

Low Carbon Futures and The Un-economics of Nuclear

Efficiency and renewables will meet energy needs without new reactors

The Un-economics of Nuclear

With the publication of the UK Government's Energy White Paper in early 2003, and the financial scandals surrounding British Energy and BNFL, nuclear questions are firmly back on the national agenda. This special SERA 'double' briefing sets out an economic and political case against nuclear energy and also explains how the UK can meet its energy targets from renewables and energy efficient options.

Building new reactors: an expensive future

Two weeks after the 2001 election, Tony Blair launched a national review of energy policy "for the next fifty years". The review is effectively on-going and considers main themes including: using energy more efficiently; security of energy supplies; the replacement of some power stations that are reaching the end of their lives; and the substantial cuts in the emissions that are leading to climate change. One key question is what to do about nuclear power. Is it an option the UK wishes to keep (even when most other European countries are abandoning it) and, if so, what will be the cost of doing so?

SERA has estimated the level of subsidy that would be required to pay for a new reactor programme of the scale sought by the UK nuclear industry. The calculation is derived from Cabinet Office cost estimates for the unit price of electricity generated from new atomic stations, combined with the 25 per cent guaranteed market share the industry is seeking. These values are, respectively: between 3 and 4 pence per unit of output (PIU, 2002); and 90 terawatt hours per year (DTI EP68). The calculation also assumes the cost of generation from gas will remain largely

unchanged at around 2 pence per unit. **At the height of the programme, the level of subsidy required is calculated to be between £900M and £1800M per year. This level of subsidy would need to be maintained for most of the life-time of the plant, that is for at least 20 to 30 years.**

These huge sums could be raised through direct taxation but are more likely to be levied (hidden) on customer bills. There is, therefore, a significant risk that such disguised costs will remain obscured from public and political scrutiny. Understandably, the nuclear industry has chosen not to present these likely costs in its own lobbying campaign.

Costs and benefits

If large public subsidies are to be made in the energy sector in support of carbon abatement targets, it is essential that each option is weighed against the others to determine which are the most cost effective. The taxpayer should not be supporting an expensive option when there are less expensive options available.

For example, if renewable and energy efficient technologies are, compared to the nuclear option, shown to be less costly per unit of energy supplied (or saved), or less costly per tonne of carbon avoided, then the rational policy response is to support those cheaper options.

The Department of Trade and Industry, with lead responsibility for energy policy, has (so far) failed to publish any adequate cost-benefit analysis of the different ways in which carbon can be avoided and energy supplies maintained. However, an indication of some options was given in the Cabinet Office PIU review and is shown in the table below. *[continued on back page.]*

"SERA believes it is in the best interests of the taxpayer to phase out nuclear power rapidly as to do otherwise would lead to mounting economic losses that would ultimately fall to the public to pay. It would be a disgraceful waste of resources to prop-up a failed, dirty and dangerous industry when clean technologies and jobs need priority support. Labour must develop a modern and sustainable energy policy which realises the potential of renewable and energy efficient technologies rather than resorting to the failed technologies of the past."

Bill Eyres, Chair, SERA

Estimated cost of UK electricity in 2020	pence/kWh
On Land wind	1.5 - 2.5
Offshore wind	2 - 3
Energy crops	2.5- 4
Wave and tidal power	3 - 6
PV Solar	10 - 16
Gas CCGT	2 - 2.3
Large CHP/cogeneration	> 2
Micro CHP	2.3 - 3.5
Coal (IGCC)	3 - 3.5
Nuclear	3 - 4

Source: Performance & Innovation Unit, 'The Energy Review', Cabinet Office, Feb. 2002.

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“On average, EU countries generate 14 per cent of electricity from renewable sources. We currently generate 2.6 per cent. I must say that I think that this is pathetic... we need a massive step change in investment in renewable sources of energy”.

“We need to look carefully at whether energy efficiency and renewables alone will be enough to meet our overall security and carbon objectives at an affordable cost. That will be the context for the decisions on nuclear power.”

