



UK Energy Policy:

The Small Business Perspective

&

The Impact on the Rural Economy

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Foreword

The Small Business Council is a non-departmental public body established in May 2000 to advise the Secretary of State for Trade and Industry and the Chief Executive of the Small Business Service on the needs of existing and potential small businesses in order to help them succeed and prosper. Working with Ministers and Senior Policy makers, the Council advises and reports on the effects on small businesses of current and potential policies.

This report, initiated before the Energy Review of January 2006, examines the current energy policy flowing from the *Energy White Paper* of 2003,¹ and in particular the impact on businesses of measures taken to achieve two of the key objectives identified, namely to reduce CO₂ emissions and to maintain security of supply.

The Government has been instrumental in leading the international debate on the serious threat of climate change. Greenhouse gases have long been recognised as being the principal cause of this phenomenon, with CO₂ the main contributor. In the UK, if left to a 'business as usual' approach and assuming mid-range economic growth, carbon dioxide emissions will double by 2050.² On a worldwide basis, carbon dioxide emissions by 2030 are set to exceed 1990 levels by 52%,³ far in excess of the absolute limit of 550 ppm recommended by the Royal Commission of Environmental Pollution.

The Kyoto Protocol in 1997 established a target of a reduction of CO₂ emissions to below 1990 levels. The UK's target was set at 12.5% by 2010, although the Government elected to nominate a more ambitious target of 20%. The *Energy White Paper* aimed to achieve this through a number of policy instruments but primarily energy efficiency, from which more than half the reductions were expected to come, aided by a target of 10% of electricity from renewable sources by 2010. However, the measures taken have not worked; CO₂ emissions have now increased. In addition businesses are concerned about unsustainable rising energy costs and the security of supply.

The timeliness of such an exercise is clear; the Energy Policy is now under formal review, with a proposed new strategy to be released the summer of 2006. It is a welcome acknowledgement that changing circumstances have made it necessary to revisit the *Energy White Paper*, and ensure that its laudable goals; clean, secure, affordable energy for all, are achieved in the long term. The SBC seeks to influence any new strategy that tackles the energy issues currently impacting on small businesses. The SBC formal response to the DTI's Energy Review includes this study as an annex as it embraces the questions raised in the DTI's consultation document and as such we believe that its commentary and analysis is relevant and trust that it will be taken into account.

¹ *Energy White Paper: Our Energy Future, Creating a Low Carbon Economy* (2003).

² Met Office 2004.

³ IEA, *World Energy Outlook* (Nov. 2005).

Executive Summary

Businesses look to Government to provide conditions favourable for reliable and affordable sources of energy that encourage long-term investment and economic growth. At the time of writing, gas prices have escalated by 21% over the past 18 months with predictions that the price of power and gas are likely to increase by at least 30% over the next two years. In November 2005 the spot price for gas rose from 31p to £1.17 in a period of just three weeks. Following predictions from the Met Office that we were likely to experience our coldest winter for decades, businesses are becoming concerned about possible power shortages during the winter of 2005/2006, and, in the light of recent international events, the long-term security of supply. The most substantive concern is, however, further price impacts and future price volatility. These issues will have a considerable impact on the growth and stability of small businesses.

This report surveys the intense debate now taking place as to why the chosen strategy is not achieving its objectives. We believe that a principal factor is to be found in the increasingly controversial renewable energy policy, which is widely criticised for its lack of balance and its over-emphasis on onshore wind at the expense of other technologies. Information is now available from the world's largest operators of large-scale onshore wind portfolios. The experiences of Germany and Denmark demonstrate the difficulties and costs of coping with intermittency and transmission. Experience in Germany suggests that the net economic effect of wind energy development is not positive. Taken together these matters raise many questions about the wisdom of the current UK policy's commitment to onshore wind for the bulk of the renewable energy target.

This study focuses attention on one particular area of potential impact in the United Kingdom, the impact on tourism, an area dominated by small businesses and of pivotal importance to the rural economy as a whole. Twenty-five percent of all registered businesses are in rural areas.

The rural visitor economy is worth £14 billion in England alone and supports up to 800,000 jobs. Research shows that for an average 75% of visitors, the quality of the landscape and countryside is the most important factor in choosing a destination. Between 47% and 75% of visitors felt that wind turbines damage the landscape quality. In North Devon turbines would deter 11% of visitors, at a cost of £29 million and the loss of 800 jobs. Approximately 7% of visitors would not return to Cumbria, which would result in a loss of £70 million and 1,753 jobs. In the South West, just a 5% overall reduction in visitor numbers would lose the region £400 million and 15,000 jobs. Because of the multiplier effect, a reduction of visitors can have far-reaching consequences for the overall regional economy, a fact richly illustrated during the Foot and Mouth crisis. The evidence shows that in some areas, 49% of all sectors of rural businesses experienced a negative impact.

We argue that the current trend towards high levels of wind energy development onshore presents an unacceptable threat to rural businesses and runs counter to almost all other aspects of Government policy relating to the rural economy. This has important implications when assessing the overall cost-benefit equation of the current renewable energy policy.

An important part of the energy equation is measures to improve energy efficiency. Originally planned to be a major part of the Energy White Paper 2003, contributing

up to half of the reductions in CO₂, we question the opportunities for small businesses to play a more positive role, via renewables and microgeneration.

Finally, for the small business sector as a whole, we argue for a change in strategy, one which acknowledges current failings and moves to more balanced, sustainable energy portfolio of low carbon technologies that will serve to ensure security of supply while containing price volatility. These are crucial factors to ensure economic growth and confidence in long-term investment for businesses in the UK.

Recommendations

- 1. Security of supply at stable, affordable prices is imperative for UK's businesses to remain competitive in a global market. Action must be taken now to ensure that adequate quantities of dispatchable, clean, generating capacity is planned, financed and built between now and 2020.**
- 2. In his keynote address to the Social Market Foundation on the 19th of December 2005, the Energy Minister, the Rt Hon Malcolm Wicks MP, was at pains to emphasise that there is no one solution to the energy problem, a position we regard as differing from the twin-track, gas and renewables, strategy outlined in the Energy White Paper of 2003. We welcome this new emphasis on pluralism in the energy portfolio, and fully support the suggestion that renewables, alongside a risk-hedging mix of conventional technologies, are a vital part of the overall energy mix.**
- 3. Existing measures to tackle climate change are flawed and should not be intensified. Rather, the United Kingdom needs to reassess its role in fulfilling its international responsibilities to global climate change policy, and redesign its strategy to provide an economically compelling example to the developing world. A thoroughgoing review of the Renewables Obligation and the Climate Change Levy in line with this reconsideration is, therefore, essential.**
- 4. The new strategy must involve a more balanced approach to renewables for electricity, including expanded support for technologies capable of larger scale firm generation such as tidal and biomass in addition to exploring the potential of microgeneration and renewable sources of heat, particular within local decentralised energy systems.**
- 5. Independent research should be undertaken with small businesses to confirm the level of awareness of renewable technologies relevant to their day-to-day operations and available financial energy efficiency incentives. The results should determine a comprehensive marketing and PR strategy to engage the business community.**
- 6. The effects on the rural economy of onshore wind development should be a material consideration in the determination of the applications for development and should constitute part of the cost benefit analysis. A greater cross-departmental co-operation producing an integrated approach to policy and systematic 'rural proofing' will continue to support a sustainable, vibrant, and diverse rural business sector.**

