

## **ECONOMIC DEVELOPMENT COMMITTEE EDC 01-02(p5)**

**Date:** 10 January 2002

**Time:** 14.00 - 16.05

**Venue:** Committee Room 3, National Assembly Building, Cardiff Bay

**Title:** EDC Energy Review: 'Renewable Energy Policy in Wales'  
Summary Renewables Workshop Report – Paper by Officials

1. Against the background of the terms of reference the EDC review of energy policy in Wales [EDC-04-01 (p4) revised], the attachment to this paper provides the Committee with a summary of the work undertaken by officials to develop a distinctive renewables policy for Wales. It has been prepared with a specialist renewables consultancy (AEA Technology) following our Strategic Study of Renewable Energy in Wales and its peer review and the renewables workshop on 5 October. In undertaking this process we have sought to adopt a consultative approach to the development of a renewables policy involving both industry and environmental interests.
2. The EDC will therefore wish to be aware the attached report (Annex A) in the context of your review. It is also being issued to those interests who attended our renewables workshop as a conclusion to the event. It is proposed that the paper will form the basis of an interim way forward in terms of a renewables policy until the completion of the renewables part of the EDC review.

### **Infrastructure and Sustainable Growth Division**

#### **ANNEX A**

**PAPER BY DR ADAM BROWN OF AEA TECHNOLOGY ENVIRONMENT, 154 HARWELL, DIDCOT, OXFORDSHIRE FOR THE INNOVATION AND SUSTAINABLE GROWTH DIVISION OF THE ASSEMBLY GOVERNMENT OF WALES - 7 DECEMBER 2001**

### **Renewable Energy in Wales**

#### **Introduction**

During 2000 and 2001 a significant effort has been made to develop a distinctive Welsh policy on Renewable Energy, in the light of emerging UK wide policies and targets. In particular:

- An assessment of renewable energy resources in Wales was produced by Sustainable Energy Limited in 2000; this report was subsequently issued for peer review, and more than 30 written responses were received;
- Based on this report, and an analysis of the consultees' responses, AEA Technology developed some possible scenarios and targets for the future contribution of renewables in Wales (see Annexe 1);
- These studies were used as inputs to a major consultation event held in Newport on 5 October 2001. The workshop involved over 150 people representing the wide range of stakeholders involved in the development and implementation of renewable energy.

This report summarises the information and the discussions at the workshop, and on the basis of all this work makes recommendations for actions needed to develop ensure that Wales benefits economically and environmentally and from the rapid expansion of renewable energy development.

### **SEL Report and AEA Technology Reports**

The National Assembly for Wales (NAfW) previously commissioned a study as part of the UK's approach to the regionalisation of renewable energy targets. It received a draft report (Strategic Study of Renewable Energy Resources in Wales – January 2001, available at:

[www.wales.gov.uk/subitradeindustry/content/consultations/renewableresources-e.htm](http://www.wales.gov.uk/subitradeindustry/content/consultations/renewableresources-e.htm)

Thereafter it sought to obtain further opinions on the conclusions and recommendations contained therein, with a view to assisting the future development of Welsh renewable energy policy.

As part of the process of reviewing this draft, NAfW commissioned ETSU (AEA Technology) to undertake a brief evaluation of the SEL Report. This latter report available at:

[www.wales.gov.uk/subitradeindustry/toc-e.htm#](http://www.wales.gov.uk/subitradeindustry/toc-e.htm#)

provided comments and recommendations for the future based upon:

- An overview of the peer review comments on the SEL Report;
- The wider framework provided by existing and emerging European, UK and Welsh policy contexts;
- A resource analysis, through “consultation scenarios”, used for assisting the derivation of future Welsh targets for renewable energy and distributed power.

