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Truth | Justice | Sustainability

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Offshore Wind Grid Development Consultation
Energy Division
Department of Communications, Climate Action and Environment
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28th June 2020

Offshore Wind Grid Development Consultation 2020

Deadline: The consultation will close at 5pm on Wednesday, 1 July 2020.
URL: https://www.dccae.gov.ie/en-ie/energy/consultations/Pages/Consultation-to-Inform-a-Grid-Development-Policy-for-Offshore-Wind-in-Ireland.aspx

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Dear Sir/ Madam

We refer to the above and make the following submissions

Note that there are **9 pages** in total to this submission inclusive of the cover page.

Yours faithfully,

[redacted]

[redacted] Eco Advocacy CLG

Offshore Wind Grid Development Consultation 2020

WIND ENERGY

1. The current wind energy strategy is driven by Irelands National Renewable Energy Action Plan [NREAP], which was submitted to the EU in July 2010 and details the renewable energy plant up to 2020. This is revised every 2 years based on whether Ireland is meeting its targets. As I understand it, currently renewable electricity ambitions are 40% of which 90% is to come from wind, which is ludicrous in the knowledge that there is a much more sustainable and less intrusive solution in the form of Deep-Geothermal.

2. ISSUES with WIND

    a. **Extremely resource hungry.**
    b. Wrecking the landscape (terrestrial and maritime) visually and in consequence the touristic potential of Ireland. Note that tourist's numbers in Scotland (where there has been much development of wind) have already taken a significant dive.
    c. Property devaluation (peoples homes).
    d. Certain health issues re people with certain conditions (asperger's, etc), probable Health issues re infrasound re other people and so on.
    e. Enormous Public disquiet.
    f. Doubling capacity to provide for lack of wind.
    g. Significant payments to operators to turn off supply to harmonise grid.
    h. Significant grants to promote wind turbines (derived from levy on electricity bills).
    i. Very little C02 emission reduction for the huge Social, economic and Environmental costs.

3. **ESKERS**: Most of the sand and gravel requirements in Ireland come from Eskers laid down in the last Ice Age. Sadly in the space of no more that about 2 generations, we have near exhausted all our reserves from these eskers without any thought for future generations. The situation is so bad in the UK and China (to mention but two other countries) that they have now resorted to dredging estuaries in an effort to get sand. Being the principle constituent of concrete, to see so much buried under wind turbines which will without any doubt become white elephants is utterly crazy.

4. Having regard to the foregoing, it is manifestly obvious that wind energy is not a long-term runner and is currently being artificially driven by significant grants, which serve only to create a rush for grants by investors and corporate's driven purely by 'returns' piggybacking on the 'Green' label.

5. Moreover the sitting of the wind turbines in the sea is incompatible with maritime heritage and ecology. The midlands have significant populations, together with significant heritage sites, which is of enormous touristic potential.

6. We can understand why Wind Energy became the front-runner as it was perhaps the most visually obvious. However, when all the facts are viewed objectively, it is utterly crazy to persist with this strategy. As we have seen above, this is badly flawed. Moreover, the emphasis on wind is largely derived from a lack of public consultation early on in this debate, which is contrary to basic democratic principles and more recently to the Aarhus convention and the Public Participation Directive.

SUSTAINABILITY

1. **The TURBINES**: The manufacture of steel and other components to assemble a turbine (particularly on the scale proposed) must also be assessed as regards its impact on the environment *vis à vis* carbon footprint and environmental sustainability of natural and finite resources.

2. **Carbon footprint of wind energy**: The manufacture of cement requires significant temperatures. The carbon footprint / ton is therefore very significant. It is submitted that the use of such a vast quantity of concrete would give rise to an unacceptably high carbon footprint. The reality is that construction and erection of wind turbines will give rise to significant and unsustainable resource consumption.