Security of supply

Businesses are becoming more aware of the issues surrounding security of supply. During 2004/5 the United Kingdom became a net importer of gas, and by 2010 we will be net importers of oil. In November 2005, the Energy Minister Malcolm Wicks acknowledged in less than fifteen years the UK would have to import more than 80% of its gas needs.⁴ Major construction work on pipelines from Norway, and on LNG terminals, is under way, with the costs to be borne by the consumer. Gas prices will rise accordingly, and may be affected by competition for what is now an internationally traded commodity. As analysts point out, where gas prices go, electricity prices soon follow. Moreover, both supplies and distribution infrastructure will also have to rely on the international cooperation of less than politically stable areas such as Russia, the Middle East and North Africa. The possibility that the supply of energy could be used to exert political pressure became a close reality on 1st January 2006. Political tension between Russia and Ukraine led to demands for a four-fold increase in charges for Russian gas. When Ukraine refused to accept this demand, the Kremlin cut off the country's gas supplies. A quarter of all EU gas is piped from Russia via Ukraine, and in view of the dispute the European Commission said that it was concerned that EU supplies would be disrupted just as gas demand reaches a winter peak.⁵

Commentators have also raised concerns about the vulnerability of imported supplies to terrorist attack, or to simple accidental failure in what are, of necessity, very long pipeline systems. Still more worrying, in some respects, is the possibility that the UK will be unable to leverage access to supplies as competition intensifies. The low level of storage capacity of the UK would accentuate the consequences of these events. France, Germany and Italy all have storage capacity equal to 20% of their annual needs, whereas the UK currently has storage for 4% of annual demand.⁶ In exceptionally cold weather this equates to just 11 days supply.

Our peak electricity demand is approximately 60 GW, and the current installed capacity serving this need is approximately 78 GW. Yet within 10 to 15 years it is more or less certain that 44 GW of this capacity will be due for retirement, possibly up to 50 GW if the older CCGT's become obsolete. Most of our coal-fired power stations will be closed due to regulation under the Large Combustion Plant Directive, and by 2023 just one nuclear power station will remain.

While renewable sources have much to offer in terms of additional or supplementary energy, evidence is growing that it is unrealistic to expect the renewable sector to replace our ageing power plant in significant quantities in the short and medium term. The extent to which a renewable sector can replace guaranteed capacity within an existing energy portfolio is known as its 'capacity credit'. Some renewable technologies can provide reliable power with a high capacity credit. Tidal systems and biomass are good examples, but under the Renewables Obligation these technologies offer developers significantly lower margins than wind-power, and consequently the focus at present is almost exclusively on wind, and mostly onshore wind. Unfortunately, the 'capacity credit' or 'substitution capacity' of wind power is very low.⁷ The CEO of E.ON-Netz, one of Europe's largest grid operators, and one of

⁴ Available at: www.dti.gov.uk/news/newsarticle201205a.html.

⁵ "Gas bills may hit new high after Russia cuts supplies", *The Times* (02.01.06).

⁶ House of Lords Select Committee on the EU, "Gas: Liberalised Markets and Security of Supply".

⁷ 'Capacity credit', which is not to be confused with Capacity Factor or Load Factor, is a measure of the degree to which the generator may be said to contribute to the portfolio's 'firm' capacity. A

the world's leading authorities on the management of large wind capacities, points out that, "during periods of calm or storm related shutdowns, traditional power station capacities must be available as a reserve." E.ON-Netz cites two independent studies that reached the synonymous conclusion that the more wind power capacity is in the grid, the lower percentage of traditional generation it can replace. Recent experience shows that Germany's very large wind installation can currently only guarantee with reasonable confidence 8% of its total installed capacity. If as forecast wind power capacity is increased to 48,000 MW, the capacity credit would fall to only 4% of the installed capacity of wind.⁸ In other words, as E.ON Netz puts it quite explicitly, 48,000 MW of wind (ca. 24,000 modern turbines) would replace just 2000 MW of conventional generation, the equivalent to two medium-sized coal stations.

We are aware that the DTI has commissioned research by Mr Graham Sinden of the Oxford Environmental Change Institute suggesting that it would be possible to take advantage of the United Kingdom's landmass to so distribute turbines as to provide a capacity credit superior to that in Europe, though still unimpressive.⁹ However, we must point out that Mr Sinden's work is theoretical, whilst the experience of E.ON Netz is grounded in very extensive empirical experience. Furthermore, at best, what Mr Sinden's report demonstrates is that in order to achieve any significant degree of firm capacity, wind would have to be supported across a very broad range of geographical areas, in very many of which it will be fundamentally uneconomic due to weak wind regimes. In other words, even the modest degrees of firm capacity available under Mr Sinden's scenarios would appear to come at a very high financial and environmental cost. It is disappointing that this economic aspect and its implications are not more fully explored in his study.¹⁰

Wind turbines do, as already noted, provide supplementary energy, and in the constrained circumstances of the future this may well be very welcome. But we must be realistic as to the scale and significance of this contribution. Any new supplementary generating capacity must not only replace the energy output of current plant but also meet a rising demand and do so in an increasingly competitive international market.¹¹ Setting aside the issue of firm power, to replace the energy output of one typical modern nuclear power station with wind would require over 2,000 turbines of 2 MW.¹² In a crowded island it is worth noting that a nuclear power station takes up 1km²; 2,000 turbines would require several hundred times that area. Yet, as already noted, even a very large number of wind turbines such as this would offer almost no reliable capacity towards filling the energy gap.

Serious doubts have also been raised over the effectiveness of onshore turbines as a means of achieving CO₂ reductions. The UK's wind turbines currently amount to 1,315 MW of installed capacity. If, as anticipated by the DTI, wind comprises 7.5% of

generator with a high availability, such as CCGT, might have a capacity credit in excess of 90% since it can guarantee its contribution with a high degree of confidence. Wind, obviously, cannot make such a guarantee. The E.ON Wind Report 2006 offers a useful discussion on page 9.

⁸ Martin Fuchs (CEO of E.ON Netz GmbH), "Wind Report 2005", (Munich, 16 June 2005); a speech delivered on the occasion of the launch of the *Wind Report 2005*.

⁹ Graham Sinden, *Wind Power and the UK Wind Resource* (2005).

¹⁰ Mr Sinden's paper has also attracted criticism of its methodology and use of statistics: see David White, "Statistics and lies", *Chemical Engineer* (Dec. 2005/Jan. 2006).

¹¹ Hugh Sharman, 'Why the UK should build no more than 10 GW of Wind Capacity', *Proceedings of the Institution of ICE: Civil Engineering* 158 (November 2005), 161-169.

¹² Personal communication, Professor Ian Fells.

UK electricity in 2010, somewhere between 7 and 10 GW will be needed.¹³ In spite of this very large installed capacity, the total CO₂ savings achieved under the Renewables Obligation would be, again according to DTI estimates, around 9-11 Mt. This is just under 2% of the UK's 2004 emissions (550 Mt) and 0.04% of global emissions (24,000 mt). This very modest saving would cost the UK consumer nearly £1 billion per year via the Renewables Obligation. As the National Audit Office has indicated in its recent report, this is several times more expensive than the alternatives.¹⁴ The importance of this point is driven home when we bear in mind that there is a growing recognition that the UK can best contribute to global efforts to mitigate climate change by providing an example that speaks in economically persuasive language. This message is not only for the developing world, particularly China, where electrical generation is predicted to grow to almost thirty times that of the UK by 2020, largely from fossil fuels. Concerns about the *economic* impact of climate change policies are proving a stumbling block to commitment from major players such as the United States.