### **Workshop**

The Newport workshop featured a number of presentations which provided the basis for subsequent discussion. These were as follows:

- Addresses by the Deputy Minister for Economic Development, and the Minister for Environment, which summarised the current policy on energy and the environment;
- A statement of overall UK policy on renewable energy and the 10% target for electricity from renewables by 2010. This included briefing on the Renewables Obligation, Climate Change Levy, and the potential for financial support for innovation;
- A summary of the AEA Technology work in developing scenarios and potential targets.

Five parallel discussion sessions were then held to discuss the potential targets, to identify barriers to implementation and recommendations for initiatives to address these barriers. The workshops covered the following areas:

- Wind Energy
- Biomass energy
- Housing/domestic sector
- New long term technologies
- Infrastructure

The workshop concluded with a plenary session in which each of the Chairpersons for these groups reported back, common issues were discussed and conclusions drawn. The main conclusions of each Group are summarised below, with a hyperlink reference to fuller versions of the reports from the Chairpersons' reports

## **Group Feedback and Conclusions**

### **Wind**

The Group reached consensus in respect of offshore and smaller community led developments, and indeed felt that the potential for these options might in fact be greater than that suggested in the AEA Technology scenarios. In order to aid such developments, the Group highlighted the need to develop a clear planning process for offshore wind, and to establish funding mechanisms which would aid the development of community-led projects.

There was much less of a consensus in respect of larger on-shore projects, reflecting the strong public polarisation of views on this topic. It was however felt that the development of regional targets and better planning guidance on the cumulative impact of wind farms could help resolve some of these issues. Broadening "areas of search" to include sites with lower wind speeds (including some potential "brown field sites"), and considering "re-powering" some existing wind farms with larger scale turbines were proposed as interesting ways forward.

([www.wales.gov.uk/subitradeindustry/toc-e.htm#](http://www.wales.gov.uk/subitradeindustry/toc-e.htm#))

### **Biomass**

The Group concluded that since Wales has significant forestry products and significant potential for growing energy crops, it should be possible to aim for the most ambitious of the AEA scenario targets for electricity production from wood biomass (90MW by 2010). It should also be possible to achieve significant heat production from biomass.

However in order to achieve these figures a number of barriers needed to be tackled. In particular significant problems had been experienced in handling planning applications for specific applications. The Group felt that the planning decision process needed to take into account the broader range of issues affecting sustainability, and that the Assembly could play an important role here.

([www.wales.gov.uk/subitradeindustry/toc-e.htm#](http://www.wales.gov.uk/subitradeindustry/toc-e.htm#))

## **Buildings**

This Group believed that Wales already had strengths in the design and construction of energy efficient housing and in the use of renewable energy technology in the built environment, with a strong research base and a growing, SME-based, renewable energy industry. This could be further developed through a number of well-publicised demonstration projects, through the potential use of European Objective 1 funding to encourage deployment of renewable energy in buildings in collaboration with industry. The Assembly should encourage local authorities to adopt a proactive and positive attitude to building developments involving low energy design and incorporating renewable energy. ([www.wales.gov.uk/subitradeindustry/toc-e.htm#](http://www.wales.gov.uk/subitradeindustry/toc-e.htm#))

## **New Long Term Technologies**

The Group felt that, in addition to the focus on the 2010 target, which would inevitably be delivered by the most commercially developed and lowest cost renewable technologies, it was necessary to give consideration to the next generation technologies, such as PV, wave and tidal energy and hydrogen producing options. The Group emphasised the difficulties encountered in taking technologies through the R&D stage into commercialisation and suggested that there was a need for funding to assist through these stages. Available financial assistance needed to be made more readily accessible, particularly to small companies for whom the application and proposal preparation costs were very burdensome.

([www.wales.gov.uk/subitradeindustry/toc-e.htm#](http://www.wales.gov.uk/subitradeindustry/toc-e.htm#))

## **Infrastructure**

This Group emphasised the need for more widely available and reliable information on the availability of renewable energy resources, energy demand patterns and infrastructure capabilities. The Assembly could play an important role by promoting such studies and ensuring dissemination of the results. If the full potential for renewables is to be realised, then there is a need for considerable network development. Under the current regulatory framework, the costs of such upgrading would fall heavily on the developers, and this could be a major disincentive to projects. Ways of spreading these costs more widely should be examined, possibly with support from taxation or potentially via European structural funds.

