

Renewable Energy and Rural Employment Opportunities



May 2009

IRL Briefing Note 09.04

1. Introduction

This briefing details Irish Rural Link's presentation to the Oireachtas Joint Committee on Enterprise, Trade and Employment's sub-committee on Job Creation Through Use of Renewable Energy Resources on the 20th May 2009. Renewable energy is set to play a major role in Ireland's future by both reducing the negative impact that our current use of fossil fuels is having on the environment and by increasing the security of energy supply through identifying renewable sustainable sources. From a rural development perspective, it has a number of potential benefits including the creation of new opportunities for rural communities in the production of biomass, wind and other forms of renewable energy and the provision of new jobs in rural areas in this increasingly important sector.

Renewable energies are defined as products, systems and services for the generation and collection of energy from renewable sources such as biomass/bio fuels, solar, photovoltaic, wind, hydro, tidal and geothermal sources including microgeneration. Examples of job opportunities include the manufacture of equipment, design, construction, installation, management and operation of renewable energy facilities,

Overview

1. Introduction
2. IRL & Renewable Energy
3. Rural Employment
4. Government Policy
5. Opportunities
6. Case Studies
 - Westmeath Energy Audit*
 - C & F Group*
 - Zengia Clean Energy*
7. Recommendations

Appendices & References

2. IRL & Renewable Energy

Irish Rural Link (IRL) is committed to environmental protection and sustainable development. Irish Rural Link wish to ensure regions and rural areas with low population densities and less industrial development are given due consideration in the development of Irish renewable energy policies. Our recent submissions to the Regional Authorities emphasised that renewable energy production can create economically and environmentally sustainable enterprises. Renewable energy offers potential to provide employment opportunities in rural areas experiencing agricultural decline. Also the development of the renewable sector will bring national benefits by creating employment and income opportunities in lagging and rural regions. The proposals outlined in this briefing note have been informed by Carnegie Commission for Rural Community Development's Petal Model of Rural Development (Carnegie Commission for Rural Community Development, 2007) which outlines elements required for resilient rural communities. This model is outlined in Appendix 1.

3. A Picture of Rural Employment

Rural areas are characterised by their narrow economic base. The rise in unemployment occurring across all sectors will be most difficult to resolve in rural areas which are over-reliant on primary industries such as agriculture, construction and low-level manufacturing, e.g. in 2006 34% of men in BMW region were employed in agriculture or construction while the Midland & Border regions are showing steepest drop in employment.

According to Teagasc farmers relying solely on farm income have a higher probability of poverty and deprivation. Furthermore, farmers working outside the farm tend to be employed at the lower skilled end of the employment spectrum which further exacerbates their exposure to the downturn (O'Brien and Hennessy, 2008). The average farm income is below the average industrial income at less than €20,000 (Department of Agriculture, Fisheries and Food, 2009).

The CSO's "County Incomes and Regional GDP for 2006" (2009) show that the disposable income per person in 2006 in the Southern and Eastern region was 3% above the State average

Irish Rural Link, Moate Business Park, Clara Road, Moate, Co. Westmeath

Tel: 090 6482744 Fax: 090 6481682 email: info@irishrurallink.ie

Web: www.irishrurallink.ie



while the corresponding figure for the Border Midland and Western region was 8.3% below the State average. The CSO figures show that disposable income per person was highest in the Dublin region, where it was more than 12% above the State average. The Border region was 8% below the average and the Midland region was 9.4% below average. Only Limerick, Kildare and Meath were the other counties above the State average. Eight counties were below 90% of the average, with Kerry over 13% below the State average. Donegal had the lowest disposable income per person at more than 16.5% below the state average. At the level of the eight Regional Authority areas the Dublin region had the highest disposable income per person, being 12.3% above the State average in 2006. The disposable income per person of the Midland region was 9.4% below the State average in 2006 and was the lowest of the eight Regional Authority areas. The deterioration in the economy will inevitably result in an even deeper gap between the incomes of rural and urban workers.

This situation requires a shift away from primary production to higher value sectors and activities which will require rural communities' to mobilise their strong track record of innovative thinking and adapting to changing circumstances, e.g. on the group water scheme. Without this transformation, economic growth will continue to concentrate on Ireland's core regions with the highest value-added sectors and this will exacerbate regional inequalities in growth, productivity and incomes.

