

# Chapter 10

# Ireland

## 10.1 INTRODUCTION

Ireland benefits from having one of the most favorable wind regimes in Europe for wind energy generation. Average wind speeds on many upland west coast onshore potential wind farm sites exceed 8.5 meters per second (m/s) at 50 meters. Several successful pilot-scale projects in the 1980s gave promising results but were not followed by larger-scale developments.

From the late 1980s an obligation was placed upon the then state monopoly vertically integrated electricity company, ESB, to purchase renewable electricity, which effectively amounted to a feed-in tariff. In 1995 the first government price support scheme for renewable electricity was introduced, replacing the earlier scheme. This was known as the Alternative Energy Requirement, or AER 1, and, through a competitive tendering process, 15-year fixed-price power purchase agreements were awarded. There have now been a total of three programs that offered contracts for wind power projects. AER 1 in 1996 authorized contracts for wind generation capacity totaling 30 megawatts (MW). AER 3 in 1999 authorized contracts totaling 90 MW for wind power projects and, in February 2002, AER 5 was announced, authorizing a total of 353 MW of generating capacity from wind power. A total of 137.7 MW of grid-connected wind energy generating capacity was installed as of the end of December 2002.

The Electricity Regulation Act of 1999 initiated the process of electricity market liberalization in Ireland, and the completion of the deregulation process is planned for 2005. Renewable electricity suppliers have been granted full access to all customers since market opening. The market for green electricity in Ireland is at an early stage of development, with a single major supplier marketing electricity from renewable sources. Virtually no wind farms other those developed by this supplier trade their electricity on the open market, opting instead for the security of the government price support schemes.

## 10.2 NATIONAL POLICY

### Strategy

Government strategy on renewable energy in Ireland is laid out in the Green Paper on Renewable Energy of 1999 and the National Climate Change Strategy of 2000. In these, a target of an additional 500 MW of installed renewable electricity generating capacity in the period 2000 to 2005 was set. Ireland is also committed to an indicative target, within EU Directive 2001/77/EC, of increasing electricity consumption from renewable sources to 13.2% of total demand by 2010. It is recognized that wind energy will make the greatest contribution to achieving the 2005 target and will also represent a large portion of the 2010 target.

### Progress Towards National Targets

The early rounds of competitive tenders had low success rates in actual deployments. Planning approval was identified as a key factor, and it was therefore made a pre-condition of the AER 5 competition of 2001 to 2002 that planning approval should be obtained prior to applying. However, as the industry grew, developers became ac-

customed to submitting more sophisticated proposals in line with planning requirements, and many planning authorities adapted the planning guidelines and local development plans to include wind energy project considerations. This is a continually evolving process as the size and nature of wind turbines and wind farms develops. The implementation of national planning guidelines at a local level is not necessarily uniform.

However, planning approval will not present a primary constraint to the achievement of 2005 targets. There is currently planning approval for wind farms with generating capacity totaling 850 MW that are awaiting development. Also, current planning applications being processed for wind farms total over 1,000 MW generating capacity, and the average success rate of wind farm applications to date has been 65%. Nevertheless, the treatment of wind energy within the planning system continues to be a focus of attention for the wind industry, and there is a continued effort to provide planning authorities with the information, training, and tools to allow an unbiased evaluation of wind project planning applications.

There was no significant progress in 2002 towards achieving the 2005 national target of 500 MW of renewable generation in addition to that installed in 1999. The installation rate has been reduced to about 10 MW per year, whereas ten times this amount is required to meet targets. An average of 170 MW will have to be installed in each of the years 2003, 2004, and 2005 to compensate for the low installation rate since 1999. A complete review of the renewable electricity price support mechanism will be carried out in 2003 as detailed below.

## 10.3 COMMERCIAL IMPLEMENTATION

### Installed Capacity

A total of 137.7 MW grid-connected wind generation capacity was operational as of the end of 2002. One large project scheduled for completion in 2002 was delayed due to difficulties with the provision of grid connection. The public service obligation (PSO) order, for the purchase of renewable electricity supported by AER 5, was issued by government to the single public electricity supply franchise holder in November 2002. This was required in order for construction to proceed on many of the projects that won contracts.

