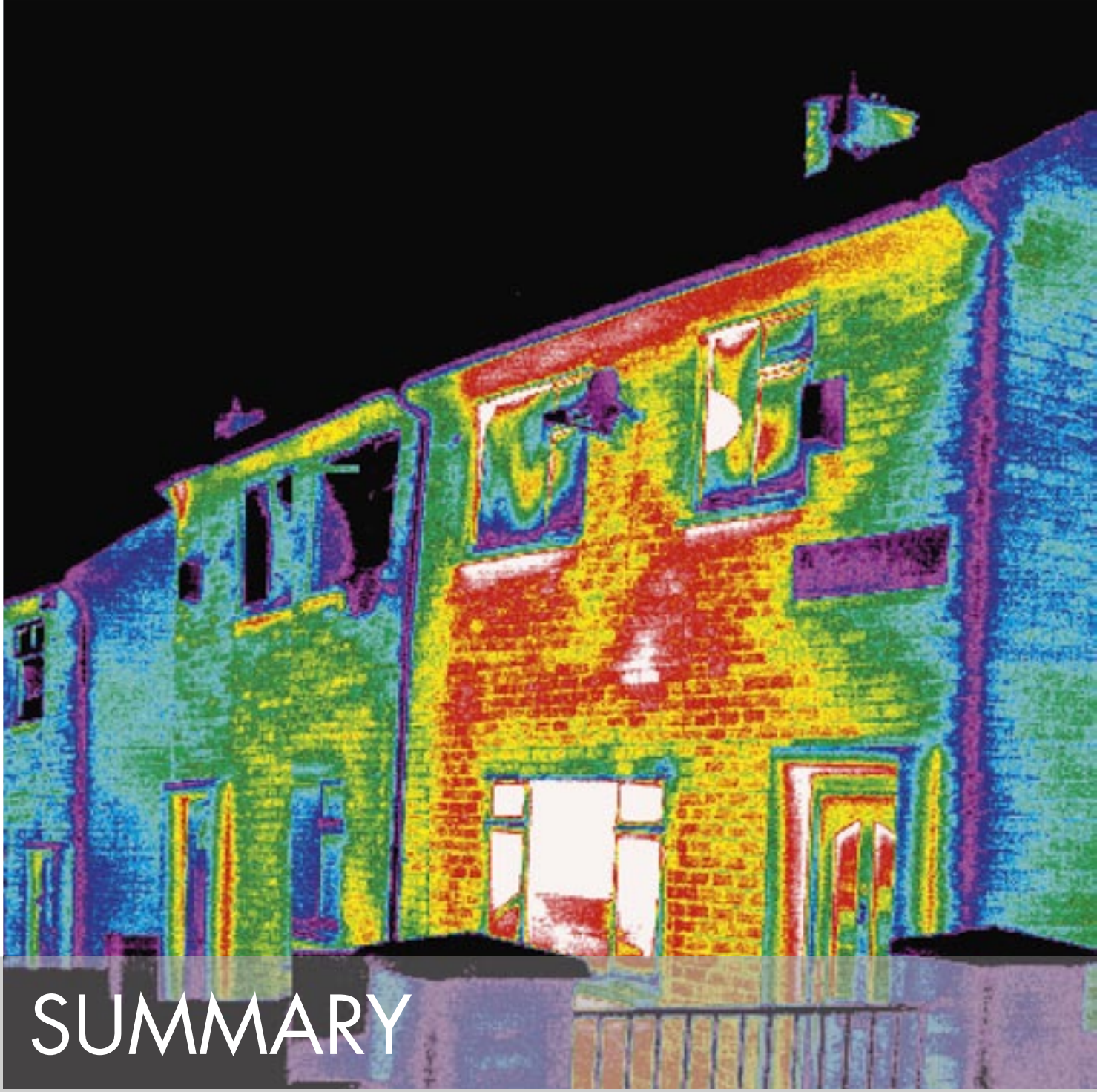
National Audit Office

Programmes to reduce household energy consumption

This report supersedes HC 787 published on the 2 July 2008 following a printing error

