

A Review of Irish Energy Policy

John Fitz Gerald

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Chapter 1

Introduction

This paper reviews the considerable body of economic research on energy in Ireland and elsewhere. It draws out the implications of this research for Irish energy policy, and also some of the implications for EU energy and environmental policy. The paper identifies some important gaps in our knowledge, gaps which need to be filled to inform policymakers of the full implications of policy choices which they are currently facing.

The economic backdrop for energy policy has changed dramatically as a result of the current recession and some of the important assumptions that underpinned the 2007 Government White Paper on energy policy are out of date. The exceptional downturn in the economy has not only reduced the demand for energy but it has also affected other important variables, such as the availability and cost of capital. In addition, there have been other changes in the external environment and new developments in the technical field that have introduced new dimensions to be considered by policymakers.

When taken together these new developments suggest a need to look again at some areas of policy. However, while the environment within which policy must operate has changed, the key objectives of policy remain the same: ensuring that energy supplies are available to Irish consumers at a minimum cost to Irish society; delivering a secure supply of essential energy and meeting our environmental targets.

Some of the background changes that are important are:

- The demand for energy has fallen and this reduction will impact over the coming decade. While there is likely to be a return to significant growth in the medium term, the energy needs of the economy will be permanently affected by the current economic crisis.
- The reduction in world growth has also had an, albeit temporary, effect in slowing world demand for oil and, hence, reducing the upward pressure on prices. However, the fact that oil prices have not fallen back to earlier levels, due to continuing growth in the economies of China, India and other newly industrialising economies, is significant. It suggests that there is little prospect of a return to low oil prices in the immediate future and further upward pressure

on prices can be expected in the face of a prolonged world recovery (IEA, 2010a). Temporary shocks, such as the current unrest in the Middle East, can also put prices under pressure.

- The effect of the global and domestic economic crisis has been to raise the risk premium attaching to all investment in Ireland. This will substantially raise the cost of capital, with the greatest impact falling on the very capital intensive energy sector. This means that some projects, that previously looked attractive, may no longer look as desirable.
- Intense pressure is being put on the competitiveness of the Irish economy. Economic recovery requires a substantial reduction in the domestic price level relative to that of competitors. This enhances the need for policy to minimise the cost of energy for the economy. While in the past a significant price premium might have been acceptable to outperform environmental targets, this may no longer be the case.
- The prospect of shale gas¹ could weaken the traditional link between the price of gas and the price of oil. This “technical change” is affecting world markets and has implications for the Irish energy sector. However, it is unclear how big an effect it will have on the European market in the coming decade.
- The weakness in the EU economy has meant that the price of carbon under the Emissions Trading Scheme (ETS) has been volatile and remained relatively low. With uncertainty about future policy on climate change, both within the EU and worldwide, there are considerable doubts about how this price will develop over time. This militates against major private sector investment in developing new technologies and in investing in energy efficiency.

In terms of policymaking, the energy sector presents special challenges. Because a significant part of the investment in the sector may have an expected lifetime of forty or more years the wisdom of such investment must be considered within a similar time frame.² Also, because of the capital intensity of the sector, the importance of investment decisions dominates most other issues. Thus, the cumulative impact of energy policy over a longer time scale is the appropriate framework for consideration, not just the implications for competitiveness and for emissions today. This long time horizon makes the formulation of energy policy rather different from many other areas of public policy. Finally, given the uncertainty inherent in any forecasting exercise, the objective should be to design policy on a ‘no regrets’ basis.³ It may well be appropriate to pay a price to cover a range of possible outcomes rather than locking in on what one set of forecasts would suggest would

¹ Shale gas is a new source of supply that has recently been developed in the US.

² Investment in transmission has a very long life. In addition, investment in nuclear and coal-powered plant typically has a life time of around 40 years.

³ Policy should be formulated so that, whatever the actual outturn, it is likely to be appropriate.

be the “optimal” approach to meeting society’s objectives for energy policy. In some cases there is also an “option value” to delaying decisions until the future path becomes clearer.

In Chapter 2 of this paper we set out the key elements of energy policy in Ireland and the EU. Chapter 3 summarises the sources of energy for the Irish economy. The crucial drivers for change in energy policy are discussed in Chapter 4. Chapter 5 considers the role of energy policy in promoting competitiveness and Chapter 6 discusses the drivers for energy policy in Ireland arising under the renewable and environmental heading. Chapter 7 analyses the issues arising under security of supply. Finally brief conclusions are drawn in Chapter 8.

Chapter 2

Current Policy

The context for Irish energy policy is the broader set of policy initiatives undertaken by the EU in the field of both energy and climate change.

The 2007 Government White Paper spelt out three main strands of Irish energy policy: competitiveness, energy security, and sustainability.

The underpinning Strategic Goals in promoting competitiveness were:

- Delivering competition and consumer choice in the energy market;
- Delivering the All-Island Energy Market Framework;
- Ensuring that the regulatory framework meets the evolving energy policy challenges;
- Ensuring a sustainable future for Semi-State Energy Enterprises;
- Ensuring affordable energy for everyone;
- Creating jobs, growth and innovation in the energy sector.

The underpinning Strategic Goals on energy security were:

- Ensuring that electricity supply consistently meets demand;
- Ensuring the physical security and reliability of gas supplies to Ireland;
- Enhancing the diversity of fuels used for power generation;
- Delivering electricity and gas to homes and businesses over efficient, reliable and secure networks;
- Creating a stable attractive environment for hydrocarbon exploration and production;
- Being prepared for energy supply disruptions.

The underpinning Strategic Goals on promoting sustainability were:

- Addressing climate change by reducing energy related greenhouse gas emissions;
- Accelerating the growth of renewable energy sources;

- Promoting the sustainable use of energy in transport;
- Delivering an integrated approach to the sustainable development and use of bioenergy resources;
- Maximising Energy Efficiency and energy savings across the economy;
- Accelerating Energy Research Development and Innovation Programmes in support of sustainable energy goals.

In 2007, the European Union agreed climate and energy targets: These are a 20 per cent reduction in greenhouse gas emissions by 2020; a 20 per cent increase in energy efficiency by 2020 and ensuring that 20 per cent of the EU's energy consumption comes from renewable sources by 2020.⁴ Under the terms of the Renewable Energy Sources Directive, each Member State is set an individually binding renewable energy target, which will contribute to the achievement of the overall EU goal.

Apart from a sub-target of a minimum of 10 per cent in the transport sector that applies to all Member States, there is flexibility for each country to choose how to achieve its individual target across the sectors. Ireland's overall target is to achieve 16 per cent of energy from renewable sources by 2020.

Ireland's National Renewable Action Plan NREAP, consistent with the EU directive, was published in 2009. In that plan the Government has set a target of sourcing 40 per cent of electricity consumption from renewable sources by 2020. In transport there is an initial target of using 4 per cent of biofuel in road transport. The Government has set a target of 12 per cent renewable heat by 2020.

The REFIT (Renewable Energy Feed-In Tariff) scheme has been implemented to help ensure that the renewable target in electricity is met. This scheme incentivises investment in onshore wind by providing a guaranteed price for such electricity. It also provides a limited subsidy for all wind electricity, no matter what the market price. Finally, it is in the course of being extended to include biomass co-firing in peat stations. Much higher guaranteed prices are also guaranteed for electricity produced from offshore wind, tidal or wave sources.

The draft Climate Change Response Bill proposed a unilateral adoption of a 30 per cent emission reduction target for 2020. The achievement of this target would be problematic, as EU legislation would oblige Ireland to bridge the gap between the EU

⁴ Tol (2011), considers the costs and benefits of this policy at an EU level.

target (-20 per cent) and the Irish target (-30 per cent) through emission reduction in the domestic non-ETS sectors (mostly agriculture, households, small and medium-sized enterprises, and transport) (Gorecki and Tol, 2011).

After many years of deliberation, a carbon tax was introduced in 2010 which applies to much of the economy that is not covered by the EU Emissions Trading Scheme. A number of studies have shown that this tax is likely to reduce emissions at minimum cost. In fact, if the revenue from the tax substitutes for taxes on labour the net impact on the economy is likely to be positive, as well as serving to reduce emissions (Fitz Gerald and McCoy, 1992 and Conefrey *et al.*, 2008).

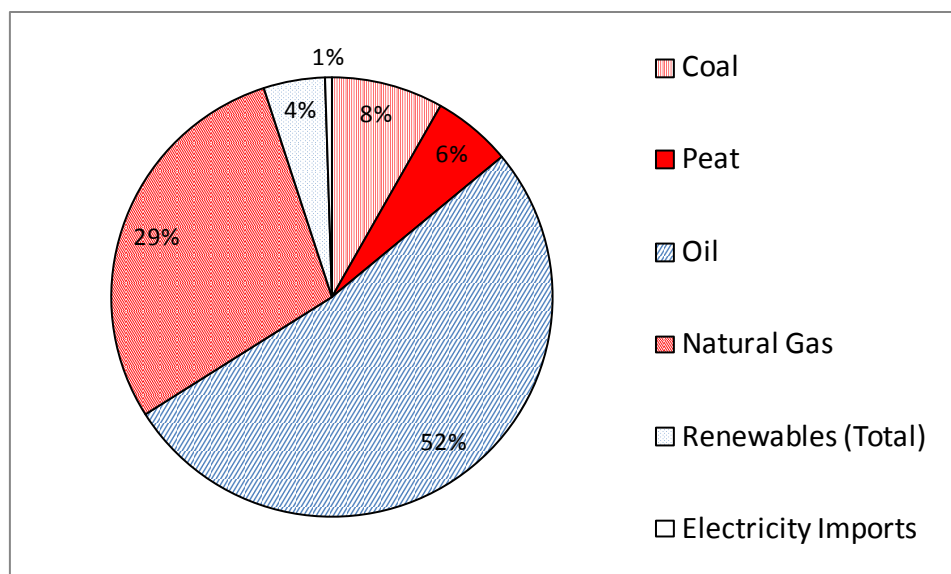
Chapter 3

Structure of Energy Supply

Before discussing the key issues for energy policy it is useful to summarise very briefly some key aspects of Irish energy supply.

Currently the vast bulk of Irish energy comes from imported fuels – coal, oil and gas. The main exceptions are peat and renewables. As shown in Figure 1, these latter domestically sourced energy sources accounted for only a small share of the primary energy used in Ireland in 2009. As discussed later, once the Corrib gas field comes on stream over the coming decade, a substantial share of the natural gas used will also come from this source.⁵ However, the size of the field is such that, without new gas finds, Ireland’s dependence on imported gas can be expected to rise again by 2020.

