

Ecotricity Heckington Wind Farm Variation of Consent (2018) 4038P0242.

Heck Off Submission:

The following information has been provided by the lead engineer (now retired) of the then Plessey Radar solid state Watchman transmitter design team. Watchman radar systems are installed at the three RAF stations that would be affected by the proposed Heckington Fen wind turbines.

Comments on “QinetiQ/Ecotricity position statement on Radar Mitigation”,

(Filename: 4038_P_0255 Heck Fen Radar Strategy October 2018 9.10.18_Redacted.pdf)

Response to “Heckington Fen Wind Park Military Air Traffic Control Radar Position Statement, October 2018”

1. Under “Background” Ecotricity state *“This work concluded that there were no solutions available at that point in time with a reasonable prospect of addressing the MODs concerns.”* It is clear that a solution to the wind farm project’s radar clutter problem remains a long way off, and that little progress has been made since that problem first came to light.
2. Under “Current Strategy” Ecotricity discusses the use of RAM (radiation absorbent material) in the manufacture of the wind turbines. RAM has been around since World War II, and is currently used to reduce radar returns from military aircraft, vehicles and ships. Its use on wind turbines however is very much in its infancy.
3. The only example of successful coexistence of wind farms and radar installations that I know of is that quoted by Ecotricity: EDF’s “Ensemble Éolien Catalan” near Perpignan in south-west France. Whilst this EDF wind farm is comparable to the proposed Heckington Fen wind farm the radar stations are far from comparable. The Ensemble Éolien Catalan is 22 km from the Météo France Opoul **meteorological** radar; the proposed Heckington Fen wind farm is just 10 km from RAF Coningsby, 18 km from RAF Cranwell and 27 km from RAF Waddington. Furthermore these **military radars are used for surveillance and air traffic control**, have a lower tolerance of clutter, and particularly of the non-stationary clutter from rotating wind turbine blades, than do weather radar stations. If surveillance and ATC radar performance is degraded the consequence could obviously be far more serious than inaccurate weather forecasts.
4. The TWT-based Watchman systems operate over the 2,750 - 3,050 MHz, a bandwidth of over 10%. It is not surprising that the achievement of the necessary stealth factor from RAM based filters on the turbine towers and blades is proving difficult. The chart of figure 3.1 in the QinetiQ/Ecotricity report indicates this – which it would do better if it had a quantified frequency axis.
5. The Quinetic report acknowledges these difficulties in two of the presentation slides at its page 11; I have reproduced their text here for easier legibility (my emphasis):

- *“You can please some of the people all of the time, all the people some of the time, but not all the people all of the time” Abraham Lincoln*
- *The same is true of radar mitigation - Can mitigate some radar impacts all of the time - Can mitigate all radar impacts some of the time, - **But we cannot mitigate all radar impacts all of the time.***
- ***There is no 'silver bullet'. The radar and renewable industries have been looking for a long time.***
- *Sometimes a combination of technologies is required...*

"Aquila has examined the technical mitigations available and concluded that **there are no solutions available that could be implemented in a timeframe prior to the replacement of the current BAE Systems Watchman PSRs at Coningsby, Cranwell and Waddington that can meet the requirements of 'no derogation in performance'**. Furthermore, Aquila has examined the technical mitigations available and concluded that, **at this moment in time, there are no Enduring Solutions available that will fully mitigate the effects of the onshore windfarms as well as meeting the Marshall requirements.**

It is unlikely that a solution of the problem created by non-stationary clutter from wind farms will be solved by attending only to the source of the clutter. If the radar signal design were allowed to contribute to the solution then the research timescale may be quantifiable. The TWT-based Watchman transmitter designs are however constrained by the TWT specification, which leaves little room for “clever” waveform design. This is unfortunate, as the development of a rack of signal processing circuits would obviously be a shorter and far less costly development project than covering with, or incorporating RAM into the construction of, 22, 125 metre high wind turbines, both towers and blades.

In my opinion the achievement and demonstration of the required challenging level of clutter suppression with no changes in the Watchman radar in the space of four years is a near impossible target.

As the slide on page 11 of the Quinetic presentation states,

Sometimes a combination of technologies is required...

In the present case only one technology is available; “stealthy turbines”.

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