

Response to consultation on the Government's Renewables Energy Strategy

by Transition Brighton & Hove (TBH) Energy Group (EG)
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*Question responses immediately precede the Conclusions and Recommendation
towards the end of the document.*

1. Introduction and polemic

The problems we face on climate change and energy resource depletion are not just technical, but political.

It necessitates that political decision makers and other activists highlight the importance of the Renewables Revolution, as a confluence of events as significant as the Industrial Revolution, which gave birth to many aspects of the way of life of the world in which we now live. This unfolding of history covers all aspects of energy, from the technical to the personal, and is directly connected to issues of energy efficiency.

Every country needs to adopt and stimulate a driving force of political commitment and mobilisation of resources commensurate with the effort that free and democratic countries put into the Second World War.

What is required is more than a short term immense effort – we must maximise our resources over an event horizon which exceeds the lifetime of many, to both cooperate at international levels to an unprecedented degree, and also, amongst other things, to localise the production of materials, goods, foods and other services so that consumption of fuel in transportation is significantly reduced.

It requires leadership and foresight, under the knowledge that we cannot achieve what we need to achieve without common endeavour. Our peoples, and the peoples of the world, from many cultures and backgrounds, from many political systems, and with many different beliefs and ideas, as a common humanity, need to rise up to the challenges which now impose upon us, because the consequences we face, if we do not succeed, and we must succeed, are dire to state and amount to a global catastrophe unprecedented in human history.

2. What are the primary concerns?

As is noted in [1] three crises beset humankind. In order of increasing severity and long term effects, they are a world financial crisis, an energy and resource crisis, and a climate crisis. In the words of [10], “the level of effort required to bend the global emissions curve [of CO₂] in time is Herculean”. For a more apocalyptic view of climate change of some of us, see the website reference [2].

The Government consultation is written with the express intention of writing policies that meet the 2020 renewable energy target of the EU. However, the mission of the UK government is not to meet EU targets, but to promote the welfare of UK citizens and residents. Before drafting any policy, it is necessary to ask if the EU targets are appropriate and sufficient to prevent any of the major problems likely to arise as a consequence of the threats of climate change and fossil fuel depletion. A careful analysis of the issue reveals that the EU targets are too conservative, and meeting them is no guarantee that major upheavals will be prevented.

Bigger emission cuts are needed if the EU is to meet its own target of limiting temperature increases to two degrees Celsius compared to pre-industrial levels. It has been estimated by James Hansen [11] that to avoid two degrees of warming we require a global emissions cut of 60% per capita between now and 2030. Nathan Rive et al, in a paper published on the scientific journal Climatic Change in March 2007, estimate that to obtain a 50% chance of preventing more than two degrees of warming requires a global cut of 80% by 2050 in total emissions. From the point of view of climate change, anything less than a 30% reduction by 2020 is dangerously conservative.

Climate change is not the only energy issue surrounding fossil fuels, though. The other concern is depletion. Oil depletion, also known as "peak oil" has been studied extensively, and forecasts coming from bottom-up analysis on average suggest a peak in production around 2010 and a decline around 2% after the peak. There has been less analysis done for gas, but it is generally agreed that peak gas should occur during the next five years after peak oil, and the decline is expected to be sharper.

A comparative of different forecasts from different sources for peak oil can be found here: <http://www.theoil drum.com/node/3720>

The most recent analysis for peak gas by the geologist Colin Campbell can be found here: <http://www.peakoil.net/>

Fossil fuel depletion needs to be taken into account because oil and gas are expected to decline sooner than coal. It is not realistic to design a policy that assumes unlimited availability of a depleting resource, but UK government forecasts so far have assumed exactly that, including those that assume an increase in renewable energy. Given that almost all of our transport uses oil-based fuels and oil availability is bound to decrease in the very near future, any renewable energy policy that does not have as one of its main goals to encourage vastly improved efficiency in transport, and to reduce unnecessary transport as much as possible, will have to be quickly abandoned as reality differs more and more from the planning.

3. How should the UK government respond?

3.1. Change standpoint from risk assessment to contingency planning.

Purpose The purpose of the Government's renewable energy strategy (hereafter called the document) is to gradually reduce the burning of fossil fuels to combat climate change from global warming. Climate change is like a Great Storm, which has been long foreseen on some radar screens and denied on others. Most western governments at last acknowledge its reality, but believe that it is not forecast to seriously affect our western way of life for at least a decade, so the issue has a low priority.

Renewables used to be called 'alternatives' and treated as secondary to the primary fuels, which were fossil and nuclear. This stigma is still visible in the attitude of the writers. The standpoint of the document is therefore the leisurely one of making risk assessments and arguing probabilities (on the one hand... on the other hand...) as if we have plenty of time. Bearing in mind that the document was published 3 months ago, in June 2008, this standpoint was not *unreasonable*. However, the events of the last 2 weeks of the consultation period have changed that standpoint to now being *unreasonable*, and made the document look like rearranging the deckchairs on the Titanic.

Great storm? Over the weekend of 13th Sept, a great storm (hurricane Ike) did \$1 trillion damage to southern USA, flattening the insurance industry. Two unsinkable companies (Excel travel and Lehman Brothers bank) went bust on what is now known as black Sunday (14.9.08) Reputable commentators are saying that a Wall St crash like 1929 is imminently possible. Politically the world scene is as tense as it was at Munich in 1938. Government leaders posture a steady hand at the helm, but the timing of the arrival and the ferocity of the Great Storm is not predictable, and may turn out to be beyond anyone's control.

The document should acknowledge that the Great Storm threatens the whole of humanity with a global catastrophe unprecedented in human history. It was caused by the greed of us in the west who collectively consume more than 3 planet's worth of resources. The onus of us in the west is to put that right by adopting the following policies so that our people, and the people in the rest of the world, can have a future.