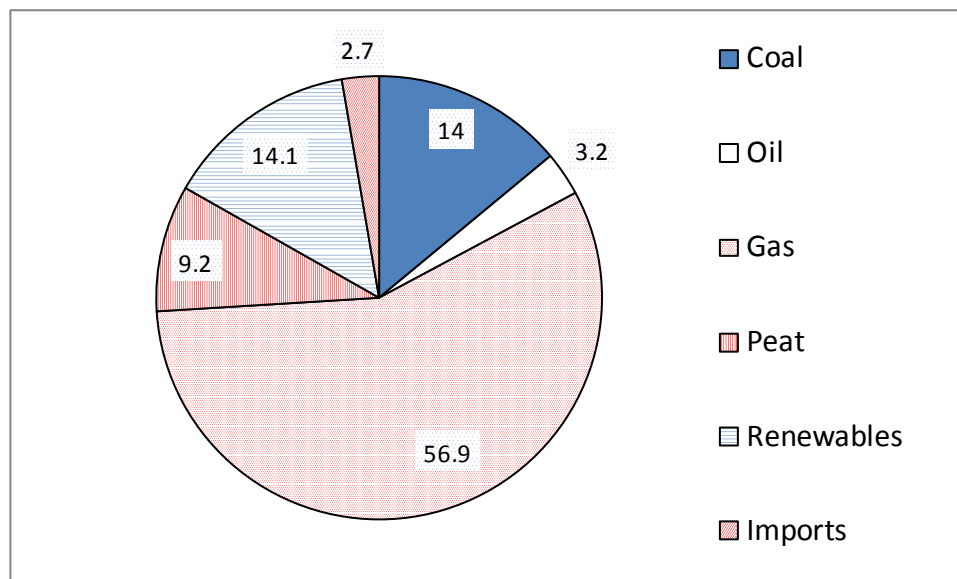
Figure 1: Source of Primary Energy, 2009, % by Fuel Source



Source: SEAI, 2010, *Energy Forecasts for Ireland to 2010*, Dublin.

⁵ The Corrib gas field was discovered off the West coast of Ireland in the late 1990s. It had been hoped that it would be brought into production early in the last decade. However, a series of problems involving the regulatory regime have so far prevented this happening.

Figure 2: Electricity by Fuel, 2009, Share of Electricity Generated by Fuel Used, %



Source: SEAI, 2010, *Energy in Ireland, 1990-2009*, Dublin.

Because of the importance of energy to the proper functioning of the economy, Ireland is very dependent on having readily available sources of supply of oil and gas. Even with some increase in renewables over the coming decade, this situation is not expected to change significantly in the period up to 2020 (Devitt *et al.*, 2010).

As shown in Figure 2, gas also accounts for the bulk of fuel used to generate electricity in Ireland. In 2009 almost 57 per cent of all electricity generated in Ireland came from gas. Coal and peat accounted for just over 23 per cent of electricity generated with renewables (including hydro) accounting for just over 14 per cent of the total. Because of the importance of electricity to the economy this makes Ireland very dependent on a reliable supply of gas.

Chapter 4

Drivers of Change

There are several factors that are driving the development of energy policy in Ireland. In the short term the recession is an important force for change. However, in the longer term it is the growth in China, India, Brazil and other similar countries that will be particularly important in putting upward pressure on the demand for fossil fuels and, ultimately, the greatest pressure on the environment. Technical changes and developments are also very important – for example, the potential impact of developing shale gas. Finally, developments in energy and environmental policy at both the EU and the world level are also important drivers of change.

The fact that the forces for change are in many cases global rather than national is important. Where the problems are global, often manifested in higher prices, there is a clear incentive for people around the world to find solutions through research and development. Where problems are purely local the resources available to find technology based solutions will be much more limited.

4.1 THE RECESSION

The depth and expected relatively long duration of the current recession in Ireland will dramatically reduce the demand for energy over the coming decade. While some bounce back will occur (Devitt *et al.*, 2010 and SEAI, 2010), output over the coming decade is likely to be very much lower than had previously been anticipated. In turn, the population will be lower than was projected in 2008 and the number of households will be correspondingly reduced. While there is likely to be a return to significant growth (Bergin *et al.*, 2010), it will not be enough to make good the losses of the 2008-2010 period and, as a result, this step down in output will affect the economy out to at least 2020.

This change in the macroeconomic environment will have a number of effects. It will greatly reduce the need for further new electricity generation over the coming decade. In turn, by reducing the overall size of the electricity system below the level that had been anticipated by 2020, a lower level of renewable generation will be required to meet current targets. Lower output and higher interest costs will probably also slow the replacement of the capital stock generally and specifically of the motor vehicle stock, which, in turn, will affect the speed with which environmental and efficiency improvements are incorporated into the vehicle fleet.

Inevitably, the exceptionally high cost of capital that the Irish government faces today will be passed on to the domestic private sector, which is dependent on the Irish banking system. While it is to be hoped that the current exceptional cost of capital will fall over the coming years, it is likely to remain elevated for some time to come. This has implications for all investment by the state. Projects which looked attractive in the past may look less attractive today. It will also affect Irish private firms which are dependent on the local market for finance. Even large Irish commercial firms may face elevated capital costs if they are largely dependent on the Irish market for finance. This could favour larger more diversified international firms, which have easy access to finance on European markets. While it is to be hoped that this disadvantage for Irish firms will be short-lived, it will affect investment in the immediate future.

4.2 WORLD GROWTH

The slowdown in world growth has reduced pressures on oil prices. In the months before the crash of September 2008 oil prices had reached an exceptional peak driven by the large increase in world demand, especially in demand from China and newly developing economies. While their growth was slowed as a result of the recession in the more developed economies, it has now resumed. Thus demand for oil is likely to continue rising over the coming decade.

It remains to be seen what the supply response to the current level of oil prices will be. Even after the falls from the summer 2008 peak, real oil prices remained well above their levels of the 1985-2005 period, making new investment in oil supply attractive. Thus some increase in oil supply in response to the higher price may be expected. However, it remains very uncertain how oil prices will develop over the course of the coming decade.

Even before the recent upheavals in the Middle East, the oil price was high by historical standards, in spite of the uncertain growth in the OECD area. This highlights the potential long-term impact on demand and prices of the growth of China, India, Brazil and the other Newly Industrialised Countries (NICs). In turn this has implications for the future: it will incentivise investment in new technologies, renewables and energy efficiency, as well as in the search for alternative sources of oil.

The major political upheavals in the Middle East have seen oil prices once again reaching exceptional levels in Spring 2011. This reflects the fact that oil demand is not elastic in the short run so any sudden supply disruption is immediately reflected in a significant supply response. In turn, this offers opportunity for speculation. However, once the impact of the political unrest becomes clear, prices may be

expected to adjust downwards. Nonetheless, this “shock” highlights the vulnerability of the world economy to sudden changes in oil supply conditions.

4.3 TECHNICAL CHANGE

Since the Government’s White Paper on Energy Policy in 2007 there have been a number of significant developments in the technical sphere. These developments affect both the sources of energy and how it is transformed into a useful form. In addition, current research in science and engineering may produce new breakthroughs in the future which could affect the energy sector in a very significant way in the period after 2020. Because of the long lives of much of the plant and equipment in this highly capital intensive sector, the prospect of such future technical change may impact on current more conventional investment. Investors, and especially financiers, face the possibility that investment undertaken over the next few years could be “stranded” by new technical developments before it has earned an adequate return. In turn, this may impact on current investment plans.

Shale Gas

One very important area where technical developments are changing the external environment for energy policy is shale gas. The development of shale gas in the US is already having an impact by cutting the cost of natural gas there, but it is also having an effect on world markets. While natural gas is a much less integrated market than the world market for oil, it had been developing into a more global market, with extensive international development of LNG (Liquefied Natural Gas). The effect of the major upward revision in expected supplies of natural gas in the US market has been to temporarily “strand” some international investment in LNG, and LNG prices have fallen.

Because of the growth of the Chinese economy and its increasing demand for energy (and related environmental problems), it seems likely that China will be a large market for LNG in the future. Thus, the changes in the US do not presage a sustained “glut” of LNG on world markets, but will reduce upward pressure on LNG prices.

The combination of the serious recession in Europe, the fall in LNG prices and the changed expectations about world gas supplies has seen a major reduction in European spot prices for gas. This had significant benefits for Ireland by reducing the price of gas and, hence, the price of electricity.

While there is no certainty that this improved European supply situation will last, any new development of shale gas in Europe could have a major impact on expectations, weakening the position of existing suppliers to the European gas market.

Nonetheless, recent research suggests that that it will be 2020 or later before shale gas supplies could become significant in Europe, directly affecting prices (Gény, 2010).⁶

Other New Sources of Gas

As some of the suppliers to the European market need to invest large sums in further developing their resources, the increased uncertainty about long-term EU gas prices will pose problems for them. In the past investment was financeable through long-term take or pay contracts with large state-owned monopolists in countries such as Germany. Because of their dominant position such firms had credibility when they signed contracts for 20 years – they were likely to be around to honour them. However, with liberalisation and fragmentation of the European gas supply market such contracts are no longer possible or credible (Newbery, 2002). This will make new investment riskier, especially for those financing it. In the sphere of oil, this problem has been handled through the development of huge oil companies that manage production and supply on a very large scale and are able to hedge many of the risks within the individual companies.

The problem of financing such inherently risky investment clearly applies to oil and gas exploration off the west coast of Ireland. Because of the huge costs involved and the low probability of success in each individual prospect, it is clearly too risky an undertaking for the Irish state. Instead, large multinational companies are able to hedge the risk inherent in such investment within the large portfolio of prospects undertaken by the companies.

Electric Cars

Another area where developments in technology hold out prospects of significant change in energy policy in Ireland is electric cars. However, as Hennessy and Tol (2010) have shown, it will be the decade after 2020 before the technical developments will begin to impact directly on energy demand. This is because the technology, while developing rapidly, still has a long way to go before it is economic. Furthermore, given the time that it takes to bring new vehicles into production it will be many years after the technology becomes fully economic that factory capacity worldwide will have adjusted to produce the new models. In addition, because of the enhanced lifetimes of modern cars, even when new technology vehicles are readily available at competitive prices, it will take the best part of a decade before

⁶ This is because of: the immaturity of the European industry in terms of geological knowledge of unconventional reservoirs; very few announced drilling investments over the next three years, which will translate into a long testing and de-risking phase; and lead times of about five years based on US shale gas projects. In addition, there are many operational, regulatory and commercial challenges to be overcome.

old technology vehicles are largely replaced, a process which the current recession will, in any event, slowdown.

Nonetheless, because this technology could well be deployed on a large scale from 2020, this technical development could impact on electricity generation, transmission and distribution after 2020. Because of the long lifetime of electricity infrastructure, investment today must take into account the possibility of such developments after 2020.

Under these circumstances investment in energy efficiency can have an additional benefit (over and above the saving in expenditure on energy). By reducing demand it can allow decisions on major new infrastructure to be postponed till the technology situation becomes clearer.

