This is a shortened version for clarity and brevity. The full length version from which this is condensed is available.

How to identify some of the misinformation and spin to fool Government, the media and the consumer into investing in wind farms which I claim do nothing to reduce green house gasses and may actually increase the burning of fossil fuel.

How the modest complexity of all power generating systems facilitates the spinning of misinformation.

Proponents of the wind farming will not engage with critics, preferring to use the media releases to spread misinformation.

There is a bias (intentional or unintentional) in most media outlets 99% of all articles in the media on the subject are in favour of wind as a source of power.

This critique is the result of an objective balanced analysis of wind as a source of renewable energy using all available information I could find. Your money is being ploughed into this industry and more is to follow. Read for yourself and then decide.

The huge investment now taking place in wind farming has all the hall marks of a Celtic Tiger economic bubble which is set to burst. As practically zero electricity is actually produced by wind farms, they rely on Government subsidies amounting to 300% of the cost base of conventional generation, but as the amount of wind capacity in the system increases, this will become unsustainable.

Written by Val Martin, Kingscourt Residents against wind farming.

(Who has an open mind of the Global Warming debate and strongly believes in squeezing the last drop of benefit from our fossil and nuclear fuel reserves)

Forword: By Paul Martin: I have examined the technical aspects of this document written by my father Val Martin. He always has an interest in science, engineering and in particular in electricity as a scource of energy. Where other dads would be watching football on TV, mine would be out in the garage making home made capacitors, electro-magnets, and motors. His book shelves are crammed with books on science and engineering. He inherited this interest from his father PJ (my grandfather) who was well known for his ability to understand and repair radios, auto and domestic electrics when this technology was new in the 1940's and 1950's.

He has has a number of objectives in campaigning to stop the construction of wind farms. He beleives they will wreak havock on the Irish environment, its wildlife and amenity. He believes the huge cost in money and in co2 emmissions released during manufacture is unjustified. He feels wind farms will drive up the cost of electrical power to business and homes. The purchase of turbines involves the transfer of huge amounts of money to companies oversees which does little to help the Irish ecomony, the impact on tourism will be severe and employment in the long term is minimal.

Above all, he sets out to prove the rather bizarre ascertion that the addition of wind energy to the national grid results in a saving of no more than 1.6% in the burning of fuel and a consequent minimal saving of co2 emissions overall. He further postulates that as the percentage of wind energy in the system increases, the saving may become zero and might fall to negative. In otherwords, a system with no wind would burn less fuel than a corresponding system with wind.

I must declare a self interest, he is my father and pointed me towards electrical engineering as a career, in keeping with the family tradition, but he himself is not so qualified. He asked me to critically examine this document and to report fairly without bias. Having done so, I can state that the technical calculations appear to be correct. The calculations appear to be complete and accurate and when measured against the work of other experts and of established know how about electrical generation and supply, I can find nothing wrong with it, but must point out that only an extensive on-site audit would finally settle the matter. I originally felt that wind could make a useful contribution to our renewable power needs, having read this, I now have doubts and the Irish Academy of Engineers appear to agree.

Val Martin is not saying he is right and everyone else is wrong. He backs up his claims by the comments of other analysis and asks for an examination to be carried out by a suitably qualified panel of experts. Not a tribunal with barristers and the like, but a simple inexpensive forward looking analysis costing no more than C20,000 euros. Without it, we are about to pour several billions of scarce euros into wind farms. He claims that in a few years time it will be noticed that we are still burning as much and more fosil fuel as before. **Paul J. Martin** Electrical/electronic Engineer,

I am painfully aware when writing this, that some parts are a bit complicated with mathimatical calculations that may be difficult to understand. They are given for completeness and as a reference to rely on in future. Please do not let these shortcoming turn you off. Just read through these hard bits and the general theme will become more clear. The author.

Part 1.

Eirgrid's (Ireland agency responsible for the generation and distribution of electricity) 2004 report on wind energy states: " it is an unfortunate fact that as the percentage of wind in the whole generation system increases, the net energy produced by wind decreases and falls to zero." (page 24 chapter 5 The Impact of Wind Power Generation In Ireland, -google eirgrid 2004 wind report)

Their 2010 adaquacy report states the following.

They give 3 senarios for growth in the Irish economy from 2009 to 2016. Low –medium – high.

One projects growth in power demand to rise by 17%, yet in the same period it is intended to increase conventional capacity from 6171 to 9191 = 148% and wind from 1167 to 4121 = 350%

Total capacity of Republic of Ireland's generation plant now = 7338 (wind included)

Planned increase to 2016 = 13,311 = 181%

The present down turn in the economy makes it very unlikely their will be any increase in demand.

The total cost for extra conventional and wind additions is more than 12 Billion Euros.

13,311 - 7338 amounts to almost 6,000 MW of capacity which will be surplus to requirements. The reason is because Eirgrid are under Government orders to bring the percentage of renewable energy in the system to 40% by 2020, most of this is to come from wind. It is obviously hoped by Eirgrid that demand will more than double. When it does not do so, we, the consummers, will be left to foot the cost. If we refuse to pay by installing our own diesel generators, they will get it from us through taxation. We the citizens will be left to pay for the "Nation Wind Farm Managment Agency" NWFMA the equivelent of NAMA mark 2. I am calling for a halt to further wind development and conventional installation pending an examination by a panel comprising engineers, economists and experienced electrical distribution operatives, not a tribunal. No-one will be accused of anything. Its function would be to report on the real effect wind farming will have on our emissions, dependence on foreign fuel, taxes, energy bills, our health and our environment.

As I write 1,300 Irish people per week are being cut off from power as winter nightime temperatures fall below – 10c, because they cannot pay their bills, electricity charges have been subjected to a levy by government most of which goes to towards the capital and running cost of windfarms. The bulk of the capital investment goes to Danish and German manufacturers. I set out to prove here that no benefit will acrue, costs will increase, co2 emissions will not be reduced. Moreover, some members of govenrment and the wind industry will falsely try to say the oposite, I hope my efforts here will enable you to identify the scam that is being pulled. If you do not agree with me, lets hear from you! My mind can be changed.

I have been campaigning for over a year now in order to try get my message accross to the media about the real situation pertaining to the contribution wind farms can make towards Ireland's energy needs. A simple official examination would answer all questions, but that is not on the cards.

I have now come to the conclusion that the manufacturers of wind turbines in Denmark and Germany cannot find a market for their products in their own countries and are activly engaged in conditioning the politicians in any country where they find succour. As some countries have come to realise that wind power is not the answer to their energy needs, they have shut their doors to wind farm development; the last few remaining countries are being targeted intensely. Intensive lobbying is taking place and past experience teaches that there is a danger of coruption. Despite making every effort, few decision makers or media will take an interest. A few are now beginning to consider the issue. (google: Bloomberg, Vestas cut forecast for wind, see interview with CEO).

When a wind farm is developed, satalite dishes are purchased by the developer and fitted to houses whose TV signal is interfered with by revolving turbine blades. The owners of the television networks may own many newspapers which could lead to a conflick of interest when it comes to publishing material adverse about wind farms, however there is no proof of this. I have tried to comment on Irish RTE radio in response to proponants of wind power being interviewed and was refused a say.

Most scientific and expert studies carried out on the usefulness of wind farms together with my own study comes to the same conclusion: Wind farms do not allow any shutting down of conventional power generation plant and may do the oposite.

Every study which tried to measure the amount of electricity provided by wind power failed to give a figure for its contribution, it is difficult to comparing like with like, but there are estimates and none gave a contribution figure greater than 2%. The figure of Denmark is 1.3% where there are 5,200 large turbines. My analysis suggests 2 things: 1) at low levels of wind in the system there may (and only may) be a contribution, 2) at high levels of wind in the system the contribution may be zero. This means that as wind power levels increase fuel savings fall to near zero and maybe become negative. Therefore wind power may result in an increase in the emission of greenhouse gasses released into the atmosphere, which makes it ridiculous to invest public money subsidising them.

No account is made here of the greenhouse gasses emitted in the manufacture and installation of wind turbines. One "2 mega watt" turbine has 768 cubic meters of concrete in the base = 4,000 tons. Concrete production is one of the dirtiest emitters of C02. Then there is the steel and wires. I concentrate here on the day-to-day situation runniing the turbines over many years, not the emission released in the manufacture, but these should still be bourne in mind.

Wind power cannot be used on its own, it must be balanced by conventional generation by a factor of at least 4.5 : 1 . Eirgrid's own adaquacy report 2010 admits that when high winds coincide with low demand, wind power is curtailed. That now with only about 15% of wind power. Ireland's targets of wind penetration of 40% can never be achieved, but the wind industry are having a say. It will be noted that at a time when demand for electricity is falling, Ireland is building more and

more fossil fuel capacity and is building an interconnector with the UK. This begs the question***: If wind can help us reduce our reliance on fossil fuel*****, <u>why are we building more fossil fuel power stations?</u>** One was recently opened in Cork by the ESB. Looncome Developments (a renewable energy company) have plans to build a gas fired power station in Co. Offaly. Why is a company committed to producing renewable energy building a dirty power plant? Quinn plans to build a gas fired plant in Louth. It is planned to increase fossil fuel generation capacity by 148% up to 2016.

The answer is because wind power does not work! It does not produce electricity when the conventional output is taken from the wind output. I wrote to the Irish Ministry for Energy for details on the method for accounting for fossil fuel energy used by wind farms; I got an acknowledgment, but no details. Wind companies appear to be paid for the "gross" power fed into the grid. No deduction is made for power used directly by the wind farms or for the cost of burning fossil fuel to allow that wind power to be accommodated within the grid. That cost is passed to the consummer. Just like the Irish banks, they cream off the proffits while the connsumers pay their costs.

Eirgrid are under orders from the Government to allow more and more connection to the grid, being a semi – state company Eirgrid must follow the party line. However, they compiled 2 reports in 2004 and 2010; some details in them may be of interest and are cited here. They are available free on – line. All their adaquacy reports appear to be conducted on the basis that wind generated energy must be incorporated into their generation portfolio by government directive. The question I would ask is "what would their aqacuacy reports look like if there was no wind in the system at all?

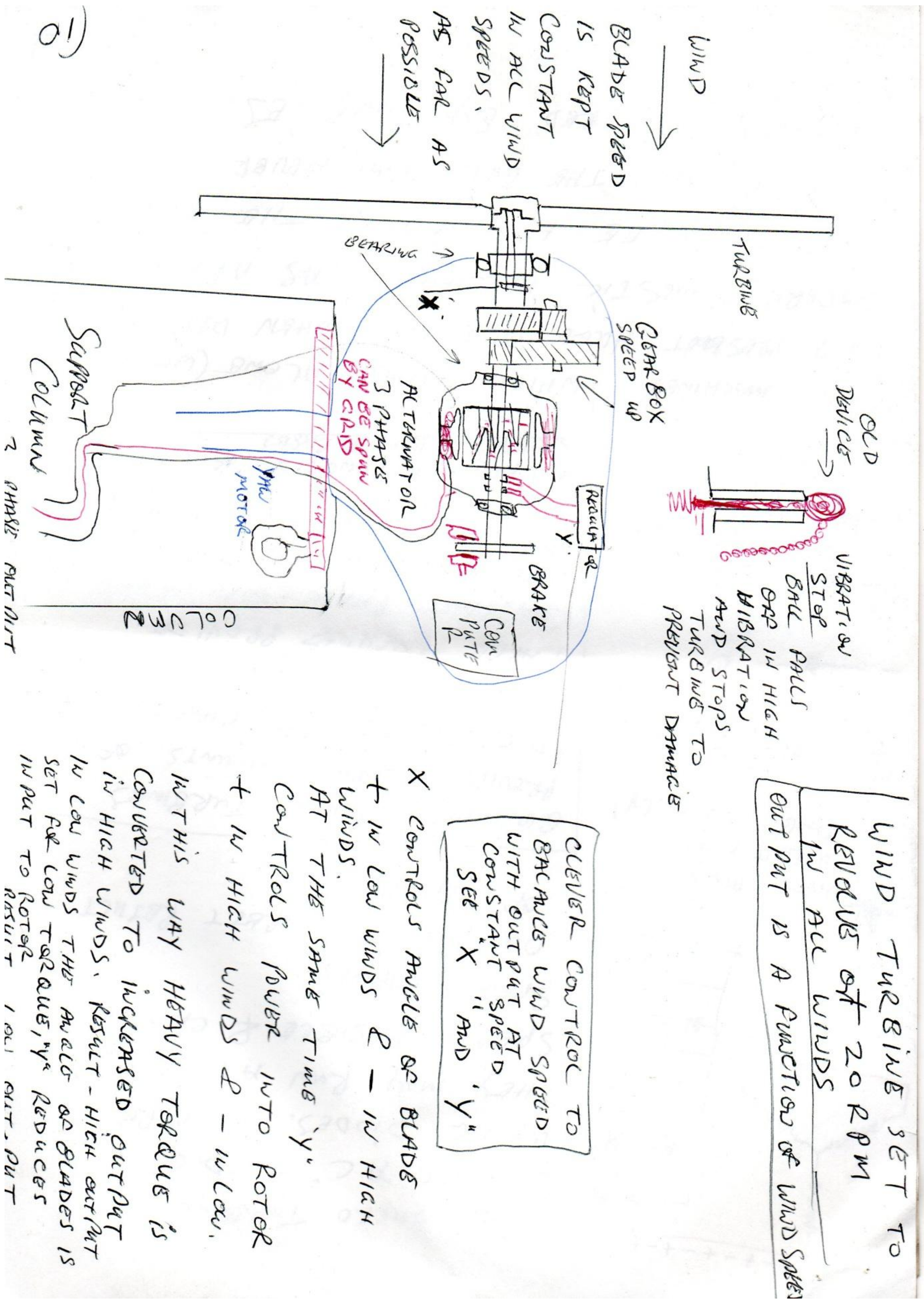
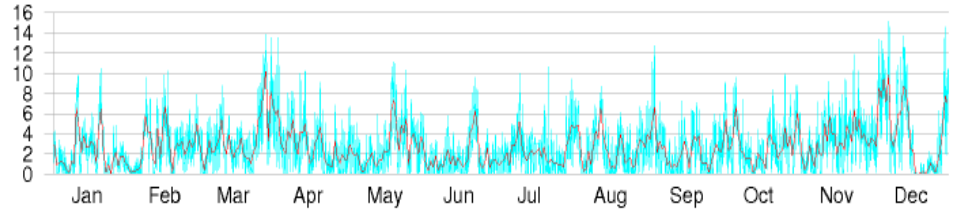


Fig. 1 Turbine generating design with wound rotor.

Part 2 Real Wind Speeds .

The theory that there is always wind blowing somewhere is a myth. You can carry out your own survey by recording wind speed each day. Wind speed is crucial to understanding the shortcomings of wind energy. In East Cavan a turbine will give useful energy 24.1 of the time.

Fig 2 Excerpt from David McKay's report to the British Government. Wind speed in Cambridge, England. A turbine begins generation @ about 12.5mph wind.