In the longer term it was felt that both micro-generation and the development of energy storage could play important roles in the future, and suggested that studies should be undertaken to assess the likely impacts of these technologies on infrastructure needs. ([www.wales.gov.uk/subitradeindustry/toc-e.htm#](http://www.wales.gov.uk/subitradeindustry/toc-e.htm#))

## Conclusions and Recommendations

The workshop endorsed the view that there is an opportunity for Wales to become a leader in the renewable energy field, as part of the broader vision of providing a global showcase for new and sustainable energy technologies. To achieve this Wales needs to take full advantage of the range of UK-wide policy measures being taken, along with the funding being provided to help implement these policies. In addition some distinctive policy measures appropriate to the unique characteristics of the Welsh situation will also need to be taken, in order to balance local and global environmental benefits and to help to stimulate and develop new manufacturing and development capabilities to help supply UK and export markets.

The workshop concluded that Wales should aim for a target **of 1000MW of renewable energy electricity by 2010**, mid-way between the targets suggested in the two more ambitious AEA Technology scenarios B and C in Annexe 1. This 2010 target would be met from the more mature technologies (wind (on and offshore), wastes, landfill gas, hydro and biomass including energy crops). The optimum balance between the contributions from these technologies needs some further consideration. Achievement of higher targets in the longer term will require the development of additional newer technologies such as solar, wave and tidal energy, and fuel cells. Early engagement with these technologies will allow Wales to establish distinctive industrial and commercial centres of expertise, so securing longer term benefits from the growing markets in the UK and overseas. In addition encouragement should be given to heat from renewable sources, and in the longer term the use of renewable fuels for transport.

In order to achieve these targets and to develop a substantial industrial capability in Wales, a number of measures need to be considered and implemented. These include:

- Through development of clear aims and a strategy for renewables, reflecting the requirement to take sustainable development into account, the Assembly can provide the leadership required to catalyse the efforts of the wide range of interested stakeholders in Wales in a concerted effort.
- Evolution of a proactive approach to planning for renewables which seeks to reflect the Assembly's view on the local and global environmental issues associated with the deployment of renewables on a significant scale. This will call for a targeted awareness and information dissemination programme which aims to inform the Assembly, professionals and the general public about the issues surrounding renewable energy. This should be centred around, and facilitated by, well-publicised demonstrations of the technologies in practice. A more detailed and rational approach to the evaluation of particular developments entering the

planning system, covering each of the elements of the sustainable development agenda could be developed to encourage a balanced debate about the positive and negative aspects of specific projects.

- A number of measures could be taken to encourage the development of a significant commercial and industrial capability within Wales. These would include ensuring that the relevant players in Wales were well aware of UK wide policy developments and the opportunities that these create. Welsh organisations also need to be fully informed of, and able to take advantage of, available funding from UK and EC sources. A “one stop shop” capable of providing advice on available funding and guidance through the application and approval stages would be very valuable. It would also be beneficial to facilitate the development of links between some of the well-developed academic centres of excellence and industry, so as to foster the development of significant clusters of expertise, with resources focussed on areas where Wales could develop a distinctive capability. Based on current perceptions this could involve areas such as tidal energy, community based systems, renewables in the built environment, and hydrogen from bioprocesses. An audit on current and potential capabilities would be a sensible first step in targeting such encouragement.
- Further consideration could be given to the potential for “repowering” of existing wind farms with larger turbines, in conjunction with developers and the planning authorities, and to the potential for modern electricity storage systems to work in conjunction with wind farms to smooth output, and improve predictability of supply.
- Measures to encourage the planting of energy crops, analogous to the “planting grants scheme” available to growers in England. However these grants should encourage the speculative planting of energy crops, rather than being restricted to crops tied to specific biomass to energy projects.
- Promoting studies which clarified the location of renewable resources, energy demand and infrastructure capabilities, so providing reliable information to developers and a realistic basis for planning improvements to existing networks. In turn developing ways of funding such improvements such that the costs do not fall so heavily on individual developers
- Arrangements to facilitate the development of smaller scale community-based renewable energy projects. This could mirror the scheme that has been launched in England under the auspices of the Countryside Agency.