Renewable Technologies

Yet another area where technical change is taking place is in the area of renewable technologies. In the area of onshore wind the technology is reasonably mature. While significant further cost savings are likely in the future, as the technology is further refined, these prospective cost savings will not greatly change the characteristics of the technology. Offshore wind technology needs substantial further development to bring down cost and, especially, to deal with the problems of maintenance and reliability in a very demanding environment. While the possibility of exploiting onshore wind still remains, it will not be economic in Ireland to develop offshore wind for domestic use because of its extremely high cost (McIlveen, 2010).

Ocean and tidal technology is only at the development stage. It is still not possible to assess the likely energy output and its characteristics (e.g. intermittency). Denny (2009), shows that, because of its high level of intermittency, tidal generation is unlikely to be economic in the foreseeable future. Thus, for these technologies the economics suggest that they should not play a major role in Ireland before 2020 at the earliest.

Nuclear Electricity Generation

The technology for generating electricity from nuclear fission was originally developed in the 1950s. However, the engineering challenges remain substantial and the latest cohort of generation plant is still not fully optimised for smaller-scale production. Even in the case of larger “standard” plants, such as two new plants in Finland and France, there are very significant cost and time overruns. However, even assuming that they can be produced at reasonable cost on a reliable basis before the end of the current decade, there remains the uncertainty about waste disposal.

For Ireland, there are two major economic obstacles to adopting this technology. Firstly, the large size of “standard” plants makes them uneconomic for Ireland (Fitz Gerald *et al.*, 2005 and Poyry, 2010). Unless reliable and economic smaller units are developed over the coming decade, this will remain an obstacle to introducing nuclear generation to Ireland.⁷ Secondly, because onshore wind is already so successful and because the share of generation likely to come from this source by 2020 could be large, this will make investment in new nuclear uneconomic. This is because wind, as with nuclear, has a zero or very low marginal cost. Thus, when the wind blows it will supply the bulk of domestic demand resulting in a zero marginal cost and price. Investment in nuclear would find it very difficult to make a satisfactory return under such circumstances.

Finally, public concern about nuclear generation would mean that even if the economic considerations favoured nuclear, any decision to build a nuclear plant in Ireland would be likely to generate major opposition. Given the costs involved in the planning process for normal investments in the energy sector, major planning delays would be probable, further increasing the costs of investing in nuclear generation in Ireland.

4.4 EU AND ENVIRONMENTAL POLICY

Policy on Climate Change

Probably the single biggest driver of change in the energy sector over the last decade was the Kyoto protocol and the related decisions by the EU on its implementation within its borders. It made concrete the challenge posed by the need to control and reduce emissions of greenhouse gases. The Emissions Trading Scheme (ETS) faced all large power producers and some large energy users in the manufacturing sector with a price for emissions of carbon dioxide. The signalling effect of this price has been attenuated because the price has remained volatile and quite low; nonetheless, the adoption of the mechanism has signalled the EU’s general intent in relation to controlling emissions.

While there is increased uncertainty about the extent to which governments worldwide will take effective action to tackle climate change over the coming decade, it still seems probable that the EU will continue to implement policies which require significant reduction in emissions within its own borders. Thus, it seems very likely that the current emissions trading regime will be renewed in a modified form

⁷ Speaking of the possibility of using small nuclear plants derived from military designs Poyry (2010) says: “Despite the attractiveness of their small size, the military designs’ unit costs are probably very high ...”

to cover the rest of the decade out to 2020. The continuation of this regime for the coming decade will be a crucial factor determining the nature and timing of new investment in energy in the electricity sector. The prospect of ever tighter limits on emissions (and higher carbon prices) provides an important signal for research and development in this area.

In addition to the ETS scheme, the EU limits on emissions of carbon dioxide from other sources⁸ will put significant pressure on individual economies. In the case of Ireland, it will be very difficult to meet the targets set without recourse to purchasing permits from other countries (Devitt *et al.*, 2010). It is very important for Ireland that this latter option is available.

The EU policy to address emissions from non-ETS sources has been analysed in Tol (2009). In the long term it would be very desirable to have a fully integrated regime where emissions from whatever source pay the same price. Having separate regimes for ETS firms and non-ETS firms makes it very likely that reductions in emissions in Europe in the future will be bought at a significantly higher price than is necessary. This would cause unnecessary damage to the competitiveness of the EU and could also undermine the credibility of EU environmental policy.

The Irish government sought a modification in the current proposed regime which would have greatly reduced the danger of such an outcome.⁹ However, this did not succeed. Instead a different proposal was agreed which would allow countries to trade in a way that would lead to a convergence in the cost for the non-ETS sector across the EU. While minimising the distortions to competitiveness within the non-ETS sector in the EU, this could still result in unnecessary costs for emissions reduction across the EU.

On the basis of current forecasts (Devitt *et al.*, 2010) it seems likely that Ireland will face major problems complying with its target for the non-ETS sector. This will involve significant costs to buy permits from other EU members later in the decade. The current proposed EU regime for limiting emissions in the non-ETS sector poses major problems for Ireland because of the way emissions from agriculture are treated. The result of implementing such a regime could be pressure to reduce emissions in that sector below the level that would be environmentally or economically sensible. It is important that the Irish authorities seek a review of the

⁸ The ETS scheme covers electric power generation and certain large manufacturing users (cement). The new EU limits apply to all other sources of carbon dioxide.

⁹ The proposal was that countries could buy and sell permits on the ETS market to cover over or under compliance in the non-ETS sector (Tol, 2009).

current policy proposals on agricultural emissions to ensure a more rational outcome from an Irish (and an EU) perspective.¹⁰

UK Environmental Policies

One area where problems could arise for Ireland, due to policies pursued outside the country, would be if UK policy continues to offer a very high return for renewable generation. This could see investment in intermittent renewables continuing in Northern Ireland long after it was economic to do so, even taking account of the cost of carbon. This could impose a cost, not only on the citizens of Northern Ireland as part of the UK, but also on consumers in Ireland because of the All-Island electricity market. This cost would arise from the need to back up the intermittent wind generation. If such a mismatch between the environmental policies in the two jurisdictions were to continue it might be necessary to consider if consumers in Ireland could be insulated from the unintended consequences of UK policy.

If UK Renewable Obligation Certificates (ROCs) were payable on offshore wind generation in Ireland this could, under some circumstances, also impose significant costs on Irish consumers without any commensurate environmental benefits. However, if the Irish market were suitably insulated from such investment, the benefits which would accrue to offshore producers might not have a negative impact on domestic consumers. It is important that work continue on both a bilateral basis with the UK and also at the EU level to ensure that the implementation of renewable policy outside Ireland happens in a way that protects consumers in Ireland from any negative impact, while still allowing producers to exploit profitable opportunities.

Policy on Renewables and Energy Efficiency

The EU has a range of policies requiring both increased energy efficiency and increased deployment of renewable electricity. The logic behind these policies is not fully clear. While they could serve to reduce emissions of greenhouse gases and to enhance security of energy supply there is no guarantee that this will be the result. In addition, the environmental and security objectives could almost certainly be met at lower cost by having better targeted policies specifically designed to meet the environmental and security goals (Tol, 2011).

The EU policy requiring substantial deployment of renewable energy across the EU is motivated by concerns to reduce greenhouse gas emissions and increase security of supply. Renewables in themselves do not confer utility. However, with a developing

¹⁰ Ireland has a comparative advantage in milk production and pressure to reduce output in this sector would only see such production relocated to other regions, with no environmental benefit and a significant economic cost for Ireland.

set of policies (and instruments) to tackle greenhouse gas emissions, the possible costs of double regulation through having this additional requirement must be considered. A carbon tax or an ETS, provided it applies to all energy, is likely to be the most efficient way of reducing emissions (Weitzman, 1974 and Pizer, 2002).

The security benefits could also be met more efficiently; for example, a tax paid on “insecure” energy would provide an incentive to seek more secure sources (Fitz Gerald, 2003). Such a direct signal would achieve the desired effect (whatever security level is chosen) at lower cost than the renewable policy.

While the costs of meeting the Irish target for renewable electricity generation may be low (Diffney *et al.*, 2009b) the costs for other countries, such as the UK, may be very high (McIlveen, 2010).¹¹ As the environmental benefits are not clear (McIlveen, 2010, shows how they could be met for the UK at dramatically lower cost) this raises the question as to whether the EU will continue to pursue this policy over the coming decade. With countries such as the UK and Germany faced with major costs for limited environmental or security benefits, pressures may well build for policy reform within the EU. In turn, this potential uncertainty about future policy must pose significant difficulties for potential investors in the more expensive forms of renewable energy (Helm, 2009a).

The current renewables policy in particular is likely, if implemented, to impose very significant costs on the EU economy without commensurate benefits in terms of reducing greenhouse gas emissions or enhancing energy security. As such, the policy lacks credibility. As the end date (2020) approaches, the question arises as to whether countries such as Germany and the UK, which face very large bills to meet their renewables targets, will go ahead with policies that ensure the targets are met. There must be a high probability that they will seek to change policy to a more rational basis from their national perspectives. If this were to happen then countries and companies that had invested heavily in meeting the targets could see themselves with major and very costly stranded assets. In turn, as this risk grows, more pressure will come from all quarters to reconsider what may be seen as an unwise policy.

The European Union has the aspiration to increase primary energy efficiency by 20 per cent from what it otherwise would have been in 2020 (CEC, 2008). This target is not binding. Devitt *et al.* (2010), suggest that the target for Ireland is unlikely to be

¹¹ This study quotes the regulatory impact assessment for the Renewables Obligation Certificate (ROC) as showing a net cost between £53 billion and £66 billion over 20 years. These numbers suggest a cost per tonne of carbon dioxide of around £130 in 2008 compared to £12 under the ETS.

met on the basis of current policies and further policy changes would be required if it were to be met.

Integrated Electricity Market

While much of the focus of EU energy policy over the last decade was on liberalisation and promoting competition, there is now more focus on the physical design and integration of the system. There is an increased realisation that action at an EU level promoting interconnection and integration could bring economic and security benefits to Europe.

The concern is that the significant strides made with the SEM (Single Electricity Market on the island) may not figure highly on the EU radar and, in designing new market structures and rules, there could be significant negative effects on the Irish market. As highlighted in Lyons *et al.* (2007), the success of the Irish market depends on the credibility of the regulatory regime and the market structure that it supports. Companies are investing in Ireland because the capacity payments regime and the market design as a whole have credibility.

The EU is actively considering the development of an integrated EU electricity market for North-Western Europe (and for the EU as a whole). It is proposed that this will be implemented by introducing rules on cross-border trade in electricity. Because these rules may not be consistent with the Irish SEM it could force its abandonment. This could fatally undermine the credibility of the Irish market, with the prospect of a long delay before a new regime could be put in place. In turn, this would make investment much more difficult to finance and, hence, more expensive.