"This figure of 6 m/s (13.5mph) is probably an over-estimate for many locations in Britain. For example, figure 4.1 shows daily average wind speeds in Cambridge during 2006. The daily average speed reached 6 m/s (13.5mph) on only about 30 days of the year. But some spots do have wind speeds above 6 m/s – for example, the summit of Cairngorm in Scotland

To convert meters per second (mps) to Kilometres per hour kph x 3.6 mps to miles per hour x 2.25.

British figures say that the optimum speed of 33mph occurs one third of the time for coastal wind farms set up many miles out to sea, but much less on land.

My part of the country is East Cavan; my check on local wind speed over the past few years shows as follows, remembering a turbine starts to give useful power at c 13 miles per hour: (McKay)

Wind Speed MPH:	Percentage time	No of days.	Turbine output yes/no
0	5	18.5	None
1.15 – 4.5	18.2	66.43	None
4.6 - 6.9	21.2	77.38	None
8 - 11.5	26.1	95.26	None
11.6- 19.9	22.1	80.66	Yes, marginal
20 - 24.5	5.1	18.62	Yes about 60%
24.6 - 30.9	1.6	5.79	Yes about 93%
31 - 38	.5	1.85	Yes 100%
38.1 up	.2	.73	No (shut down for safety)

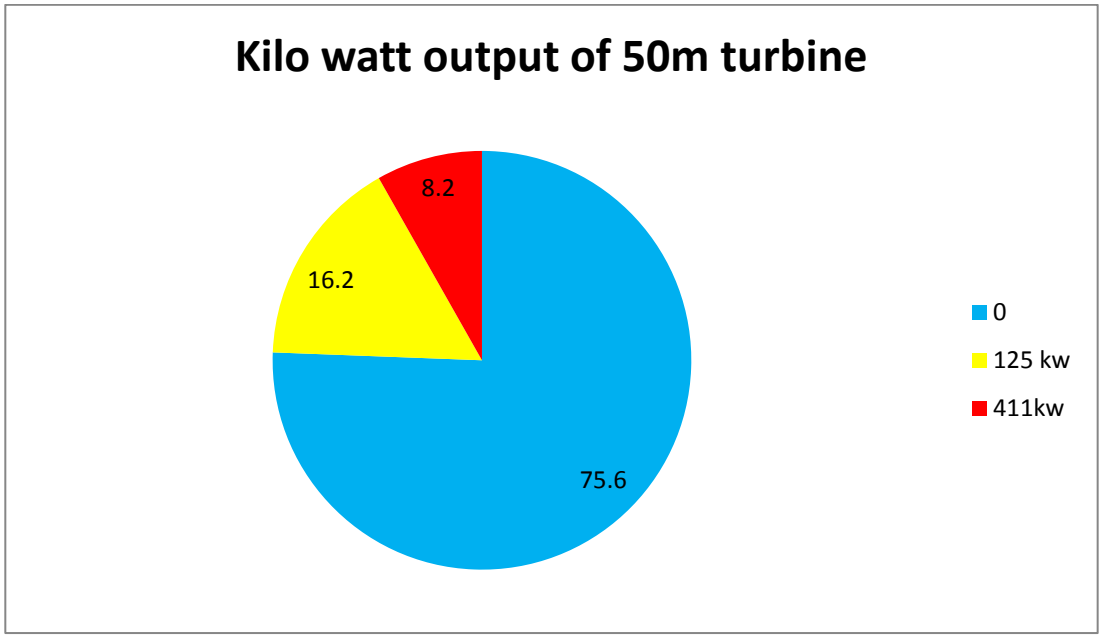
These figures do not coincide with turbine cut in speed of 13.5, so an adjustment is made (19.9-11.6) = 8.3 - (19.9-13.5) = 6.4 therefore 6.4/8.3 = 77% x 22.1 = 17%

Add 5.1 + 1.6 + .5 7.2%

24.2%

Some observers give a lesser figure because the output at the lower speeds will be much lower than at the higher speeds, but even these figures of 24.2% = only 88 days per year when useful output will be obtained. (note; I give two ways of estimating output 1) the calculations in part 1 and 2) the historic wind speed above). Remember wind speed is greater towards the west coast and lesser in the south east; both sets of figures serve to confirm the low turbine output. They may vary, but they are generally shown at much below my estimation of 24.1, sometimes as low as 10%. A major factor is the way output decreases with lower wind speed.

Fig 3. This chart shows the average output of a 50 meter turbine over any long period. The Blue segment shows the percentage when output is Nil.



Many in the industry claim that turbines give an output or 35% of their rated output; this would require wind speeds blowing @ 33 MPH 35% of the time or half that for 70% of the time. I have not observed this in any year I remember and weather reports I have noted over the past few years do not support this. **Why are we being given such overstated figures?** On way to distort the figures is to take a short time period (say 2 months in march). When you hear commentators speak of wind speeds or load factors, make sure they are talking about a period one full year January to March. Or 2 or more full years. Make sure they are recent because the speeds claimed do not correlate with my observed wind conditions in North East Ireland.

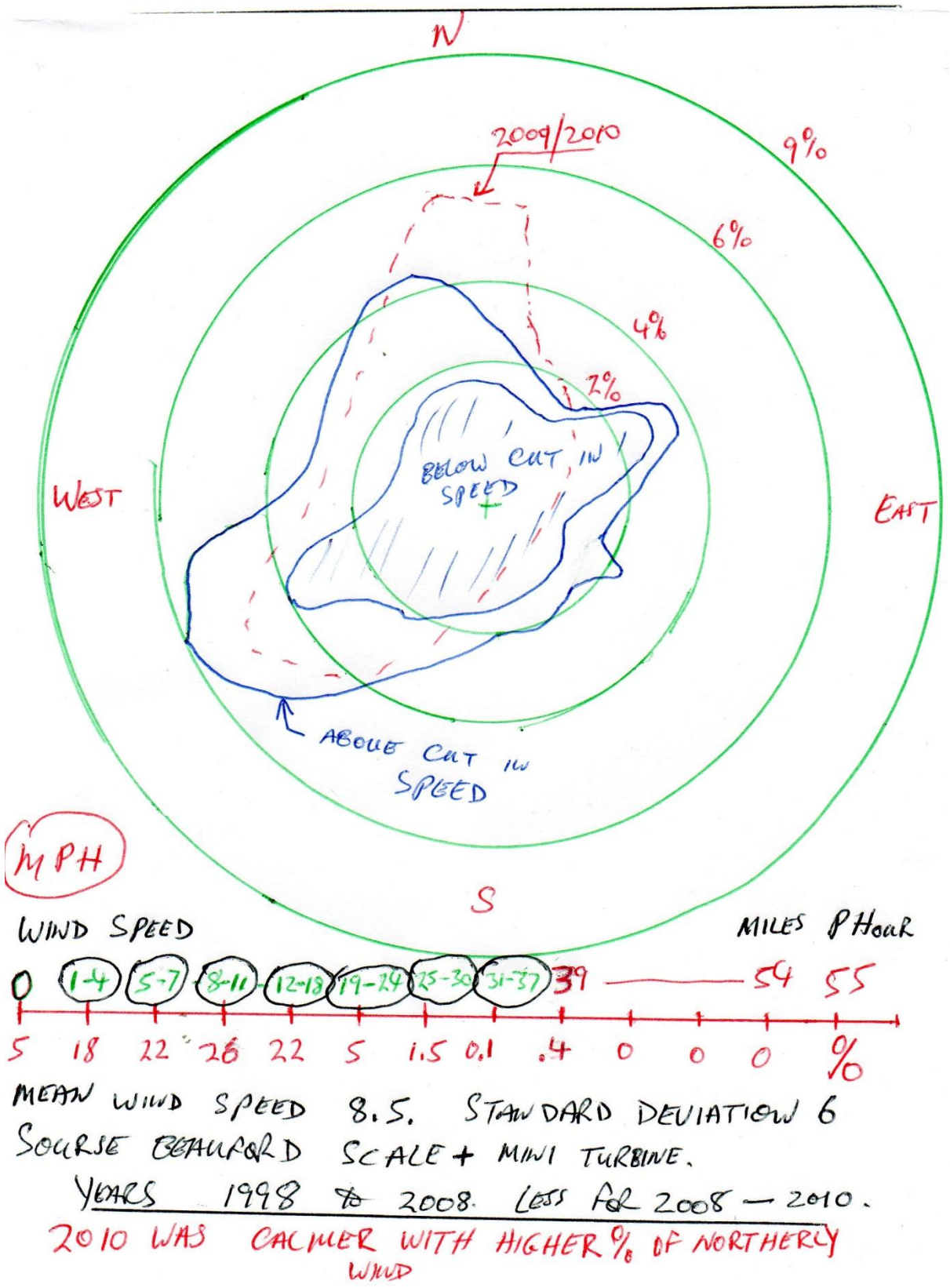


Fig 4. This wind speed map compiled from my own observations in 2007 – 2010. Other independent wind speed data collected between 1970 and 2000 is broadly in line.

"There is a theory that in Ireland, there is always wind blowing somewhere so that the average wind blowing country-Europe wide is the roughly the same. This has its origins in the fact that on

a windy day, gusting is not co-ordinated. A gust in Kerry may happen at 4.30pm while it may arrive in Donegal at 5.15pm. This smoothes the variation on the national grid. Average wind speeds are less in the south east compared with the north. "This cannot be taken to mean that there is always wind blowing somewhere, there is not." The McKay report (commissioned by the British government) agrees. I made checks at various times by phone and found that wind conditions are remarkably the same in all parts of Ireland. If it's calm in Cavan its calm in Cork and London. You can check this yourself when travelling" (McKay report available on-line)

Calm conditions usually occur during an anticyclone, a very large weather system which can extend right across Northern Europe. In Ireland best wind is on the west coast from Kerry right up to Antrim with average speed of 7 - 8 meters per sec, next is the midlands at 6 – 7, the lowest is the Kilkenny area 5 – 6 mps. Northwest Scotland has twice the wind speed of southwest England. It will be noted that winter frost and summer hot periods coincide with anti-cyclonic weather systems as our weather people continually tell us. In other conditions, wind speed can change rapidly from calm to gust, often in a matter of hours. It is important to realise that the Irish economy needs a regular uninterrupted supply of power as do small communities and individual farms and households. Just imagine a wind farm costing say 20 Million Euros which only gave 10% of its rated output (load factor). Well they still make money because they receive your money as a subsidy of at least 3 times the price thermal producers receive. The contribution made is reduced even more due to the way the grid handles wind power. Savings on co2 emissions may actually be as low as 1% and may even be a minus figure.

A check I carried out with a friend in Denmark showed that in anticyclone conditions wind speeds were similar. In normal conditions, there was a variation from 1 to 6 mph; Denmark appears to be a windier than Ireland. Some claim that this variation is enough to allow wind energy be transmitted from Denmark to Ireland, but it must be realised that there are losses through resistance which would cancel any difference.

Fig 5: Average wind speed for Ireland and Britain.

Part 3) Matching wind power to the grid.

Looks at the problem of connecting turbines to the ESB grid, it can be done, but power is lost and conventional generating capacity must still be maintained at 100% and maybe more.

Conventional grid systems here use mainly thermal power plant that convert fossil fuel to electricity to be used immediately in alternating form @ 50 hertz. Electricity has voltage (pressure) and amperage (volume) which combine in varying amounts to give useful power "watt." A watt is the power at any instant and is counted by watt/hours wh. 1 watt supplied for one hour = 1 wh, kW

= kilo watt (1,000 watts, mw = mega watt (million watts)). "A boy lifts a rock and drops it again = 1 watt. If he carries it for one hours, its 1 watt/hour. Measure of work done.

Base plant: The main string to their bow is "base plant". Usually powered by heavy fuel oil or coal, the fuel is conditioned and heated to burn intensely and completely. The heat boils water in special boilers that can withstand over 3,000 lbs of pressure per sq inch. The steam then drives a turbine which connects to a polyphase alternator. A separate "dc" generator is coupled to the end of the shaft to provide direct current for the alternator rotor. This is seriously heavy plant and is very efficient and has low carbon emissions. It is the "train" when compared to transport, cheap and powerful but not very flexible. It can take 8 hours to start up and 4 to shut down and cannot normally be started while in shut down mode. It is most efficient when run continuously except for the occasional servicing. Fuel used to start and stop is wasted. Its credit capacity is about 95%.

It is referred to by Eirgrid as "low **merit"** plant. That means it's best at supplying base load and not for responding to variations in other plant or in demand. It's not fully dispatchable meaning it can't be easily shut down to save fuel.

Nuclear plant is the same except that the heat is provided by a nuclear reactor. Starts up times are one or more days. (credit capacity explained later)

Mid Merit plant: A lighter version of base load normally fired by Gas (rarely nuclear but small nuclear plants are coming on stream). Can be started in less time, about 3 - 4 hours and shut down in less time. Better at responding to failures of other plant in the short term and for meeting foreseeable daily peaks in demand on top of base plant. Because it normally spends more time shut down, its credit capacity is lower. It does not make as good a job of converting its fuel to power and therefore emits more greenhouses gases than base load plant. It is the bus of the transport system and is slightly dispatchable. (flexible in turning off).

High merit plant: The best example is a diesel engine. Immediate starting and stopping it can respond to a failure or sudden increase in demand within a few minutes. The oil is fed into the combustion chamber at room temperature. Heat is dissipated through the cylinder walls and wasted through the heating system. The pistons reciprocate wasting energy in the process and high pressure gasses are exhausted to the atmosphere. They are inefficient and heavy polluters like lorry engines. Credit Capacity is low: They are the motor car of the transport system flexible, handy but hard on the pocket and environment. They are very dispatchable.

When starting all these plants must be pulled into phase (ramping up). You cannot just throw the switch. The heavier the plant the more time it takes to do this. Ramping up time must be added to starting time. Light plant can be pulled into phase quickly as it's dominated by the inertia of remaining system.

If hydro has a continuous supply of water it can be used for base load, mid merit or high merit generation. It starts immediately and ramps up quickly. It's an excellent power source and very versatile though scarce in Ireland. The ramping process could be compared to putting a car into gear with and without using the clutch, you need to have it moving first. Another example would be a minor road joining a major road. You can join it at right angles which results in accidents or you can join it by a gradual filter lane which is much safer.

In countries like Norway, hydro it is so abundant it is used for base load, mid merit & high merit purposes. It is the ultimate form of renewable energy. Hydro is sometimes mentioned as being the same as wind, but it is completely different. It is sometimes included with wind as part of the renewable portfolio, in this way it is hoped to hide the inadequacy of wind. It's like having 100 Euros of currency in your pocket and 40 of counterfeit notes and saying that your pocket contains a valuable resource of bank notes . (It would be the same value without the duds)

It is an unfortunate fact that if you want to provide back up for an intermittent power source you have 2 choices. 1) Use high merit plant switching it on and off as required with the consequent high level of carbon emissions and high fuel cost. 2) Use mid or low merit or base plant leaving it running continuously even when it's not required thereby wasting its fuel. It can idle, but this still requires fuel. This is what is meant by the statement that thermal plant must be kept running when wind output is good.