Precautionary principle Our main comment on the document is that the place from which the writers are coming is wrong, and should be changed. The government's *standpoint* is based on the unspoken underlying assumption (paradigm) that continued foreign energy supplies of Russian gas and OPEC oil can be taken for granted as a fixed *given* for the term of the study, namely at least until 2020 or even until 2050. The events of black Sunday show graphically that this assumption is not only *untenable*, but *absurd* and even *ridiculous*.

For the document to be worthy of the name of policy, that standpoint should be changed to the *precautionary* principle and the assumption should be changed to assume the inconvenient truth that imports of foreign gas and oil could stop at any time. This requires a paradigm shift in thinking and attitude, which sees renewables as *primary*, and fossil fuels as secondary, and temporary.

The Transition Town movement This was formed two years ago in 2006 to challenge this false underlying assumption in the collective mind, and promote a paradigm shift. We ‘transitioners’ acknowledge that the west is dependent on (and addicted to) gas from Russia and oil from the Middle East which the west does not control, and which could be turned off at any moment, whether war is declared or not.

We are aware of the many vested interests who are in denial of this truth. It is hard to get a man to understand something inconvenient when his salary depends on him *not* understanding it. We are campaigning to influence others to our views, including government, hence this response. Whether we influence policy or not, we are nevertheless doing what we can in our own back yards to mitigate against this eventuality.

The document should come from the same *position* as that from which the transition town movement is coming. That is the recognition that western society is cruising on an ocean liner (like the Titanic) which is not only *sinkable*, but could hit an iceberg and sink at any *moment*. The document should therefore be rewritten to stop talking ‘ifs’ (rearranging the deckchairs) and start talking about the action required by government staff and citizens between now and the inevitable ‘when’ that the sinking occurs (build lifeboats)

D day Changing that standpoint and assumption changes everything in the document, which is why it should be rewritten. As the saying goes: ‘the thought that you may be hanged tomorrow concentrates the mind wonderfully’. The newly concentrated mind should take the position of acknowledging that sooner or later the west’s foreign gas and oil supplies will cease at an anticipated future moment, which henceforward we call ‘D day’.

The document should be rewritten as the government’s plan for the contingency of the cessation of foreign oil and gas, (hereafter called the contingency plan) The plan should include the action required by national and local government and citizens in the run up to D day, whenever that might occur. It may be weeks, months, years or decades away. The more that the idea of a D day is in the mind of public opinion in the west, the better the contingency plan will work, and the further away D day will be pushed and recede.

Commodity or right? Petroleum products should be seen for what they really are, namely *commodities* to be traded, rather than *rights* to be taken by force by the strongest country that imposes its will on weaker countries who happen to have them. Some of us believe the latter was the position and assumption of George Bush and Tony Blair when they invaded Afghanistan and Iraq, and is the current position now when our alliance is threatening Iran and Russia.

As the representatives of us in the west, our political leaders are behaving like addicts who will stop at nothing to get the fix of oil to which we have become addicted. We transitioners have a name for this addiction, and its resulting affliction: ‘Post Petroleum Stress Disorder’ (PPSD) We are in process of drafting an ‘Energy Descent Resilience Action Plan’ (EDRAP) which is like a 12 step programme to dry out the west of its addiction to oil, the essence of which is contained in this submission.

Top priority The priority of the contingency plan should be pushed up to the very top of the political agenda. Whether this is declared or not, we in the west are in a state of emergency, and at cold war, if not hot. As in 1938 the realisation that we needed to rearm against Hitler meant that we when war broke out we had a years' preparation behind us.

This time the boot is on the other foot, as we have been the agressor. However we have driven the Russians so far that they could strike first in self defence. Bush should back off to avoid another world war, and we should build renewables with the same urgency and attitude that prevailed from 1938 to 1945 ('don't you know there's a war on?') Any foreign gas and oil that the west is fortunate enough to receive between now and D day should be used primarily to mitigate the effects of their inevitable subsequent cessation after D day.

Target 100% renewable electricity by 2020. Al Gore pointed out in a speech last July the craziness of western policy, saying: 'we are borrowing money from China, to buy oil in the Gulf, to burn and wreck the planet'. The solution is simply to stop, by adopting the policy of making 100% our electicity supply renewable by 2020. Some of us believe electric vehicles should replace petrol and diesel ones, and replug into the renewable mains every night to recharge their batteries. Others of us disagree strongly – that this is not reasonable given the energy flow required by private transport.

Al Gore is right, and we urge all national and local governments throughout the world to adopt the 100% policy on renewables by 2020 as their central objective. He points out that the price/demand curve of fossil fuels is inexorably *upwards*, whereas that of renewables is inexorably *downwards*. That single policy could create a secure and better future of new jobs for everybody in the world, and eliminate the cause of wars over oil, securing the world peace that all citizens want.

3.2. Contingency plan for cessation of foreign gas and oil

What will happen? What will the effect be in Europe and USA after D day, when Russia turn off the gas tap and OPEC turns off the oil supply? These are two separate events, and so will probably occur at separate moments in time. However, the precautionary principle requires the worst case scenario to be considered, which is that they occur as substantially the same time.

The only occasions in the past which give us any answer to this question are the OPEC price hikes in 1973, (about 300%) 1979 (about 100%) and July 2008 (about 50%), These gave us brief glimpses or hints of what the consequences might be. There were long queues at filling stations, business was disrupted, and recession followed.

Cuba 1990 The example to study is Cuba, because they had become dependent on the Soviet Union for oil and gas which suddenly ceased in 1990 after the Union collapsed. Cubans had to make a rapid adaptation, and now consume a seventh of the energy per capita of the USA. We in the west would have to do the same. The longer

the period that we have before D day, the better we will be able to adapt, and less disruptive that adaptation will be.

