue to rise, depending on the fuel mix of electricity supply. Reducing emissions from this sector will make a significant contribution to achieving reduced carbon emissions, as the government has recognised in its Climate Change Programme. To achieve this aim we believe a target for reducing household energy use to 2010 and an indicative target to 2020, are needed. This paper suggests some options for a target and some ways of reaching it.

Since 1994 the Energy Efficiency Standards of Performance (SoP) have been the key instrument for energy suppliers to achieve energy savings from households. In April 2002 this will be replaced by the Energy Efficiency Commitment (EEC). The EEC requires energy suppliers to achieve energy savings through a range of cost-effective energy efficiency measures that are to be offered to households. EEC will make a very important contribution to the overall effort to reduce energy use, and carbon emissions, but it is clear[3] that current activity is not even achieving the savings envisaged in the Climate Change Programme to 2010. Furthermore the EEC has only been set for the period up to 2005; beyond that the government has made no commitments.

The government needs to take a long-term look at energy efficiency, at the benefits it brings for cost-effectively achieving UK environmental and fuel poverty goals, and in the benefits to householders in reducing their energy bills. This outline Strategy draws together the issues relating to energy efficiency and suggests some options for achieving much more significant improvements in energy saving in the household sector.

2 THE BENEFITS OF ENERGY EFFICIENCY

Energy efficiency policies ***help the UK to meet all its key energy and environment objectives***. Energy efficiency is beneficial for the environment because it reduces the amount of resources used, and the carbon emissions from those sources. Energy efficiency is recognised by government as a major contributor to achieving the Climate Change target. Nevertheless, Exchequer spend on energy efficiency continues to be modest. A table comparing the level of investment in energy efficiency, against investment to support renewables, CHP, and the fuel poor, is attached at Appendix 2.

Experience with the SoP schemes since 1996 has shown that energy efficiency clearly ***benefits the UK economy***. The National Audit Office in their report on the Energy Efficeincy Standards of Performance schemes[4] underlined the cost effectiveness of the measures over a period of years. Capital investment per household is relatively low, and yet the return on even modest investment is significant. The benefits accrue because the cost of supplying energy is saved over many years (e.g. over the 15year lifetime of a boiler, the 30 year life of insulation, or during the 10-15 year life of a household appliance). Energy efficiency also delivers benefits to industry from the additional sales of energy efficient products and services. With the increased supplier effort on energy efficiency EEC (2002-5) is confidently expected to deliver:

- *£250M/a* in customer benefits (worth *£10/a for every household in Britain*) for the expected annual cost of £3.60 per customer per fuel.

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[1] Climate Change - The UK Programme. TSO 2000
[2] Energy Projections for the UK *Energy Paper 68* TSO 2001
[3] Forum for the Future *Household Energy Efficiency to 2020* September 2001
[4] *Improving Energy Efficiency Financed by a Charge on Customers* National Audit Office July 1998

- Total *lifetime benefits* of the measures amounting to *£2,800M*[5], of which £2,300M is on energy savings.
- *Over £2 billion in net benefit to the UK* . This is even after taking account of the total cost to suppliers, customers, landlords and other parties.
- *Negative costs.* The cost of saving carbon emissions from UK households through the EEC is actually -£215 per tonne of carbon.

Energy efficiency also ***benefits consumers*** through reduced energy bills, although the capital cost of the measures can discourage householders from taking action, even if the pay-back is relatively short.

Energy efficiency creates jobs. In households, energy efficiency measures include insulation (cavity wall, loft, pipes and tanks), draught-proofing, double-glazing, efficient central heating systems (condensing boilers) with advanced thermostatic controls, compact fluorescent bulbs (CFLs), and efficient household appliances. With its operational efficiencies combined heat and power at community scale, or in individual households with the new domestic CHP boilers (dCHP), offer the same advantages. Most of these measures require trained installers. In the heating industry there is constant demand for boiler repair and replacement, and indeed there are acute personnel shortages in some parts of the country. Jobs in these industries are scattered throughout the country, with demand in both rural and city areas. New technologies such as domestic-scale CHP (dCHP) and household renewables (e.g. photovoltaics, active solar water heaters, and ground-source heat pumps) will provide new employment opportunities as well as the potential for being "ahead of the game" in industrial development worldwide.

In addition, energy efficiency provides the only ***sustainable solution to fuel poverty***. By improving the fabric of a home, through insulation, draught-proofing and an efficient heating system, the household is awarded greater comfort, and at the same time will be able to maintain these improved interior conditions even if fuel prices rise. Furthermore there are unquantified benefits such as overall improvements to the UK housing stock, and health benefits for households previously suffering cold and damp homes. It is in recognition of this that the Home Energy Efficiency Scheme (and equivalent devolved administration schemes) fund such measures in fuel poor households, to the sum of around £200M/a. Under the EEC half the supplier measures will be targeted at the fuel poor, to ensure a comprehensive effort to overcome fuel poverty.

Energy efficiency also ***provides benefits for energy security*** (as recent EU work recognises[6]). If demand for energy is reduced, indigenous resources of gas and oil will be maintained for longer, thus delaying the day when importing these resources will be necessary. In addition, existing nuclear or coal capacity will represent a higher proportion of demand, which will help maintain supply diversity. By reducing demand there will also be spare capacity in energy supply which is good for security, and also encourages competition between suppliers. Losses from electricity transmission and gas storage are also reduced if demand is reduced, particularly at peak times.

With these clear and demonstrated benefits energy efficiency will continue to offer environmental, economic, social and employment advantages, and should be supported fully through government policies.

[5] Total benefit = bill savings plus comfort benefit. All lifetime benefits quoted are present value (6% discount rate)
[6] EC Green Paper: *Towards a European Strategy for the Security of Energy Supply*

3 THE BARRIERS TO ENERGY EFFICIENCY

There are a number of barriers to energy efficiency:

- *Capital costs:* even if the connection is made, householders are often put off taking action because improving their insulation, upgrading their heating systems, and buying energy efficient appliances costs money.
- *Energy bills are a minor concern* to many householders so the effort of improving efficiency is not important. The promise of reduced bills is also viewed with scepticism as householders are not always confident that some technologies will work well. Well publicised condensing boiler problems in the past have encouraged householders to believe they are unreliable.
- *Energy efficiency is boring:* while climate change and renewable energy catch public imagination, householders make no real connection between their electricity and fuel use and the greenhouse gases causing climate change.
- *Lack of information: h*ouseholders need to be systematically informed of the impact of their fuel use on the environment, and offered alternative purchasing choices at all opportunities.
- *Installer attitudes*: many boiler installers are suspicious of condensing boilers and don't know how to install them properly, so they discourage householders from buying them.
- *Industry fails to see the marketing opportunity:* some sections of the energy efficiency industry have failed to see the commercial advantage in using the environmental advantage of their product as a marketing tool.

4 A TARGET FOR HOUSEHOLD ENERGY EFFICIENCY

4.1 Target to 2010

To achieve a long-term commitment from all the key players to energy efficiency, and to enable suppliers to plan activities over several years, a target for energy efficiency is needed. The target could be in terms of energy used in households or in terms of resulting CO_2 emissions.

A target could take many forms e.g.:
a) A target per household;
b) a target for the household sector as a whole;
c) a cap on energy suppliers linked to their customer numbers.

The pros and cons of each are discussed below. Detailed analysis of how the target could be met is only to 2010; at this stage it is difficult to extrapolate in detail to 2020, but we have suggested measures that may make a significant contribution to energy/CO_2 saving in the second decade.

a) A target for reducing energy per household

This could be a target as a percentage reduction in energy per average householder. This has the advantage of allowing for the expected growth in the number of households, but is affected by changes in the size of the average household, which would become increasingly more demanding.

b) A UK target for reducing the total energy consumed by households.

We would advocate a this option because:
- It avoids problems with changing fuel mix in electricity production;
- It is more consistent with the approach adopted for the renewables target.

The target could be for primary energy, delivered energy, or useful energy. We would suggest that the target should be on delivered energy, as this is the figure that appears on

customers' electricity and gas bills. For the purposes of this paper we have used a delivered energy target, but have kept track of the electricity saved, and the equivalent CO_2 savings.

c) A cap on energy supplied

A cap on the amount of energy (possibly carbon weighted depending on the source of supply) that can be supplied to households could be introduced. Ofgem currently know the total annual customer figures for each supplier, and under the Renewables Obligation will receive the total annual sales figures from electricity suppliers. From this data, a cap on energy could be calculated to correlate with a supplier's customer numbers. The supplier will then be obliged to achieve this level of energy use by whatever demand side measures it thinks fit. For maximum impact an energy cap would need to be reinforced by a sustained consumer awareness campaign so householders are aware of the environmental impacts of their actions, and of the advantages of energy efficiency.