3. We were unable to easily find exact grade of aggregate, steel or nm of concrete in any of the works be it bases, culverts, manholes, etc. It would be essential that the applicants provide a table of figures for the amounts of aggregate required to construct the network of access roads.

MATERIALS USED

4. It is considered helpful to provide a short analysis of some of the components of wind turbines, which we will now outline.

5. **STEEL**: To create 1,000 Kg of pig iron, you start with 1,800 Kg of iron ore, 900 Kg of coking coal 450 Kg of limestone. The blast furnace consumes 4,500 Kg of air. The temperature at the core of the blast furnace reaches nearly 1,600 degrees C. The pig iron is then transferred to the basic oxygen furnace to make steel. 1,350 Kg of CO2 is emitted per 1,000 Kg pig iron produced. A further 1,460 Kg CO2 is emitted per 1,000 Kg of Steel produced so all up 2,810 Kg CO2 is emitted. 45 tons of rebar (steel) are required so that equals 126.45 tons of CO2 are emitted.

6. **CONCRETE**: To create a 1,000 Kg of Portland cement, calcium carbonate (60%), silicon (20%), aluminum (10%), iron (10%) and very small amounts of other ingredients are heated in a large kiln to over 1,500 degrees C to convert the raw materials into clinker. The clinker is then interground with other ingredients to produce the final cement product. When cement is mixed with water, sand and gravel forms the rock-like mass know as concrete. For the turbines currently being proposed, upwards of 200 lorry loads of readymix calculate are required to anchor each turbine (in addition to lots of reinforcing steel).

7. **RARE METALS**: Each and every wind turbine has a magnet made of a metal called neodymium. The mining and refining of neodymium extraordinarily dirty and toxic – involving repeated boiling in acid, with radioactive thorium as a waste product – 90% of it comes from – Baotou, China. Neodymium is a rare earth metal, which is generally sourced in China and which is causing. There are c. 4 tons of neodymium magnets in each turbine for example. China's Ministry of Industry and Information Technology estimated that the cleanup bill for southern Jiangxi Province could amount to 38 billion yuan, or around $5.5 billion. Only a fraction of that amount has so far been spent.

8. **The MAGNETS**: The turbines themselves come from a process, which cannot be considered sustainable. In fact the trail of destruction and environmental pollution, which is left behind, is shameful.

    a. To quote from the enclosed article on the issue '*Neodymium is commonly used as part of a Neodymium-Iron-Boron alloy (Nd2Fe14B) which, thanks to its tetragonal crystal structure, is used to make the most powerful magnets in the world…There's not one step of the rare earth mining process that is not disastrous for the environment. Ores are being extracted by pumping acid into the ground, and then they are processed using more acid and chemicals. The fact that the wind-turbine industry relies on neodymium, which even in legal factories has a catastrophic environmental impact…Finally they are dumped into tailing lakes that are often very poorly constructed and maintained. And throughout this process, large amounts of highly toxic acids, heavy metals and other chemicals are emitted into the air that people breathe, and leak into surface and ground water. Villagers rely on this for irrigation of their crops and for drinking water. 'Whenever we purchase products that contain rare earth metals, we are unknowingly taking part in massive environmental degradation and the destruction of communities."*

b. Curiously RTE's weekly 'World Report programe also alluded to the issues presented in Baoding, China on 31st May 2015; http://www.rte.ie/radio1/world-report/ It was referred to as Chinas most polluted city.

c. Aside from the manufacture of the magnets alluded to above and in the appended enclosure, World Report alluded to the manufacture of Blades for wind turbines together with solar panels. Some statistics about Baoding were that the skies are constantly full of smog from pollution and thus far this year, they had only got 16 days smog free as of [31st May 2015]. The listener was informed that Blue skies are seldom seen. Fine particles (PM 2.5) are double that of recommended levels and the population have respiratory problems/ breathing difficulties and facemasks are frequently worn in an attempt to protect oneself. It is estimated that air pollution is responsible for 100,000 deaths each year. Because of Chinas Censorship, it is difficult to obtain detailed data. To make maters worse, at decommissioning stage, the blades are being chopped up and being land filled. See: https://www.bloomberg.com/news/features/2020-02-05/wind-turbine-blades-can-t-be-recycled-so-they-re-piling-up-in-landfills

