Wind Aware
Ireland

The Costs of Wind Energy in Ireland

Wind Aware Ireland

November 2017

SOCIAL ECONOMIC ENVIRONMENTAL
SUSTAINABILITY

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Executive Summary

"It is hard to see such a slipshod approach to major strategic planning being tolerated in the private sector. But unfortunately for consumers and industry this is the reality of the regulated market" [1]

The aim of this report is to identify the major economic costs associated with the deployment of on-shore wind energy to the Irish State and consumer. To date, wind energy has been judged without accounting for the complex and supporting infrastructure, hidden subsidies and services required to actually put the electricity generated onto the grid. This is misleading.

We estimate that Ireland is spending approximately €1.2 billion on wind energy per annum. As we save between 2.6[2] to 4%[3] of our overall CO2 emissions from this deployment of wind, the cost per percentage point of CO2 saved is between €300 million and €461 million per year. This is clearly unsustainable as Ireland moves to achieve more ambitious emissions targets. To date, no alternative methods of reducing our CO2 emissions have been adequately considered or analysed. For example, the conversion of Moneypoint power station from coal to gas would save more CO2 than all wind turbines currently constructed.[4] Our energy policy must be urgently reviewed and all current actions paused until full analysis has taken place of the most cost-effective and sustainable way to decarbonise.

No analysis by the Irish State or by the EU have been undertaken to justify these enormous costs. Indeed no legally mandated Cost Benefit Analysis, required by the Public Spending Code, has been completed. Nor has a Strategic Environmental Assessment, mandated by the EU been undertaken. This huge infrastructural project, which impacts upon our economy, our environment and our people, has been allowed to proceed based on opinion, assumptions and we believe, groupthink. All the ingredients of the property crash are present and it is possible that, as predicted by economist Colm Mc Carthy, we will end up with a "NAMA for wind turbines".

This report is not intended to be an exhaustive examination of the economic costs of wind energy as that is beyond the resources of Wind Aware Ireland. Some costs could not be disaggregated and there may be other costs we have not considered, so assumptions had to be made as to what could reasonably be attributed to wind. There is no attempt to account for the social and environmental costs of wind energy, which also warrant examination. We have not examined the implications of large data centres on Ireland's energy demand, nor have we quantified the effect of increased wind energy on conventional power plant viability, on industry (due to higher electricity prices) or on fuel poverty as described in section 2.8. However, we hope that this document will encourage and help those in positions of responsibility and authority to examine in more detail these important issues.

Table 1: Overview of costs attributable to wind energy in Ireland excluding interconnectors*

COST	REPORT SECTION	AMOUNT	PERIOD	PROPORTION ASSUMED ATTRIBUTABLE TO WIND	COSTS PER ANNUM
Public Service Obligation	2.1	€375.7 million PSO for renewables	2017/2018	Wind comprises 80% of total PSO for renewables	300.6 million
Grid expansion capital costs	2.2	€4.499 billion	2011/2020	See Table 2	€176.1 million
Maintenance of grid	2.2	€3.999billion	2011/2020	See Table 2	€50 million
Capacity payments (non-wind generators)	2.4		2016	See Table 3	€193 million
Constraint payments (all generators)	2.4	€113 million	2016	50%	€56.5 million
Curtailment of wind	2.4	€21.3 million	2015	100%	€21.3 million
Balancing payment for wind	2.4		2015	See Table 3	€64.9 million
Smart metering	2.5	€1 billion	Assume a 10 year period	100%	€100 million
DS3 programme	2.6			100%	€235 million**
Demand Side Units	2.7		2017	100%	€10.9 million
Tax incentives	2.9	€7.3 million	2007-2014	100%	€7.3 million
Skillnet training	2.10	€0.847 million	2008-2025	100%	€0.094 million
				Total	**€1.2billion**

*Page 6 describes interconnectors and funding of these projects
**Including N.Ireland

The report is in four sections.

Section 1 outlines the background to Ireland's wind energy plans.

Section 2 details the costs we consider inherent to these plans. (See Table 1)

The obvious costs of wind energy include the subsidies, the expansion of the grid to cater for geographically dispersed wind farms, the increased maintenance of this larger grid and new interconnectors required to balance wind on the grid. Because wind is an intermittent source of power that cannot be stored on a grid-scale, it has knock on effects on how the grid operates. Conventional generators must be ramped up and down to balance wind. This has an effect on the market for electricity, as both wind and conventional generators require constraint, curtailment and capacity payments to ensure there is always a supply of electricity sufficient to our needs.

Several mechanisms have been proposed to decrease demand on electricity at times of peak demand. These include smart metering, the DS3 scheme (which aims to increase the ability of the grid to cope with frequency changes due to variable wind speeds) and demand-side units (which often entails industrial users turning on diesel generators instead of using grid electricity). All of these incur substantial costs, usually not attributed to wind.