The disadvantage of a cap is that it would be politically difficult to set the cap at a really challenging level and would probably be set at a level too low to achieve serious carbon savings.

Trading of caps and carbon credits could be introduced to allow maximum flexibility between suppliers. Depending on the success of the embryonic carbon trading scheme, household emission targets could be included in the arrangements, as suggested in the EEC consultation paper.

The Target

A challenging but achievable target for energy efficiency will provide a key driver for increased effort on energy efficiency throughout the UK. We are confident that a 12.5% per decade target for reducing energy consumption is achievable. With year 2000 energy use levels as baseline a 12.5% reduction target will achieve actual savings of around 100TWh. In year 2000 529TWh[7] of energy was used in the household sector. Energy Paper 68 predicts an increase of 32TWh in the household sector by 2010. When our target is met in 2010 this figure will fall to 461TWh per annum.

We believe that increasing EEC 2.5 times would achieve a 9% (51TWh) reduction in energy use. The additional 3% could only be met with the additional measures we outline in *section 5*: by fiscal incentives, regulation to improve appliance standards, zero emission new build by 2012 and an integrated programme of awareness raising and information to consumers about energy efficiency (see *sections 5.1-5.4).*

At Appendix 1 we have described how most of the target could be met through EEC.

We recommend:

- *that a target for reducing energy use in households is set to 2010 (on 2000 baseline). As we discuss below, we believe this target should be 12.5% from 2000 to 2010 and a further 12.5% to 2020 (on 2010 baseline).*

4.2 Target to 2020

Having achieved a 12.5% reduction in energy use over the 2000-2010 period, we see further potential to achieve a further 12.5% per annum reduction in household energy use to 2020. If the 2010 target is met, household energy use at 2010 should be around 480TWh. It is possible to foresee that this trend in reducing energy use could be maintained through to 2020.

There will be considerable technological changes in the decade after 2010 that are difficult to predict in detail, but we can see some improvements additional to those we outline to 2010. As the cost-effective measures (see *section 5*) are taken up to 2010, there will increasingly

[7] *Energy Paper 68.* DTI

need to be investment in the currently less cost-effective measures for achieving the required carbon savings. In the intervening years, provided more effort is made on R,D&D in low carbon technologies for households than has historically been the case, we believe that there will be further improvements in the cost effectiveness of existing measures and new measures will be developed. See *section 7.2.*

5 FOUR WAYS TO MEET THE 2010 TARGET

Energy efficiency is currently supported by a combination of methods, and we would expect this to continue. There is no single solution for improving energy efficiency. Currently the four methods are:

- *public/private incentives*: through energy supplier/customer investment through EEC, and government funds for fuel poverty programmes (HEES etc) and EST programmes;
- *fiscal incentives*: with reduced VAT on some energy efficiency products;
- *regulation*: through the Building Regulations; and
- *consumer information*: through the EST programmes.

We envisage these four methods would need to be expanded as outlined below.

5.1 Meeting the 2010 target: Public/Private Incentives

With the Utilities Act 2000 requiring energy suppliers to stimulate energy efficiency in their customers' homes, the EEC will be the major funder for energy efficiency up to 2005. If the EEC is extended and increased by 2010 as we propose, the major effort will continue to be funded by energy suppliers, and ultimately customers. However the EEC will only really be effective if there is also a very comprehensive effort by retailers and energy efficiency manufacturers to promote the advantages of energy efficiency and to offer householders information about the energy consumption of their products.

Direct government support for energy efficiency is small. Around £28M/a is allocated to the EST's programmes, and specific expenditure is targeted exclusively at the fuel poor through the HEES schemes[8]. Most of the rest of the funding for subsidising energy efficiency through the EEC rests with energy suppliers. In 2001/2 this amounted to £55M. From April 2002 energy suppliers will be offering discounted energy efficiency measures, that are expected to cost them around £165M, and the government will continue to fund EST activities at around £28M/a.

Table 1 Current and Planned Expenditure 2001-5

Non fuel poor : direct funding for Energy Efficiency				**Fuel poor : direct funding for Energy Efficiency**			
2001/2		**2002-5**		**2001/2**		**2002-5**	
Govt Funding (EST)	£21M	Govt Funding (EST)	£21M/a (expt'd)	Govt Funding (EST)	£7M	Govt Funding (EST)	£7M/a
				Govt Funding (HEES)	£200M	Govt Funding (HEES)	£200M/a
Energy Suppliers (SoP)	£20M	Energy Suppliers (EEC)	£65M/a	Energy Suppliers (SoP)	£35M	Energy Suppliers (EEC)	£100M/a
Total	**£41M**	**Total**	**£86M/a**	**Total**	**£242M/a**	**Total**	**£307M/a**

In addition to energy supplier investment it is clear that a very much increased effort by retailers and manufacturers is also needed. Some of the most successful EST programmes are those working closely with retailers to improve the staff training in retail outlets so that energy efficiency is promoted on the ground to customers. However this programme is small,

[8] Includes all national schemes

and the level of effort with retailers needs to be significantly increased to be most effective as part of an integrated UK effort on energy efficiency.

Experience of the SoP schemes has proved that Exchequer spend is modest in relation to the spend by energy suppliers (and customers), and that it stimulates much greater spend by other parties. An increase in investment by government to widen the involvement and commitment of the retail and manufacturing sectors would reap much greater benefits and investments.

There is clear evidence from the SOP schemes, that householders respond to the marketing and incentives offered by energy suppliers. Supplier SoP programmes have been very successful in offering householders reduced priced insulation, CFLs, or appliances. But the scale of these measures is small in relation to the 25 million households in the UK. The EEC is expected to offer more incentives for householders, but only 50% of their programmes will be focussed on the 16 million households not receiving benefits. Thus the households that produce the highest CO2 emissions (so called "fuel-rich) will receive only a limited range of offers from suppliers to reduce these emissions.

5.1.1 Extension of the Energy Efficiency Commitment

The EST believes that by extending the EEC in 2005 and 2008, 9% of these savings can be met. To achieve this we envisage the EEC working as follows:

The overall target to 2010 is 51TWh or 256 standardised TWh in EEC terms. This target is broken down into 3 stages with 3 targets:

Table 2

Target in EEC standardised TWh	**Target in delivered TWh/a by 2010**	**Target MtC savings per annum by 2010**
2002-5 with 64TWh	5.7TWh[9]	0.4 MtC/a
2005-8, with 171TWh	21.5TWh	1.52 MtC/a*
2008-11 with 256TWh	23.4TWh (2 years only)	1.65 MtC/a (to 2010 only)*
Achieved cumulative savings per annum by 2010	**51TWh/a**	Around **3.6MtC/a** including EEC 2002-5
		Around 3.2MtC additional to EEC 2002-5

* These savings are achieved if:

- Oil and coal customers are included in the EEC from 2005 (10%-15% of all homes are heated by these fuels). The existing legislation does not permit setting an EEC on these fuels. We recommend the Government explores alternative mechanisms to ensure these fuels are also brought within the scope of EEC.
- The cost-effectiveness improves by 20% at each 3-year phase, which will be even more easily achieved if energy services take off.
- The annual contribution of "deadweight" (households that do energy efficiency without subsidy) remains as in EEC 2002-5.
- The proportion of the EEC targeted at those on benefits declines from 50% in EEC 2002-5 to around 40% of the total in the 2005-8 EEC and 30% of the total in 2008-11 EEC. This decrease in effort on the fuel poor could be met by increased HEES[10] schemes (see below) with qualification criteria for HEES becoming the same as for EEC.

These savings are achieved if the investment by energy suppliers rises as follows:

[9] Real energy savings, so not including improved comfort levels, nor counting savings that would have happened without these programmes.

[10] Home Energy Efficiency Scheme, and equivalent devolved nations' schemes.