In this context, the experience of our European neighbours becomes relevant. Professor Pfaffenberger, Director of the Bremer Energy Institute at the University of Bremen, and a leading analyst of German policy has written in a recent report that there is unease in Germany about the cost-effectiveness of wind-power to achieve emissions reductions, and he notes that the net economic effect of support for wind has been, it is now thought, negative, largely because of its effects on intensive energy users. Professor Pfaffenberger writes:

“Part of the motivation for promoting renewable energy is to substitute local generation for imported energies and in this way promotes economic activity and employment. A number of studies have been carried out during recent years to investigate the effects of the promotion of renewables in this respect. The results are not very encouraging (see Häder, 2005 and Hillebrand, 2005).¹⁵ Basically, of course, investing in renewable energy plants creates employment in industries producing these investment goods. On the other hand the extra cost of renewables adds to the cost of energy and in this way destroys purchasing power that otherwise could have created demand and indirectly employment in other areas. Whereas the gross effect of spending money on renewables is always positive, the net effect may be negative.”¹⁶

¹³ The exact capacity of wind turbines required to reach this proportion of the target is uncertain, and much debated, due to doubts with regard to achievable capacity factor. Performance in Denmark has hovered around 0.2, and in Germany is significantly below this. However, in the UK the wind industry assumes that 0.3 is likely onshore, due to a supposedly superior wind resource. However, since the instigation of the Renewables Obligation, which has resulted in the first reasonably accurate data for wind turbine output, the performance of the UK's onshore wind turbines, by and large in the most favourable sites, has been 0.241 (in 2003) and 0.266 (in 2004).

¹⁴ National Audit Office, *Department Of Trade and Industry: Renewable Energy*, report by the Comptroller and Auditor General, Hc 210 Session 2004-2005, 11 February 2005. Available from <http://www.nao.org.uk/>

¹⁵ Häder, M., Schulz, E. *Beschäftigungswirkungen des EEG* [Energie im Dialog, Band 6], Frankfurt a.M. 2005. Hillebrand, B., et al. The expansion of renewable energies and employment effects in Germany *Energy Policy*, Available online 6 September 2005,

¹⁶ W. Pfaffenberger, “Renewable Energy Policy in Germany: Experience and Problems: A Short Survey for the Renewable Energy Foundation”, in Renewable Energy Foundation, *Submission to the Stern Review on the Economics of Climate Change* (2005), 13. Available from <http://www.ref.org.uk>.

Professor Pfaffenberger voices the concern that high energy prices will have the effect of exporting jobs. Following recent excessive gas price fluctuations, senior business leaders have warned that intensive user businesses are considering transferring their production out of the UK. It is apparent that our European partners with energy policies favouring wind power are not faring any better. Though small businesses do not, as a rule, consume *large* quantities of energy, this point must be a matter for general concern. Partly because small businesses are disproportionately affected by cost increases and, partly because an economy is an interdependent web, and disturbance in one part of it may be felt at considerable distances.

We conclude, therefore, that it is a matter for significant concern that the current policy appears to depend on a combination of growth in gas and renewable energy generation to address the impending energy gap caused by the decommissioning of nuclear plant (currently supplying 19% of our electricity generation) and coal under the Large Combustion Plants Directive. However, it is reassuring to note that the Chancellor's recent budget speech offers encouragement for emissions capture and sequestration from coal plant, and that the Energy Review promises to look afresh at the nuclear option and its future role in security of supply and reduction in CO₂ emissions. Nevertheless, concerns remain. Without compromising the necessary public engagement and consultation, if a decision is made to maintain or rebuild nuclear power, or indeed to reject that option, it must be taken quickly. The lead-time to bring a new reactor online is estimated at ten years. As the UK no longer has the domestic resources to engineer and construct this plant, it would be necessary to turn to the handful of contractors available and join the world's waiting list. China has recently ordered 40. If the United Kingdom chooses not to engage in a new nuclear program, then the alternative mixed portfolio of clean coal and gas requires immediate and careful planning to ensure fuel supplies, perhaps from a reborn domestic mining industry.¹⁷ Notwithstanding these recent evolutions in the debate, onshore wind continues to be widely publicised as being a very major part of moves to address our energy needs. We judge that the European experience shows that the imbalance towards wind in the current policy will prove to be an expensive and ineffective strategy, and trust that the Energy Review will indeed, as seems likely, offer a much needed corrective.

Onshore wind; Part of the solution, part of the problem

The recent Sustainable Development Commission report, *Wind Power in the UK*, asserts, in somewhat worryingly dogmatic terms, that, "wind power must be made to work".¹⁸ However, authoritative critical commentators have pointed out that the report is based on selective theories and unrealistic calculations. Malcolm Keay of the Oxford Institute of Energy Studies goes further, writing that the Commission are "underestimating the likely costs; minimising the practical problems; overstating the benefits; and dismissing the alternatives".¹⁹ Mr Keay, indeed, draws an analogy with the early advocates of nuclear energy, whose overstatements still tarnish the industry's reputation today. Such overselling, Mr Keay writes, will do wind energy a disservice. We find this argument compelling, and conclude that while wind may have

¹⁷ While most remaining UK coal sources are not easily mineable by conventional means, there is growing interest in other methods such as underground gasification.

¹⁸ Sustainable Development Commission, *Wind Power in the UK* (May 2005).

¹⁹ See, for discussion, Malcolm Keay "Wind Power in the UK: Has the Sustainable Development Commission Got It Right?" (Oxford Institute for Energy Studies: Oxford, 2005). Available from <http://www.oxfordenergy.org/>.

an important part to play in the energy mix, its problems and limitations must be recognised.

Over 80% of the world's wind energy capacity is installed in Europe, and approximately half of that is based in Germany. Denmark, on the other hand, while having a rather smaller installed capacity, is the world's most wind intensive nation, with more capacity per head of population than any other country. It is now widely recognised that the UK would be well advised to look to Denmark and Germany for experience based guidance on what may be expected from extensive deployment of wind power.

Germany hosts around 11,000 turbines with a total capacity of 16,394 MW, which nonetheless only provides 4.7% of Germany's gross demand. The behaviour of this installation is now well known since one major grid operator, E.ON Netz GmbH, which is responsible for integrating 7,000 MW of wind power, and serving a population of 20 million people, has chosen to release data. E.ON Netz has more experience of the practical realities of managing a large wind carpet in a modern grid than any other organisation in the world, and its *Wind Reports* for 2004 and 2005, which are available in both German and English, are consequently amongst the most discussed documents in the energy sector.²⁰ Its principal lessons can be summarised in the words of Martin Fuchs, Chief Executive of E.ON Netz, who described their experience with three bullet points:

1. The wind blows WHEN it likes,
2. The wind blows AS it likes – despite increasingly accurate forecasts it is difficult to predict its actual strength”, and
3. The wind blows WHERE it likes which unfortunately is rarely in places where large quantities of power are required.²¹

Drawing on the main report, Fuchs goes on to describe the effect of intermittency:

“On the morning of 24 December 2004, maximum wind power output in our control area was achieved with an absolute figure of 6,024 MW. However, the supply on Christmas Eve fell to under 2,000 MW in just ten hours. By Boxing Day it had slumped to under 40 MW.”

As E.ON Netz have found, these issues create major challenges to the grid operator. In every power grid, load and demand are balanced dynamically as there is no storage in the transmission and distribution system. Due to its extensive wind development programme Germany is beginning to experience serious balancing problems, problems that are intensifying as the proportion of wind power grows in response to continuing financial incentives.²² Germany has sufficient grid connections with its European neighbours to export power when strong winds coincide with low demand. But this is economically questionable, and in fact E.ON Netz has already received complaints from its Dutch and Polish neighbours, because untimely German exports have taken these national grids to the limits of their capacity. For the UK, an island grid, this is not a management option, should a similar

²⁰ E.ON Netz, *Wind Report 2004* and *Wind Report 2005* are both available from <http://www.eon-netz.com>.

²¹ Martin Fuchs (CEO of E.ON Netz GmbH), “Wind Report 2005”, (Munich, 16 June 2005); a speech delivered on the occasion of the launch of the *Wind Report 2005*.

²² Martin Fuchs (CEO of E.ON Netz GmbH), “Wind Report 2005”, (Munich, 16 June 2005); a speech delivered on the occasion of the launch of the *Wind Report 2005*.

scenario be allowed to develop, and the likeliest route seems likely to be curtailment, which is also practised in Germany.