The only other variables are wind power and demand. They don't co-relate, wind speed are often better at night. You should now see the problems in using wind power for grid electricity. Wind generation has been around for nearly 100 years now; it was never more than a novelty. Our government seem to think that the wind will blow to suit their policies!

Most figures for wind power's reliability are given as statistical averages. Now if you paid me 2,000 Euros on condition that I supply you with a 4 course meal 50% of days in 2011 and you had no other food at all for that year, could you manage? Well yes, if I fed you every other day, but no, if I fed you nothing for the first 6 months. You might be dead for the next 6 months from hunger.

There was no sufficient wind to generate power from 15/12/2009 to the 28/1/2010 and from 1/2/1020 to 24/2/2010. The billions already spent on wind turbines gave no contribution despite the fact that ESB bills sent a portion of our bills to wind companies. This despite the fact that "***statistically***" wind power is available for a certain percentage of the time, the reality is different. Another way of looking at it is if you lived 30 miles from your work and drove every day. Then a bus company offers a service to suit your timetable. They agree to have busses on the route 95% of the time. This will be ok if know in advance what days there will be no service. If you do not know, you will miss work and 5% of days. This can be further complicated if you lease your car to someone else for 50 days per year without notice. If there is no bus and the car is gone and on a particular day, you can't get to work. With wind, there is no way of knowing when it will blow.

(The phrase "there are lies, damn lies and statistics" springs to mind.)

Power distribution. Irrespective of the type of fuel used to drive the shaft, all large scale power is produced by a revolving rotor which has magnets arranged around the circumference. These magnets can be permanent or produced by electromagnetic windings in receipt of a charge of direct current through slip rings. The polarity of these magnets alters from North to South in sequence. Arranged around the rotor are a series of windings around a soft iron core called a stator. As the rotor revolves anything close to it experiences a fluxed magnetic field alternating from north to south. If the rotor has "say" 40 poles, then the field will change "flux" from north to south 40 times per revolution. This flux induces an electric current in each winding of the stator which changes from negative to positive depending of the polarity of the rotor pole. The consequent power output alternates at a given rate per second called frequency or Hertz. Such a generator is more correctly called an "Alternator".

Old type auto generators used brushes and segmented commutators to convert alternating current "ac" to direct current "dc". A transformer uses the same induction process to alter the voltage of the output up or down. Only fluxed / alternating current can be used in a transformer.

If there is only one winding on the stator, then only 2 wires will come out from each end of the winding giving single phase current as used in domestic houses. However, there can be any number of windings arranged around the rotor, the standard is 3, giving polyphase power, with 6 wires (3 of which are joined) leaving 3 wires. Any 2 of these 3 wires will give useful power, but single and 2 phase electric motors are not inherently self starting. The minimum for self starting motors is 3 phase. In most countries including Ireland and the rest of Europe, 3 phase is supplied to consumers with one single phase tapped for domestic houses.

When a load is applied to the output the rotor experiences resistance tending to slow it down and increase the torque on the shaft to the power source. In practice equilibrium is reached between the power source and the load. The voltage "power pressure" is a function of the balance between the generator potential output and the load. The ESB must balance the power they supply with the demand at any particular instant. This is important when considering wind power. Output must be tailored to demand instantly.

When more than one generator is added to the system, they tend to pull into phase which is the path of least resistance, but if 2 or more generators are running and suddenly connected, sparks will fly until they pull into phase.

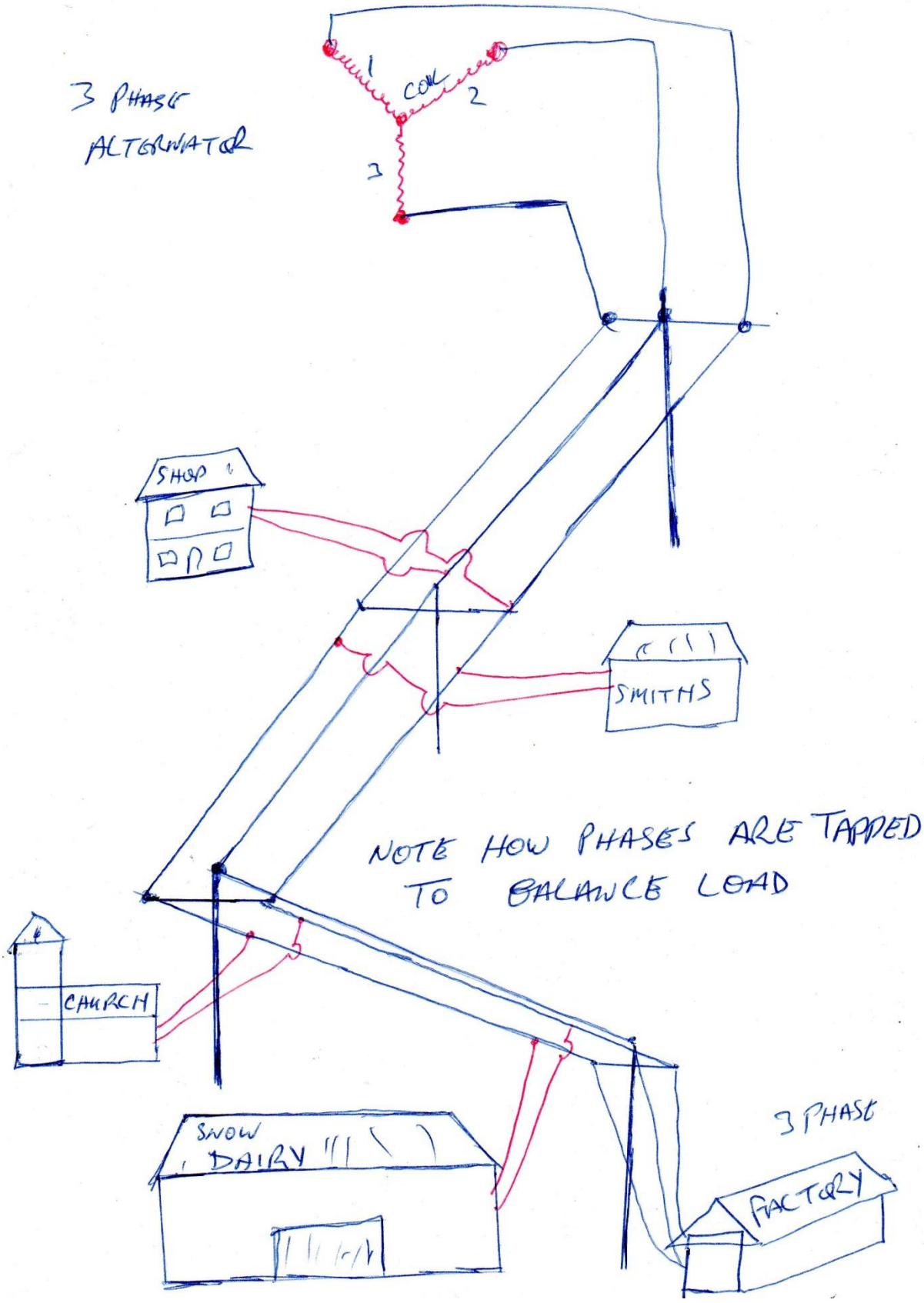


Fig 6: Power distribution by 3 phase line tapped for single phase to domestic consumers and 3 phase to industry. There can sometimes be a neutral added to make 4 wires in 3 phase supply.

Part 4) The Irish grid before and after the advent of wind farming. **Shows how the ESB keeps a balance between supply and demand and how wind will impact on that system. Some of the terms used by the industry are explained.**

It is vital to understand the following terms because they are constantly bandied about and misused in the media and by wind farm proponents.

"L**oad Factor**" of plant, is **"the actual output compared to the ideal rated output in a given period."** (Capacity factor in the US) and it is high for base plant, servicing being the main stoppage. No plant will run continuously without stoppages. Extra plant will be started up to meet extra loads for "say" 40% of the time, it will therefore have a load factor of 40%. . Hydro stops when water levels go down. As generators with low load factors will not run all the time, their load factor will be less (and their pay-back time on investment is poor). With wind the load factor is dictated by repair stoppages and mainly because of lack of wind. Load factor for wind varies and its values are hotly disputed. To clarify, if a turbine operated in a particular year and the wind blew the first half @ optimum speed giving a load factor of 100% for 6 months and the 2nd half was completely calm giving a load factor of zero, then the load factor would be 50%. In reality a load factor of zero is a minus figure because wind farms consume grid power continuously.

The American wind energy association (AWEA) on their web site, plan for a factor of 30% in future, (amount of time there will be best wind). The historical figures are Britain 26%; on-shore blades build up coatings of dead bugs and off- shore ones build up salt. However, the biggest problem is the intermittency of the wind speed. My figure for the Irish load factor is 24.1% and falling. If true, it means that a wind-farm only yields 24.1% or less of its optimum output. Load factor can never exceed the % time when wind blows above cut in speed, 12.5 mph. Eirgrid give Ireland's load factor at 30.5% which I dispute. (They originally gave it @ 35%). Note that load factor is not the contribution in co2 savings, just the power leaving the windmills.

"Reserve Capacity" There is a portion of demand which cannot be accurately planned. Power lines out from one power station may suddenly break down or a sudden cold night may cause people to turn on electric heaters or electric kettles during a tv add break. To cope with this, the ESB rely on "**reserve capacity**" of up to 20%. This plant is kept running alongside base load plant but, the load is not applied unless and until an unexpected demand occurs. This reserve plant is then connected up (after being ramped-up) to cater for the extra load. If used 10% of the time, its load factor will be 10%, so it will be slow to repay its cost, compared with base capacity which could have a load factor of 97% and therefore pay back quickly. It is a type of prudent insurance capacity. Guess what the wind companies argue: *They say that as this capacity is already there, why not use it to take up the slack from wind, when the weather turns suddenly calm. In other words they want to steal our insurance policy. They pay nothing for the service provided, but get paid for their intermittent energy in full.*

So what If the ESB are forced to give over their capacity reserve to the competing wind companies? Their insurance is gone, so in turn have to commission more conventional plant to cover what their original reserve capacity was meant for. This plant may be high merit (more wasteful on fuel). This results in more fossil fuel being burned! Maybe you don't believe me: Well: Lumcoome energy claims to be a wind energy concern in Co Offaly. Guess what they are about to do first? = Build a dirty gas fired power plant of 350 mW rating. The regulator will only allow them produce 100 mW and they are not happy. Of course if they are allowed to generate to full capacity, we the consumers will have to pay them for gas fired power we do not use, so that they can eventually bring their wind power along. (If you told that to an ass he would kick you! He - ha!) But the increased cost will mean cash starved consumers will have to turn off the heater in the cold or they will find themselves cut off altogether, despite the fact that power may being dumped. And it gets better.

Back-up capacity. Reserve capacity was always part of the conventional system to cope with sudden failures and unexpected increased in demand. It was not intended to be used as dedicated support to wind farms and when called on to do so, it can only back-up a small amount of wind penetration. (Penetration is the term for wind inclusion or % in the system). As wind is a new feature there was no dedicated back-up for it, but as wind is increased more and more convention back-up is required. It was proposed to build 317 large turbines in the Thames Estuary near London to provide renewable energy for London, "The London Array". Its proximity to the city meant losses through resistance would be small. Royal Dutch Shell committed to provide 40% of the installation cost as part of its green credentials. When it came to sign the contract they backed out. The reason was that it was told that the first thing it must do is build 2 coal fired power station on the shore to back-up wind. This wind farm was so large that the local conventional generators refused to provide the back-up. (Reported in the Financial Times) Loomecome are to build a gas fired station in Offaly to back up their wind farms. As wind penetration increases more and more dedicated back-up is required. Wind companies try to have this provided by **other power providers**. Our government proposes to make we the consumers pay directly for it, the wind companies pay nothing in some cases. The question you should now be asking is. How much back up is required? (RTE Primetime on 15th Dec 2010 reported that a portion of the new social charge "income tax" will go to subsidise wind new wind farm's capital cost)

Next is the most important term of all, read a few times to get the concept right.

Capacity Credit (firm capacity and secure credit in the USA) is a term is used to describe how efficient one type of generating plant is at replacing another. It is **"the percentage of one form power plant that can be shut down and replaced by the one being examined, without making the system less reliable.** " (Please read again) As we have no nuclear power and just a little hydro, this country's electricity has been powered by various types of fossil fuel (thermal). I'll refer to our power supplier by its traditional name "the ESB" (it's Eirgrid now). The first thing they need is a base supply which underpins the basic everyday demand. They know that at 4am Tuesday morning, 2,500 mW is normally demanded and at 3pm on Friday evening, 4,000 mW is demanded. They ensure that their base supply is matched to most of this. Base generation requirements are predictable and is usually supplied by heavy plant with slow start and ramp-up times and slow cool down times, which are kept running over long periods. When kept running constantly, this plant is very fuel efficient and a low co2 emitter. Because this type of plant is slow and expensive to start up and stop, it is referred to as "low credit plant". (It is not good at replacing erratic wind which may stop blowing suddenly). Start up time is the time it takes to go from cold to ready to generate, ramp-up is the adjustment time to match the plant to the existing grid frequency. Low credit plant cannot be started and stopped without the huge expense incurred in fuelling start up. (think of it as a steam locomotive).

"The next bit is very important" go and get a cup of coffee to settle the nerves! But swallow before reading the next piece! (Health and safety act "Laugh")

On the 4th June 2008 the Guardian carried a report from E.ON UK, (formally Powergen). The English subsidiary of E.ON nertz in Germany. They say that if the targets for renewable power rely on wind, conventional capacity in the UK will have to rise from 76 GW to 120 GW (presumably with a corresponding increase in emissions!).

The UK's Energy Research Centre admitted that some conventional plant will not be shut down during high wind; instead it will be left running thereby reducing efficiency. The Irish policy of Eirgrid is the same; they propose to build an ever increasing amount of conventional power plant at a time of reducing demand. This is to comply with the government directive to bring wind to 40%. **The question is 40% of what?**

Installed capacity of wind is the makers rated output of the entire countries wind farms in optimum wind conditions, with all in operation. (The manufacturer's output rating is usually given, but I have discovered that turbines never actually achieve this output.)

Capacity credit "for wind," is "***the amount of conventional power plant that can be shut down to be replaced by wind power without making the system less reliable***." If all wind farms delivered 100% continually, their capacity credit would be 100% whether wind

formed 5% or 95% of the total capacity. It uses the rated (theoretical) installed capacity for wind in optimum conditions above the dividing line and the corresponding amount of conventional capacity below it. It has never been measured to date because, you would have to measure an ideal constant demand over a period with no wind farms and compare this with a similar period after wind is added. There are so many variables that it is very difficult to measure precisely

The main factor in wind capacity credit is the effect the intermittent nature of the wind has. How ***much conventional power stations can be shut down permanently and replaced by wind?*** (The answer appears to be very little or none!). Others will argue that if you shut down thermal plant temporary, that counts as a saving on co2. Attempts have been made to measure capacity credit. German power companies put the figure at 8%, but likely to reduce to 4% if wind capacity is increased. (2005 press release from Martin Fuchs concerning wind energy there see appendix). (note this is % of total installed wind capacity, not total generation capacity from all sources.)

