



Economic Analysis of RES-E Support Mechanisms
Appendix I

ANNEX I “OVERVIEW OF RES-E STRATEGIES”

TO

(DRAFT) FINAL REPORT

**Study on the Economic Analysis of RE Support
Mechanisms
in the electricity generation sector**

prepared for Sustainable Energy Ireland (SEI)

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ANNEX I – OVERVIEW OF RES-E STRATEGIES

Most current EU Member States have adopted the EU indicative RES-E targets as the leading driver to their national RES-E policy. However, only a minority of Member States have adopted legally binding targets. Most of the support programmes for renewable energy currently existing on the European market are directed towards the promotion of renewable electricity. According to the EU Treaty and the definition of the EU's formal competences, the choice of instruments is not prescribed or harmonised in Europe, and therefore each country has adopted its own unique set of promotion instruments. Usually two or more types of instruments are combined as multiple goals are to be met. Renewable heat and biofuels are mainly supported through tax exemptions. Innovative support instruments for support of renewable heat and biofuels or systems combining this support with RES-E support have yet to be developed.

This section describes the four types of support mechanisms most commonly adopted in Europe and the Irish policy context where relevant.

FEED-IN TARIFFS

The primary support instrument used in European countries is the system of fixed feed-in tariffs, in which a fixed price is paid for renewable electricity. Often different price levels are specified for different types of renewable electricity technologies, depending on their level of market penetration and their stage of market development. An obligation is set on network operators or supply companies to purchase all renewable electricity supplied to the grid at these fixed tariffs. The costs are usually passed on to the final consumers by means of a levy on the network tariff.

The fixed feed-in tariff system is well known for its success in deploying large amounts of wind and solar energy in countries such as Germany, Denmark and Spain. High tariffs have been the prime reason for its success, combined with the stability of the supporting policies. This longer-term certainty is the biggest perceived advantage, considerably lowering investment risks and providing improved opportunities for new market entrants. A fixed feed-in tariff system is effective, flexible, fast, fairly easy to implement and has low administrative costs. The system is however often criticised for not providing enough incentives to driving down the costs of renewable energy technology investments.

To counteract these drawbacks, more advanced feed-in systems have been defined such as a stepped feed-in tariff - where the tariff decreases as installed capacity increases, a premium tariff – where the tariff is linked to actual electricity market prices, or a tariff where total payments are limited to an agreed rate of return on the renewable electricity investments. These advanced feed-in systems are more economically efficient as they add an element of dynamic cost reductions. Administrative costs may however be higher.

QUOTA SYSTEMS IN COMBINATION WITH TRADABLE GREEN CERTIFICATES

In recent years renewable obligations, also called quota obligations or renewable portfolio standards, have become increasingly popular. The renewable obligations impose minimum shares of renewables to consumers, suppliers or producers. Market parties not meeting their targets have to pay a penalty. Since 2003, five EU member states are using a system of renewable obligations: the UK, Austria, Italy, Belgium and Sweden. Renewable obligation systems are considered to be more in line with requirements to define market-based solutions and competitive policies that provide a strong incentive to technology cost reductions. Its perceived drawbacks are its initial stage of development, the complexity of the system, the risk of supporting only the lower-cost technologies and uncertainty about the support and the stability of the policy targets.

The renewable obligation system is often combined with tradable green certificate (TGC) systems; although this does not necessarily have to be the case. The concept of TGCs is based on the separation of physical electricity from its green value and allows the two components to be sold separately. In 2003, five EU member states had implemented a TGC system: Belgium, the Netherlands, Sweden, the UK and Italy. Four of these countries combine the TGC system with a renewables obligation. The Netherlands combines the system with a combination of energy tax exemptions and a feed-in tariff. Austria had introduced a TGC system for small-scale hydro in 2001, but has abolished the system from January 2003. Poland is considering the use of a TGC system in combination with its already implemented renewables obligation. The TGC system has a strong connection to the Guarantee of Origin as required by the RES-E Directive to be introduced from October 2003 in each EU member state. Both systems specify the origin of the source and provide the opportunity of cross-border trade of the green value it presents.

The most important perceptions with respect to quota systems combined with TGCs are:

- Quota systems minimise the total RES-E system costs. However, it generally does not lead to minimisation of the costs for society as technologies other than the cheapest technologies are also supported;
- With a flat RES-E supply curve such as in Ireland social costs are relatively low as well;
- In the case of higher targets specifying technology bands or introducing additional support schemes for higher-cost technologies, this will assist in reducing social costs. Administrative costs will however be higher;
- As TGC price developments are uncertain and difficult to forecast in illiquid markets, investor risks are higher compared to alternative systems such as the feed-in tariff or a tender scheme. The risk premium leads to higher costs for society. Risks can be reduced by a guaranteed floor price or allowing banking and borrowing of TGCs;
- A main advantage of a quota system is that if the system is well designed the targets can be exactly reached. Thus, in contrast to a feed-in tariff scheme or a tender procedure, no adjustment is necessary to fulfilling targets;

- Experiences show that non-compliance penalties should be significantly higher than the expected market price for TGCs, otherwise there is no incentive to fulfil the quota;

TENDER SCHEMES

The third category of promotion schemes is the best known in Ireland, the tender scheme. In this system the government requires a specific amount of renewable energy capacity to be developed and announces a tender competition in which the best offers are offered a contract. Usually the government obliges the network operator to offer supply contracts to the winning bidders. The scheme is either funded from the general budget or from a levy on the network tariff. The advantages of the tender system are the value that it generates to renewable energy investment opportunities and the competitive element incorporated in its design. Its largest drawback is that the overall amount of projects actually implemented has been very low, resulting in a much lower penetration of renewables than originally anticipated.

