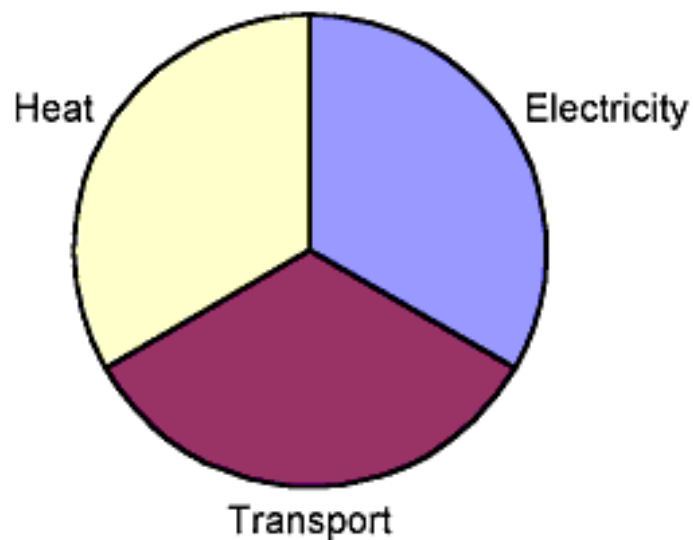


bye-bye, Irish energy pie

KEVIN HEALION

Ireland needs an annual intake of energy from various sources - its 'energy pie' - to keep active. Major changes in the country's energy diet are required in the next few years. Unfortunately, government policy documents are only just beginning to take this into account.

You could say that Ireland is at the adolescent stage. In the last few years, the nation has put on a massive spurt of growth. From a small kid we've grown to be a gangly teenager so fast that we've surprised ourselves and all the neighbours. And like any teenager, our appetite has become voracious - we consume 70% more energy pie in the year 2000 than we did in 1980. And it is



projected that our energy consumption will be 26% greater in 2010 than it is today - if 'business as usual' continues. Our energy pie is divided into three slices of roughly equal size: heat, electricity and transport. Our demand for energy in all three sectors has grown significantly since 1980 and our need for extra helpings of electricity and transport seems insatiable.

Irish demand for heat has increased by nearly 40% since 1980. It is required by all sectors of the economy: industry, agriculture, the public and private service sectors

and in the home. Its main sources are oil, natural gas, peat, coal, wood and electricity.

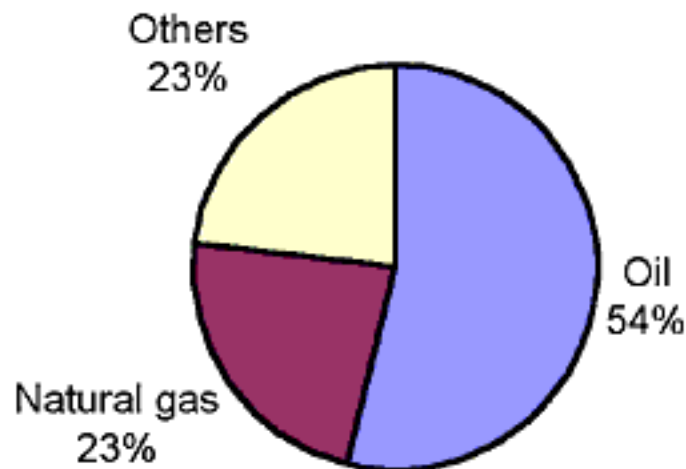
Irish electricity demand has doubled since 1980, and continues to increase. During the past year, there have been a number of red alerts at ESB headquarters when the demand for electricity came uncomfortably close to the supply capacity available. An ESB report on generation capacity requirements from 2000 to 2006 says that there is an immediate need for extra capacity ¹. Using the Economic and Social Research Institute's projections of GDP growth, it concludes that around 1000 megawatts should be installed over the time period. This would be enough to supply one million homes. Present installed capacity is about 4,700 megawatts (MW).

Ireland's need for transport, both passenger and freight, is also increasing at a rapid rate. This has resulted not just in increased congestion on the roads, but also an increased demand for petrol and diesel. Total final consumption of energy in the transport sector is now more than double what it was in 1980.

The ingredients for the pie are getting scarcer

One of the stated objectives of Irish energy policy is to ensure the security of energy supply (that is, make sure our economy/society has sufficient quantities of energy resources available at acceptable prices). Together oil and natural gas provide 77% of our energy requirement at present,

and this figure could grow to 83% by the year 2010. To help ensure the security of supply of oil and gas, Ireland has its own oil refinery, its interconnector to the European (and beyond) natural gas network is to be duplicated, and the provision of natural gas storage capacity has been considered. However, it appears to me that there has been a major omission from the security of supply discussion: the future global availability of oil and natural gas..



What is being said about the future availability of oil? Figures produced by Shell forecast that global oil production will peak around 2012². Another forecast was presented by Dr. Colin Campbell at the Feasta 'Energy, Money and Growth' conference in March 2000. As his paper in this Review makes clear, Dr. Campbell's message was that the end of cheap oil is coming soon. He estimates that peak conventional oil production globally will be reached about the year 2005. Plausible estimates of global peak oil production are therefore in the range 2005 to say 2015. After peak production is reached, oil supplies will decrease, thus causing significant and permanent oil price increases.. In other words, a 'permanent oil shock' is coming. Dr. Campbell's advice is that all governments should plan seriously for this foreseeable oil supply crisis.

