

# Sustainability Committee

## SC(3)-24-08 (p1)

### 27 November 2008: Paper on Energy Production in Wales from the Minister for Environment, Sustainability and Housing

#### General Background

1. Climate change is one of the most important challenges facing the world and tackling this challenge is a key priority for the Assembly Government. One Wales contains a clear commitment to achieving annual 3% reductions in greenhouse gas emissions by 2011 in areas of devolved competence and to setting sectoral targets for residential emissions, transport and the public sector.
2. In the fight against climate change, Wales should be in the forefront of the transition to a low-carbon economy. To that end, the Assembly Government believes that with sufficient innovation and investment, the right Government framework and public support within 20 years Wales can generate as much electricity from renewable sources as it consumes. Now, following the publication of our Renewable Energy Route Map, we are focusing on how we might exploit Wales' exceptional renewable energy resources.

#### Electricity Generation/Distribution/Supply

3. Total electricity production in Wales which is either used in Wales, or fed into the integrated England and Wales national grid through links in the north and the south, is estimated to be about 35 TWh/year. It is estimated that 24TWh/year is consumed in Wales.
4. Electricity in the north comes from two major gas stations, Connaught Quay (associated with the Liverpool Bay gas field) and Deeside; the nuclear station at Wylfa and the pumped storage stations at Dinorwic and Ffestiniog. Predominantly in mid-Wales, but also scattered around all of Wales, a range of hydro and on-shore 'renewables' stations are operational. In the south, the main suppliers are coal fired stations at Aberthaw and Uskmouth; and gas fired stations at Baglan Bay and Barry. A new gas fired station at Uskmouth is being constructed and the world's largest biomass station (350MW) at Port Talbot has been consented. There are proposals, at various stages in the consents process, for a number of new gas fired stations in South Wales. There are also a small number of medium-size on-site gas-fired combined heat and power (CHP) stations in Wales which both generate for the primary industrial purpose (eg paper-making at Shotton) and often export to the national grid. Further quantified details on the major operational generating stations are contained in the Annex to this paper.
5. In the north, generation exceeds demand but, in the south demand exceeds supply which results in extra costs to consumers and premium payments to the existing generators. Electricity prices in south Wales are amongst the highest in the UK partially because of high transmission costs.
6. The electricity infrastructure in Wales contains part of the England and Wales national grid through links in the north and south (but note there are no north-south national grid links within Wales), and our regional distribution systems are operated by Manweb (Scottish Power) in the northern half of Wales, and Western Power Distribution in the southern half.

#### Renewable Energy

7. Investment in proposed and consented renewable energy projects in Wales, mainly on and off shore wind, would total approximately £8.5 Billion. At present wind energy is the most commercially viable renewable technology available. Currently some 360MW of on-shore wind energy is operational in Wales, with 60MW of off-shore wind development at North Hoyle and a further 100mw of off-shore wind development currently under construction at Rhyl Flats. In addition 150MW of hydro is operational in Wales. In total there is around 570MW of operational renewable energy, from on and off-shore wind and hydro.
8. The Route Map gives our current best estimate of the practicable heat and electricity generation outputs which can be achieved by 2025. We believe Wales could produce 33TWhr per year of electricity from renewable technologies by 2025 - with about a half of this from marine, a third from wind and the rest mainly from sustainable biomass.
9. If we were to achieve this, then not only could Wales' electricity needs be met in their entirety from low carbon energy sources but we would also contribute significantly to the UK's energy security objectives - in particular by reducing our dependence on imported fuels in a world where energy geopolitical developments are of increasing concern. Compared to energy generation using fossil fuels, we estimate that achieving the renewable energy aspirations in the Route Map would save some 4 million tonne of carbon emissions each year.
10. The Route Map consultation responses will inform the development of a Welsh Assembly Government strategy that covers energy issues. This strategy will outline the contribution expected from a range of sources of renewable energy for the period beyond 2010 as well as setting out wider energy issues concerning energy efficiency. Once the strategy has been established, TAN 8 will be reviewed revising upwards the targets for renewable energy supplied by a range of sources.