Rt Hon Patricia Hewitt MP, Oct 2002

“A low carbon future is well within our grasp without recourse to nuclear power – there is simply no need to prop-up a failed, dirty and dangerous industry when clean and economically viable alternatives exist. The Energy White Paper represents a historic opportunity for the Labour Government to embrace the technologies of the future and reject the failed technologies of the past. This briefing takes on the sceptics and makes the case for an energy policy based on efficiency, renewables and combined heat & power. In short, these options are cleaner and less expensive than nuclear.”

Bill Eyres, Chair, SERA

The Performance & Innovation Unit (PIU) Energy Review proposed a target of 20 per cent improvement in energy efficiency by 2010. Is this achievable?

The PIU Energy Review highlighted that there is still a large untapped potential for energy efficiency. The UK has never invested heavily in energy efficiency, especially in the household sector. As a consequence the UK lags well behind the energy efficiency progress made by our European neighbours.

Existing programmes show that energy efficiency not only reduces energy use and carbon emissions but also gives net benefits to the economy. For every tonne of carbon saved the economy typically benefits by £150 (EST, 2002)

Through greater take up of home energy conservation measures the household sector alone could deliver the PIU's proposal of a 20 per cent improvement in energy efficiency.

Indeed, the Energy Savings Trust (EST) has calculated that greater household efficiency could save 120TWh of energy and 8 million tonnes of carbon by 2010 - an energy efficiency saving beyond the PIU's suggested 20 per cent target.

SERA therefore believes that the PIU proposal of a 20 per cent improvement in energy efficiency in this decade is achievable and cost effective and urges the Government to adopt it as a firm target.

Significantly, hitting this target would mean that households would not need the energy supplied by old nuclear plants to be replaced by new nuclear plants.

Currently annual use of nuclear powered electricity in households is around 20TWh per year. We are confident that with energy efficiency, micro combined heat & power (CHP) and renewables, the household sector could adequately meet its electricity demands without the need for new nuclear electricity capacity.

Can renewables and energy efficiency meet our future energy demands?

Yes. The energy scenarios tested by the PIU's Energy Review team show that renewables (wind, solar, wave, tidal and biomass) and CHP would be sufficient to meet our projected energy demands until 2020 and that no new nuclear build would be necessary. Greater energy efficiency and adoption of CHP is expected to reduce overall demand for energy, in turn making it easier to get rid of existing nuclear supplies.

Aren't the costs of renewables too high?

Taking full financing charges into account, the output from Sizewell B (the most recently constructed nuclear plant) costs around 6p/kwh (PIU, 2002). If new nuclear plant were built in multiples (e.g. ten units across the UK), then the PIU calculate the total output cost would fall to 3-4p/kwh. Fossil fuel sources such as gas and coal cost around 2p/kwh and 3p/kwh respectively.

On a good site, however, wind power costs between 2-3p/kWh. Therefore, wind power today is already more cost effective compared to nuclear power. It is also completely free from the long-term financial and environmental risks associated with nuclear liabilities. Moreover, the PIU has projected that the costs of all renewable energy sources are likely to rapidly fall in the coming years. By 2020, many (if not most) renewable technologies will provide least-cost low and zero carbon energy resources, easily paving the way for a nuclear free future.

Should we adopt future renewable electricity targets?

Diversification from fossil fuels will be necessary for the transition to a low carbon economy. Renewables currently contribute only 2.6 per cent of total energy supply, but we have massive natural resources that can be harnessed to produce energy. Indeed, the UK has some of the best wind and marine resources in Europe.

Targets send a strong signal to industry. The Government's current renewables target, to deliver 10 per cent of electricity from renewable energy sources by 2010, has already played a significant role in encouraging renewable energy investments and developments.

The PIU has convincingly demonstrated that delivering 20 per cent of electricity from renewables by 2020 would be both achievable and affordable. The PIU's

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proposed target of at least 20 per cent of electricity from renewables by 2020 would be a good first step, but SERA believes that it is not ambitious enough.

SERA is calling for the Government to commit to a 30 per cent target for renewable electricity by 2020.