Take a few seconds to think through the possible implications of a permanent oil shock. Think how dependent the transport sector is on oil (in fact, oil supplies 95% of the energy required for the world's land, sea and air transport fleet). Remember also that mechanised food production in the developed world is now highly dependent on oil and oil-derived products. Now think of how dependent on transport we have become in the globalised market economy - all those imports, exports (including food) and tourists moving between countries. Increased oil prices will also make it more expensive to develop other energy resources. Factor in that 10 to 15% of oil supplies go into the production of petrochemicals, including plastics and other substances and materials which we have come to take for granted. So a long term steep increase in oil prices could force us into ways of running things that are very different from those at present.

The argument has been made that natural gas will replace oil. Indeed, Ireland has moved significantly to natural gas in both the electricity and heating sectors. At present, the Republic of Ireland imports gas via a pipeline to Scotland, built in 1993. The interconnector was designed to meet all of Ireland's needs until 2015. However, Ireland's rapid economic growth, its pattern of energy use and the fact that a number of large new natural gas power stations have been proposed, now means that additional gas supplies must be made available by the winter of 2003/2004. The 'Gas 2025' project was commissioned by the Department of Public Enterprise to examine options for the supply of gas up to the year 2025. The report concludes that additional interconnector capacity is required soon³. However, it appears that the terms of reference of the 'Gas 2025' study did not include consideration of the security of supply of gas at a global level.

So what is being said about gas resources globally? Firstly, it should be said that gas resources are much more difficult to assess than oil resources. There are differences in the views of energy experts on the extent of the resource but the plausible estimates for global peak gas production are in the range 2020 to 2050. In addition to conventional natural gas, there are opportunities to develop the use of natural gas liquids, and the large deposits of what is termed 'non-conventional gas'. However, there is another aspect to the security of supply of natural gas - what part of the world is it coming from? The European Union is expected to be 46% dependent on imported natural gas this year, 2001. Supplies are, and will continue to be, from quite far away. Ireland's dependence on natural gas in electricity generation could reach 80% if Moneypoint is switched to natural gas by 2008, as is proposed in the National Climate Change Strategy published in October 2000⁴. This has serious implications for security of supply if significant new indigenous gas supplies do not materialise.

While the estimates of future supplies of oil and gas vary to some extent, I believe that Ireland would be wise to plan its energy policy based on the 'precautionary principle'. This is an environmental management principle which advocates proceeding cautiously in situations where there is a high degree of uncertainty over the effects and impacts of your actions - the 'better safe than sorry' approach. There is certainly uncertainty that oil supplies and prices will remain stable in the long term. The possible negative impacts on our society and economy of significant and sustained oil price increases are huge. Natural gas should be seen as merely a stepping stone to a more sustainable energy future based on using less energy and getting this to a large extent from renewable sources.

The US is in a major power and natural gas supply crisis at present (January 2001). This is due to increasing electricity demand, declines in US and Canadian gas production, and limitations in the electricity generation and transmission infrastructure due to deregulation. New deeper gas wells and long pipelines will take time and money to develop. The capacity to manufacture and install gas turbines is stretched to the limit. Two major utilities in California face bankruptcy, which has led to a fall in the share-prices of the banks that lent the utilities money. It is not too difficult to see how an energy crisis could spiral into an economic crisis. And remember how dependent Ireland is on the well-being of the US economy. The US crisis can only be solved by reducing electricity, gas and oil use. EU and Irish energy policy makers should take note.

Despite the uncertainties over future oil and gas supplies, the Green Paper on Sustainable Energy published by the Department of Energy in November 1999

does not address the issue ⁵. Nor does the most recent report of the Energy Advisory Board, which brings together representatives of the major energy players in Ireland to provide the Minister for Public Enterprise with policy advice on energy efficiency, renewable energy and related areas of research ⁶. Nor does the National Climate Change Strategy. Even the Energy Panel report of the Technology Foresight Ireland exercise, carried out by the Irish Council for Science, Technology and Innovation, under Forfás, does not consider the issue of global oil and natural gas reserves in detail ⁷. There seems to be an implicit belief in Irish energy policy that oil and gas will remain readily available for the foreseeable future.