In Ireland the AER tender scheme involves offering Power Purchase Agreements (PPAs) of up to 15 years. THE ESB is obliged to offer these contracts to the selected bidders (usually the lowest cost bidders) at the individual (time indexed) bid price. This long-term certainty is another big advantage of the tender scheme. The AER is funded from the PSO for renewables. The most recent AER rounds require a planning consent at the time of application, aiming to increase the actual deployment of renewables from the selected bids.

Continued calls for tender are important to stimulate investor stability, stronger competition and thus more efficient RES-E deployment. The social costs of tender schemes can be relatively low compared to other support schemes if sufficient competition exists. A main reason for this are the relatively low administrative costs. Limited competitiveness or an illiquid market may strongly reduce the efficiency of the tender system. Technology and location specific tenders can further reduce administrative burden but also reduce competition.

FINANCIAL AND FISCAL INCENTIVES, SPECIFICALLY PRODUCTION CREDITS

A fourth category of renewable energy promotion schemes is the category of financial and fiscal incentives. Fiscal and financial incentives are very widespread. Their biggest advantage is that they can be easily linked with existing fiscal and financial structures. The most well-known financial incentives are the production credits and tax credits, which refers to situations where renewable energy investments or earnings from such investments can be deducted from taxes.¹ Investors benefit from larger cash flow and consequently better loan conditions.

¹ Under EU state-aid guidelines for environmental protection this is generally allowed to up to 40%.

Tax credits can be used by corporate investors to deduct their investments against corporate income tax or carried forward against future tax payments. In Ireland this system would not be very interesting as the corporate tax base is very low and thus the tax credit would bring only small tax deductions. The system of production credits can be used by private entities subject to taxation (corporations, small businesses and individuals) to deduct their payments against income taxes. With a much higher tax base this makes much more sense in Ireland, specifically as it would support smaller investments closer to the final consumer.

The drawbacks of financial incentives are similar to the ones mentioned for fixed feed-in tariffs: insufficient incentives to achieving dynamic market efficiency. That is, they do not include mechanisms that drive down technology costs or increase efficiency of use. They do however reach part of these by means of economies of scale.

Ireland has had a history of spectacular successes in generating very large levels of investment with fiscal incentives. Many urban renewal schemes have provided great relief for the film industry. Particularly BES in favoured industrial areas like information technology, pharmaceuticals and tourism have worked well in the past and were extended to 2006 in the recent budget. Renewable energy project investors favour this type of instrument as it provides a guaranteed and direct payment. However, the AER price regime for the power produced by such investment has not provided sufficient impetus to support the fiscal tax breaks. Were this to be resolved, it would be reasonable to predict large numbers of investors switching from property or BES schemes to RE investments.

Fiscal incentives include CO₂ or energy tax exemptions, low-interest loans and financing packages for consumers. Its biggest attraction is the direct message given to the final consumers of energy on the added values of renewable energy. Its largest drawback is the fact that it does not create longer-term certainty on investments, therewith increasing investment risks for project developers and other renewable energy investors. Another drawback is that fiscal incentives can become tax havens, thereby reducing the incentive for efficient utilisation of renewable energy investments. Fiscal incentives in combination with fixed feed-in tariffs can lead to a spectacular growth in renewable energy investment in Ireland, especially for smaller projects.

OVERVIEW OF SUPPORT SCHEMES CURRENTLY OPERATED IN EUROPE

The choice of renewable energy support instruments is clearly shifting more and more to integrated policies. This is important for Ireland, as there are good opportunities to combine agricultural policies and energy policies.

Table 1 provides an overview of the main instruments used in supporting individual technologies in each of the EU-15 Member States.

The 10 new EU Member States have less extensive support systems, but all use some form of feed-in tariff, tax exemption or direct subsidy schemes. Poland has introduced an obligation system in 2002, but as penalties have not been set the system does not have a big market influence yet.