A working hypothesis is that our petrol pumps will sometimes run dry, and some of our journeys by car, bus, train, and plane will be curtailed. Our lights will sometimes brown out or black out in our homes and offices, sometimes disrupting our computers and phones. Our shops will sometimes run out of goods. Water supply will be intermittent, and our taps will sometimes run dry. People will sometimes be hungry, if not starving.

To mitigate these effects we will again have to ‘dig for victory’ and localise the production of food, materials, goods, and services so that consumption of fuel for transportation is significantly reduced. Rationing may have to be introduced. This is a big subject which is well covered in the Transition Handbook – from oil dependency to local resilience.

Civil Defence The contingency plan for that state of emergency should be modelled on the old Home Guard and Civil Defence plans. The overall aim of the plan should be to make everyone in UK independent of foreign energy supplies (oil and gas) as soon as possible, and by 2020 at the latest.

When choosing between alternative renewable resources the key issue is *energy return on energy invested*. This is calculated by estimating the kWhs delivered over their lifetime divided by the energy required to build, run and decommission them.

For example (the author acknowledges references are needed here, and others are sceptical until these are provided. We have not supplied them)

- Wind turbines take little energy to build, and can deliver energy returns of up to 100 times, (i.e. they deliver 100 times *more* energy than that required to build, erect and commission them).
- Coal fired power stations barely return 1, (i.e. they consume *as much* energy in building the station and mining and transporting the coal as they provide in electricity).
- Nuclear power stations return less than 1 (i.e. consume *more* energy in building them, mining the uranium, and disposing of the waste, and decommissioning).

We compare the “*Credit Crunch*” with the “*Energy Crunch*”, as the energy debt will catch up with us sooner or later.

3.3. Electricity generation security

Emergency generation Modern society’s greatest dependency is on computers – depending on a secure electricity supply to keep them running. Every town should plan to have local generators for at least the town hall, so the government machine can continue to work. Emergency generators should be installed as soon as possible, as in Woking. Ideally these should be renewables, but if fossil fuelled, the fuel should be reserved for emergency use only. Note the compatibility between much of our computing and comms equipment and low voltage DC as provided by renewables and local Lead Acid storage – standard backup supplies use DC.

4.

Responses to questions

UK RENEWABLE ENERGY STRATEGY JUNE 2008

Q1: How might we design policies to meet the 2020 renewable energy target that give enough certainty to business but allow flexibility to change the level of ambition for a sector or the level of financial incentive as new information emerges?

It is essential that *tariffs and business models* are developed which reward low consumption and distributed generation. Links between access to ultra low use tariffs and high energy efficiency in both the domestic and commercial sector need to be urgently developed. This will enable those who invest to reap the benefits of near nil energy bills below a certain consumption level.

Grant aid for energy efficiency: This is well developed and should be continued with vigour to extend the benefits of energy efficiency to low income households. We believe there should be a stable financial environment for companies provided with grants to enable the very necessary work on increasing domestic energy efficiency. This means that grants should not 'dry up' when their financial allocation is exceeded. Grants should be set at a long term level, i.e. reduced by small decrements if necessary on a per installation basis, so that companies do not first of all take all the allocation, and then when it is used up, go into receivership. Previous policy in this respect has not been a sensible way of encouraging the uptake of energy efficiency in the domestic environment.

Q2: To what extent should we be open to the idea of meeting some of our renewable energy target through deployment in other countries?

Renewable energy target: The suggested target is 20% by 2020 across the EU. We agree a cross European strategy is sensible as there is diverse geography and weather, hence an opportunity to accordingly maximise renewables opportunities. However the UK target of 15% of TOTAL energy coming from renewables by 2020 should be sourced within the UK based on an achievable plan. If member countries achieve surplus capacity this should be available at a preferential rate compared to the installed fossil base.

Renewables offset schemes, and negotiations with other EU states: The UK government, in its desire to maintain the Renewables Offset schemes, should not prevent other EU nations from adopting policies with intended similar effect that differ from those of the UK.

Bogus schemes: There is an urgent need for transparency and confidence in environmental measures. A number of Carbon Offset schemes are bogus and unmonitored. As an example mentioned in Private Eye, in a recent case a businessman and UK government advisor on the environment has been very heavily fined by the Brazilian authorities for logging forests. The penalties for Carbon Offset fraud should be equivalent in all categories to that for financial fraud and theft

Q3: In the light of the EU renewable energy target, where should we focus further action on energy efficiency and what, if any, additional policies or measures would deliver the most cost-effective savings?

We ABSOLUTELY support the need for *energy efficiency and increased renewables deployment*. We re-emphasise it is essential that tariffs and business models are developed which reward low consumption and distributed generation. Possible links between access to ultra low use tariffs and highly energy efficient housing should be developed, enabling those who invest to reap the benefits of near nil energy bills below a certain consumption level.

Low use tariffs which reward minimum consumption should be made.

The OFGEM *regulator* should impose a standard tariff structure and pricing breaks, so consumers can simply compare costs on a pence per kWh basis. This will encourage genuine competition. Tariffs should be developed to have single annual rise in the spring (April) fixing for the next 12 months, consumers having the right to switch at any time.

We also stress the need for *load matching* – grid demand follows a predictable pattern whereas renewables availability does not. Local energy (residential scale) storage needs to be provided using existing technologies as well as RandD to develop and support large scale (commercial) energy storage. This will be an unchanging requirement for renewables, given their variable nature.

Large scale energy efficiency projects (NW negawatts): Energy saved is energy that does not have to be provided, so it is sometimes called *negawatts*. There are many ways of doing this, from switching TV and computers off, rather than on standby, to insulating buildings, to large scale schemes.

