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Gwasanaeth y Pwyllgorau

# Wales in the Energy Crunch





Wales in the Energy Crunch

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## Wales in the Energy Crunch: Summary

### Overview

There is increasing agreement that the peak of global conventional oil production will occur within the next 10-15 years, if not sooner. Crude oil comprises around a third of primary energy requirements, and almost 100% of energy use in transport.

The decreasing output of 'easy' oil will provoke a number of strong economic reactions. For example, there will be a rush to alternative fuel sources where technically feasible, including nuclear, gas, wind and biomass for electricity generation, and biofuels, gas and electrification for vehicles. Meanwhile, it is likely that development of oil from more difficult locations will intensify, as will that of 'unconventional oil' such as that strip mined from tar sands in Canada.

None of these alternative fuels and technologies will replace easy oil, or make any appreciable difference to the timing of the global peak in production. Each fuel faces significant geo-technical, environmental, political or economic barriers to increased production - sometimes all at once. Novel energy sources and new nuclear (or Severn tidal power) will not come on stream in large quantities before 2020 at the very earliest. Carbon capture and storage technologies, which may make the burning of coal possible without engendering catastrophic climate change, are likely even further away and requiring enormous investment.

The world then faces a very significant energy gap in liquid fuel availability in the upcoming decade, and probably beyond. The increasing concentration of remaining fossil fuels in a small number of regions with often problematic relationships with the West may see energy supply increasingly used as a political tool. At the same time the increasing demand and purchasing power of China (in particular) suggests that even where fossil fuels are brought to global markets, they will be extremely expensive.

In 2009-10 the UK will for the first time import more than half its gas; a proportion that will move inexorably upwards as North Sea reserves dwindle. Unfortunately, the former abundance of North Sea gas has meant the UK is ill placed to secure and store gas compared to its European partners: for example, whilst many European nations have developed bilateral long term contracts with supplier nations to buy gas, the UK typically purchases its gas on 'spot' markets. We are at the very end of the gas pipeline.

The response of the UK government to tighter and more volatile energy markets has been to call for their better operation. It also believes that should national (state-run) energy companies be replaced by multinationals, increased efficiencies would also drive increased supply. In the longer term, and linked to its climate commitments, the UK Government suggests that nuclear could produce a third or more of UK electricity, with the remainder renewably or 'clean' coal sourced

The prospect of an early peak in conventional oil and intermittence or expensiveness of gas disrupting this smooth medium term transition does not appear to form part of Government scenario planning.

## Implications for Wales

### Energy Generation

The substantial renewable energy potential of Wales remains largely unfulfilled. Wales produces 4% of its electricity from renewables (largely onshore wind) which is higher than England but significantly lower than Scotland (and indeed many other European countries). The installation of renewable capacity in Wales is progressing far more slowly than Assembly Government targets.

The commissioning of a large new LNG gas-fueled power station at Milford Haven and the continuation of generation at Aberthaw coal fired power station means that Wales will continue to be overwhelmingly fossil fuel dependent for its primary energy for at least the next decade - or for as long as such fuel is available and affordable. It is notable that the commissioning of the Milford Haven gas turbines, and the decommissioning of Wylfa, will increase CO<sub>2</sub> emissions from power generation in Wales by at least 4.5 million tonnes per annum (around a 30% increase).

### Energy Use and Competitiveness

Whilst the energy supply issues faced by Wales are mirrored elsewhere in the UK, there are substantially more vulnerabilities in Welsh industry. Wales is more manufacturing dependent than the UK as a whole, which means wealth generation is more energy intensive. Further, manufacturing in Wales is particularly energy intense, requiring over 50% more energy per unit of value added than the UK average. This means our manufacturing activities are more vulnerable to energy cost increases than other UK (and likely European) regions.

Some of Wales' key industrial players are in sectors which are likely to face significant restructuring in the face of energy scarcity and climate regulation. The implementation of EU regulations on carbon emissions may affect the competitiveness of each sector, whilst increased fuel costs and lower disposable income would particularly affect the prospects for Airbus.

In almost no case is a 'final' product made in Wales, let alone having a strong association with Wales. This means that there is little incentive for companies to continue to manufacture in Wales should cost competitiveness decline at a time when industries face significant reinvestment in production infrastructure.

