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Friends of the Earth Cymru

Energy Route Map

Consultation Response

Renewable Energy Targets / Benchmarks

Friends of the Earth Cymru

Friends of the Earth Cymru inspires solutions to environmental problems which make life better for people.

Friends of the Earth Cymru:

- is dedicated to protecting the environment and promoting a sustainable future for Wales
- is part of the UK's most influential environmental campaigning organisation
- is part of the most extensive environmental network in the world, with over 60 national organisations across five continents
- supports a unique network of campaigning local groups working in communities across Wales
- is dependent upon individuals for over 90% of its income

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Introduction

We support the 4 TWhr 2010 target but we consider that the 2020 target of 7 TWhrs is premature and unambitious.

The current 2020 target could well be exceeded especially considering potentially large marine projects around Wales (offshore windfarms, tidal stream arrays, wave farms, tidal lagoons). Also it is not clear if schemes outside the 6 mile limit are eligible for inclusion. Our view is that even if a scheme is not strictly in Welsh waters (6 mile limit) if the visual impact is mainly from Wales and or the onshore infrastructure (Grid lines / transformer buildings, etc) come ashore in Wales then we think that it would be reasonable to include it in Wales's energy generation inventory.

For example, the Gwynt y Mor windfarm proposal at around 6 miles out in Liverpool Bay should be included in post 2010 Welsh figures if it is built. At around 750 MW at 35 - 37% load factor this scheme would generate about 2.3 - 2.8 TWhrs/yr (10 - 12% of current Welsh demand - based on UK per capita overall electricity demand).

Note: we do not consider that the output of the Gwynt y Mor scheme should be included in the 2010 WAG target as this target (benchmark) was set with such second round schemes being outside the terms of reference or calculation. Indeed, during the WAG consultation and debate in 2003 about the target for 2010 we had called for a 6 TWhr target (3 TWhrs onshore / 3 TWhrs offshore) as we considered at that time that some second round offshore capacity may have been built by 2010. Our call was disregarded partly because it was not certain that second round offshore wind capacity could be built in that time frame, or if its output would be included (eg consideration of 6 mile limit, etc).

1. Raising Awareness

We support proposals for a climate change awareness programme to include use of key media and other outlets.

If a forum is to be established it should include Non- Government Organisations which are active in the field of energy and climate issues.

2. Energy Efficiency

We consider the lack of significant fiscal support for energy efficiency programmes as a major omission and missed opportunity despite widespread public support for energy efficiency for many years. Various energy efficiency programmes are some of the most cost effective ways to reduce energy use and carbon emissions yet the timescales for implementing such programmes is absent. It is also likely to be counted in decades at current rates of progress. Encouragement is not sufficient. Indeed, encouragement has been promoted for well over a decade and yet there is still much to be done. For example much of the Welsh housing stock is still poorly insulated.

We welcome the proposal to develop a draft microgeneration strategy by end of 2005. Installing renewable energy devices on households is progressing very slowly. The Clear Skies programme has paid grants for 4,116 of such installations on UK homes (as of 31st March 2004) mainly solar thermal panels after running for about 2 to 3 years and is considered a great success. However, there are about 23 million households in the UK. Yet, the Energy White Paper said that energy efficiency was central to achieving UK emission reduction targets.

We think that the inclusion of electricity-generating micro-CHP as well as renewable devices is important in regulations for new build. Presumably highly efficient electricity-generating central heating appliances (eg Whispergen boilers) are not defined as RE devices. However, Part L revision of building regulations which discusses carbon emission limits on new build and major refurbishments might result in inescapable need to specify micro or mini CHP to achieve the limits. We also call for mandatory policy for the sale of micro/mini CHP boilers where possible. Such a policy may need to be phased in but the emissions savings are so substantial (around 40 - 50%) and the urgency to reduce emissions so great, that such a policy is necessary. Fuel cell micro/mini CHP units may be available by 2010 with potentially substantial electricity output, possibly resulting in some overall export to the local Grid.

If 750,000 homes in Wales install micro/mini CHP by 2020 (the UK turnover rate is about 1.3 million CH boilers a year for 23 million homes) then the overall electricity output of the boilers could be around 10 - 15% of current electricity demand in Wales or about 2.25 - 3 TWhrs a year.