Table 3

£/cust/annum/fuel		£ invested/annum
2002-5:	£3.60	£165M
2005-8:	£7.20	£360M
2008-10:	£9	£450M

However these improvements will only be achieved if there is increased consumer awareness of energy efficiency and the full involvement of other parties such as landlords, installers, retailers and manufacturers to provide information and advice to customers. A commitment to a larger EEC programme would therefore need to be accompanied by work in other areas (*see sections 5.2-5.4)*

We recommend:

- *that EEC is extended in 2005 and 2008 to triple investment in energy efficiency, with comprehensive programmes to involve all key stakeholders, and raise awareness with householders.*

5.1.2 Energy Services

Energy services could be the most comprehensive form of demand side management. However there are not currently sufficient incentives for energy suppliers to offer energy services to their customers on a large scale, and Government and Ofgem need to develop incentives for suppliers to do this.

In its most complete form energy services mean that an service provider offers a householder sufficient energy to provide all the heating, lighting, hot water and appliance needs of the household. The provider will then meet this obligation through the most efficient means. In addition to competitive supply, this can mean reducing the energy demand of the household as the energy provider installs insulation, a condensing boiler, draught-proofing and efficient glazing etc. The energy provider will recoup the costs for these measures through the householder's energy bill, usually through a contract period comparable to the "payback" period of the investment.

This is how energy services should work, but in practice only limited energy service in niche markets have been offered by energy suppliers, as they do not currently see it as commercially attractive. There are a number of perceived and real barriers to energy services e.g. the "28 day rule", whereby customers can change energy suppliers with a month's notice, is seen as a disincentive by suppliers.

The EEC does go some way in encouraging energy services, as suppliers can earn extra energy saving credits for offering them. However, further work to make energy service more attractive is needed to encourage suppliers to offer energy services on a large scale.

We recommend:

- *That Ofgem and Government work proactively with energy suppliers and EST to remove the barriers and encourage suppliers to offer energy services.*

5.1.3 The Role of Local Authorities

Local authorities(LAs) are key influencers of their local communities, and are also housing providers. Of the total 469 LAs, 409 of these are Energy Conservation Authorities and have a clear commitment to improve energy conservation in their areas.

Most LAs need to do much more to improve the energy efficiency of their own housing stock. This will require LAs to set aside more funds for investing in energy efficiency, but LAs often have little incentive to do this. Experience with the Energy Efficiency Commitment (EEC) has proved that energy suppliers are taking it seriously now that it is a serious business issue. The same would apply to LAs, and Government would do well to consider ways of

incentivising LAs to give energy efficiency priority while it is reviewing LA energy efficiency activitiy.

LAs transfer housing stock to housing associations and charities, and this is a good time for energy efficiency improvements to be made. Housing landlords should make energy efficiency a priority and offer it to the tenants as an important and attractive part of the transfer deal. Most tenants would be keen to reduce their energy bills if they were aware that they could benefit in this way.

We recommend:

- *That the Government develops incentives for LAs to encourage them to make energy efficiency a priority in their own properties.*
- *That LAs participate fully in energy efficiency awareness-raising campaigns and work with energy suppliers, retailers and other local stakeholders to encourage householders to buy energy efficiency goods and services.*

5.2 Meeting the 2010 target through Fiscal Incentives

The Climate Change Levy gives us a good indication of current Government policy to encourage business towards environmentally sustainable solutions: taxes are increased on the "bads" i.e. pollution and CO_2 emissions, and are reduced on the "goods" i.e. employment. We see considerable scope for continuing this logic in relation to household energy efficiency, so VAT would be reduced on all energy efficient products, while prices could be raised through taxes on comparable inefficient products.

5.2.1 VAT

VAT on domestic fuel currently stands at 5%, while on some energy efficient items it remains at 17.5%. All energy efficient products should receive reduced VAT to make them financially more attractive to the householder. As the capital cost of the energy efficiency item is important to householders a reduction of 12.5% would be very welcome. Current EU legislation has been interpreted by the UK Government as prohibiting VAT reduction on DIY purchases. The Government should vigorously seek to change this ruling by the EU for all the significant energy efficient measures.

Sixty percent of household energy use is for heating the home, so the efficiency of the household boiler is vitally important for reducing overall energy use. The cost of a boiler is a strong influencing factor when a householder chooses a new one. With 17.5% VAT on condensing boilers their cost remains high. HM Treasury has not reduced VAT on these items because it believes condensing boilers are not a qualifying energy efficiency measure, even though householders would only choose an energy efficient boiler for energy saving reasons. Reducing VAT on the most efficient condensing boilers (A-rated) to 5% would reduce the price to the consumer and increase sales. Manufacturers and retailers will promote condensing boilers in their sales and marketing and would expand their condensing boiler range. The market for all condensing boilers will expand with the EEC (assumed to increase to 440,000 over the 2002-5 period) and condensing boilers rated B efficiency will be most widely on offer. If VAT is reduced on A-rated boilers, more of these will be purchased by the householder and offered through the EEC.

The cost to the Exchequer will be £6M/a, and assuming that 60% of EEC offers will be A-rated boilers, this measure will achieve carbon savings of 44,000tC/a.

Similarly, the markets for CFLs and high performance windows are limited because the capital costs are so much greater than the inefficient alternatives (tungsten bulbs and ordinary windows). Reducing VAT to 5% would reduce the overall price by 12.5%, which would contribute to expanding the market for all of these products. There are currently 7 million CFLs sold annually, so reducing VAT to 5% would reduce Exchequer revenue by around £3M/a.

Increasing the cost of the inefficient alternative through other fiscal means would also make them less attractive. This would also be consistent with the tax on the "bad" and incentive on the "good" principle. Denmark has increased the cost of incandescent light bulbs to achieve just this objective.

Do-It-Yourself energy efficiency products have 17.5% VAT. We recognise that EU legislation is inhibiting change, but it is clear that action by the Government is needed to overcome this problem

We recommend:

- *That VAT is reduced to 5% for all energy efficient products including condensing boilers, good quality CFLs, high performance windows and DIY energy efficiency products.*

5.2.2 Energy Taxes

There are widely differing views about the impact of energy prices on consumer behaviour and on energy efficiency. Some argue that the price of energy is the most important potential influence on energy efficiency if there is continual publicity about low energy prices. Others do not believe that higher energy prices necessarily result in a sustained reduction in consumption.

The EST believes that households will be more motivated to save money on their fuel bills when prices are high. However, this is not by any means the most important determinant of consumer behaviour.

A tax on energy would at present have seriously adverse consequences for fuel poverty. However, once progress has been made with fuel poverty, it would be sensible to reflect the cost of externalities in domestic energy prices via taxation – possibly with hypothecation of some of the proceeds to energy efficiency and renewables – in order to increase public acceptability.

We recommend:

- *that the current policy on energy taxes is reviewed once fuel poverty has been tackled, so the cost of externalities are reflected in domestic energy prices.*

5.2.3 Tax Credits

Tax credits could be another mechanism for encouraging energy efficiency in the home. Specified energy efficiency measures could be offset against an individual's tax bill, providing a further incentive for householders to take action.

A number of other OECD countries provide tax incentives for environmental measures on houses. In the US, for example, a proposed tax credit scheme is designed to promote PV and solar thermal equipment. A maximum credit of $2,000 is available for the installation of each technology. If the proposal goes ahead, the credit will be available from 2002-7 for PV and 2003-5 for solar water heating. Government could explore the scope for tax credits for energy saving measures.

We recommend:

- *That tax credits are given for specified energy savings measures.*

5.2.3 Reduced Stamp Duty and Mortgage Rates

Householders are most interested in the physical state of their property when they are moving home. This is probably the most effective point at which to encourage them to make significant improvements to the energy efficiency of their home.

Stamp duty ranges from 1% to 4% of the purchase price of a property, and is therefore a significant additional bill. In an Energy Audit the energy efficiency of the house is specified. Any home mover who fulfilled the recommendations of the Energy Audit for improving the energy efficiency of the home should then receive a stamp duty rebate. This would provide the right incentive at the right time.

The costs to Treasury of this proposal have not been fully analysed, and the EST is currently carrying out further work on this.

We recommend:

- *That stamp duty rebates are made available for energy efficient housing.*

Some mortgage lenders already offer cash-back incentives to their clients to encourage them to carry out energy efficiency in their home. To date these have been fairly limited in their effectiveness, and limited in the range of measures that qualify. The proposed energy audit in the Seller's Pack would provide the framework for assessing the state of the property and measures to take to improve it.