#### Wind

11. The Forestry Commission Wales (FCW) has been undertaking the process of leasing the land which it manages within the TAN 8

strategic search areas (SSA's) for major wind farm developments on a competitive basis. Four companies have signed agreements with the Welsh Assembly Government which will allow them to seek permission to develop wind farms.

12. Under the scheme, over 600MW of electricity would be generated by windfarms from within these forests. The current proposals indicate the need to fell approximately 500 hectares of woodland if all the proposed developments proceed. This is less than 0.5% of the total Assembly Government woodland estate of around 110,000 hectares. In comparison FCW fells around 1,500 hectares each year as part of its normal timber production.

13. In addition to the Forestry Commission's estate, other schemes of varying size are in the pipeline within the SSAs, as indicated in the monitoring database set up by the Assembly Government and available on our website.

14. We are also committed to supporting community-sized wind, biomass and hydroelectric schemes. We intend to do this by providing grants under the climate change framework of the Convergence Funds programme. The project is called 'Community Scale Renewable Energy Generation' and it aims to establish or further develop around 20 sustainable social enterprises based on new community scale renewable energy installations.

15. Several of the TAN 8 strategic search areas will require the construction of major new grid connections. National Grid is proposing to adopt a "strategic investment" policy, the objective of which will allow them to build certain new transmission capacity ahead of clearly signalled user demand. NG has discussed four possible UK areas for this with Ofgem including strategic investment into mid Wales.

16. The transportation and movement of the large component parts for modern turbines requires a strategic approach given the level of activity we envisage. Our aim is to ensure that we minimising the impact of this activity in rural mid Wales. We are therefore liaising with the highway agencies and industry on a collaborative transport management plan.

## **Marine Technologies**

17. The Assembly Government is investing considerably in background studies to improve our understanding of the marine energy resource around Wales, and its potential for exploitation within a sustainable development framework. It is our intention that this work will enable us to more accurately determine Wales' optimum and sustainable marine energy targets. The project also includes an initial study into the CO2 storage potential in Welsh waters.

18. Based upon the knowledge base produced during Stage 1 and 2 of the project, proposals for the optimum location of marine renewable energy technologies in Welsh waters will be made. Against the background of a better understanding of Wales' marine eco-systems we expect this work to underpin a formal Wales marine strategic environmental assessment in due course.

19. The Stage 1 Report has been completed and signed off by the Steering Group. The Steering Group has agreed 6 priority research areas to form Stage 2 of the project. The research will fill critical data gaps identified in the Stage 1 report and assist in the development of the Marine Strategic Framework. It is envisaged that Stage 2 research will commence in January 2009. The final report of the project will be used to inform the forthcoming Welsh Assembly Marine Spatial Plan. The data and recommendations for further study will be used to assist in the development of the DECC offshore wind SEA and the Severn Tidal Power SEA. This work will contribute to the development of a Welsh Assembly Government strategy that covers energy issues.

20. Taking on board the completion of the first phase of our marine research work, the Assembly will be publishing for consultation our Marine- energy strategic plan. This will discuss, within a timeframe of 20 years, the potential targets for each type of marine renewable energy and also how we intend to ensure all the relevant Welsh Assembly Government policies support this agenda from a sustainable development perspective and help stimulate a new marine energy industrial sector in Wales. One which serves not only our needs here in Wales but also seizes the growing global opportunities. The work will contribute to the development of the overarching Wales strategy that covers energy issues.

21. Although wave and tidal technologies are still currently very much in their early stages of development in Wales, considerable progress is being made at research and demonstration stage. There are a number of projects, including;

A proposal to develop a 10.5MW tidal energy farm off the coast of Anglesey in a fast flowing patch of 25 metre deep open sea known as The Skerries. Subject to successful planning consent and financing, the tidal farm could be commissioned as early as 2011. Studies are now underway and will last throughout 2008, with a consent application likely to be submitted in mid 2009.

A company is proposing to develop a small pre-commercial tidal stream project off the coast of Pembrokeshire. The proposed scheme will utilise between 4-8 Rotech Tidal Turbines (RTT) and will generate up to 8 MW's of renewable electricity. The Company is currently undertaking initial site feasibility studies and stakeholder consultation with the intention to begin environmental impact assessment work in 2008. If given the go ahead, the plant could be operational by 2012.