9. We invite you to assess the following links to substantiate what we have outlined above: -

Rare-earth mining in China comes at a heavy cost for local villages
Pollution is poisoning the farms and villages of the region that processes the precious minerals
Cécile Bontron
Tue 7 Aug 2012 13.59 BST
https://www.theguardian.com/environment/2012/aug/07/china-rare-earth-village-pollution

Rare earth mining in China: the bleak social and environmental costs
China produces 85% of global supply of the 17 chemically similar elements crucial to smartphone, camera lens and magnet manufacture – and half that output is from the city of Baotou
Jonathan Kaiman in Baotou
Thu 20 Mar 2014 14.30 GMT
https://www.theguardian.com/sustainable-business/rare-earth-mining-china-social-environmental-costs

The dystopian lake filled by the world's tech lust
By Tim Maughan
2nd April 2015
https://www.bbc.com/future/article/20150402-the-worst-place-on-earth

China Wrestles with the Toxic Aftermath of Rare Earth Mining
China has been a major source of rare earth metals used in high-tech products, from smartphones to wind turbines. As cleanup of these mining sites begins, experts argue that global companies that have benefited from access to these metals should help foot the bill.
BY MICHAEL STANDAERT
JULY 2, 2019
https://e360.yale.edu/features/china-wrestles-with-the-toxic-aftermath-of-rare-earth-mining

10. **Human Rights**: In addition to the issue of sustainability raised above, there are clearly significant Human Rights issues to consider here. It is therefore unconscionable that the practices alluded to in the appended article should be supported in any way

11. **The FUEL**: The sheer volumes of concrete required together with boat trips is vast. It follows that the amount of diesel fuel necessary to fuel the truck to haul all this material on site would be enormous. This too must be factored into the carbon footprint equation together with the sustainability of consuming so much fossil fuel in the construction of the proposed wind turbines.

12. **Where does the aggregate come from?**
    a. Further to the above, sourcing such an enormous quantity of aggregate would pose enormous challenges. Aggregate is a major constituent of concrete. Aggregate will also be required to

construct all the hard standing areas and access roads. It is submitted that this is squandering of national resources.

b. The sighting of turbines should be in a situation where naturally occurring bedrock can be utilized, obviating the need for the requirement of such vast amounts of concrete and aggregate. Furthermore, in addition to aggregate, sand and gravel are also component constituents of concrete. Through our experience and understanding of the quarry industry, we know that supplies of sand and gravel are rapidly dwindling. It is therefore essential that such schemes be situate on naturally occurring bedrock!

13. **Sporadic nature of wind power**: wind power is historically very sporadic and erratic. To state the obvious, in periods of static airflow, no wind is produced. This causes all sorts of challenges for management of the grid in that it must be replaced by alternative sources of energy. Other alternative Energy Sources are discussed separately in this submission, as are issues pertaining to the management of the grid.

14. **Spinning Reserve**:
    a. It follows that alternative sources of energy must be constantly available to provide power when wind isn't blowing. This can be referred to as cycling up and cycling down. During periods of static air mass and nil generation of wind energy, power must be generated from other sources.