In addition, we consider the effect of the costly interventions outlined above on the electricity prices and the knock on effect of these increases to the citizen, consumer and wider economy. We also outline tax breaks and training schemes that add to the cost of wind.

Section 3 outlines the bodies responsible and mechanisms recommended to ensure accountability in spending public money and in allowing costs to be imposed on consumers.

Many mechanisms to ensure accountability and value-for-money have been bypassed in the development of on-shore wind energy in Ireland. No Strategic Environmental Assessment (SEA), Cost Benefit Analysis (CBA) or Regulatory Impact Analysis (RIA) have been carried out although all are legally required. The EU's State aid guidance has been ignored and the Commission for Energy Regulation (CER) has not been vigorous in its regulatory responsibilities in this sector. The threat of fines from Europe if we do not meet renewable targets, we believe, is a red herring, given the fact that these legally required assessments outlined above, have not been carried out for what is probably the largest infrastructure programme in the history of the state.

It is unlikely that Europe will want to have to defend this omission by taking individual countries to court on non-compliance.

Section 4 outlines a case study of the Laois/Kilkenny Reinforcement Project where the project and expenditure increases from €80m to €110m have been approved without cost benefit analysis as required under the Public Spending Code. In addition, the CER claims not to hold any records regarding the purpose and necessity of the extra capacity despite deeming the works necessary.

Section 1: **Introduction**

In 2007 the Irish Government issued a white paper on energy [5] and established its aim to achieve 33% electricity consumption from renewable sources by 2020. Most of this was to be achieved by deploying large amounts of on-shore wind energy. The aim of the plan was to reduce Ireland's CO2 emissions. Dermot Byrne, former chief executive of EirGrid describes this transition as follows:

"Over the next two years we … will put in place … more electricity generation than we have connected in this country since the foundation of the State. This is a huge undertaking." [6]

This ambitious pledge was to focus on "tangible outcomes" subject to "rolling expenditure review and value for money policy review". However, to date, no analysis of outcomes or value for money has been undertaken and the Irish electricity consumer and industry, paying the third highest electricity prices in Europe continue to prop up a lucrative wind industry that saves at best 2.6-4% of our overall CO2 emissions.

In 2008, the Commission for Energy Regulation (CER) issued a Direction [7] to the system operators requiring 40% of electricity to come from renewable sources - mostly wind. This was supported by the newly created entity EirGrid launching its plan to double the capacity of the Irish Transmission Grid. Also "to support this level of wind" a further Direction [8] issued in 2009 for "an additional 1,600MW of conventional electricity generating capacity" and an "interconnector to the UK"

Amazingly, no cost benefit analysis was conducted at the outset of this massive infrastructure programme. As noted in the Irish Independent in 2009 [9]

"Unfortunately, the regulator's insistence on the creation of a false market to attract new entrants means it is unlikely to ever act as a champion for consumers and anyone who thinks this is an exaggeration need look no further than a recent study carried out for the all-island energy project… This document makes disturbing reading, not only because of its conclusions, but for the willingness of the authors to ignore commercial realities in coming to those conclusions."

However, the CER study noted that it is based on "an ideal scenario where other factors such as system constraints, cost of ancillary services and network reinforcements were not considered".

Unfortunately, an ideal scenario is rare in the real world and in this document we attempt to outline some of the economic costs and outcomes of this ill-conceived plan.

Section 2: **Costs of Wind**

We have identified the following costs attributable to wind energy: PSO subsidies, electricity grid upgrades, increased electricity grid maintenance, curtailment and constraint payment, capacity payments, interconnectors, smart metering, demand side unit payments (DSU), DS3 programme, tax breaks, Wind Skillnet training.

1. PSO

The PSO levy is a subsidy charged to all electricity customers in Ireland. It consists of various subsidy schemes to support national policy objectives related to renewable energy, indigenous fuels (peat) and security of energy supply. The PSO levy for 2017-2018 for renewable electricity is €375.7 million. [10] As wind comprises over 80% of renewable electricity, [11] this year consumers are paying €300.6m to subsidise wind.

Because the price of wind is guaranteed, the lower the wholesale price of fuel the more we pay in PSO to match the difference between this market price and the guaranteed price. If we double the amount of electricity generated from wind, as planned, and wholesale prices of fossil fuels stay low, we will double PSO, bringing it to about €600million p.a. in order to subsidise wind.

2. The costs of the grid

By 2020 it is estimated that €8.49billion will be spent on maintaining and expanding Ireland's electricity grid. It is unclear what proportion of this is required to integrate wind on the system. However, CER have stated that the period 2011-2015 was

> *"characterised by the requirement for a significant investment in transmission in order to connect a large volume of new generator connections, predominantly wind"* [12]

so it is likely that a significant proportion of these costs relate to integrating wind.