LED traffic lights: We put forward the proposal for a UK statutory requirement forcing local authorities to adopt traffic lights that have an energy efficiency equal or greater than current LEDs. Although their replacement used to be a large capital investment, it has a quick payback, and the unit cost would come down dramatically if every town in the UK bought them. A website reference is [4]. This is a good and easy way of reducing energy consumption in the municipal services and transportation sector. The use of LED traffic lights is universal in the US because they consume less than half the energy of normal traffic lights and have greatly extended bulb life, it should be universal here, and the government can do something about it

Buckminster Fuller's ideas: There is an EU solar generated energy scheme based on Buckminster Fuller's ideas for transmitting electricity hyperefficiently over large distances.

Local energy storage is already available and viable in the form of deep cycle lead acid batteries (and other means). Local Authorities should implement demonstration projects across a range of housing stock. (see US Dept. of Energy

www.solardecathlon.org competition for what is possible – we suggest UK initiates a similar competition based on local conditions).

Smart metering and demand management should be promoted urgently. Widespread Internet availability provides for coordinated management of high load activity. Smart metering should really be integrated with tariff management to ensure low consumption and off peak patterns of use are rewarded.

Electricity metering library loans: Brighton & Hove Transition Energy Group has been considering setting up a scheme for electricity metering library loans, which is a commendable idea and one we think could be adopted elsewhere. The metering equipment to monitor electricity consumption of domestic appliances is a little expensive for the less well off – see <http://www.maplin.co.uk/Module.aspx?ModuleNo=220934&source=1>. There is also thermal imaging kit that is more expensive. We propose that public libraries issue loans to their membership of this metering equipment, in a similar way that they issue loans of books, CDs and DVDs.

We suggest *Energy Audits* are rolled out across residential properties as a matter of urgency with key recommendations to be acted on within 6 months. This would have a direct effect within 12 months. The Audit should be structured include fast EROIE measures as well as biggest saving measures. 80% of housing in place now will be in place in 2050.

We suggest a target of £1bn per year income from *exported renewable energy* (Executive Summary Para. 66) is most unlikely. The Executive Summary suggests 130 TWh of RE is required with offshore wind providing 50 TWh – a £1bn export at £50/MWh is approximately 20 TWh = approximately 40% of our capacity. It is unlikely this will be available.

Q4: Are our assessments of the potential of different renewable electricity technologies correct?

The 25 GW figure of offshore wind as in para. 6. (Executive Summary) equates to approx 8 GW yield. There is an urgent need for *clarity and consistency of use and application of units*.

We are *not convinced the RO is a real success*.

Wind schemes have gone ahead in poor wind regimes and are not delivering as they should. Schemes in poor wind regime locations are yielding 20%, compared to a reasonable site yield of 30%. This is in fact half that possible from the best locations which yield 40% or more. A break down of installed sites and performance is here: <http://www.ref.org.uk/Files/ref.red.wind.06.08.pdf>

There is little quantified note of the potential contribution of *wave power* – example of Pelamis, a 3.5m dia. 140m long flexible barrage rated at 750kW with yield of 25-40%. At 40 per km² this equates to energy density of approx. 10MW/km² (at 30%

yield) compared to London Array Offshore wind target of approximately 1GW*30%yield/245 km² = approx 1.2MW/km². We suggest this technology is promoted more strongly to give the UK a greater geographical distribution of generation and supply resilience. Economics are claimed to be very competitive on a pence/kWh basis. www.pelamiswave.com/

Solar is developing with major recent improvements in material efficiency: <http://www.nanosolar.com/>. The US is installing utility scale PV projects.

Energy storage through *electrolysis* may be advancing: <http://web.mit.edu/newsoffice/2008/oxygen-0731.html>

Q5: What more could the Government or other parties do to enable the planning system to facilitate renewable deployment?

On planning and planning delays – what should be encouraged and what should not, we note that an efficient and rapid process, in particular for offshore wind farms, must be put in place, such is the urgency of dealing with the energy gap. Some of us believe, and some of us are strongly opposed to this, that the same can be said, manifested over a longer time period, for the construction of a Severn barrage. This does not mean that it is advisable to speed the planning process for supermarket construction.

We believe the *planning system* needs proper tools for ensuring the best performing projects are prioritised. We also suggest the planning system should have much more direct influence over integrating energy efficiency and microgeneration and renewable energy sources. New build should be obliged to provide renewables appropriate to location and style of building. These requirements should be informed by the demonstration projects referenced in response to Q3.

Q6: What more could the Government or other parties do to ensure community support for new renewable generation?

Some of us are not convinced this is necessary. If there is mitigation required it should relate to specific issues – renewable energy has inherent community benefits when compared to other means of less clean generation. However it is essential the public have faith in the value of implemented schemes and hence the need for transparency and appropriateness.

Encouraging *not for profit energy supply* seems reasonable and community schemes could be viable but we suspect the potential is limited.

Q7: What more could the Government or other parties do to reduce the constraints on renewable wind power development arising from: a. marine navigation; b. environmental legislation; c. aviation and radar; d. any other aspects of regulation?

a) We suggest there may be compatibility between offshore wind and Marine reserves once built and suggest consultation with appropriate expert bodies is progressed as a matter of urgency. The case is similar for wave power from flexible barrages.

b) Offshore protection in the Marine Bill needs to take account of renewables. We also suggest careful thought is given to risk and responses to failure of Carbon Capture and Storage technology. (In the authors opinion CCS is a misnomer – it should be Carbon Capture and DISPOSAL – storage suggests we have a future use for it).

c) Define standards required for radar installations to be unaffected and publish these to developers such that they are not faced with last minute objections.

There should be proper funding for the MoD to replace radar affected by wind turbines. If the government does not do this, then one arm of government is disabling the policy intent of another arm.

d) Ensure noise data is consistent and clear and published such that objections are based on reliable practice and evidence.