3. Renewable Energy Development

While we welcome the renewable energy target of generating 4 TWhrs/year by 2010, including 800 MW of new on-shore wind energy we are concerned about some aspects of the TAN 8 guidance:

- i) lack of support for schemes up to 25 MW outside the Strategic Search Areas and brown field sites - which is a major change to the proposals in the TAN 8 consultation
- ii) the lack of support and willingness to engage in negotiation with the Ministry of Defence for the development of a large windfarm in the Camddwr area

We support further development of offshore 'windfarms in waters of the Welsh coast'. Offshore wind capacity is potentially significant. The Gwynt y Mor scheme plus the Scarweather and North Hoyle schemes could supply around 15% or 2.9 TWhrs/yr supplying the annual electricity demand of 435,000 people in Wales.

We support the research and production of a biomass strategy for Wales. We consider that significant biomass production could fuel the Aberthaw and Uskmouth coal-fired power stations if transport impacts are acceptable. We also support a strategy and necessary funding for biomass CHP schemes in rural and urban areas and bio road fuels production.

As regards marine energy systems the failure to even mention support for tidal lagoon systems while keeping 'open consideration' for an environmentally damaging and economically constricting Severn barrage is deplorable. The resistance by a small number of civil servants to tidal lagoons, despite evidence presented in a report by WS Atkins is reprehensible. The resistance to providing assessment reports by those civil servants (by WDA and DTI) to the public despite several requests under the Freedom of information Act is possibly unlawful and against the spirit of openness on which an informed democracy works. A more detailed response on lagoons and barrage is set out in Annex 1 below

The actions to date of the DTI and WDA have been totally at odds with their stated aim of promoting tidal energy which itself reflects strong and widespread public support for tidal

schemes including specific support for lagoon schemes. Consequently the actions of the DTI and other detractors in the civil service have been against the public interest and the will of the UK public. Furthermore Minister Carwyn Jones AM stated in an address to the NASEG forum that 'lagoons are controversial' in answer to a question from a firm member. We have seen no evidence whatsoever to support such a statement in relation to the public - just a small number of civil servants. If the WAG is sincere in its aim to 'make appropriate efforts to try to ensure that major demonstration projects are located in Wales by 2010' (page 9, Task point 6) then Tidal Electric Ltd's proposed world's -first scheme in Swansea Bay should be supported in terms of open environmental / economic studies, in political discussion, and fiscally if this would appreciably speed progress in identifying viability or scheme construction. It could be that a lagoon scheme under advanced consideration in the Bay of Fundy, Canada may now become the world's first.

As regards tidal stream devices, we strongly agree with proposals to 'examine the potential for marine, wave and tidal technologies in Wales through resource assessment and environmental evaluation' (page 9, Task point 4). As strong currents have been identified in areas of the Severn Estuary and around the north coast of Anglesey we suggest that such areas be assessed as soon as possible. One company, Marine Current Turbines Ltd, who have been testing their 'Seaflow' device in the Severn Estuary near Lynmouth have said that they may be ready to start commercial deployment within the next couple of years. It should be noted that they have had better than estimated output from their device.

We would oppose the Severn Barrage scheme for reasons of damage to bird life especially in the intertidal areas of this highly designated Estuary.

4. Coal/ Carbon Capture & Storage

We support a review and a coal planning TAN as proposed. We oppose any opencast coal production but would support investigation of the possibility of a deep mine in the Margam area and any drift mine potential. We also support research and possible development of capture/extraction of methane from coal seams (we understand that some proportion of the methane may be the result of microbial activity). We would support coal gasification (IGCC) schemes on appropriate sites though we are currently considering the possible modification of existing coal stations in Wales (Aberthaw and Uskmouth). Modification would likely include retro-fitting with advanced super-critical boilers, feedwater heating, oxyfuel firing and carbon capture. This may result in a significant efficiency improvement above existing efficiencies and potentially low carbon output if CCS is added. In that respect we support identification of suitable capture and storage sites in geological structures with proximity to Wales.