Meanwhile, Wales' comparative lack of higher order innovative and R&D activities means it is unlikely that the region will gather much of the product and process innovation that will accompany volatile and increasing energy costs. Where Wales is innovative and has an international presence in the field of energy, organisations tend to be focussed more on social or environmental goals (such as those clustered around the Centre for Alternative Technology or Sundance Renewables). However, this activity at the edges of the economic mainstream, and in areas that possess little economic advantage in a traditional sense do show that people and organisations in Wales can make a difference, by thinking and acting 'outside the box'. Understanding and benefiting from these processes may be a key element in sustaining prosperity in future, even more challenging environments.

## **Travel and Transport**

Employment opportunities that persist in the face of energy scarcity and climate regulation are a necessary but not sufficient condition for a long-term successful region. The people of that region also have to be able to get to and do those jobs; products must be brought to market and various services accessed by the people of Wales. This is a concern should fuel costs rise, with an often very limited set of substitutes for private car use.

In this context, Wales' dependence on the private car is a concern. A substantially higher proportion of commuting trips in Wales are by private car than in GB as a whole and with even more rural areas than Wales less car-dependent for commuting. This car dependence is not restricted to work trips: In 2005-6 Wales had the highest proportion of all household trips in GB that were by car. Wales also had the lowest proportion of children walking to school and the highest proportion driven to school of any UK region at this time

Some of these travel patterns are the result of geography and the dispersal of populations and services: for example, Wales has the poorest access of any region to hourly bus services close to home, and its children travel amongst the furthest to get to school. Whether these patterns are the result of socio-economic, cultural or purely geographic factors will be very important for policy development.

Proportionately less people in Wales work than in the UK, although that gap has narrowed over recent years. What has not narrowed is the gap in Wales-UK wage and income differentials, with Wales remaining at 12-13% below the UK. The combination of the highest car dependence, with amongst the lowest income (household and GVA) of the UK regions is concerning. This is not only with respect to access to work, but also services – especially for the one in six workless households in Wales. Transport and travel constitutes the largest single element of household expenditure, and the largest element within this is fuel costs. Relatively cheap motoring costs overall (despite increasing fuel costs) have encouraged the use of cars over relatively more expensive modes since 1990.

The implication of the data is that Wales is perhaps worse placed than any other region to absorb higher travel costs and/or climate taxation, especially those that impact more on private car use. With four-fifths of commuters travelling by car, increases in fuel costs have the effect of lowering the real wage. It is more expensive to travel to work, hence the differential between earned income and benefit payments decreases, encouraging more people, especially at the lower end of the income scale, to stay at home rather than work. The increasing real cost of bus and train travel over many years does not hold out much greater hope for non-car commuters.

In 2008 270,000 of Welsh households, were estimated to be in fuel poverty, a 12% increase on 2004 and showing that the Assembly aspiration to eliminate fuel poverty by 2018 is probably unobtainable in a regime of increasing energy prices. The ‘double whammy’ of increasing fuel prices for both home use and for travel means that many Welsh households face substantial falls in real welfare as fuel purchases comprise an increasing proportion of household spending - and with the number of these households proportionately higher in Wales than elsewhere in the UK.

## Policy & Politics

The need to fundamentally change production processes and lifestyles, in a very short timeframe, yet with long and uncertain payback times on associated investments suggests that governments at all levels will play an increasingly important role in the economy. The lack of a critical mass in private sector innovation and lack of company autonomy in Wales suggests the government here will be even more important in the transition.

It is notable then that the National Assembly does not control energy policy for Wales, with centralised generation of over 50MW installed capacity remaining under the remit of Whitehall (and with this unlikely to change in the short term). However, Assembly Government policy (as opposed to aspiration) is currently very similar to that of the UK government, suggesting that even if the Assembly was to be awarded powers in this area, there is no guarantee an appropriately radical energy policy and implementation would follow.

With Wales subservient to London in many energy matters, the relationship between DECC in Whitehall and DESH and DET in Cardiff will be critical. For example there may be a tendency, despite DECC's UK-wide remit, to direct innovative low carbon technology and development to the South West of England rather than Wales, with the former identified as England's pathfinder low carbon region.

