Comments on "An Energy Strategy for Ireland"

In General

I welcome the publication of the report and the opportunity to comment on some of the findings and conclusions of the IERC. A reliable and secure energy supply is an essential pre-requisite for a successful knowledge economy[1] and therefore energy research and development is of vital importance to our country. The output of trained personnel from such a programme is also of tremendous benefit.

Every document, *including my own commentary*, carries with it a bias emanating from the author(s) and the IERC report is not immune in this regard. The most noticeable in this report stems from the composition of the Council which does not appear to include any active energy researchers from the natural sciences amongst its members. I believe that this lack of balance has resulted in a one-sided picture, depriving the Minister of the very best possible advice.

Consider the title of the report "An Energy Strategy for Ireland"; the theme is not "A Renewable Energy Strategy for Ireland" nor "A Carbon Reduction Strategy for Ireland". Important as these topics undoubtedly are the Minister and the Irish Government cannot be seen to focus exclusively on side issues when diversity and security of energy supplies and the efficient utilisation of same are the key issues of the day. Competition for energy supplies will intensify in part because of the emerging giants of the world economy, the BRICK countries (Brazil, Russia, India, China and Korea) are increasing their usage of energy and because of the coming scarcity of fossil fuels. But these questions are not addressed; instead there is a virtually exclusive focus on side issues.

So, only lip service is paid to "energy" in spite of the fact that the remit was to "advise on the development of policy for energy research …"; throughout the document virtually every single reference is to "renewable energy" and occasionally "to renewable energy and energy efficient technologies". This has long been a problem in Ireland; we have a "Sustainable Energy Ireland" agency whose mission statement is "to promote and assist the development of sustainable energy" (but not an "Unsustainable Energy Ireland" agency) consequently there is no-one charged with the duty of overseeing R & D in the area of "energy' or indeed with the necessary expertise. So, at the heart of Government and its agencies and particularly amongst the civil service there is a distinct lack of understanding of the way things are now and will be for the medium term.[2] The Research Council needs to remedy this deficit and amend its advice accordingly.

[1] Non-Nuclear Energy Research in Europe, EU Commission 2005 EUR 21614/1

[2] See also "Government White Paper: Delivering a Sustainable Energy Policy for Ireland" but which is subtitled "The Energy Policy Framework 2007-2020".

Some idea of skewed past priorities can be seen in Table 3.2 on page 18; nearly three times more R & D money was spent on nuclear fission and fusion than on fossil fuels! Yet the generation of nuclear power is illegal in Ireland!

The Irish Energy Research Council report is little better; the word "combustion" is totally absent, as is "liquefied natural gas" and "zero emission power plants" or "clean coal". "Coal" and "carbon capture and storage" make just two appearances each; by way of contrast "energy systems modelling" appears seventeen (17) times.

I cannot be alone in thinking that such stress is somewhat unfortunate for a document purporting to tender advice on energy research strategy to the Minister for Communications, Energy and Natural Resources. The document is deficient in this regard although there is much that is good in it, for example, the vision statement.

Facts: 91% of the primary energy supply on Earth is provided by the combustion of wood, dung, peat, coal, oil, natural gas, municipal solid waste, bio-fuel, *etc*. There is widespread agreement that this situation is not expected to alter appreciably in the near to medium term, that is, up to 2030 [International Energy Agency, "Key World Energy Statistics 2007", © OECD/IEA 2007].

For Ireland, 97.9% of our total primary energy supply in 2006 came from combustible fuels [private communication from the Energy Policy Statistical Support Unit of Sustainable Energy Ireland]. For 2007 provisional figures indicate that yet again 97.9% of our energy is sourced from combustible fuels.