LONDON: The Stationery Office
£14.35

Ordered by the
House of Commons
to be printed on 4 November 2008



SUMMARY

1 Household energy consumption is an important area of public policy. UK households spend £20 billion on energy each year, mostly on electricity and gas, and account for just under 30 per cent of all energy consumed in the UK. Programmes to improve energy efficiency and reduce energy consumption cost some £2.6 billion a year: a mixture of direct expenditure and compliance costs borne by business and households. However, the value of the possible energy savings is thought to outweigh these costs many times over –at current prices the typical household could save at least £280, or roughly 30 per cent of their energy bills, if they adopted the cost-effective measures already available to them. In addition to its financial importance, household energy consumption is responsible for 27 per cent of all carbon emissions, and is central to efforts to mitigate climate change. And in times of rising energy prices and concerns over energy security, reducing household energy consumption can help reduce fuel poverty and reduce reliance on imported energy.

Key targets

There are two measures against which government has set targets: energy consumption and energy efficiency. Improving energy efficiency contributes to the ultimate goal of reducing energy consumption.

On energy consumption:

- government has set a UK-wide target to cut total energy consumption across all sectors by 9 per cent by 2010 compared with average 2001-2005 levels; and
- government is expecting that the contribution from households towards that target will be to reduce their energy consumption by just over 11 per cent by 2010, and a further 2 per cent by 2016, compared with 2001-2005 levels.

On energy efficiency:

- government has set a target for households in England to be 20 per cent more energy efficient in 2010 than they were in 2000; and
- government has also set a target to save 4.2 million tonnes carbon (MtC) per year by 2010 through energy efficiency measures in the UK residential sector (3.5 MtC in England) from a 1990 baseline.[1] This carbon-based target reflects a similar outcome in terms of the required improvement.

2 This report examines the programmes government has put in place to reduce energy consumption in England, including UK-wide programmes, but excluding programmes specific to Scotland, Wales or Northern Ireland. It sets out government's targets and expectations, progress to date and the significant issues influencing the cost-effectiveness of the four major programmes in this field. In doing so, it draws upon departments' own estimates of energy savings, which are produced in accordance with cross-departmental guidance and processes.

Main findings

3 Programmes to influence household energy consumption have been in place since the early to mid 1990s. The main programmes have been those to promote and install energy efficiency measures in households, particularly in vulnerable households to reduce fuel poverty, setting energy efficiency standards for new homes via Building Regulations, and requirements for new household appliances to be more energy efficient. There have also been information campaigns to influence householder behaviour. These programmes are delivered by a range of government bodies, principally Defra, CLG and BERR. Defra is responsible for overall coordination and delivery.

4 These programmes have contributed to improvements in household energy efficiency (it now takes less energy to heat our homes to the same temperature) but, until very recently, overall household energy consumption has risen. Household energy efficiency improved steadily between 1990 and 2004 – by approximately 1.4 per cent a year (19 per cent since 1990), with greater improvements in social than in private housing, reflecting past concentration of efforts on vulnerable groups. However, improvements in energy efficiency have until recently not been enough to offset other trends – such as the growth in the number of households, more comfortable homes (e.g. more of the house heated to the same temperature), and the growth in energy-using appliances – which have meant that household energy consumption rose 19 per cent between 1990 and 2004.

5 Prior to 2004 there were no targets specifically for household energy consumption or efficiency. Targets and expectations have built up over time as a result of EU requirements and UK policy reviews. As a result, the main energy targets to which UK households contribute differ in the nature and timings of the baselines, their target dates and their geographical and sectoral coverage. No specific energy-related targets have been set beyond 2016. Therefore, the contribution that household energy consumption is expected to play in meeting the range of energy policy objectives in the longer term (including reducing fuel poverty, reliance on imported energy and climate change, where UK-wide targets have been set to 2050) is unclear. Departments expect that in the future, targets for household energy consumption will be driven by carbon budgets set by the Government in response to the recommendations of the proposed Climate Change Committee.