Most of the German wind turbines are concentrated in the northernmost part of Germany, a degree of concentration that is likely to arise in the UK since the wind resource is predominantly located in the North-West of Scotland and parts of Wales. As in Germany, this is at some distance from the centres of load. The E.ON 2005 *Wind Report* remarks that;

“Very substantial grid expansion is required to carry this energy down to the centres of most demand and to allow the flow of immediate import and export of energy fluctuations in wind power.”²³

The estimates are that by 2020, Germany as a whole will require 2,700 km (1,700 miles) of new or reinforced grid at a cost of €3 billion Euros. Underground cabling, which might reduce the environmental impact, would result in an estimated cost of €15 to €20 billion and is thus unlikely.

A comparison with Scotland is relevant. Earlier this year, NGT revealed that developers are applying for 17,000 MW of wind to be connected to the grid in Scotland, more than is installed in the whole of Germany. Scotland’s electrical inter-connection is currently limited to 0.5 GW with Northern Ireland and 2.2 GW with England.²⁴ National Grid estimates grid expansion at a cost of £250,000 per MW of wind. Thus, if all 17 GW of wind were to go ahead, the cost would be £4 billion in Scotland alone. Presumably, this is unlikely, but the cost of supporting only a fraction of this very large proposed wind installation will be considerable, and controversial, not least because the lines would be under-utilised, due to relatively low load factor for wind, even in favourable sites. It may also be added that the greater the distance between the source of generation and centre of demand, the greater the losses during transmission. Currently these losses are estimated at 10-15%.

The experience of West Denmark has been often referred to but little understood in the English speaking world. However, corrective data is now readily available in two concise and informative articles published in *Civil Engineer* during 2005.²⁵ It has often been said that Denmark generates nearly 20% of its electricity from wind energy, but this is a half-truth, since careful analysis of the generation and net trades on the European grid reveals that Denmark in fact exports roughly 80% of this energy to its neighbours because the wind blows when energy is not required, or when it is unexpected (due to errors in forecasting: even small errors, as little as +/- 1 m/s, equates to +/- 320 MW of power output, or 12% of West Denmark’s wind capacity). Denmark is able to balance its grid in this way due to fortuitously pre-existing interconnectors, an option not open to the UK.

It is clear from this summary that the German and Danish record of wind deployment is far from free of problems, and that these problems continue. Bearing this in mind, the degree of indirect subsidy support made available to wind developers must be regarded as questionable. Suppose a hypothetical 16 turbine wind farm somewhere

²³ E.ON Netz GmbH, *Wind Report 2005*.

²⁴ Hugh Sharman, 'Why the UK should build no more than 10 GW of Wind Capacity', *Proceedings of the Institution of ICE: Civil Engineering* 158 (November 2005), 161-169.

²⁵ Hugh Sharman, 'Why Wind Works for Denmark', *Proceedings of ICE: Civil Engineering*, 158 (May 2005), 66-72; and, 'Why the UK should build no more than 10 GW of Wind Capacity', *Proceedings of ICE: Civil Engineering* 158 (November 2005), 161-169.

in England, with a total capacity of 32 MW. Assuming £20 per MWh as an approximate wholesale electricity price, and £45 as an approximate price for Renewable Obligation Certificates²⁶ we can calculate the total likely output and income:

32 MW (total capacity) x 8760 (hours in a year) x 0.241 (2003 load factor) =
67,557 MWh.

Thus we can calculate the likely income from the RO system:

Electricity income: 67,557 MWh x £20 per MWh = £1,351,140

Renewable Obligation Income: 67,557 MWh x £45 per ROC = £ 3,040,065

Total income: £ 4,391,205

This is a very substantial income from a small stream of stochastically generated power, but electricity sales contribute only approximately 30% of a renewable station's income, while the remaining 70% comes from indirect subsidy paid for by the consumer, whether they have elected for 'green' energy or not.

The SDC Report urges that wind *must* be made to work, but it is reasonable to ask in response "At what cost?" It is difficult to avoid the conclusion that more transparency with regard to the full costs of onshore wind turbines, to the domestic consumer, the business user and the environment, would be highly desirable, and result in a better informed public consideration.

So far we have sketched elements in a rapidly developing debate, which is now clearly showing that our expectations for wind power must be revised downwards, particularly in the light of European experience. However, an unbalanced approach to renewables, with over-dependence on onshore wind, has other unintentional consequences, which are relevant to this matter, and have been hitherto little discussed. The impact on one major industry sector, tourism, raises immediate concern that needs to be addressed.

Impact on Specific Industry Sectors: Tourism

Tourism Minister James Purnell, at the 4th annual European Tourism Forum in Malta in October 2005 stated; "Tourism in the UK is worth more than £75 billion a year, making it the fifth biggest industry in the country. "We've set a tough target to make it worth £100 billion by 2012..."

Clearly this is an ambitious target and will not be achieved through the lead up to the Olympic Games alone. Part of that growth will be from the rural visitor economy, currently worth in England more than £14 billion a year.²⁷

There are many competing interests for use of the countryside, making it a complex arena. Rural tourism is a key component, providing rural communities with sustainable business opportunities. In England it supports between 340,000 and 800,000 jobs, depending whether the definition includes rural towns or not.²⁸ For

²⁶ Based on data available from the Non-fossil Purchasing Authority: www.nfpa.co.uk.

²⁷ Countryside Agency (2002).

²⁸ Countryside Agency, *Tourism and sustainable land management knowledge assessment*.

the urban dweller, the countryside represents a much-needed refuge for day visits, holidays and a diverse range of recreational opportunities.

Rural tourism is unique as a major employer, income generator and source of social cohesion that both supports and depends on the countryside. The economic impact of the visitor economy is extensive, and the multiplier effect ripples through rural communities via suppliers, shops, pubs, restaurants and services. The scale of this knock-on effect can be appreciated from the fact that of the annual £8 billion visitor spend in the South West, accommodation accounts for just 29%.²⁹

The success of these rural enterprises is inextricably linked with the maintenance and conservation of a healthy and attractive rural environment. English Heritage confirms that 40% of employment in tourism depends directly on a high quality environment, rising to 60-70% in rural areas.³⁰ The unique beauty of the UK's countryside is a fundamental element of the industry's marketing strategies. The regional tourist boards capitalise on the countryside for their national and international campaigns. Likewise, thousands of small businesses market the rural product via their websites and brochures. Research confirms that the quality of the natural landscape is cited by up to 80% of domestic visitors as the key factor in determining their choice of destination. This is true whether the visitor is a spectator or active participant in the landscape. As previous landscape preference studies have shown, individuality of perception is still capable of reaching synonymous conclusions; people choose to visit an area because of their enjoyment of the quality of countryside and landscape.

Evidence is rapidly accumulating to confirm that visitors to our landscapes and countryside do not want to see industrial wind turbines. Tourism businesses and organisations are becoming concerned about the impact on their bottom lines if they were to lose their irreplaceable rural appeal.

Northumberland Tourism Businesses

North Northumberland is an area renowned for its beautiful and unspoilt landscape, a beauty, which draws large numbers of visitors many of whom return again and again. Five wind farm applications are proposed with an approximate total of 71 turbines along an 18-mile stretch between the two biggest tourism centres, Alnwick and Berwick-upon-Tweed. Local tourism businesses, aware of the appeal of the landscape to their customers, are becoming concerned visitors may decide to take their feet and their money elsewhere.

A low-key pilot survey led to 1,500 visitors being questioned on their opinion of wind farms in North Northumberland. Around 95% of the visitors agreed that wind turbines would spoil their enjoyment of the landscape. As a matter of urgency, local businesses are planning to execute a full research study to examine the potential damage to their economic futures.

²⁹ South West Tourism, *The Value of Tourism* (2004).

³⁰ English Heritage, *State of the Historic Environment Report* (2002).