These developments could have serious implications for Ireland. As of now little research has been done in Ireland or elsewhere to examine the costs and benefits of the putative new regime. As developments are happening rapidly in this domain at the EU level the full implications of such changes for policy will need to be considered urgently.

If the Irish electricity market has to be radically changed to conform to a new EU trading regime this could involve very substantial transactions costs – for example, the development of new software and a new legal and accounting framework. While such “transactions costs” might seem trivial in the context of a large market such as Germany or the UK, they could impose a very substantial burden on consumers in the small Irish market. For example, the software required to allow consumers to change electricity supplier cost around €100 million to develop and implement. It is questionable whether Irish consumers will ever reap the reward from this investment. Similarly, the costs of implementing a new EU market could prove to be very high relative to the size of the Irish market.

EU rules on how interconnectors are used will be important in determining how the costs and benefits of their introduction will be shared between producers and consumers in Ireland and in Great Britain (GB).¹² Inappropriate rules could well disadvantage Irish consumers. Following the logic of free trade in goods, it is likely that the EU will seek rules such that interconnection charges are minimised, reducing (economic) friction costs and enhancing free trade. While such a regime could maximise the overall benefit for the EU economy, it could negatively affect producers or consumers in specific locations. In the case of freeing of trade in manufactured goods and services these distributional costs were seen to be greatly outweighed by the overall benefits of free trade. However, in the case of electricity, if consumers in one country pay for the interconnection then it would seem unfair that they should actually lose out from the effects of interconnection.¹³ Without some assurance that investors (consumers) will reap some of the benefits of their investment, that investment is unlikely to happen. Unless this issue is successfully resolved at an EU level it could prove a major problem, not just for Irish consumers, but for consumers elsewhere.

Security of Oil and Gas Supplies

The EU currently has a policy on burden sharing in the case of a major oil shortage. This policy framework is consistent with the broader International Energy Agency (IEA) policy. This strategy includes detailed plans to deal with a crisis affecting oil supplies and periodic tests are carried out to ensure that the plans are appropriate. After the hurricane Katrina disaster these plans were invoked by the IEA and implemented successfully.

The EU is developing a similar framework for gas. Regulation 994/2010 came into force on 1 December 2010 providing for advanced planning, involving all EU Member States, in how to deal with a possible future gas shortage. Already discussions are taking place between the Irish and UK authorities on foot of this regulation. This provision is important for Ireland because of our current dependence on imported gas. It is designed to ensure that in the event of a major disruption to supplies, those supplies that are available will be shared on an equitable basis. The issue of gas dependence is dealt with further in the Chapter on security of supply later in this paper.

¹² Throughout this paper Great Britain is used to refer to England, Scotland and Wales whereas United Kingdom encompasses Great Britain and Northern Ireland.

¹³ The EU has provided some financial assistance for the construction of the Moyle interconnector between Northern Ireland and Scotland and financial assistance will also be provided for the new interconnector being constructed to England. The rest of the funding has effectively come from Irish consumers.

The current EU requirement is that each country has to hold significant stocks of oil. To minimise cost and increase flexibility countries, including Ireland, generally hold this strategic reserve substantially in the form of crude oil, or in oil being processed in refineries. However, in the event of a major oil shortage worldwide, problems could arise in availability in different locations of refined product, given the distribution of refining capacity across the world. Thus, there could be an even more severe shortage of certain refined products in some locations. This issue is dealt with further in Chapter 5.

Chapter 5

Competitiveness

In most cases network infrastructure is so important that duplication would be impossibly expensive.¹⁴ This confers natural monopoly status on the owners of the infrastructure. It will also never be made redundant or obsolete so that consumers will continue to use it and, presumably, to remunerate it. The electricity and gas sectors are typical network industries because of the crucial role played by the transmission and distribution infrastructure in ensuring the safe, reliable and efficient delivery of their product from suppliers to consumers. The dominant importance of network infrastructure in many parts of the sector provides special challenges.

The special features of the energy sector, outlined above, mean that the government has an essential regulatory role. Government needs to ensure the reliable supply of energy; it needs to ensure that the un-priced environment is protected; finally it needs to ensure that the sector operates competitively and to ensure that the necessary supply of energy is delivered at least cost in the long term.

5.1 DELIVERING NECESSARY INVESTMENT EFFICIENTLY

There are concerns about the ability of the state regulatory system (including physical planning) to deliver the necessary investment in transmission and distribution. While the Strategic Infrastructure Act should make a difference, it is not yet clear that it is working adequately. Delays in building infrastructure could impose major economic and social costs. If the existing system does not deliver it will need further reform. In this regard there are even greater problems with the physical planning process in the UK. This poses problems for Ireland by restricting the location and nature of interconnection.

5.2 THE COST OF CAPITAL

Because of the capital intensity of the sector, uncertainty about the future regulatory framework provided by government can dramatically increase the financial risk facing the sector. In turn, such risk, being reflected in the cost of capital, can have a major effect on the cost of supplying energy. Thus, regulatory certainty can have a major pay-off in terms of reducing cost (Lyons *et al.*, 2007).

¹⁴ For example, electricity wires, water pipes etc.

The fact that the regulatory regime for electricity is provided under joint legislation in two parliaments is most unusual. It provides added credibility to the regime as any changes would need simultaneous co-ordinated legislation in the two parliaments. This rules out sudden or arbitrary changes to the regime, even if individual governments were so minded. However, as discussed above, developments at the EU level could make the current situation much less certain.

The SEM established in November 2007 has been a success. It provides for transparent pricing at short-run marginal cost. This is the appropriate signal to consumers (and producers) and it should minimise the cost of producing electricity in any particular time period. The capacity payments regime is designed to reflect the additional long-run costs of producing electricity (paying for the cost of capital etc.). When taken together these two payments are designed to reflect the long-run marginal cost of production.

While the capacity payments regime may need some tweaking to reflect adequately other costs experienced by operators (cost of reserves etc.) it has basically met its design requirements. By providing a reasonably predictable environment for investors it helps reduce the cost of capital.

Because of the capital intensity of the electricity and gas sectors, minimising the cost of capital is crucial if the overall cost of the system is to be minimised for consumers. Thus regulatory certainty is very important, as set out above. In addition, because networks (electricity and gas) are natural monopolies and are unlikely to become obsolete through technical change they are likely to be always needed by consumers. Thus it is appropriate for consumers, through the regulator, to guarantee a return to the owners (on the Regulated Asset Base, RAB) commensurate with efficient construction and management of the networks. In turn, the existence of such a long-term guarantee makes the network utility business very different from most others. In some cases utilities may even be able to borrow at lower cost than governments.

If network utilities were in private hands the owners would normally expect a significant rate of return to reflect a substantial equity investment in the firm, meant to reflect substantial risk. This has been the case in the UK over the last 20 years (Helm, 2009b). However, because of the *de facto* low risk of the business, with the regulator guaranteeing the remuneration of their RAB, this has resulted in excess payments to investors in the UK and excess costs to UK consumers. The nature of this excess was reflected in the large amounts made by initial investors through selling their stake in the utilities to other investors, who financed the bulk of the purchase through low cost debt, greatly increasing the leverage of the utility.

Public ownership of network industries has the advantage of increased flexibility. Where they are in private ownership it may prove difficult to provide in advance for all eventualities. For example, the contract for the M50 Westlink bridge looked acceptable when it was written in the late 1980s but it proved very inflexible and costly to change to deal with unexpectedly rapid growth in the 1990s. A possible downside from public ownership is that such companies may permit the employees to capture some of the monopoly rents inherent in the networks through excessive staffing or remuneration. Diffney *et al.* (2009b) suggest that this may well be the case in the ESB.

The current crisis has resulted in a dramatic increase in the cost of capital for the Irish state. This perceived risk is also affecting Irish-owned firms, including major utilities. It also affects the perceptions of foreign firms and hence, the return that they will seek on investment in Ireland. Thus, the cost of capital is today very high in Ireland and it will continue at this elevated level until the economic crisis is brought under control. As noted previously, this has very negative implications for all new investment in what is a very capital intensive sector. It also poses significant problems for state-owned utilities in funding their investment plans and it will also affect any attempt to restructure the state-owned firms in the sector by selling assets or transferring assets between them.

5.3 PRESSURE ON OPERATING COSTS

The high level of future investment in transmission and distribution suggests that it is also important to keep maintenance costs low. In most developed economies employees working in the utility sectors (water, natural gas and electricity) earn more than manufacturing workers. However, in the Republic of Ireland the ratio of utility worker's pay to manufacturing worker's pay is significantly larger than in other European countries (Devitt *et al.*, 2011). If labour costs in Ireland remain high, the cost of updating transmission and distribution networks may be greater than necessary. There has, however, been a shift towards subcontracting maintenance work through competitive bidding, putting downward pressure on costs, and this trend should be encouraged to ensure competitive electricity costs. A possible way to drive out excess costs is to contract out much of the operational maintenance and investment work, so that private sector firms compete for the business.

5.4 ELECTRICITY PRICES

The conclusion of Diffney *et al.* (2009b) was that the new wholesale electricity market for the island of Ireland appeared to be working well – it was producing a wholesale price that approximated the long-run marginal costs that would apply in a large liquid competitive market.

Devitt, *et al.* (2011), suggested that in 2008 wholesale electricity prices in Ireland were broadly appropriate, reflecting true long-run marginal cost. They would have been expected to be a bit higher than in GB (c. €16 a MWh higher) reflecting the differences in technology – GB has a lot of low-cost coal plant. However, the study also suggested that the GB price was below the long-run sustainable level – below long-run marginal cost. Thus, it must be anticipated that the GB price will rise in coming years while the Irish price is already at the long run sustainable level (Devitt *et al.*, 2011 and Giuletti, Grossi and Waterson, 2010).

The analysis in these two papers also indicated that the retail margin in GB was high, especially for household consumers. This reflected the lack of effective competition in that segment of the GB market (Giuletti, Grossi and Waterson, 2010). While the retail margin for households in Ireland was lower than in GB, there was still probably some pass through of excess costs to consumers. However, the bulk of the impact of high labour costs in the ESB probably fell on the profitability of the company, reducing the potential dividend for its owner, the government.

However, there are other factors which are within domestic control in Ireland which could reduce the margin paid by electricity consumers. In the longer term the current price penalty due to differences in generation technology is likely to be eroded, or even reversed, due to new investment (or lack of it) in the two markets. In the very long run increased interconnection will bring about a convergence in prices in the two markets.