Public policy approaches to energy and climate are typified by an unwillingness to accept the existence of (and hence impose) substantial costs in the transition to an energy resilience. Here, the focus on short term 'regional competitiveness' precludes the possibility of imposing costs on existing stakeholders (such as high energy industry or users of private vehicles). This means Wales will travel no faster than other parts of the UK towards true energy resilience despite the need for greater urgency implied by our relative vulnerability.

## Policy In Wales

The Assembly Government's broad policies on energy and carbon emissions are radical, brave and pointless. Planning Guidance support for renewables is far less strong an economic signal than support for a new 2000MWe gas fired station at Milford, or the planning permission for Ffos-y-Fran that enables Aberthaw to burn coal until 2018. What incentive is there to invest in smart grids; innovative dispersed generation; and politically difficult energy from waste plants or wind; when power is available at the flick of a switch from *currently* inexpensive gas and coal?

The problem here is that the continued dominance of fossil fuels in upcoming years may lock us even further into a path of dependency, meaning that should supplies be interrupted or become extremely expensive, the window for investment in truly large scale alternatives may have passed – in both financial and climate terms. In this scenario, those who suffer most are the poorest households in Wales and potentially, Wales itself as one of the poorest regions.

Energy policy in Wales needs to be far more complex and holistic if it is to be fit for purpose. Currently, there is very little discussion in energy ‘route maps’ and strategies regarding how different generation methods fit together in terms of complementarity, substitutability or cost. Without this, no assessment can be made of how likely take-up of renewables will be beyond purely regulated levels.

Wales has an aspiration, along with many other regions, to develop low carbon industries. A healthy dose of realism is necessary when considering this aspiration. There are very few policies extant in Wales which will encourage industry to ‘green’ more quickly than anywhere else in the UK – although our exposure to high energy costs may do the job for us sooner than we’d like. Assembly support is extended to companies irrespective of their energy profile or climate commitments. £28m spent supporting re-investment at Airbus cannot then be invested in low carbon, sustainable or energy resilient activities or products.

The identification of Aerospace and Automotives as favoured ‘key’ sectors in Assembly policy, and the continuing focus on these sectors (along with others that are currently high energy such as tourism and agri-food) sits uneasily within a green jobs strategy when Wales has access to none of the levers that might ‘green’ these businesses. Welsh aspirations for a low carbon future are wholly dependent on the adoption of appropriate technologies (where they even exist) by businesses in these sectors – and then their roll-out to Welsh operations. History suggests a measure of caution here.

Similar limitations exist in policies on travel and transport. Like other governments, the Assembly relies on carrots rather than sticks. The insistence of the Assembly that it will not toll any existing strategic trunk roads effectively signals that it is unwilling to impose costs on motorists beyond those imposed by the UK government. The prospect of modal shift occurring in Wales beyond any UK changes is therefore low.

Policies to improve walking, cycling and public transport infrastructures in Wales are welcome. However, policies which rely upon the incremental improvement of facilities, together with making citizens aware of low energy and CO2 options will have a limited impact, and this only in the medium term.

Unless the relative-cost and convenience issue is tackled extremely rapidly in favour of public transport, the majority of Welsh workers and residents will stop using their cars for day-to-day essentials only when car use becomes economically unfeasible. When this happens, public transport services will be unable to cope. Ramping up public transport provision by orders of magnitude whilst encouraging (or in some cases, such as in city centres, forcing) residents to use these modes is necessary if Wales is to function economically beyond peak oil. The appropriate policies are well known and proven in much of Europe - mandating priority bus and cycle lanes on arterial routes; high occupancy lanes; and car-free city centres; and with urban congestion charging and road pricing providing the income to enable investment in lower-carbon transport. Unfortunately all of this appears currently politically unacceptable.

### Summary of the Problem

Fossil fuel energy traded on global markets is to become far scarcer in the medium term. In particular, availability of easily recoverable and easily refinable liquid fuels will decrease at a precipitate rate for geological reasons by the mid-2020s at the absolute latest, and with the significant possibility that the 'peak' of conventional oil may come far sooner (or in fact, already be passed). The behaviour of global energy markets in 2007 and 2008 suggest that once the absolute decline in 'easy' oil is priced in to markets, prices will respond quickly upwards, but with increasing volatility.