Up to now, a small number of large power plants supplied most of Ireland's electricity requiring a limited number of high voltage power lines to transverse the country. But wind is typically generated in geographically dispersed areas and will have a significant impact on the amount and location of grid infrastructure needed to connect it. EirGrid's 'GRID25' [13] is a plan to double the capacity of the existing transmission system with additional very significant upgrades also required to the distribution network.

Minister Simon Coveney noted [14]

> *" we are already committed to …… 3 or 4,000 MW more of grid connection from wind farms spotted all over the country in a totally uncoordinated fashion which will be a headache for EirGrid to manage … because of the problems with intermittent nature of wind"*

The distribution system consists of the electricity wires and substations that connect homes and businesses to the national grid. It is owned and operated by ESB. The transmission system comprises the high voltage grid infrastructure and is operated by EirGrid.

Building and upgrading such infrastructure requires significant capital expenditure (Capex) that is recovered from energy customers. The customer doesn't see these significant costs because they are bundled with other costs. The suppliers of electricity pay a Distribution Use of System charge (DUoS) per unit of electricity that they buy, which is then passed on to final customers in their electricity bills. The DUoS charge and the corresponding Transmission System Use of System (TUoS) charge for the transmission system together form around 30% of an average consumer's electricity bill. [15]

The larger the grid the higher the operating costs, which includes transmission (heat) losses at about 8% of the electricity generated.[16] Once the electricity grid is expanded it needs to be maintained on an on-going basis, whether it is transporting much electricity or not. Due to our dispersed rural population, Ireland's grid is already four times the European average of length of network per capita. [17] This means, that if consumers use fewer units of electricity, the operating costs will have to be spread over the remaining units i.e. the cost of a unit of electricity will rise. Expanding the grid will increase this effect.

Table 2: Capital and operational costs of the grid 2011-2020 ***

	PR3 (2011-2015	PR4 (2016-2020)	TOTAL	PER ANNUM COST ATTRIBUTED TO WIND
Capital costs				
Transmission system	1024.35m[18]	148.17[19]m+875.42[20]m=1023.59m		€163.84m - *Note 1*
Distribution system	1114.5m[21]	1336.9m[22]		€12.26m - *Note 2*
		Capital costs total	**€.4.499 billion**	€176.1

Operating Costs				
Transmission system	€445.8m[23]+€240.5m[24] =€686.3m	€810.51[26]		€29.93m - *Note 3*
Distribution system	1140.4m[26]	1362.1m[27]		€20.02m - *Note 4*
		Operating/ maintenance costs total	**€.3.99 billion**	€226.06m per annum

In the absence of more detailed information, we have assumed that the following % of costs outlined in Table 2 are attributable to wind - these costs are included in Table 1.

Note 1 - 80% assumed attributable to wind - see footnote 28

Note 2 - 5% assumed attributable to wind – see footnote 29

Note 3 - 20% assumed attributable to wind - see footnote 30

Note 4 - 8% assumed attributable to wind - see footnote 31

3. Interconnectors

Why we need interconnectors

The Republic of Ireland's electricity grid functioned, for decades before wind energy, reliably and cost effectively, without interconnection to either the UK or the European mainland. Give the planned installation capacity, wind energy in the future will often be produced in excess of demand (2,000-5,000MW) and 6 to 13% would have to be curtailed in the absence of interconnectors to transfer it abroad. [32]

The example of Denmark

Denmark has the highest electricity prices in Europe [33] and in periods of low demand, excess highly subsidised wind power is exported at 'dumping prices' into neighbouring grids.[34] In this way excess variable power is absorbed by interconnection. [35] Danish wind power overflow is sold to neighbouring countries at times of excess wind power production and Denmark imports electricity during calm periods. The benefits of falling wholesale prices are not felt by the Danish consumer, who are not only subsidising their own renewable sources of electricity, but also effectively subsiding the Norwegian and Swedish consumer. In 2013 Denmark on average imported 50% more electricity than it exported. For this, it paid almost 50% more to import than to export electricity. [36]

EU's Projects of Common Interest

The EU's 'Projects of Common Interest' (PCIs) comprise projects deemed to be part of the EU's efforts to build an "Energy Union". The most recent list of PCIs includes the Celtic Interconnector (Ireland-France), Greenlink and ISLES (both Ireland –UK) and either one or two more Ireland –UK interconnectors.[37] It is likely, of course, that Brexit will impact these PCIs to the UK. These PCIs are complementary to the National Renewable Energy Action Plan's (NREAP) requirements for the East West Interconnector to Wales and the North South interconnector to Northern Ireland plus further interconnection to the UK and to France. [38]

The upgrading of existing, and development of new energy transmission infrastructures of European importance will require investments of about €140 billion for electricity projects. Grants from the Connecting Europe Facility (CEF) will contribute to the construction costs to "fill in the gaps in commercial viability of the projects that are particularly relevant for Europe".[39] €800 million in CEF grants has been set aside for PCIs in 2017 and a total of €707 million in grants was allocated to 27 PCIs in 2016.[40] The total fund amounts to €30billion. [41] However, promoters of PCIs are encouraged to "primarily explore and use other types of financial support available at EU and national levels", [42] including the European Fund for Strategic Investment (EFSI) and the European Structural and Investment Funds (ESIF), as well as state aid which may be granted to such projects. The Commission has also acted at project level, in particular by facilitating contacts between promoters, and financial institutions, such as the European Investment Bank (EIB) and the European Bank for Regional Development (EBRD), to attract financing for PCIs under standard financial instruments.