4. Existing Government Policy

The Energy White Paper *Delivering a Sustainable Energy Future for Ireland* (2007) contains commitments to renewable energy targets, including 33 per cent of electricity generation from renewable sources by 2020, 12 per cent of heat generated from renewable sources by 2020, and a biofuels penetration target of at least 10 per cent by 2020 in the transport sector. There is a strong focus on security of supply, the use of indigenous sources for energy generation and on reducing carbon emissions.

Building Ireland's Smart Economy (2008: 6) outlines the implementation of "a 'new green deal' to move us away from fossil fuel-based energy production through investment in renewable energy and to promote the green enterprise sector and the creation of 'green-collar' jobs"

According to the *Rural Development Programme Ireland 2007-2013* (2007) renewable energy production can create economically and environmentally sustainable enterprises and play an important role in the provision of employment. The document states that the development of a policy and overall strategic framework for this sector will be prioritised in the coming years.

The Government's small scale microgeneration plans are only beginning to be rolled out. Teagasc have however questioned whether the microgeneration scheme is sufficient, arguing that the prices guaranteed fall short of international standards and that it discriminates against farmers and households who receive their electricity from a source other than ESB Customer Supply (Caslin, 2009). The IFA have described it as a "missed opportunity" lacking long term political commitment (quoted in Young, 2009).

5. Opportunities

Renewable energy production can create economically and environmentally sustainable enterprises and can play an important role in providing employment opportunities in rural areas. The greatest potential for renewable generation is likely to be in the least developed regions where opportunities to make the best use of natural resources such as wind, wave and bioenergy production are found. These opportunities will arise across the economy in primary production, electricity generation, manufacturing and services. It has been estimated that the number of jobs in the renewable energy industry globally in 2007 was 2.4 million, of which 1.1 million were in biofuels production (NESC, 2008).

The International Energy Agency gives a clear explanation of employment from biomass, (IEA, 2002): "Direct employment results from operation and construction of conversion plants as well as

production and transportation of biomass. Indirect employment is jobs generated within the economy as a result of expenditures related to biomass fuel cycles and induced jobs are secondary jobs created by increased spending in the region.” The Irish Farmers Association believe that up to 5000 jobs can be created in biomass here. The Western Development Commission (WDC) (2008) estimates that by 2020, using wood to produce heat energy could be worth an additional €15 million per annum to the economy, create up to 900 additional jobs in rural areas. The WDC argue that creating manufacturing and research opportunities in the region would create more jobs as their projections assume the CHP technology would be imported into the region. Biomass is just one aspect of the renewable energy sector.

A Marine Institute & Sustainable Energy Ireland study in 2005 calculated that 1,900 jobs could be created by 2020 if Ireland continued to invest in marine energy technology.

ECOTEC Research and Consulting Ltd. (with a number of other organisations) undertook a comprehensive study during 1998 and 1999 to quantify the employment and economic impacts of renewable energy in the former EU15 (ECOTEC *et al.*, 1999). The study investigated direct, indirect and subsidy impacts. It estimated that net new employment in the Republic of Ireland from renewables would be over 11,000 full-time-equivalents (FTEs) by 2020 (relative to a 1995 baseline). One FTE is equivalent to more than 30 hours of work per week all year round.

It has been estimated that the development of renewable energy heating systems in Northern Ireland and border counties in the Republic of Ireland (the INTERREG Region) could result in a “... total of 1,650 new full time local jobs for the installation, operation and maintenance of RE heating systems: 650 for wood heating (300 Installers, Technicians & Engineers, plus 350 Farm, Transport and Contract Workers to Supply the Wood Fuel); 500 for heat pumps (Installers, Technicians and Engineers); 100 for solar thermal systems (Installers, Technicians and Engineers); 400 jobs in associated construction and installation activities.” (Action Renewables and SEI, 2004: 4).