These price increases will affect not just oil, but its substitutes, such as liquid and piped natural gas. Meanwhile, the increasing concentration of the bulk of resources in a few countries brings into question how much fuel will actually reach global markets at all, with nationalistic concerns and behaviour already evident amongst resource rich nations. Moves by Chinese national companies to secure access to energy through joint ventures and trade-for-aid deals may also diminish globally traded supply.

All alternatives to liquid fossil fuels face significant problems in terms of access, be these technical, geographical, political, environmental or in many cases all four. There may be two trillion barrels of oil 'left', but much of it may as well be on the moon in terms of its usefulness for plugging short-to-medium term energy gaps.

North Sea oil and gas may have been more a curse than a blessing for the UK, leaving us short of energy storage and lacking long established commercial relationships with energy rich countries. Meanwhile, the prospect of peak oil disrupting the easy transition to a low carbon future is not even considered by the UK government. Despite our renewable potential, Wales appears more vulnerable than the UK as a whole to energy-cost induced disruption and poverty.

### What Can and Should be Done?

The response of the UK government to upcoming energy issues is summarised by a belief in the power of open markets. Replacing inefficient state enterprises with efficient global companies in resource rich countries; encouraging further exploration; and freeing gas markets will be sufficient, in conjunction with squeezing our own North Sea gas, to ride the energy storm into a bright, low carbon future. If this analysis is correct, then Wales may have little to worry about. However, this optimistic reading has attracted sharp criticism; and not just from environmentalists. The 2008 credit crunch and recession reveal the consequences of ignoring the potential for systematic risks to go unnoticed within strategic industries.

The devolution settlement leaves limited room for manoeuvre in some respects, although even within the limited set of powers held by Cardiff, much could be done to prepare Wales more effectively for a higher energy cost world. We face a problem however. The framing of climate and energy security issues as 'win-win' in governments' dialogue with voters, together with continuing climate-change scepticism amongst some, means there is little incentive for politicians to suggest to the electorate that radical changes to their fundamental behaviours are needed. The spectre of appearing 'anti-business' appears to further restrict debate. This means that whilst actions taken in Wales appear worthwhile or even radical by UK standards they are doing nothing to prepare us for the changes we are likely to face, within the timescales we are likely to face them.

A number of policies, if implemented quickly, might serve to move Wales towards greater energy security and resilience. Each of the suggested policies has something in common: they would be generally unpopular. Whilst a debate with the Welsh people on the urgency of the peak-resource problem is obviously needed, it is perhaps less important than the creation of 'political space' within which AMs as a whole can show leadership. It is difficult to see how anything other than wide support within the Assembly (in the best case, fully cross-party) will allow this to happen.

The transition to energy resilience will involve significant investment. Whilst some of the actions undertaken will provide revenues for government (and perhaps even profits), this will be in the longer term, with investment spending required up front. The credit crunch and subsequent recession has left UK and hence Welsh public sector funding facing cuts in the near future. Again, in common with the rest of the UK, money will be hard to find, and investment will require the abandonment of other programmes. There are however a number of potential avenues which could provide funding for energy resilience interventions on a significant scale. These might include the redirection of monies from existing policies (such as flexible support for business); the utilisation of EU Convergence and transition funds; the issuing of ‘green bonds’ by the Assembly or LA partners; and, of course new taxes.

## Conclusion

Economic and energy policy is increasingly shaped by the need to decarbonise production to respond to anthropogenic climate change. So far, however policies have failed to influence the structure of our economies sufficiently quickly to respond to the science. This is perhaps because climate change is a complex process, with long term and uncertain effects. The impossibility of ‘seeing’ these effects directly means that despite overwhelming scientific and government consensus regarding the causes and eventual severity of climate change, a public debate still continues as to its fundamental existence.

Further complexity arises because the worst of climate change effects are predicted to affect the global South and less developed nations. Radical climate change abatement is for Wales and the UK in part a moral action. As such it is open to debate and different attitudes based upon the subjective values of individuals. These facets have perhaps provided an incentive for governments and political parties of all types to avoid proposing the radical economic and public policies that the climate change science demands for fear of electoral punishment.

Peak oil, and the coming energy crisis, is *not* the same. Wales is amongst the most fossil fuel dependent regions of the UK, and with the UK having increasingly limited access to fossil fuel sources that are reliable and abundant. The impact of the global peak of oil production will be felt directly in Wales, by the latest within 10 years, perhaps more here than anywhere else in the UK, and with an economy and population less well prepared to deal than in other regions with substantially increasing and volatile energy costs.