Ann Lamb, Director of Barmoor Castle Country Park says:

“Northumberland receives over 10 million visits a year, generating £324 million for the local economy. 36% of the economy hereabouts is tourism related so the threat to our livelihoods is acute.”

Dominic Coupe, of Charlton Hall Holiday Cottages adds:

“Wind turbines don't just threaten the people that live here. The vast majority of our visitors come to us from the urban areas of the North of England. During the peak season, visitors outnumber residents 5 to 1. By this measure, our visitors are far more important than we are.”

In Scotland, where tourism is of such crucial importance to the economy, the danger is acute, as the study carried by Wilderness Scotland, and considered in the following case study, shows.

Case Study

Wilderness Scotland, winner of the VisitScotland Tourism Business of the Year 2005 Award, is the leading adventure tour operator in Scotland. The company offers a wide range of inspirational walking holidays, adventure tours and wilderness experiences throughout the Highlands. As the winner of the 2003 Shell Scotland Award – Best Business Demonstrating Ecological Sustainability, Wilderness Scotland leads the way in “responsible tourism”. Managing Director, Neil Birnie, says “At Wilderness Scotland we have built our operations with responsible travel at the core and are dedicated to running our company along the highest ecological and social standards. We are absolutely committed to engaging local businesses throughout our entire operation. It is our belief that an equitable distribution of the benefits of tourism can provide the Highlands and Islands with a means of achieving economic and social stability. We believe our customers find travel is far more rewarding when they know that the experience is consistent with the conservation and enhancement of fragile environments and communities.”

The stunning scenery of Scotland is an integral part of the business that offers such a unique experience. Concerned about the increasing number of onshore wind farms, Wilderness Scotland asked their customers whether they would consider not returning to the Highlands and Islands of Scotland if wind turbines were built on a significant scale in the wild parts of Scotland. Of the 1,653 replies, 91% stated yes, they would seek unspoilt landscapes elsewhere. 5.7% replied no and a further 2.9% answered no, but stated in their response that they were nevertheless against wind farms.

Managing Director, Neil Birnie says;

“If only a proportion of the wind farm developments go ahead it may prove devastating for our business. This will result in a direct loss of 8 full time and 12 part-time jobs plus all of our ancillary benefits to local businesses and communities. Our local spend in the Highlands is estimated at over £400,000 pounds each year.”



The impact of renewable energy projects on the overall rural economy is, clearly, an area of very significant concern, and one, which needs to be correctly factored in to any full cost-benefit analysis.

Cumbria Business Research

Tourism is worth £1 billion a year to Cumbria, supporting 47,000 jobs. The Cumbria Tourist Board (CTB) represents over 4,000 businesses that are totally or partially dependent on tourism in Cumbria, and for the past ten years has been monitoring performance through its quarterly 'Tourism Business Performance' survey. A section asking businesses for their views on wind farms was included in that for the quarter October-December 2003. Nearly two thirds of those responding agreed that turbines are visually intrusive. While 54% thought wind turbines would increase the 'green' credentials of the county by providing a renewable energy source, 27% believed it would still have a negative impact on the tourism industry by reducing visitor numbers.

Comments were collected from 212 businesses and showed a fairly even balance of strong feeling for both sides of the debate. Overall there was general support for renewables, suitably located, and with a strong preference for offshore turbines.

In 2004 CTB surveyed 344 businesses to ascertain their opinion of a proposed wind farm in their area, comprising of 27 turbines each 400 feet in height. Fifty four percent thought that the turbines would be intrusive and damaging to the landscape. Forty two percent thought that wind farm development in Cumbria would detract from the visitor experience. The number of business owners who believed that visitors would stop visiting completely had increased from the previous study from 27% to 39%.

North Devon Research

North Devon is a rural area where tourism income exceeds £267m and accounts for 18% of employment. Since 1959 the north and west coasts and hinterland form part of the AONB, which covers the coast down to Hartland and Clovelly. A UNESCO Biosphere is located at Braunton Burrows and to the east lies Exmoor.

A small study of face-to-face interviews with twenty-eight tourism businesses in North Devon took place in 2004. With one exception, all the businesses were concerned about visitor reaction to wind turbines. As one owner pointed out, "We understand what our customers enjoy as we talk to them every day they are here."



A research study in 2004 sought the views of a random UK sample of 1,500 holidaymakers, who have either actually taken a holiday in North Devon or shown an interest (by ordering a brochure). Of the 446 replies, 93% had visited North Devon before and 94% were planning to take another holiday again in the near future. When asked what features attracted them to North Devon, 95% chose beautiful countryside. 'A good place to relax' was nominated by 85% while 'beaches' scored 75%. The importance of landscape and countryside on holiday was the most important or one of the most important factors for choosing North Devon according to 72% of the visitors.

Measures were taken to evaluate visitor opinion of wind turbines before and after informing the respondents that turbines in excess of 300 ft were being planned for North Devon. At the beginning of the survey 34% were generally favourable and 66% unfavourable towards turbines. After the size and location of the turbine proposals was revealed, the number of 'unfavourable' visitors rose to 84%.

However, while 77% of visitors disagreed with siting wind turbines in the countryside, nearly 72% said offshore would be acceptable to tourists and 61% suggested at the sides of main roads, industrial sites and motorway service stations. There was also considerable support for other renewables, particularly tidal and wave. If onshore wind was necessary then 49% would elect for one large wind farm rather than numerous smaller clusters (21%) but 30% still insisted they would prefer not to see them at all.

When asked if wind farms would affect their choice of holiday destination, just less than 50% claimed that they would still choose North Devon. A further 39% said they would choose North Devon but subject to the size and location of the wind farms. Eleven percent would stay away from North Devon altogether. This is the lower boundary to the estimate of number of visitors lost. Visitors claimed that if they found wind turbines on their arrival and had not been previously informed, 15% would complain to their tour or holiday operator and around 28% stated they would not go back to that area again.

Cumbria Visitor Surveys

Cumbria Tourist Board has also carried out a number of wind farm related surveys with their visitors. In January 2005 a representative sample of 2,000 people nationwide were contacted. Around 20% strongly agreed that wind turbines should never be built in or near areas of outstanding beauty such as the Lake District. Fifteen percent of people over 50 would think twice about visiting the Lake District if the proposed wind turbines were built. This has worried the Cumbria Tourist Board as this age group represents 40% of Cumbria's current visitor base.

A second face-to-face survey followed in February 2005 with 449 respondents. Almost half thought wind turbines have a negative impact on the landscape and 19% would avoid areas of countryside containing wind turbines. A smaller percentage of 7% claimed they would stay away altogether.

This new research builds on the previous surveys undertaken by VisitScotland³¹ and the Wales Tourism Board.³² The results consistently demonstrate the importance of the landscape in visitors' choice of destination and how they feel turbines would affect their experience. The percentage of visitors likely to be deterred from visiting could have considerable financial impact.

RESULTS OF VISITOR SURVEYS:	% of visitors to whom the quality of the landscape/countryside is the most important factor in choosing a destination	% of visitors who feel wind turbines spoil landscape quality	% of visitors NOT returning to a destination if wind turbines are built	% of visitors who would support <i>offshore</i> wind turbines
VISITOR DESTINATIONS :				
Scotland	81%	62%	15%	49%
Wales	77%	33%	11%	83%
North Devon	72%	75%	11%	70%
Cumbria	68%	47%	7%	-

Certainly the deterred visitors were in the minority. A large number of the visitors surveyed did not feel the wind turbines would make a difference to whether they returned or not to the destination (VisitScotland²³ 68%, Wales Tourist Board²⁴ 63%). However, the VisitScotland report questioned visitors on the premise that 500-600 extra turbines would be built. Three years later, there are 17,000 MW of projects in various stages of preparation, which would mean around 8,000 turbines, predominantly onshore.³³ Even if only a fraction of this enormous total were to enter

³¹ VisitScotland, "Investigation into the potential impact of wind farms on tourism in Scotland" (2002)

³² Wales Tourist Board, "Investigation into the potential impact of wind farms on tourism in Scotland" (2003).