6. Case Studies

Westmeath Local Energy Audit

Any attempts to reduce energy consumption and develop innovative alternative energy sources must be developed with consideration to local assets, knowledge and experience. Completed in 2007 the Westmeath Local Energy Audit, commissioned by Westmeath Community Development, assessed the renewable energy potential available in Co. Westmeath, with a focus on agricultural and rural development. Renewable energies investigated included: the growing of bioenergy crops such as oilseed rape, miscanthus and willow; the production potential of wind energy and hydro-power in addition to Co. Westmeath’s wood energy resources. It also identified possible market outlets. It examined renewable energy activities underway in Co. Westmeath such as the production of biodiesel, anaerobic digestion and others.

C & F Group, Athenry, Co. Galway

THE industrial equipment group, C&F, is to expand into wind energy, creating 250 new jobs in the manufacture of wind turbines in County Galway – and making it the first company to fully design and build wind turbines in Ireland and using world-first technology.

The company is currently in the middle of a four-year €20 million investment programme, and the move into wind energy will mean the expansion of its 180,000-square-foot Athenry manufacturing headquarters by an additional 70,000 square feet. The 250 new jobs will be in design, engineering, manufacturing and management, sales and after-sales, and will be generated over the next two years.

There will also be spin-off benefits for installers and electricians, and C&F has commenced the process of appointing distributors in Ireland, the UK and Europe, all of whom are currently working in wind energy.

The C&F turbines will use a revolutionary new technology which allows them to harness wind at lower speeds than ever before. Patented by C&F, that technology is capable of generating power from wind at speeds as low as 1.2 of a metre a second, as a result, the C&F turbines can generate power 350 days a year, outperforming current market offerings.

The new turbines will be marketed initially in a range of six sizes, from 6 kW to 50 kW, and the aim is to make clean wind energy available to domestic, agricultural and small business users at affordable prices – in Ireland and globally. The business plan is to build turbines up to 360kW competitively and efficiently. It is anticipated that around 70 percent of the turbines made in Galway will be exported, mainly to the European market. C & F demonstrates the potential opportunities in manufacturing in the renewables sector.

Denmark has become the global leader in wind turbine production and sales. 20,000 jobs have been created, while 90% of production is exported. In 1996, turnover was €390 million. Ten years later, turnover was a massive €4.3 billion. If turnover from international facilities owned by Danish companies are included, turnover totalled €6.5 billion in 2006.

Zengia Clean Energy Solutions, Dunhill, Co. Waterford

Zengia Clean Energy Solutions are a start up company formed with the vision of creating an Irish company which will become a global leader in the R&D and manufacture of renewable energy products and systems, focusing primarily on Vertical Access Wind Turbine (VAWT) powered micro generation. Based in Dunhill Ecopark close to Tramore Co Waterford, it was the inventors' village concept and the supports offered that attracted them to set up there. The two founding partners have extensive knowledge of high volume manufacturing environments. They commend the work of Enterprise Ireland in the support and mentoring offered but would welcome more meaningful financial supports for projects such as theirs. They feel that business has to be flexible to survive in today's environment and that the rules and regulations attached to setting up renewable energy initiatives can restrict progress. They welcome the support and sharing of ideas from similar type businesses and have been working collaboratively to achieve their business ambitions. They see networking and the sharing of ideas as being very important for those trying to compete in any rapidly evolving emerging industry.

7. Recommendations

Irish Rural Link make the following policy recommendations which are required to ensure rural communities are empowered to take advantage of the opportunities renewable energies offer and create sustainable jobs.

Co-operatives

It is Irish Rural Link's opinion that any proposals to boost micro and local level energy production will fail unless local groups are sufficiently fostered. Community energy co-operatives should be supported. Such co-operatives would comprise a cross section of rural communities. It will support local communities who are exploring options for alternative energy production.

These co-operatives would be established to develop renewable energy solutions, appropriate to local circumstances and requirements. The supports would foster the development of such co-operatives from producer and discussion groups, leading to the formation of co-ops.

Energy co-operatives aim to promote and facilitate locally the development and use of renewable energy for the benefit of the co-operative members. The main purpose of the co-operative is:

- Developing locally available renewable energy resources by and for the co-operative members
- Reducing the expenditure on energy (electricity and heating) sourced from outside the county/area and maintain the expenditure within the local community

75% of wind turbines in Denmark owned by local co-operatives (see Appendix 2) and the model can also be used for anaerobic digesters etc.