A project concerning a DeltaStream Device. This is a nominal 1MW unit which sits on the seabed without the need for a positive anchoring system, generating electricity from three separate horizontal axis turbines mounted on a common frame. The technology has been validated in sea trials and simulations by Cardiff University and is undergoing detailed design work at Cranfield University supported by Carbon Connections UK Limited.

Another project concerns Swanturbines. This is a monopole carrying a single turbine which is set in a large base sitting on the seabed - being completely submerged. Following trials in the Tawe estuary, a prototype at one third MW size is planned for installation in 2008. Swanturbines are aiming to site 30-50 units by 2010-2011 in the Severn, off Pembrokeshire or south of Barry.

A Wave Energy Converter pre-commercial demonstrator off Milford Haven has been proposed and will be UK's first and largest offshore wave energy installation. The pre-commercial demonstrator is a single floating slack moored wave energy converter with a rated capacity of 4-7MW. A company has been working toward commercialisation of the device for 3 years.

22. A Severn tidal power project would provide long term access to a renewable, indigenous energy resource using proven technology. The largest option (a barrage from Minehead to Aberthaw) could provide 7% of the UK's current electricity demand for over 100 years. A feasibility study is looking at a wide range of options for capturing the tidal energy, including various lagoon and barrage configurations, a tidal fence and a tidal reef. There is no preferred option at this time. A consortium is making good progress in analysing the 10 different options and in the large task of reviewing key environmental issues and scoping the Strategic Environmental Assessment (SEA). The work feeds into a Ministerial review followed by public consultation. The two key areas for consultation will be the scope of the SEA and the short listing of tidal power schemes. The Ministerial review will take place on 17 December and a public consultation will take place in January 2009.

23. The potential capacity in Wales from tidal and wave projects by 2025 could be more than half of our current electricity consumption. The Assembly Government has already provided financial support for early stage wave and tidal stream projects, but in order to push toward achieving this ambition, the Assembly will be looking to see that the Structural Funds Programme is effectively used to support the development and deployment of wet renewable devices.

## **Biomass**

24. Electricity generated from biomass is carbon neutral, as long as the feedstock is obtained from sustainable sources. Providing feedstock can be sourced from certified sustainable sources, the Assembly Government is fully supportive of new biomass developments. We believe biomass, (including waste) could produce each year some 7 TWhr of low carbon electricity and 3TWhr of low carbon heat.

25. A 350MW biomass plant consented at Port Talbot will be the largest biomass generating station in the world and will make a significant initial contribution to the Assembly Government's renewable energy targets.

26. Early next year, following the Route Map consultation, we hope to produce a more detailed Wales bioenergy action plan.

## **Land-Based Hydro-Power**

27. Hydroelectric plants in Wales generate around 0.28TWh per annum of electricity and the pumped storage schemes at Dinowig generate approximately 2 TWh p.a. The development of large amounts of new hydro-power in Wales is not thought possible. Most new developments are expected to be small 'in river' hydro-schemes in the 50 to100KW range.

28. We are undertaking a study, jointly with Whitehall, to identify the potential for new hydropower schemes in Wales and England. The results, expected in December 2008, should provide clear information on the most appropriate locations for developing new hydro-electric power plants.

## **Microgeneration**

29. Microgeneration features strongly in the consultation on a Renewables Energy Route Map. We work with stakeholders to ensure that business and the public in general have clear information on the benefits of micro-generation.

30. The Assembly Government is committed to encouraging utilities to pay a fair price for the export of locally produced electricity onto the grid. We have made clear to the UK Government that we want to make network connection easier for smaller scale renewable units so people generating their own power can be rewarded for exporting surplus energy to the grid. We welcome the recent UK Government announcement that there will be a move to introduce feed in tariffs for local renewables up to 5MW, as an amendment to the Energy Bill. We will be able to use this opportunity to help assess what the potential effects would be for Wales. It is also our intention to bring forward amending legislation in the New Year, relaxing the need for planning permission for certain forms of microgeneration equipment.