For commercial banks, loans to PCIs are low risk, as the EU has effectively bank rolled the major share and enabled a mechanism for the cost to be passed on to the consumer to be recovered. The question then arises as to whether these projects would ever have happened if they were subject to the normal rules of project financing and return on investment.

Accountability of PCIs

The EU's PCI programme is the subject of an investigation at UNECE, as it bypassed the legally required assessments and public participation.[43]

Documents regarding these PCIs, obtained after a legal battle, [44] show discrepancies in the stated aims and costings of these projects.

- Eirgrid's Gridlink (Cork-Waterford-Dublin) purported to be for the integration of wind generation in the south of the country requires an additional interconnector to the UK or France. A €110m saving was claimed for the French 'Celtic' interconnector whose total cost is estimated at €1billion [45], but Eirgrid reported elsewhere a maximum saving of only €37m. [46]
- The East West interconnector cost €570m which includes a grant of €100m from the EU Commission and an EIB loan of €300m. [47] The UK electricity consumer paid nothing. In Ireland transmission tariffs, which are about a third of a typical bill, went up by 5% per annum to pay for wind upgrades, primarily the East West interconnector.[48] A UK/German academic research paper found [49] that: "Eirgrid's conclusion the East-West Interconnector is socially attractive does not stand up to scrutiny, the true conclusion could be negative instead of positive". The Irish Academy of Engineering's 2009 Energy Policy Review called for this interconnector project to be deferred "pending a full techno-economic study".[50]

Eirgrid's Interconnector Feasibility Report dates from 2009 [51] and there has been no big picture analysis from Ireland's perspective of what this interconnection will achieve in terms of the costs, benefits, emissions savings etc. Nor have we found any easily accessible information on what costs exactly are passed on to the consumer. Irish and European citizens are directly and indirectly funding these large infrastructural projects, which lack transparency and for which the value-for-money has never been quantified.

4. Constraint, curtailment and capacity payments

Electricity suppliers are often scheduled to supply a certain amount of electricity at a particular time. Energy payments are the market prices for electricity paid to the generator. They are calculated on a half-hourly basis.

When this power is not required, the supplier is paid a constraint fee to compensate for the cost of starting up the plant. Without wind generation, constraint payments can be kept to a minimum by fine-tuning scheduled generation with expected demand. The intermittent nature of wind energy increases these costs that are eventually borne by consumers.

Table 3: Capacity, constraint and curtailment payments estimation

TYPE OF PAYMENT	COST PER YEAR €	COSTS ATTRIBUTABLE TO WIND
Constraint payments for all generators 2016	€113m[52]	€56.5m*
Curtailment 2015 (wind)	€21.3m[52]	€21.3m**
Capacity payments to non-wind generators 2015	€21.3m[53]	€21.3m***
Balancing payment to wind	€64.9mm	€64.9m****
	Total	**€.335.2m**

** All these costs are expected increase as more wind is added to the system. We assume 50% of constraint payments are due to wind*

***5% wind curtailed in 2015 Total electricity energy payments=€1.85b Wind supplied 23% of total electricity = €426.4m 5% was curtailed =€21.3m*

****As wind comprised 23% of electricity in 2015, €426m (23% of €1.854b) was NOT paid in energy payments to conventional generators who lost out on producing this 23%. We assume they are compensated for this full amount minus the savings they accrue in fuel*[54]

***** Total wind output in 2015= 6561GW*[55] *Balancing payment is €9.90/MWh* [56] *Balancing payment to wind= €64.9m*

Constraint payments are made to both wind and conventional generating plants. Conventional power stations get constraint payments when they are due to run at say 2pm today, but wind unexpectedly blows more. In this case the plant has to ramp down because electricity generated from wind gets priority dispatch onto the grid. Conventional power stations now run less frequently than they would with no wind on the system and, as a result, they will need more constraint payments to stay open. When wholesale fossil fuel prices are low, constraint payments rise. Years with good wind output coincide with those years that had high constraint payments. [57]

Wind curtailment is an intentional reduction in overall wind power output ordered due to the risk of instability on the electricity grid from non-synchronous renewable generation, as well as other reasons such as managing grid stability and reserve requirements. In 2015 5.1% of Ireland's wind was curtailed.[58]

In addition, in order to ensure the demand for electricity is always met, generators receive a capacity payment for being ready to generate electricity. [59] Capacity payments are made to all electricity generating plants and the payments allowed are decided by CER every year. These payments are required with or without wind on the system, but larger payments are needed for conventional plants when wind is on the system. This is to compensate the conventional generator for their loss of earnings because wind has priority dispatch. Capacity payments that conventional generators normally receive are not relevant to this report. We are only concerned with the additional capacity payments they receive as a result of wind. In our estimates we assume that this portion of capacity payments to conventional generators is equivalent to the energy payments paid to wind less the amount of fuel the conventional generator has saved by not operating.