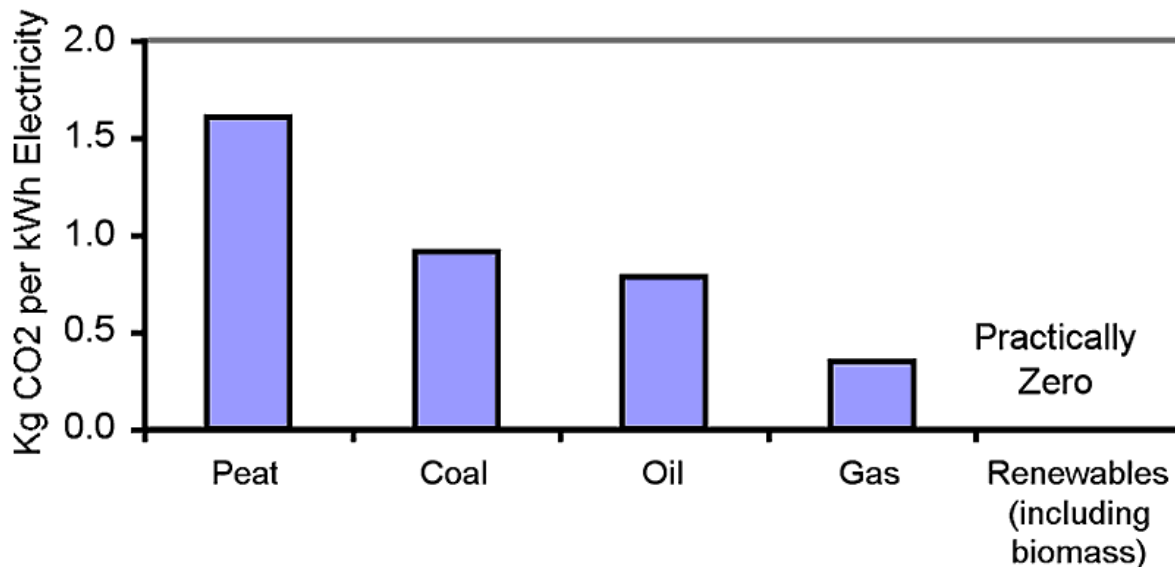
The key aims of Irish energy policy seem to be to ensure the competitiveness of the Irish economy while meeting our international commitments on greenhouse gas emissions at least cost. It's a case of 'Where you stand determines what you see'. There does not seem to be any impetus to move away from dependence on oil as quickly as possible, nor to reduce our natural gas use. If such a 'status quo' policy was based on a convincing analysis of the future of oil and gas supplies, it might be acceptable. But I have not seen such an analysis in any of the various documents on Irish energy policy. Surely a major omission? A study of the future global availability of oil and gas and its implications for Irish energy and economic policy could be carried out for a reasonable cost. It should be undertaken as a matter of priority.

Can we get by on less pie?

As I stated earlier, Irish energy consumption will be 26% greater in 2010 than it is today if 'business as usual' continues. Both the Green Paper on Sustainable Energy and the National Climate Change Strategy stress the importance of reducing the forecast levels of energy use, and describe a comprehensive range of possible methods to achieve such reductions.

A key component of the implementation programme set out in the Green Paper is the development of appropriate economic instruments to reduce the use of fuels contributing most to greenhouse gas emissions. The fuel with the highest greenhouse gas emissions per unit of energy produced is peat, followed by coal, then oil, then natural gas. Renewable energy sources have about zero greenhouse gas emissions (see diagram).

Carbon Dioxide Emissions from Electricity Generation



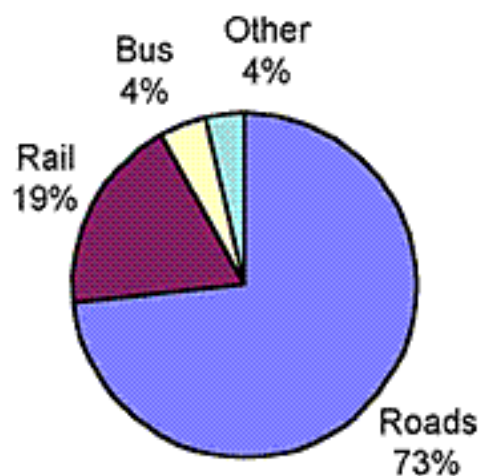
Economic instruments such as greenhouse gas taxation (including a 'carbon tax'), energy taxes and tradable permits are a key component of the National Climate Change Strategy. (A system of tradable green credits was launched recently by the renewable energy company Eirtricity, with Waterford Glass signing up as its first customer). These instruments will reduce the cost of renewable energy in comparison with fossil fuels and provide exciting new opportunities for sustainable products and services. It has already been announced that carbon energy taxation will be introduced in Budget 2002. This will be a fundamental shift towards a policy framework that promotes the sustainable use of resources and makes the polluter pay.

Energy efficiency standards and energy labelling for buildings and appliances are also proposed in the Green Paper. The Irish Energy Centre is to be significantly strengthened, increasing its role in energy efficiency promotion and market stimulation. Improvements to the energy efficiency of pre-1980 housing stock and Government and local authority buildings are to be made. The Green Paper mentions the possibility of improvements in the conversion efficiency of heating equipment, referring to the fact that oil-fired condensing boilers can be up to 95% efficient, compared to 75% for conventional boilers, thus giving a saving of 33% on annual fuel use and consequent emissions. However, there is no comprehensive treatment of the heat sector per se in the Green Paper.

The National Climate Change Strategy reinforces the proposals in the Green Paper - energy efficiency is to be promoted in both existing and new houses through upgrading of local authority housing, energy rating, an adjustment to the New House Grant, improvement in building regulations and the construction of demonstration and experimental housing. The current boom in house building will give Ireland one of the most modern housing stocks in Europe by 2010, with a high energy efficiency standard. The Strategy again stresses the role of the Irish Energy Centre in demand side management (that is, controlling the amount of power people use), education, awareness creation and information provision. The local energy agencies are also seen as a very important resource, and will work closely with the Irish Energy Centre. Local authorities will have a new role in promoting energy efficiency and renewable energy.