There are two basic approaches that the current (and the next) Government in Wales can take to the energy crisis. Firstly, it could rely upon the UK government to fulfil its responsibility and plan for sharply decreased imported energy with a credible, costed and holistic energy strategy. In this case Wales would of course have to hope that UK-wide actions are sufficiently sophisticated to protect prosperity in Wales in terms of direct interventions (given our different industrial mix and population dispersal); that UK and European energy markets respond effectively to rapidly changing economic stimuli; and that public finances recover quickly enough from the dire position in 2009 to appropriately fund actions.

The other option is to assume the worst: that one or more links of this chain will break, and Wales will suffer substantial economic dislocation and increased poverty following an energy crunch. In this case, it is the responsibility of the National Assembly and Government to embark immediately upon a risk assessment exercise that identifies the key likely impacts of an energy crunch, and can suggest policies to minimize these impacts without the assumption that any current programme, sector, infrastructure or mindset will remain viable and appropriate.

Clearly embarking upon this route involves a difficult, complex and expensive journey, and probably the need to fundamentally reassess both the nature of party politics in Wales, and the quality of debate between Welsh politicians, civil society and people. It involves upsetting and inconveniencing many people. The alternative for Wales is to avoid serious debate and radical action and to follow the UK government in trusting markets to provide solutions. However, the fundamental geographic and character of Wales means that this failure in the duty of care will have the most severe consequences for our prosperity and wellbeing.

<b>Policies for Preparedness?</b>
<i>A Sustainable Resource Map of Wales</i>
<p>There is currently no systematic understanding of the potential for the landscape in Wales to provide an increased output of energy which is fit to drive land use policy. A typology of land within Wales could be developed with ecological and topographical characteristics; elevation; wind profile; distance from grid points and current ownership and usage. The development of this 'blank sheet' classification system would indicate to what uses land in Wales could be put. Important here is the ground-up assessment of land potential, unconstrained by existing restrictions or conventions. The land use map developed above would provide intelligence to guide a plan of action to rapidly increase non-fossil fuel energy supply. Sites with prime technical potential could be quickly identified and the information on ownership and current usage used to identify those sites where development is immediately feasible.</p>
<i>Direct Intervention in Renewables</i>
<p>Identifying suitable sites is not adequate for action. Market, planning and perception barriers to the development of local non-fossil energy could be breached with the Government of Wales and its partners taking direct action to ensure security of energy supply. Starting with the prime spots in its own estate, and that of partner organisations (Unitary Authorities; Education; Forestry Commission) the Assembly could rapidly develop energy sources which are effectively in house – owned by, and with the output used by, public sector organisations. (and potentially with a measure of trading via the grid or directly).</p>
<i>Changing Travel Behaviours</i>
<p>In Wales as elsewhere, motorists have benefited from a relative cheapening of travel compared to other modes. Reversing this trend would require the Assembly to make motoring more expensive. Road pricing has the benefit of both reducing energy use and climate emissions, and potentially providing revenue with which other transport options can be improved. The 'inelastic' nature of demand for car travel means that those who can pay will continue to use their private vehicles even if prices increase significantly. Clearly, there is potential here for a nuanced policy to drive revenue increases which improve public transport for the very worst off.</p>
<i>A Single Focus Economic Policy</i>
<p>Assembly policy for economic development is the same as many other regions with alike situations: this approach has, unsurprisingly, done nothing to improve Wales' prosperity compared to other regions over many years. The opportunity exists, however, for the Assembly to concentrate its economic policy on one goal and one goal only – increasing regional energy resilience. Through this filter a very different set of industrial and labour market interventions will arise. Clearly this approach would involve the slaughter of many sacred cows, generic grants to business and general business support amongst them. Some companies in search of grant aid that is not linked to low-carbon production might not reinvest or even leave Wales. Companies might not choose to come to Wales in the absence of an unquestioningly positive attitude to business investment. These are not trivial concerns. However, the impact on actual regional economic performance is likely to be substantially less than that which would occur should Wales enter an energy recession at its current level of unpreparedness.</p>