One bank is developing a mortgage that will offer reduced rates if specified energy efficiency measures are undertaken. This may be linked to EST's Energy Efficiency Recommended list of boilers and appliances, with proof of purchase or installation a necessary requirement for the rate to be reduced. Creative incentives such as this need to be offered on a much more widespread basis for customers to recognise the importance of their energy use, and benefit from them.

We recommend

- *That government encourages mortgage lenders to develop schemes which will offer reduced mortgage rates to households that carry out energy efficiency measures*

5.3 Meeting the 2010 target through Regulations

5.3.1 Building Regulations

The EST has made a rough comparison of the energy losses from houses built to minimum standards in the UK, Belgium, Denmark and Germany. This assessment reveals that the UK uses 200kWh/m^2 annually, as against 125kWh/m^2 in Belgium, 69kWh/m^2 in Denmark and 60kWh/m^2 in Germany. From 2002 the new Building Regulations will improve the energy use per metre^2 in houses to an average of around 140kWh/m^2 [11]. However it is clear that there is considerable scope for improvement in the UK in comparison with these European countries.

New energy efficiency requirements under the Building Regulations will now come into force in spring 2002. Government believes that these will lead to carbon emissions reductions from new homes of 23%, which corresponds to 0.25MtC per year by 2010 if no further tightening of standards is brought about in the intervening period. We estimate that reductions in emissions of 0.5MtC/a could be achieved, by a phased tightening up of the Regulations and promoting highly energy efficient homes between now and 2010. [12] If standards are tightened in 2007 to reduce CO_2 emissions per home by 50%, this would correspond to the requirements in Sweden in 1985, and requirements currently in place in Germany and Denmark.

We believe it is important for the Government to signal early and clearly to the building industry their long-term commitment to sustainable development. EST believes it should be possible for the Building Regulations to require near-zero emission homes by 2012, and to leave it to the private sector to develop the best methods. With a decade lead-time the building industry would have ample time to develop building methods and techniques to

[11] EST calculation

[12] "Achieving the Challenge" Energy Saving Trust, April 1999 and "New Build Housing and Energy Efficiency to 2010" Energy Saving Trust, March 1999

comply with the Regulations. The private sector will adapt the current examples of near-zero emission buildings to "mass-scale" building techniques to meet the requirements.

As a step towards this goal, a review of the Building Regulations in 2007 could measure the CO_2 emissions from a home as its assessment of energy efficiency. Using this method would also encourage the use of CHP.

We recommend:

- *That government announce at an early date its intention to tighten the Building Regulations beyond 2002, with a clear indication that near zero emission new build will be required in 2012.*
- *That in 2007 the Building Regulations measure the CO2 emissions from a home as its assessment of overall energy efficiency.*

5.3.2 Minimum Appliance Standards

Energy use by domestic appliances will grow rapidly over the next decade. Growing use of home computers, and new technologies such as digital set-top boxes will increase demand for energy. Many of these appliances consume energy even when in "stand-by" mode, and they are rarely switched off.

Minimum standards should be agreed between Government and industry at an EU level, in particular reducing the standby mode consumption. Aspirational targets are agreed between the Government's market transformation programme and manufacturers, but these need to become voluntary commitments or regulations to work fully.

We recommend:

- *That minimum standards should voluntarily be agreed between government and industry so the standby mode consumes minimal energy; if necessary these could be legislated for in the EU as well as the UK.*

Smart meters are being developed to give the householder a clearer indication of the actual level of energy being used in the home. It will be important that all smart meters display clearly actual energy being consumed, as a minimum standard. It is possible that up to 20 million smart meters could be in homes by 2020, and the effectiveness of this new technology will be important for helping householders understand the level of energy they actually use.

We recommend:

- *That minimum standards are developed to ensure that Smart Meters display clearly the actual level of energy consumed.*

5.3.3 Ofgem

Ofgem has a critical role in the success or failure of Government policies on energy efficiency and renewables.

Ofgem's recent publication of its Environmental Action Plan (EAP) is encouraging, and is a significant step towards recognising the environmental impacts of its activities. However, the EAP will only be effective if it is truly integrated into Ofgem's decisions. Ofgem needs to give more priority to energy efficiency to encourage electricity and gas suppliers to use energy efficiency as a marketing tool, and to use their activity on energy efficiency to retain and attract customers.

The operation of New Electricity Trading Arrangements (NETA) is just one example where policy has adversely affected the renewable energy and CHP suppliers, particularly for new generators. The potential impacts of NETA were clear even before the arrangement came into effect, and Ofgem's attempt to pass responsibility back to the government is a discouraging interpretation of its environmental responsibilities.

Ofgem's role as regulator has a clear impact on embedded generation issues, which will be important if domestic and community scale renewables and CHP are to succeed. In addition, technologies such as smart meters should be encouraged so consumers, electricity distributors and suppliers see the benefits of energy efficiency and power generation in the household.

The Government has clear powers to give guidance to Ofgem about its duties, and DTI's role in doing this will continue to be critical to ensure that Ofgem truly internalises its Environmental Action Plan and makes consistent policy decisions.

We recommend:

- *That Government influences Ofgem to make decisions consistent with UK environmental objectives, and that Ofgem truly internalises its Environmental Action Plan.*
- *That Ofgem activity makes provision for encouraging embedded generation in the electricity supply system.*
- *That Ofgem incorporates environmental externalities within its decision-making process.*

5.4 Meeting the 2010 target: Changing Consumer Attitudes

Householders are not currently much interested in energy efficiency. The environmental impacts of energy use (particularly electricity) are largely either unknown, or the messages are confused in their minds. The long term financial benefits of energy efficiency are often outweighed by the short-term capital investment that needs to be made (in insulation, or an efficient boiler). Consequently, to date only limited impact has been made in encouraging householders to improve voluntarily the energy efficiency of their home. While the EEC to 2005 will increase the availability and attractiveness of energy efficiency (through reduced prices and financing arrangements from the suppliers), it is unlikely to change consumer behaviour on a mass scale.

There needs to be a very much increased effort to inform householders of the impacts of energy use, and the value of energy efficiency. Currently, activity to raise awareness of energy efficiency is divided between Government, energy suppliers and some retailers. A greatly increased advertising and publicity campaign could continue to be funded in this way and would link with suppliers', manufacturers' and retailers' efforts in promoting energy efficient products and services.

High-income households consume more energy than low-income households, and therefore the carbon savings from energy efficiency measures in a higher income household can be much greater. This is particularly true for households in older, energy inefficient properties. All householders need to make the connection between their energy consumption and the environmental and financial benefits of energy efficiency, so mass-market changes in consumer behaviour and purchasing choices are achieved. Current funding for targeting these households is lamentably small, despite the significance of the savings that could be made. The benefits of improving energy efficiency in high-income require more activity by the Government, key influencers, and energy suppliers. Government funding will play a key part in changing customer attitudes, and will stimulate action by householders.

We recommend:

- *That energy suppliers, government, the energy efficiency industry, retailers, local authorities and housing landlords work in partnership to raise awareness of energy efficiency, and so a very significant increase in effort and funding is achieved for promoting cost-effective energy efficiency measures to 2010.*

5.4.1 Providing Information

As outlined above, giving householders information about the environmental impacts of their energy use, and facilitating the means for them to do something about it will be critical.

Householders need to receive the energy efficiency message via all appropriate routes, for example via advertising, when purchasing products, on fuel bills, and as a part of property details when they are moving house. When a householder receives a fuel bill they can be receptive to information on the bill which demonstrates where they could make savings. If this information is tied in with a promotional energy efficiency offer, that may provide an added stimulus.

All energy suppliers will only provide this information if they are required to do so, and we recommend that Ofgem draw up guidelines accordingly.

New technologies such as smart meters could also be very important for stimulating householder awareness of the energy they consume. Currently electricity and gas meters are out of sight (in a cupboard, cellar or outside) and are not easily readable. In addition the information they display is not easily related to a householder's knowledge of actual energy consumption. Smart meters can display much more clearly than current models, actual energy being used. This information is more accessible if the meter is located in a kitchen and is at eye level. If the information is simple to understand it will be more effective in encouraging householders to be aware of their energy use.

Many householders are more concerned with the fabric of their home when they are moving home. With the right incentives and information householders are more likely to invest in energy efficiency measures. The government proposal for the ***Seller's Pack*** to contain an energy audit with property specific advice on energy efficiency measures will be a very welcome measure. The draft EU Buildings Directive also supports this proposal. The Energy Efficiency Advice Centres currently provide advice to householders on energy efficiency, and home energy efficiency audits (done by the householder) have proved a successful way of stimulating action. As householders carry out the audit voluntarily, it is largely these motivated individuals who will follow up the recommendations.