    b. Currently the main energy source is at the Moneypoint station in County Clare. Is it not the case that this must be kept burning in order to take up the slack when there is no wind energy coming on stream? We understand that it and similar power plants cannot be turned off, as they take too long to power up (48 hours), which for obvious reasons would not be feasible when wind energy falls off. We further understand that this has been very problematic in Scotland where there are a large numbers of wind turbines. '

    c. The Limits of Wind Power [by William Korchinski] states: - '***The analysis reported in this study indicates that 20% would be the extreme upper limit for wind penetration... Very high wind penetrations are not achievable in practice due to the increased need for power storage, the decrease in grid reliability, and the increased operating costs. Given these constraints, this study concludes that a more practical upper limit for wind penetration is 10%. At 10% wind penetration, the CO2 emissions reduction due to wind is approximately 45g CO2 equivalent/kWh, or about 9% of total.***' [Source: The Limits of Wind Power [by William Korchinski]

    d. In 2012, Ireland was already at 15.3% from wind. This figure is almost certainly higher now with the advent of more energy streams (including wind) since then. '*The Department of Energy figures also show that in 2012 19.6 per cent of our gross electricity production was by renewables. 15.3 per cent of this was wind, followed by 2.7 per cent by hydroelectricity.*'

15. **Efficiency of Wind Turbines**:

    a. '*Not all the energy of blowing wind can be harvested, since conservation of mass requires that as much mass of air exits the turbine as enters it. Betz's law gives the maximal achievable extraction of wind power by a wind turbine as 59% of the total kinetic energy of the air flowing through the turbine*' [Harvesting the Wind: The Physics of Wind Turbines Kira Grogg – 2005]

    b. '*Further inefficiencies, such as rotor blade friction and drag, gearbox losses, generator and converter losses, reduce the power delivered by a wind turbine. Commercial utility-connected turbines deliver 75% to 80% of the Betz limit of power extractable from the wind, at rated operating speed.*' [Tony Burton et al., (ed), Wind Energy Handbook, John Wiley and Sons 2001], See also http://en.wikipedia.org/wiki/Wind_turbine#Efficiency

16. **Grants/ Subsidies**:
    a. We understand that significant grant incentives are available for the construction of wind based power units. We further understand that such grants are restricted to terrestrial based units and that these grants are no longer available for maritime-based units. This may well explain why the

current proposal is a land-based proposal. This; notwithstanding the fact that there is a far more steady flow of wind at sea.

b. The evidence available suggests that the wind industry have lobbied extensively to retain this subsidy both in Ireland and in the UK, which is in our view misguided, and short-sighted in view of the many other more promising and sustainable energy sources. **Chasing grants/ subsidies makes for very poor planning law and should have no place in any society.**

RoCoF

17. **RoCoF**: Rate of Change of Frequency (islanding detection method for decentralised generation units). Because wind fluctuates electricity generated changes regularly which can cause problems o the grid. This is difficult to manage on the grid. It follows that the more wind that is put on, the more difficult it is to manage. i.e. the more wind we get the more likely the grid will have problems in managing the fluctuating power intake. We have inserted some quotes taken from a document published in 2011 by the University of Manchester entitled 'Loss of Mains Protection':
    a. *'Loss of Mains (or islanding) occurs when part of the public utility network (incorporating generation) loses connection with the rest of the system*
    a. *If LOM is not detected, then the generator could remain connected, causing a safety hazard within the network.*
    b. *Automatic reconnection of the generator to the network may occur causing damage to the generator and the network*
    c. *Islanding is not permitted in most countries. The most challenging scenario is when the local load closely follows the generator output both in terms of active and reactive power.*
    d. *LOM performance requirements – stability*
    e. *LOM should be stable under remote faults cleared by the utility system.*
    f. *It is undesirable to issue a false trip as it leads to the unnecessary disconnection of the generator.'*

WIND ENERGY

18. The current wind energy strategy is driven by Irelands National Renewable Energy Action Plan [NREAP], which was submitted to the EU in July 2010 and details the renewable energy plant up to 2020. This is revised every 2 years based on whether Ireland is meeting its targets. As we understand it, currently renewable electricity ambitions are 40% of which 90% is to come from wind, which is ludicrous in the knowledge that there is a much more sustainable and less intrusive solution in the form of Deep-Geothermal.