### Rates and Trends in Deployment

In 2002, 11.9 MW of new grid-connected wind power was installed, and a single 0.67-MW off-grid installation for an island desalination plant was also commissioned in this year. This was a small increase on the 2001 figure of 9 MW of new capacity but is still lower than previous peak annual installation rates, which have exceeded 30 MW. Details of the upcoming AER 6 tender round were announced towards the end of 2002. In order to address the low uptake of AER 5 contracts, projects awarded contracts under that tendering round will be allowed to compete for new contracts in AER 6. The AER 6 tendering round will have more favorable price caps and contract terms.

### Contribution to National Energy Demand

The estimated contribution from wind power to national electricity demand in the year 2002 was 426 gigawatt-hours (GWh). This represents a 27.5% increase on 2001 production. A preliminary estimate for the total electricity demand in Ireland in 2002 is 24,695 GWh, a decrease of 1% on 2001. The

percentage contribution of grid-connected wind power to gross national electricity demand was therefore 1.7%.

## 10.4 MARKET DEVELOPMENT AND STIMULATION

### Support Initiatives and Market Stimulation Incentives

As outlined in the introduction, the primary market support mechanism is the Alternative Energy Requirement (AER) scheme, through which price support contracts with a 15-year term are awarded to renewable electricity generators in regular competitive tender rounds. The scheme has been in place since 1996. The AER 6 tender round announced in November 2002 will be the last in this scheme, as it will allocate the remaining generating capacity for which EU state aids approval has been obtained. Consultation with the industry on the design of a new support scheme to succeed AER will be embarked upon in 2003.

In the liberalization of the electricity market in Ireland, special consideration was given to renewable electricity suppliers in granting them access to all consumers in advance of full market opening. Renewable electricity generators and suppliers are also advantaged in that they only have to balance aggregated annual renewable electricity supply and demand to qualify as a "green" electricity supplier, rather than that for each half-hour metering and trading period. One renewable electricity supplier, Airtricity, has been successful in developing a renewable electricity market and is also involved with the development and operation of wind farms. However, few other wind farm owners have opted to sell generated electricity within the deregulated electricity market, as the guaranteed term of the government price support scheme is the best vehicle for at-

tracting financing. Also, the base level price or "spill price," which non-dispatchable electricity generators can command, when selling their electricity within the electricity market without a supply contract, is currently considered too low to be viable. The independent electricity supply market is as yet in the early stages of development, with few relationships formed between renewable electricity generators and independent suppliers.

The main fiscal incentives, from which investors in wind farm projects can benefit, are (a) the Business Expansion Scheme (BES) and (b), tax relief under Section 486b of the 1998 Finance Act, on capital directly invested in wind farm assets. Under (a), those investing in approved qualifying businesses can claim a tax refund on income invested. Electricity generation is a qualifying business activity. The scheme has an investment cap of 750,000 Euro and is thus of limited value to larger wind energy projects. Under (b), corporate investors in renewable energy projects can claim tax relief on equity investment in capital assets. As the corporate tax rate will be reduced to 12.5% in coming years, this fiscal incentive will hold limited attraction in the future. A 2002 amendment to the Finance Act also restricted eligibility for tax relief on capital assets, and this measure effectively eliminated a commonly used investment vehicle for private investment in wind farms.

## 10.5 DEPLOYMENT AND CONSTRAINTS

### Wind Turbines Deployed

The number of operational grid-connected wind turbines in Ireland at the end of 2002 was 226. The size of operational wind turbines ranges from 225 kilowatts (kW) to 1.65 MW. The largest wind farm currently operational is 15 MW. The average size of grid-connected wind turbines deployed in Ireland in 2002 was 850 kW. A wind farm

with 10 Nordex 2.5-MW wind turbines is currently under construction and to be commissioned early in 2003. When completed, this will be the largest wind farm and have the largest wind turbine deployed in Ireland to date.