The UK has a developed system for rating houses by their energy efficiency – the SAP rating scheme, and houses are SAP rated by qualified assessors. The SAP rating is effectively a ***labelling scheme for houses***. A number of other OECD countries have voluntary labelling schemes. In France the Qualitel scheme has seven performance parameters including energy efficiency. A label is applied to a house receiving a rating above 3 for all performance parameters. Japan is adopting a similar scheme in 2001. In Denmark the mandatory Energy Labelling Scheme is seen as the principal instrument for achieving the target savings (under their climate change programme) of 1.6MtC/a from homes. An energy audit has to be provided by householders when the home is to be sold. The Netherlands operates a voluntary scheme similar to Denmark's, and a if householder implements the recommendations of the energy report any expenditure on energy efficiency measures is eligible for a 25% capital subsidy under the Energy Premiums Programme (up to 158 Euros).

Incentives such as a reduced rate mortgage or reduced stamp duty for energy efficiency measures undertaken would also provide a huge incentive for householders (see section 4.3)

We recommend:

- *That an integrated information campaign is launched and maintained over the years to 2010 and beyond to stimulate energy efficiency activity by householders. This should include environmental impact information on energy bills.*
- *That the Seller's Pack or equivalent is introduced including an energy audit of the property.*
- *That the Energy Efficiency Recommended (EER) label is extended to other energy efficient products to stimulate awareness and choice, and that more manufacturers and retailers are brought into the EER scheme to increase penetration (see Appendix 1).*

6 COST EFFECTIVE MEASURES FOR MEETING THE TARGET

There is a comprehensive range of cost-effective energy efficiency measures which will ensure that the majority of the 12.5% energy saving target is met. There will probably be a

need to invest in less cost effective measures at some point, but as there is such a wide range of cost effective measures still not taken, these should be tackled as much as possible.

The measures in Table 4 and 5 are technical improvements to the fabric of the housing stock and have the potential to deliver the energy savings needed to achieve the target, but only when they are supported by the other measures outlined in 5.1-5.4 above. Achieving a truly holistic approach to energy and environmental issues requires action across the range of groups affected: householders themselves, energy suppliers, the energy efficiency industry, retailers, local authorities, housing managers and of course central governments where the decisions on legislation and funding are made.

Table 5[13].[14]

Household Energy Efficiency: Achievable Potential by 2010 - Energy and CO2 Savings

	Potential Households¤	Households improved by 2010	Energy TWh/year	Total CO2	Additional CO2
	M	M		MtC/year	MtC/year
Building fabric					
Cavity Wall Insulation	9	7.2	38.7	2.3	1.9
Low E glazing	20	9.7	4.5	0.3	0.3
Loft insulation	7.5	6.0	12.4	0.7	0.3
Tank/pipe insulation	9	7.3	6.6	0.4	0.3
Draughtproofing	6	2.7	1.0	0.1	0.1
Sub-total			**63.2**	**3.7**	**2.8**
Heating					
Condensing boilers	15	4.4	10.6	0.5	0.5
Boilers (building regs)	15	7.0	7.0	0.4	0.4
Controls	7	2.1	3.2	0.2	0.1
Community CHP	4	1.0	2.2	0.3	0.3
Micro CHP	12	0.7	1.7	0.2	0.2
Sub-total			**24.6**	**1.5**	**1.5**
Lighting					
CFL	120	100.0	**4.8**	**0.6**	**0.5**
Appliances					
Cold	All	25.0	5.0	0.6	0.6
TV/VCR	All	25.0	3.4	0.4	0.4
Wet	All	20.0	2.1	0.3	0.3
Other	All	25.0	2.3	0.3	0.3
Sub-total		**95.0**	**12.8**	**1.5**	**1.5**
New build					
Standards/promotion	2.1	2.1	10.4	0.6	0.6
Demolition	3	0.3	-	0.4	0.3
Sub-total		2.4	10.4	**1.0**	**0.9**
TOTAL			**115.8**	**8.4**	**7.2**

Under the EEC, energy suppliers and eventually customers, would be expected to support the bulk of the expenditure to offer energy efficiency measures to householders. The EST

[13] These figures are updated from EST's 1999 document *Energy Efficiency to 2010, Achieving the Potential*

[14] All carbon savings for electricity saving measures are based on an average emission factor of 0.12kgC/kWh. The carbon emission factor based on the fossil fuel basket in 2010 would be 0.16kgC/kWh.

assessment of the level of funding required to achieve this potential is around £1billion/a. Spending on this scale would stimulate spending from other parties, as happens now. In return for this investment savings of around £2.8 billion/a could be expected, totalling lifetime savings of around £24 billion.

However to achieve this level of commitment from suppliers will be difficult if no effort is made to increase consumer interest in energy efficiency, and if other key players are not fully involved. Partnerships of industry representatives, energy suppliers, retailers, local authorities, government officials, mortgage lenders, and NGOs, are very effective fora for exchanging ideas about energy efficiency, and for stimulating initiatives. These partnerships also stimulate the funding for energy efficiency, in addition to the energy supplier programmes

The costs and benefits of carrying out these measures are summarised in Table 6 below.

Table 6

Household Energy Efficiency: Achievable Potential by 2010 - Costs and Benefits							
	Households improved by 2010	Cost per measure	Total Investment	£ saving per measure	Total savings	Rate of return*	Lifetime energy bill savings**
	M	£	£M	£/year	£M/year	%	£M
Building fabric							
Cavity Wall Insulation	7.2	300	2,160	96	691	32	9,514
Low E glazing	9.7	35	340	7	72	21	991
Loft insulation	6.0	200	1,200	40	240	20	3,304
Tank/pipe insulation	7.3	35	256	15	106	42	1,463
Draughtproofing	2.7	85	230	10	26	5	217
Sub-total			**4,185**		**1,135**	**27**	**15,489**
Heating							
Condensing boilers	4.4	150	660	34	148	21	1,436
Boilers (building regs)	9.0	0	-	14	126	-	1,224
Controls	2.1	200	420	21	44	6	428
Community CHP	1.0	2000	2,000	147	147	6	2,029
Micro CHP	0.7	500	350	161	113	32	1,549
Sub-total			**3,430**		**578**	**16**	**6,666**
Lighting							
CFL (no. of lamps)	100.0	4	**400**	3	**322**	**80**	**2,367**
Appliances							
Cold	25.0	40	1,000	13	335	33	3,254
TV/VCR		***	***		254		2,467
Wet		***	***		152		1,476
Other		***	***		170		1,651
Sub-total			**1,000**		**911**	**91**	**8,848**
New build							
Standards/promotion	2.1	250	**525**	79	**166**	**32**	**2,284**
Demolition of old properties	0.3	0	**-**	-	**-**	-	**-**
TOTAL			**9,540**		**3,112**	**32**	**35,654**

* internal rate of return

** present value, discounted at 6%

*** no reliable estimates of costs; expected to be modest

Detailed discussion of the measures that can reduce emissions from boilers, CHP, improved insulation, lighting and appliances is attached at Appendix 2.

The bottom line of Table 5 highlights the savings that can be achieved if the maximum number of measures are done. Total investment approaching £9 billion will achieve savings of £2.8 billion per annum, which equates to over £23 billion when the savings are averaged over the lifetime of the measures. The rate of return on energy efficient investments is 28%.

The main means for taking these cost effective measures is likely to be through the extended EEC (see *section 5.1.1* above). But fiscal incentives, regulations and changing consumer attitudes will also be critical. In addition, current programmes such as Community Energy (see appendix 2) will need to continue to at least 2010, to achieve savings of 1MtC/a. HEES will need to be expanded to ensure that the fuel poor continue to receive energy efficiency measures while the EEC contribution declines over time. Annual Exchequer spend on the HEES schemes amounts to some £200M/a, this would need to rise to £300M from 2005.