5.5 OWNERSHIP

Experience on privatisation is not clear-cut.¹⁵ While the privatisation of network utilities in countries such as Great Britain had a big effect on the efficiency of production it is not clear that it produced commensurate benefits for consumers. Newbery and Pollitt (1997), show that the bulk of the benefits of the privatisation in GB accrued to the initial private investors, the UK government and the French government,¹⁶ with limited benefits for British consumers. McGurnaghan (1995), showed that the privatisation in Northern Ireland proved very costly for Northern Ireland consumers. Thus the correct answer for Ireland is not straightforward. It is likely to differ from market to market and sub-sector to sub-sector. While EU regulation (and also possibly UK regulation) will affect developments in Ireland, there is a wide range of issues which is under the control of the domestic regulatory authorities.

¹⁵ Here we differentiate between sale of the network utilities – privatisation – and tendering for the supply of services to such utilities.

¹⁶ The French government benefited as a shareholder in EDF because of an increase in the price of electricity exported to GB as a result of the changed market rules.

In any event, as discussed above on the cost of capital, Irish assets are unlikely to be attractive to buyers in the near future. Thus, even if it proved desirable to sell off some of the state-owned assets in the energy sector, this is very unlikely to be a good time to implement such a sale.

5.6 INTERCONNECTION

Diffney, *et al.* (2009b), highlight the importance of putting in place the right amount of electricity interconnection to Great Britain and of ensuring that its operation (and governance) is efficient. If the interconnector does not work efficiently the benefits of increased wind on the system will be smaller (or it could increase its cost for consumers). Malaguzzi Valeri (2009), shows that most of the gains from interconnection between Ireland and Great Britain are likely to derive from the difference in electricity generating portfolios in Ireland and Great Britain. Great Britain relies more on coal-fuelled and nuclear generation whereas Ireland relies more on generation fuelled by natural gas. Malaguzzi Valeri (2009), also shows that there are decreasing returns to investment in interconnection, both for society as a whole and for interconnector investors in particular. Returns decrease particularly quickly for independent interconnector owners, in part because they are unable to capture all the positive externalities from interconnection, such as increased returns to generators or lower greenhouse gas emissions in electricity generation. Increased interconnection also lowers the cost of electricity reserves, which further widens the gap between interconnector returns and the returns to society. Privately owned interconnectors are, therefore, likely to invest less than would be socially optimal, which suggests that there is a key role for public investment in interconnection.¹⁷

¹⁷ Many of the electricity interconnectors that have been built have had support from government or the EU. For example, the Moyle electricity interconnector between Ireland and Scotland had substantial EU financial support. The new interconnector between Ireland and England will also receive some EU financial support. The rest of the funding for the Irish interconnectors effectively comes from a guarantee provided by Irish consumers.

Chapter 6

Renewables and Environmental Policy

Climate change is a key driver of energy policy for the future. It is clear that globally this is a crucial issue over which there is little agreement among the major world economic blocks. However, it is taken especially seriously in the EU and in Ireland. Because of the lack of a global policy framework, one of the problems facing energy policymakers in Ireland and in the EU is the uncertainty around what is the appropriate strategy to deal with this issue. It is unclear what action will be taken in other key regions of the world. This uncertainty militates against unilateral government action as well as action by private investors in Ireland and the wider EU. Uncertainty also reduces the impetus for technical change.

6.1 DRIVING RESEARCH

The solution to the problem of climate change will involve major research developing new technologies worldwide, as well as major investment in implementing these technologies. However, the big problem facing investors in research and development, or in implementing new technologies, is that the new technologies are potentially very expensive to develop and there is great uncertainty about what the price of greenhouse gas emissions will be in the future. As a result it is not clear whether investment in this sphere will achieve an appropriate payback.

The lessons of the oil price crises of the 1970s are instructive. Because there was widespread belief that the rise in the real price of oil in the 1970s was permanent, there was massive investment worldwide in the subsequent decade into energy efficiency. However, as a result of the high price there was also massive investment in seeking new sources of hydrocarbons.

The investment in research into energy efficiency produced major results between five and ten years after the initial signal was sent by rising prices. However, the outcome in terms of technological improvement occurred at the same time as the investment in seeking new sources of hydrocarbons paid off, producing increased supply. The result was a major improvement in energy efficiency – you cannot turn back the clock on technology – but investors did not receive the return that they expected when prices fell and remained low for the subsequent decade (Popp, 2002). This memory affects investment in research and technologies designed to reduce energy use and, hence, greenhouse gas emissions.

This experience suggests the importance of providing clear signals and adopting policies which provide some expectation for firms that investment in research and development and in technologies that reduce greenhouse gas emissions efficiently will actually pay off. There is obviously a cost to this as consumers or taxpayers have to share the risk that investment may be stranded by unexpected events. Getting this balance right is an important issue for policymakers.

In allocating scarce taxpayer funds for R&D it is important that the criteria for allocation should treat all areas of research in a consistent way. The criteria for choosing the areas of research to support should include the following¹⁸:

- The research team(s) supported should be clearly of high repute internationally; in other words, in developing research areas, we should play to our comparative advantage.
- Research which is important for Ireland’s economy or society, especially where this research might not be undertaken internationally, should be favoured. (For example, in the context of energy, research into managing small isolated electricity systems with a lot of intermittent generation is of special relevance to Ireland.)
- Research funds should be concentrated so they can make a difference, in line with the general approach adopted by Science Foundation Ireland (SFI).
- Where research areas have a low probability of success but a high potential gain if they do succeed, they represent a gamble, investment is best undertaken in conjunction with other partners so that the riskiness of the project is shared by many investors.¹⁹

6.2 FISCAL INSTRUMENTS

The EU ETS provides a framework within which that part of the Irish economy that is covered by the regime is adjusting to reduce emissions. However, the volatility in the price of carbon, and the related uncertainty about its future time path, make life difficult for investors. For that reason, among others, a carbon tax would be preferable. *Faut de mieux*, a floor on the EU carbon price would do much to reduce uncertainty for investors and encourage more rapid change (Helm, 2010).

The operation of the current EU ETS regime generates major windfall gains for firms covered by the ETS scheme because of the grandfathering of emissions permits.²⁰

¹⁸ See Irish Energy Research Council (2008), Section 5.1.

¹⁹ Similar principles apply to exploration for gas or oil.

²⁰ Where emission permits are granted to those who previously emitted greenhouse gases so that they can continue to do so without incurring major costs this is referred to as “grandparenting”.

These windfall gains provide a capital subsidy for incumbents. Since the subsidy is only payable if a plant continues to produce, it provides the wrong incentives. A regime with grandfathering will only work if the grandfathering is once-off. However, it is now proposed that there will be, in effect a third round of grandfathering.²¹ As discussed below, it could have negative effects through the capital subsidy it provides (see Fitz Gerald, 2004). For this reason it is essential that from 2014 all permits are auctioned to all types of firms covered by the ETS.²²

Under the current regime the grandfathered permits provide potentially large windfall gains for plants covered by the ETS. In Ireland the windfall gains are especially important in the case of electricity generation and cement production. In principle these windfall gains should be recaptured by society at large through the tax system. It was not a good use of the windfall gains in electricity in 2009 to use them to subsidise electricity prices for two reasons. Firstly, this provided the wrong incentives from an environmental point of view. Secondly, it is likely that much better use of the funds could have been made, given the current economic crisis. For the future it is important that users pay the true cost of energy, including all the negative externalities, such as the cost of climate change. Special arrangements have recently been made to recover some of the windfall gains from electricity generators for taxpayers. This is facilitated by the way the SEM treats the price of carbon.

6.3 SUPPORT FOR RENEWABLE ELECTRICITY

In the absence of a floor price for carbon, the Irish government has acted by introducing a REFIT scheme which guarantees a floor price for electricity produced from onshore wind (the support for other technologies is discussed later). The effect of this scheme is to reduce substantially the uncertainty facing investors in the sector and the result is a very significant rate of investment in new wind generation. This level of investment by a range of different companies is not driven by instruments directly related to policy goals (e.g. security of supply, greenhouse reduction or the renewables requirement) but rather by the existing incentives: the REFIT scheme and the returns to investors under the SEM.²³

On the basis of the electricity demand projected at the time, research by Diffney *et al.* (2009b), suggested that up to 6000MW of onshore wind generation on the island would probably reduce costs for consumers in the future in the event of medium or high prices for gas or carbon. In the event that prices remain low there would be a significant cost for consumers from such a level of wind generation, but that cost

²¹ The first was the trial phase. The second is the current regime and the third will be the regime for the latter part of the current decade.

²² It is proposed to move to auctioning for the power generation sector.

²³ The REFIT scheme applies to tranches of investment and, as a result, is not totally open ended.

would be less than the cost to consumers of a failure to invest in wind generation in the event that prices were medium or high. As a result, investment in onshore wind looks like a reasonable hedge for consumers against possible exceptionally high prices in the future.²⁴

More recent research (Devitt and Malaguzzi Valeri, 2011) suggests that, while the floor price for onshore wind in the REFIT scheme is broadly appropriate, it is unnecessarily expensive to pay a continuing subsidy when the market price rises above the floor price. This aspect of the REFIT scheme should be eliminated for all new investors.

Devitt and Malaguzzi Valeri (2011), also show that the REFIT scheme incentives for offshore wind, ocean and tidal energy could give rise to very high costs for consumers with no commensurate environmental benefits. If the NREAP targets for these other technologies were met through the REFIT subsidies the costs would be very substantial.

As there is a limit to the amount of intermittent generation that can efficiently be absorbed into the Irish electricity system (Eirgrid, 2008, CER, 2009) what is important is that this renewable electricity be concentrated on onshore wind, which is likely to be dramatically less expensive than offshore wind or ocean energy for the foreseeable future. If the REFIT subsidies were to produce investment in these other technologies it would just serve to displace relatively cheap onshore wind with much more expensive alternatives, while having no net impact on Irish carbon emissions or on compliance with EU requirements.

Thus, the Irish REFIT scheme for technologies other than onshore wind should be ended. Offshore wind, tidal and wave power are all technologies that are worth researching as they could possibly eventually prove cost effective in some locations in the world. As a result, it could make sense to provide some limited public support for research in this area out of the national research budget (Irish Energy Research Council, 2008). However, the scale of this support should recognise that there is no guarantee that new developments in this field as a result of the research in Ireland will benefit Ireland. Consequently, this area of research should compete for state funds with other similar types of basic research. Certainly, until these technologies can yield economic benefits for Ireland, it is inappropriate for consumers to have to pay through the PSO (Public Service Obligation) for this research.

²⁴ The previous method of support for wind in Ireland, the Alternative Energy Regime (AER), involved a commitment to buy the output of the wind generators at an agreed price (set in an auction process). Looking back, it has delivered very good value for consumers in terms of the agreed price. However, a significant part of the benefit of the hedge may accrue to wind producers.