³³ Lewis Dale (Regulatory Strategy Manager, NGT), 'The Energy White Paper - Will it Deliver?', IEE seminar, 19 May 2005, at the Royal Society.

the planning system proper, and be approved, say 25%, this is still nearly four times the number of turbines considered in the survey.

The North Devon study highlighted a similar predicament. The new generation of wind turbines are between 350ft and 400ft high. Few people have experienced construction on this scale. When asked to judge the height of the proposed 22 turbines for a North Devon wind development, 73% underestimated the height of the turbines by at least 100 feet.

Both the Wales Tourist Board and VisitScotland studies reported that over 50% of visitors claimed that electricity pylons and wires had detracted from the experience of visiting the countryside. The question was concerned with pylon ranges as individual 'features', rather than as structures in conjunction with wind farms. Indeed, somewhat misleadingly, wind turbines are often portrayed as 'stand alone' structures. Consequently, visitors' judgements rarely connect the turbines with the necessary supporting infrastructure such as roads, buildings and many miles of extra electricity pylons.

It has been argued by those lobbying in favour of wind power that tourists would view wind farms as attractions, rather than deterrents. A statement on the Friends of the Earth website reads, "There is no evidence to suggest that wind farms deter tourists, indeed many wind farms are themselves tourist attractions." However, this contention, which is widespread, is not borne out either by research or in practice. The following table summarises the results of the surveys already referred to:

RESULTS OF VISITOR SURVEYS:	% of visitors who DISAGREED that wind turbines were an added attraction
VISITOR DESTINATIONS:	
Scotland	74%
Wales	67%
North Devon	53%
Cumbria	28%

Furthermore, empirical experience from sites with constructed wind farms is not encouraging. North Cornwall hosted the first UK wind farm, built at Delabole in 1991. Ten years later a new £5.5m visitor centre was developed on the site with funding from Europe and the South West Regional Development Agency. The Gaia Energy Centre thus opened with much publicity in August 2001. It was expected to attract 100,000 visitors in its first year, rising to 150,000 in its second. Less than 15,000 visitors actually toured the site and financial difficulties led to the centre going into administrative receivership in March 2003.

Mr McIvor said: "When we are talking about an exhibition on renewable energy it is not high on holidaymakers' list of fun things to do while they are on holiday." Gaia Energy Centre 2004

The new owners, Neoventator of Surrey also failed to turn around this 'tourist attraction'. The centre was closed in September 2004 after just three years of operation. Chief Executive, Ian McIvor, said, "Sadly, just like many eco-attractions, they're not sustainable, there's just not enough interest." Having successfully fought a planning appeal, Neoventator is selling the site as an environmentally friendly suite of offices for an estimated £2m.

In 1999 at Swaffham in Norfolk, Ecotricity built what was then one of the tallest turbines in the world. A key feature for the 1.5 MW turbine was a 65m high viewing platform designed by Sir Norman Foster. The adjacent Ecotech Visitor Centre was a £3m Government funded project run by the Ecotech Charitable Trust. Due to financial difficulties the centre was closed to visitors in October 2002. The Trust Chairman revealed that the cash crisis arose because they had forecast substantial income from tourism, but in the event satisfactory visitor numbers had not materialised. A new company Ecotech Centre Limited was established with loans from the local district council and Norfolk County Council. The land and buildings are owned by Breckland District Council and were leased to the Trust for a term of 99 years at a fixed peppercorn rent. In May 1999 the Trust's interest in the property was valued at £1,200,000. When the Trust ceased activities in November 2002 it reduced the value of the leasehold interest to zero. This allowed the new company to take over the 'fixed assets' of the company for £48,000. The Independent Auditors Report stated that in both the case of the Ecotech Charitable Trust and its subsidiary, Ecotech Enterprises Limited, "financial records were not accurately maintained" and of the Trust; "employees responsible are now not available to provide explanations." **Ecotech Centre Limited continues its commercial activities, and the turbine is still open to visitors. In the last financial year, tourism brought in just £11,543.**

While there are financial questions that could be asked of these publicly funded projects, it does suggest that the failure of both the centres was due to the fact that the visitors do not accept wind farms as tourist attractions.

Economic Impact

The counter argument from the wind lobbyists is that there is no 'concrete' evidence that tourists will be deterred. Indeed, it is claimed by BWEA that, "people are generally in favour of wind energy in the UK" and that "There has never been any other result from surveys into wind energy, no matter where or when they were carried out." The BWEA do not, however, differentiate between onshore and offshore. The tourism research concurs with the BWEA that there is considerable support for renewables, particularly for offshore. There is still sufficient evidence to give considerable concern to business owners who rely on the quality of the environment to attract customers. If you take away the product, these businesses will not be able to trade. It is not unreasonable to suggest that a number of visitors will vote with their feet and seek out the solace they need elsewhere. No one is predicting a mass exodus of the countryside. Nevertheless, the research clearly indicates that an average 11% of visitors would not return to a destination should wind turbines be built. The impact on rural economies needs serious consideration.³⁴ The following tables draws a number of conclusions based on the visitor surveys already examined.

³⁴ The estimated figures for Scotland were adjusted to reflect the number of visitors to the countryside. Visitors to Edinburgh and Glasgow were totally excluded. Data for Orkney, Shetland

RESULTS OF VISITOR SURVEYS:	% of visitors NOT returning to a destination if wind turbines are built	Potential loss to the economy	Potential loss of jobs FTEs
VISITOR DESTINATIONS:			
Scotland	15%	£80,000,000	3,750
Wales	11%	£153,450,000	5115
North Devon	11%	£29,418,290	800
Cumbria	7%	£70,000,000	1,753

Applying, this at regional level, if visitor numbers were reduced by just 5%, the loss to the North West economy would be £150m. The South West region would lose £400m a year and around 15,000 jobs. It should be emphasised that these estimates take no account of the high level of repeat business tourism attracts. More than 93% of visitors to North Devon have visited before, 71% are regular visitors to Cumbria, 84% to Scotland and 86% to Wales. It is therefore conceivable, indeed likely, that the actual economic impact of wind turbines would be much higher and the replacement of lost repeat visitors a considerable challenge.

The Impact on the Rural Economy

Our rural economy is a thriving and diverse business sector that contributes towards economic output at a local, regional and national level. Nearly half a million, or one quarter of all registered businesses are in rural areas.³⁵ A growing culture of entrepreneurship and enterprise means today that the number of businesses per head of population in rural areas is significantly greater than is found in urban areas.³⁶ Typically, these businesses are micro in structure; four out of five have less than 10 employees and a turnover under £250,000. Micro businesses, nonetheless, account for 41% of all rural employment.

The Government now recognises that “the countryside is the greatest asset for the rural economy”.³⁷ The Rural Strategy acknowledges that 300,000 jobs are directly dependent on the quality of the natural environment and thousands of businesses are indirectly linked to the countryside and its consumers. Undoubtedly, an indispensable interdependence exists between the countryside, the rural economy and the visitors. This was best illustrated by the effect of the outbreak of Foot and Mouth disease in February 2001. The policies designed to control it were

and the Outer Hebrides was not available. Figures for Wales are from Wales Tourist Board stating 93% of visitors are from the UK and 50% of those visit the countryside, small towns and villages of Wales. North Devon and Cumbria figures are based on rural economies statistics.

³⁵ Office of National Statistics (2003).

³⁶ Countryside Agency, *The State of the Countryside 2005*.