Table 1 Overview of main renewable energy policies in EU-15 at technology level

	Generic	Wind onshore	Wind offshore	Solar Thermal	PV	Biomass	Hydro	Geothermal
AT	Quota for production new renewables	Feed-in tariffs Compensation schemes	No wind offshore, thus no policies	Compensation schemes Tax deduction	Compensation schemes Feed-in tariffs	Compensations schemes (small scale) Tax deduction biofuels Feed-in tariffs	Feed-in tariffs Compensation schemes	Compensation schemes Feed-in tariffs
BE	Feed-in tariffs Tax incentives Quotas RES-E with TGC system	Feed-in tariffs	Feed-in tariffs	Compensation schemes	Feed-in tariffs Compensation schemes	Feed-in tariffs Tax exemption biofuels	Feed-in tariffs (< 10 MWe)	Feed-in tariffs
DE	High feed-in tariffs	Feed-in tariffs Tax Measures	Feed-in tariffs Tax Measures	Compensation schemes	Feed-in tariffs Fiscal Instruments	Compensation schemes Feed-in tariffs Comp. Schemes shift to biofuels	Feed-in tariffs (< 5MW) Compensation schemes	Feed-in tariffs Compensation schemes
DK	Compensation schemes Feed-in tariffs	Tax incentives Feed-in tariffs	Tax incentives Feed-in tariffs	Compensation schemes Solar Heating Obligation	No specific policies	Compensation schemes Feed-in tariffs Tax incentives	No specific policies	Compensation scheme (heat only)
ES	High feed-in-tariffs Compensation schemes Third Party Financing	Feed-in tariffs Compensation schemes Tax incentives	Feed-in tariffs Compensation schemes Tax incentives	Compensation schemes Tax incentives	Feed-in-tariffs Compensation schemes Tax incentives	Feed-in tariffs Compensation schemes Tax exemption biofuels Tax incentives	Feed-in-tariffs (< 10 MW) Compensation schemes (< 10 MW) Tax incentives	Compensation schemes Feed-in tariffs
FI	Energy tax exemption Compensation scheme	Energy tax exemption	Energy tax exemption	No specific policies	No specific policies	Energy tax exemption (woody-based and solid biofuels) Compensation schemes	Tax exemption (small hydro)	No specific policies
FR	Tax incentives Feed-in tariffs	Feed-in tariffs & Tender (>12MW)	Feed-in tariffs & Tender (>12MW)	Compensation schemes Tax incentive	Feed-in tariffs compensation schemes	Tax exemption biofuels Feed-in tariffs Compensation schemes Tendering (>12MW)	Compensation schemes Feed-in tariffs (small scale)	Feed-in tariffs & Tender (>12MW)
GR	Feed-in tariffs Compensation schemes	Feed-in tariffs Compensation schemes	Feed-in tariffs Compensation schemes	Tax incentives Compensation schemes	Feed-in tariffs Compensation schemes Tax incentives	Feed-in tariffs Compensation schemes	Feed-in tariffs Compensation schemes	Feed-in tariffs Compensation schemes Tax incentives
IE	Bidding scheme Tax incentives	Bidding scheme Tax incentives	Bidding scheme Tax incentives	No specific policies	Tax incentives	Bidding scheme Tax incentives system	Bidding scheme Tax incentives system	No specific policies
IT	Quota system with TGC for new production	CO2-tax Quotas with TGC	CO2-tax Quotas with TGC	Tax incentives Bidding scheme	CO2-tax Compensation schemes Quotas	CO2-tax Quotas (only electr.) Tax exemption	CO2-tax Quotas	CO2-tax Quotas (only electr.)

	Generic	Wind onshore	Wind offshore	Solar Thermal	PV	Biomass	Hydro	Geothermal
	(since 1999)					biofuels		
LU	Compensation schemes Feed-in tariffs	Compensation schemes Feed-in tariffs	No wind offshore, thus no policies	Compensation scheme	Compensation schemes Feed-in tariffs	Compensation schemes Feed-in tariffs	No specific policies	No specific policies
NL	Feed-in tariff Energy tax exemption Fiscal incentives	Feed-in tariff Energy tax exemption Fiscal incentives	Feed-in tariff Energy tax exemption Compensation schemes (off shore)	Compensation schemes Tax incentives	Feed-in tariff Energy tax exemption Tax incentives Compensation schemes	Feed-in tariff Energy tax exemption Tax measures	Feed-in tariff (small scale)	No specific policies
PT	Feed-in-tariffs Compensation schemes	Compensation schemes Feed-in tariffs	Compensation schemes Feed-in tariffs	Tax incentives Compensation schemes Financing schemes	Compensation schemes Feed-in tariffs	Compensation schemes Feed-in tariffs	Compensation schemes Feed-in tariffs (small scale)	Compensation schemes
SE	Quota obligation with TGC Tax exemptions	Quota obligation with TGC Tax exemption Compensation schemes	Quota obligation with TGC Tax exemption Compensation schemes	No specific policies	Quota obligation with TGC Tax incentives Compensation schemes	Quota obligation with TGC Tax exemption (biomass & biofuels) Compensation schemes	Quota obligation with TGC Tax incentives Compensation schemes (small scale)	Quota obligation with TGC Tax incentives Compensation schemes
UK	Quotas (Renewable Energy Obligation) Climate Change Levy (CCL)	Quotas & TGC Tax exemption	Compensation schemes Quotas & TGC Tax exemption	Compensation schemes	Compensation schemes Quotas & TGC Tax exemption	Compensation schemes Quotas & TGC Tax exemption	Quotas & TGC Tax exemption	Quotas & TGC Tax exemption
	Red	Instrument in operation: < 1 year or still have to become active						
	Green	Instrument in operation: 1-3 years						
	Blue	Instrument in operation: > 3 years						
	Black	Operational period is not known						