In summary the estimated cost to the Exchequer of the four ways to meet the 2010 target would be:

Table 7: Current UK Exchequer Spend 2001/2

	Public/private incentives		**Fiscal Incentives**		**Regulations**		**Changing Consumer Attitudes**	
Govt Progs 2001/2	EST progs:	£21M/a	5% VAT insulation & controls	c£5M/a	Building Regs	£0	EST + Gov't progs	£7M/a + c£6M
	New HEES	£200M/a						
	Community Energy	£25M/a (to 2004)						
	Total: £264M 2001/2							

Table 8:
Indicative UK Exchequer Costs for achieving 12.5% target to 2010

	Public/private incentives		**Fiscal Incentives**		**Regulations**		**Changing Consumer Attitudes**	
Govt Progs 2002-2010	EST progs:	£30M/a	5% VAT insulation & controls	c£5M/a	Building Regs	£0	EST + Gov't progs	£20M/a + £10M/a
	New HEES	£300M/a	5% VAT on A-rated condensing boilers, CFLs, DIY	£6M/a + £3M/a	Minimum Appliance Standards	£1M/a		
	Community Energy	£25M/a						
	Total: £400M/a							

By increasing EEC energy suppliers will be investing £162/a 2002-2005, £360M/a 2005-8 and £450M/a 2008-10. This will of course be retrieved through customer contribution of £3.60/a to

2005, £7.20/a to 2008 and £9/a to 2010. Only relatively modest additional investment is required from the Exchequer. Further details of Table 7 is attached at appendix 2.

7 REDUCING ENERGY DEMAND TO 2020

7.1 Potential Savings in Electricity Supply

In terms of *energy supply*, increased demand side management can overcome the need to invest in new energy sources. Over the period 2010 to 2020 some of the UK coal and nuclear capacity is expected to close, meaning a loss of around 60TWh in electricity capacity. Around 30% of this (20TWh) is used by householders. It should be noted that this improvement in energy efficiency will more than compensate for the expected reduction in supply capacity.

7.2 Measures 2010-2020

By 2010 household energy use should be around 460TWh, and carbon emissions at around 35MtC/a. On this basis the trend in reducing energy use could be maintained through to 2020.

We can see some energy efficiency improvements beyond the cost-effective measures outlined to 2010 (see *section 6)*, that require the long-term view. Some of the currently cost-effective measures will still remain to be done, but increasingly there will need to be investment in the currently less cost-effective measures for achieving the required carbon savings. Undoubtedly R,D&D will improve the cost effectiveness of existing measures over the decade, but R,D&D will need to be expanded so new technologies and techniques are developed.

- We envisage *near zero-emission* new build by 2012, so considerable carbon savings of around 1MtC/a will be made. This policy would need to be announced early to allow house builders a decade to achieve it.
- The current programme of demolishing and *replacing* 15,000 *houses*/a could be significantly increased so this level of replacement is around 50,000/a during the decade. We assess the energy savings from this measure to be around 0.5MtC/a by 2020 on the basis of zero emission new build by 2012.
- We assume that *dCHP* will rapidly fulfil its market potential, increasing from our estimated 0.7m installations by 2010 to around 8 million installations by 2020, and some of these could be fuel cell technology. If current technology is used this would save 2.1MtC
- Minimum *energy performance standards* should be specified/agreed for all new and existing technologies.
- Household *renewables* will need support so they are increasingly used on houses, especially with near zero emission building regulations.
- Options for insulating 7 million *solid wall housing* will need to be reviewed as these could potentially save 1-2MtC.

Despite expected growth in carbon emissions a reduction of 12.5% energy use by 2020, from 2010 levels should be achievable.

Improving Technologies and Standards

7.2.1 Housing Standards

The UK has an ageing housing stock[15] with 45% of homes built over 50 years ago (compared to 39% in France, 30% in Germany and 24% in the USA). Some of the UK housing stock is the poorest in Europe, and only 15,000 houses are demolished and replaced each year. Replacing old, very inefficient houses with new houses meeting the Building Regulations

[15] *English House Condition Survey* 1996

would improve our overall housing energy efficiency and hence reduce carbon emissions. Over the long term this policy should be closely re-examined with a long-term aim perhaps of achieving replacement housing of around 0.3m houses in the decade to 2020.

Many LA houses have poor insulation and heating systems. Minimum standards for energy efficiency in local authority housing stock would help improve the measures that are taken by LAs, especially when they transfer large numbers of their housing stock to housing associations through large scale voluntary transfer (LSVT). Improvements in house refurbishment techniques should be actively researched through the Best Practice programme.

We recommend:

- *That housing policy be focussed towards improving housing stock above the existing thermal efficiency levels.*
- *That the rate of replacement house building is increased, and the environmental impacts of retaining old inefficient housing are assessed.*
- *That refurbishment techniques are developed further to improve energy efficiency.*

7.2.2 dCHP

dCHP has been in the process of development over a number of years and now looks set to become more available on the market. This will provide 90% efficient technology in the home, generating electricity while providing heat. It will cover up to 75% of the needs of the household. Excess electricity can be fed back into the network. dCHP can save between 0.3 and 0.6tC/a per unit installed, dependent on the boiler it replaces. These units are likely to be marketed as " replace your old boiler, save on your heating bill and generate most of your own electricity" . However to calculate the additional savings over the Building Regulations minimum standards from 2002, the comparison has to be made with a 78% efficient boiler.

Some estimates suggest that there will be around 1 million units installed by 2010. EST believe that a realistic expectation is that around 700,000 units could be in place by 2010, saving around 0.3MtC on average. However uptake of these units could grow rapidly to around 8 million units by 2020 and with expected increase of electricity output from the dCHP units (especially if fuel cell units are used) CO_2 savings will rise. Condensing boilers have struggled to gain their 9% share of the boiler market, but some of the installer difficulties are unlikely to occur because the manufacturers will train a dedicated installation team. The technology is also attractive to energy suppliers because suppliers have to buy electricity when it is expensive, to cover for the peak demand hours in the evening. dCHP will shave off some of the demand at peak times (and will be predictable in doing so), thus reducing suppliers' electricity purchasing costs. The long term potential for this technology is likely to be even greater.

If dCHP becomes widely installed in houses potential technical and regulatory difficulties in the electricity distribution system will have to be overcome. Government and regulator activity to overcome these barriers will also be needed to encourage householders to take up the new technologies.

We recommend:

- *That Government supports dCHP demonstration/field trials as soon as possible to validate the savings and assess its suitability across different household types.*
- *On successful completion of the field trials, Ofgem should include dCHP as a qualifying EEC measure.*
- *That a working party led by Government and Ofgem is set up to identify and address any legal or technical barriers to the wider deployment of dCHP, for example through energy services.*

7.2.3 Solid Wall Housing

Most houses built before 1930 are of solid wall construction, and therefore have no cavity wall to fill. There are currently around 7 million solid wall properties in the UK. These houses will always suffer from considerable heat loss through the walls. To limit heat loss through the walls there are currently two options: exterior cladding, and interior lining.

Exterior cladding is most efficient and effective, but can be aesthetically unattractive in many locations. It costs around £1900 per house, with a pay-back of 9-11 years. Many UK cities have Victorian and Edwardian houses which preserve their period style, and exterior cladding would not be in keeping with the area. However there have been a range of successful local authority programmes with exterior cladding, and these successes need to be disseminated and encouraged.

To date, interior lining is not as effective for energy efficiency, and there is some loss of space in each room. It costs around £1000 per house, with a pay-back of 5-6 years. BASF in Germany has made considerable progress in developing interior lining materials made from neopor for solid wall houses. These are 50% more efficient than traditional styrophone panels as well as being thinner, thus reducing the amount of lost space. However a 5 year payback will be a disincentive for householders, but energy efficiency programmes may offer incentives to encourage uptake.

We recommend:

- *That new materials are deployed in pilot projects, and promoted if successful*

7.2.4 Household Renewables

Renewables provide an indigenous source of carbon-free energy to complement fossil fuels. Renewables currently contribute 3GW to UK electricity supply (3%). The 2010 target for renewables is 10% of electricity supply. The trend in electricity supply over the past decade has been towards smaller more flexible sources (smaller Combined Cycle Gas Turbines rather than previous large scale coal and nuclear powered stations).