Q8: Taking into account decisions already taken on the offshore transmission regime and the measures set out in the Transmission Access Review, what more could the Government or other parties do to reduce the constraints on renewable development arising from grid issues?

Ensure greater use of *distributed generation, local energy storage and energy efficiency*. This will reduce demand for GRID supplied power and reduce the need for generation access to the GRID in remote locations.

Q9: What more could the Government or other parties do to reduce supply chain constraints on new renewables deployment?

The projections for additional 25GW (rated) of Wind suggest 1 turbine per day will need to be installed for 10 years. This suggests a huge challenge but also an opportunity for UK industry. We suggest a proper *build plan* is developed along with necessary business incentives to promote very rapid start up. This is a possible case for accelerated/extended writing down allowances.

Q10: Do you agree with our analysis on the importance of retaining the Renewables Obligation as our prime support mechanism for centralised renewable electricity?

See response to Q3 above. We suggest RO qualifying *schemes should meet minimum EROEI criteria*. We prefer that actual limits and targets are broken down across generators and compliance is required in order to generate.

Q11: What changes (if any) should we make to the Renewables Obligation in the light of the EU 2020 renewable energy target?

As above we suggest EROEI *criteria* are introduced and RO is biased to those with the best performance.

Q12: What (if any) changes are needed to the current electricity market regime to ensure that the proposed increase in renewables generation does not undermine security of electricity supplies, and how can greater flexibility and responsiveness be encouraged in the demand side?

Use of *load sensitive tariffs* ought to be promoted, especially with industry.

Onshore Wind: The planning and other restrictions on onshore wind turbines should be relaxed to make it economic so anyone with land (such as farmers) can erect one or more and sell power profitably to the grid subject to a satisfactory EROEI case. Many of the continental countries already do this (eg Germany, Holland and Denmark, where they can be seen almost everywhere).

Offshore wind/tidal: The licencing of coastal waters should be extended all round the British Isles coastline for offshore wind/tidal power farms and speeded up, so that entrepreneurs can bid for them and build them as soon as possible. Scotland already exceed the EU target of 30% renewables production because of its investment in offshore wind farms, which are an extension of their offshore oil rig production.

Energy storage from wind farms: Offshore wind turbines are presently the most cost effective, efficient and technologically well developed solution to both our energy and carbon emission problems. Website references are [5] and [6]. If solar PV realises the potential some see for it this could change.

The recent change of policy is commendable, but we have still a long way to go. The UK has some of the best characteristics for wind energy production in Europe, but to voice our dispute with the BERR document, on a per capita basis, our wind turbine power generation is less than one tenth of Denmark.

Variable energy from wind farm resources, which is predictable using both satellite data and computer modelling, can be *stored* by e.g.

A Severn barrage. Frederick Snow put forward proposals for this in the 1960s. He felt that a central spine with a high and a low lagoon would be the best solution. Wind turbines can be erected along the spine as soon as it is there, so can be generating power long before the tidal scheme is generating. Turbines would be connected between the lagoons and could provide power when required, but they would also be capable of pumping water back to store energy. This solution for the Severn barrage could provide three times the power storage of the 4 hour 1.6 Gw hydroelectric storage at Dinorwig in Wales. This would be a sensible way of storing the variable energy from wind power and releasing it as required.

Electrolysis. Recent developments mean this can now proceed using inexpensive materials, and this is now sufficiently efficient to be commercial. Hydrogen and oxygen generated could be used in gas powered stations, and elsewhere. See [3].

Air compression. An enhancement is to use adiabatic storage – the heat that appears during compression is also stored, then returned to the air when the air is expanded. This is a subject of ongoing study, but no utility scale plants of this type have been built. The theoretical efficiency for adiabatic energy storage approaches 100% for

large and/or rapidly cycled devices and/or perfect thermal insulation, but in practice round trip efficiency is expected to be 70%. Heat can be stored using liquid salts at 600 degrees Celsius. The US has experience in using a less advanced technology for storing wind turbine energy.

Q13: Assuming financial support measures are in place, what more could the Government do to realise the full potential of renewable Combined Heat and Power?

Combined Heat and Power (CHP) / District Heating: This is a well established technology which was well developed in large European towns throughout the last century. (eg Paris, Berlin, Freiburg, Gothenburg, etc) The radiators in most of those cities were kept hot by hot water pipes laid under the roads, known as district heating.

They utilise the waste heat from the power stations, which were situated in the centre of the town to minimise losses. For example, from about 1930-1985 Battersea power station in London provided hot water to heat 3,500 flats in Pimlico via a cable tunnel under the Thames. The overall efficiency of energy utilisation of all these big schemes was in the region of 90%. These schemes became uneconomic in the era of cheap natural gas over the last few decades, but are now viable again at current gas prices. As gas prices rise further, CHP/DH schemes will become increasingly attractive investments.

Any power station which is situated close to a conurbation can be retrofitted with CHP. An example is Shoreham power station, which is a gas fired station of 400 MW. It throws away into the sea about 500 MW of hot water, but is near enough (within 10km) of a conurbation of 200,000 homes and businesses from Worthing to Brighton to be able to meet all the population's needs for space and water heating.

All that is required is district heating pipework under the roads to make the heat sink to condense the steam in the town instead of the sea. This would increase the overall efficiency of the station from its present 55% to at least 90%, and save the gas which those 200,000 homes presently consume (about 0.4 TWh pa) which is presently burnt twice.

The need for *back up fossil generation* needs to be properly explored. A modern CCGT can be generating within 30mins of start up. Properly coordinated cogeneration with renewables needs to be developed. Industrial scale CHP as demonstrated at Immingham shows sufficient potential for dramatically improving overall UK fuel efficiency. Consideration must be given to relocating generating plant to sites where this is viable. An initial study has shown potential for up to 16 GW continuous generation – equivalent to 10 nuclear power stations.