### Operational Experience

Due to competition for the award of supply contracts, developers consider operational data for wind farms to be commercially sensitive, and consequently no national statistics have been compiled on turbine availability or failure rates. There is currently no representative body of wind turbine users in Ireland, and the absence of a mechanism by which the market can ensure minimum standards of service from turbine manufacturers is seen as a weakness that could compromise long-term development of the wind industry. It is therefore a priority for Sustainable Energy Ireland to stimulate the formation of an Irish wind turbine users' group and monitoring program in 2003.

**Main Constraint on Market Development**  
In past years, planning difficulties placed a major constraint on the development of the nascent wind power industry. However, education of both planners and project developers, particularly relating to planning requirements for wind farms, has removed planning permits for wind farm construction as a primary constraint upon development. There is now a substantial reserve of wind farm sites with planning permission awaiting development. There still remain some particular difficulties relating to stringent planning and environmental impact assessment requirements, local issues, and planning for electrical power lines for grid connection.

The availability of grid connections, in particular for larger wind farms, is likely to emerge as a further primary constraint upon the rate of development of the wind power generating industry in Ireland in coming

years. High economic growth rates in the late 1990s and consequent high growth in electricity consumption outpaced electricity infrastructure development, and the national electricity grid is now operating outside of transmission planning standards in many areas (ESB National Grid [2001], *Forecast statement 2001/2 – 2007/8*, page 19). Studies by the Transmission Grid Operator have indicated that there are few areas where new generation can be connected without major reinforcement. The lead times associated with grid reinforcement work may preclude large wind farms being connected within a time scale that allows national renewable electricity targets to be met. A program to provide grid upgrades, specifically for the connection of clusters of renewable energy projects, has been initiated by government but has not yet been implemented.

Other constraints on development have been low "spill" prices available within the electricity market and the slow rate of development of a green electricity market sector. The competitive tendering market support system has also been argued to constrain development, as it assigns capacity in discrete blocks and has a long lag time in receiving feedback on its effectiveness. The market support system for renewable energy in Ireland will be subject to a complete review in 2003.

## 10.6 ECONOMICS

### Trends in Investment

Due to the competitive nature of the price support scheme for wind power, construction costs are considered to be confidential and there is difficulty in obtaining accurate detailed breakdowns of these. However, indicative average total costs for onshore wind farm construction for 2002 are in the range of 900 to 1,100 Euro per kilowatt installed (Sustainable Energy Ireland [2002], *Renewable Energy Research, Development*

and *Demonstration Strategy*, page 16). Wind turbine and tower costs average approximately 80% of total project costs. Costs for off-site grid connection assets generally fall within the range of 60 to 200 Euro per kilowatt connected, with the average at 100 Euro/kW. Annual operating and maintenance costs are estimated at 5.5% of project capital costs. As no offshore wind energy projects have yet been built, there are no confirmed costs for this sector of the industry. Estimated costs for developments in Irish coastal waters range from 1,270 to 2,050 Euro per kilowatt installed (Sustainable Energy Ireland [2002], *Cost Benefit Analysis of Government Support Options for Offshore Wind Energy*, page 41.) The costs for such developments are highly sensitive to project scale.

### **Trends in Cost of Energy and Buy-Back Prices**

The 1995 bid price for AER contracts was 0.051 Euro/kWh; the 1998 weighted-average bid price for AER 3 contracts was 0.035 Euro/kWh. In 2000 the weighted-average bid price for large-scale wind energy projects in AER 5 was 0.048 Euro/kWh; for small-scale wind energy projects it was 0.0525 Euro/kWh. When consideration is given to the fully index-linked increases in buy-back prices for AER 1 and AER 3 projects, compared with 25% indexed prices for AER 5 and considering that grant assistance was available for project construction under the earlier schemes, a general trend downward in the buy-back price can be inferred. However, the low uptake rate of AER 3 and AER 5 contracts may indicate that the highly competitive nature of the scheme may be counterproductive and is hindering the growth of a wind power industry.