³⁷ DEFRA, *Rural Strategy 2004*.

implemented in reaction to what was thought to be an agricultural crisis. The result was a rural crisis with crippling affects on the rural economy. In effect visitors perceived that the entire British countryside was in quarantine and stayed away in large numbers. Tourism was, unsurprisingly, the hardest hit. The crisis led to the almost instantaneous collapse of the rural tourism industry with estimated losses for England alone over £5 billion.³⁸ What was not anticipated, however, was the knock on effect on other rural businesses.

Two studies by the Centre of Rural Economy (CRE), University of Newcastle Upon Tyne, serve to remind us of the affect of deterring visitors from rural areas.

In March 2001 the CRE surveyed 180 non-farming rural micro businesses to ascertain the impact of Foot and Mouth.³⁹ This was just seven weeks after the outbreak of Foot and Mouth in the North East of England and, significantly, a week before Easter and the traditional start of the visitor season. A number of business sectors were interviewed including, construction, land based, business services, retail, hospitality, manufacturing and transport. Across the board, 28% of businesses suffered a loss of 10% or more of turnover and one in six reduced employment. In greater detail, 84% of the hospitality sector was significantly affected with turnover down by 15% to 100% with an average 64%. 80% of recreation and culture businesses were also significantly affected, as was 40% of retail, in particular antique shops, village shops, meat wholesales, café, and restaurant suppliers.

Businesses were forced to take a number of urgent measures as a result of reduced trade. The most frequent response was to reduce staff working hours. As sales continued to fall with no prediction of how long the crisis would be sustained, standard business practices were suspended.

Business Response to Rural Crisis	% of Businesses Affected
Reduced staff working hours	40%
Cancelled/postponed investment in premises	38%
Cancelled/postponed plans to expand business	33%
Family member working longer hours	32%
Temporarily laying off staff	29%

Source: Adapted from – see footnote 40

Orders were cancelled, marketing curtailed and building and renovation plans shelved. These measures induced impacts on other businesses in the supply chain. The CRE report describes how it is was the firms’ position in the supply chain and the nature and geography of the customer base that determined the level of impact on a business rather than the geography of the disease.

³⁸ English Tourism Council (2001).
³⁹ Katy Bennett, J Phillipson, P Lowe, and N Ward, *The Impact of the Foot and Mouth Disease crisis on rural firms; A survey of micro businesses in the North East of England.* (Apr. 2001).

The sample businesses were surveyed again during September-December 2001 as part of the second CRE report, "Confronting the Rural Shutdown: Foot and Mouth Disease and the North East Rural Economy".⁴⁰ The disease outbreak had abated at this time but widespread restrictions were still in force.

The report acknowledged that it was not possible to measure additional internal and external factors that could be impinging on economic growth. However, the reduction of visitors was found to be the critical factor for not only 84% of hospitality, recreation and culture businesses as expected but also 49% of all other businesses. Non-hospitality sectors most affected were manufacturing and retail. Conversely, not all sectors were consistently affected; both least affected and most affected sectors suffered high impact casualties. Emphasis again was on the customer base and position in the business supply chain. The persistence of impact was still apparent in November with manufacturing, business services, and hospitality worst affected. Around 20% of businesses said it would take up to 2 years to recover.

These painful lessons have been learned and absorbed into the Rural Strategy 2004. It recognises the diversification and dynamic changes taking place in the rural arena while acknowledging that the lynchpin remains the countryside itself. If the strategy is to deliver its promise "to enhance the value and the natural beauty of the countryside for the benefit of society in general" and "to achieve economic rural regeneration through sustainable development" then a closer engagement with the details of the UK tourism industry is indispensable.

Sustainable development, as defined by the Rural Strategy, is characterised by "integrating and balancing environmental, social and economic considerations at every stage."⁴¹ Recognising its potentially negative impact on the environment, UK tourism has long embraced the ethos of sustainability. Today UK tourism is striving to be a role model for sustainable practices. Businesses are investing in energy efficiency, recycling and local purchasing. Many are gaining international accreditation through sustainable programmes such as the Green Business Tourism Scheme. Local partnerships are operating visitor payback schemes that include visitors as stakeholders in reinvesting back into the conservation of the environment they enjoy. It is in the industry's interest to maintain and improve the environment and to contribute to the economic and social stability of local communities.

This symbiosis represents the greatest prospect of achieving the Rural Strategy 2004 goals and the Government's sustainability agenda. In contrast, the current onshore wind policy is at odds with the concept of sustainability. For the majority of onshore wind developments, the environmental costs are local and the benefits are invariably taken or delivered outside the region. In the most striking cases, a large-scale wind farm may be entirely financed by overseas investors, using imported equipment and a team of specialist contractors to oversee the installation. Once operating no one is employed on the site and the income and profits from the Renewables Obligation scheme are repatriated back to the investor country.⁴²

In conclusion, there is still a worrying degree of polarisation in approaches to the urban and rural economies at a national level. It is essential that steps be taken to achieve more satisfactory levels of harmonisation and collaboration in policy making.

⁴⁰ Jeremy Phillipson, P Lowe, and T Carroll, *Confronting the Rural Shutdown: Foot and Mouth Disease and the North East Rural Economy* (July 2002).

⁴¹ DEFRA, *Rural Strategy 2004*, p. 6

⁴² CLA, *Renewable Energy – more than wind?* (2005), 44ff.

Only a cross-departmental, integrated, approach, and a concerted effort to achieve systematic ‘rural proofing’, will continue to support a vibrant and diverse rural business sector. In the longer term we believe that the government should consider the creation of an independent overarching energy agency to achieve satisfactory levels of consistency.⁴³

Alternative Renewable Strategies

In his keynote address to the Social Market Foundation on the 19th of December 2005, the Energy Minister, the Rt Hon Malcolm Wicks MP, was at pains to emphasise that there is no one solution to the energy problem. We welcome this emphasis on pluralism in the energy portfolio, and fully support the suggestion that renewables, alongside conventional technologies, are a vital part of the overall energy mix. However, we ask for a more balanced approach to renewables. Any review must undertake to reassess the Renewables Obligation Scheme and the Climate Change Levy to remove the barriers to growth for renewable technologies capable of proving ‘firm’ capacity. We would also suggest a strong focus on three other areas:

1. Expanded support for renewable technologies capable of larger scale deployment, such as tidal and biomass
2. Exploration of a decentralised energy system through the development of microgeneration.
3. Formulation of a comprehensive marketing strategy for energy efficiency incentives.

Case Study – Larger-Scale Renewables

“A 19th century idea, built with 21st century values”

A £600 million plan to build the world’s first ‘green’ bridge is waiting in the wings to span across Morecambe Bay. ‘Bridge Across the Bay’ is the company led by a dynamic consortium of private investors aiming to exploit the energy potential of the UK’s second largest embayment. The engineer George Stevenson first suggested the idea of a bridge across Morecambe Bay in 1834. Today, the bridge will incorporate tidal turbines. A major piece of independent research (commissioned by Bridge Across the Bay) on the tidal energy resource in the Bay is proving invaluable in progressing discussions with tidal turbine developers. Electricity will be transmitted into the National Grid via Heysham Power Station. Reliable, renewable energy is only one of the benefits, the company claims. The bridge could be about 12 miles long and take 15 minutes to cross, which will save the usual journey time of over an hour, saving CO₂ emissions and reducing distribution costs for small businesses in the area. The NWDA and others are said to be interested in the opportunities for regeneration that would be presented by opening access to disadvantaged areas such as Morecambe, Barrow and West Cumbria.

The company applied, unsuccessfully, for funding through the DTI

⁴³ See, for example, Dieter Helm, *A new British energy policy* (Social Market Foundation, 2005). Available online from www.dieterhelm.co.uk.

Technology Programme, but Chief Executive Hazel Broatch is not despondent. She says, "The feedback and advice we received was excellent. We hope to secure funding for the capital development stage. There is tremendous potential for tidal turbines in the UK, especially slow flowing settings such as Morecambe but we need Government intervention to accelerate this technology from the research and development stage to market readiness."

