

NORTH WALES WIND FARMS CONNECTION

WRITTEN SUBMISSION (first of two) for Deadline 9

This text is my notes from which I spoke at my oral presentation at the Open Floor hearing held at Denbigh on the evening of 9th December 2015.

I am John Hopkinson, a private citizen. I am very concerned at the amount we have to pay for each kWh of electricity. This is set to increase due to renewables "subsidies" if we continue to "Go Green".

I disagree with the presumption that there is a need for this connection. I submit that it is **not in the public interest** to have this transmission link and connect yet more wind generation into the nation's electricity system. For my argument I draw heavily on the System Operability Framework document, released by National Grid on 30th NOV 2015. This SOF has a 20-year assessment period, from 2015 to 2035. All page and Figure references I give are to National Grid's SOF 2015 document, which is available on National Grid's website. (Ref 1)

National Grid must balance demand and supply, and ensure the security and quality of the electricity supply by having reserve, controlling frequency and controlling voltage. The higher the amount of wind generation on the system, the harder (**and more expensive**) this becomes.

REDUCED SYSTEM INERTIA

Page 22, col.1 System Inertia is the primary source of electrical system robustness to frequency disturbances

Figure 12 on page 37 shows that System Inertia will drop from 230 GVA.seconds today to 130 GVA.seconds by 2025 for 3 of the 4 scenarios considered by National Grid. Only in the "**No Progression**" scenario does it stay high. I term this scenario as the "steady as we go" approach. It assumes gas generation replaces retired coal, rather than having more wind. The 4 scenarios are detailed in Figure 2 on page 11.

230 GVA.seconds means there is enough inertia in the rotating plant connected synchronously to the grid to meet a demand of say 23GW for 10 seconds. With only 130 GVA.seconds this time drops to 5.5 seconds. This does not mean that the whole country blacks out in 10 s or 5.5 s but it does indicate how supply and demand have to be matched dynamically. If we go ahead connecting more wind, frequency swings in 2025 on loss of generating plant will be twice as severe as today; this effect is obviously worse the larger the generator that is lost. National Grid intend to combat this in part by restricting the maximum size of single unit on the grid, particularly at times of low demand. This means that the most thermally efficient generation units will be obliged to run at part-load, and inevitably be less efficient.

Wind generators do not add anything to system inertia, and by replacing

synchronous generation, will actually reduce it. Compare Figure 8 on page 23 with Figure 9 on page 24.

RATE OF CHANGE OF FREQUENCY RoCoF

Page 41, col.1 "**No Progression**" is the only scenario under which the highest RoCoF across a year out to 2035 is expected to be within the new wider limits that will be implemented from 2016. The "**Gone Green**" scenario (Figure 15 on page 42) shows excessive RoCoF for a large percentage of the year by 2025. The wider RoCoF limits are right now being implemented by relay setting adjustment from 0.15 Hz/s to 0.5 Hz/s. Page 4, the first page of the Executive Summary, tells us that National Grid now see a greater need to expedite this update program for RoCoF relays settings.

Rate of Change of Frequency is a critical parameter; if frequency swings wildly, other plant gets "nervous" if I can put it like that, and trips itself, further aggravating the dynamic swings. Page 40 refers to "cascading losses of large amounts of embedded generation".

Page 41 col 2 tells us that under the "**Gone Green**" scenario the Interconnexion France Angleterre (IFA) will have to be restricted as early as 2025 to limit the maximum infeed whose loss would cause RoCoF to exceed the new settings. **So we are in the very real but bizarre position that if we go for green, we must reduce the green (nuclear) energy we import day in day out from France.**

FAULT RIDE THROUGH

Page 83 tells us that National Grid are seeking Increased Voltage Support from non-synchronous generation, but they acknowledge this will require "broader market construction development" - I interpret this as more money for someone and **higher bills for us all.**

FREQUENCY RESPONSE

I would like to say something about normal FREQUENCY RESPONSE. Frequency response is not the same as RoCoF, which is concerned with very quick changes. Frequency response is typically within 30 seconds for primary response and 3 minutes for secondary response. Figure 7 on page 22 gives illustrative Frequency Response timescales in graphical form. The text on page 22 states "System Inertia is the primary source of electrical system robustness to frequency disturbances which arise due to an imbalance of generation and demand." There is a Licence Obligation on National Grid for frequency to be maintained at 50 Hz + or - 0.5Hz.

With thermal plant, be it nuclear, coal, or CCGT unless it is absolutely flat-out with the governor valves 100% open, the set will respond quickly and automatically to a drop in frequency by driving the governor valves more open. A wind generator does not have a governor valve and will not respond to a drop in frequency. Wind generators are Converter-Connected.

Page 37 col 2 tells us that "Converter-connected plant is unable to provide an inertial

contribution"; also see the schematic diagram Figure 9 on page 24 which I have already referred to.