## ANNEX 1

### **DEVELOPMENT OF CONSULTATION SCENARIOS FOR RENEWABLE ENERGY AND DISTRIBUTED POWER TARGETS ACROSS WALES**

To assist the further consultation process associated with the National Assembly's approach to renewable energies, we developed "consultation scenarios", intended to aid the process through which a renewable energy and distributed power targets for Wales can be derived. These scenarios illustrate three alternative levels of deployment, broadly representing "Business as Usual", "Accelerated Deployment" and "Green Future" approaches. A broad definition of the scope of these scenarios is shown below. Tables showing these illustrative scenarios are shown subsequently.

#### **Lower End of Target Range "Business As Usual" (535MW<sub>e</sub> target)**

- This represents overall a moderately ambitious deployment. For some technology areas (e.g. landfill gas) it continues the current trends within Wales, and so could be partly classified as "Business as Usual". For other technologies (particularly offshore wind, biomass and PV) it represents a major increase from the current minimal Welsh uptake;
- In reaching the deployment implied by this target figure, a number of existing technical, economic or infrastructural barriers to some technologies are assumed to be overcome or at least addressed to some extent;
- Onshore wind schemes are deployed at levels representing approximately a doubling of the current installed capacity. Schemes are typically somewhat smaller (fewer turbines per scheme) than hitherto, but there is a significant increase in typical output per turbine;
- An offshore wind energy scheme is deployed;
- Relatively few biomass schemes appear, with existing barriers to deployment persisting through the decade;
- Deployment of PV and other solar technologies continues to grow, but only at a moderate rate in the absence of economic or other kinds of support incentives.

#### **Upper End of Target Range "Green Future" (1400MW<sub>e</sub> target)**

- This represents a very ambitious level of deployment across Wales, with all of the major technologies contributing strongly to the overall target;
- In reaching this level of deployment, it is assumed that most (if not all) of the various existing technical, economic or infrastructural barriers to deployment of some technologies are overcome, ameliorated and/or addressed;
- Wind energy, biomass and PV all increase their contributions significantly within this scenario but waste adds little extra to deployment levels;
- Four offshore wind farms are constructed around the coast of Wales;
- Substantial growth of short rotation coppice resources helps to "unlock" barriers to exploitation of the existing woodland resource. More wood combustion schemes appear. Significant numbers of "woodheat" schemes appear;

- Large amounts of onshore wind power are deployed. A range of scheme sizes is deployed. Installed capacity increases by a factor of around four from present levels;
- Deployment of PV expands dramatically in housing, commercial and “motorway” sectors. This expansion is achieved through major economic and infrastructural initiatives (e.g. closer and consistent links between Local Authority building control and planning regimes);
- Solar water heating installations across Wales increase ten-fold;
- There is major deployment of micro CHP, made possible by the lifting of regulatory barriers to uptake and supported by an incentive programme;
- A prototype tidal current device is successfully deployed. A tidal barrage scheme appears on the Conwy.

### **Approach to derivation of consultation scenarios**

Table 2 shows the approach that we have adopted towards the derivation of these consultation scenarios. Generally we have used existing data from the SEL Report, but in some cases we have undertaken our own assessment of potential. Our approaches are set out within Appendix 2.