It must be remembered that the ETS regime is the key to EU and hence Irish strategy on reducing greenhouse gas emissions. If Ireland were to spend a significant amount, thereby reducing emissions in the ETS sector below the level that the carbon price would warrant, it would have no effect on world emissions of greenhouse gases. Given the EU “bubble”,²⁵ what it will do is to reduce the cost of meeting their targets for other EU members at an extra cost to Irish consumers. Such an outcome would be neither good for the environment nor for Irish competitiveness.

The research to date all shows that, while the Irish electricity system could absorb significant levels of wind generation, as the share rises towards its “optimum” it will become necessary either to cycle fossil fuel plants more often or to constrain off wind.²⁶ In the absence of Locational Marginal Pricing²⁷ how can the regulator ensure that the expansion of wind happens at a rate that is optimal in terms of minimising the costs for consumers? While research by Diffney *et al.* (2009b), shows that, with adequate interconnection, quite high levels of wind could be optimal by the year 2020, in the absence of interconnection this would tend to impose additional costs on consumers rather than benefit them in the form of lower energy costs. Given the long lead time for delivery of interconnection, consideration should be given as to how best to send signals to potential investors such that their behaviour maximises the benefit for consumers. As indicated above, it is possible that this issue could be dealt with by introducing formal rules on constraining off wind and ensuring that the cost of such constraining off is carried by the latest entrants to the market.

It may well be the case that constraining off wind is the cheapest option (see an estimate of possible costs in Diffney *et al.*, 2009b). If this is the case, then the issue arises as to who should pay for the constraining off of wind when the supply is greater than the capacity of the electricity system to absorb it. This issue needs further research.²⁸ There are a number of possible answers.

- One would be to share the losses from constraining off so that they are paid either by all wind generators or all consumers. However, this would encourage investment in intermittent generation beyond what is socially optimal (and minimises the cost of energy for consumers).

²⁵ The EU has committed to a particular level of emissions for the EU as a whole – this is referred to as the EU “bubble” of greenhouse gases.

²⁶ Cycling means that generating stations, which are optimised to run at a particular load, have to reduce and increase their load in a sub-optimal manner to ensure that electricity supply equals demand on an instantaneous basis. Constraining off means that generating capacity is not allowed to run even though it is available. This happens either because it is too expensive or because to allow it to run would produce more power than the system could handle.

²⁷ The price generators receive reflects the constraints on the transmission system.

²⁸ Eirgrid (2010), considers some of the technical issues involved in operating the system with high levels of wind.

- An alternative is that the cost of constraining off should be carried by the wind generators who are the most recent entrants.²⁹ This would discourage new investment beyond the optimal level as that new investment would lead to increasing constraints for wind generation. While new generators would accept some constraining off, given likely returns they would be in the best position to judge when that restriction was making new investment unprofitable and hence, socially suboptimal. (Other similar mechanisms, which would face marginal investors with appropriate incentives, would also be possible.)

An area which also needs further research is the likely impact of the prospective new investment in wind on the profitability of fossil fuel generation. If there is not adequate fossil fuel generation to provide back up for the intermittent generation (or sufficient flexible generation) there could be significant problems balancing the system. This could arise either through early closure of unprofitable plant or a failure to invest in necessary new plant. To some extent firms active in the generation market have invested in a range of technologies to hedge their exposure within the firm. Nonetheless, if fossil fuel generation needed for system security was to be clearly unprofitable there would remain the possibility that necessary investment for the security of the system might not take place.

6.4 INTERCONNECTION

The studies by Diffney *et al.* (2009b) and Pyory (2010), showed the importance of enhanced electricity interconnection between Ireland and Great Britain (GB), especially where there is very extensive deployment of intermittent renewable generation in Ireland. However, by interconnecting to the GB market there are also risks. If there is a serious failure of policy in GB (Giulietti *et al.*, 2010) this could see prices in the GB market rising dramatically in the second half of the coming decade. If this were to happen, Irish consumers, having paid for the interconnector, could see it being used to benefit Irish producers and GB consumers at the expense of the Irish³⁰ consumers themselves (who had underpinned the original investment through a guarantee from the regulator³¹). While this outcome might maximise the welfare of the people of the British Isles it would not necessarily be optimal for the people of the island of Ireland.³²

²⁹ The feasibility of such an approach would need to be checked to see how it would comply with EU rules.

³⁰ Both in Northern Ireland and in Ireland.

³¹ The regulator will facilitate the financing of the interconnection by effectively guaranteeing that the investment will be repaid by a charge on consumers.

³² Current EU rules permit congestion charging on interconnectors. This leaves open the possibility that the Irish consumer, as the effective owner of the interconnectors, could under most circumstances capture the benefits of the interconnectors.

Of course there is a range of other circumstances in which enhanced interconnection will benefit the Irish economy. In particular where Ireland invests in intermittent technology and GB does not, but has significant coal and nuclear generation, this could benefit Ireland. It could also provide benefits in terms of enhanced security and by providing a hedge against exceptional movements in gas prices.

As noted above in relation to other areas, this issue of interconnection needs further study. Firstly, further consideration needs to be given to the amount of interconnection. Secondly, the rules governing the use of the interconnector need to be developed. Under certain circumstances it is possible that EU law could result in Irish consumers suffering adverse consequences from underpinning such investment with a regulatory guarantee. The market arrangements for operating the interconnector also need to be designed to take account of the differing market structures at either end of the wire and to ensure that the interconnectors are used optimally. Finally, the destination of the interconnection (e.g. GB or France or Iceland) needs to be considered in the context of the growth of an integrated EU electricity market.

6.5 OFFSHORE WIND

As indicated above, in the current context extensive investment in Ireland in offshore wind (or wave) is unlikely to be of value to the Irish economy. However, if current EU policy (and UK policy) on renewables continues, then there will be a big demand for very expensive offshore wind generation elsewhere in the EU. While at present the subsidies payable for such a technology by the UK or other governments are not available to Irish generators, this situation could soon change. Under these circumstances there could be considerable investment in offshore technologies in Ireland for export as Irish producers would seek to exploit such profitable opportunities arising from the availability of subsidies in the UK.

Provided that this export takes place directly without passing through the Irish electricity grid, and provided that there is no subsidy paid by Irish taxpayers or consumers (either directly or indirectly, including through the tax system), then it should not adversely affect the Irish economy or consumers. However, if any of it were to pass through the Irish transmission or distribution system it could impose serious costs on the Irish economy by increasing congestion or necessitating further investment in the grid. It will be important to develop rules which ensure that any or all such costs are recouped so that Irish taxpayers and consumers are not adversely affected. It will also be important that EU rules support this approach, i.e., allowing the Irish authorities to ensure that all output of electricity, including exports from offshore wind generators, pays the full costs that it imposes on society.

6.6 OTHER RENEWABLES

So far we have considered renewables policy in so far as it affects electricity. As discussed above, the evidence suggests that meeting government targets in this area, if implemented through appropriate policies, will have limited negative impact on Irish competitiveness. By shifting the Irish renewable obligation from heat to electricity the potential costs for the economy have been reduced.³³ However, further research is needed in the field of heat to establish what is the appropriate objective.

Earlier studies of biomass for electricity production (Fitz Gerald and Johnston, 1999) suggested that it was a feasible but expensive option. However, if used for heat purposes close to where it is produced, the cost of biomass might be closer to market prices.

Among the issues to be considered are:

- What are the costs for farmers of producing the biomass (ESBI, 1995)? Omitted in Refs.
- What is the value of the land potentially used for biomass when used to grow other crops?
- Is the market for land use distorted by the CAP?
- What other obstacles are there for farmers to growing biomass as a crop? Wiemers and Behan (2004) showed that for a number of reasons the option value for farmers of holding out of the biomass industry was high because of the difficulties reversing a commitment to the business due to high exit costs.
- How costly is it to transport the biomass from where it is produced to where it might be consumed? Does this take account of the negative externalities arising from damage to rural roads through use of heavily laden vehicles?
- What price for the biomass would be required to persuade consumers of different types to switch to biomass? This needs to take account of the handling costs for consumers (storing the biomass, moving it, reordering etc.)

6.7 TRANSPORT

In the case of transport there seems little reason to encourage use of bio-fuels over and above the encouragement associated with the tax on carbon.³⁴

³³ As discussed above, the investment in onshore wind generation may prove advantageous for Irish consumers whereas using renewables for heating purposes or transport is likely to add to consumers' costs.

³⁴ As the unsatisfactory nature of the EU obligation (from an environmental and an economic point of view) becomes clearer the EU may itself choose to change the regulation.

In the case of excise taxes on motor fuels, these should be separated into two elements. The first would be the carbon tax and the rest (the vast bulk) would be payable for revenue reasons to the government and to reflect the congestion costs of transport although road pricing would be better.³⁵ Vehicles that are carbon neutral either because they use biofuels or electricity should be exempt from the carbon tax element but they should continue to pay the rest of the tax (the bulk of it). Exempting motor vehicles from all excise taxes on fuels would represent a massive subsidy, which would go way beyond the cost of carbon, and would be inefficient because it would encourage even more congestion.

6.8 ENERGY EFFICIENCY

It is not clear why the EU should have separate targets for energy efficiency. By pricing the cost of carbon appropriately consumers are sent a signal to use energy more wisely. If they choose to continue using energy unwisely in an engineering sense then it must be because of market failure³⁶ or because consumers face other costs or have other objectives. For example, the hassle of installing insulation has a high cost for consumers. Thus, it may be rational for consumers (and hence welfare maximising) to fail to install what seem obvious improvements from an energy efficiency point of view (Scott, 1993 and O'Malley, Scott and Sorrell, 2003).

To develop policy we need to establish why consumers do not exploit obvious opportunities to save energy, as shown in SEAI (2009). Where they fail to do so through lack of information because of other related costs or other market failures, these can be addressed. Diffney *et al.* (2009a), suggest that some information campaigns have not been successful in changing consumer behaviour. There is also some evidence of market failure in the building sector where buyers, through lack of information or understanding, may not adequately value energy efficiency. In such cases regulation of building standards is appropriate.

People on low incomes may be credit constrained and hence will need a full return from investment in energy efficiency within a short period (a year or even a month). Under these circumstances a government funded scheme, may well get over such obstacles, producing significant welfare gains for the low income consumers, as well as a reduction in greenhouse gas emissions. However, schemes of subsidies for those on high incomes are much less likely to be welfare improving.

³⁵ In the case of road pricing users would pay directly for the use of road space. Use of congested roads would be priced relatively highly, whereas use of uncongested road would incur a low (or even zero) price.

³⁶ SEAI (2009).