We note the role of the seasons in dictating energy consumption patterns.

In the end all costs come back to consumers either through direct billing or increased taxation. Energy efficiency is an immediate opportunity to achieve effective ROI solutions. Energy efficiency is critical to the success of a renewables/low carbon energy supply.

Taking Gross Thermal efficiency of UK GRID generating plant at 40% for coal and 50% for gas (generous) with European Union figures for electricity production 2004 of 131.8 TWh Coal and 159.2 TWh gas gives waste heat of 360 TWh. This is greater than the projected 15% renewable contribution of 260 TWh by 2020. It is also approx. £10bn revenue potential at domestic gas price of 2.7 pence/kWh (net). This is approx. 0.6% of UK GDP. (data sources – *EU UNITED KINGDOM – Energy Mix Fact Sheet Jan2007; price of gas Ebico not for profit rate*) [12].

Q14: Are our assessments of the potential of renewable heat deployment correct?

We suggest the approach taken by *Poyry in a report “Securing Power”* (June 2008) is carefully analysed and its potential explored. We similarly suggest the potential for smaller CHP units at district/neighbourhood level is explored. Especially for new build we suggest energy self sufficiency at a local level is the target.

Q17: What more could the Government or other parties do to encourage renewable heat deployment with regard to:

- a. awareness raising;
- b. air quality;
- c. building regulations;
- d. planning;
- e. anything else?

Build and implement *demonstration schemes* open to full scrutiny of results and costs.

Q18: How far should the Government go in focusing on areas off the gas grid as offering the most potential for renewable heat technologies?

It is likely this is obvious and already happening if they are off grid. Likely major population/load centres are already served by the grid.

Q19: Do you agree with our analysis of the mechanisms for support of small-scale renewable electricity?

There is a need for a *simple amortised cost package for householders* which guarantees energy provision up to a certain level. Cost over say 10 years to be equivalent to anticipated energy bills and finance should be available as part of a mortgage arrangement qualifying for MIRAS style relief. Package should include best practice energy efficiency. Cost case should be clear and straightforward.

Q20: Given the analysis on the benefits, costs and potential, in what way and to what extent should we direct support to microgeneration electricity?

Excess electricity should be bought at the same rate as the consumer pays.

Financial incentives for photovoltaics: The government need to adopt financial incentives for photovoltaics – similar to long term German financial stimulation of this still rapidly developing technology, and which should similarly be enabled here so that UK industry is ready to take up the challenge when this form of energy becomes truly competitive. Website reference – see appendix of [5], and reference [6].

Every businesses and home should be encouraged to install photovoltaic collectors on their south facing roofs, which could keep at least computers and emergency lighting running in the event of a power brown out or black out. The planning restrictions hindering the erection of these should be removed. The electric companies should allow and pay for electricity surplus to the owners demand to be exported to the grid, so that the output of all home generators is pooled.

Q21: If you agree that better information will aid the development of distributed energy, where should attention be focused?

As above – focus on clear transparent demonstration projects with results appropriate to local conditions.

Q22: Do you agree with the Government's current position that it should not introduce statutory targets for microgeneration at this stage in its development?

Results of the above demonstrations should be used to *quantify the potential*. Demonstrations should be run for a year then a rollout plan with statutory targets should be developed. This should be subject to annual review as technology improves and energy costs change. The projects should be run in public view with results published in a public forum similar to the Warwick Wind Trials.

The *exception* is new build where *solar thermal should be statutory* – the installed base shows this to be effective with good EROEI.

Q23: What more could the Government do to incentivise retrofit of distributed energy technologies?

Widespread *skills transfer program for installers*.

Q24: How can we best incentivise renewable and low-carbon transport in a sustainable and cost-effective way?

We suggest much greater emphasis is given to the *prioritisation of walking and cycling* for transport in urban areas and suggest minimum targets for energy consumed per passenger km travelled are required from public transport operators – these must be based on actual full seats!

Part of the answer is to *dis-incentivise high-carbon transport*.

Planning permissions for airports: Planning constraints on airport construction are an effective way of obstructing the development of air travel, which some claim broadens the mind, and others point out produces in each flight more carbon dioxide emissions than would be produced under a lifetime's use of energy inefficient light bulbs.

As a minimum, the inequitable pricing of aircraft fuel under international agreements, so that more carbon efficient transportation is penalised, needs to be redressed. Aircraft fuel should be taxed similarly to road fuel at the very least, eliminating what is in effect a subsidy of aviation.

Also, expansion of existing airports should be considered carefully and rarely accepted. All cheap flight carriers are likely to go bankrupt as oil prices increase due to limited supply, and the future of aviation is likely to be constrained and become a type of transport available only to the upper part of the market due to constraints in fuel supply alone.

If the prices were further increased by the suggested taxes, it would guarantee a drastic reduction in flights. Therefore, airport facilities are likely to be more than sufficient in the foreseeable future, because it is an industry that is likely to suffer imminent contraction, rather than growth.

Future cars: Whatever the future of the car – we think it can be, and circumstances will force it to be, reduced – the desirability of a transfer of new car production to hybrid electric and electric vehicles presents itself.

We suggest caution re: electric vehicles – they may consume all the RE generated! – and suggest urgent measures for improving occupancy of vehicles to provide improved efficiency of the IC engine. Additionally, we suggest urgent measures to achieve urban modal shift to walking and cycling. We suggest benefits of health and environment improvements are quantified.

