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Green Paper:
Towards a Sustainable Energy Future for Ireland

Submission from the

UCD Energy Research Group

Introduction

The UCD Energy Research Group (ERG) is based in the School of Architecture, Landscape & Civil Engineering at UCD Richview. Since 1975 ERG has undertaken research, development, specialist consultancy, education and dissemination activities on energy and environmental matters in building and climate-sensitive architectural design. Since 1980 the Group's activities have had a strongly European dimension, with (until recent years) practically all of its funding competitively obtained within EC programmes.
We warmly welcome the publication of this Green Paper, and are grateful for the opportunity to comment. In particular we welcome the recognition accorded energy efficiency and demand management:

"Energy saving is the quickest, most effective and most economic means of reducing energy usage and emissions".

In our comments we focus on energy in the built environment. Over half of all energy in Ireland is used in building and construction, and in the operation of buildings. The building sector offers the single greatest opportunity to achieve significant improvement in energy utilisation through a combination of improved building design, innovative energy delivery technologies and improved system and design integration.

Energy demand

Notwithstanding the attention given to energy saving, the emphasis in the Green Paper appears to be on energy supply issues and concerns. We believe it would be illuminating to also adopt a parallel focus on energy demand and on the purposes for which energy is required. More detailed analysis of energy use will facilitate an informed prioritisation of best value demand reduction measures. The presentation of fuel statistics which detail consumption by the electricity sector does not help in this process.
Energy efficiency measures often pay for themselves simply by savings in energy costs. The economic value of reductions in emissions associated with fossil fuel consumption is an additional benefit, while improved building energy efficiency has also been shown to have the potential to provide health and comfort benefits. Notwithstanding these potential societal net benefits, evidence indicates that the market alone will not ensure an optimal take-up of these energy efficiency opportunities. Policy interventions are required to overcome these failures of the market.
There is very great potential for reducing energy consumption in both new and existing buildings. This can be achieved through an integrated range of measures designed to

support significantly enhanced energy conservation and increased use of renewable energies in buildings –especially passive solar heating, daylighting, natural cooling and 'active' solar systems where appropriate.

Consultation questions

10) Solar domestic waterheating has hitherto received inadequate attention here. In new Irish housing, as space heating is reduced through thermal insulation, waterheating is becoming proportionately more important, and is of considerable significance to electricity use. The Greener Homes grant scheme has given a sudden boost to the market, but it is crucial that quality standards are implemented lest the damage experienced in certain unregulated European markets leads to a similar set-back in the development of the technology in Ireland.

11) Building Regulations can be a highly effective means of improving energy efficiency in new buildings. Current Irish new-build construction rates provide opportunities unique in the EU. The Regulations should be broadened to take account of more factors affecting energy consumption and environmentally sustainable development, and tightened progressively. Examples of specific issues to be addressed are:

- lighting in commercial buildings;
- air infiltration, particularly in housing;
- restrictions on air-conditioning.

The Energy Performance in Buildings Directive already addresses a number of these issues. Its implementation, and the upgrading of the relevant Parts of the Building Regulations, requires that additional technical staff be made available in the Department of the Environment, Heritage & Local Government. But beyond such incremental measures, a strong argument can be made for introducing a step change in this area.

Canada has recently decided that all new buildings should be carbon neutral from 2030, and similar changes are being discussed in several European countries. Already, Local Authorities such as Fingal, Dun Laoghaire Rathdown, and Wicklow County Councils are moving to require levels of performance considerably in advance of the Building Regulations minima. We recommend that Ireland decide that all new buildings completed from 2025 onwards will be required to produce at least as much energy as they individually consume. The Forum for the Construction Industry together with the Building Regulations Advisory Body could be charged with devising an appropriate programme, which must be coupled with effective enforcement measures including statutory certification of compliance.

12) A small levy should be applied to all building contracts to create a fund for construction research, on the model of the Belgian Building Research Institute. There should be significant industrial participation in the development of a strategic research agenda and in the governance of such research funds, which should be competitively awarded among universities and research institutes.

While energy consumption per square meter in residential buildings should have reduced recently due to a higher standard of insulation there are serious grounds for concern that building defects and failures may arise if well-insulated constructions and tightly-sealed

dwellings, and grant-aided renewable energy technologies are not underpinned by local research insights and scholarship. Such failures elsewhere have set back the introduction of energy efficient technologies by years if not decades. There are further grounds for concern in recent over-glazed, air-conditioned commercial buildings. Research priorities should include a focus on current building performance and post occupancy evaluation, including evaluation of indoor environmental quality in both residential and non-domestic buildings; on exploring and innovating energy efficient building engineering related solutions based on integrated design principles and on a sound foundation of building physics.