## Annex B

### Wales in the Energy Crunch: Update & Implications

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1. When Wales in the Energy Crunch was written in late 2009 the medium term price of a barrel of oil (2005-2009) was at \$65-\$70. Since that time the price has largely remained at a level above \$100, despite an extremely weak economic recovery.
2. Many of the political-economy concerns raised in the report around oil supply have been exemplified by the 'Arab Spring', with unrest and revolution in Tunisia, Egypt and then war in Libya having a positive effect on oil prices, despite the fact that these countries are not the major Middle Eastern suppliers. Notably, the prospect of political volatility within Saudi Arabia has arguably increased not receded.
3. Recovery (in the West) has been stymied by worries around public, corporate and household debt. Were these resolved, it is uncertain how far oil supply could be increased to enable a higher level of economic supply. Without this increase, even a second debt recession could be extended or followed by a recession triggered by spikes in energy and resource prices - effectively the recession we avoided in 2008.
4. Nonetheless OPEC oil production increased slightly in August showing there is at least a moderate amount of slack in supply - especially should the Eurozone, and hence demand, collapse.
5. Additionally, developments in gas 'fracking' promise increases in the supply of liquid gas, albeit with uncertain environmental concerns. This is, however, a technology with medium- rather than short- term application in Europe due to licensing & environmental impact issues. For example the New York Times reports high levels of radioactivity in fracked wastewater from some of the the 70,000 Pennsylvania franking wells, with this water retuning to the table largely untreated ([http://www.nytimes.com/2011/02/27/us/27gas.html?\\_r=1](http://www.nytimes.com/2011/02/27/us/27gas.html?_r=1)).
6. Substitution between gas and oil, especially in transportation, is short term limited. This is evidenced by the recent licensing in the US of a controversial pipeline to take Canadian oil-sands crude to Texas for refining despite extensive fracking developments in the US itself.
7. Turning to the UK there have been strong signals since the 2010 election that Nuclear is (by and large) the chosen solution for electricity supply problems. Whilst the UK Coalition make nods to the need for increased renewables, a lack of consideration of the

substitutability/complementarity between wind and nuclear means that beyond direct subsidy through Renewable Obligation Certificates, development of renewables at large scale is uncertain. -The 'always on' nature of nuclear electric supply, together with plant locations at centralised locations near large transformers gives it a massive technical advantage over diffuse wind without substantial investment in a new 'smart' supply grid. This advantage is cemented by what appears to be a government willingness to insure private sector companies' risk regarding decontamination costs. Nuclear will become more attractive than gas should the coalition follow through on its promise of a high carbon price floor.

8. It is notable that whilst offshore wind is more reliable and efficient than onshore, its relatively high cost means it is unlikely to progress substantially at the expense of nuclear without the continuation of ROCs - and with of course all subsidy uncertain in these budget constrained times.

9. Wales' energy mix and prospect for the same is de facto similar to that of the UK; fast increasing reliance on imported gas (Pembroke), with a medium term switch to nuclear - dependent of course on the development at Wylfa B and the size and number of its reactors.

10. Despite strong demand from supply companies, onshore renewables installations have missed Government targets for a number of years now, and with some anecdotal evidence that, even with TAN8, this is largely due to Planning delays and refusals (this may apply more widely to renewables, e.g. biomass, but I have no evidence of this). If the planning system is indeed the major constraint, then all government attempts to substantially move Wales toward a more renewable energy mix are pointless without fundamental planning reform - that for example minimises the influence of aesthetic considerations on approvals.

### Summary

In common with other places, Wales needs new supplies of both primary energy and electricity generating capacity. A number of factors, including location of hydrocarbon deposits and transformer locations will bias development toward already-industrialised areas. Additionally, the need for employment in these areas (despite most energy developments extreme capital intensity), together with the geographically tighter visual impact of hydrocarbon and nuclear facilities, might make planning and development of such facilities 'easier' compared to rural wind. The local welcome (broadly) for Ffos-y-Fran and Wylfa B as compared with the furore over wind developments in Powys is a case in point. If one had to bet on whether fracking test licences were more likely to be awarded in the Vale or Maesteg, it would be a relatively easy win. Effectively, then, the 'status quo' and cumulative causality will lead to the industrialised (and poor)

parts of Wales continuing to supply our energy and bear the majority of any regionally arising environmental and social costs.