THE FOUNDATION FOR SCIENCE AND TECHNOLOGY

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DINNER/DISCUSSION SUMMARY

Meeting the carbon reduction targets – how can the energy efficiency of the existing building stock be increased?

Held at The Royal Society on 4th June, 2008

We are grateful to
ARUP, The Carbon Trust, The Comino Foundation, Economic and Social Research Council (ESRC) and Engineering and Physical Sciences Research Council (EPSRC) for supporting this event

Chair: **The Earl of Selborne KBE FRS**
Chairman, The Foundation for Science and Technology

Speakers: **The Lord Turner**
Chair, Committee on Climate Change
Professor Michael Kelly FRSE FREng
Chief Scientific Advisor, Department for Communities and Local Government
James Rae
Chief Executive, Consensus Environmental, Real Estate & Technology
Eddy Collier
Managing Director, Centrica and Central Heating Installations, British Gas

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LORD TURNER explained the importance of targeting CO2 emissions from existing buildings. Of the 600m tonnes of CO2 emitted, 172m tonnes came from domestic use and 237m tonnes from industrial and commercial. In 2005 42% of residential emissions came from electricity (mainly appliances) and 58% gas (mainly heating). In the industrial sector, much of the energy usage was in manufacture, but in the commercial, public sector and SME sectors, it lay in building use. Improving energy efficiency (e.g. insulation, new boilers); decarbonising energy sources (e.g. renewables, micro generation); and changes in lifestyle (e.g. turning down the thermostat) could all reduce CO2 emissions. Energy efficiency could be installed in new buildings through regulation, but new buildings were only a small part of the problem - even if new build reached 240,000 a year, demolitions would be only 17,000. So even in 2050 existing buildings would be overwhelmingly those which existed now. The older they were (and 44m were built before 1918), the less efficient they were. Many efficiency measures - insulation, better appliances - were, in effect cost free, or beneficial, because lower fuel costs gave immediate returns. Why did people not take them up? Possible factors were the inevitable hassle, lack of information, and the small proportion of household income taken by fuel costs. Better billing arrangements and more information could help. But more could be done - financial incentives (on the analogy of taxing cars in relation to their fuel use); reinforcing the suppliers' obligation; creating one-stop assessment, purchase and installation schemes. The public sector itself should give a much more determined lead.

PROFESSOR KELLY said that the science was clear; his concern was with the robustness of the engineering response. He endorsed Lord Turner's view of the importance of the domestic sector. 45% of the target for CO2 reductions in 2050 had to come from the domestic sector - but 87% of the stock in 2050 would be dwellings already built. There had been growth in the installation of energy saving devices between 1990 and 2000, but there must be a six fold rise in the trajectory to meet targets. These could only be met by a combination of fiscal measures or incentives, reengineering the fabric of existing houses, and developing new energy sources. Much of the responsibility for delivery lay with local authorities; they needed road maps which enabled individual boroughs to understand through better metrics precisely what must be done, whether they were on the right path and what remedial measures were needed - a pilot scheme for five boroughs was being developed. Leadership from the boroughs and from the centre, which understood the rehabilitation and retrofitting industry and sought to create a consortium from among the many trades and small companies who formed the industry was needed. We needed to recognize the scale of the challenge; develop leadership and increase skills and expertise.

MR RAE explained the business model behind Consensus Environmental, Real Estate & Technology (CERET). The object was to bundle the income streams which came with property ownership and management - ground rents, service charges etc - into sufficiently large and sustainable groups so that they could be securitized. The particular "green" advantages that this approach could yield were in the possibility of adding income from services such as waste collection and disposal, more efficient lighting, district heating, combined heat and power, or micro generation. Securitizing such income meant that the capital cost of providing the infrastructure could be spread over time. The financial benefits could be shared between tenants and management, but the public benefit would be reducing the use of resources (not only energy but also water) more quickly. Crucial to the success of this model was a detailed knowledge of the behaviour, priorities and wishes of tenants and the establishment of accurate metrics to measure energy use. The success of CERET showed how the private sector could harness profitability to government policies in reducing energy use.

MR COLLIER outlined the scale of Centrica's operations, as power generator and retailer, installer and developer of heat technology and major centre of research into renewable technology. It was important to concentrate on the consumer - the ultimate payer. Until recently the cost of gas was of little concern to him, as it was only a small part of household expenditure and household incomes had doubled since 1990. But consumer research was now showing that consumers were becoming more price sensitive, as a result of other pressures on their income. Carbon Emissions Reduction Target (CERT) (suppliers' obligation to customers) was costing £60

per customer. Any addition to it would be seen by consumers as a price rise and be resisted. The case for an addition was that while CERT certainly did have an effect, it was not sufficient to meet targets. Although heat loss was down by a third since 1970, there were still 75% of houses without condensing boilers and 9.1m houses with unfilled cavity walls. Renewable must be encouraged to meet the target - but this meant subsidies as micro generation solar etc would not otherwise take place. More thought needed to be given on how to get more customers to take up existing efficiency measures and how to subsidize non CO2 emitting sources of energy.