Electric and hybrid cars are already on the market, but are produced in small quantities so the price is still high. Fiscal measures should be used to penalise gas guzzlers and promote hybrid and, some think, electric cars which can be more than twice as efficient. One approach is to reduce car tax for these type of vehicles. This should not be a blanket reduction, but depend on the level of efficiency achieved by the model. The easiest approach would be to tax cars depending on average mileage per kilo of carbon dioxide emitted, taking into account the carbon emissions of vehicles powered through the electricity grid would vary depending on the amount of fossil fuels in the electricity mix, so the tax would need to be recalculated every year for electric vehicles.

The government also can and should set challenging standards of new vehicle energy efficiency, standards to reduce the energy expended in the construction of new vehicles, and measures to ensure the lifetimes of such vehicles are extended.

The capacity of public transport needs to be increased, because higher prices of oil and carbon taxes will gradually erode car ownership levels. Public transport infrastructure needs generous investment. Ideally, public transport networks should be

centrally coordinated and not profit-driven, and service level agreements set up with customers, so that regular users who buy seasonal tickets would get refunds if the level of service dropped beyond a known value.

We suggest *wind power for shipping* should be evaluated and encouraged as appropriate – skysails example:

<http://www.skysails.info/index.php?id=472&L=2> .

Rail could benefit from the solar potential of the land portfolio but it especially requires metered energy use, improved off peak utilisation and regenerative braking. Improved off peak use should be achieved by widening appeal to all social groups.



Consideration should be given to *free off peak travel* in order to benefit overall UK energy efficiency. There is a huge spare capacity in the off peak use of public transport - one of us noticed this morning at half past nine only 100 people were on a 650 seat train. The previous count done on this was of 67 people – this capacity is effectively free. See the photo opposite of weight rating – a 50 tonne car with 75*100 kg passengers is only a 15% payload. Each of those empty seats could be a single occupancy car of the road.

Q25: What potential is there for the introduction of vehicles powered through the electricity grid in the UK? What impact would the widespread introduction of these kinds of vehicles have on:

- a.energy demand and carbon emissions;**
- b.providing distributed storage capacity;**
- c.smoothing levels of electricity demand on the grid?**

What factors would affect the scale and timing of these impacts?

Substituting the current fleet of vehicles for electric ones powered through the electricity grid would require a *50% increase in generating capacity*. This is clearly unrealistic, especially when at the same time fossil fuel power plants need to be substituted by renewable electricity in large numbers.

New vehicles powered through the grid should be introduced only under the following circumstances:

- a. If the amount of renewable electricity has increased to such levels that electric vehicles have less carbon emissions than those using oil-based fuels, and at the same time, there is spare capacity in the grid
- b. For transport that is absolutely necessary (such as ambulances, fire, etc.), in case that there are shortages of oil-based fuels
- c. For trains, because many are already electric and the average locomotive lasts more than 20 years, and by that time diesel may not be easily available.

Q26: Over what timescales do you think electric vehicles could plausibly contribute to our renewable energy and carbon reduction targets and what could the Government most effectively do to accelerate the introduction of such vehicles in the UK?

See the answer to Q25. Some of us believe the Government should NOT try to accelerate the introduction of electric vehicles.

We suggest caution with electric vehicles on a scale similar to present IC vehicles. Assume average car mileage is 10000 per annum. Say at 40mpg = 5 gallons per week. Approx energy value = 200 MJ. Average home energy consumption approximately £50/month = £12.50/week electric at 10p/kWh = 125 kWh= 450 MJ. Hence electric vehicles will require approximately 50% more energy available via the GRID.

See response to Q24 and reduce IC vehicle demand by incentivising the alternatives. We suggest studies are done to investigate/support the local employment and economic benefits.

Q29: Should the Government take further regulatory measures to discourage biomass waste, including food waste, from going to landfill? If so, which types? What, if any, other measures should be taken to encourage its use to generate bioenergy?

Energy from waste: There are better ways of obtaining energy from waste than mass incineration, which tends to produce dioxins downwind of the exhaust plume causing health hazards to the population downwind. Alternatives to incineration are mentioned in a local context in website reference [7], which refers to incineration, CO₂ and particulate emissions, toxicity, energy generation, financial (including EU) penalties and the green alternatives to incineration.

We strongly support LESS WASTE. The EROEI case will be far better for reducing waste than accepting it but reusing it for fuel.

We suggest CHP *is the default* for all energy from waste plants.

Q35: How can we adapt the Renewables Obligation to ensure that it effectively supports emerging as well as existing renewable technologies? Are there more effective ways of achieving this?

We suggest ROC *is increased* according to EROEI criteria. We suggest competitions are promoted to encourage innovation.

Q36: Is there evidence that specific emerging renewable and associated technologies are not receiving an appropriate form of support?

See response above re: *wave power* in Q4.

Q37: Are there barriers to the development of renewable and associated technologies that are not addressed by current or proposed support mechanisms?

The document has little mention of *energy storage at either local or bulk scale*. This needs to be a specific area of RandD. Existing viable technologies (deep cycle lead acid for example) need to be packaged and promoted for domestic use. We suggest storage and transport applications are separated.

Development of a *demonstration distributed neighbourhood generation scheme* should be encouraged.

Q38: What more could the Government or other parties do to ensure that the UK secures the maximum business and employment benefits from the EU renewable energy target?

We would like to see stimulation of the *practical teaching for trades* in the construction of solar panels on domestic and industrial properties, and also for photovoltaic arrays, for example, locally in B&H College of Technology.

We believe it is best to develop skills transfer programs whilst running demonstration/evaluation projects – incentivise UK based manufacture then mobilise to implement.

Q40: What more could the Government or other parties do to ensure the UK meets the EU renewable energy target?

Urgently *tackle waste and inefficiency* across all sectors.