5 Security of supply improvements

Task point 1 : The 2003 UK Energy White paper estimates 70% dependence for primary energy on imported gas, and 90% gas dependency in electricity generation. Such a high level of dependency on imported gas is causing concern in terms of energy security considering potential security issues in countries from where the gas may be imported (eg Algeria, Russia, Middle East). Yet efficiency improvements in coal-fired technology, especially when energy losses in the import of gas are considered, indicate there may be little difference in the overall CO₂ emissions per kWhr from coal and gas fired power stations. If this is so then it would seem very reasonable to favour coal generation where possible as coal can be sourced

indigenously and or from more stable countries (eg South Africa, Australia).

For this reason we would oppose the construction of CCGT power stations unless they can demonstrate that the overall CO₂ emissions associated with their electricity output would be significantly less than modified, more efficient coal plant. We specifically point to the energy losses in the production, transport and re-gasification of liquefied natural gas (LNG) and also the carbon dioxide content in the natural gas extracted. The LNG liquefaction and re-gasification process could account for up to an additional 25-30% CO₂ emissions compared to North Sea gas. The CO₂ content of the extracted natural gas is typically up to 5% but which is around 10% in resources in some regions (eg. In Salah field in Algeria where BP are re-burying the CO₂) and reportedly up to 20% in some Russian gas fields. Energy losses and methane leakage from imported gas via long pipelines (eg. north Africa, Russia) are also estimated to be significant.

For fair comparison the overall emissions from gas-fired generation need to be compared to overall emissions from modified coal-fired generation which includes methane releases from deep mining, less so from opencast mining. A report by MitsuiBabcock indicates there may be little difference in overall emissions between more efficient coal (retro-fitted to existing stations) and latest CCGT gas turbines. Our calculations, which include LNG losses and figures from the CHPA (Combined Heat and Power Association) indicate that even using high efficiency next-generation CCGT turbines the difference in emissions may be narrow. When considering the day to day demand variations and operational conditions of the National Grid, CCGT gas turbine efficiency can dip below its best baseload figure whereas a coal station's steam turbine efficiency is less affected by load following operation, which will increase with the increasing capacity of variable renewable electricity generation. Furthermore, the use of biomass in coal plant could give coal station generation an additional edge in terms of emissions per kWh.

As regards LNG imports to the Milford Haven terminals under construction and the proposed terminal at Amlwch, Anglesey the re-gasification losses could be minimised using waste heat from a CCGT or re-heating using sea water at Amlwch if practicable and benign. This may reduce overall LNG losses possibly down to around 15%. Consequently we would support the construction of CCGT plant adjacent LNG terminals if they are optimised to the re-gasification needs of the LNG imports. This would most likely require significantly less capacity than was recently applied for and then withdrawn by Milford Power adjacent the Petroplus terminal (1.6 GW CCGT with regasification facility). No CCGT / regasification scheme has even been proposed for the larger ESSO terminal at South Hook. The 2 GW CCGT Pembroke Power Station application on the south side of the Haven could not use its waste heat for re-gasification due to its location and we consequently oppose a station on this site, especially considering the heat need at South Hook about four miles to the west. See Annex 2 for estimated heat losses from non-optimised CCGT capacity in Milford Haven.

MitsuiBabcock are leading various research and development programmes with the DTI on modifying existing coal technology and are due to report further in the coming months.

We do support proposals for CHP capacity at all scales be it on large industrial sites (eg 750 MW scheme at Immingham) to mini and micro CHP schemes and devices in the commercial and domestic sectors. The CHPA propose a target of 20 GWe of CHP capacity by 2020 (the Government target is 10 Gwe by 2010 of which 7 - 8 GWe may be realised). Progressive or

mandatory policies for micro/mini CHP could possibly result in more than 20 GWe by 2020.

We oppose the 800 MW CCGT proposal by Carron Energy adjacent their 300 MW coal-fired Uskmouth power station for the reasons above. The waste heat from the Uskmouth coal station might well be utilised by the location of appropriate industrial processes requiring hot water.

We support the investigation of large-scale energy storage opportunities (Task point 2). Indeed, this could include large tidal lagoons in the Severn Estuary and Liverpool Bay which could help partially or totally balance the National Grid at any point during the 24 hour day.

6. Energy Infrastructure strengthening

We support all the task points.