In addition to the measures proposed in the Green Paper, Government's Technology Foresight Energy Panel made exciting suggestions for energy efficiency research, development and training, and for personal tax relief for energy conservation measures in private housing. The National Development Plan 2000-2006 allocates £146 million to the energy sector (mainly for the implementation of recommendations in the Green Paper), but the vast bulk of the capital investment in the energy sector over the period to 2006 will take place outside the National Development Plan ⁸. It is expected that the market will cater for the investment needs of the power generation and gas sectors. The current ESB programme to upgrade the electricity network is also outside the National Development Plan.

As regards energy use in the transport sector, the Green Paper proposes integrated planning for land use and transport planning, charging for road use, the promotion of cheap public transport, and energy standards and labelling for road vehicles. Further details on



Breakdown of the £8.5 billion spend on transport in the National Development Plan

plans for the transport sector are contained in the National Development Plan. More than £8.5 billion from the Plan is to be spent on the provision of transport infrastructure. £4.7 billion is to be invested in national roads, £1.6 billion in non-national roads, up to £1.6 billion in public transport in the Greater Dublin Area, over £650 million in regional public transport and £60 million for seaports and regional airports (the pie chart shows the breakdown between roads, rail, bus and other measures). The £1.6 billion allocated to public transport in the Greater Dublin area concentrates on:

- * developing the bus network;
- * constructing the LUAS light rail network;
- * developing the suburban rail network;
- * promoting transport integration through park and ride facilities,
- * integrated public transport ticketing and public transport interchange facilities; provision of further cycle infrastructure and facilities;
- * implementation of traffic management measures; and
- * transport demand management.

The £1.6bn figure also includes a contingency sum for possible rail developments outside Dublin. The Strategic Planning Guidelines for the Greater Dublin Area state that the future spatial development of the region must be based around public transport. Housing investment under the National Development Plan (in and outside Dublin) is to be co-ordinated with public transport development. The National Development Plan money allocated for regional public transport includes £500 million for mainline rail, supporting the Iarnród Éireann 'On Track 2000' programme. Bus Éireann is also to receive substantial funding to improve its urban and rural bus fleets. £3.5 million is allocated to encourage local or community-based initiatives to provide bus services in rural areas - all welcome developments.

Here again, the National Climate Change Strategy builds on the proposals in the Green Paper. It describes how increased fuel efficiency, transport demand management and shifts in mode of transport used will help control greenhouse gas emissions from the transport sector. Increased fuel efficiency will result from voluntary agreements at EU level with car manufacturers, from energy labelling and modifications to Vehicle Registration Tax and road tax rates to promote efficient fuel use and low carbon fuels. Integrated spatial, transport and energy planning is also seen as an essential element in greenhouse gas abatement.

Roads account for 96% of passenger traffic and 90% of freight transport inside Ireland. The total investment in roads under the National Development Plan is £6.3

billion, almost three quarters of the total Plan spend on transport infrastructure. The Plan explains that roads must continue to be the first priority for investment in transport, given the immediate infrastructural bottlenecks in the transport sector, the heavy reliance on roads for the transport of people and goods and the lack of alternative networks of real scale for inter-urban transport in Ireland.

These are all very sensible reasons from one point of view. The National Climate Change Strategy argues that this investment will contribute to greenhouse gas emission reduction by making road transport more efficient and by implementing charges for road use (e.g tolls) on a wider basis. However, I come back to my previous point regarding the future availability of oil supplies: road transport depends almost entirely on petrol and diesel. What if transport fuel prices take a large and permanent hike upwards due to an increasing scarcity of oil resources? We are making investments that will shape our future for years to come, yet we seem to be doing so without serious consideration of one major risk factor - oil availability. The recent mini fuel crisis over petrol and diesel prices should help to focus attention on this issue. I was pleasantly amazed while reading a recent review of a new petrol/electric hybrid car in the motoring column of one of the national Sunday newspapers ⁹. The correspondent wrote that worldwide oil production will have peaked within five years. And I am sure that you will have seen the recent TV advertising by Shell, with the message that renewables may one day be their biggest business. So maybe the message on future oil supplies is getting out!

The measures proposed in the Green Paper, the Technology Foresight Ireland Energy Panel report, the National Development Plan and the National Greenhouse Gas Abatement Strategy should be successful in slowing the rate of increase in energy demand across the heat, electricity and transport sectors. Unfortunately specific targets for the size of the Irish energy pie in the years to come are not set in any of documents I have read. It is therefore not clear how effective we can expect the various measures to be in reducing energy demand. Setting such targets would provide a focus for energy management efforts, and allow progress to be measured against a yardstick. We could take a lead from Denmark in this regard - the 1990 Danish Energy Plan had a specific objective to reduce energy consumption in 2005 by 15% compared to the 1988 level.

Another major opportunity for reducing energy use is moving away from large scale centralised electricity generation towards small scale decentralised heat and power generation. Electricity in Ireland is produced mainly by burning fossil fuels in large electricity generating stations, and using the energy to drive turbines and

generators. The dominant fuels in electricity generation, in decreasing order of importance, are natural gas, coal, oil and peat. The overall energy efficiency of electricity production from these fuels was just 36% in 1998. So 64% of the energy in these fuels is wasted in the electricity generation process. The 'waste' is the heat that goes into the cooling towers or a nearby water body.