Malcolm Wicks in response to a parliamentary question in Britain asking about how easily new generating plant could be started and stopped, did not include wind energy at all in his answer, which tends to confirm what I would suspect: 'wind energy has little or no capacity credit itself.' Wind energy proponents say these considerations are myths. All I ask of you is that you think about it in an open fair manner and decide for yourself.

(Note capacity credit is sometimes referred to as firm capacity or secured capacity.) (don't ask me why)

Eirgird's 2010 report states that wind is not considered when planning for peak demand.

It might help in understanding credit capacity to think of a generator "A" running continuously for year one. It is hard on fuel oil but very reliable, never failing. A second generator "B" is introduced which is easier on fuel, but needs servicing lasting 2 days every calendar month, during which time it is shut down. It allows plant "A" to be shut down permanently except during this servicing.

While B is being serviced, A is reintroduced.

$$\frac{365 - (2 \text{ days} \times 12 \text{ months})}{365 \text{ days}} = \frac{365 - 24}{365} = \frac{341 \times 100}{365} = 93.4\%$$

Therefore the new plant "B" has a credit capacity of 93.4%. It would not be correct therefore to say that the old plant "A" has a credit capacity of (100 - 93.4 %) = 6.6% because plant B is not being shut down to the advantage of the system and the criteria for defining credit capacity includes the term "without endangering supply". As there would be no back –up for failure of plant "A", supply would be endangered.

The term "***endangering supply***" is partly humanly driven (not an exact science). It depends on the attitude of the supplier to risk of blackouts. In a banana republic it might not matter a hoot, in most developed countries it matters a lot. It can have a safety issue. (Imagine standing in the middle of a saw mill at night and the lights go out (but the saws keep running). Claims can arise when fridges warm up etc.

Credit capacity (capacity credit) for wind as a % of total supply is the only accurate way to measure wind's contribution. (Or any other plant for that matter).

Part 4 a) Idealized model.

Windyland a hypothetical country with constant demand of 8000 mw and traditional conventional capacity of 8000 mw exactly matching demand with no reserve capacity. Analysis over 6 years 2001 – 2006. No wind installed at all in 2001, but construction under way of a 2000 mw wind generating system. Traditional accounting used the first year. In 2002 wind is installed but not connected, accounting system changed to account for wind. 2003 wind speed is low resulting in low load factor, but gradually increases through to 2006 giving supernormal return. The purpose of this is to demonstrate industry terms and measuring methods and avoid confusion.

Year	Demand	Convention Generation	Conventional capacity equal to wind	Conventional plant shut down and replaced by wind	Credit capacity for wind	Total emissions saved due to wind
2001	8000	8000	No wind	No wind	N/A	N/A
2002	8000	6000	2000	0	0	0
2003	8000	6000	1920	80	4%	1%
2004	8000	6000	1880	120	6%	1.5%
2005	8000	6000	1820	180	9%	2.25%
2006	8000	6000	1760	240	12%	3%

Formula for capacity credit for wind:

$$\frac{(\text{Installed wind capacity} - \text{corresponding conventional generation used}) \times 100}{\text{Installed wind capacity}} = \text{credit capacity for wind}$$

Formula for establishing co2 saving due to wind:

$$\frac{\text{Credit capacity for wind} \times 100}{\text{Conventional capacity}} = \text{saving in \% conventional generation.}$$

Figures given by Eirgrid for 2009 (adjust if you disagree). 6200mw of conventional and 1167 of wind, they give 8.8% credit capacity for wind.

(1167 – 1065) x 100 / 1167 = 8.8 credit capacity: Conventional plant shut down = 102mw.

Savings due to wind: $\frac{102 \times 100}{6200} = 1.6\%$

Note: There is very little co-relation between Load Factor and capacity credit except that capacity credit can never exceed load factor. A consistent average wind speed of 16mph with max highs of 20mph and minimum lows of 14 mph could give a load factor of 17% with a credit capacity of 9%, whereas an erratic average wind speed of 23mph with a range of 5 – 40 mph might give a load factor of 21% with a credit capacity of only 5%. Consistency of wind speed is key.

The reason is that management at the grid could risk shutting down conventional plant in the 1st scenario to be replaced by wind, whereas taking such a risk in the 2nd scenario could endanger supply due to potential gale force winds and sudden calm conditions. Therefore load factor is largely irrelevant.

Scenario 1. Average wind 16 (range 14 – 20) = load factor 17% = credit capacity 9% = saving 1.5%.

Scenario 2. Average wind 23 (range 5 – 40) = load factor 21% = credit capacity 5% = saving .83%.

Where load factor becomes useful is when the proprietor is paid for the power leaving the wind farm as appears to be the case in Ireland. The correct payment model is on credit capacity for wind.

However the method of payment is largely irrelevant, because wind generation is so heavily subsidized with no link to actual contribution of wind. Proprietors have control over all aspects of remuneration to such an extent that even with no saving of co2, they still make a handsome profit.

I give this simple model to help clarify.

A farmer has 40 female sheep and 30 male bull cattle = 70 animals.

12 lambs are born to the sheep with no calves born to the bulls. Lambing rate is **not** 12/70 = 17.14%. It is 12/40 = 30% similar to capacity credit for wind. Contribution of new lambs to total livestock is 12/70 = 17.14%. Sheep form 57.1% of his flock, so another way of calculating newborns to total livestock is 30% x 57.1% = 17.1. **"You must multiply capacity credit by the proportion wind forms of the entire system to get net contribution = savings in CO2. "**

It is vital to understand the above!

Security of supply: A lot depends on the degree to which the grid operators need to ensure sufficient supply to match demand. In underdeveloped countries, getting food and shelter may be more important to having power at the flick of a switch. In such situations, operators may do without reserve spinning plant to save fuel costs. In Ireland, a continuous supply is essential and Eirgrid could find themselves answering on the Pat Kenny programme or to an Oireachtas committee on energy. About 98% security of supply is the standard, but this is a statistical figure which I prefer not to go into. This is reflected in the percentage of credit capacity for wind and is part of the reason for it being so low. Staff are afraid to shut down thermal plant in case the wind subsides and turns to a gale, when turbines are stopped, so they leave it spinning, thereby duplicating capacity.

Stability of Supply. Irish mains power is used within 1/100 th of a second of production. Voltage must be maintained within strict frequency limits or between 46 – 54 hertz and voltage must also be kept within limits (for single phase 220 – 240 volts). Variations outside this will damage equipment and vary the speed of motors. As wind power varies with wind speed, its percentage must be kept below prescribed limits. Otherwise industry limits will be breached. In Ireland it appears Eirgrid can direct turbines to be shut when demand is low and wind is high. "Curtailment" (Eirgirds reports).

Part 4 b) Inertia: Battery power such as a car electrical system use direct current, the current in one wire is continually positive and the other negative. You can connect the poles of 2 batteries together "positive to positive!" and "negative to negative", but never positive to negative. (You'll get a dead short)! Mains systems use alternating current, mostly to provide flux in transformers and to run motors at a set speed. The current in one wire alternates from positive to negative 50 times per second (phase measured in hertz (alternations per second). Where there are several generators running independent of each other and connected to the same system, they must be run "in phase". So that the positive current rises commonly in the entire system (in phase). As "being in phase" offers no resistance to the generators and being out of phase causes current to flow (a short) , losses through heat resistance makes the generators do work, even though no outside work is being done, the system naturally pulls into phase over a time until no work is being done. If you connect a light generator to a much larger heavier generator, the inertia (weight of the large plant's rotor) will force the lighter one to pull into phase quickly. (Think of it by the fact that a generator will operate as a motor when supplied with power). The inertia of conventional generators can control low amounts of wind power, because the inertia of the alternator rotors or the turbines is much less. The exact amount of wind inertia that can be accommodated by conventional inertia is not settled. I maintain it cannot be anywhere near the 40% set by our government. About 15% appears to be the best so far reached. The wind industry appears to claim it's no problem. Our policy makers seem to think inertia is to do with their golf swing! LOL.

Ramping up is the process of introducing a new generator to the existing system in a controlled way to avoid sparking. It's like 2 cyclists wishing to hold hands while cycling. First they must get their speed synchronized.

Part 4 c) Ballyhill Island isolated community **with** no mains power,

The impact of wind power penetration on an isolated micro grid system in a fictional Island of Ballyhill. This Island community, with its own stand alone thermal generation system with a wind element of 40% of maximum total (wind+heat) capacity in best wind speeds. There is no mains supply. Conventional generation inertia can only accommodate 22% wind. I set this arbitrarily for this example. 22% has never being reached to date.

Demand is the percentage of conventional capacity. The output of wind is independent of demand. **Note NB:** As demand decreases, conventional plant will be shut down so that wind will form an increased percentage of total.

← **High** **Demand** **Low** →

% wind penetration due to varying wind speed	Consumer Demand at Full Capacity	Demand at 3 quarter Capacity	Demand at half Capacity	Demand @ one quarter Capacity	Demand @ one eight Capacity
5%	5%	6.6	10%	20%	40%
7.50%	7.50%	10%	15%	30%	60%
10%	10%	13.30%	20%	40%	80%
11%	11%	14.60%	22%	44%	88%
15%	15%	20%	30%	60%	120%
20%	20%	26.60%	40%	80%	160%
22%	22%	29%	44%	88%	176%
30%	30%	40%	60%	120%	240%
40%	40%	53%	80%	160%	312.50%

Fig 7 Wind penetration as a percentage of total wind/conventional generating system.

Yellow area is within what wind can be accommodated being fewer than 22% of total.

Orange area is above what can be accommodated. At these levels damage will be done.

Wind must either be curtailed or the surplus power dumped to a heat sink and wasted.

To explain: Say is a good windy day and wind penetration is 20%. This can be accommodated if demand requires conventional output in the order of full or 3 quarter capacity. If lower demand causes thermal output to fall below this (say half) the penetration level will rise to 30% which cannot be accommodated in a 22% system. If such a penetration is forced on the system, conventional generation must be increased until penetration stands at 22% or wind is curtailed. To figure how much see next paragraph.

To establish how much conventional capacity must be increased, we take the proposed percentage of wind penetration. Say it's the previous example of 30% up from 22%.

New penetration less previous accommodated penetration multiplied by 100 divided by original penetration. So (30 – 22) = 8 x 100/22 = 36.36% increase.

Now to put this in plain man's language. This system cannot accommodate wind penetration above 22%. By dividing 100 by 22 we find that for every 1 percent of extra wind we need 4,54 of conventional generation. So just find the extra wind penetration and multiply by 4.45. This can be applied to any figure. The problem is the extra power is not wanted.

The present Green party is aiming for a wind penetration of up to 40% by 2020. So we need to know what penetration the present grid can accommodate. Capacity was 6,200 mw up to recently. So say the system can accommodate 22%. So (40-22) x 100/22 = 81% of increased conventional capacity – 6,200/81 = 5022 + 6,200 = 11,222 MW. Note this formula; it can easily be applied to any figure. On the first Thursday in January 2010, the demand on the Irish grid reached an all time high of 4,952 MW. The grid people performed well to meet demand. It was frosty and calm so there was no contribution from wind. It shows that existing thermal and hydro plant is just about right at present and no investment need be made on increasing capacity. (They may need replacing, but that is a different matter). This extra power is not wanted. Penetration is still 20% (40% cannot be achieved).

As there are no more sites for Hydro, the increase must be from thermal or nuclear (but say thermal for now). Should the wind be blowing at 33 mph some day and the minister's orders are to be complied with, the whole conventional plant must be put running: 11,222 MW so that the wind can be accommodated @ 40% of present grid capacity. (22% is the most that conventional plant will accommodate) 11,222(conventional) + 1,167 (wind) = 12,389 MW. But the max we need is 4,952MW. So 7,048 must be disposed of. It can be sent to a heat sink which wastes it at high cost in which case the fossil fuel to produce it is also wasted and the extra carbon dioxide is sent into the air needlessly. Now bear in mind that this assumes that the optimum wind coincides with maximum demand. If demand is only half, then more of the thermal power is wasted. In reality, wind is curtailed which means the turbines are idle and their cost is not being repaid. The cost is passed on to the consumer.

A fault with the above example is that the actual wind planned for, is close to 4,000 mw (not 1,167). If they actually install 4,000 mw of wind, conventional capacity will have to rise to 4,000 x 4.5 = 16,200 mw of thermal. That's about a quarter of that needed to power Britain and consumers will pay for it. 4,000 mw of wind would have a massive inertia.

Although Ireland's power demand is presently dropping and there is no reason to believe demand will increase much in the next 10 years, Eirgrid's 2010 report shows plans to

increase Ireland's convention power capacity by a figure very close to 11,222. Remarkably close to my calculations. (The worst of the calculations are over folks).

A case in point! (Google Eirgird's 2010 Adequacy report) Fig 8.

Year	Total Electricity Sales (GWh)	TER (GWh)	Transmission Peak (MW)	Wind contribution at peak (MW)	TER Peak (MW)
2001	20,821	23,511	3905	4	3995
2002	21,208	23,912	4116	122	4335
2003	21,891	24,673	4117	63	4278
2004	22,692	25,581	4230	140	4485
2005	23,751	26,676	4593	86	4777
2006	24,972	27,974	4850	4	4951
2007	25,643	28,427	4906	61	5004
2008	26,048	28,830	4873	222	4976
2009	*24,589*	*27,240*	*4665*	*0*	*4736*

Table A-5 Historical energy and peak, with forecast for 2009. The actual peak for 2009 will have appeared at the start of the year – the figures here give the peaks for Winter 09/10

Notes: The Total Electricity Sales are measured at the customer level, for a 52-week year. To convert this to TER, it is brought to exported level by applying the loss factor (8.3%) and adding on an estimate of self-consumption.

The Transmission Peak is that met by centrally-dispatched generation, measured at exported level by the National Control Centre. It does not include the contribution of wind. To calculate the TER Peak, partially and non-dispatchable generation are added to the Transmission Peak, i.e. the measured contribution of wind at peak and an estimation of the contribution from small scale hydro, biomass and CHP (both exporting and self-consuming CHP). When forecasting the transmission peak, it is assumed that the wind contribution is zero.

This extract from Eirgrid's 2010 adequacy report makes interesting reading (page 62). For simplicity, I re-do the 9 year figures giving average values under plain headings. Production exceeds demand due to resistance losses and power used at plant centres. Anything below 50 MW can be regarded as zero.