Previous DCMNR funded energy research

The document does not refer, I note, to energy research funded in the very recent past (January 2007) by the previous DCMNR Minister under the Charles Parsons initiative. These seven-year long *circa* €2–3M projects included marine energy, electricity markets, planning and operations, electricity networks, bioenergy, bioresources, a Charles Parsons Institute (marine robotics, optical fibre sensors, environmental research) and the built environment. It is probably a little early to judge whether project targets have been reached but clearly double-funding, certainly before an adequate review of progress made, should be minimised. Not to have taken cognisance of this seems to be a major omission on the part of the Council.

UK model

Quite often in situations like these it has been the practice to copy British procedures and/or rely on their expertise but the UK is not a very good model for Ireland in this particular case. In terms of the origin of our greenhouse gas emissions our closest match is with New Zealand, and, the British dependence on nuclear power for electricity generation presents a quite different scenario to our own. Note too that we are required by the EU to cut our emissions by 20% over the period 2005–2020; the UK is required to cut by only 16%.

In Particular

Page 8 (and page 26)

The sector specific-fields identified seem to me to be rather narrow. For example, the power generation sector which produces the bulk of our energy today, and will do so for the next 20 years, is entirely missing from the list. Thus, the combustion of coal in a clean manner and the combustion of natural gas either by itself as a pure fuel or blended with renewable bio-fuels are hugely important R & D issues for Ireland and the rest of the world but are totally absent from this report.

There is absolutely no mention of nuclear power; should not this, at the very least, be considered in a document detailing an energy research strategy for Ireland? I could understand if the Council were to conclude that it is not suitable for Ireland but should not the Minister be given arguments detailing the pros and cons? After all we are talking about research, not actual power generation, so some consideration should be given to establishing an expert group perhaps via the 'watching brief' option.

Oddly "energy systems modelling and analysis" is so important that it occupies a separate category and does not have to compete with other areas as for example the sector specific fields or indeed all the other themes which have been shoe-horned into "fundamental frontier & multi-disciplinary research".

There is no evidence presented in the report which would support such a view, yet 10% of the total budget is allocated and ring-fenced to this topic.

In addition SEI is charged [page 25] with developing its own expertise … is this not a case of duplication of effort? I cannot for the life of me see how you can do energy systems modelling in a vacuum, divorced from a multi-discipline approach and without any scientific input.

Page 11*: Section 2.1.1*

Energy security and diversity of supply are THE overriding concerns for Ireland which far outweigh the environmental impacts. The Minister in his recent assessment of Corrib Gas is in tacit agreement with this. No Irish Government can jeopardise the economy by neglecting this issue. Note that the last report published by the Commission for Energy Regulation[3] is quite outdated; it has simply been overtaken by events.

Page 12: *Section 2.1.5*

The International Energy Agency has identified improvements in efficiency as the most cost-effective way of achieving cuts in emissions ["World Energy Outlook 2007"]. Working Group III in their contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change in 'Climate Change 2007' state that "improving energy efficiency offers an excellent opportunity for transport GHG mitigation through 2030".

[3] Report on Ireland's Security of Supply of Electricity, CER, August 2006

Sustainable energy will cost more, not less, for example off-shore wind farms. Energy costs can be reduced by widening the sources of supply; that is, increasing competition. All our natural gas is currently piped in from the North Sea but within 20 years or so it will come from Russia which is much further away. Political and/or business disputes have shut down supplies in the recent past and left Western Europe temporarily without gas. Since we will be at the very end of this fragile supply chain we are particularly vulnerable to disruption. Also, as opposed to most European countries, we only have a reserve capacity of some 30 minutes. Thus a liquefied natural gas storage facility should be an essential component of our national strategy and if it can be coupled to a natural gas power plant utilising cryogenic exergy then an effectively zero emissions electricity generating station will result.

Similarly our only coal-burning power station needs to be converted, probably via oxy-fuel combustion, to attain the same zero emission status; unfortunately Ireland was not represented in the recent EU Technology Platform discussions on zero emission power plants prior to the framing of FP7 research topics. This is yet another demonstration that no body, Government, ESB, SEI or others, is ensuring that the dominant player in the energy market is looked after. None of these issues are discussed in the IERC report.