**Table 2: Background Information and Sources Used to Develop Consultation Scenarios**

<b>Energy Source / Technology</b>	<b>Sources or Methods Used to Derive Estimates</b>
Offshore Wind Energy	Estimates for future deployment based upon (1) Crown Estates' pre-lease agreements for 3 offshore farms around Wales (2) a view of possible additional Crown Estates' agreements in advance of 2010 (3) a view of turbine technology development by 2010
Onshore Wind Energy	<i>Current Capacity</i> – Based upon installed NFFO schemes <i>Future Deployment Projections</i> – Our approach is outlined within Appendix 2 of this document
Wood Combustion	These estimates are based upon the data presented within the SEL Report
Farm Biogas	These estimates are based upon the data presented within the SEL Report
Sewage Gas	These estimates are based upon the data presented within the SEL Report
Municipal Waste Combustion	These estimates are based upon our knowledge of waste disposal authority plans across Wales (see Appendix 2)
Landfill Gas	Taken directly from the SEL Report.
Small-Scale Hydro Power	We have used estimates or prospective targets supplied by organisations providing feedback on the SEL Report, namely from Innogy and the Environment Agency.
Photovoltaics / Other Solar Energy Technologies	These estimates are based upon the data presented within the SEL Report
Fuel Cells	The assumptions underlying our estimates are shown in Appendix 2
Micro CHP	The assumptions underlying our estimates are shown in Appendix 2



**ILLUSTRATIVE RENEWABLE ENERGY ELECTRICITY SCENARIOS FOR 2010 IN WALES**

Indicative Renewable Energy Generation Type/Size	Existing Installed 'nameplate' capacity (MW)		Scenario A – Business As Usual 535 MW Target		Scenario B – Accelerated Deployment 765 MW Target		Scenario C – Green Future 1400 MW Target	
	Schemes	Capacity (MW)	No. of New Schemes	Installed Capacity (MW)	No. of New Schemes	Installed Capacity (MW)	No. of New Schemes	Installed Capacity (MW)
<i>Offshore Wind Farms (60-112.5 MW; 30 Turbines)</i>	0	0	1	60	2	120	4	450
<i>Large-Scale Wind Farms (50MW; 21-40 Turbines)</i>	6	109.2	0	0	1	50	2	100
<i>Medium-Scale Wind Farms (25MW; 10-20 Turbines)</i>	5	36.3	2	50	4	100	6	150
<i>Small Wind Clusters (6 MW; 4-10 Turbines)</i>	2	6	6	36	10	60	16	96
<i>Single Large Wind Turbines (1.5 MW)</i>	2	1.1	6	9	20	30	48	72
<i>Single Small Wind Turbines &amp; Chargers (0.03 MW)</i>	?	V small	10	0.3	30	0.9	90	2.7
<i>Large CHP or Electricity Plants Fuelled by the Combustion of Energy Crops and/or Agricultural &amp; Forestry Wastes (AfW) (20+ MW)</i>	0	0	0	0	0	0	2	40
<i>Small CHP or Electricity Plants Fuelled by the Combustion of Energy Crops and/or AfW (5-10 MW)</i>	0	0	3	25	5	35	8	50
<i>Anaerobic Digestion Plants Fuelled by Farm Biogas (0.5 MW)</i>	2	0.1	0	0	2	1	6	3
<i>Anaerobic Digestion Plants Fuelled by Sewage Gas (0.5 MW)</i>	2	0.12	0	0	0	0	2	1
<i>CHP or Electricity Plants Fuelled by Municipal or Industrial Solid Wastes</i>	0	0	0	0	1	6.5	2	16.5
<i>CHP or Electricity Plants Fuelled by Landfill Gas</i>	7	14.4	12	20.6	12	20.6	19	27.6
<i>Large-Scale Hydro Power(&gt;5MW)</i>	≈200	160	0	0	0	0	0	0
<i>Small-Scale Hydro Power (&lt;5MW)</i>			10 - 25	5	24 - 60	12	40 - 100	20
<i>Domestic PV Installations (1.5-3kW<sub>p</sub>)</i>			200	0.3	500	0.75	1500	2.25
<i>Commercial PV Installations (50kW<sub>p</sub>)</i>	?	≈0.15-0.2	12	0.6	24	1.2	36	1.8
<i>Motorway PV (160kW<sub>p</sub>/km)</i>			0	0	2	0.16	6	0.36
<i>Tidal Current installations (5MW)</i>	0	0	0	0	0	0	1	5
<i>Tidal Barrage installations</i>	0	0	0	0	0	0	1	33 (Conwy)
<i>Tidal Lagoon installations</i>	0	0	0	0	0	0	0	0
<i>Shoreline Wave</i>	0	0	0	0	0	0	0	0
<b>Total</b>	<b>≈225 + PV</b>	<b>≈327</b>	<b>50-65 + PV</b>	<b>207</b>	<b>111-147 + PV</b>	<b>438</b>	<b>247-307 + PV</b>	<b>1071</b>