Bridge Across the Bay continues with extensive research and consultation with key stakeholders, the public and private sectors and is commissioning environmental, societal and economic impact assessments.

The recent "Potential for Microgeneration"⁴⁴ report from the Energy Savings Trust suggests that, "Microgeneration could deliver significant efficiency and CO₂ benefits, through increased use of renewables, utilisation of 'waste' heat from electricity generation or renewable heating fuels, and avoidance of losses in the electricity transmission and distribution system." It claims that microgeneration could potentially provide 30-40% of the UK's total electricity needs and help reduce CO₂ emissions by 15%.

Small businesses have been the driving forces in renewables innovation. Positive opportunities abound in this field for small businesses. Moreover, microgeneration could assist businesses to escape the unpredictability and volatility of energy costs increasingly impacting on profitability.

Case Study – Microgeneration

Award winning Kensa Engineering is the only UK manufacturer of a full range of ground source heat pumps. Systems are available for any size building whether for heating or cooling. Kensa claim they offer the lowest carbon emission method of heating any building (except for biomass).

The system works on an average 1:4 ratio; a 4 kw power output would use 1 kw of electricity and draw 3 kw of natural heat from the ground, using a range of Slinky ground arrays attached to a heat pump. Connected up to domestic heating systems such as radiators and under floor heating, the reduction in heating bills could be approximately 75%. The compact heat pumps are also maintenance free with a life expectancy design of 25 years. Managing Director, Richard Freeborn, also points out that domestic users can apply for a £1,200 grant from the Clear Skies programme.

A unique feature with a Kensa ground pump is that it is supplied as a complete 'kit', including matching slinky ground arrays that are easily installed by any plumber. Kensa sees it has broken the market barrier by avoiding specialist installation contractors and the need for installation training.

⁴⁴ Energy Savings Trust, *et al*, *Potential for Microgeneration Study and Analysis Final Report* (Nov. 2005).

Based in Falmouth since 1999, Kensa employs 15 staff but are aiming for rapid growth in 2006

However, to develop microgeneration would require a comprehensive decentralised approach to energy policy and planning. The Government would have to maintain grant schemes while implementing an ongoing strategy to determine the policy measures needed to take such technologies from the adoption of early niche markets to the commercial mass market and thus become cost effective. Kensa's Managing Director, Richard Freeborn says he is "very happy with what the Government has done in terms of grants. We see the problem being the lack of money being used for public awareness." Lack of consumer awareness was also cited as a barrier to growth by the Energy Savings Trust report.

We would expand this theme by suggesting that the lack of a co-ordinated marketing strategy has left a number of capital energy efficiency incentives available for businesses poorly publicised. Initial informal enquiries would suggest a large number of businesses are unaware of such schemes as the Enhanced Capital Allowances that give 100% tax relief on spending on qualifying energy efficient plant and machinery. The Carbon Trust offers interest free loans for renewable capital equipment, although there may be a case to lower the minimum loan rate of £5,000 to £3,000 to encourage participation from micro businesses. We believe small businesses should be encouraged to be pro-active to mitigate the impact of new legislation such as the Energy Performance of Buildings European Directive. Initially the directive will demand minimum energy performance standards in all new buildings and for larger existing buildings, above 1,000m², that are subject to major refurbishment. Crucially, all commercial buildings will require an Energy Performance Certificate whenever a building is constructed, refurbished, sold or rented out. As international property company, GVA Grimley, points out, "the Directive is pivotal because it will make the entire property stock accountable to the demands of energy efficiency."⁴⁵

Independent research should be undertaken with small businesses to confirm the level of awareness of renewable technologies relevant to their day-to-day operations and available financial energy efficiency incentives. The results should determine a comprehensive marketing and PR strategy. Of the 4.1 million businesses in the UK, small businesses represent 99.1%⁴⁶ To help achieve CO₂ reductions and increase energy efficiency the Government must do more to engage the small business community. This lack of communication must be addressed.

Conclusions

As Malcolm Keay of the Oxford Institute of Energy Studies states, "the policy measures favoured in the UK and EU have not delivered significant CO₂ reductions and are clearly inadequate to the longer term challenge."⁴⁷ It is a view supported by

⁴⁵ GVA Grimley LLP, *Commercial Property, Energy Use and Sustainability*. Available at <http://www.gvagrimley.co.uk/2529.xml>

⁴⁶ DTI.

⁴⁷ Malcolm Keay, "CO₂ Emissions Reduction: Time for a Reality Check?" (Oxford Institute for Energy Studies: Feb. 2005), p. 1.

the Royal Society.⁴⁸ While acknowledging the difficult issue of how the UK can achieve an adequate supply of affordable energy while cutting emissions, Sir David Wallace, Vice President of the Royal Society, warns that the Government is still overestimating how much the UK can cut its carbon dioxide emissions without changes in current policy.

There is great potential to utilise the wind resource through low-key community projects and roof-top micro generation. Offshore wind, although not without its own difficulties, has yet to reach its potential but will need more investment. There are also undoubtedly suitable onshore sites. Nonetheless, applications for onshore developments in vulnerable landscapes should continue to be assessed on a case-by-case basis, with a compulsory element to measure the impact on tourism and the local economy through robust independent research. Tourism businesses and visitor dependant businesses must be engaged in the process.

There are alternatives to onshore wind developments to secure energy supply and reduce carbon dioxide emissions in a way that will provide the economically compelling example required to encourage the developing world to do likewise, and in a truly sustainable fashion. Indeed, we would argue that the established UK tourism industry represents an efficient, effective and sustainable use of our countryside and landscapes, and as such provides a model for the deployment of renewables and climate change mitigation strategies.

The Energy Review must deliver a new strategy to secure a supply of energy at an affordable cost to the consumer, which must include the business consumer, while at the same time providing cost-effective emissions abatement. These are crucial factors for the long-term economic, environmental and social sustainability of the United Kingdom.

Recommendations

- 1. Security of supply at stable, affordable prices is imperative for UK's businesses to remain competitive in a global market. Action must be taken now to ensure that adequate quantities of dispatchable, clean, generating capacity is planned, financed and built between now and 2020.**
- 2. In his keynote address to the Social Market Foundation on the 19th of December 2005, the Energy Minister, the Rt Hon Malcolm Wicks MP, was at pains to emphasise that there is no one solution to the energy problem, a position we regard as differing from the twin-track, gas and renewables, strategy outlined in the Energy White Paper of 2003. We welcome this new emphasis on pluralism in the energy portfolio, and fully support the suggestion that renewables, alongside a risk-hedging mix of conventional technologies, are a vital part of the overall energy mix.**
- 3. Existing measures to tackle climate change are flawed and should not be intensified. Rather, the United Kingdom needs to reassess its role in fulfilling its international responsibilities to global climate change policy, and redesign its strategy to provide an economically compelling example to the developing**

⁴⁸ Available at: <http://www.royalsoc.ac.uk/news.asp?id=3148>

world. A thoroughgoing review of the Renewables Obligation and the Climate Change Levy in line with this reconsideration is, therefore, essential.

4. The new strategy must involve a more balanced approach to renewables for electricity, including expanded support for technologies capable of larger scale firm generation such as tidal and biomass in addition to exploring the potential of microgeneration and renewable sources of heat, particular within local decentralised energy systems.
5. Independent research should be undertaken with small businesses to confirm the level of awareness of renewable technologies relevant to their day-to-day operations and available financial energy efficiency incentives. The results should determine a comprehensive marketing and PR strategy to engage the business community.
6. The effects on the rural economy of onshore wind development should be a material consideration in the determination of the applications for development and should constitute part of the cost benefit analysis. A greater cross-departmental co-operation producing an integrated approach to policy and systematic 'rural proofing' will continue to support a sustainable, vibrant, and diverse rural business sector.

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