6.9 GREEN JOBS

A frequently argued case is that investment in energy efficiency creates jobs. However, if this investment has to be funded by the state, either partly or fully, then the cost of the taxes that need to be raised to finance it will itself lead to the destruction of jobs elsewhere in the Irish economy. Honohan and Irvine (1987), showed that at the then very high marginal tax rates there had to be a huge return from state expenditure (including in terms of jobs) if it was to offset the jobs lost from raising taxation.

Over the 1990s, with falling tax rates, the opportunity cost of state funds for public investment projects fell (Honohan, 1998). In addition, with a return to full employment the shadow price of a job rose to around 0.8 (each job created would see a reduction in jobs elsewhere of roughly 0.8 of a job).

Forfás has developed an appropriate methodology for assessing the value of such investment projects, which takes these issues into account. The methodology, based on international best practice, was developed for an Irish context by Honohan (1998), and further developed in Barry, Murphy and Walsh (2002). This is the approach which should be used in assessing the value for the nation of investment projects involving taxpayers' money, including investments in energy efficiency. As an example of this approach, a major cost-benefit study is currently under way into the possible impact of smart electricity meters.

Chapter 7

Security of Supply

A secure supply of energy is essential for a modern economy. Any major failure in supply could have dramatic negative consequences for welfare. There are a number of possible areas where security of supply issues arise: the supply of gas, the supply of oil and, related to these two, but having some special characteristics, a secure supply of electricity. A failure in any one of these elements for any significant time could prove catastrophic. Even failure for a short period could prove hugely disruptive and costly.

The nature of the failure is also important. A physical interruption to supply generally has more serious implications than a “shortage” which leads to exceptionally high prices.

In choosing the appropriate response by policymakers to the issue of security of supply the first issue will be to identify the potential costs to Ireland from the different sources of risk. Where the potential cost is high there is then the issue of the probability of an event occurring. Then the task of policymakers is to choose the least cost way of producing the optimal reduction in potential risk. This is not a straightforward task and requires the complex analyses of risks and associated mitigation costs.

Security of supply is not just about physical security. It would be extremely rare that there would be a complete physical interruption to supply of oil or gas. However, shortages in supply could manifest themselves in a dramatic rise in price rather than an actual physical interruption. The strategy for dealing with these issues will differ depending on the specific issues of concern.

There are a number of potential approaches to hedging risks: ownership (of gas fields) and related financial instruments; investment in additional infrastructure (including bringing Corrib on stream, encouragement of exploration, investment in duplicate gas pipelines); diversification of fuels; storage; and development of LNG facilities.³⁷

³⁷ While permission has been granted for such a facility it still remains on the drawing board.

7.1 GAS

Ireland has become very dependent on the supply of natural gas to ensure both heat and the provision of essential supplies of electricity (See Figures 1 and 2 above). With gas accounting for over 50 per cent of all electricity generated, secure supplies of gas are synonymous with securing the supply of electricity.

A consequence of this very high dependence on gas is that any major interruption in physical supply for any significant period could produce huge economic costs. The economy, in turn, is completely dependent on the supply of electricity to operate. A recent paper (Leahy and Tol, 2010) has looked at the costs of a temporary loss of load in electricity. This study suggests that the costs are higher than previously thought.

In the case of gas the first concern is with the security of the network supplying Ireland. This must take account of risks onshore in Great Britain (GB) that could potentially cause major domestic interruption. There are also risks to the supply of gas to the wider EU. These may be more political in nature, but nonetheless real.

There are now three gas pipelines between Ireland and Great Britain so that the risks of disruption through problems with the undersea pipe system is effectively zero. The loss of any one pipeline would not be catastrophic. This is important because repairs to undersea pipelines could take some time. However, all the gas that flows through those three pipelines flows through only one onshore pipeline in Scotland.³⁸ Thus there is vulnerability to a very improbable loss of the onshore pipeline. While much easier to repair onshore, it is, nonetheless, a concern that Ireland is vulnerable to any difficulties with a single pipe.

One solution to this vulnerability would be to pay to double the onshore pipeline (and compression facilities) in Scotland. However, this would be expensive compared to the alternative (of Corrib) and would take some considerable time, given the planning system in the UK. It is unlikely that the UK authorities would fast track such a project as it involved security of supply in Ireland rather than in Great Britain. Nonetheless, because Northern Ireland is equally vulnerable it should still be a concern to the UK government.

In the medium-term, a much cheaper and more satisfactory way of ensuring the vital security of gas supply for the island of Ireland is to ensure that the Corrib field is brought into production as soon as possible. This has a number of advantages.

³⁸ In addition, the vulnerability of the compression process for these pipelines needs to be considered.

Firstly, it will cost the Irish taxpayer nothing at a time when the cost of public funds is exceptionally high. Secondly, it will reduce Irish dependence on the gas transmission infrastructure in Scotland. Thirdly, by sourcing the gas from a new field it will reduce Ireland's dependence on the UK for transit. Fourthly, if additional supplies of gas were found off the west coast, making Ireland more than self-sufficient in gas, it could result in a marginal reduction in the cost of gas in Ireland.³⁹ Because of the very low probability but catastrophic effect of a possible loss of gas supply from GB, which would have dramatic economic effects and put lives at risk, it is essential that the Corrib gas is brought onshore as soon as possible. However, after 2020, as the Corrib field runs down, alternative measures may be needed to provide for longer-term security.⁴⁰ Obviously the most satisfactory long-term solution would be if a further field (or fields) was found off the coast which would see Ireland having an independent local source of gas for the foreseeable future.

The problems with the regulatory regime, which have contributed to the very protracted development phase for the Corrib gas field,⁴¹ have negative consequences for such investment and, hence for security of supply. It suggests that even if future prospecting is successful it may not be possible to bring such finds to production in an efficient manner. If a large gas field were to be found off the west coast it could well be a better prospect for the investor to land the gas in Great Britain rather than in Ireland.⁴² This could have negative consequences for long-term security of supply for Ireland.

Gas-fired electricity generating stations are required to hold supplies of gas diesel on site so that, in the event of an interruption to gas supply, they can continue in production for 5 days (CER, 2009).⁴³ This requirement could be re-examined in the light of the possible risks of damage to infrastructure to establish what the optimal level of storage actually is. In requiring such storage (and enforcing it) it must also be recognised that the cost would have to be fully passed on to consumers, i.e., it is not a costless option.

Facilities to allow import and conversion of Liquefied Natural Gas (LNG) tend to be very expensive. Such facilities would not be justified on security grounds alone when

³⁹ As Ireland moved to be an exporter of gas, exporters would get the GB price of gas less the cost of transporting it across the Irish Sea. This would compare with the situation where Ireland imports gas and the price is then the GB price plus the cost of transporting it to Ireland.

⁴⁰ An interim measure would be to reach an arrangement whereby Corrib would be depleted at a slower rate than planned.

⁴¹ Mistakes by the company involved also contributed to delays.

⁴² If the find were greater than the gas needs of the Irish economy then the gas would, in any event, have to be exported to GB. Under such circumstances a direct pipeline to GB could be commercially viable. However, it would mean that such new capacity would not contribute directly to the security of supply of gas in Ireland.

⁴³ In practise, with proper management, this would allow a steady but rationed supply of electricity over a significantly longer period, providing some leeway to repair damaged infrastructure.

there are so many other options. Nonetheless, it would have some value in enhancing security of supply if it were provided by the private sector without state support. Because of the interconnection between Ireland and GB the Irish gas price is largely set on the GB market. Thus, a large increase in LNG supply through an Irish terminal would probably not greatly affect the market price in Ireland. It would only be the case if the supply of LNG plus the supply from Corrib exceeded Irish demand for gas. As discussed above, under those circumstances the price of gas would fall by twice the transportation cost between Ireland and GB.

7.2 HEDGING AND GAS STORAGE

In many cases these risks to gas and oil supply may translate into a financial risk rather than the risk of actual supply shortages. For example, a reduction in gas supply would translate into a major rise in price. It will be rare that a complete interruption of supply would be experienced. This latter event is most likely to arise through damage to infrastructure rather than through political events.

One option to hedge against the risk of future gas price volatility would be to buy shares (through the NPRF) in gas fields in the European region. While the purchase of Corrib would be another possible option, this would tie up huge resources in one field without knowing how productive it will prove to be. If a financial hedge were desired then it would be better to have shares in a number of gas fields. In the case of a sudden rise in price these shares would also increase in value, compensating for the economic cost of the price rise.

In the case of oil, rather than buying shares in oil fields it would probably be simpler to buy shares in major oil companies which own oil fields. As with gas this would also provide a financial hedge. However, in the light of the economic crisis the government (and Irish consumers) probably cannot afford to take out such insurance at this point in time. In addition, in the case of gas technical developments are reducing the risk of future price spikes so that the need for such a hedge may be less than it was a few years ago.

Another option is to look at enhanced storage for gas in Ireland. As well as insuring against the risk of physical disruption it could also provide insulation against seasonal increases in gas prices. Depending on the cost of the storage, the smoothing of seasonal peaks could make a significant difference to the economics of such an investment. It remains to be seen what the cost of such storage options actually is. However, if storage were used for seasonal purposes it would not provide full insurance against interruptions to physical supply. While over the summer it might hold a number of weeks gas supply, at the end of the winter, when the gas stored had been used up insulating against seasonal price fluctuations, no gas would

be available for an interruption at that point in the year. Thus the value of storage must be assessed against the purpose for which it is most likely to be used.

7.3 FUEL DIVERSITY

A further security of supply issue concerns the growing gas dependence in the electricity sector. As outlined above there are ways to manage this. In any event, if there is major development of shale gas in Europe after 2020 gas dependence could prove to be of limited concern. However, it is too early to assess the likelihood of such an outcome and its potential implications for the EU gas market. In the absence of a fully secure long-term EU gas supply, one approach, not already discussed, is the possibility of using alternative fuels to gas in electricity generation. The Moneypoint coal-fired generating station will probably remain in operation till around 2025. Given the lead time on building such replacement generation a decision will have to be taken around 2015, a decade before the plant closes, on a possible replacement. As discussed above, replacing the current large coal-fired station with a nuclear station is unlikely to be economic unless there is substantial progress in developing small-scale nuclear plants. The choice is likely to be between a new coal plant with or without carbon capture and storage, a new gas plant with appropriate measures to reduce the security concerns, or enhanced interconnection with other more diversified electricity systems⁴⁴ (Poyry, 2010). Wind generating capacity, while providing some security against price shocks, will not provide a substitute for Moneypoint because of its intermittency. This issue needs further research before decisions have to be taken in the middle of this decade.

In addition to these risks in the gas and oil markets, there are risks of interruption to supply in the sphere of electricity, either through failure of the network or through a failure to deliver adequate investment in appropriate generation.⁴⁵ Enhanced integration of the Irish electricity market with that in GB could also expose Ireland to the consequences of regulatory failure in GB (e.g., a failure to invest in adequate generation capacity in GB.)