## **Gas**

31. Gas is the primary fuel for electricity generation in Wales and there are a number of further proposals in the pipeline amounting to a total investment of around 1.5 Billion, at very stages in the consents process. Major gas stations are relatively cheap to build and have higher thermal efficiencies than coal fired stations. The 500MW GE turbine at Baglan has an energy conversion efficiency of 60% whilst conventional coal-fired stations operate at around 35%. However, with the UK now a net importer of gas, increasing reliance on gas-fired generation raises fears about the future UK dependence on overseas suppliers. There are concerns about security of supply, as although Norway has enormous reserves, there are uncertainties about reliable supplies from less secure regions. The cost of gas has risen sharply, and on a regular basis, in recent years and future price movements in an increasingly global market remain uncertain. The lack of storage capacity exacerbates the problem in the UK, because supplies cannot be purchased in large quantities at times of low prices. Other EU countries have far larger gas storage capacity and are able to build up supplies of gas when the price is at its lowest, in the summer, for use during the winter. Measures in the Energy Bill currently before Parliament aim to facilitate underground gas storage for use in periods of high demand.

32. The South Hook and Dragon Liquefied Natural Gas terminals are expected to receive their first shipments before the end of the year. It is anticipated that the Milford Haven terminals will provide for 20% of the UK's gas requirements.

33. Gas is also important for the heating of premises but there are some parts of Wales without access to mains gas. With the price of alternatives such as oil being expensive, this is clearly a factor in fuel poverty in some areas.

## **Coal**

34. The long term future of coal in western countries probably depends on the development of viable clean coal technologies - preferably in conjunction with carbon capture and storage (CCS).

35. The world price of coal has risen markedly in recent years making Welsh coal, deep mined as well as surface mined, very competitive. Whilst the large Aberthaw coal burning station, now fitted with Flue Gas Desulphurisation (FGD) technology remains in operation the physical extraction of coal in south Wales will remain economic.

36. FGD is fitted at the smaller Uskmouth Station where there are plans to fit Selective Catalytic Conversion (SCR) technology to control nitrogen oxide emissions. The lifetime of Aberthaw power station beyond 2016 will be dependent upon RWE fitting SCR. The fitting of SCR at Aberthaw is an important issue from the perspective of electricity generation, fuel diversity security of electricity supply and safeguarding the medium term future of the south Wales coal industry. 50-60% of Aberthaw's coal supplies are imported and all of Uskmouth's supplies are from overseas. Indigenous supplies cannot meet demand. The Coal TAN, which is being finalised, will set out revised guidelines for coal extraction in Wales.

37. Wales is at the forefront regarding research into carbon capture. In October 2007 RWE npower announced its plans to construct the first pilot facility in the UK processing flue gas from an operating coal-fired power station, Aberthaw being the chosen location. The plant will use post-combustion capture technology, which could have great application on existing coal generation plants.

38. Since the original announcement, extensive studies have been completed internally to ensure that the plant will be specified to give optimum performance for a commercial solvent and that the scale is sufficiently large to provide the required data. Detailed discussions have taken place with engineering and technology providers and initial approaches have been made to the relevant authorities to initiate the process of site development and planning. Cardiff University has also been approached with respect to forming a consortium of Welsh researchers to provide support in the area of CCS and help to fill some of the gaps in knowledge that will need to be addressed in the coming years. The Aberthaw project is on course for operation from early 2010.

## **Nuclear**

39. In view of our considerable renewable energy resources, outlined above, and the ambitions contained in the Renewable Energy Route Map, the Assembly Government considers there is not a need for new nuclear power stations in Wales. Its current priority is to secure a life extension to the current nuclear plant at Wylfa to provide a breathing space for alternative sources of power to be developed for Anglesey Aluminium.

40. Nuclear power produces radioactive waste which will need managing for decades and final disposal which for the higher level wastes must be capable of isolating the waste from the environment for hundreds of thousands of years. We can have a reasonable idea of the inventory of waste that has arisen and will arise from existing nuclear power stations, and about its characterisation. We can have very little idea about the volumes of waste from any programme of new nuclear power stations or its characterisation given that we do not know how many stations may be built, or how they will operate or for how long. Proposals for higher burn up fuel may for example produce less spent fuel for a given energy output than existing power stations but at the cost of fuel that will be much hotter, much more difficult to manage and will require active management on the surface before it can be finally disposed of. After extensive deliberation and public and stakeholder consultation, CoRWM proposed that geological disposal is the best option for disposing of legacy waste, but also stated that waste from new nuclear power stations would raise additional practical and ethical issues. At present the problems of geological disposal have not been resolved even for legacy waste: it is therefore inappropriate to proceed with new nuclear power stations until there is a clear and safe way of managing the waste and spent fuel they will cause. The Assembly Government will play an active part in the Managing Radioactive Waste Safely programme with a view to safeguarding the people and the environment of Wales, however it has, for the present, reserved its position on the policy of geological disposal.