Just like fuels for heating and transport have to be distributed around the country to final consumers, so too does electricity. Energy is lost from the power lines used to move electricity around - for some consumers the loss is up to 10% of the electricity generated. By having smaller units located closer to the point of consumption, power line losses can be reduced. But in the present electricity system roughly two thirds of the energy in the original fuels used for generation is lost by the time the electricity is delivered to the customer's door (and the customer might then go on to use this delivered electricity inefficiently).

Are there better options? The answer is yes. Modern power stations can achieve electrical efficiencies of around 50% and over (natural gas-fired combined cycle plants, or the new gasification and pyrolysis technologies fuelled by fossil or renewable fuels). But the greatest improvement in overall energy efficiency can be achieved if the heat produced in electricity generation is also used. By making use of the heat, overall efficiencies of 75 to 90% can be achieved (this is known as Combined Heat and Power, or CHP for short). Ireland has the lowest level of electricity generated by CHP in the EU at just 2%. All of the Irish CHP capacity at present is fuelled by natural gas, but other fuels can also be used, including the renewable fuels wood and biogas. A CHP plant can be considered as a mini-electricity generation plant that is connected into a heating system. The heating system might be that of a hospital, an office block, an apartment building, or it could even be a district heating system for a suburb, town or village. A district heating system consists of a network of underground insulated pipes, which distribute hot water to heat customers. The Dublin Corporation offices on Wood Quay are part of a district heating network. Such networks are quite common in other EU member states, but the Green Paper does not quantify their potential in Ireland.

So our electricity demand is climbing steadily and there is a demand for new generation capacity. How is this electricity to be supplied? Will CHP technology have a significant role to play? The Green Paper sets aside a welcome £4 million from the National Development Plan to support high efficiency CHP, and an intention is expressed to lessen the barriers to increased use of CHP. The Irish Energy Centre is to examine the future potential of CHP in Ireland and consider

the continuation of Government support for CHP. While the Green Paper does not set specific targets for CHP, the National Climate Change Strategy does recognise its importance and intends to promote it strongly.

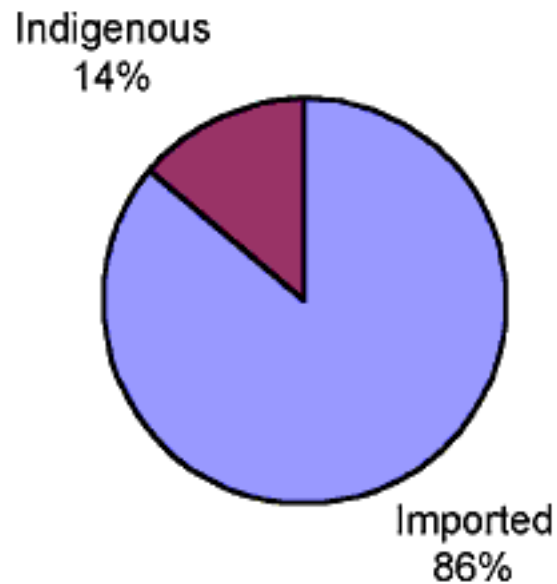
CHP also received consideration in the Technology Foresight Ireland exercise. The Energy Panel of the Foresight exercise looked to the year 2015 and asked 'How should we manage and meet Ireland's energy demand up to 2015?'. The panel was made up of nineteen people, including environment and renewable energy representatives. The recommendations of the Panel envisage a clearly defined energy research, development and demonstration programme focused on key technologies. The report is most refreshing to read, as it addresses all three energy sectors (electricity, heat and transport), recommending detailed and costed measures to improve energy efficiency and renewable energy use. It is recommended reading for all those interested in the future development of the energy sector in Ireland. The report includes a proposal for tax relief for Combined Heat and Power projects and promotes decentralised energy production. The report recommends that the Minister for Public Enterprise convene an Action Panel to secure implementation of the Panel's recommendations. A £560 million Technology Foresight Fund has now been established under the National Development Plan to support research, technological development and innovation. Unfortunately it appears that the Technology Foresight Fund is focused on information technology and biotechnology, and it is not clear if monies have been allocated to implement the excellent recommendations of the Energy Panel.

So the question remains - where will extra electricity come from? It seems that most of the demand will be met by new large centralised natural gas-fired power stations. The Commission for Electricity Regulation (CER) is overseeing the opening of the Irish electricity market to competition, as part of EU-wide moves to a liberalised energy market. A number of gas-fired power stations have been proposed by independent power producers, who are now allowed to compete with the ESB in the power generation market. The CER has a role in allocating scarce capacity in the natural gas network for electricity generation and the selection criteria are set to give preference to the larger proposed power stations. These plants will be very efficient at generating electricity, but they will not be operating in CHP mode, so much of the energy value of the natural gas will go to waste. Is this the most prudent way to use a scarce energy resource? Neither the Green Paper or the National Climate Change Strategy address this issue adequately.

Our pie is made of imported ingredients

You won't find a 'Guaranteed Irish' label on the energy pie that fuels the country. It is estimated that 86% of Irish energy is supplied by imported fuels. Our own natural gas reserves have declined, and our only other indigenous energy resources are peat and renewables. Expenditure on imported fuels represents a large outflow of money from the national economy. Yet Ireland has a richness of indigenous renewable energy resources, which if harnessed to their potential would reduce energy imports nationally. Perhaps more importantly, renewable energy sources offer significant

opportunities for the retention and recirculation of money within local economies.