7.4 MAINTAINING SUPPLY IN THE FACE OF COMPANY FAILURE

A further area that policymakers need to consider is the risk to the survival of companies owning key infrastructure.⁴⁶ For example, the UK also experienced the major financial failure of the company owning the rail infrastructure. Legislation in Ireland could prove inadequate to deal with such events. Existing legislation is

⁴⁴ Enhanced interconnection would provide fuel diversity if the countries connected to had a different generation mix. The additional cost of the interconnection would be the “price” to be paid to buy access to a more diverse generation mix.

⁴⁵ Leahy and Tol (2010), quantified the cost of a temporary interruption to supply.

⁴⁶ We have seen the consequences of the collapse of major banking firms, threatening the security of the whole banking system and the economy – thus the banking system has many of the characteristics of a network industry.

designed to protect creditors in the event of a financial collapse. However, in the case of network industries the first responsibility of the regulatory authorities should be to protect users of the network and ensure no interruption of vital services. While most unlikely in the foreseeable future, policymakers should guard against such eventualities and put in place appropriate legislation (similar to a bank resolution scheme).

7.5 EU POLICY MEASURES

Finally, the EU and the IEA have already in place an arrangement to manage scarce supplies of oil in the event of a major supply interruption (for example, due to a war or a hurricane). The EU is developing a similar framework to cover gas and this is very important for Ireland. However, once Corrib starts to flow, with gas supply equal to roughly half our needs for the next decade, the value of such co-ordinated action for Ireland could be reduced.⁴⁷ Nonetheless, as the Corrib gas field runs down we will once again be concerned about the security of our gas supply and this developing EU framework will provide important reassurance.

Ireland is vulnerable to arbitrary decisions by countries through which our future gas supplies will flow. These concerns apply not just to countries in Central Europe but also to the behaviour of the UK. In recent years we have seen how proposed changes in the rules covering the GB transmission system posed significant problems for Ireland. These problems were resolved, not so much because they caused Ireland problems but because they posed problems for major GB energy companies. The developing EU regulatory framework will provide important future security against such arbitrary behaviour. Already work is progressing on a bilateral basis between the UK and the Irish governments to have in place a plan to deal with any future likely emergency.

In the case of transport in Ireland, there is currently almost total dependence on oil. While, as a result of EU regulations, there is likely to be a marginal increase in use of biofuels over the coming decade, this will do little to reduce the dependence of the sector on oil. It is only in the years after 2020, as transport begins to use more electricity, that this dependence will be reduced significantly.

A final security of supply issue concerns the security of our oil supplies. While each country is required to hold substantial supplies of oil to deal with temporary interruptions in supply, much of this oil may be in the form of crude oil. In the absence of refining capacity this oil is not usable. The issue then arises as to whether

⁴⁷ Once the gas begins to flow from the field the company will determine the most profitable rate of extraction, given the expected price of gas and given the technical characteristics of the field.

adequate refining capacity would be available to turn that crude into usable oil supplies for Ireland.

Provided that there is adequate refining capacity somewhere in the EU (or within the countries covered by the IEA) to refine all of a very much reduced supply of crude oil, the absence of native refining capacity may not be a problem. Given EU regulations and the rule of law within the EU, Ireland's strategic reserve of oil would be preserved and, even if refined elsewhere, could not be pre-empted by the country in which the refining actually took place.

The IEA response to the Hurricane Katrina emergency involved specific measures to deal with regional imbalances in refined product (IEA, 2010b). This showed that the IEA framework of agreements works, in this case providing insulation for the US from the consequences of the serious natural disaster affecting its refining capacity. Another strategy would be to hold the Irish strategic oil reserve in the form of refined product; but this would greatly increase the expense of the reserve. Finally, there could theoretically be an option value in keeping the existing refinery in Ireland in operation under such circumstances.⁴⁸ On balance the EU and International Energy Agency agreements on burden sharing in an emergency are likely to be the least costly strategy.

⁴⁸ However, whether this value would offset the other costs would need to be determined.

Chapter 8

Conclusions

This Chapter brings together conclusions from this review of the research on the many elements that impact on Irish energy policy. It also draws out the implications of this research evidence for public policy and identifies significant gaps in our knowledge.

One of the key successes of Irish energy policy in recent years was the implementation of the Single Electricity Market (SEM) on the island without any glitches. It was a very complex project from an administrative, legal, financial and economic point of view and success was not guaranteed. The market has worked as it was expected to do since 2007 and it has provided sufficient certainty for investors to ensure adequate investment. Before it began there had been concerns that investment in generation would be inadequate, but the SEM has delivered on security of electricity supply on the island.

However, there are areas of energy policy where the changing world economy and developments in technology require new approaches. This is true at both the EU and the Irish level.

8.1 COMPETITIVENESS

EU proposals for the development of an integrated EU electricity market are moving ahead rapidly. These new rules could possibly render the successful SEM obsolete. It will be very important to tease out the full implications of this EU initiative as the uncertainty it would create about the future of the SEM could have very negative consequences for investor confidence. We need to know whether the SEM can continue to operate under its current rules and, if not, what the alternative would look like. In addition, any change to the SEM could involve substantial transactions costs (e.g., software), costs which could have a significant impact on bills in the small Irish market, while having only a small impact on prices in large markets such as France or Germany.

In developing an integrated electricity market there will have to be greatly enhanced interconnection between transmission systems. The manner in which this investment in interconnection is financed and the rules under which trade will take place across the interconnectors needs to be developed. There is a danger that EU

rules could see Irish consumers paying for interconnection which might end up raising their price of electricity. The rules under which markets will link up will have important efficiency and distributional consequences which need to be explored before policy decisions are reached.

The price of electricity in Ireland reflects the long run marginal cost of production. This is the correct price if future energy security is to be ensured. Around €16 per MWh of the difference between Ireland and GB in 2008 was due to differences in generating technology. The bulk of the rest of the difference between Irish and GB wholesale prices was due to GB prices being lower than was sustainable in the long run. GB prices will have to rise (relative to Ireland) over the coming decade if necessary investment is to take place in GB. In some other countries, such as Germany, investment pressures will also put upward pressure on prices. This should see an improvement in Irish relative competitiveness.

The use of some of the windfall gains from the ETS to provide subsidies to energy users in 2009 was unwise from both the point of view of energy policy and from the point of view of Irish competitiveness. It sent the wrong signal to firms. If instead, the resources had been used to avoid increasing taxes on labour the effects on the macroeconomy, including employment, would have been more beneficial. Energy is an imported factor of production which has negative side effects on the environment. Subsidising its use is wasteful and bad for the environment, employment and economic growth. The same arguments apply to the policy of requiring the electricity system to buy electricity generated from peat whether or not it is competitive (Tuohy *et al.*, 2009).

8.2 RENEWABLES AND ENVIRONMENTAL POLICY

At the level of the EU, current climate change policy is not very coherent with many overlapping policies and targets. The EU should move to simplify the policy framework in a manner that will minimise the cost of meeting environmental goals. Ireland should contribute to a re-evaluation of EU policy to ensure that it will deliver the required reduction in greenhouse gas emissions in the future at least cost to the EU economy.

The Emission Trading Scheme (ETS) should either cover all EU emissions of carbon dioxide or it should be replaced by a carbon tax. In the next round of the ETS the EU should rapidly move to auctioning all emissions permits.⁴⁹ The desirability of adopting a floor price for carbon within the ETS (or a minimum rate of carbon tax) should be considered by the EU. If Ireland unilaterally implemented such a floor this

⁴⁹ This is currently proposed for electricity generation.

would increase the costs for Irish consumers and reduce them for consumers in the rest of the EU, while making no change to EU emissions of greenhouse gases.

Ireland should contribute to the next stage of policymaking to ensure that the approach to managing greenhouse gas emissions from agriculture is efficient from both an economic and an environmental point of view.

The EU policy on renewables needs to be reviewed as it seems likely to increase the cost of reducing emissions while providing limited security of supply advantages. While the costs to Ireland from the inappropriate configuration of EU policy may be small, the potential costs to the EU economy as a whole are likely to be significant.

The danger that a mismatch between national environmental policies could impose unnecessary costs on fellow EU members needs to be considered. This possibility could militate against the development of a common market in electricity. In particular, unwise environmental policy in the UK could have negative spillovers for Ireland. Consequently, co-ordination of national policies at an EU level could prove valuable.

Domestically, policy on climate change needs to be developed in a manner which minimises the cost of compliance. The 2011 draft Climate Change Response Bill could have resulted in significant additional costs without commensurate environmental benefits (Gorecki and Tol, 2011) and its proposed targets for 2030 and 2050 were extraordinarily ambitious. Furthermore, the draft Bill did not introduce an appropriate framework of policy measures to meet the proposed targets.

While current policy on promoting renewable electricity may be broadly consistent with the strategic aims of energy policy (reducing emissions at minimum cost), there are aspects of market design and of the REFIT scheme which could result in substantial unnecessary costs falling on Irish consumers. The SEM structure may need to be adjusted to ensure that it does not result in excessive investment in intermittent renewable generation. This will be important if the investment in interconnection does not keep pace with investment in wind generation. The rules for controlling wind output when it imposes costs on the system need to be developed to ensure appropriate incentives for investment in different generating technologies. In addition, the REFIT scheme for onshore wind is too generous – the additional sum payable where prices are high should be dropped for new investors.

Probably the most important change in the REFIT scheme should be the ending of REFIT incentives for offshore wind and wave and tidal generation. It is premature to incentivise substantial investment in such technologies and it could prove very expensive for the Irish economy, while bringing little or no environmental benefits. Meanwhile, limited taxpayer funds should be provided for research into these technologies as part of Ireland's research effort.

The potential effects of high levels of wind generation on the economics of other generators needs further research.

8.3 SECURITY OF SUPPLY

EU policy on energy security is developing in the light of changing circumstances. The extension of the current arrangements for co-operation in the event of a shortage of oil to the gas market is important for Ireland. It is to be welcomed that the EU is also developing clear rules on gas transmission through other member states.

Domestic security of energy supply requires that the Corrib gas field is brought to production as rapidly as possible. The economics of gas storage needs to be considered.

In the case of oil, EU (and IEA) provisions on storing oil supplies and provisions for sharing in the event of an emergency are important. However, Ireland also needs to develop its national policy. Technical developments and the impetus of climate change policy may eventually result in some reduction in oil dependence in transport. However, even in that sector, it is likely to be the 2020s before there is a significant reduction in oil dependence.

In the case of electricity, the decision on what replaces the Moneypoint coal-fired generation station after 2020 needs to take account of security considerations, as well as the other drivers of policy.

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The Economic & Social Research Institute
Whitaker Square
Sir John Rogerson's Quay
Dublin 2, Ireland
+ 353 1 863 2000 www.esri.ie
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