We think that any new or replacement methane pipeline construction should be considered for hydrogen compatibility for potential future use with hydrogen. Hydrogen, because of its elemental nature (small molecule size), would tend to leak from existing methane pipelines, and the lower energy density of hydrogen could also necessitate larger diameter pipes. At some point in the coming decades the UK will have to reduce methane use due to the resulting CO₂ emissions and or possibly methane availability. Consequently, pipelines to new housing estates should be made hydrogen proof as hydrogen could then be used in mini/micro CHP with no CO₂ emissions at the consumer end. If renewably-generated, methane reformed, or coal gasified hydrogen is available (possibly with CCS) then a high efficiency, low carbon energy network could be built year by year (ie hydrogen powered mini/micro CHP schemes in new or refurbished housing estates and commercial areas). This would be a world leading innovation. The WDA/Glamorgan University H₂ project has already identified several sources of industrial hydrogen production in south east Wales, from which hydrogen-powered CHP demonstration schemes could be facilitated.

We support the review of international interconnector capacity considering that the more variable output renewable energy schemes are built across Europe and beyond (north Africa) then peak power flows in different regions / countries can be transferred as required. This would further improve system efficiency and integration. We oppose any strengthening of the mid Wales Grid to the Nant y Moch Strategic Search Area (as we opposed this SSA) but would support any strengthening to the Camddwr area (the Camddwr Trust say their proposed 300 MW plus windfarm would include the required additional power line capacity within their application).

In terms of energy security we consider that the location of LNG terminals within the narrow confines of Milford Haven pose[s] a huge security and public safety risk from accidental (eg collision) and malicious events (eg high vulnerability to terrorist attack). An LNG tanker fire is estimated to cause second degree burns at two miles within one minute. Any leaks could result in cold, dense clouds of methane being blown along the Haven, bounded by the high slopes along much of the Haven, and onto or close by populated areas situated only about one mile away.

7. Drive for Innovation

We support all the task points

8. Carbon dioxide emission reductions

We support the aim of the task points but believe that deeper cuts are necessary. We are asking the UK Government to reduce UK carbon dioxide emissions by at least 3% per year to 2050 and an Early Day Motion to that effect has been drawn up by Friends of the Earth and currently 240 MPs have signed up. It should be a undepinning objective of this routemap that energy production in Wales should contribute to this scale of reduction in our carbon dioxide emissions.

We note that if the WAG 2010 renewable energy target is achieved and the large Gwynt y Mor offshore windfarm is fully commissioned soon after then there would be around 6 TWhrs/year of renewable electricity generation in Wales by around 2011- 2012. This would be enough to supply the annual needs of nearly one third of the population in Wales or about 1 million of the 2,903,000 people in Wales. It also seems reasonable to estimate that assuming targets are met and some additional onshore windfarm construction and re-powering occurs then around 1 million people in Wales would be supplied by wind energy alone by about 2015. This is not the 'trickle' of electricity that some suggest.

We estimate the annual electricity demand in Wales is about 19.5 TWhrs/year using DTI (UK) and Census figures. That is, UK demand is currently 400 TWhrs/year, the UK population is 59 million and in Wales 2,903,000. This electricity demand figure includes transmission losses and auto-generation and shares out large industrial power usage (eg. Anglesey Aluminum Metals Ltd, Corus) to a UK average as this would be arguably fairer because not all the aluminium or steel would be used in Wales.

Annex 1

Lagoons and Barrage Technology

It has been claimed that tidal lagoons have a drawback because they would require a large quantity of rock aggregate, possibly nearly 200 million tonnes for schemes in the Severn Estuary generating over 20 TWhrs/year (by comparison Welsh electricity demand is about 19.5 TWhrs/yr based on UK electricity demand and per capita consumption). Yet coal imports to the UK are currently around 30 million tonnes per year. So such lagoon systems would require the equivalent of around 6 years imports of coal which may come from as far afield as Australia, South Africa and Russia. Yet aggregates for lagoon construction may be imported from much less distant locations such as Sweden and Spain. Furthermore, the electricity output per tonne of aggregate from a lagoon over a 50 year lifetime could well be around 1.2 times more than per tonne of coal burnt in a power station and of course there would be near zero operational carbon emissions.