Other Sources of Alternative Energy

19. **Alternative Energy Sources**: Renewable Energy comes in many forms including: -

    a. Biomass,
    b. Geothermal,
    c. Solar Energy,
    d. Wave Energy,
    e. Tidal Energy,
    f. Hydroelectricity, etc.

20. It is appropriate that we should give a brief analysis of each below.

21. **Solar power**: Is the conversion of sunlight into electricity. This is somewhat dependent on technical advances in the conversion rates of the photovoltaic (PV) cells that convert sunlight into electricity. Moreover, battery power would be required during night hours or when there is poor sun during daylight hours.

22. **Biomass:** usually refers to plants, which are specifically grown as a crop for the purposes of energy generation. **Often available in the form of wood pellets that can be produced from crops of plants such as willow. Given the existing Moneypoint Power plant in County Clare, there is potential to convert this plant from burning coal (fossil fuel) to burning biomass.**

23. **Biofuels**: Biofuels have been proposed as an alternative by some commentators. Bioethanol is made by fermenting plant materials and biodiesel is made from vegetable oils, animal fats or recycled grease. Biofuels typically include Biodiesel and Ethanol. In 2008 biofuels provided a mere 1.8% of the world's transport fuel. Bioethanol production relies on the cultivation of large amounts of plant material. A major issue with biofuels is that arable land would have to be taken out of food production to produce bio fuels. Given that the human population of the world is increasing at a rate never before seen, little of no land could be made available for production of biofuels. Moreover, there is a danger that more tropical rain forest would disappear to satisfy the demands for same.

24. **Hydrogen**: Hydrogen can be used to power future transportation and may be the power of the future given that hydrogen is the most common element in the Universe. Power can either be through the use of electric motors powered by fuel cell technology or by improved internal combustion engines. In both cases emissions would be zero. The difficulty is that Hydrogen power is currently prohibitively expensive, but progress is being made in the technology to achieve this. A big challenge is to source the hydrogen from renewable resources. Honda has produced the first 'commercial' hydrogen powered vehicle in the form of the Honda FCX Clarity, although this has limited availability.

25. **Tidal**: Tidal energy capture usually consists of the construction of barrage dam type structures is being examined as a means of converting tidal movements into energy. Turbines installed in the barrage wall generate power as water flows in and out of the estuary basin, bay, or river. There are downsides to this though, the most obvious one being that the structures in themselves are visually obtrusive. There are also ecosystem considerations as the flooding of mud-flats within the estuary together with altered saltwater flow which changes the hydrology and salinity within. That said, they are not near as visually obtrusive as large land based wind turbines.

26. **Wave**: Wave Energy refers to the capture of energy from the motion of surface waves of the ocean. This is still a developing science, which is still in experimental stage but looks promising.

27. **Hydroelectric:** Hydroelectric: the capture of energy from running water such as in a river is perhaps among the oldest of the alternative energy's as was seen in the 17-1800's when countless water mills were erected on river banks to power massive mechanical apparatus. In the 1900's this was developed into a far more commercial scale energy capture with the construction of massive dams. Examples being the famed Hoover Dam on the Colorado River in the USA, The Three Georges Dam on the Yangtze River in China, the Golden Dam situate on the Golden River, in Tasmania, Australia and Ardnacrusha power plant situate on the Shannon River in Ireland.

28. **Geothermal:** Geothermal: work on this form of energy generation is much more advanced that other alternatives. Energy capture ranges from installing a series of pipes in the upper layers of the earths crust typically about a meter deep in domestic type situations. On a commercial basis, exploitation of hot springs, which often occur on fault lines is usually indicative of thermal energy close to the surface.