Average values Years 2001 to 2009. All in Giga Watts. (note decimal points)

Total electricity produced GWh	Total electricity sales GWH	Amount produced @ peak. Demand	Consumption @ peak demand	Contribution of wind at peak demand.
26313	23512	4 . 615	4 .472	0 .078

This is a rare glimpse into the contribution of wind at a time of peak demand. At such time the system can take a high penetration of wind power, because there is plenty of conventional output and consumption to accommodate it. High demand will gradually rise usually in December/January, dropping as the days get longer. It will peak on one particular day (10th January 2010). The figures for wind are a snap shot of one moment in one day in each of the nine years. It is statistically very random and may have a high standard deviation, but is non-the-less representative.

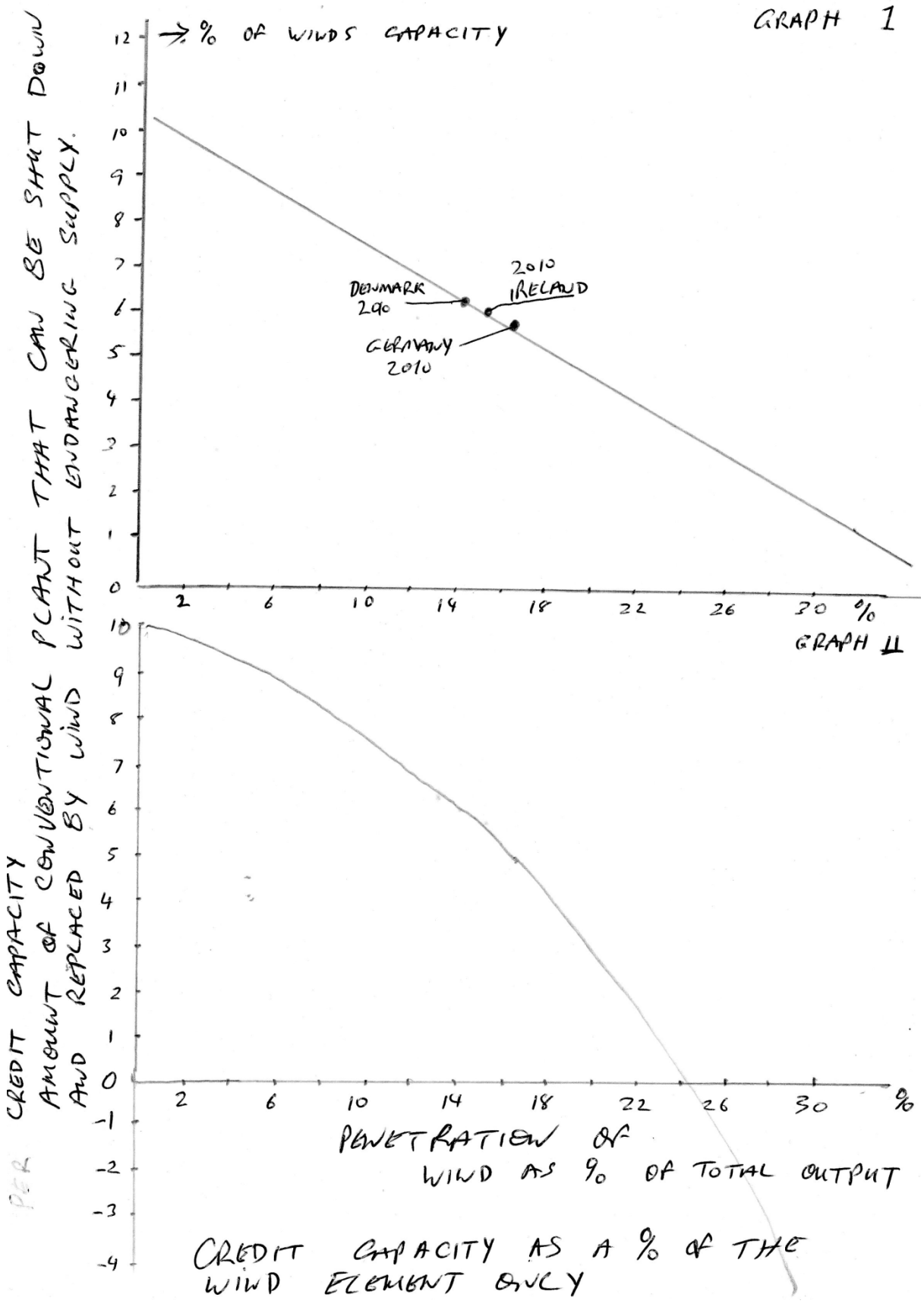
The contribution of wind as a percentage of peak production is .078 / 4.615 = 1.69 %. This is remarkably in keeping with figures for the world over at between 1.3. – 1.8%. (nearly nothing). I

claim that as the % of wind increases further, this 1.7% will decrease possibility to zero or below. I am working to try arriving at a formula or equation to measure the contribution. Average output is found by dividing by hours in period. VIZ: 26,313/ 8,760 (365x24) = 3.003 Gw or 3,003 mega watts. This is convincing evidence that wind can never be described as renewable energy. In my opinion. At the time of writing, I cannot find any figures for wind contribution other than at peak demand in Ireland. It is estimated abroad.

Look again at Fig 8 above on separate issue. Note that generation, consumption and peak demand (non-wind) gradually increases from 2001 to 2007 during the last years of Ireland's economic boom when construction and spin off industries were at a high. However it will be noted that production, consumption and peak demand continued to rise in 2008 when the economy was in recession and in 2009 when the biggest downturn and economic crises in history ravaged the country. Why did electricity demand not drop? Your guess is as good as mine, but for what it is worth here is mine.

The extra power went into wind farms for the purposes stated in part 5 entitled "Grid Power Used by Turbines". Wind farms are heavy users of conventional generated electric power. The more we install, the more fuel we will burn.

Figure 9. The amount of conventional plant that can be shut down while securing supply.



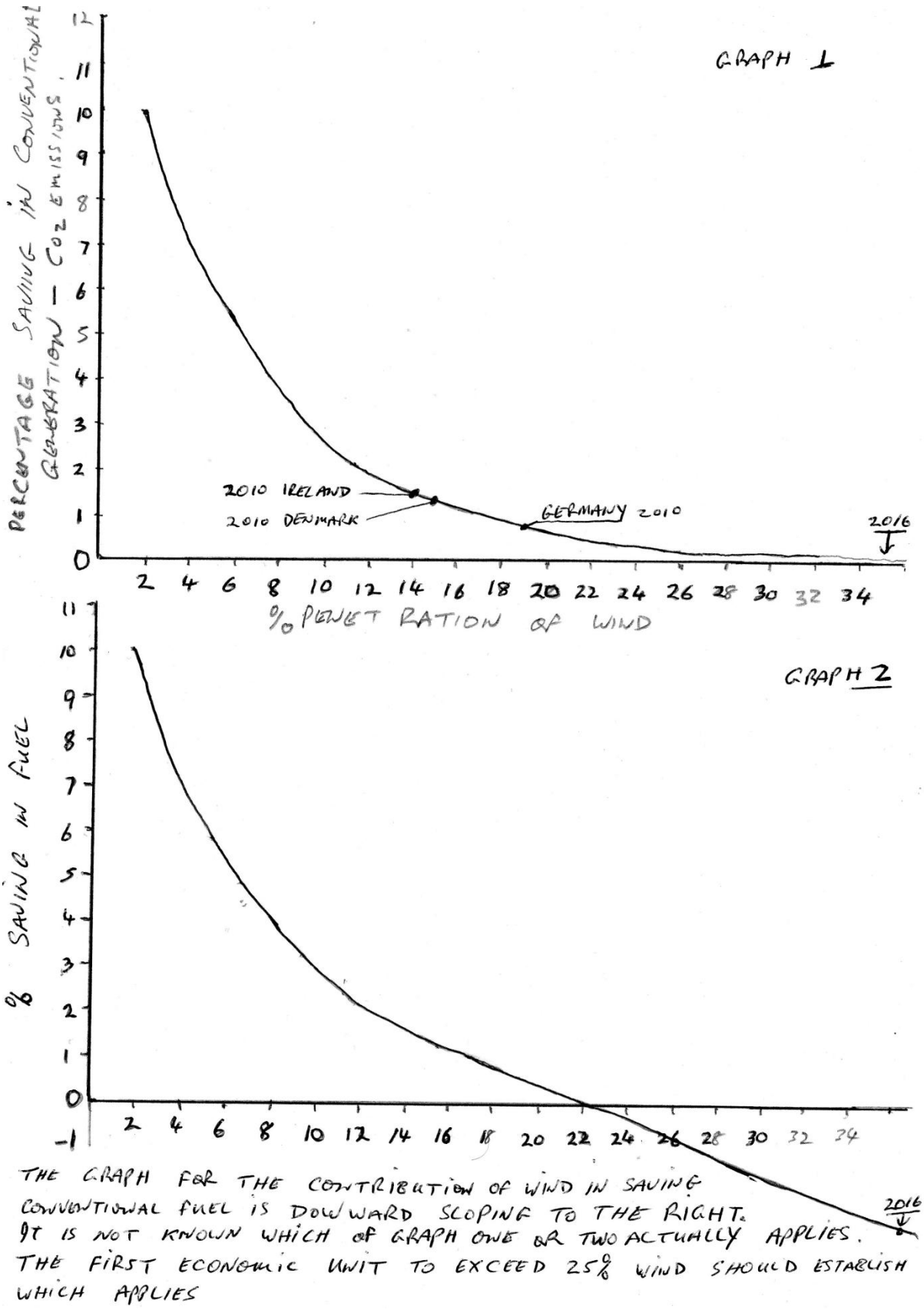


Fig 10 A measures of the saving of a wind+conventional system expressed as a percentage of a system with no wind.

Part 4 d) **Germany:** As evidence that the above is correct, a look at the findings of a major power supplier in Germany might help. E.ON Hertz manages the transmission grid for Schleswig-Holstein & Lower Saxony in Germany. They also now own the English power provider Powergen. They handle about one third of Germany's power supply. In one of their systems, their present capacity is 1,295mw of wind (based on feed in capacity) and presumably 5,782 mw of conventional, that's 18.3% of wind penetration. Two independent studies in 2004, arrived at the same conclusion. Wind is contributing only 8% of its own rated capacity and that if the amount of wind power continues to increase at the present rate, by 2020 the increased ratio of wind to conventional power will mean that the capacity credit will decrease to only 4% of wind's installed capacity. This figure is often cited as being the percentage of the total power generation in the entire system. As I point out elsewhere, the capacity credit for wind must be multiplied by the percentage wind forms of the entire system. i.e. 4% x 18.3% = .07% . See appendix.

Part 4 e) **The UK** David McKay the scientist who carried out a study of alternative energy in the UK stated that if a turbine were placed in every field, the amount of fossil fuel saved would amount to the equivalent of one 32 mph car journey per citizen over a yearly period.

Table 3.1 Annual wind – Generated GWH for 2007. Percentage of electricity supply and load factors for wind power (data from Digest of UK Energy Supplies) 2008, Table 7.4.

Wind Power	GWH per year	Load Factor	Average 5 year load factor	Percentage of total supply from wind
Onshore	4,491	27.5%	26.4%	1.1%
Offshore	783	25.4%	26.4%	.2%
Total	5,274	26.6%	26.6%	1.3%

(the author's comment: This is exactly in line with my claim, that no matter how many wind farms are build the contribution to power needs never exceeds 1.5% - 2%).

Part 5) Grid Power used by turbines.

This information must be estimated because wind companies do not allow it into the public domain. There is definitely grid power generated by fossil fuel supplied to all large turbines. Up to half of the total power produced by wind may be drawn from the grid to maintain the turbines over a period. They take in dirty power and pump out clean power – power laundering -.

Large wind turbines require a large amount of energy to operate. Other electricity plants generally use their own electricity. Wind plants, however, use electricity from the grid. To date I cannot discover

how it is accounted for. I wonder is it even metered and charged for. The manufacturers of large turbines -- for example, Vestas, GE, and NEG Nicon -- do not appear to include electricity consumption in the specifications they provide. It is accepted that aviation lighting in calm weather must come from the grid.

Among the wind turbine functions that use electricity are the following:

- yaw mechanism (to keep the blade assembly facing to the wind; also to untwist the electrical cables in the tower when necessary) -- the nacelle (turbine housing) and blades together can weigh 92 tons on a GE 1.5-MW turbine
- blade-pitch control.
- lights, controllers, communication, sensors, metering, data collection, etc.
- heating the blades -- this may require 10%-20% of the turbine's nominal (rated) power, very necessary in frost to prevent ice flying off the blades causing damage.
- heating and dehumidifying the nacelle -- according to Danish manufacturer Vestas, "power consumption for heating and dehumidification of the nacelle must be expected during periods with increased humidity, low temperatures and low wind speeds"
- oil heater (oil must be kept warm), pump, cooler, and filtering system in gearbox
- hydraulic brake (to lock the blades in very high wind)
- thyristors (to graduate the connection and disconnection between generator and grid) -- 1%-2% of the energy passing through is lost
- using the generator as a motor (to help the blades start to turn when the wind speed is low or, as many suspect, to maintain the illusion that the facility is producing electricity when it is not particularly during important site tours) -- it seems possible that the grid-magnetized rotor must work to help keep the 40-ton blade assembly spinning. Spinning is necessary to prevent warping of the enormous blades due to unequal heat over their varying height. I have personally witnessed blades being turned in complete calmness.
- N. B. The synchronous generators used in most large grid-connected turbines require a "large" amount of direct current electricity from the grid having being rectified to power the magnetic coils around the synchronous rotor on the generator shaft; at the rated wind speeds, it helps keep the rotor speed constant, and as the wind starts blowing it helps start the rotor turning, the stator may use power equal to 10% of the turbine's rated capacity, in slower winds possibly much more – this is dirty power. (Note a car alternator provides its own current to the rotor (except start up), I cannot understand why turbines don't supply rotor power themselves, but by not doing so, they leave the system open to abuse and fraud.

Car alternators need direct current into the wound rotor, but they produce this themselves once they start to generate. Output is total output less power consumed in the rotor.

Whatever the actual amount of consumption, it could seriously diminish any claim of providing a significant amount of clean energy. Instead, it looks like industrial wind power could turn out to be a laundering scheme: "Dirty" energy goes in; "clean" energy comes out. That would explain why developers demand legislation to create a market for "green credits" -- tokens of "clean" energy. *i.e. carbon trading. Carbon fines are not levied on this grid power input, why?*

If wind worked and is not mere window dressing, the industry would trot out some real figures.. But they don't. I cannot get any information. I suspect that they can't."

Proponents claim that these turbines begin producing energy at 5 m/c 12 mph, the ones I observed do not stop even at wind speeds of 2 to 4 mph. They rarely stopped between 16th December 2009 and 18th February 2010 right through all the calm frost. They kept going making noise too.