Significant lagoon capacity in the Severn Estuary and or Liverpool Bay could also help balance the National Grid at any state of the tide by pump storing or releasing water. This would significantly reduce carbon emissions from relatively low efficiency open cycle gas turbines currently used for Grid balancing, thereby reducing carbon emissions. If contracts were made for such operation then lagoons could essentially become a carbon-negative technology. The lagoons could well operate for similar timescales as a Barrage (120 years) with little additional cost. Decommissioning would be required within any planning agreement and the aggregate could be relatively easily recovered from their shallow water location for onward re-utilisation. So there should be no objection on the grounds of a lack of decommissioning strategy or concerns about abandonment.

We understand that some within the DTI have questioned the economic cost of such lagoons yet this is not an issue for the DTI to block consents for such schemes. If private companies are willing to invest in such schemes, which they have shown interest in doing, then it is not the DTI's remit to frustrate via the consents process. Lord Sainsbury has stated in Parliament that if commercial interests are willing then schemes may be funded so he does not acknowledge a role for DTI determination on economic grounds. Indeed, it has been widely reported that the figures used to criticise lagoons were taken for an extremely small scheme to power a fishing village in a remote area of Alaska with a small tidal range. Such costs do not reflect the economies of scale of large schemes in an Estuary with the second highest tidal range in the world. The company Tidal Electric who wish to build such lagoon schemes have stated that they do NOT need taxpayers money to fund construction so there can be no criticism in that respect for lagoon schemes either. It has been claimed in error that lagoon schemes would be dependent on subsidy (Capital Grant, marine development funds, etc). Indeed lagoons schemes may be the only marine energy generation technology that does not require development or capital subsidy.

Annex 2

Optimised CCGT capacity around LNG Terminals in Milford Haven

In terms of policy on energy efficient CHP (combined heat and power), which is promoted in TAN 8, the TAN advice is completely undermined by the DTI's recently revised power station consents policy. Indeed, two large gas power stations totaling 3.6GW capacity have recently been proposed around Milford Haven (Milford Power's 1.6GW scheme has been withdrawn but possibly only so a larger scheme could be applied for).

The siting of two LNG terminals in the Milford Haven waterway, now under construction, means that there will be a substantial need for hot water to re-gasify large quantities of super cold liquefied natural gas (LNG) being piped ashore from tankers. Otherwise some of the incoming LNG itself has to be burnt to provide heat to re-gasify the LNG imports.

Only the Milford scheme is proposed to use an average of 250 MW of its 900 MW+ of waste heat to re-gasify LNG coming in to the Dragon LNG terminal under construction. There would also be an additional 50 MW of heat for peaking, etc from the small reburbished on-site CHP scheme. So, even the Milford Power scheme would be in no way 'quality' (high-efficiency) CHP schemes optimised to the heat need.

The two CCGTs would total 3.6 GW capacity and would generate an annual average of about 3 GWe of electricity (assuming an annual load factor of 85%). Yet 3 GWe of electricity generation would produce about 2 GW of waste heat (even operating at an 'as new' 60% efficiency). So between them the power stations would use about 12% (250 MW) of their waste heat to re-gasify LNG.

The AVOIDABLE wasted energy would be roughly 1,050 - 1,250 MW (assuming CHP efficiency averaging 86 - 90%). The gas used to generate this wasted heat could be used in distributed CHP schemes to generate 9 - 11 TWhrs/year. Distributed generation would also avoid Grid transmission losses and CCGT operational losses of about 5% or 250 MWe or 2.2 TWhrs/year. So the overall waste would be around three times the TAN 8 renewables target of 4 TWhrs/year by 2010. It is also the equivalent to potential saving of gas imports with a usable energy value equivalent of about half of all electricity consumed in Wales (about 19.5 TWhrs/year).

At the larger South Hook LNG terminal Exxon have not even announced plans for an LNG re-gas CHP scheme, optimised or not. This is despite their advertised commitment to energy efficiency (a recent TV ad showed a kettle recirculating water vapor from its spout into its plug). So an opportunity to save 500 MW of heat or over 4TWhrs/year is being spurned (that is by having a 2 GW CCGT nearby but not connected up).