SONE

Supporters of Nuclear Energy

ENERGY SUPPLY - THE FACTS

A lack of understanding about how electricity reaches us at the flick of a switch is distorting energy policy. The essential facts behind electricity supply are:

Electricity cannot be stored in bulk.
It must therefore be generated to meet demand at all times.

This means the National Grid Company (NGC) has to balance supply and demand minute by minute around the clock.

STORAGE LIMITATIONS

We may have batteries for our cars, but so far it has not been found possible to store electricity in industrial quantities. We can to some extent store it in another form – e.g. in hydro-electric schemes as at Dinorwig in Wales where a mountain top reservoir can be tapped to meet surges in demand. It is filled by pumping water up to it when there is surplus power overnight. But the duration of this supply (a few hours at full bore) is limited by the amount of water in the reservoir.

BALANCING SUPPLY AND DEMAND

The NGC has more than 70 years' experience of balancing supply and demand every minute of the day and delivers a 99.9% reliable service. Apart from morning and evening peaks of demand, it can also anticipate surges – e.g. at half time in a televised football match – and call on reserves such as at Dinorwig to meet them. But that means it needs to be able to rely on both base load and supplementary supplies. Some generators take several hours to reach maximum output. Frequency or quality has also to be maintained by law. If supply falls below a certain frequency electric clocks and machinery run slow.

The failure to understand these constraints has led to many ideas that are distorting energy policy and threatening the security of power supplies.

HOW DO WE GET OUR POWER?

We need a reserve margin of about 25% above demand to keep the UK continuously supplied. The evening winter peak requires just over 60,000MW – the equivalent of 60 large power stations – so 75,000MW of plant need to be in some state of readiness. In summer demand falls to about 24,000MW. To ensure supply, there is a "spinning" reserve able to take over at very short notice.

Private companies operating power stations bid to supply 30-minute tranches throughout the 24 hours at a price and under penalty if they fail to deliver. Coal, gas and uranium (nuclear) generate about 95% of the power needed. But our coal and nuclear stations are ageing and nearly a third of existing capacity (some 18,000MW) will close over the next decade. Coal stations are being closed partly for environmental reasons. They emit up to 200 times more carbon than nuclear stations.

WHERE WILL FUTURE POWER COME FROM?

As things stand, most of the replacement stations over the next 10 years will be gas-fired. Most of the gas will have to be imported and we face becoming reliant on imports for up to 80-90% of our energy at an unknown price. Gas may be half as carbon-intensive as coal but it still emits up to 100 times more carbon than nuclear and, imported, is not the most secure source of electricity. More nuclear stations are envisaged (up to 16,000MW) but possibly only one over the next 10 years. A vast increase in mostly offshore wind power is also proposed – as much as 30,000MW by 2020 – as well as much more micro-generation from small-scale or domestic wind, solar, biomass etc. All have severe limitations.

WHAT IS DRIVING THE CHANGE?

The answer is the political response to the threat of global warming. "Dirty" coal is in the dog house unless it can be cleaned up by capturing its carbon and sequestering it for all time in strata beneath the North Sea – as yet a hypothetical solution that would possibly double the price of its electricity. Clean renewables – which effectively mean wind – are being encouraged with massive subsidies and priority access to the grid. But wind is unreliable. It simply cannot be predicted. Its intensity can also vary very widely in a short time.

A LESS RELIABLE GRID?

Wind also generates very little power under a winter anti-cyclone when demand is at highest. Its unreliability means that there has to be a massive increase in the "spinning" reserve of coal and gas power stations ready to step in at very short notice, operating inefficiently and in a way that increases the wear and tear on them. Inevitably it reduces wind's saving in carbon output. Estimates vary from 8-20% as to how much wind power the NGC can cope with without difficulty in managing supply and demand. Whatever it is, we seem to be heading for a less reliable supply.

WHAT'S WRONG WITH MICRO-GENERATION?

Superficially it is an attractive idea – everybody generating their own power with wind, solar etc and selling their surplus to the NGC. But since most available renewables are unreliable, how can the NGC manage supply and demand if it doesn't know where the supply is coming from? Any substantial development of micro-generation would bring problems. Until the 1930s power supplies were locally generated. Then the national grid was formed, bringing huge economies of scale. It cut the reserve margin from 85 to 15%. The saving paid for 75% of the cost of establishing the grid and fuel costs were cut by 25%. It does not seem a good idea to put the clock back.

WHAT ABOUT TIDAL POWER

Theoretically, it is a splendid idea since tides can be predicted. But it does not supply continuous electricity. There is slack water for several hours between tides and this can only be overcome at even more expense.

We need a mix of reliable and economic sources of electricity in which nuclear, the safest, cleanest, most reliable and cheapest power, has pride of place in delivering baseload requirements. We cannot meet the nation's needs without it.

Published by: Supporters of Nuclear Energy, c/o 45 Church Way, Sanderstead, CR2 0JU
Tel: 0208 657 3479 *Web site:* www.sone.org.uk *E-mail:* sec:sone.org.uk