However, if deliberately run at part load, and with suitable controls, a wind turbine could be programmed to respond to a drop in frequency by ramping up its output. However, National Grid (page 51, col.1) says "There are currently no incentives for renewable energy plants such as wind and solar to run part-loaded in order to provide frequency response but this could change in future through new service provision arrangements." That to me says anyone will do anything if the rewards are high enough. **Higher bills for all, again.**

Page 51, col 2 goes on to say "The development of new synchronous energy storage plants such as Compressed-Air Energy Storage could offer frequency response services in the same way as the existing pumped hydro plants in addition to adding synchronous inertia to the system. Other types of energy storage such as flywheels and certain types of batteries could offer frequency response services which may be much faster than current providers." This is of course true, but all these things will cost money, serious money. Worse still, in the future it is likely that new nuclear stations will be asked, at certain times of day and probably when system demand is low, to operate part-loaded. I don't know about you, but if I had contracted to generate at £92:50 per MWh guaranteed price with my 3.3 GW nuclear station for 35 years, I would not be too keen to do anything other than generate at full rated output. So once again, more money will be needed. **Higher bills again.**

TWO SHIFTING THREE SHIFTING AND FIVE SHIFTING

Even today, we have CCGT plant coming on and off as wind energy (if available) gets precedence. Figure 28C on page 66 show wind squeezed out between 10:30am and 4pm in favour of nuclear by 2035, with five-shifting of non-nuclear thermal plant at other times. Taking plant on and off load wastes energy, and though CCGT can be very efficient (Siemens claim 60.75% for one piece of plant in Germany) when used for a short period, it is brought on as OCGT not CCGT with an efficiency of typically half that.

VALUE and COST of FLEXIBLE SYNCHRONOUS GENERATION

Para 8.3.4 on Page 184 says how **valuable** flexible synchronous generation (which wind is NOT) is to the Grid because it provides a number of services to aid system quality, namely :

RoCoF Management, Frequency Management, Voltage Management
Protection System Effectiveness and Commutation of HVDC Links.

As the dwindling number of synchronous generators realise that these system quality services become relatively more valuable, they will demand more cash for providing them. Once again, **higher bills for all.**

Finally, whilst all I have said so far reflects the National picture as to the problems of

adding more wind generation, North Wales comes in for specific mention in the SOF 2015 report, see especially Table 3 on page 127 which identifies Stability Challenges in the Regions.

Thank you

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9th December 2015

Ref 1. "2015 System Operability Framework" document published on 30th November 2015 by National Grid and available to download (8.8 MB) from :

<http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/System-Operability-Framework/>

NORTH WALES WIND FARMS CONNECTION

WRITTEN SUBMISSION (second of two) for Deadline 9

This text is my notes from which I spoke at my oral presentation at the Open Floor hearing held at Denbigh on the evening of 9th December 2015.

THE LINK IS NOT IN THE PUBLIC INTEREST

I disagree with the presumption that there is a need for this connection.
I submit that it is not in the public interest to have this transmission link.

At 16:30 hours on Wednesday 4th November 2015 the National Grid nearly "sat down". It was a very close thing, saved by a payment of £2,500 per MWh to a lucky organisation who happened to have a few MWh available (at a price). This state of affairs came about (and I have the next day's Financial Times here to back me up (Ref 1)) despite the Renewables UK wind industry website telling us there is no less than **13,395 MW of installed wind power capability**. Wind didn't just fail us at 16:30 on the 4th. There was virtually no wind generation on the 1st 2nd 3rd or 4th NOVEMBER 2015. (Ref 2).

This lack of wind when we need it is forcing us down the "Smart Homes" route, where we will all have to install smart meters (**costing us £11 billion**), purchase intelligent white goods, take steps against hackers and fraudsters accessing the wireless signals emanating from our smart meters, and accept restrictions to avoid "herd behaviour". All this risks (**says National Grid**) destroying the economic case for low-carbon generation (see Slide 34 of the set of 120 slides as presented at the 9th April 2015 National Grid SOF "teach-in" (Ref 3)).

But it is much worse than this. The elderly will not be able to master the numerous Apps. that will appear, promising us ways to save money by anticipating smart meter dynamic price rises - to £2,500 per MWh i.e. **£2:50 per kWh** in the case of 16:30 to 17:00 on 4th November. The total amount we all pay, in aggregate, on our bills will be the same. But who pays most will be shifted to the elderly who often rely on electricity for local one-room heating. In numerous villages and even small towns in North Wales there is no mains gas. North Wales is generating wind energy its citizens will not be able to afford.

Excess deaths in winter due to fuel poverty hit the headlines from time to time. 2.3 million families or 9 million people are in fuel poverty. But smart meters will introduce another factor : **FEAR**. Folk, possibly not all elderly, will be scared to death to put an electric fire on after 4pm until a relative rings them later in the evening and gives them the ALL CLEAR.

THERE SHOULD HAVE BEEN A HOLISTIC APPROACH TO PLANNING

The Clocaenog wind farm and the transmission link should have been taken together. PINs guidance said so, and Mr John Lloyd-Jones is reported as having said so, too. He said there was a case for a more joined-up approach so that wind farm applications can be considered alongside the grid connections that need to accompany them. If I can read exactly what he is quoted as saying "**The biggest problem we have in assessing windfarm applications is that the windfarm application and the grid connection application are two separate processes, and sometimes the grid connection can be more visually intrusive than the wind farm itself. If you're asking what I would do to improve the planning process, I would roll the windfarm and the grid connection into one application process**". (Ref 4)

Ref 1 The Financial Times for Thursday 5th November 2015, Front Page headline and article on pages 1 and 2.

Ref 2 Website gridwatch.templar.co.uk accessed on 1st December 2015

Ref 3 Slide 34 of the set of 120 slides as presented at the 9th April 2015 National Grid SOF "teach-in"

Ref 4 Website Walesonline.co.uk/Wales/News accessed on 1st August 2015

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