An observer in Toronto, Ontario, points out that the blades of the turbines installed at the Pickering nuclear plant and Exhibition Place turn 90% of the time, even when there is barely a breeze and when the blades are not properly pitched -- in a region acknowledged having low wind resource." (I have made a similar observation at Mountain lodge and Gartnaneane wind farms.) The ones at Gartnaneane were rotation on the evening of the 4th February 2010 when there was dense fog all around. One was making noise like an engine. Wind speeds in the hollows were 0 but were about 3mph (beauford scale) at turbine height on what is a good site wind wise.

In large rotating gear trains such as these, if allowed to stand motionless for any period of time, the unit will experience "bowing" of shafts and rotors under the tremendous weight. (Try leaving a steel rod against a wall for a few weeks. It will bend). Therefore, frequent rotating of the unit appears necessary to prevent this. As an example, even in port, Navy ships keep their propeller shafts and turbine power trains slowly rotating. It is referred to as "jacking the shaft" to prevent any tendency to bow. Any bowing would throw the whole train out of balance with potentially very serious damage when bringing the power train back on line.
"In addition to just protecting the gear box and generator shafts and bearings, the blades on a large wind turbine would offer a special challenge with respect to preventing warping and bowing when not in use. For example, on a sunny, windless day, idle wind turbine blades would experience uneven heating from the sun causing warping. The only way to prevent this would be to keep the blades moving to even out the sun exposure to all parts of the blade.
"So, the point that major amounts of incoming electrical power are used to turn the power train and blades when the wind is not blowing is very accurate, and it is not something the operators of large wind turbines can avoid.
In addition, there is the likely need for a hefty, pumped lubricating system for the shaft and turbine blade assembly bearings (like a car engine). This would be a major fixed load even on a still frosty day. Given the weight on those bearings (50 tons on the bearing for the rotor and blades alone) a lubricating oil system would be required using a pump. It would also have to include air cooling for the oil and an energy using lube oil purification system too." Oil would require heating in sub – zero temperatures.
-

Eirgrid or the Dept of Energy should clarify if dirty power fed to wind turbines is charged for, how it is metered and what is the rate at which charged. I wrote a letter to the Minister for Energy requesting this information, he acknowledged receipt, but never provided the information.

On the 17th February, 2010 smoke from Gypsum industries was rising at 45 degrees meaning it was almost calm. 2 turbines at Bailieboro/Gartnaneane had their blades turned away and were stopped. 5 had their blades set and were slowly revolving, 3 were going slowly but ground to a halt and one was going strong, 13 revs per min. It had to be being driven by the grid, but it too halted after 15 mins. All eventually stopped. I would have thought that it would be wise to stop them and lock them at all wind speeds under about 13 miles per hour. (75.9 of time). This would stop TV interference, flicker, noise etc. It is a great pity and a flaw in their design in my opinion. It's bad enough to have them annoying you when producing, but worse when they are not producing at all. Surely payment should be for total output less total inputs.

Part 6) Storage of wind generated electric power. *Why storage of electric power is next to impossible.*

The power supplied by these machines is alternating current which cannot be stored in that form in batteries which need a continuous supply of direct current. It can be converted to direct current for storage in a battery, but a lead acid battery to serve Dublin city for an hour would be too large to fit into Croke Park football stadium and would be 150 feet high. The lead and acid would create a huge environmental cost as would the gas released on charging.

Storage of compressed air in mines etc has a very limited application due to air escape through water fissures because the walls cannot be sealed, the energy obtained from escaping air decreases with its volume. There are people, who will argue that it can be stored, but it cannot as yet and any such storage is only possible in certain rare locations.

It is suggested that wind turbines could pump water from lowlands to reservoirs on high ground and the failing water then used to generate power. The advantage of this is that the rate of flow could be strictly controlled by sluices and fed to the grid precisely to provide back up for wind. The disadvantage is that it would take huge lakes to store the water in upland valleys. The impact on the environment and the wipe out of homes and farms is obvious. Can anyone suggest a suitable site? This scheme has only minimal use in Ireland ""unfortunately"". Every molecule of water must be forced up the hill, whereas a high percentage must be allowed to return down unhindered in order to extract the optimum power from the remaining water striking the blades. There would be losses when energy is converted from one form to another, the acceleration of still water to drive it up the hill and draw it back down would create further losses. When fluid flows through a pipe it experiences resistance losses as the outer flowing circumference is dragged against the side of the pipe walls. (You can see this effect with a garden hose). There are losses in converting wind to electricity

and electricity back to mechanical energy to drive the pump. A report by Powry to Eirgrid and Eirgrid's own 2010 report says pumped storage is of very limited value whether powered by thermal or wind.

Eirgrid have such a facility at Thurlock Hill in Co. Wicklow using thermal generated power. It can provide 290 mw for 6 hours for high merit peak load support. If this were supplied by wind, its power would only be available for 6 hours after the wind died down. It would take up to 200 turbines to fill the reservoir. In long windy periods the pumped storage could provide continuous power as the top lake would be kept filed, but the turbines could do that without a storage system. In calm periods there would be no power. The cost of the one suggested by Organic Energy "wind pumped storage in the west of Ireland" would be around 200 turbines @ 2 m = 400m (going abroad) + installation costs of c 100m + construction of the system + 150 m = a total of 650 million Euros. The developer would most likely expect that both the stored output and the direct surplus wind output to be bought from him. Back up plants costing several hundred million Euros would be **needed.** The question is who would provide the capital and subsidies to build and run this extra plant. Guess who would provide most of it? (The man in the street). All pumped storage does is to provide a few extra hours of power after the wind dies down. It smoothes out the peaks. If you get cold winter calm weather you still have no power.

It is suggested that electric powered car batteries could store wind current produced at night so that the national fleet of these cars could act as a dispersed storage battery. This could have some application, but if it has, a small home turbine unit would be an obvious choice, rather than buying it from a wind farm. This technology is a long way into the future. Storage of mains power comes down to one question. How do you achieve the huge volume of storage media required?

According to a web site -prenwire- it quotes Sorne Developments and Renewable Energy Ireland and says that up to 700 GW of electricity storage will be required in Ireland. That's right! 700 million watts. = 700,000,000 watts. Now do the maths. Volts x amps = watts. Now say the voltage is 12. Therefore 700,000,000 divided by 12 = 5833333 amps. How many 80 amp (tractor) batteries would that amount to? 5,833,333 / 80 = **72,916** tractor batteries. Allow 18 inches per battery; it would amount **to 9 miles of batteries placed end to end.** They don't say how long it would last.

Summary of storage: It's not at the races. Proponents of wind power cite pumped storage as a justification for installing wind turbines. Turbines and storage are only relevant if storage is part of the plan for the turbines. Many wind farm want-to-be millionaires try to claim their turbines will do the business because pumped storage is coming down the road. This is ridiculous. Pumped storage can lengthen the generation peak giving a little extra output after the wind dies down. If you get one windy day followed by 6 days of calm, pumped storage can at best extend the wind's power by 5 – 7 hours. In theory this would allow time for medium merit plant to be started and ramped up, thereby increasing winds credit capacity. However the volume is very low. To be effective, the amount of storage would need to be directly proportional to the total wind capacity. At present wind stands at

about 1167 mw, set to rise to 2,500 in a few years and to over 4,000 mw by 2020. Water storage to give an output of 4,000 mw for one day would cover over at least one county. Pumped storage is not an option; both Poyry and Eirgird agree with me on this. Groups like the Spirit of Ireland and Organic Energy are day dreaming and should be ignored. Let them produce their figures and let's examine.

Part 7) How it is paid for!

Why a system than does not work is made economically viable through government subsidies and its only just beginning. One subsidy pays more the less is produced.

Exactly how much power we are actually getting from wind is very hard to say. We can say that over the last ten years the ESB has upgraded its thermal plant and increased its capacity. It might well have to do this anyway to replace old plant and to cope with any future demand. But with the present recession, demand is falling. They are in the process of increasing capacity from the 6,200 mW to at least 9,191 mW and above. (Adequacy Report 2010) The Airgrid web sites speak about the need to increase capacity to allow extra penetration of wind. **Common sense would say that the opposite should be the case**, There is now a good deal of wind farms and that should mean that less (**not more conventional plant should be required**). The whole theme of this document is to point out that as wind penetration increases so conventional generation increases and more fossil fuel is burned. How this policy can reduce emissions and save the planet is beyond me.

There is energy regular to control production and supply and to control the billing and payments system and charges to the consumer. I have found it next to impossible to secure accurate information but here is what I believe happens.

1) Substantial capital grants are made available for the construction of wind farms. One small turbine in Dundalk costing about 850,000 Euros, received over 400,000 Euros.
2) Rapid depreciation rules amount to a tax break on wind farming profits. Other direct tax reliefs may be available (normally the full cost of new equipment cannot be off-set against tax in the year of purchase, it is written down over its useful life. Take a tractor @ 30,000 in 2005 written down over 10 years. So 3,000 straight line depreciation is allowed against tax for 10 years. This period is shorter for wind farms).
3) A government subsidy of about 57 Euros per mW is paid from taxpayers and from ESB bills. (5.7 per unit – 5.9 for small turbines).
4) A carbon penalty is imposed on electricity generated from fossil fuel including imported thermal energy, but not nuclear and not for grid power used by windfarms.
5) **Every mWh of renewable energy sold attracts a certificate called a Renewable Obligation Certificate ROC. This certificate can be traded on the markets at the going rate. Producers of thermal energy are fined for every unit they produce. If**

they buy these certificates the fine is reduced by the corresponding rate for each mWh bought.

All this adds up to wind energy being paid for in the region of 3 times that of its thermal counterpart. Nuclear power attracts no certificates even though there are no emissions.

Who pays: The Irish taxpayer contributes part of the subsidy through the exchequer. Even if you have your own diesel generator and don't use the grid, you pay through VAT, Carbon tax and income tax. Consumers pay an added per unit fee which goes towards renewable energy most of which is wind based. This means that an old person using a 2 bar electric heater to keep warm during the cold spell of 2009/2010 is paying a percentage towards wind, even though there was no wind energy produced during this calm period.

The certificates are the best laugh of all: If there is a year with good wind blowing and therefore a high number of certificates issued, these will trade a relatively low price. If the next year is very calm by comparison, less certificates will be issued but they will be in higher demand so holders will be paid better. i.e.

Year 2008: 10,000 mW produced yielding 10,000 certs sold @ E50 = 500,000

2010: 8,000 mW produced yielding 8,000 certs sold @ E62.5 = 500,000

The effect of this is that so long as some wind blows, the wind farm will yield the same income (under this heading) even though it creates less amounts of energy. Remember that it is we the consumers and taxpayers who must foot the bill by paying for a product that does not exist. Ridiculous: **It's a swindle** cleverly presented and fooling politicians, the media, the public and investors. The excess power must either be exported or dumped. Don't get bogged down in the figures, they are here for proof.

Part 8) Micro wind power for home and farm.

Explains why there are currently no self contained energy communities and makes a suggestion to experiment. Take up of a government scheme is 5% after 2 years.

"Roof mounted generators consume more power than they create" - David McKay, British government's chief scientific advisor.

Very small wind turbines revolve relatively fast resulting in lower gear losses; some are connected directly to the alternator. The tip speed is low at the smaller diameter. The rotor is usually a

permanent magnet and the output may be direct current (via diode converters (one way valves)) at 12 or 24 volts, capable of storage in a battery pack to power lights and other low wattage appliances like computers and TV sets. Dynamos (dc) also work well. They will **not** run cookers, boil kettles or run vacuum cleaners etc and may even be too erratic for computers etc. Erratic charging will shorten the life of a battery. The only issue is the installation cost. They are a lot of trouble and need double wiring to separate them from the mains. I suspect Mr McKay was talking about supplying small turbine ac output to the grid. This is a ridicules proposition. It would be like teaming up a horse pulling a plough on one side and a duck on the other, yet the British government looks set to provide them with grant aid and the Irish Government already has. Grid connected ones are carbon negative. If purchased cheaply or made up, they can be a source of education, particularly for someone considering joining forces with a turbine company. Some re-winding companies might re-wind a car alternator to run at low turbine speed. Turbine blades can be made from wood. See books "Wind Power Workshop" by Hugh Piggott available from Camden Book Services.

So what about a dairy farmer installing a large (say 25m dia) turbine to milk and run the house? What about a village farmer installing a turbine. First, a mains supply will still be required for up to 80% of the time. As wind gusts, a mains supply may be needed in optimum wind conditions to stabilize the phases and absorb excesses. I cannot find any outlying island community relying on wind power alone; a backup diesel generator is usually available. (The Danish Island of Sams claims the exception, something which is very doubtful and may result from the fact that Denmark has extremely high electricity costs). Most likely they are saying that the amount of power they sell to the grid is equal to the amount they use so they are carbon neutral. This is not true, the calculations do not take into account the backup thermal plant required. Remember isolated communities may accept an interrupted supply, whereas an industrial/farming community like Ireland could not. The farmer or community may have to make a huge investment in the turbine to provide power only 20% of the time and erratic power at that. If the government gives a grant, that cost is loaded on to the taxpayer/bill payer, who in turn must use more fossil energy to generate the income. Why don't government provide funding for a West Coast Island like Arran More off Galway to install a few turbines as a test project? There is wind, there is a community, there is a need for power, and the small area would be perfect for electric cars. Renewable energy companies may try to find excuses to stop such a project, because they know the inadequacy will be exposed. This discovery would endanger government investment to them country wide.

A county Monaghan farmer I enquired from has installed a turbine rated above the power needed to milk his cows. He now says that the turbines will not do the milking on their own. He still must use the mains. It pays because he is paid for power fed to the grid. In other words, the backup is paid for by someone else. It's like if you filled you car at a filling station and the next motorist has to pay for it. This example proves I am on the right track.

There is a 2.5 meter dia turbine on sale in a local outlet. It's is designed to generate power for connecting to an immersion heater for household hot water for washing etc. The full retail price is 3,640 Euros. Needless to say, few if any are to be seen in the area, it's an example of the culture of ripping off anyone foolish enough to buy. The real value of this machine is about E1, 300.

Sunday Times 7th March 2010: The Green party initiative to encourage home owners to create their own electricity has attracted only 5% of expected take-up; it was launched in February 2009.