5. Smart meters

Demand and supply of electricity must always match. Increasing the amount of electricity generated from wind makes the supply more unpredictable, therefore there is a need to control demand to match supply. The aim of smart meters is to reduce demand during periods of peak demand and increase demand at periods of low demand, for example at night. As a result CER decided to roll out the National Smart Metering Programme (NSMP). [61] Combining information on energy demand with weather forecasts can allow grid operators to better plan the integration of renewable energy into the grid and balance their networks.[62]

The NSMP involves the roll out by ESB Networks and Gas Networks Ireland of new meters, a communications network to support them, and investment in new IT. The total cost of the roll-out is estimated to be in the order of €1billion[63] which will be passed on to the consumer.

We are attributing all costs of smart metering to wind. If all electricity were produced by conventional (synchronous) generation, supply and demand would be more accurately matched. By adding intermittent (non-synchronous) wind generation, smart metering is required to attempt to match supply and demand.

6. DS3 Programme

Electric power generators connected to the electricity transmission and distribution grid function not individually but as part of a team of generators. The key factor that is common to the grid and the individual generator is the frequency. In Europe the frequency used is 50 Hz. The grid frequency is not a fixed value; it keeps changing within a narrow range called the Rate of Change of Frequency (RoCoF). Allowable variation of the grid frequency is in a small range of plus or minus 0.5 Hz or less. At any point of time all the generators connected to the grid run at the same speed or in a "synchronized" mode.

If this frequency is not maintained, machinery operating on electricity can be impacted, from sensitive clocks running slow to large electrical equipment being damaged.[64] In addition, the effects of not operating at RoCoF could have serious consequences for machine insurance, outage planning and maintenance costs, and overall cost-effectiveness and profitability of each machine.[65]

In the past all generators were dispatchable; the grid operator could adjust their output as required. However, now with wind on the system, output can change quickly either when wind speeds drop or when there is excessive wind and wind turbines are forced to stop operating.

To achieve some 40% of our generation from wind, the grid will now have thousands of small generators randomly varying their output. Given the variable nature of wind, other dispatchable generators have to rev up and down to keep frequency steady. To facilitate this, Eirgrid have dictated that a wider RoCoF is required.

This change of frequency has not been undertaken before, as it is considered too dangerous. Generators are fitted with RoCoF protective devices because if they suddenly

load up or load down it puts huge strain on mechanical drives. These protection devices are to be adjusted to much wider limits. Eirgrid's own technical consultants have expressed concern about the risks entailed. [66] Many of the technical details and risks are still unknown, particularly as Ireland is a small island grid, without the inherent stability to be found with larger mainland grids.

To counter these technical problems, EirGrid and SONI's launched the "Delivering a Secure Sustainable Electricity System" (DS3) programme in 2013.[67] This is a multi-stakeholder, multi-year programme of work designed to increase the capability of the power system and to reduce curtailment. It will cover operation from a maximum of 50% System Non-Synchronous Penetration (SNSP) level to a maximum of 75%.

The budget of the DS3 (including Northern Ireland) is €235million p.a.[68]

7. Demand Side Units

Because wind is intermittent and cannot be stored on a large scale more wind on the grid means that supply of electricity becomes more volatile. So, if the grid operator can get some consumers to reduce their demand at certain times it makes it easier to balance the grid. These operators, who often operate large industrial sites, are called Demand Side Units (DSUs) and they can produce electricity for their own use on site. [69] The grid operators issue instruction to participating sites to go off grid when electricity demand is high. Instead of powering their facilities from the grid they will turn on their own on-site generators, which are often diesel generators. The individual demand sites use a combination of on-site generation and plant shutdown to deliver the demand reduction.

Producers are paid €42,000/MW/yr [70] and the capacity of Demand Side Units in Ireland has increased to 260 MW [71], and is set to increase further. The cost of DSU is €10.9 million p.a.