Do the public really support renewable energy over other sources? How can we win public support for “renewable energy in my back yard”?

Public opinion surveys conducted by Greenpeace and RSPB show high levels of support for renewable energy developments, with acceptance levels for technologies such as wind and hydro power much higher than for coal or nuclear generation.

However, while there may be agreement with wind energy in principle, NIMBYism can sometimes prevail at local level. The predominance of large scale, developer led projects has contributed to difficulties associated with local acceptance of new renewable energy. As a result, smaller scale renewable developments are likely to be more palatable to local communities and these are already under development or being proposed.

Experience in Denmark has shown that small-scale renewables can greatly assist in overcoming planning, familiarity and public acceptability barriers that can currently restrict renewables investment.

How much will future renewable electricity targets cost consumers?

There is a misconception that greater renewable electricity generation will cause domestic electricity prices to soar and will be publicly unpopular as consumer electricity bills significantly increase. This is simply not true.

The current renewables target, for 10 per cent of renewable electricity by 2010, is expected to result in a maximum increase of 4-5 per cent on domestic electricity prices, at the time the target is reached (i.e. 2010, not today). This works out at an additional 30p/week for the consumer. The PIU has calculated that achieving its proposed target of 20 per cent of renewable electricity by 2020 would increase domestic electricity prices by 5-6 per cent at the time the target is reached. This works out at an additional 30-50p/week for the consumer.

SERA's call for 30 per cent of renewable electricity by 2020 would only cost the consumer an extra 60p/week (EST estimation). Even though this is only a modest rise, the most vulnerable or ‘fuel poor’ energy customers can be protected by adjustments to instruments such as the winter fuel payment and home energy efficiency programmes.

Even so, consumers won't support these price rises, will they?

According to a recent wide-ranging DTI consultation on

public attitudes to energy policy, tackling pollution and checking global warming are seen as greater priorities than squeezing costs to the minimum.

The DTI found firm support for energy efficiency and renewable forms of energy – indeed, many respondents were concerned that by focusing on lower energy prices, the government might be sending the wrong signal about using energy efficiently.

This supports evidence that, above all else, the public looks to the government to take a lead in tackling climate change and other environmental problems.

Won't local, distributed energy systems be expensive?

Micro CHP, fuel cells and small-scale renewables such as small wind farms hold out great promise for delivering more cost effective, reliable energy services. PIU calculations show that by 2020, micro CHP could cost 2.5-3.5 p/kWh compared to nuclear at 3.0-4.0 p/kWh.

As the technologies for supporting renewables and CHP continue to advance, it is expected that both large and small-scale developments, will prove cheaper than new nuclear investments.

Isn't renewable power intermittent? What happens when the wind doesn't blow?

The variation in output of wind farms, wave and tidal projects will not matter as long as their total contribution to UK power generation is less than 20 per cent (PIU, 2002; Elliott, 2001). Therefore, intermittence is unlikely to be a problem within the next couple of decades.

By the time renewable electricity generation does exceed 20 per cent, new forms of energy storage, such as hydrogen and regenerative fuels cells, are likely to be in widespread use, resolving intermittency concerns by allowing for far greater levels of energy storage when the wind does blow.

What's the role for hydrogen storage?

There is growing interest in the role for hydrogen as a future fuel in both energy and transport markets. Rapid advances in hydrogen storage technologies suggest that in future years excess renewable electricity capacity could be converted and stored as hydrogen.

When there is peak demand or variable weather conditions, the hydrogen would then be converted back into renewable electricity for use. Hydrogen is therefore likely to play an important role in the long-term transition to a distributed, renewable energy system.