Eamon Ryan the energy minister has ordered a review as to why it generated so little interest. He is considering changing the regulations. The scheme has a target of 4,000 participants but only 222 have installed micro turbines. Surplus can be fed back to the grid @ 19 c per unit (42c in Germany) for the first 3 years (current unit price from ESB is 13c.) Set-up costs are between 17,000 and 30,000. Simon Coveny FG TD (Irish MP) said the state should increase the unit subsidy and give a grant to installation cost. David Staunton FG TD said there is a limit on how much power can be sold and how big the generator can be. *My opinion: Surely micro generation is open to abuse by proprietors feeding diesel power into it instead of wind. Also the TDs say it's frustrating: "Did anyone consider that the reason it's frustrating is that the wind does not blow most of the time." The people most likely to take up this scheme are farmers. I have a lovely bit of high ground which would be suitable for a small turbine. But I cannot see how it could pay me back over about 10 years. There was no wind between 15th December 09 and 18th March 2010." Farmers are out and about all the time and instinctively know the wind conditions. They know it's not reliable. Imagine getting the demand for re-payments from the bank on 4th January '10 and waiting for the wind to blow to get some money in. That's real frustration. Unlike large wind turbines, it's easy to contact a fellow with one already installed and find out what money he is making/saving. The feedback is that small turbines are no good and that is why no-one is foolish enough to bother with them. If you must, my advice is go for the smallest cheapest machine and see what that pays and then decide whether to go for a bigger one. The idea of increasing the subsidy is ridiculous it's like subsidising sheep's wool and taxing woollen clothes.*

I could make an improvised turbine at my cattle shed to power a small light I leave on all night, but I know well it will only work about 7% of the time. What would happen is that on occasions both the wind and mains would be on together. I won't bother with it. Usually micro turbines do not need grid power to operate, unlike their bigger cousins. Micro alternator rotors use permanent magnets.

One of the most famous turbines in Ireland is installed at Dundalk RTC. It is about 50 meters diameter which is between micro and large. They claim that when the wind blows they supply the college for about 50% of the time and they buy the rest from Airtricity the other 50% of the time. They claim therefore that the college is carbon neutral because Airtricity power is completely green. I took this up with the college authorities and they agreed to differ. The situation is that the 50% they claim to be self sufficient their windmill has the exact credit capacity as all the rest. It is saving at best 2%. Airtricity draw their power from ESB just like all other suppliers. They have a fleet of wind farms whose contribution is also no more than 2%. Therefore if Dundalk RTC had no wind turbine its CO2 emissions would be just 2% more than at present.

Part 9) Denmark:

This so called green energy exporter's figures are strange.

Denmark is a producer of wind turbines. It is held up as a showcase. It produces wind energy mainly in Jutland and (hey presto) is an exporter. A great example for Ireland!

In order to understand the electrical system in Denmark one has to consider the country from the point of view of 1) electricity bills to homes and businesses and 2) the sources of the power used in the country. The billing system is similar to Ireland where you choose your supplier from a few companies in the market, but the actual power all comes from the same source. On the generation side, Denmark is part of power transmission network linking it to Norway, Sweden and Germany .

Norway has some conventional thermal power plants, but the most of its power comes from Hydro Dams. The country is blessed with several large rivers running through valleys. The power is dispatchable, fast to start and ramp up and unless you are salmon "green". Hydro is used for base load, mid merit and high merit generation. They have no wind farms. A study resulted in a policy not to use wind.

Sweden has conventional thermal power, but relies on nuclear for most of its base load. Nuclear accounts for most of its power. It did not go the wind route.

Germany has some nuclear and quite a bit of wind power installed. The bulk of its power comes from burning brown coal, a fossil fuel found there.

Denmark did build at least 3 nuclear power plants, but the government decided not to produce power from them. They are used for research and development and produce waste. Denmark uses thermal plant fired by coal, gas and oil similar to Ireland. However there are 5,200 turbines in the country. The grid in Denmark is split in two, Jutland in the west had no link with the eastern part up to recently. All 4 countries are almost totally interlinked. They are at a stage now where the green party in Ireland would hope Ireland to be in the future.

The policy not to use nuclear may be linked to the image Denmark wants to portray – a country which has proved renewable power can be generated and which is in the business of selling turbines-. A look under the carpet reveals that all it not so rosy.

Very little of the wind power produced in Denmark is actually consumed by Danish consumers. Most is exported through the extended grid to the other 3 countries. As Germany is getting it hard to deal with its own wind power, they are left with Sweden and Norway to take the bulk. Most of the sales to Sweden are made below the cost of production. In a dry windy year, Norway's hydro power is insufficient and they buy power from Sweden, Germany and Denmark. It appears that in such a favourable year Denmark can get something close to a reasonable price. However if there is a wet year when Norway has enough hydro power, Denmark has a problem getting rid of its wind power. In some instances they are forced to pay neighbours to take it. A fee of about 20 cent per unit (kwh) is mentioned. Hard information is not easy to get, but there is widespread acceptance that most of Denmark's wind power is exported at a loss.

What I cannot say is how this loss is computed. Are they paid for the gross power leaving the windfarms or is it on credit capacity? In everyday life, if one is assessing a profit or a loss, it is selling price less buying price. As with so many things about wind farming, percentages and other figures are touted out without telling us what they are comparing to. The Danes are among the highest emitters of CO2 in Europe per head of population, this fact is of course ignored in the media.

It is probable that Denmark's wind power is not exported "neat" and that a considerable amount of dirty thermal power is mixed with it. They are importing fuel at full market price to export below cost. The neighbours are getting a bargain the natives are subsidizing foreign consumers.

The penetration level for wind in Jutland is 19% and this is frequently given of the figure for the country as a whole. However eastern Denmark has a much lesser penetration level. When East and west is measured the actually percentage for wind in the entire country is close to 14%, below Irelands current lever of 16%.

The real sting in the tail is the cost of Denmark's wind project. Electricity costs are amount the highest in the world, double that of France. According to a friend of mine who has been there, a unit of electricity in Denmark costs over 26 euro cents per unit at present. The price in Ireland in 2010 was 13.5 cent and is now 14.5 (give or take a few decimals.) This is the tariff Danish consumers are forced to pay in order to keep the wind farms running. I cannot find out how much extra they must pay in tax to cover wind farming, but it is likely they pay through their power bills and through taxes as well as tax reliefs to the industry.

There is little doubt that if Denmark were not interlinked by super grids to its neighbours, they could not use all the wind power they produce and they could not get rid of the surplus. By being interlinked, they can make an effort to export some of it at least. It is harder to trace and quantify the benefits of its wind power. I claim that this is why we constantly hear wind companies and supporters call for a super grid between Ireland and the rest of Europe. "It's easier to hide in a bigger house".

Not one conventional power plant has been shut down. Conventional plants must be kept running at high capacity. When the wind is not blowing. Denmark imports a small amount of energy, but when wind is strong it exports it at a discount price. David J White wrote in the utilities journal, that all the turbines provided only 3.3% of the nation's electricity in 2003 and exported 84% of it at a loss. The Copenhagen newspaper Politiken reported (according to the Wall Street Journal in Europe) that wind only met 1.7% Denmark's total demand in 1999. Frede Vestergaard reported that Denmark exported 70.3% of its wind production in 2004 at a loss. Danish electricity costs to consumers are the highest in Europe. (Prices for everything are very high) (My note--- **Are we facing a huge increase in power bills here? While we increase pollution!! And damage tourism and wildlife.**

P.S. On the 30th March, 2010 the weather forecast gave strong North East winds accompanied by snow in the evening. Seems like a good time to shut down some conventional plant and replace it with wind. Demand was high due to the cold. The turbines at Gartnaneanne, Bailieboro were strutting their stuff as I passed at 5.30pm. It could be seen they were aggressively pumping power into the grid in what was near optimum wind speeds. Terrific:

Well, I popped over at 8.pm and guess what! They were all stopped. They had to be shut down to prevent damage because of the possibility of very high winds. Now where would that leave the grid operators? If they had shut down their thermal plant a supply shortage would cause blackouts. The grid cannot chance blackouts, they will leave thermal plant running, so where's the saving? There is none. When all was added up on that day, there was no saving of thermal plant, just an input of wind contributing nothing! **That is the inescapable conclusion.**

Just imagine if you were operating the grid and a good windy evening, would you shut down thermal plant and rely on the wind? If you did what would happen if the wind turned into a gale **and all turbines shut down for safety? As they say in Cavan "you could be in a spot of bother".**

Part 10)

How identify misinformation: The wind lobby are experts at misinformation to fool everyone into believing in their product. Here are some things to watch for.

HYDRO "14.5% of our electricity comes from renewables, 9% of which is wind."(They say). The remaining percentage is Hydro power. Hydro power has been around since 1926, before the present fad for wind and before most people now alive were born. Hydro is the most dispatchable, convenient power known. It can be switched on and off very fast, it can be stored and released at will to suit demand and it is green (unless you are a salmon) and fuel is free. Wind on the other hand has only one of these attributes, free fuels. By bunching Hydro and wind power together the wind lobby fool the public into thinking both make a contribution. All hydro is in the hands of the ESB and the wind companies do not have any hydro in their generation folios. If they are commenting on wind, insist that they stick with wind only.

Once you install wind there are no further production costs: This is the most frequent and barefaced tall tale being touted by the wind industry. Calling it so is something I do not use lightly. They are involved in the business and must know this is spin. It gives the impression that unlimited amounts raw wind power can be fed into the grid as and when the wind blows without any further costs. As Minister Ryan says "it's a win wind situation" It certainly is if you are investing in wind right now.

"Wind forms a substantial part of Irelands renewable portfolio" This is another piece of misinformation. Hydro provides good power, but wind provides little, the way this is worded is designed to trick the reader into thinking wind is working. They continually try to avoid wind being isolated from hydro. (The only significant forms of renewable energy are wind and hydro at present)

"Irish wind speeds are the highest in Europe." That is untrue, Britain has twice the area of high wind speeds that Ireland has, Iceland and Scandinavia are higher still. (See wind map page 9)

"The wind is always blowing somewhere" Oh no its not, you can see that yourself.

"Wind Power is sustainable" Only with massive Government subsidies and fines on fossil fuel.

"The Load Factor is 35%" The wind would have to blow 35% of the time above 30 MPH or 60% above 18mph for this figure to be true. It's about 20% or a bit more in a windy year.

"Wind is providing 35% of our energy" That's the load factor, not alone is the figure only a bit above 20%, but the load factor takes no account of the conventional power spinning alongside wind paid for by us. Wind provides between 1.3% and 1.7% depending on % wind in the system.

"We accept the credit capacity is only 8%, but that's still a good saving on co2 emissions"

Credit capacity is the correct way to measure the amount of conventional power plant shut down, but the percentage is only of the wind element. Multiply by the penetration level for wind to get the actual saving. 1167 mw/ 6,200 mw = 19% x 8.8 % credit capacity = 1.67. (These figures are optimistic)

We will create jobs. This is nonsense. There are jobs created in building turbines, most of them abroad, but once up and running only a few operatives are needed. As virtually all of the cost comes from the consumer and taxpayer, we would be better off to dig millions of holes in the ground and put a stuffed camel into them. Spending public money on a non sustainable form of energy is hardly the way to rejuvenate the economy. Remember if we project forward to 2030, the wind will hardly be any different, If fossil fuel runs out we still cannot use the wind power and turbines will be damaged beyond repair is left without grid power for long. So we will have to divert the little fuel there is to saving the wind mills. Government sponsored jobs are only sustainable is there is a benefit to society from the product, there is none with wind.

Ireland can be an exporter of electricity if only we build the power interconnectors.

Counties Kerry, Clare, Galway, Mayo, Sligo, Donegal Derry and Antrim have an average wind speed of 7.5mps. All of Scotland and the part of England North of Hull have similar or greater wind speeds. Ireland and Scotland do (undisputed) have a large area of sea exposed to the Atlantic winds. The claim is that Ireland can install billions of Euros worth of on and off shore turbines the product of which cannot be used at home, but can be exported. The UK is a potential customer. The penny of the fallacy of wind has not yet dropped in the UK, They are installing lots of wind at present. So who is going to buy and why would they buy from us?

They may buy if the Irish taxpayer carries the burden of paying to buy and install all this plant both wind and thermal and pylons. Once installed, the wind companies get free grid power to run their wind farms and free power to balance the erratic wind. The cost of providing all the back up and input power falls to the Irish taxpayer. The wind companies can then export their power at a discount. 98.5% of this power comes from fossil fuel

burned in Ireland. The net effect is that the UK will buy our power because it is being subsidized by the Irish taxpayer, not just the capital cost, but the ongoing cost.

So will the people who monitor Irelands CO2 emissions not detect that we are burning more fuel per head than before we went for wind. Well if all of Europe goes for wind, then it is possible that Ireland's emissions will remain constant as a percentage of fuel being burned by the rest of Europe. It appears that there is already a "nod and a wink" that this will be tolerated. We can only export power if Mrs Gillhooley in No 44 in Ireland pays 30 euros per bill to allow Mrs Homeycome in England keep warm at a discount. This is already happening in Denmark. Remember it is a fact of science that you can change energy from one form to another, but you cannot create it, no matter how much you invest in infrastructure. In fact there is a case to be make for Ireland to buy cheap "green Power" from the UK. Why not let them subsidise us. It is possible that Ireland (which has a legal ban on Nuclear power) will import nuclear power from Britain in the near future. So are we to import nuclear fuel from Britain and also import oil and gas to back it up.

Ireland is a trading nation, but trading a force like electricity which must be used within $1/50^{th}$ of a second of production is a different thing to trading beef and butter. Remember too that power loose intensity through wire resistance. Also bear in mind the huge amount of copper and other metals required to build power lines.

Part 11) Negative side effects of turbanization.

Tourism. Over a quarter of a sample of tourists who visited Scotland surveyed said they would not return to a "turbanized landscape". Ireland may not seem too beautiful to some living here, but many visitors think it is beautiful. We can imagine all the high ground being turbanized and only guess what the effects are. There is growing concern in Germany about the effect on the landscape. Tourism is a major earner in Ireland; wind farms contribute nothing to our tourism potential. Would you book into a B & B if there were 120 meter high turbines whirling overhead? B & B's in England near turbines are experiencing problems with reduced bookings.

If we get more government handouts, we can be greener. We cannot! More subsidies make a ridiculous project profitable on paper. There is an increase in nuclear and fuel burning and consumers and taxpayers burn more fuel trying to raise the extra cost of power. The capital cost involved means that we must pay for wind and thermal plant. Double the plant required duplication.

Wildlife: Wind proponents make the point that the actual number wild birds killed per year is less than that killed on the roads. This belies the fact that the figure is a total of all birds killed. The total of all birds killed on the road includes birds not under treat such as magpies, crows, blackbirds, swallows and starlings. These birds do not fly at night. Raptors however, owls, eagles, Kites, Buzzards etc fly at night and have evolved to see danger from beneath, not from above. They have no protection from turbine blades coming down on them from overhead. A disproportion of all birds killed by turbines are rare raptors. Statistic in the US confirms this.

Planning: There is a terrible howl of the lattice and guy masts erected to hold wind speed measuring devices. If they are permanent expect a very annoying howl in windy conditions.

Of course the noise from a turbine is very pronounced in strong winds and bad in light winds at night. The blade gives a "whoosh" each time it passes the column and the generator emits buzzing sound with a shuffling sensation as the alternator resists the torque of the blades. Current department guidelines say there should be 500 meters between a turbine and a house for noise. But 9 blade diameters for shadow flicker. These should be changed to take account of larger turbines. The cumulative noise of 10 turbines at Bailieboro can be heard 2 miles away. The book "The Wind Farm Scam" by John Etherington is a must when making submissions on wind farms. The Davis Family in Lancashire England welcomed a wind farm near their period farmhouse, but had to move out after it was installed due to noise. The council reduced the property tax as a result. The business plan of many larger developers is to construct the wind farm and sell on immediately. So don't assume you will always be dealing with the same owner. Some developers may arrive to persuade you not to object, but it may not be these you will eventually be dealing with, it may be a Japanese or Chinese finance company. The biggest problem is trying to sleep and it is worse in light to moderate winds in mild weather when the window would be left open. The effect is more pronounced in quiet country areas than along busy roads. The best thing of all to do is to go along to a wind farm and judge for yourself.