Section 2.2.1: In their haste to deliver a 'sustainable energy' future, the Government advisers including the IERC are neglecting the 'unsustainable energy' sector … it is vital that we continually strive to <u>extract more efficiency out of the current usage of fossil fuels at the same time that we reduce our need for them.</u>

I do not believe that peat-fired power stations should be encouraged any longer; their contribution to our generating capacity is quite small, peat is not a renewable resource and in addition they operate largely obsolete technology. Co-firing biomass such as meat and bone meal in a peat-fired station will not be straightforward; the ash formed when bone meal, for example, is burnt is quite difficult to remove from the flue gas and expensive exhaust gas treatment will be required. It is far better to use this biomass in a municipal solid waste incinerator which already will have installed all the necessary flue gas treatment protocols and which will produce district heating and electricity generation. Note that current peat-fired power stations are not combined heat and power (CHP) enabled.

The report echoes Government policy in respect to bio-fuels in road transport and simply quotes that targets of 5.75% by 2010 and 10% by 2020 have been set. There is no appreciation that such targets were set a long time ago *("A week is a long time in politics")* and changing circumstances have placed both the Ministers (of Environment *and* Energy) and the Government itself in a very awkward situation.

Note that the SEI commissioned "Liquid Bio-fuels Strategy Study for Ireland" published in December 2004 made it clear that we would only be able to meet 23% of our 2010 targets from our own resources and recommended, *inter alia,* importation of bio-ethanol from Brazil as a possible option.

What has changed since then? The ongoing food crisis means that sourcing bio-fuels from human/animal foodstuffs is now probably completely unacceptable – in the words of UN special rapporteur Jean Ziegler at United Nations headquarters in New York on 27 October 2007, "a crime against humanity".

Furthermore the importation of bio-fuels from the tropical world is equally indefensible; the potential loss of biodiversity is well known, less well known is the fact that the conversion of rainforests, grasslands and peatlands results in very large increases in greenhouse gas emissions[4].

And finally the kind of bio-fuel produced, even if it is produced from waste biomass or even by second-generation methods, must not impact adversely on local air quality or the water table[5].

Clearly there is an overwhelming need for R & D in this area as there is a conflict between EU policy and reality – ways must be found to circumvent this politically explosive situation … "food riots in Haiti, Cameroon, Indonesia, Egypt …" versus "bio-fuels for SUVs". None of these issues are touched on in the report.

Finally, it must not be forgotten that "there are no other renewable energy rivals (to bio-fuels) for either the road or air transport sectors".[6]

Page 19: *Bullet point three*

The implications of this paragraph are that the already well-funded (some would say over-funded) research teams in the area of biotechnology would be allowed to compete for research funds from the "Energy" pool. I believe that this would enormously discourage genuine energy researchers who cannot compete in the biotechnology pool.

There are plenty of openings and funds available to biotechnologists who might wish to contribute to solving energy problems[7] under current biotech SFI schemes. But new production methods only solve part of the energy problem … as adverted to above the properties and effects of bio-fuels need to be considered. Perhaps a case can be made for co-funded awards, from both fund pools.

Page 23: *Section 4.4*

We see our own role as providing an R & D capability in a highly specialised field but on a global scale ... I believe that should be written in as one of the outcomes. There is no reason why Ireland cannot be the home of expert research centres with a world-wide client list – a niche market to be sure but none the worse for that.

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[4] Fargione *et al.* "Land clearing and the bio-fuel carbon debt", *Science*, 319 (2008) 1235.

[5] Jacobson, *Environmental Science & Technology,* 41 (2007) 4150; Mackay *et al,. ibid.* 2015.

[6] Moriarty & Honnery, *Int. Journal of Global Energy Issues* 27 (2007) 231 .

[7] For next-generation bio-fuels see *Nature Biotechnology* 26 (2008) 298; *Science*, 311 (2006) 484.