References

- EST (2002) Putting Climate Change at the Heart of Energy Policy. EST submission to Energy White Paper.
- Elliott D (2001) When the Winds Don't Blow. New Ground 62. SERA publication.
- IPPR (2001) Power to the People. Delivering a 21st Century Energy System
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A messy and costly nuclear legacy

The UK's radioactive legacy of the last fifty years will not go away. Indeed, it is still growing from the operations of the nuclear industry today. **The current cost of decommissioning, clean-up and on-going waste supervision is officially estimated at today's prices at around £62 billion. This sum excludes MILITARY facilities and materials, but includes CIVIL liabilities in both public and private sectors.**

Proposals have been made, in a DTI Consultation Paper in July 2002, to set up a new statutory 'radioactive waste management agency', also referred to as the Liabilities Management Authority (LMA). This measure is in principle backed by SERA as existing radioactive waste will not disappear and must be looked after. However, serious questions remain about exactly how the LMA will operate. As the proposals currently stand, there is a significant risk that the LMA may represent a backdoor route by which many millions of pounds of further damaging subsidies will be poured into the nuclear industry.

An early and key credibility test for the LMA will be the early cessation of reprocessing at Sellafield. The operation of the THORP and Magnox reprocessing plants are an economic and environmental nonsense that are increasing costs to the taxpayer every week they continue to run. The six remaining Magnox power plants are also losing money and should be closed immediately.

However, the closing of the nuclear age does not mean the loss of all the jobs that have gone with it. It is clear that many existing jobs in the sector will be preserved to manage the legacy the industry has created. Redundant nuclear materials need to be conditioned and packaged into less dangerous forms in order to be prepared for long-term storage.

Even assuming improper subsidies can be avoided, the LMA's expenditure is therefore still expected to be around £1,000M per year (met directly by the taxpayer) for the decommissioning and clean-up of nuclear sites. It is a costly legacy derived from the disastrous decisions in the past to pursue the nuclear option.

Given such massive costs, the Labour Government must not be so reckless as to give its support to a new round of nuclear power plants that in turn would only add to the huge headache already faced. The Government must instead back the less costly renewable and energy efficiency options which, unlike nuclear, do not impose a substantial and damaging drag upon our national economy.

A few opportunities do exist. The Sellafield MOX Plant (SMP), for example, commissioned earlier this year,

still remains largely idle. One option is to convert SMP into a facility that will treat or 'condition' the UK's substantial inventory of plutonium into a form that is more suitable for long-term storage. This option preserves the utility of SMP and the jobs that it supports, while significantly reducing the risks associated with this weapon's-usable material.

However, even when all the necessary plant decommissioning and materials conditioning work has been done, there will of course remain a nuclear legacy that must be managed on an ongoing basis, as there remains no safe means to dispose of radioactive waste.

Public opinion

Recent opinion polls have reaffirmed that around three-quarters of the British public maintain their opposition to the nuclear industry and do not want it to expand. If Labour were to launch a major new programme of reactor building, it could lose a significant amount of votes at the next election and severely damage the Government's reputation on environmental issues.

- A British Market Research Bureau and RSPB survey found that 68% did not think that nuclear power stations should be built in Britain in the next ten years
- A MORI and Greenpeace poll found that 72% preferred renewables to nuclear power and that 41% were less likely to vote for a political party that supported a new reactor building programme.
- NOP and Energy Saving Trust found that whilst only 10% thought the government should invest time and money into building new nuclear facilities, 85% wanted government investment in renewable energy such as solar and wind.

Conclusion

Experience of the last fifty years has shown the UK nuclear industry to be a failure in economic and environmental terms. **Labour must not offend taxpayers and voters by again throwing good money after bad.**

Now is the time to make a clear decision to bring the nuclear age to an end, and to use available public funds for accelerating the growth in renewable and energy efficient technologies and jobs.

SERA, November 2002

SERA is an independent environment group, affiliated to the Labour Party. Our members include 104 MPs. SERA believes that social and environmental concerns must be addressed together and works to integrate green thinking into Labour Party policies. SERA campaigns by organising events such as conferences and seminars, and publishes regular briefing papers and a magazine entitled 'New Ground'. This briefing was produced by SERA for its Parliamentary Group. For more information about the issues discussed in this briefing or about SERA generally, go to www.serauk.org.uk or contact 11 Goodwin Street, London, N4 3HQ; 020 7263 7389; seraoffice@aol.com.