Opportunities may include the development of a community bio-digester (anaerobic digester) and combined heat and power plant (CHP) run off the biogas. Slurry from local farms would be the major energy source and the heat may be used to heat community buildings or local houses with the electricity sold to the grid. This also mitigates the ecological risk of the significant amounts of slurry produced by farms and creates an odourless fertilizer reducing nuisance to communities. Green waste (such as lawn clippings etc.) from across the community could also be used as a fuel source. Such a development may be most appropriate for locations where development is clustered.

This is an opportunity to widen the economic base of communities. Any pilot schemes can develop synergies with existing Leader groups and other local structures.

Training & Education

Rural communities have a strong track record of innovative thinking and adapting to changing circumstances, with the group water scheme just one example. Irish Rural Link is aware that rural communities are curious about, and receptive to, knowledge regarding environmental protection and sustainable development. However our work has identified a gap in the information available to rural communities on such matters.

Accreditation and Standardisation of Renewable Energy Training

The growth in the renewable industry industry has led to an increase in demand for training in all renewable technologies. This rapid growth has led to an explosion in the number of training schemes available as there is an increased demand for a properly trained green workforce. There is an urgency to ensure that this new workforce is of a consistent and high standard and that it develops at the same rate as the renewable energy market is evolving. The objective of any training would be to deliver core knowledge and skills on all facets of renewable technology.

A single, Europe-wide, green-collar certification scheme is essential at this stage to ensure a supply of qualified workers who will be able to exploit the new job opportunities both in Europe's as well as Ireland's emerging green economies. The European Computer Driver License (ECDL) that operates with computer training could be a good template to follow. The implementation in Ireland of European initiatives to train, accredit and certify trade professionals in new 'green-collar' trades needs to be implemented. Properly-certified workers from this type of system will have a clear advantage in gaining employment as well as pursuing the possibility of enhancing their education in renewable energies technologies in other European Countries.

Any new training recognition could be modelled on the Spanish government's approval of 18 new professional certificates, which represent the official accreditation of professional skills for certain labour market activities in that country. Those participating in this level of training should be able to obtain good, stable employment in the emerging green industries.

Education

Responses to a questionnaire distributed by Westmeath Community Development Ltd at a recent information evening on micro-generation grants highlighted the urgent need to provide comprehensive training on renewable energy for individuals and community groups in the county. This need is reflected in the large attendances that are turning out at the information events taking place through-out the country advertising and promoting different brands of micro wind turbines now available in Ireland.

Sadly there is no co-ordinated training taking place in Ireland at present. A training model worth exploring to deliver on this challenge would be the Solarteur model. Solarteur-Training was originally developed in Vienna, Austria. The European Solar Schools, founded in Vienna in 1993 by Dr. Werner Rauscher, was the first to design an educational curriculum to train qualified electricians, plumbers, roofers, tin-smiths, cooling technicians etc. to design, install and service energy production systems powered by renewable energy sources. The goal of the European Solar Schools was to train a labour force who could offer services that allowed consumers sustainable energy options while creating new job opportunities and economic security for a professional labour force trained with a view towards the future. This new model of training the labour force to use traditional skills they possessed in the context of renewable energy development and production was a great success and led to an alliance with five other European countries.

In this programme, the alliance formed by the success of the model of the European Solar Schools developed an international educational certification standard in line with the "Leonardo da Vinci" European training program. Seventeen Solarteur Schools are presently operating in seven European countries with more opening on a regular basis. Thousands of Solarteur engineers have been graduated and now earn their living designing and building a sustainable future in a new economy.

In the town of Gussing, Austria, a Solarteur School was established in 2003 through the cooperation of the Town of Gussing, The European Centre for Renewable Energy and Solar Projects Ltd. The Solarteur Schools currently offer training in the fundamentals of renewable energy production as well as advanced training. In addition to training craftsmen, the Solarteur Schools also has a training program for individuals who want to teach the curriculum at new Solarteur Schools worldwide.

With many of our agricultural colleges closing or recently closed throughout Ireland, perhaps in view of the original use of these facilities and the land bank that is available beside many of them, there may be opportunities to replicate and develop this model in a number of locations strategically placed throughout Ireland in order to deliver renewable energy training.