There are a number of renewables suitable for small-scale production at community and household level. The renewable technologies considered most economically viable in this context are:

- Small scale wind power projects, if planning arrangements are sensitively handled with local communities;
- Energy crops. Production of energy from biomass can be a local community-based scheme.
- Photovoltaics (PV) are deployed in domestic houses in Germany and Japan. The DTI PV project will help raise awareness of PV technologies, but much greater effort is needed for these to become cheaper (from mass production). Subsidies are needed for this technology to become market competitive, and this will include a favourable buy out rate for the electricity generated. In commercial buildings, PV panels are already cost-effective when compared with prestige cladding materials. In this sense, there is already potential for 250MW PV (a small power station) by 2010.
- Solar thermal technologies provide water heating for the home. This is a relatively inexpensive technology. Denmark and Austria have extensive capital and tax support mechanisms for this technology.
- Ground source heat pumps are widely used in the US and Scandinavia. This technology could be particularly efficient for providing energy to households in rural regions off the gas supply.

Support measures are necessary to overcome local resistance to renewables development at the planning stage (providing help for developers to gain community approval for schemes). Favourable buy-out tariffs, and help in overcoming the problems engendered by NETA will be essential. Renewable energy operators have realised this, and new initiatives aim to secure local support, e.g. National Windpower's 'WindWorks' initiative.

It would also be important for energy suppliers to be offered incentives for encouraging embedded generation in the electricity network. It is likely that this will entail a completely different approach to the regulation of distribution networks, allowing them to invest in smarter networks, capable of coping with large numbers of very small distributed generators.

We recommend:

- *That government gives full support for domestic and community based renewable energy projects, including subsidies as necessary for the electricity fed into the supply system, and fiscal incentives for capital investments.*
- *That Government issues planning guidance to local authorities, setting out the national and regional context in which they should make future planning decisions on such issues*

CONCLUSIONS

In this paper the Energy Saving Trust has outlined how a target of 12.5% reduction in household energy use to 2010 can achieve a reduction of 100TWh, and additional savings of 7.2MtC/a. This will allow the Government to exceed its target for reducing household emissions outlined in the Climate Change Programme. We believe an aspirational target of 12.5% reduction in household energy use can be achieved between 2010 and 2020.

With the full range of policy measures we have described, 100TWh of energy will be saved by 2010. This will compensate for the projected rise in energy use, and will avoid the need to provide replacement electricity capacity to the domestic sector.

Appendix 1

Cost Effective Measures

1 Boilers

Space and water heating accounts for 85% of energy use in the home. The energy efficiency of the boiler therefore plays a critical part in reducing energy use in the household sector.

Total sales of domestic boilers stand at 1.32 million per annum (year 2000 figures). These boilers are divided according to their efficiency into bands A to G, with A the most efficient. From April 2002 new *Building Regulations* come into force which require all new boiler installations to meet standards A to D. All these boilers will have an efficiency of 78% or greater. Of these, bands A to C apply to condensing boilers, with band A boilers achieving 90% efficiency and above. Condensing boilers are the most efficient (in bands A-C) and currently account for around 9% (on 2001 projections) of total boiler sales. Since 1993 annual sales of condensing boilers have grown by 21% per annum, largely supported by grants (initially funded through EST schemes but more recently funded under the Standards of Performance).

Condensing boilers have been slow to achieve even current market share for a number of reasons: many boiler installers discourage householders from buying condensing boilers because they are not trained to install them properly. Badly installed equipment breaks down, so householders think they are unreliable. Condensing boilers cost around £1,600 (including VAT) installed. VAT on condensing boilers remains at 17.5%, even though it is an energy efficiency measure, while VAT on domestic fuel has been reduced to 5%.

From April 2002 suppliers are likely to be offering incentives for householders to buy condensing boilers, under the EEC. Expected total sales for condensing boilers under EEC 2002-5 are 440,000 (of which 360,000 are additional to business as usual) with lifetime savings of 1.9 tonnes of carbon per unit. Around 60% of the boilers on offer through the EEC schemes will be B-rated, as these provide good carbon savings for the cost per appliance, the remaining 40% would be A or C rated. If VAT is reduced for A-rated boilers, we believe this balance would be reversed so 60% of offers would be for A-rated boilers. *By increasing uptake of A over B-rated boilers carbon savings of 63,000 tonnes/a could be achieved instead of 58,000 tonnes*..

Reducing the retail price of condensing boilers will encourage manufacturers to expand the condensing boiler range. Manufacturers and retailers will promote condensing boilers in their sales and marketing, thus widening the uptake even beyond the EEC.

We recommend :

- *That the government reduces the rate of VAT on A-rated condensing boilers to 5%, reducing their wholesale price.*
- *That government supports a wide scale gas installer training programme, to increase the number of gas heating system installers which will be linked to NVQ 1,2,& 3 level training.*

2 ***Combined Heat and Power (CHP)***

dCHP and community heating based CHP provides the maximum efficiency in fuel use associated with electricity generation, with efficiencies as high as 80-85%. The current UK CHP capacity of 4,700 MWe is estimated to have saved 4.48 MtC in 2000 against a fossil fuel basket[16]

The Climate Change Programme has set a target of at least 10,000MWe of CHP capacity by 2010. Current severe economic barriers for the CHP industry mean this target will not be met, unless difficult trading conditions are alleviated for CHP. Falling electricity prices and increasing gas prices have made CHP less economic. Even with Government programmes

[16] *Energy Trends A Quarterly Statistical Bulletin from the DTI.* June 2001

like Community Energy, which is intended to kick-start CHP/community heating projects, further policy supports are needed.

If an obligation of 15% of UK electricity by 2010 were set, our estimate, consistent with CHPA's, is that the buy-out price would need to be of the order of 1-2p/kWh. On 15% of electricity supplied, this would be around 0.3p/kWh supplied, similar to or lower than the cost of the renewables obligation, with similar CO2 emissions savings.

We recommend:

- *That, in recognition of the importance of electrical exports which now account for a third of the output from CHP schemes, all electricity exports from good quality CHP be exempt from the Climate Change Levy regardless of customer.*
- *That the government should set an obligation on energy suppliers to supply 15% of UK electricity from good quality CHP by 2010.*
- *Continued funding for Community Energy to extend it beyond 2004. A target of 1000 MWe of Good Quality Community Heating by 2010 is, we believe, both realistic and challenging.*
- *That more incentives for energy services are developed (i.e. less emphasis on low cost per unit and more emphasis on lowering total bills).]*

3 Insulation

There is still considerable potential for improving household insulation (loft, hot water tank & pipes and cavity walls). Many householders believe they have adequate loft insulation, but they laid the insulation years previously and have not topped up the level to meet new building regulations, which recommend 250mm thickness. There are still 7.5m houses that would benefit from increased loft insulation. Householders are most likely to assess energy efficiency, including insulation levels when they move home. Economic incentives for encouraging energy efficiency at the time of a home move, are essential (see section 4 on Fiscal Incentives) perhaps as a reduced level of stamp duty or as a reduced mortgage rate.

Nine million households have unfilled cavity walls. Only 30% of all cavity wall houses have insulated the cavity. This is a remarkably low figure in comparison to the Netherlands (75% of cavity wall houses) and Denmark (40%) of potential houses. If cavity walls are filled energy loss is reduced by an average of 28% per household. Capital cost and suspicion about the quality of workmanship have traditionally been barriers to wider uptake, though schemes such as SoP programmes and EST cash-backs have helped address these barriers and raised installations to over 200,000 a year in existing homes. This compares to less than 100,000 a decade ago. However more effort needs to be put into raising the capacity of the industry to deliver larger numbers, and also to ensure quality standards are maintained, e.g. through a Government-backed installer accreditation scheme..

Most houses built before 1930 are of solid wall construction. To limit heat loss through the walls there are currently two options: exterior cladding, and interior lining. Exterior cladding is most efficient and effective, but is aesthetically unattractive in many locations. It costs around £1900 per house, with a pay-back of 9-11 years. Many UK cities have Victorian and Edwardian houses which preserve their period style, and exterior cladding would not be in keeping with the area. Interior lining is not as effective for energy efficiency, and there is some loss of space in each room. It costs around £1000 per house, with a pay-back of 5-6 years. New materials have been developed by BASF in Germany that are twice as efficient as conventional materials while being half as thick. This may prove to be an attractive option in some houses. In some houses a dCHP unit might be a more cost-effective energy saving measure.

A range of technical options have been researched under the Best Practice programme and major housing providers such as local authorities and housing associations could be informed of the options. Some LAs have incorporated energy efficiency measures into the building fabric when regeneration work is undertaken on housing blocks. Other options for individual buildings could also be pursued if money was made available.