8. Effect of wind on industry and consumers

(a) Effect on conventional power plant viability

In 2009 a report calculated the extreme volatility, which would occur in the UK and Ireland electricity markets, if proposed wind energy policies were pursued [72]. For conventional power plants "Revenues will be volatile and uncertain to the point where plant may only operate for a few hours one year and then some hundreds the next". Power plants are big investments with a lifespan of forty years. By 2015 it was reported that 57 power plants in Germany were to close; financially unviable due to the aggressive 'Energiewende' promotion of renewables. [73] Hildegard Müller, head of the German Energy Association: "An ice age is looming for the construction of new plants too. Every second planned facility is hanging by a hair". According to the 2014 Single Electricity Market report, increased back up costs in Ireland as (combined cycle gas turbines (CCGT) are run inefficiently to provide back up for when the wind does not blow) are estimated to rise by €175 million per annum.

(b) Effect of high electricity prices on industry

'The Times' in the UK reported, that due to insufficient generation capacity: "Businesses (were) paid to cut energy at peak times". [74] 'The Economist' reported in 2015 on Germany's

glaring investment deficit.[75] 'The New York Times' reported in 2014 how high energy prices have forced European industrial giants to cut investment in Europe and relocate to the US: "Over the next five years, BASF plans to pump a quarter of its planned €20 billion in investments into North America."[76]

(c) Effect of high electricity prices on fuel poverty

It is not just long-standing once financially viable European companies, which have been cannibalised to fund the huge sums required for renewables. There is a social consequence to electricity prices, which have risen by 50% in the UK 77 and Ireland [78], even more in Spain and effectively doubled in Germany.[79] In Germany electricity is now designated as a luxury item;[80] more than 350,000 households a year are being disconnected, as they can no longer afford to pay their electricity bills.[81] Similar disconnections are occurring in Spain, where more than 5 million are now in energy poverty; indeed actual deaths have as a result occurred.[82] The poor are left with a disproportionate burden.

9. Tax breaks

Under the Employment & Investment Incentive Scheme an individual can invest in a wind farm and receive tax relief. In 2016, the cost to the taxpayer of this scheme relating to windfarms was € 4.7 million. This information was obtained by Freedom of Information from Dept. of Finance in March 2017. Total cost to the taxpayer over last 7 years according to UCC report was €50.59m.[83]

10. Wind Skillnet Funding

Wind Skillnet is a subsidised training fund for trainees in the wind industry. Member companies of the Irish Wind Energy Association (IWEA) and the Department of Education fund this programme.[84] A Freedom of Information request shows that over €847,000 was paid over nine years, funded by taxpayers.[85]

Section 3: **Who should be accountable and how?**

3.1 Commission for Energy Regulation – Public Interest Obligations

The Commission for Energy Regulation (CER) is Ireland's independent energy regulator. [86] In order to protect the public interest CER is obliged to:

- take account of the protection of the environment
- encourage the efficient use and production of electricity
- take account of the needs of rural customers, the disadvantaged and the elderly

CER determines the charge for using and maintaining the transmission or distribution system that are recovered from producers of electricity. CER is obliged to ensure that these are "objective, transparent and non-discriminatory, in particular taking full account of the costs and benefits of the various renewable energy sources technologies distributed generation and combined heat and power".

All Government Departments, public bodies and all bodies in receipt of public funding must comply, with the relevant requirements of the Public Spending Code.[87] The Public Spending Code is the means chosen by the government to ensure 'value-for-money' in public expenditure. In the case of State Companies, the Board of each must satisfy itself annually that the Company is in full compliance with the Code. Cost Benefit Analysis (CBA) is the mandatory appraisal technique for projects costing more than €20m. The general principle of CBA is to assess whether or not the social and economic benefits associated with a project are greater than the costs.

Both ESB and EirGrid are semi-state companies and must justify how they spend public money. A semi-state company's sanctioning body must ensure that the business case for spending this public money is robust. If there is a sanctioning body or regulator it is their role to ensure robust accountability. If there is no sanctioning body, the relevant government department takes on this role. Each price review conducted by CER is a form of evaluating value-for-money, however, CER have not required cost benefit analyses from either ESB or EirGrid for the costs they have sanctioned in their price reviews.

In addition, as CER issued the original Direction to ESB and EirGrid to expand the grid to enable the deployment of a large increase in wind energy, questions have to be raised as to how CER would and should critique their own Direction.[88]

CER has a regulatory role in transmission capital developments and say

> *"whilst EirGrid must plan the system, it is up to CER to determine if planned developments have been delivered in the most efficient and cost effective manner. CER only allows EirGrid to recover efficiently spent monies through its tariffs. We do this by monitoring and reviewing expenditure on each individual project."* [89]

CER is obliged to

" …monitor …the terms, conditions and tariffs for connecting new producers of electricity to guarantee that these are objective, transparent and non-discriminatory, in particular taking full account of the costs and benefits of the various renewable energy sources technologies distributed generation and combined heat and power." [90]

However, CER, in response to an Access to Information on the Environment request admitted: "*The CER does not hold records with a breakdown of grid costs attributable to Gate 3*".[91]

In addition, a report by consultancy firm Jacobs [92] criticised CER for not including a definitive list of projects associated with capital expenditure for the 2011-2015 period.