6 Despite the gradual rise in household energy consumption since 1990, government now anticipates a significant reduction in household energy consumption. Indeed, energy consumption has fallen in 2005, 2006 and 2007 (gas consumption decreased 12 per cent over the period; electricity consumption decreased only marginally and remained slightly higher in 2007 than in 2004). These are promising signs, and if this trend continues, suggest that households' share of the key targets for consumption, set for 2010 and 2016, can be met. Departments have made considerable efforts in recent years to pull together a more systematic approach to household energy consumption – especially in the Energy Efficiency Action Plans of 2004 and 2007. Achievement depends on successful delivery of various programmes; but is also dependent on non-policy factors influencing energy consumption such as energy prices.

7 It is difficult to assess progress against the 2010 energy efficiency targets; the latest available data are for 2004. Although Defra has an agreed method to measure performance against the target, it has not done so since 2005.

8 Departments' plans to reduce future household energy consumption rely mainly on an expansion or continuation of existing programmes, or new programmes: more stringent **Building Regulations** which require new homes and some renovated homes to be more energy efficient; **obligations on energy suppliers**, which require them to promote household energy efficiency measures to consumers; and **programmes to improve the efficiency and labelling of household appliances** to require or encourage the purchase of more energy efficient models. In addition the government provides **information to influence behaviour**, including proposals for Better Billing and Metering so that households are more energy-aware. But there are some major challenges:

- There is a growing recognition that non-compliance may undermine the effectiveness of Building Regulations, especially as they become increasingly stringent. But as yet there is little concrete information on the extent of non-compliance or how best to tackle it. There are also concerns, but little information, over the capacity of the construction supply chain to deliver more stringent energy standards
- Obligations on suppliers to promote energy saving measures have been successful, particularly in targeting vulnerable homes. But there are concerns about the capacity of the energy efficiency industry (e.g. insulation manufacturers and installers) to meet the required installation rates of key measures (such as loft and cavity wall insulation); and about the level of consumer demand required to drive expected future energy savings, particularly in private households.
- Even by 2050 two thirds of the housing stock will have been built before 2005, so there is a need to focus on existing housing as well as new homes. Future obligations on energy suppliers will require them to install more measures in private households, but it is uncertain whether sufficient consumer demand can be generated. Also, 43 per cent of homes in England have at least one feature associated with 'hard to treat' housing stock – so cannot be fitted with all standard energy efficiency measures.
- Programmes to move consumer choice to more energy efficient appliances through design and labelling schemes have had some effect although the UK lags behind others in Europe. Estimates of their future effectiveness depend on as yet unknown technologies, and on the European Union's preparedness to adopt them (the UK government is not able to set mandatory standards for products; international agreement is required). There are particular risks and uncertainties regarding the growing consumer electronics sector. Also, UK and EU standards are not as wide-ranging or as stringent as some in other parts of the world.
- Alongside technological efforts, programmes will need to address householder behaviour. Householder behaviour is not only important for the take-up and impact of the other programmes listed above but also because behaviours such as leaving lights on and using unnecessary heat have a big impact on overall energy consumption. But there remains a significant gap between householder awareness and behaviour. There is limited information about the outcomes of information programmes (in terms of a discernible shift in consumer attitudes and behaviours) and thus about their cost-effectiveness, or how they could be better designed in the future. In particular, there is considerable uncertainty over the likely impact of better ways of metering.

Recommendations

9 After years of increasing household energy consumption, the relevant departments (Defra, BERR, CLG) now anticipate a significant reduction in energy consumption and continued improvements in energy efficiency. But to achieve future targets, and for these programmes to be cost-effective, there is much that still needs to be done:

- **There are no explicit targets for household energy consumption beyond 2016 and none for energy efficiency beyond 2010.** Instead, departmental expectations are embedded in the analysis supporting the Energy White Paper and Climate Change Programme. Defra should consider whether household energy consumption is important enough in its own right to warrant more explicit targets, and clarify expectations of household energy beyond 2016.