13) The Charles Parsons Awards scheme is very welcome; in the building industry there is a critical need to strengthen building science, and to reduce the dominance of craft and trade traditions. Building energy research in most cases is undertaken in a third and fourth level education milieu and a strengthening of such research activity will help expand the national energy research capacity by educating building professionals in a stronger research environment. It is a matter of concern that construction, an activity this year estimated to account for 23.9% GDP, does not appear significantly in the Science, Technology and Innovation Strategy.

15) Both mandatory targets and better incentives are required.

21) Preferably, fuel poverty should be addressed as part of a wider social and economic programme. Because poorer people typically have to buy more expensive fuel and convert it to heat in less efficient devices, and have to devote a significantly larger share of disposable income to energy than richer people, for several reasons this area should be prioritised. In addition there is a correlation between poor housing and ill health, with the highest risks to health being associated with cold, damp, mouldy conditions, and cold being statistically linked with an excess of winter deaths. Improvement of the dwelling and its heating system would seem preferable to the provision of fuel allowances. Some years ago with the UCD Environmental Institute we prepared a Household Energy Conservation Strategy (HOUSES) for Ireland with the support of Energy Action, with as key recommendations

1. Close the information gap
2. Reduce the opportunity cost of investing funds in energy conservation measures
3. Make such funds more widely available
4. Reduce the transactions cost of such investments
5. Make private benefits reflect more closely the social benefits of such measures
6. Provide an incentive for landlords to invest in energy conservation measures

Policy target

A series of demand reduction measures and instruments are set out on pp78-81 and all are welcomed. The summary policy target is to develop an Action Plan on energy efficiency to deliver 20% improvement in energy efficiency by 2020; we believe that this is seriously lacking in ambition.
The recent EU Action Plan for Energy Efficiency: 'Realising the Potential' proposes a

similar target, although according to the Commission, the largest potential is in the building sector, with between 27% and 30% energy efficiency potential. Construction is much more significant here than elsewhere in the EU, and the scope for cost-effective improvement in energy efficiency is considerably greater in new-build than in retrofitting. Thus we recommend that a target of at least 30% improvement by 2020.

Additional comments:

Training of building operatives

Fás courses for operatives in building-related areas (construction, heating & plumbing, electricians) should include additional content on energy-efficiency topics. Upgrade courses on energy-efficiency topics could also be made available for practising tradespersons. Examples of topics to be addressed are:

- Construction apprentices should be taught how to meet specified air-tightness standards in buildings;
- Heating apprentices should be made aware of the interaction between heating system response time and utilisation of passive solar gains, and trained in the installation of solar waterheating systems;
- Electrician apprentices should be taught how to install photo-cell controls for daylight linking of electric lighting, and in the installation of photovoltaic systems.

Bord Gáis tariff structure

The domestic tariff structure of Bord Gáis involves a relatively high standing charge and a low per-unit charge. This low per-unit charge discourages energy efficiency, since it makes energy-saving investments less cost-effective. A lower standing charge and higher per-unit charge would be better.

Electricity for space heating

The use of electricity for space heating is in most cases inefficient compared to boiler systems. This is particularly evident when comparisons are made on the basis of primary energy consumption and consequent greenhouse gas emissions. A significant proportion of recent apartment buildings are provided with electric storage heating. While electric heating is appropriate in some circumstances, the widespread marketing of electric space heating should be questioned.

Use of solar energy in buildings

Passive solar heating, daylighting and natural cooling all have considerable potential to reduce fossil-fuel-derived energy consumption in Irish buildings. Passive solar gain already contributes to heating requirements in most buildings, and this contribution can be increased through informed energy-conscious design at zero cost. Automatic daylight linking controls have particular potential to reduce lighting electricity consumption in

workplaces and schools occupied mainly during daylight hours. The use of natural cooling methods to avoid the need for air-conditioning systems can be highly effective in Ireland's relatively cool summers, yielding large savings in both installation costs and energy consumption.

The use of passive solar design principles can be increased through information and mid-career education targeted at architects and building services engineers. Given the need to adopt appropriate design strategies and the specialised nature of some design methods, the provision of a design advisory service would be useful in complementing these educational activities.

Public awareness

Funding for Sustainable Energy Ireland's role in increasing public awareness of energy efficiency measures and renewable energy technologies should be increased. Awareness campaigns should inform building owners and occupiers of the many benefits of good quality energy-efficient building design, construction and use. Information on the need for sustainable energy should also be communicated – an informed electorate is more likely to support progressive political decisions in this area.