29. **Deep Bore Geothermal:** This is essentially 'free' energy contained within the earths crust. Briefly, it entails boring to depths of between 2 and 3 miles and harnessing energy from the natural heat contained within the earth's crust where temperatures of between 100°c and 200°c can be easily achieved. This is done by circulating water down and back up (rather like a heating system). A very small plant is all that is required on the surface to convert the energy into electricity. There are many examples around Paris, Austria, Germany, Iceland and so on. The Eden Project in Cornwall published plans for such a plant in October of 2019. See: https://www.dailymail.co.uk/sciencetech/article-7571129/Eden-Project-ahead-17m-geothermal-energy-revolution.html

30. **Deep Geothermal in a local context:** Off all the points listed above, Deep Geothermal is extremely promising and warrants further discussion having regard to the local context. Our research as shown this to be by far the most promising.

    a. The Caledonian fault line traverses the Irish and English landscape in a rough line from Limerick – Dundalk – Newcastle in the UK. Either side of this, there are two different rock formations on two different tectonic plates.
    b. The differences in rock fossils in Scotland and England are well documented. Thermal energy tends to be much closer to the surface on such fault lines.
    c. In Ireland a fault line stretching from Limerick to Louth (the Caledonian fault line) where this heat is much closer to the earth's surface than elsewhere.
    d. The irony with the current planning proposal is that alternative energy is virtually underneath the proposed sites.
    e. Moreover, as an energy source, it's far more stable and reliable than wind energy. This has been used as an energy source in Austria and other countries.
    f. We understand that legislation is currently being drafted to facilitate this energy source in an Irish context.
    g. Therefore, leaving aside all the other planning and related issues, it is submitted that the erection of turbines in the current context is rather ironic. It is unlikely that there would be the same challenging issues re **RoCoF** with the use of Deep Geothermal.

31. The ADVANATAGES of Deep Bore Geothermal over Wind are many and may be summarised as follows: -
    a. no visually obtrusive issues,
    b. no fluctuations in the availability of energy and dispatchable,
    c. no property devaluation,
    d. no health issues,
    e. no noise,
    f. no infrasound,
    g. no spinning reserve (backup) requirement,
    h. minimal wastage of finite natural resources such as sand and gravel, steel and so fourth.
    i. There are numerous suitable geological bedrock areas in Ireland.

OTHER ISSUES

32. This extract from 'Marine governance in an industrialised ocean: A case study of the emerging marine renewable energy industry'
    *'The world's oceans are **currently undergoing an unprecedented period of industrialisation,** made possible by advances in technology and **driven by our growing need for food, energy, and resources.** This is placing the **oceans are under intense pressure,** and the ability of existing marine **governance frameworks to sustainably manage the marine environment is increasingly being called into question.** Emerging industries are challenging all aspects of these frameworks, raising questions regarding **ownership and rights of the sea and its resources, management of environmental impacts, and management of ocean space.** This paper uses the emerging marine renewable energy (MRE) industry, particularly in the United Kingdom (UK), as a case study to introduce and explore **some of the key challenges.** The paper concludes that the challenges are likely to be **extensive** and argues for development of a comprehensive legal research agenda to advance both MRE technologies and marine governance frameworks.'*
    From: https://ideas.repec.org/a/eee/marpol/v52y2015icp77-84.html

BIRDS

33. **Migratory birds**: there have been major issues in the past with turbines interfering with the flight path of migratory birds.

Our time is limited and we did not have the time or resources to further research this issue. But we highlight the following information: -

34. New study pinpoints birds of prey as hardest hit by wind farms: 'A new study has revealed which bird and bat species are most at risk of collision with wind turbines, with birds of prey and migratory birds coming top of the list. This research is the first to take a global view of the problem, and pinpoints some possible solutions to allow birds, bats and wind turbines to share the skies with less conflict.'
    https://www.birdlife.org/worldwide/news/new-study-pinpoints-birds-prey-hardest-hit-wind-farms

35. Birds and offshore wind farms: a hot topic in marine ecology, by KLAUS-MICHAEL EXO1, OMMO HÜPPOP2 & STEFAN GARTHE3: https://www.offshorewindenergy.org/COD/reports/report-files/report_009.pdf

ENDS