- **There are some lags and deficiencies in the data needed to monitor progress towards targets.** The latest available household energy consumption data are a provisional figure for 2007. The target for energy efficiency was set in 2004 but Defra has not updated the data used to measure performance against it since that year. Defra will need to improve the data on which progress is monitored, so that programmes can be responsive and kept on track.

- **The evidence base about programme effectiveness needs further work.** Defra, BERR and CLG have developed better models and projections, but there is as yet a lack of genuine ex-post evaluations of effectiveness based on real practice in homes. This should include a deeper understanding of the impact of installation techniques on the effectiveness of insulation; the capacity of industry supply chains to meet required insulation installation rates and to meet stricter Building Regulations; and the performance of measures once installed, perhaps through learning from exemplar housing developments.

- **Until recently, there had been little work carried out to establish whether non-compliance with Building Regulations may be a significant factor inhibiting effectiveness.** Until now, projected impacts for this programme have assumed full compliance. A project, part funded by CLG, is now underway to look at average levels of compliance with energy efficiency standards in the Regulations. This work needs to be concluded and continued and convincing proposals made to address the issues. The results of this project must be used to inform future amendments to the Regulations and support more realistic estimates of impact. This will be especially important since future Regulations are expected to be more stringent and non-compliance correspondingly more likely.

- **Older and private homes may need to assume greater importance if energy targets are to be met.** Existing homes dominate the housing stock. Although departments believe that the current policy mix will deliver the required energy savings, there are nonetheless significant risks and uncertainties. It will be important that departments monitor the progress of current programmes in addressing the poor energy performance in many older and privately-owned homes and consider whether further intervention is required when deciding on the design of the Supplier Obligation post-2011.

- **Better information on the use of energy efficient appliances could help bring about more effective policy.** Data on the use of such appliances varies by type of product; Defra should consider what scope there is to improve the evidence base, for example by setting up long term monitoring of appliance use in a representative sample of homes. There is also limited information from which to compare and learn lessons from UK performance with European counterparts; Defra should renew its efforts to work with other Member States as far as possible to put together a more systematic picture of performance across the EU.

- **Whilst householders are aware of energy efficiency and climate change, there are many barriers to action, both real and perceived.** How householders use energy in their homes can undermine attempts to improve energy performance in UK homes; overcoming the barriers to action is crucial to delivering energy savings in the existing and new housing stock. Whilst Defra now has a good understanding of these barriers, it is less clear whether the policy mix is addressing all of them sufficiently. There is also a need to assemble more evidence about the outcomes of information programmes, incorporating the results of ongoing evaluations, and about how householders are likely to respond to Better Billing and Metering initiatives. The evidence base for the cost-effectiveness of smart metering compared with other ways of providing information to households is thin, and needs development before departments can be in a position to recommend expansion.

- **Earlier work on cost-effectiveness gives some assurance but could be updated and improved to inform future decisions on the best mix of programmes.** Work carried out at the time of the 2006 Climate Change Programme Review was based on carbon reductions rather than energy saving, and explored a limited number of options for varying the mix of programmes. Things have moved on, and departments should use forthcoming reviews of household energy policy to look again at the most effective mix of policies to reduce household energy consumption.

Value for money conclusion

10 Reducing household energy consumption should provide value for money for consumer and taxpayer alike. If government programmes are designed and carried out well, many householders across England will benefit from warm homes and lower energy bills, whilst wider objectives relating to climate change and energy security are made more achievable. There are some signs that these programmes have begun to reverse the long term trend of rising energy consumption and analysis shows that they have been cost-effective. However, for all types of intervention, departments must collect more evidence to be sure that their programmes are working as well as they could be.

11 To achieve their longer-term targets, programmes must focus increasingly on homes that are harder to treat, technologies that are newer and more expensive, and householders who are less keen to act. These challenges make the risks to cost-effective delivery of energy savings in the future all the greater. Departments have done good work to identify these risks, but as yet there is not convincing evidence that these risks can be overcome.