"As such, assessment of individual project capital expenditures, and outturn variances … has been performed solely to understand how project requirements, specifications and costs have evolved over the PR3 period and has not been performed to approve expenditures on individual projects."

In other words, projects funded by the consumer have not been itemised and no quantification of value-for-money undertaken. Although the aim of the whole wind project is to reduce CO2 emissions, no one, including the CER, has analysed the impact of this large spend. Jacobs noted: *"there are still questions over how efficient the actual expenditure incurred on some projects during the PR3 have been."*

3.2 Strategic Environmental Assessment and Regulatory Impact Analysis

As a former TD put it:[93]

"Most voters are, somewhat naively, of the view that government policy is developed through a process of careful analysis, comprehensive consultation, and the selection and prioritisation of initiatives based on impact and thorough cost-benefit analysis. In reality, most government policy-making is based on an ad-hoc reaction to events / media-pressure, and driven by the responsible Minister's particular requirement to be seen to announce something which seems at least semi-sensible".

Ireland and the EU are required to undertake Regulatory Impact Analysis 94 (RIA) procedures to be applied to all draft legislation and proposals for EU Directives before they are agreed. Integral to RIA is the assessment of the costs, benefits and impacts of each option: "Where possible monetise costs and benefits".[95] [96]

Before infrastructural plans and programmes are adopted, Member States are required to assess the justifications, impacts, adequacy of mitigation measures, and alternatives of these infrastructural plans and programmes by means of a Strategic Environmental Assessment (SEA).[97] The UNECE Aarhus Convention requires public participation on all plans and programmes related to the environment and, according to Ireland98 and the EU, 99 this legal obligation is fulfilled by their RIA and SEA procedures.

Typically EU Impact Assessments run into several hundred pages, such as for air quality control measures, [100] where extensive financial estimates are made of the negative impacts of pollutants. The Impact Assessment for the EU proposal for the 20% by 2020 Renewable Energy Directive [101] was 62 pages; no proper method existed for calculating carbon savings, the negative impact of carbon emissions or the impacts on "regional development and rural economy".[102] The EU's overall target was then shared out to the Member States, based on their GDP and their existing level of renewables. Nobody knew what was to be built or as to why.[103]

Neither did Ireland complete a RIA of the proposed Directive. The Directive was then rushed in with member states having a year to adopt a National Renewable Energy Action Plan (NREAP) prepared to a complex template[104] issued by the Commission. The legally required SEAs[105] and public participation provisions of the Aarhus Convention [106] were bypassed. The Commission issued a template to be filled out by member states to assess the impacts of the NREAPs. States were to quantify the amount and costs of renewable energy they expected to use, the expected reduction in emissions as a result of these renewables and expected jobs created. Nineteen Member States, including Ireland, left this section blank, the others fudged it as it was optional "to avoid an excessive administrative burden on Member States". [107]

In summary, both the EU and the Member States broke all their legally binding procedures, subverted their citizens' rights, inflicted a financial burden of hundreds of billions[108] and caused major adverse environmental impacts to deliver something, for which they have absolutely no form of tangible assessment or quantification, as to what it is. Currently the EU wide investment in wind, solar and supporting infrastructure is close to €1,000 billion.[109]

3. State aid and regulatory impact of state aid funding for renewables

State Aid can be awarded for environmental protection, such as the Irish Renewable Energy Feed in Tariff (REFIT) scheme. [110] However, State Aid distorts competition, so is in conflict with the EU's core principle [111] of a "highly competitive social market economy" in which "prices are set according to supply and demand and are not controlled by the State." [112]

REFIT gave wind investors a minimum subsidised electricity price, plus priority access, as their competitors with conventional generation had to go offline when wind energy was available. In Ireland it has been decided that we must purchase some 40% of our electricity from the State promoted wind farms.

So what environmental protection was this State Aid to support? The purpose of renewable electricity is to reduce carbon emissions by replacing other sources. However,

there was a failure to complete Regulatory Impact Analysis and Strategic Environmental Assessments, so nobody knew what actual tonnes of carbon dioxide were to be saved and its environmental damage cost.

The EU requires that where there is a choice between several appropriate measures to achieve an aim, "recourse must be had to the least onerous, and the disadvantages caused must not be disproportionate to the aims pursued."[113]

The EU's State Aid guidance[114] requires evidence that the aid is necessary, that the amount is kept to the minimum and that the selection process is proportional. However, Eirgrid's own economic analysis [115] concluded that the cost of replacing conventional generation with wind energy "appears high relative to other alternatives". State Aid given to wind from REFIT I and II represents more than €12 billion. [116] The amount of CO2 saved by this investment so far is less than half that forecast according to the SEAI [117] and the EU Commission itself has no information as to what environmental protection the REFIT I or II schemes are to provide.[118] [119]

4. Fines

It is claimed that Ireland will be fined hundreds of millions by the EU if we don't meet the renewable target set for 2020. So how does the EU's legal system actually function when a Member State is in non-compliance, and what are the number of fines that have actually occurred?