Joined Up Thinking and a One Stop Shop

There is a need to roll out a comprehensive support and advisory structure nationally to fast-track the establishment of community renewable energy projects. This would act as a local one-stop-shop for interested parties making enquiries regarding all aspects of renewable energy production and energy conservation and deliver a comprehensive service to community groups that need expert technical, legal and financial advice on renewable energy projects. This could also serve as a contact for communities to negotiate a stake in commercial projects being developed in their area as well as exploit the opportunity of establishing renewable energy co-operatives. It is related to the reorganisation of energy agencies outlined below.

Planning

Many renewable energy initiatives never get off the ground because of difficulties with obtaining planning permission for their projects. Certain county development plans have excluded areas that are perhaps more suited to the production of renewable energy. There is a strong case that there should be more clarity in this area and that counties should be clearly zoned as to their suitability and as to whether applications would be acceptable when planning proposals are put forward. Interestingly in Denmark there are no exceptions and the entire country is zoned suitable regarding wind energy production.

Barriers to manufacturing in rural areas and a bias in the planning system against non-traditional enterprise in a rural setting means that renewable energy businesses seeking to operate in rural

areas, providing a range of jobs to rural dwellers, find this difficult. Planning policy must not be too rigid as to prevent such businesses from operating or expanding.

Audits

As noted above any attempts to reduce energy consumption and develop innovative alternative energy sources must be developed with consideration to local assets, knowledge and experience. Local energy audits should be completed to cover all the country. Each area's Audit would identify own unique mix of opportunities and resources in a given area and propose a model to harness the renewable energy potential of the area's land, topography etc. Responsibility for eliminating duplication may be given to local energy agencies which need to be restructured to make them fit for purpose (see below).

Role of Local and Regional Energy Agencies

There are currently almost 180 regional and urban energy agencies throughout Europe. 12 of these are situated in Ireland and were established in 1998 as a joint initiative between their respective local authorities and the European Commission, DG TREN under the SAVE II program. Funding for the agencies is provided by the individual Local Authorities and local bodies.

The aim of each agency is to support the development of sustainable development initiatives in its region. Depending upon the individual requirements of each region the agencies also focus on Renewable Energy Sources and Energy Conservation and Management.

Unfortunately there is little public understanding or knowledge of the role of these agencies and they should be overhauled to cover the entire country with a clearly understood remit, including the promotion of local energy audits.

Enterprise support and mentoring

Forfas and InterTradeIreland (2008) note that the Environmental Goods and Services (EGS) market includes a significant number of specialised start-ups and small companies. These firms face difficulties in accessing start-up and growth finance common to all small firms. Measures to improve seedcorn financing and remove market failures in the access of finance for these firms will continue to be important, particularly due to the credit crunch. As noted in the Zengia case study above, mentoring from professionals skilled and knowledgeable about the sector is vital to nurture enterprise and this knowledge should be built up in our enterprise agencies.

Appendix 1 Petal Model of Rural Development

All proposals presented to the Committee have been informed by the Carnegie Commission for Rural Community Development's Petal Model of Rural Development which outlines elements required for rural communities to be sustainable. The Carnegie Trust based in Dunfermline, established this commission, chaired by David Steel, former Liberal Party leader, to "carry out a research programme, promote debate between policy makers and local communities and support the exchange of good practice nationally and internationally". Irish Rural Link were a member of the Commission which produced the report 'A Charter for Rural Communities'. The report includes the Commission's Ideas for Action. The Commission sees central and local government, landowners, the Social Investment Bank, the Lottery distributors, Third Sector agencies, trusts and local communities working together to deliver these actions. These include:

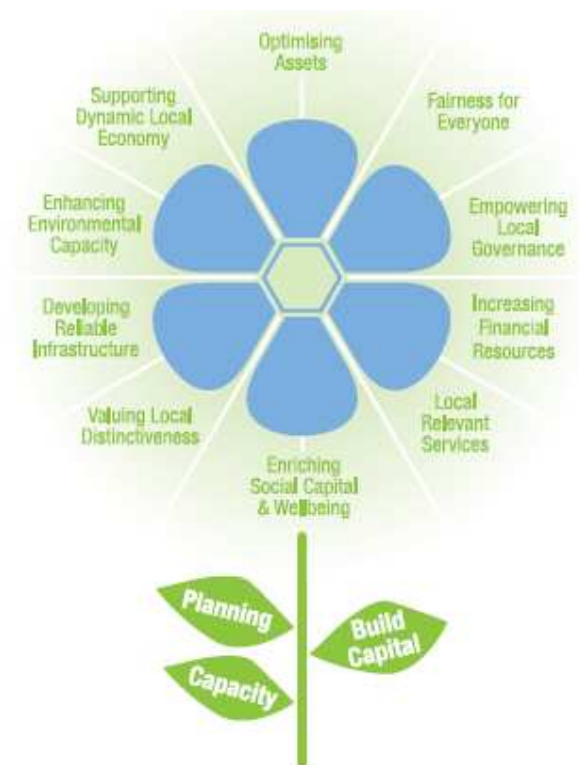
- A major expansion in community ownership of local assets
- An enhanced role for parish and community councils
- A Centre for Excellence supporting rural community development policy and practice on the ground (now developed as a 'Community of Practice'.)
- Encouragement and assistance for local communities to develop and manage their own services and to engage in community planning

According to this model the ten characteristics of sustainable rural communities are:

- Optimising assets
- Achieving fairness for everyone
- Empowering local governance
- Increasing financial resources
- Enjoying locally relevant services
- Enriching social capital and wellbeing
- Valuing local distinctiveness
- Developing reliable infrastructure
- Enhancing environmental capacity
- Supporting a dynamic local economy

The three enabling factors are:

- Growing the capacity
- Enhancing community assets through building capital
- Increasing the scope and quality of community planning



Appendix 2 The Danish Experience

Denmark has some significant similarities with Ireland, for example, in terms of population, demographics, country size, wind resource, co-operative tradition and the narrow economic base of rural areas. Therefore, the evolution of the renewable energy industry in Denmark is worthy of some thought and reflection when considering what the future of the Irish rural economy could look like.

The popular movement to invest in renewable energy can trace its origins to three families living in Ny Solbjerg on the outskirts of Aarhus. Following an escalation in energy prices in 1979 three neighbours, who had previously shared a snowplough, decided to come together and buy a wind turbine to meet their energy needs. Following many years of campaigning and dealing with the challenges and obstacles similar to those that are restricting the growth of the sector here in Ireland presently, systems were put in place to facilitate community groups to participate in the industry. The successes of the Aarhus group sowed the seed for the Danish wind industry and by drawing on the rural cooperative tradition, which is quite similar to that which exists in Ireland, the concept was replicated throughout the country. To encourage investment in wind power, families were offered a tax exemption for generating their own electricity within their own or an adjoining commune.

In the early eighties Danish wind turbines rapidly became large enough to produce more than what a single household or farmer would use themselves. This resulted in two principal types of private ownership: a) several people jointly erecting a wind turbine on a reasonable site nearby and b) the landowner erecting his/her own wind turbine and selling the excess production to the grid. By 2004 some 150,000 Danes had invested in wind power and own wind turbines or shares in wind turbine co-operatives. This co-operative model has since spread to Germany and the Netherlands. Denmark has about 5,500 wind turbines, of which 75% are privately owned by local co-operatives. Most of the employment created by the Danish wind industry is primarily situated in sparsely populated areas of the countryside, contributing significantly to the development and sustainability of its rural economy.

The wind industry has been good for the Danish environment (helping to meet their government's greenhouse gas reduction commitments) and it helps preserve the rural community. It also has helped build a large new industry in Denmark (thousands of jobs) and avoided the import of fossil fuels. Denmark plans to produce half of its electricity from the wind by 2030. The Danish wind industry exported €4.7 billion worth of wind electricity in 2007, up 30.7% in the year (www.windpower.org). This figure equates in monetary terms to the worst case scenario that Ireland faces annually if we fail to adhere to green house emission targets set down in our commitment to global green house gas emission reductions. Regrettably Ireland now only produces from wind farms the equivalent that Denmark produced back in 1988.