Page 29 (repeated on page 31): *Key strategic objectives.*

These sections are somewhat patronising and almost insulting to those of us who have developed world-class research centres and already have collaborations with the best researchers in the world. Three small examples, a new **COST Action**[8] application co-led by us in collaboration with French and Swedish colleagues in 2008 is promoting more accurate chemical models for combustion involving research institutes from 18 EU countries; a current **FP7** proposal[9] on "Flexible and Complex Combustion Design Tools for High Efficient Power Trains" is a medium scale collaborative project with major EU automotive and biofuel companies on clean and energy efficient gasoline and diesel power trains has just been submitted, whilst a second (under FP7-Infrastructures-2008-1) is in evaluation.[10]

We do not need to be revitalised, but we could do with some support from our national agencies to complement and build upon that which we already received and continue to win in highly competitive schemes from the EU. As an illustration, nearly 50% of the 2005 funding listed in Table 3.1 on page 17 under EU sources, was obtained by our own research group. In addition the absence of automotive and turbine manufacturers or even oil companies in Ireland has meant that we have had to compete on a global basis for R & D contracts from major industrial corporations which in turn builds our profile, employs Irish postgraduates, *etc.* Here co-funding would enable us to grow stronger and increase our market share in this knowledge business.

Note that the energy focus is yet again narrowed down to 'sustainable'. In line with the stated aims of this report this phrase should always be accompanied by 'energy efficient technologies' at the very least.

I see that the key strategic objectives for "Strategic Line 1: Energy Systems Modelling and Analysis" do not include the phrase that I have objected to under "Section 7 Line 2: Fundamental Frontier … Energy Sector" nor under "Strategic Line 3: RD&D … Fields". The implication is that world-class research teams already exist in Ireland, do not need revitalising and already attract the best researchers in the world. Is this what the Council is saying?

Page 32: Exhibit 8.1 Is a very peculiar Table indeed, it seems to have been thrown together without much thought.

Ocean energy: There may well be a vast source of low-carbon energy available but this has already been stated in the first point. Note that the Marine Institute is aiming at 500 MW

[8] **European Cooperation in the field of Scientific and Technical Research** – one of the longest-running European instruments supporting cooperation among scientists and researchers across Europe. COST is also the first and widest European intergovernmental network for coordination of nationally funded research activities.

[9] With Renault FR, Volvo SE, Ford & Volkswagen DE, Neste Oil FI, University of Duisburg DE, CNRS FR, Brandenburgische Technische Universität DE, Warsaw University of Technology PL, Toronto University CA.

[10] Universities of Lund SE, Darmstadt DE, Einhoven NL, Czestochowa PL , Eötvös Loránd HU *etc.*

by 2020; currently we are at 5,000 MW and expecting, according to EirGrid, to hit 6,000 MW by 2014.

Transport: the comment is made that Ireland will be "a technology taker". This is incorrect, there is ongoing research and considerable expertise in energy efficient internal combustion engines and gas turbines, in second generation methods of production and next generation bio-fuels, and, in alternative propulsion (fuel cells). And existing links with relevant research in Europe and elsewhere.

Why is it considered that research experience in cutting-edge technology is not called for? All the other sectors are not similarly proscribed.

Exhibit 8.2 As above

Page 37: *Section 9*

Initially I thought that the notion of developing a capacity to understand and interpret new technological advances in areas, which are not to be funded by this programme, a good idea. But it is hard to see how this can be successfully implemented in practice – it is extremely difficult to keep up with the latest advances in a field of research unless one is an active participant. Provided this can be resolved it might go some way to rebutting my criticism of the lack of expertise within the system, but, if Sustainable Energy Ireland are to be placed in charge then a re-alignment of their mission is called for.

Page 45: *Section 12.3.2 (a)*

"... genuine contribution to an efficient energy system for Ireland"

Why cannot demonstration projects be subjected to the same high standards? Unless they are to function purely as public relations exercises? Running one city bus on bio-methane for a year has been done to death ... it is time to move on.