The EU has a hierarchy of laws.[120] The Treaties are the primary legislation, comprising the Lisbon Treaty and the International Treaties ratified with other countries and international organisations. The secondary legislation comprises Directives, Regulations, etc. Treaties take precedence over legal acts adopted under the EC Treaty. So if there was a conflict between a Directive and a Convention, such as the Aarhus Convention, all Community or Member State administrative or judicial bodies would have to apply the provision of the Convention and derogate from the secondary law provision. [121]

The EU Commission is the "Guardian of the Treaties" and hence meant to enforce EU legislation, but it has absolute discretion on what it enforces and enforcement is actually limited. Proceedings take many years, first going through formal reasoned opinions before appearing in the European Court. Only the Court can decide, if there is an infringement, which is then referred back to the Member State to comply. If this doesn't happen, only then can the Commission bring proceedings for a fine.[122] The Commission has a methodology for calculating fines, based the Member State size, GDP and the severity of the offence,[123] but only the Court can decide the size of the fine and if it is appropriate, which has happened less than thirty times.[124]

YEAR	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2000
NUMBER OF FINES	3	5	4	3	2	0	2	2	0	0	0	0	1	1

Section 4: **Case study**

The Laois/Kilkenny Reinforcement Project *(EirGrid project ref. CP0585)*

The Laois/Kilkenny reinforcement project is associated with a need to reinforce the grid in 'high wind scenarios'. [125] It was originally selected in 2008 as an €80 million project [126] but in a recent EirGrid statement it transpired that the project cost has risen to €110million [127] thus calling the original selection criteria into question.

The Laois substation is also going to be much bigger than the stated need. With a capacity for up to 16 connections it will be one of the biggest substations in the country. More than half of this capacity has never been justified and EirGrid have refused to explain why so much capacity is needed or what the future plans for the substation are, effectively keeping its primary purpose and impacts a secret.

The project is currently the subject of separate complaints to the European Commission and to the UN Aarhus Convention Compliance Committee on the basis of this refusal and other breaches of the EU Environmental Directives and the Aarhus Convention.

According to the CER's own decision process "*each proposed project (e.g. over €10 million) will undergo a rigorous cost-benefit analysis to determine the most appropriate mechanism to deliver the required capacity.*" [128] This was later watered down [129] to a monitoring process "*based on ensuring annual workload does not become over-bearing for the three parties.*" [130]

Despite the obligation for CBA arising from the Public Spending Code and the CER's original requirement, no Cost Benefit Analysis has been completed for this huge project, which has now increased in cost by almost 40%.

When the CER was asked to confirm the purpose and necessity of the extra capacity for further power-line connections (i.e. what projects are they intended to support/connect to/ interact with) they responded

"The CER does not hold any records in relation to this matter and suggest that you contact the EirGird FOI division."

but that

"CP0585 has been deemed necessary works by the CER." [131]

Independent consultants to the CER have already raised concerns regarding "A presumption of efficiency "by default", with no onus on the businesses to demonstrate that they have efficiently incurred capital expenditure".[132] This means that the €110million cost of the Laois-Kilkenny Reinforcement Project will be retrievable from energy customers despite the complete lack of a cost benefit analysis and the main objective of the project being so secret that even the Regulator doesn't know what it's for.

Conclusion

The Irish state and citizens are spending approximately €1.2 billion per year on an energy programme which has never been subject to proper analysis. For this, Ireland is saving between 2.6% and 4% of overall CO2 emissions; a cost of between €300 million and €461 million per percentage point saved. This is unsustainable as we aim to achieve greater emissions savings. In addition, no alternative methods of achieving these aims have been analysed. Obvious considerations include the retrofit insulation of houses and the conversion of Moneypoint power station from coal to sustainable biomass or CCGT gas. As legally mandated costs benefit analysis and strategic environmental assessment were bypassed these, and other alternatives have never been explored.

Our energy policy must be urgently reviewed and all current actions paused until full analysis has taken place of the most cost-effective and sustainable way to decarbonise

Our Mission

Wind Aware Ireland's aim is to reform the Irish Government's unsustainable wind energy policy. Our objective is to ensure that energy policies and developments fulfill the three pillars of sustainability: environmental, economic and social.

Who are we?

We are an alliance of over fifty community groups in twenty-two counties. We are voluntary, have no political alliances and are unfunded. Our role is to hold policy makers to account to ensure that they act on evidence and to provide a counter balance to business influences on the political process that has underpinned wind energy in Ireland.

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Design

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Acknowledgements

Wind Aware Ireland would like to thank Mary Byrne, Henry Fingleton and Richard More O Ferrell for their help with editing this booklet.

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