The jobs created are not only in the construction and servicing of wind farms but more importantly in the manufacture of wind turbines. This has resulted in Denmark having remained at the cusp of research and development in this increasingly important industry. The Danish wind turbine industry is the world's largest. Around 90 percent of the national output is exported, and Danish companies accounted for 38 percent of the world turbine market in 2003, when the industry employed some 20,000 people and had a turnover of around € 3 billion. Ireland has a much bigger wind resource than Denmark and has the capability to do what Denmark has done.

Wind is only one of the renewable energy options. There are similar opportunities in biomass, bio fuel, wave power and micro hydro production of renewable energy production. What is now needed are structures to be put in place that would allow communities and individuals to play a central role in the development of this renewable energy sector as has occurred in other European countries, such as Denmark, as outlined above.

References & Reading

Action Renewables and SEI (2004), *Renewable Energy Academy – Interreg IIIA Grant Application Form – Part B*, (Unpublished) Renewable Energy Information Office, SEI, Bandon, Co. Cork

Carnegie Commission for Rural Community Development (2007), *A Charter for Rural Communities*, available at <http://www.carnegieuktrust.org.uk/files/main/A%20Charter%20for%20Rural%20Communities.pdf>

Caslin, B. (2009), “Microgeneration Small Power with a Potential Big Impact”, Teagasc

Central Statistics Office (CSO) (2009), *County Incomes and Regional GDP for 2006*, available at <http://www.cso.ie/releasespublications/documents/economy/current/regincome.pdf>

Department of Agriculture, Fisheries and Food (2009), “Fact Sheet on Irish Agriculture 2009”, available at <http://www.agriculture.gov.ie/media/migration/publications/2009/February2009.doc>

ECOTEC Research and Consulting Ltd., Energy for Sustainable Development Ltd., EUFORES, Forum für Zukunftsenergien e.V., IDEA, Observ'ER and O Ö Energiesparverband (1999), *The Impact of Renewables on Employment and Economic Growth*. Project supported by the European Commission's ALTENER programme, contract number 4.1030/E/97/009. Birmingham, United Kingdom

Forfas and InterTradeIreland (2008) *Environmental Goods and Services Sector on the Island of Ireland: Enterprise Opportunities and Policy Implications*, Dublin: Forfas

Government of Ireland (2008), *Building Ireland's Smart Economy*, Dublin: The Stationery Office

_____ (2007), *Delivering a Sustainable Energy Future for Ireland*, Dublin: The Stationery Office

_____ (2007), *Rural Development Programme Ireland 2007-2013*, Dublin: The Stationery Office

Healion, K. et al (2005), *Bioenergy Training and Education Needs*, SEI, available at http://www.sei.ie/Renewables/REIO_Library/Biomass/Bioenergy_Training_Needs_amended_Fnl.pdf

International Energy Agency (IEA) (2002), *World Energy Outlook 2002*, Paris: IEA

Irish Rural Link (2008), “Renewables: Opportunities for Rural Communities or Not!”, *Rural Policy News*, Ed.1, pp. 14-15, available at <http://www.irishrurallink.ie/Publications/10548%20Irish%20Rural%20Link%20Policy%20Newsletter.pdf>

Joint Committee on Enterprise, Trade and Employment (2008), *Report on the potential to establish local enterprises and create jobs based on the generation and utilisation of energy from renewable energy resources*, available at <http://www.oireachtas.ie/viewdoc.asp?DocID=9921>

Morgenroth, E. (2009), “Who is Paying for Regional Balance in Ireland? ESRI Research Bulletin 2009/1/3, published 21/04/09

National Economic and Social Council (NESCC) (2008), *The Irish Economy in the Early 21st Century*, Dublin: NESCC

O'Brien, M. and Hennessy T. (eds), (2009), *An Examination of the contribution of off-farm income to the viability and sustainability of farm households and the productivity of farm businesses*, <http://www.teagasc.ie/research/reports/ruraldevelopment/5490/eopr-5490.pdf>

Western Development Commission (2008), *Biomass CHP Potential in the Western Region: An Assessment*, available at <http://www.wdc.ie/documents/BiomassCHPMarketPotentialintheWesternRegionanAssessment.pdf>

Young, P. (2009), "Wind turbine returns don't add up", *Irish Farmers Journal*, 28th March 2009