Our pie is bad for us and for the world

Almost all of our energy pie is made up of non-renewable fossil fuels. Fossil fuels release carbon dioxide into the atmosphere when used to generate energy. There is an official consensus that carbon dioxide, along with other greenhouse gases, is contributing to unnatural changes in the climate of planet Earth. Many governments from around the world came together in Kyoto, Japan in 1997 to sign a protocol to limit greenhouse gas emissions. The overall EU target is to reduce greenhouse gas emissions by 8% below 1990 levels by the period 2008 to 2012 and progress towards this target must be demonstrated by 2005. To allow Ireland to develop, it was given a special derogation, and it can increase greenhouse gas emissions by 13% over 1990 levels. This would allow them to rise from 56



million tonnes of carbon dioxide equivalent to 61 million tonnes. However, we have already used up all of our special allowance. Emissions in 2000 were 65 million tonnes and it is projected that without the measures in the National Climate Change Strategy they would, at 72 to 74 million tonnes, be at least 34% above 1990 levels by 2010.

Ireland is likely to face significant financial penalties if it does not meet its commitments under the Kyoto Protocol. Energy use (including electricity, heating and transport) makes up over 50% of the country's total greenhouse gas emissions. So if Ireland is to go anywhere near meeting its Kyoto commitments, positive actions in the energy sector are essential. The government is convinced that its National Climate Change Strategy will do the trick with its proposals for energy demand reduction and greater energy efficiency, a move from more carbon-intensive fossil fuels (peat, coal and oil) to less carbon-intensive natural gas, and a switch from fossil fuels to renewables. Implementation of the Strategy will be overseen by an inter-departmental team and progress will be reviewed every two years so that the Strategy can be revised if necessary.

Only 2% of Ireland's energy is supplied by renewables. As stated in the Green Paper, the largest contribution to renewable energy at present comes from the burning of wood at wood processing plants and in open fires in the residential sector. The second largest contribution is from hydroelectricity, then electricity from wind farms and landfill gas plants. The main mechanism to encourage the expansion of renewable energy electricity production has been the Alternative Energy Requirement (AER), a competitive process in which potential project developers bid to supply power to the national grid. The AER has provided additional renewable capacity at low cost. However, the low prices paid for the renewable electricity are reflected in the low rate at which capacity has been installed in Ireland particularly when one considers the country's potential for electricity from renewables and what other countries in the EU with much less potential have done. On average, the EU gets 6% of its energy from renewables, three times the Irish figure, and has set a target of 12% renewable energy by 2010. Bioenergy (power from biomass) is expected to make up a large part of this increase.

The Green Paper on Sustainable Energy states that:

"Government policy is to create the circumstances and conditions that will stimulate the deployment of renewable sources of energy where they have the prospect of being economically and socially attractive and to facilitate research, development and demonstration of emerging

renewable energy technologies.... It is now intended that an ambitious approach will be adopted to increase the role of renewable sources of energy in the power generation sector."

It sets a target of 500MW of additional electricity generating capacity from renewable sources for the period 2000-2005, stating that the bulk of this will come from wind energy. The target will be kept under review and additional targets will be set for 2005-2010 on the basis of this review process. It is intended to hold annual AER competitions to award contracts for new renewable electricity generation capacity. This will give confidence in the market, and allow resources to be mobilised in a planned way.

Thanks to the liberalisation of the electricity market, renewable generators are now allowed to sell green electricity directly to customers. A number of electricity companies producing wind power have been set up to take advantage of this opportunity and every Irish household now has the opportunity of buying green electricity at no extra cost. Net metering - which allows someone who generates green electricity to feed it into the grid when they have a surplus, and to draw power from the grid when they have a shortfall, and only pay for the difference - is also under consideration. It would encourage small-scale renewable energy production.

Community-based development of renewable development is to be encouraged. The existing tax relief for corporate investment in renewable energy will be continued, and other tax relief measures for renewable energy will be considered. Over £20 million from the National Development Plan will be allocated for a planned approach to grid improvements to facilitate connections from renewable energy generators. There is to be a revitalised approach to the promotion of research into the development of renewable sources of energy. The contribution of the Irish Energy Centre and its Renewable Energy Information Office to the promotion of renewable energy in Ireland to date is praised, and their role is to be developed to support the renewables strategy set out in the Paper. Finally, a very welcome development is the establishment of the Renewable Energy Strategy Group, which has been set up to examine obstacles to the further deployment of renewable energy technologies. Implementation of the measures set out in the Green Paper would mean that to almost 4% of Irish energy was from renewable sources by 2005 and the National Climate Change Strategy says that the amount of power the country gets from renewables has to be maximised to help meet the Kyoto targets.