**ILLUSTRATIVE RENEWABLE ENERGY HEAT SCENARIOS FOR 2010 IN WALES**

Indicative Renewable Energy Generation Type/Size	Existing Situation		Scenario A – Business As Usual		Scenario B – Accelerated Deployment		Scenario C – Green Future	
	Schemes	Output (MWh)	No. of New Schemes	Output (MWh)	No. of New Schemes	Output (MWh)	No. of New Schemes	Output (MWh)
<i>Domestic-scale Solar Water Heating installations (1.0 MWh/yr)</i>	1500	1,500	1500	1,500	4000	4,000	15000	15,000
<i>Solar Water Heating installations for Swimming Pools (6 MWh/yr)</i>	?	?	125	750	300	1,800	1000	6,000
<i>Solar Water Heating (14 MWh/yr) for commercial/industrial installations</i>	?	?	5	70	10	140	25	350
<i>PSDesign in Domestic dwellings (1-2 MWh/yr)</i>	?	?	50	50 - 100	150	150 - 300	1000	1000 – 2000
<i>PSDesign in Comm. Buildings (3-9kWh/m<sup>2</sup>/yr)</i>	?	?	1,500 m <sup>2</sup>	4.5 – 13.5	4,500 m <sup>2</sup>	13.5 – 40.5	20,000 m <sup>2</sup>	60 - 180
<i>Plants fuelled by wood wastes (0.25MW<sub>th</sub> and upwards)</i>	?	?	10	18,750	40	75,000	120	225,000
<b>Total</b>	<b>1500 +</b>	<b>1,500 +</b>	<b>1640 + PSD</b>	<b>≈21,000</b>	<b>4350 + PSD</b>	<b>≈81,000</b>	<b>≈16,000 + PSD</b>	<b>≈245,000</b>

**ILLUSTRATIVE DISTRIBUTED POWER SCENARIOS FOR 2010 IN WALES**

Indicative Energy Generation Type/Size	Existing Situation		Scenario A – Business As Usual		Scenario B – Accelerated Deployment		Scenario C – Green Future	
	Schemes	Installed Capacity (MW)	No. of New Schemes	Installed Capacity (MW)	No. of New Schemes	Installed Capacity (MW)	No. of New Schemes	Installed Capacity (MW)
<i>Domestic fuel cell CHP systems (~5kW)</i>	0	0	10	0.05	1000	5	10000	50
<i>Industrial scale fuel cell CHP systems (50~500kW)</i>	0	0	1	0.2	5	1	20	4
<i>Large-scale power generation fuel cells (1-10MW)</i>	0	0	0	0	0	0	1	1
<i>Gas-fired Micro CHP (1-5kW<sub>e</sub>)</i>	0	0	0	0	35,000	85	53,000	127
<b>Total</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>0.25</b>	<b>36,000</b>	<b>≈90</b>	<b>63,000</b>	<b>≈180</b>