41. On 22 July 2008 the UK Government published a Consultation Document which specified the criteria and process for assessing where new nuclear power stations could safely and securely be built across England and Wales. Alongside this, it published and sought views on a study of the environmental and sustainability effects of the criteria. Site nominations must fulfil certain conditions, one of which is that suggested sites would require a letter of support from a "Credible Nuclear Power Operator". The Consultation sets out the exclusionary and discretionary criteria that would be applied in making that assessment and will include those that would automatically rule out certain sites. Sites identified through this process would then be considered through the planning process, which DECC anticipates should be finalised in early 2009. Following this, the invitation for the nomination of sites that could be suitable for new nuclear generation will commence. The UK Government expects a National Policy Statement (NPS) will be published in 2010 which would include a list of sites identified as strategically suitable for building new nuclear power stations.

42. Subject to Parliamentary approval of the Planning Bill, this would steer the Infrastructure Planning Commission (IPC) in dealing with specific planning applications on the identified sites. The IPC would decide on applications from developers.

## **Welsh Assembly Government Powers**

43. The Welsh Assembly Government has very limited direct legal powers relating to energy. Responsibility for UK energy policy rests with UK Government.

44. Approval is required from the UK Government Secretary of State under Section 36 of the Electricity Act for the construction, extension or operation of generating stations above prescribed thresholds. For onshore stations the prescribed threshold is 50MW and 1MW for offshore stations. The thresholds are prescribed by order made by the Secretary of State. Consent for the construction of onshore electricity generation stations whose capacity is under 50MW lies with local authorities and Welsh Ministers under the normal planning regime requirements. In addition, Secretary of State consent is required for the installation of overhead electric power lines, under Section 37 of the Electricity Act. Secretary of State consent is also required for the construction of cross-country pipe lines under the Pipe-lines Act 1962.

45. The functions referred to above have not been transferred to Welsh Ministers.

46. Local authorities are statutory consultees in generating station applications under section 36 of the 1989 Act. They can submit objections and if they are not withdrawn the Secretary of State must call a public inquiry. The Assembly Government is not a statutory consultee but in practice DECC seeks its views on applications. Welsh Ministers may comment to DECC on issues which might require more detailed investigation, or which might make it appropriate to hold a public inquiry.

47. The Planning Bill is intended to simplify the consulting and licensing required for major infrastructure projects. Under the Planning Bill as it stands consents for all power generation projects over 50 MW in Wales will rest with the Infrastructure Planning Commission (IPC). The proposals outlined in the White Paper also seemingly allow the IPC the potential to consider applications for sub-50MW energy projects in Wales, where their cumulative impact exceeds 50MW, or where they are extensions to existing facilities bringing them above 50 MW.

48. These provisions replicate existing Secretary of State's powers. The UK Government has given Welsh Ministers assurance that the Planning Bill will be devolution neutral in relation to powers already devolved to Wales. We have therefore obtained a provision in the Bill which will enable the Secretary of State to exclude from the IPC's remit any ancillary consents which are devolved, unless the devolved bodies agree otherwise. The UK Government has agreed that it will use this provision to exclude devolved consents to preserve the current devolution arrangements in Wales.

<b>Annexe - Major Operational Energy generating Stations In Wales</b>		
Company Name	Station Name	SIZE/Capacity (MW)
<b>Coal Fired</b>		
RWE	Aberthaw	1,455
Welsh Power	Uskmouth	360
<b>Nuclear</b>		
Magnox Electric	Wylfa	1,050
<b>Gas Fired</b>		
International Power	Deeside	500
E.ON	Connahs Quay	1,500

GE	Baglan	500
Centrica	Barry	230
<b>Pumped Storage</b>		
International Power	Dinorwig	1,600