The Renewable Energy Strategy Group was established in November 1999 and examined onshore wind energy first. The Group recently published its 'Strategy for Intensifying Wind Energy Deployment' report. The principal conclusion is that three elements, electricity market, electricity network and spatial planning need to be integrated into a plan led approach to wind energy development. The report recommends that the Government send a clear signal to the renewables market by committing to hold an AER V and then an AER VI competition. The Group also recommends that the Department of Public Enterprise help the green electricity market as a temporary measure to allow renewable generators to become established in the liberalised market. The problem they face is that the AER competitions offer 15 year power purchase agreements at index-linked prices, making it easy for the successful bidders to raise project finance. Potential entrants to the green electricity market cannot offer such long term 'bankable' contracts and so do not have equal access to capital.

So the Green Paper contains many commendable proposals. However, I believe that there are a number of serious weaknesses. The renewable energy proposals are focused entirely on renewables for electricity generation. Remember our first pie? Electricity is only about one third of our energy demand - heat and transport make up the other two thirds. There are significant opportunities for renewables to contribute to the heat sector in particular. For example, wood is the largest single renewable energy source at present. The use of wood as a fuel for heating could be significantly expanded, in the industrial, residential, agricultural, commercial and public sectors. Wood can be used in automated systems to heat large premises. Enclosed stoves for domestic use allow firewood to be used much more efficiently than in an open fireplace. Possible sustainable sources of wood fuel include sawmill and wood industry residues, some residues left in the forest after timber harvesting, wood from woodland management and tree surgery operations, and possibly waste wood that is presently being landfilled. Value-added wood fuels, such as wood pellets and briquettes, can provide convenient environmentally-friendly fuels.

Ireland also has very significant potential for the production of short rotation forestry and other energy crops, which should now be developed on a demonstration basis. On-farm anaerobic digestion plants can produce methane gas for heating farm buildings and the farm homestead. The sun's energy can be harnessed via passive solar design, or solar heating systems. And heat pumps, using the low temperature heat from the ground, can also contribute to our heating requirements (a number of heat pump systems have been installed around the country). While no consideration was given to the potential for either fossil fuelled

or biomass-fired district heating systems in the Green Paper, the National Climate Change Strategy does recognise the contribution district heating systems can make to greenhouse gas reduction. However, it does not mention the potential of wood as a renewable source of heat. .

As regards renewables for electricity generation, the Green Paper is quite focused on wind. This focus has been maintained by the recent report of the Renewable Energy Strategy Group 10. While work is being undertaken to examine the potential for offshore wind and wave, it is vital that other renewable energy sources with potential for electricity generation are not forgotten in the setting of capacity targets and the application of support mechanisms. There are considerable opportunities for micro hydro power plants. And biomass (landfill gas, anaerobic digestion and wood) could make a very significant contribution to renewable electricity generation, often while providing other environmental benefits such as reduction of methane emissions (methane is 21 times as potent a greenhouse gas as carbon dioxide). I would like to see the Renewable Energy Strategy Group focus next on the bioenergy area. Bioenergy provides alternatives to some of the proposals currently being considered to reduce greenhouse gas emissions: for example, there is considerable experience worldwide in co-firing wood with peat or coal in large power stations, thus reducing greenhouse gas emissions by displacing fossil fuel. Another interesting technical possibility is that of co-firing gas produced from the gasification of biomass with natural gas. Bioenergy also provides opportunities for renewable fuelled Combined Heat and Power, giving an alternative to fossil fuelled CHP.

The Green Paper does not seem to propose any measures to promote alternative transport fuels (for example biodiesel, bioethanol, methanol, fuel cells, electric vehicles). In the chapter on transport, the Paper states that the testing and demonstration of new transport technology options can be continued in the short term with a view to increased deployment in the medium term. However, in the chapter on research and development, it is stated that bio-fuels and other alternative fuels for transport are not considered to need significant, immediate Government-supported action (disappointingly, anaerobic digestion and the production of wood biomass are also in this 'not considered' category). Ireland is described as a technology taker in the area of alternative fuels, yet significant research, development and demonstration work on biodiesel has been undertaken in Ireland by a number of organisations supported by EU energy programmes.

Biodiesel can be a means to convert waste management problems (waste cooking oil, low grade animal tallow) into an environmentally friendly vehicle fuel.

However, such developments are blocked by the fact that no Irish government has reduced or removed excise duty from biodiesel, despite a long standing commitment to do so. The Green Paper mentions the possibility of a fuel taxation policy that would favour alternative fuels, but seems only to see the problems with such a measure, and not the potential benefits. It may be that alternative fuels are not considered to have a large enough potential in the transport sector to justify promotion. But why not take all of the opportunities that we can, particularly when there are benefits from a number of viewpoints? I find it hard to reconcile the negative attitude of the Green Paper to alternative transport fuels with the recommendations of the Technology Foresight Ireland Energy Panel, which states *'Given the huge anticipated growth in energy consumption in the transport sector, it is of paramount importance that alternative environmentally friendly transport systems be developed'*. The Energy Panel recommends a £3 million allocation for a three-year research, development and demonstration programme, but as stated previously, it is not clear if the Energy Panel's recommendations are to be implemented. The National Climate Change Strategy does promote short rotation energy crops, anaerobic digestion, landfill gas utilisation and carbon dioxide-efficient vehicle fuels. There is now an obvious need to integrate the Strategy with the energy policy proposals from the Green Paper to produce a clear and comprehensive picture of where Irish energy policy is going in the medium to long term.