There was widespread agreement in the ensuing discussion on the importance of tackling the energy use in the housing stock, but a recurrent concern about the practicability of implementing existing policies. Recent studies - May 2007 - using thermal imaging in Scotland had shown that dwellings built in the last ten years had shown the worst heat loss. There was evidence that building standards were not enforced, the actual standards used in buildings not checked, insulation was badly fitted or limited, and that no penalties were imposed for failing to meet standards. Suggestions that, perhaps, the building boom had caused builders to drop standards in order to meet demand did not excuse failures such as these. Of course builders would seek to limit their costs, whether in boom or not; the problem lay in both inadequate skills and training in the workforce, and - most important in some speakers' view - the reluctance of authorities to devote sufficient resources to checking that standards were complied with, and instituting action when they were not. But authorities were in a difficult position; they were being pressurized by the government to build more new dwellings and to implement planning policies which would make them affordable, they were strapped for resources for regulation, and, finally, they themselves found it difficult to get properly trained staff. Was there a case for charging much more for inspection, but requiring authorities to use the funds to improve standards and regulation? Overall, however, the problem for new building was not policies, but implementation. In the case for retrofitting and rehabilitation, where the prospect of poor workmanship and defective installation was likely to be more acute, the problem of policing was even more acute. Both materials and workmanship needed to be checked. Thermal imaging after construction could become mandatory. A further concern was that existing policies did not take sufficient account either of the different needs and desires of different types of families an occupiers - the rich, the poor, the old or young, or the different types of dwellings – flats, terraces detached houses. Reactions to either threats or incentives would differ and could not be accurately assessed without detailed knowledge. There was some evidence about how families with different characteristics react, but more needed to be done. Marketing assessment and expertise were necessary so that effective incentives could work in differing circumstances. For example, many people feared that having work done would damage precious decorations or features of their homes; others that they would be forced to accept standardized solutions. There was widespread skepticism about resulting savings, and a failure to appreciate that for some – and not necessarily only the poor – a small capital outlay was frightening. Much more needed to be done to show families what their improved dwelling would be like - concern that damage would be done to decorations or stylistic features, and doubts about savings that would result, were widespread. Much more needed to be done to reassure people about the result of works. There were also concerns about health problems arising from retrofitting works - on the one hand, it surely must improve health if families could be warm, but inadequate ventilation and the use of new materials could lead, as in so many flats, to damp and mould.

There was no doubt that fuel prices would have a strong influence on people's willingness to take more interest in energy efficiency. The introduction of the EU Cap and Trade scheme, with the auction of permits would, in effect, be a carbon tax. But even without that, fossil fuel prices - including coal - would rise. It was important that the fuel poor were helped. There were already tools in place to help them and the aged, but did they cover all the right cases, and were they sufficiently publicized? Families must be helped to understand the payback and the rate of return they got from efficiency measures. It was also important to understand the interaction of more efficient use of energy with life styles - did savings on fuel costs simply mean people used more energy by using appliances more often or putting up the thermostat? Speakers endorsed Mr. Collier's emphasis on the consumer, and reaction to price and accepted that while it was important not to overemphasize consumer resistance, benefits had to be made transparent. This applied particularly to expenditure on micro generation, even with subsidy.

Speakers welcomed the introduction of energy certificates, to be produced on the sale of a dwelling, although considerable doubt was expressed about how likely it would be that they would affect price, given the mortgage problems and, in London and the South East, house shortage. But Australian experience showed that, at any rate after a short time, the effect would be noticeable (prices for high energy saving houses were 6% higher).

Leadership was necessary to drive forward the three elements necessary to achieve the target reductions from the existing building stock – energy efficiency, decarbonization and lifestyle change. It was also necessary to keep people focused on the green agenda - self interest because of the likely rise in fuel costs is unlikely to be enough. The public and private sectors must work together to implement such schemes as consortiums of companies and trades to work together in retrofitting, where property owners from both sectors developed a comprehensive project. Equally important was ensuring that standards were rigorously observed, that trained staff were available, that the public understood how micro generation-solar panels etc. - would attract subsidy and benefit their own energy use, and the whole construction sector saw the commercial benefits open to them if they participated in energy efficiency and micro-generation schemes.

Sir Geoffrey Chipperfield KCB

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