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UK ELECTRICITY SYSTEM AT SEVERE RISK 2010 TO 2020

The following note was written for private distribution and discussion on the 19th of August 2008. We are aware that it is now in the public domain, though without attribution to Renewable Energy Foundation. In view of this we are now publishing the note, unrevised, as a contribution to public information on this all important topic.

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UK ELECTRICITY SYSTEM AT SEVERE RISK 2010 TO 2020

STATEMENT OF THE THREAT

From 2010 to 2015 the United Kingdom will face extreme fragility in the electricity sector, with a high risk of generating capacity shortfalls and a dangerous over-dependency on imported natural gas. This would bring price shock and interruptions of supply, with consequent economic harm and social unrest weakening the UK's international diplomatic and military positions vis-a-vis states holding the balance of power in the gas markets.

EXECUTIVE SUMMARY

(for details see following page)

- **The UK now faces an imminent shortfall of firm, reliable, electricity capacity**, as some 40% of our conventional generators are being rendered illegal by EU legislation affecting emissions of sulphur dioxide (SO_2) and nitrogen oxides (NO_x).
- System stress is already evident in very high wholesale prices, and in the weak response to the major blackout on the 27th of May 2008.
- **The politically constrained market reaction to these difficulties is, primarily, a new dash for gas**.
- The secondary reaction, driven by subsidy, is a very large wind turbine fleet, which provides supplementary energy (MWh), but *no firm capacity* (MW). **At other than modest levels wind power causes and compounds greater gas dependency rather than alleviating it**.
- Some 20 GWs of gas plant is now planned, which by 2020 would result in a firm portfolio consisting overwhelmingly of gas (around two thirds of peak load).
- **Gas dependency on this scale is economically and geopolitically dangerous**. The UK will be importing 50% of its gas by 2010, and 80% by 2020. The increasingly reluctant Norwegians can supply only 15% of this demand, the rest coming from or through unstable or hostile regions.
- **Atlantic basin gas prices will be set by doubling Asian demand**, largely for Liquefied Natural Gas (LNG), and Russia will not only benefit from these high prices, but also exert a controlling interest through the supply of pipeline gas at times of scarce or unaffordable LNG.
- Thus, **from 2010 to 2015 onwards the UK faces a high probability of insufficient firm capacity and, or, very expensive gas, at best resulting in price shock, and in all probability blackouts both scheduled and unpredicted**. In either case the UK will be gravely weakened economically, socially, geopolitically, and militarily.
- **Political prevarication is not now an option; emergency measures are needed to mitigate gas dependency** and address its consequences, for example:
    - Rapid construction of extra gas storage facilities;
    - Repudiation of unachieavable and distorting EU renewable energy targets;
    - Unlimited co-firing of biomass in coal-fired power stations;
    - Dedicated biomass generation at major ports (fuel from UK and Canada);
    - Facilitation of the use of domestic coal resources;
    - High efficiency new coal generation, "carbon capture ready";
    - Dispensations for older coal to avoid EU legislation harmful to the national interest;
    - **Strengthened social policies to mitigate hardship and maintain order**.

ARGUMENT IN DETAIL

SIGNS OF A SYSTEM UNDER STRESS

1. On *the 27th of May 2008 the UK suffered its worst blackout for a decade*, causing losses of supplies to 500,000 consumers. National Grid managed, but system response was weak and embedded generation (eg. Combined Heat and Power (CHP) and windpower) failed at the moment of greatest need.
2. The UK is seeing **sharp increases in wholesale electricity prices, particularly for peak power, a sure sign of system stress**. Fuel cost is a factor, but the principal cause is *lack of firm capacity*.

EFFECTS OF THE EU LARGE COMBUSTION PLANT DIRECTIVE (LCPD)

3. A significant driver of this tightness is the EU LCPD, which limits the hours that combustion plants can run unless fitted with SO_2 and NO_x emissions reducing equipment. In fact, much of the UK's capacity is soon to be illegal under the LCPD, but some obsolescent plants cannot for technical reasons fit the required equipment, and others are discouraged by poor financial prospects in a distorted market.
4. EdF and E.ON UK estimate that **around 30 GW of plant, mostly coal, will retire by 2016; 30 GW is over 50% of peak load** (at 5.30pm on a cold week-day winter afternoon), and the impact of the EU's recently proposed Industrial Emissions Directive (IED) will almost certainly make matters worse.

RENEWABLES TARGETS COMPOUND THE NEW DASH FOR GAS

5. Unless new plant is built, *available capacity will be insufficient to meet demand in 2015/16*, perhaps earlier. **The politically constrained market will respond to this situation with one firm technology only, gas fired turbines**, for the following reasons:
   - 5.1. UK government policy dictates levels of renewable electricity while leaving the rest of the market only *notionally* free in the selection of generation technology. The EU 2020 20% Renewable Energy Target will require significant extensions of these mandates and further consequent distortions.
   - 5.2. Government predicts that the UK will need 30% renewable electricity if the EU 2020 target is to be met, but BERR appears to have made an error in calculating the target magnitude, and is in any case irrationally optimistic about the effect of energy efficiency improvements on total consumption.
   - 5.3. *The electricity industry believes that the EU target would probably demand an unrealistic 45% to 50% renewable electricity system, mostly wind*, which is infeasible in any timeframe.
   - 5.4. **A requirement for 30% to 50% renewable electricity causes extreme gas dependency** because wind power denies market share to conventional generators but cannot provide any firm capacity, so the conventional generating portfolio must remain equal to peak load (60 GW, plus a 10% to 20% margin), with the consequence that the conventional plant will be under-utilised, increasing fixed costs (and emissions, and related costs), and reducing plant income;
   - 5.5. Investors are responding to these risk factors by selecting the least capital cost technology, namely gas turbines, in order to achieve prompt Return On Investment and thus reduce exposure.
6. Some **20 GWs of gas plant is currently planned, which by 2020 would result in a "firm" portfolio consisting overwhelmingly of gas** (around two thirds of peak load) with only residual and declining elements of nuclear and coal.

GAS DEPENDENCY IS ECONOMICALLY AND GEOPOLITICALLY DANGEROUS

7. The UK will be importing 50% of its gas by 2010, and 80% by 2020. **The increasingly reluctant Norwegians can supply only 15% of UK demand, the remainder coming from, or through, hostile or unstable regions.** More gas storage will help, but is insufficient to address the issue.
8. By 2020 demand for gas, largely Liquefied Natural Gas (LNG), will have more than doubled in the major Asian markets, and will thus set price in the Atlantic basin, drawing supplies away, a trend already evident (during the first six months of 2008 the Grain import terminal received no commercial cargoes due to price competition from Japan).
9. **Russia will benefit enormously from high prices**, and exert a dominant controlling interest through the supply of pipeline gas to Europe at times of constrained LNG availibility.

DISPENSATIONS FOR ILLEGAL COAL UNAVOIDABLE, BUT INSUFFICIENT

10. Concern about gas is delaying Final Investment Decisions in power plant, but because of the distorted market this is not balanced by timely investments in other firm technologies (nuclear, coal).
11. Dispensations to permit older coal plant to avoid crippling EU emissions regulations will be both unavoidable and essential. However, stringent EU emissions legislation has encouraged a run-down in maintenance, and much coal plant may be unfit for this interim function.