At the World Conference and Exhibition on Biomass for Energy and Industry in Spain in June 2000, biomass-based fuels for transport received a lot of attention in view of rapidly increasing vehicle numbers, particularly in the developing world. The Brazilian and United States experiences of producing ethanol for transport fuel were detailed. Visions of future transport fleets using fuels such as ethanol, methanol or hydrogen were presented. There was a nice concept of 'green' crude oil: produced by pyrolysis or other processes from plant materials, refined, and then distributed through the existing distribution channels used for fossil diesel and petrol. Experience with biogas as a vehicle fuel was also reported. It seems to me that Ireland should be taking at least an active interest, and preferably an active part, in such developments.

So while the Green Paper on Sustainable Energy contains many welcome proposals for the promotion of renewable energy, at the end of the day it is focused on electricity production from wind power, and does not adequately address the potential for other renewables to contribute to electricity production, nor the potential for renewables in the heat and transport sectors. Contrast this with Denmark which has set itself the target of meeting its entire energy needs from

renewables by 2030. Wind will supply 50%, bioenergy 35% and solar 15%. These omissions must be rectified at the next stage of Irish policy development, and a table showing the potential of all renewables across the electricity, heat and transport sectors must be part of future policy documents on renewable energy.

Time for some serious changes in diet

It has been quite difficult to assemble the information for this article. No single document considers the totality of the Irish energy picture or examines how Ireland's energy is to be produced and used in the future. We would do well to follow the example of the United Kingdom Royal Commission on Environmental Pollution. Their report 'Energy - The Changing Climate', published in June 2000, is a comprehensive consideration of the UK's energy future¹¹. The report looks to the year 2050 and first asks how much should the UK's carbon dioxide emissions be reduced, based on a equitable worldwide allocation of emission rights on a per capita basis. The size of the emission right is designed to stabilise carbon dioxide concentrations in the atmosphere at a tolerable level. This approach is known as the principle of contraction and convergence. For the UK, an international agreement along those lines could imply a reduction of 60% from 1998 carbon dioxide emissions by the year 2050.

The report then goes on to examine what the UK's energy picture might look like in the year 2050. The long term view taken in the report is commendable, particularly as it looks at the emission reductions that will possibly be required as far ahead as the year 2100. The report helps provide a focus for debate by presenting four possible scenarios for the year 2050. These scenarios describe how energy demand can be managed, and the ways in which energy demand could be met. The report does not see a magic source of unlimited energy with negligible environmental impact as a foreseeable prospect: for example, it is considered unlikely that a commercial-scale nuclear fusion demonstration plant would be built before 2050. So the scenarios for the year 2050 are based on energy technologies in use at present or under development. By presenting detailed quantified scenarios, the report helps the reader to visualise how the energy future might look, and provides an excellent platform for discussion on alternative courses of action. Finally, the report points out that there will be benefits from moving to a more sustainable energy economy and society, and that this could give an improved quality of life for many.

While the Irish energy policy documents produced to date are steps in the right direction, I believe that we in Ireland urgently need a comprehensive analysis of

our possible energy futures, taking account of global energy resource availability and adopting a responsible role in global efforts to limit climate change. At the moment we seem to be focused on meeting international obligations at the least cost to ourselves. Why not creatively develop our potential to become a leading 'energy-fit' nation - a Celtic Cheetah rather than a Celtic Tiger?

And remember, if you live in Ireland, you consume a slice of Ireland's energy pie. While positive action at governmental level is required to help the nation move to a more sustainable pattern of energy production and use, we should all examine our own energy intake, and make efforts to cut back if possible. Responsible energy use is not pie in the sky!

Author's Note: *This article is written in my personal capacity as a member of Feasta and is not intended to represent the views of my employer, the Tipperary Institute, or of the Irish Bioenergy Association, of which I am Treasurer. I would like to thank Richard Douthwaite, Dr. Colin Campbell, Seamus Hoyne of the Tipperary Energy Agency and Paul Kellett of the Renewable Energy Information Office of the Irish Energy Centre for providing information or for commenting on drafts*

Footnotes

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- 3 Bord Gáis Éireann and Department of Public Enterprise, 1999. *The Gas 2025 Project Close-out Report and Review*, Dublin. Available on www.marine.gov.ie/display.asp?pg=722
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- 6 Energy Advisory Board, 1998. *Annual Report 1997*. Department of Public Enterprise, Dublin.
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10 Renewable Energy Strategy Group, 2000. *Strategy for Intensifying Wind Energy Development*. Department of Public Enterprise, Dublin.

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Biographical Sketch :



Kevin Healion is from the village of Rosenallis in the Slieve Bloom mountains, Co. Laois. He studied biotechnology in Dublin City University and environmental engineering in Trinity College Dublin. He worked initially as an environmental consultant, specialising in sewage sludge management and renewable energy production from wood. Now living in Thurles, Co. Tipperary, he teaches environmental science and systems on the National Diploma in Sustainable Rural Development at the Tipperary Institute. He is presently completing studies in adult and community education at NUI Maynooth. His project and research work is focused on the community-based development of bioenergy, and he is the current Treasurer of the Irish Bioenergy Association (IrBEA). He may be contacted on 0504 28105 or khealion@tippinst.ie.

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This article is from the first Feasta Review, a 204-page large format book. Copies of the book are available for £15 from [Green Books](#).