We recommend:

- *Greater effort to raise capacity and maintain quality standards with the installation industry.*
- *Further R&D into improved insulation that can save energy without reducing interior space.*

4 Appliances

Energy use by domestic appliances will grow rapidly over the next decade. Increased use of home computers, and new technologies such as digital set-top boxes will increase demand for energy. Many of these appliances consume energy even when in "stand-by" mode, and they are rarely switched off.

A three-pronged approach is needed to tackle the problem:

- minimum standards should be agreed between government and industry within an EU framework so the standby mode consumes near zero energy, current aspirational targets agreed in the government's market transformation programme need to become reality;
- consumers need to be influenced so they choose energy efficient appliances;
- manufacturers and retailers need to be motivated to promote energy efficient appliances and convinced of their marketing opportunity.

Promotional schemes such as the EEC have significantly increased uptake of energy efficient appliances. This is supported by the Energy Efficiency Recommended (EER) label that helps consumers easily identify energy saving products. This label needs to be extended to other products, and more manufacturers and retailers need to be brought into the Trust's EER scheme.

The EU Energy label provides consumers with information about the energy consumption of a product. However this information needs to be supported by a sale assistant's direct promotion of an appliance's energy efficient properties. The EST has worked closely with some retailers to improve staff training on energy efficiency, and this work needs to expand.

We recommend:

- *That minimum standards (voluntary and statutory) should be agreed between government and industry so the standby mode consumes minimal energy.*
- *That the EER label be rapidly extended to other energy efficient products, and that more manufacturers and retailers be brought into the EER scheme.*
- *That consumers are educated (through awareness raising campaigns) in the energy and environmental implications of their appliance purchases.*
- *That government support general R,D&D into reducing standby power consumption.*

5 Lighting

CFLs account for only 4% of the UK lamp market. The market for CFLs has increased rapidly in the last few years, as capital costs have fallen, and suppliers have often met their SoP obligations through promoting low-cost CFLs. Currently around 35% of UK households have at least one CFL. However there remain 120 million light bulbs that could be replaced by CFLs by 2010.

While the EEC will promote CFLs, there will be further scope for promoting them. Currently most homes have traditional light fittings, many of which are small decorative lamps that cannot take CFLs.

There is considerable scope for further energy savings. Luminaires (light fittings with inbuilt bulbs) offer the most sustainable energy savings in the home. The new Building Regulations require an average of 3 energy efficient luminaires to be installed into newly built houses,

however developers may work around this requirement by installing no light fittings. Luminaires are expensive to buy and because of the capital cost there is little customer demand for them. So manufactures see no market for their most efficient products, and are reluctant to expand their luminaire designs. With the right incentives, and recognition that there is a market for the product, manufacturers could develop efficient luminaires so they become a natural alternative to existing light fittings. Some suppliers are promoting luminaires through their EEC offers, but these are often limited in their selection and may not appeal aesthetically to the customers. An integrated approach for encouraging the energy efficient lamp market is needed, enhancing the work now done by the EST. Labelling with the Energy Efficiency Recommended logo is necessary to alert customers to the energy and environmental advantages of these products, and this in itself has been slow to be adopted. Manufacturers operate on a global scale and they argue that packaging with a UK-only logo is too expensive to produce, and in the event of having to withdraw stock from the market this would incur further expense.

The EST is already working towards linking manufacturer and retailer promotional activity to a widespread energy efficiency information campaign, but this is limited in its effect at this stage. The partnership approach, with the EST facilitating a common approach by manufacturers and retailers, is most successful in taking forward energy efficiency objectives.

We recommend:

- *that VAT is reduced to 5% for "good quality" CFLs;*
- *that an environmental "levy/tax" is imposed on standard light bulbs e.g. tungsten;*
- *that government continue to press the EU to include imports of low quality CFLs in the EU import tax;*
- *that government supports R,D&D into the innovation of new technologies (e.g. the potential for LED lights in the domestic sector).*

Appendix 2

No. of measures by activity (million)									
	Incentive programmes								
	EEC	HEES	Com'ty Energy	TOTAL incentive progs	Building Regs	Fiscal	Total measures to 2010	Business as usual uptake	Net add'l house holds
Building Fabric									
Cavity Wall Insulation	5.7	1.5	0.0	7.2	0.0	0.0	7.2	1.1	6.1
Low E glazing	0.0	0.0	0.0	0.0	9.7	0.0	9.7	0.0	9.7
Loft insulation	3.9	2.1	0.0	6.0	0.0	0.0	6.0	3.0	3.0
Tank/pipe insulation	7.3	0.0	0.0	7.3	0.0	0.0	7.3	2.4	4.9
Draughtproofing	0.6	2.1	0.0	2.7	0.0	0.0	2.7	0.0	2.7
sub-total	17.5	5.7	0.0	23.2	9.7	0.0	32.9	6.5	26.4
Heating									
Condensing boilers	2.9	0.8	0.0	3.7	0.0	0.7	4.4	0.3	4.1
Boilers (building regs)	0.0	0.0	0.0	0.0	9.0	0.0	9.0	0.0	9.0
Controls	1.5	0.6	0.0	2.1	0.0	0.0	2.1	0.3	1.8
Community CHP	0.0	0.0	1.0	1.0	0.0	0.0	1.0	0.0	1.0
dCHP	0.7	0.0	0.0	0.7	0.0	0.0	0.7	0.0	0.7
sub-total	5.1	1.4	1.0	7.5	9.0	0.7	17.2	0.6	16.6
Lighting									
CFL	75.0	5.0	0.0	80.0	4.0	16.0	100.0	15.0	85.0
Appliances									
Cold	6.0	0.0	0.0	6.0	19.0	0.0	25.0	0.0	25.0
TV/VCR	0.0	0.0	0.0	0.0	25.0	0.0	25.0	0.0	25.0
Wet	0.0	0.0	0.0	0.0	20.0	0.0	20.0	0.0	20.0
Other	0.0	0.0	0.0	0.0	25.0	0.0	25.0	0.0	25.0
sub-total	6.0	0.0	0.0	6.0	89.0	0.0	95.0	0.0	95.0
New Build									
Standards/promotion	0.0	0.0	0.0	0.0	2.1	0.0	2.1	0.0	2.1
Demolition of old properties	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.3
sub-total	0.0	0.0	0.0	0.0	2.4	0.0	2.4	0.0	2.4
TOTAL	**103.6**	**12.1**	**1.0**	**116.7**	**114.1**	**16.7**	**247.5**	**22.1**	**225.4**

Appendix 3

Renewables, Energy Efficiency, Fuel Poverty and CHP

Below is a comparison of the current and planned public expenditure devoted to renewables, energy efficiency, fuel poverty, and CHP. This comparison is made to highlight the relatively low level of Government expenditure on energy efficiency, particularly in relation to the non-fuel poor.

Warning

- We recognise that different activities have different objectives, so expenditure will vary. Renewables are largely immature technologies on the market and require support.
- In the comparisons below we are not always comparing like with like and are not always using the same time periods.
- This analysis is designed to give rough orders of magnitude.

Renewables

Cost to Government:
CCL exemption - £100M/a
Grants/subsidies - £200M (one off)
DTI Programmes - £100M PIU (one off)
Cost to energy suppliers/customers
Renewables Obligation- nearly £800M/a by 2010 (Renewables Consultation Paper)
NFFO - £100M/a

Total Cost to Government*:* About £300M one-off, £100M/a

Energy Efficiency - non households

Cost to Government*:*
Negotiated agreements £350M – £400M/a
Climate Change Levy Revenue – £1 Billion/a – £50M for energy efficiency and postponement for some years of £100M/a tax payments via 100% first year capital allowances.

Energy Efficiency - Households

Households (non fuel poor)
Cost to Government: £21M/a EST Grant to 2004/5 (assumed)
c£2M/a customer VAT relief (insulation and controls) in EEC
Cost to energy suppliers/customers : £65M/a EEC to 2005

Households (fuel poor)
Cost to Government: £200M/a new HEES (plus devolved administrations)
c£25M/a VAT relief (insulation and controls) in HEES programmes
£7M/a EST Grant to 2004/5 (assumed)
Cost to energy suppliers/customers: £100M/a EEC 2002-5

Fuel poverty, not energy efficiency measures:

Cost to Government:/a
Winter fuel payments **–** £1.7Bn pa (not all going to the fuel poor)

CHP

Cost to Government:
Climate Change Levy exemption for good quality CHP – estimated at £100M in 2001/2.
Community energy - £25M/a 2002-4