Scale of deployment is a big issue – work should be done on *modelling possible speed of deployment* of smaller scale distributed generation. Say 10 MW rated offshore turbines become possible – the projected 25 GW (rated) target would need 2500 turbines in ten years = approx 1 per day manufacture, ship, install and commission – possibly a huge employment and business opportunity. However compare the London Array – aiming for 341 turbines over 4 years. The microgeneration case needs to be worked up for comparison/compatibility.

Q41: Do you agree with our overall approach to developing a UK Renewable Energy Strategy?

No – it is too little too late. Whilst this consultation is still open it appears the decisions for new nuclear and new coal have been taken. Government needs to properly coordinate across departments and policy objectives.

Recent events in the finance markets show deregulated industries to lack a strategic view and they fail due to the domination of short term objectives. Energy and environmental policy need long term direction and commitment.

Much of this consultation appears to be interested in protecting the “market”. The energy market does not need protecting – it is the consumer and the environment which need protection!

In the end all costs find their way back to the consumer. Hence the cheapest solution is to use less and reward people for doing so. Compared to the commodity price rises recently seen in the energy sector these are small amounts. Renewables have the benefit of being commodity independent and are effectively a capital purchase case and therefore offer security of price related to the cost of capital. Future revenue streams beyond the capital return period will be highly profitable and should lead to energy price reductions. Example of socially responsible capital repayment scheme on this model is French toll motorways.

The outcome of this Consultation is due for publication spring 2009 – this is only 6 months away. The need for radical reform is not likely to be properly analysed in this timescale and this is supported by today's announcement of "business as usual" commitment to centralised generation. Suggest strict EROIE evaluations of coal with CCS and nuclear are performed.

A bit more time in the analysis and planning stage will be time well spent. The example of Bio Fuels as rushed legislation giving unexpected and unwanted results should not be forgotten.

QX: What should the Government do about nuclear power?

This end paragraph is about *nuclear power*: We are convinced its justification, under whatever covert UK-US 'accounting' procedures, is the dual one of energy generation and production of fissilable weapons material, otherwise Thorium reactors would have equal or more justification – since their nuclear waste is much easier to handle. They do not solve the immediate energy gap problem. Since it is government policy to take this route, the government will no doubt ensure that such construction is enabled.

New nuclear power stations take at least 10 years to build, so will always lag a decade behind the gap. They also have a very low energy return, even lower than coal, less than 1, so that they take more energy to build, mine and transport the uranium, dispose of the waste and decommission, than they create in electrical output. They can therefore not be classed as a renewable resource.

Despite a half century of trying, the problems of disposing of the radioactive waste and decommissioning have not yet been solved, and the stations are therefore uninsurable. The proposal that EDF should build the governments next series of reactors in UK fell through last July, although it is now back on – see link <http://news.bbc.co.uk/1/hi/business/7632853.stm>. Only two nuclear reactors are being built in Europe. The one in Finland is in financial difficulties. The one in France at Flamanville has had construction difficulties. <http://www.edf.fr/accueil-fr/edf-and-power-generation/nuclear-power/the-future-of-nuclear-power/epr-y-flamanville-3/introduction-122318.html>.

We therefore believe that nuclear power should be dropped from the contingency plan. Pursuing the nuclear option further will be a distraction that takes scarce resources away from truly renewable solutions.

Annex 2: Feed-in tariffs for small-scale electricity generation

QA5: Do you think it is reasonable to put in safeguards to limit the potential cost of feed-in tariffs for small-scale electricity generation, and if so how could those safeguards be set, and what would the access criteria be? Possible factors and criteria we would like you to consider include:

- a limit on overall number of new installations in a given period;
- a limit on new installed capacity in a given period;
- whether priority should be given to particular groups; for example, people in fuel poverty.

We suggest EROEI *criteria* are used with all schemes being allowed provided they meet a minimum standard.

5. Conclusion and recommendation

We recommend national and local government to adopt Al Gore's policy initiative of making 100% of our electricity renewable, and all vehicles highly energy efficient – some of us believe electric – as soon as possible, and by 2020 at the latest. This could be termed the Renewables Revolution, as it will be to the world what the Industrial Revolution was to the west, giving birth to many new industries and jobs.

To realise this vision we need to maximise our resources and cooperate at international levels to a hitherto unprecedented degree. It requires leadership based on love of common worldwide endeavour rather than fear of shortages, wisdom rather than knowledge, and foresight rather than hindsight.

6. References

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- [3] W. Kanan and D.G. Nocera, *In Situ Formation of an Oxygen-Evolving Catalyst in Neutral Water Containing Phosphate and Co²⁺*, Science, August 2008, 1072-1075.
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- [12] <http://www.jimhadams.com/eco/UKEnergyMix2004.pdf>

7. Writing of this document

Transition Brighton & Hove (<http://www.transitionbrightonandhove.org.uk>) is open to all citizens of Brighton & Hove and the surrounding area. B&H Transition Energy Group is a subgroup of this organisation. This renewables consultation response is the work of the following members of the Energy Group:

Jim Adams is currently researching in mathematics, prior to that worked for an environmental think tank, the Omega Institute, and has worked as a political lobbyist on environmental issues [8], [9].

Chris Boocock is a manager for Sustrans in the South East of the UK. Sustrans is the UK's leading sustainable transport charity. Sustrans' vision is a world in which people choose to travel in ways that benefit their health and the environment.

Graham Ennis is a human rights activist and journalist, founder member of the Omega Institute, and is working on wind turbine patents.

Doly Garcia was a founder member of the Peak Oil Group, a precursor of Transition B&H, has constructed an updated 'Club of Rome' computer model on resource depletion, and is coordinating the 'Energy Descent and Resilience Action Plan' for Transition B&H.

John Kapp is a former Conservative councillor and consulting electrical engineer, who has been promoting sustainability and energy efficiency projects.