As the majority of wholesale electricity in Ireland is traded through bilateral contracts, average wholesale prices for comparison to wind power are unobtainable. However,

the Commission for Energy Regulation does calculate annually a benchmark “best new entrant” (BNE) electricity price to be used in setting prices in the secondary balancing market including the “top-up” price for electricity. This price, based on CCGT generating plant, was 0.0441 Euro/kWh in 2002. Wind power, with generating costs in Ireland ranging from 0.003/kWh to 0.006Euro/kWh (Sustainable Energy Ireland [2002], *Renewable Energy Research, Development and Demonstration Strategy*, page 16), compares favorably with it. The other benchmark price, which can be used for comparison, is the 110-kilovolt (kV) maximum demand public electricity supply tariff, which, in 2002, was on average 0.0537 Euro/kWh.

In November 2002, a government announcement was made on the sixth and final round of the AER program. Price supports of 0.05742 Euro/kWh for projects smaller than 5 MW and 0.05216 Euro/kWh for those larger were announced. Also included was a category for offshore wind farms to a total capacity of 50 MW with an indicative price cap of 0.084 Euro/kWh. The price support scheme is to be redesigned in consultation with the industry after AER 6.

## **10.7 INDUSTRY**

### **Manufacturing**

There is no significant wind turbine manufacturing industry in Ireland. All of the grid-connected wind turbines currently deployed in Ireland have been imported. The late development of the wind sector of the electricity generating industry in Ireland left indigenous technology developers without a home market in which turbines might be piloted. Some industrial research and development work is currently being carried out on manufacturing technologies for specific wind turbine components. At this stage of industry development, the more likely manner

for full-scale turbine manufacture to be initiated in Ireland is through one of the larger turbine manufacturers locating a subsidiary in Ireland to serve a local market.

### **Industry Development and Structure**

Not applicable.

### **Export Potential**

Not applicable.

## **10.8 GOVERNMENT-SPONSORED R,D&D**

### **Priorities**

Prior to 2002 the majority of R,D&D effort in renewable energy in Ireland was sponsored through EU programs such as Joule, Thermie, and Energie. The 1999 Green Paper on Sustainable Energy set out a program of Sustainable Energy R,D,&D with a budget of 50 million Euro for the years 2000 to 2006. Sustainable Energy Ireland was charged with administering this budget, of which 16 million Euro is specifically allocated to renewable energy research, while other parts of the program also contain renewable energy elements. Priorities identified within the Green Paper were techniques for assessing the wind regime on land-based sites and their adaptation to Irish conditions and site evaluation techniques for offshore wind farms.

### **New R,D&D Developments**

In August 2002 Sustainable Energy Ireland launched the Renewable Energy R,D&D program outlined in Section 10.8.1. The focus of the program is to stimulate the application and further deployment of renewable energies, particularly those close to market viability. That could include measures to stimulate the development of the technologies and produce implementation plans for

those with economic potential. The primary objectives are to remove barriers to the deployment of renewable energy technologies and help stimulate the development an Irish renewable energy industry.

The Renewable Energy Research, Development and Deployment program, with a budget of 16 million Euro, will give priority to supporting the following work.

- Research aimed at developing policy options for enhanced deployment
- Research to define the market structure for renewable energy technologies with high penetration potential
- Research aimed at cost reduction, improved reliability, and/or opening new markets
- Demonstration of non-technical innovation
- Feasibility studies for renewable energy projects
- Demonstration aimed at high-risk, high-reward projects
- Investigation into core areas, common to many renewable technologies, such as the electricity system, regulation, technical standards, fiscal and support measures, finance, markets, planning, and policy.

For onshore wind energy, specific priorities that have been identified for the program are measures to address the creation of the correct electrical network and creation of market and social conditions for the wider acceptance of the expanding deployment of wind energy.

For offshore wind energy, key priorities are assessment of government support mechanisms, assessments of wind farm construction costs in Irish waters, assessment of the environmental impacts of offshore wind farms, resource prediction, and energy storage.

References:

ESB National Grid (2001), Forecast statement 2001/2 – 2007/8, Page 19.  
Sustainable Energy Ireland (2002), Renewable Energy Research, Development and Demonstration Strategy, Page 16.  
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