You might wonder why it is that turbines which produce power only c25% of the time cannot be shut down for the remaining 75%. This would mean the neighbours would have to contend with noise only when power is being produced. Turbines I observed revolve over 90% of the time. The figures are like this: blades rotating and producing power 25% of time, blades revolved by wind but not producing power 60% of time and blades being driven by the grid to prevent damage, 10% of time. Blades shut down 5%.

I have been told by a person who regularly visits Denmark the machines there were not too bad when first installed, but now they are very noisy as they get older. As the Irish Engineers pointed out, there should be proper zoning and planning areas for turbines. Note

they are not allowed in scenic area and national parks. An Board Pleanala (Irish planning appeal board) have approved a 5 turbine development at Raragh Kingscourt where one turbine is within the 500 meter distance from an objector's house. They have completely ignored department guidelines for noise and shadow flicker, (the moving shadow of the blades in the path of sunlight).

There is no zoning for wind farms in Ireland.

Part 12 a) The word on the street.

As I delve into this subject, new information has come to hand. This from an operative in the wind industry:

For example: If the wind doesn't blow, the system needs a certain amount of conventional generation on standby, so not only are you paying for wind power, you are also paying for a generation plant to run at minimum load, so it has the ability to ramp up quickly should wind fall off the system and also provide inertia to the system as most Wind Turbines are asynchronous generators. (Designed to produce alternating current at a particular frequency) A great example can be seen on 5th April this year when there was 1200MW of wind on the system (see attached images)- Subsequent to this, reports were published that the wind power was providing 50% of total demand that day, fantastic!. Ok so this was good, but the following days there was an amber alert i.e. a frequency drop on the system, wind dropped from 1200 to 200MW in approx 8hrs. For a typically conventional unit it would take 8hrs to start up the respective unit, so they had to call on really quick fast acting hydro turbines to support the system. This problem was caused because there was too much wind in the system.

A blackout (called a brownout if caused by renewable failure) occurred in Europe in 2008 when the wind suddenly died down. When they tried to start the system's thermal capacity again, they needed to get a balance of power supply across an area of several hundred miles. They could not control the wind farms whose turbines kept turning in one area. This cancelled out the balance and delayed restarting for several hours.

Could wind be used at all for our benefit?

It is excellent at providing heat for nursing homes etc if the turbines are nearby. The windows can simply be open to let out surplus heat and oil heating can be turned on when it gets calm. It could also be used by industries that use large amounts of energy occasionally in their production. For example if they weld one day per week and assemble on the other 4 days, they could schedule their welding for the windiest day.

Waste in the present system.

Where any thermal power plant gives off surplus heat, it should be built near centres of population where the heat is supplied to homes in winter. It is next to criminal to push scarce heat out into the atmosphere. The turf burning station at Lanesborough, Co. Longford pushes large amounts of hot water into the River Shannon. Not alone could this heat be used by local homes, but a huge glass house could be built nearby and heated by this recourse, producing a variety of exotic vegetables for consumers. Just think of the exotic fruits vegetables that could be grown there in the middle of this country. Our government did not even think of it. Their consultants did not think of it either. As an old observer said "they have no brains".

Part 13) The media. Opponents of wind power the world over complain that their view is never allowed to be aired in the media. I sent letters to Irish Sunday news papers and they were never published them. The only conflict of interest I can think of that owners of these newspapers also own satellite tv channels which benefit from the fact that satellite dishes must be installed on homes by wind developers to restore tv signal interfered with by turbines. There is no evidence that this is the case, however. Irish radio stations appear to have a policy of allowing advocates of wind on air while ignoring opponents. I have heard people involved in the business being interviewed, but my texts pointing out the misinformation being broadcast was not read out.

An associate of mine thinks is just ignorance. Wind power is the flavour of the month and media people believe in it. However, the complaint is that the other side cannot be aired at all and presenters will not take the trouble to listen. The Anglo Celt Newspaper and the Irish Farmer's Journal did publish my letter and the subject.

Wind advocate Damien Mee on Rte Radio with Pat Kenny 18/1/2011, said that in years to come fossil fuel will become scarce and it will be very wrong for the Irish Government not to invest heavily in

wind farms now so there will be power for the children of the future. He appears to think that raw wind power can be fed into the grid. This is amazing ignorance. If there is no thermal generation possible, none of the available wind power can be used in mains supply. It will lie idle just like the thermal plant. None of this was countered by the presenter. I rang the programme and asked to be interviewed, but was met with silence.

There are some notable exceptions. RTE television Primetime programme on the 15th December, 2010 gave the subject a balanced covering. 3 experts questioned the whole wind concept and pointed to its expense but Minister Ryan persisted that wind energy would reduce electricity costs. He did not say to what level he expected prices to be reduced to.

In November 2010, Colm McCarthy, the famous University College Dublin economist who set out the framework for reducing the cost of Government In Ireland said in a brief interview. "I cannot understand why the media have not taken issue with all the Guffaw being touted by green energy lobby, I can foresee a NAMA for windmills in future". NAMA is the National Asset Management Agency to manage the defaulted loans on bank books resulting from the collapse of the Irish property bubble.

Part 14) What I am calling for.

I published a letter in the Anglo Celt news paper. No one took issue with it. I had a letter published in the Irish Farmer's Journal giving my e-mail address. No one criticized it. I got over 30 requests for this document. I claim that the present rush to wind is nothing more than a scam, a Ponzy scheme (pyramid selling). I am calling for an examination into the industry before government commits to subsidizing wind power into the future. I don't mean a multi million euro enquiry. Rather a panel comprising an engineer, former grid operative, an economist and one of two lay people. It could take submissions and it would place everyone (me included) in the spot light and expose any miss-understandings. It should not cost any more than about 20,000 euro and it would be money well spent. One turbine casts about 1.7 million Euros. Above all it could take accurate measurement of the output of wind farms, the load factors, credit capacity and saving of CO2 emissions.

Part 15) Carbon trading. I am still trying to get my head around this system. There is some evidence that the following bazaar situation could arise.

If I built an iron smelting factory on an uninhabited island off the west coast of Ireland, then built a coal fired generation plant of 100 Kw capacity and began producing 100 tons of co2 per year. My emissions would be capped at 95 tons in course so that I would have to buy

carbon certificates to avoid penalties or reduce output. If I installed a large wind turbine bringing total generation capacity up to 120 kw, I could off set the renewable capacity against my thermal capacity . My situation would be 95 thermal + 20 renewable = 115 kw. So I could increase my emissions back to 100 despite the fact that the wind is saving only .25% emissions. In fact I could emit more co2 than if I had no wind power.

Part 16) Conclusions:

1) The global warming scare has lead to an official and public mentality that "we must do something". The policy is for a small amount of conservation measures like home insulation which is good and a move away for fossil fuel generation which would be good if done intelligently.
2) There is a mood out there that Mother Nature is standing ready and willing to provide us with plenty of renewable energy. With the exception of conventional hydro, there is little evidence that this is the case.
3) As the huge difficulties in harnessing wave, tidal and solar energy become apparent, wind is selected as the obvious way to go. This document questions this idea. Far from being a reliable consistent form of energy, wind is a feeble erratic source with no co-relation between supply and demand.
4) The real way to measure wind's contribution is by capacity credit multiplied by winds percentage in the system. If this is not done, then a more simplified way is to see how much conventional generation is saved because of wind.
5) The best possible indicator of wind's contribution is to look at countries where wind penetration is high. Denmark, Germany, Spain and Ireland have not managed to shut down even one power station. In fact Ireland is planning to increase thermal generation from 6200 conventional + 1167 wind = 7,367 to 9,091 conventional + 4,000 wind = 13,000mw. What a ridiculous thing to contemplate!
6) The claim that Ireland has the best wind speeds in Europe is false; Britain has twice the resource, why should they buy our wind power?
7) Mains power cannot be stored in any practical form in any worthwhile amounts.
8) If you want to add to the capital cost of power, if you want burn more fossil fuel, if you want to pollute the atmosphere and add to the problem of global warming, if you want to see more poor people cut off from power and dying from the cold, if you want to increase taxes and energy charges. It you want to make more "eco millionaires" and boost the profits of manufacturers. There is only one way to go. Install thousands of wind turbines! Think I am joking, well that is what is happening right now, and both Airtricity and our forestry company are planning to do this. They

don't intend to sell on the wind power themselves; they want to sell the wind farms on to investors. "Get in and get out quick," sounds familiar (Celtic tiger housing madness). !

9) The powers that be have two options, 1) invest billions of scarce money in wind farms now, in which case it will be noticed after a few years that we are still burning the same or more fossil/nuclear fuel as when we had no wind power. 2) Carry out an objective analysis to ascertain what contribution wind can make and fix responsibility for the result with someone. Pending this, all subsidization of wind farms should be halted.
10) The wind industry constantly say that the reason wind farming is not working here is that many billions needs to be spent on upgrading the national grid. I say it is easier to hide in a bigger house. It is a rule of science that you cannot create energy; you can only convert it from one form to another. If we link the grid to Britain and upgrade it here, we will spend billions. But the power must be produced somewhere and used somewhere. It is a myth that all this must be spent. When did any multinational company complain about inadequacy of supply? The price yes - but not supply, never.
11) The claim that investment in wind farms will eventually result in cheaper power is nonsense. The present reduction is due to a decrease in gas prices. Those in a position to do so will install diesel generators for their entire peak power requirements, leaving the "less well off" to shoulder the burden for the excesses of the Green energy revolution. We need to get back to the drawing board, the solution is not as obvious as it seems. I personally see an opening for businesses selling small diesel generations with cooling systems connected to domestic heating.

A recent seminar was held in Dublin on the subject of renewable energy; I intended to attend and ask hard questions. Guess what they did? They put the entry fee at 490 Euros.

I state here and now, I will meet and discuss this issue with anybody in public or private, I would love to be proved wrong! So far no one seems willing to talk to me. I suspect they can't, as it is a bubble, a bluff. They can force it through, but they cannot fool everyone! Only one event will stop it. A total collapse of Ireland's economy! It's sad that it will take that to get them to their senses!

Val Martin Bachelor of Business Studies

PS: A few readers have contacted me to further explain how there can be a measure of power output based on credit capacity and another based on credit capacity x % wind penetration. To explain better I will take an extreme example where 1,000 x 2 MW turbines is installed in every county in the Republic. That's 26 x 1,000 x 2 mw = 56,000 mw. That's about 8 times out conventional capacity. In such a case the vast majority of turbines would be curtailed (switched off) most of the time on a scheduled basis. In this case it is likely all turbines would be numbered in batches from 1 to 50 and only one batch would be allowed into the grid per day rolling over each 50 days to 56,000/50 1120 mw, close to the present installed wind capacity.

So in the 15th January batch No 15 is running with a credit capacity of 7% = 78 mw. You can then say that that batch is yielding 78 mw, which is 7% of the wind. However if you are asked what the yield of all installed wind is, your answer would still be 78 mw because most of the wind is curtailed. If you now double the wind to 56,000 x 2 = 112,00 mw you can still only produce 78 mw.

At 56,000 mw wind you get 78/56,000 = .0014% credit capacity x 8 = .0115 % contribution in the entire system. (there is 8 times the wind : total capacity).

Double wind to 112,000 you get 78/112,000 = .0007% x 16 = .0115 % contribution.

It is similar to the law of diminishing returns. Put 5 men building a house and they do it in 2 months. Put 100 men and they still take 7 weeks because there is no room to work.

I suspect that in arriving at a mathematical equation, logarithms would have to be used to account for this effect. Any examination would be better placed to consider this.

Appendix:

Irish Academy of Engineers claim that the drive to increase wind farm perpetration is driven by ideology. You can access their article by googling -"independent business Irish ideology is driving energy policy." They say that those supporting the current development of "ad-hoc" wing farm development do not take into account the total cost of linking it to the grid. They say Eamon Ryan is proposing to surpass Denmark in achieving a penetration for wind energy of 40% by 2020 for renewal energy. I discovered the engineer's remarks after I compiled this article and as far as I can see they are signing from the same hymn sheet as I am. Their comments are completely with Dundalk Regional Technical College. How can this be, for they are all engineers? (I wrote this in June 2010)

This is an extract from a report from Garrard Hassan on the effect of wind in the Irish system.

Capacity credit

The study found conflicting evidence for the value of wind generation in providing capacity. It is clear that there will be occasions, possibly several times per year, when there is no or very little output from all wind generation on the island at times of high electricity demand. It also appears that in these circumstances there will often be little output from wind generation in preferred wind areas in Scotland and Wales, so the economic case for interconnectors to these areas on this justification alone is weak.

However, other detailed studies have shown some capacity credit, with significant economic value to wind projects. This study has taken the conservative view that wind has no capacity credit, but it is recommended that this be studied further. The methodology adopted in the latest ESB National Grid Generation Adequacy Report appears sound, but needs repeating with more extensive data. For this reason, and for other similar reasons, recommendations are made for comprehensive collection of data from operating wind farms, to be started as a priority.

Conclusion

This work has provided answers to some of the technical questions being discussed by the wind industry and system operators. It has also identified some technical issues that need further work to resolve. None of the technical issues are considered insuperable.

The major cost elements are:

- Transmission reinforcement, starting at Limit A and Limit C as defined above, unless the RAS principle is adopted.
- Wind curtailment, starting at Limit B.
- Capital and operating costs for wind generation, including network connection.

Depending on the aims of any economic analysis, the last item can be replaced by the difference between the selling price of wind and the selling price of conventional generation. Against this must be set the savings in conventional fuel consumption. These savings decrease in relative terms as wind capacity increases, because the conventional generation is forced to operate further from its optimum efficiency.

posted: August 31, 2006 • Germany, Grid, Impacts

Eon Netz Wind Report 2005

[Alternate short URL for linking • HOME]

Author: Eon Netz (my quote, note the author, one of the biggest energy companies in the world)

Download original document: "Wind Report 2005"

E.ON Netz manages the transmission grid in Schleswig-Holstein and Lower Saxony, about a third of Germany, hosting 7,050 MW of Germany's 16,394 MW installed wind-generating capacity at the end of 2004. The total production in their system was 11.3 TW-h in 2004, representing an average feed of 1,295 MW (18.3% of capacity).

"Wind energy is only able to replace traditional power stations to a limited extent. Their dependence on the prevailing wind conditions means that wind power has a limited load factor even when technically available. It is not possible to guarantee its use for the continual cover of electricity consumption. Consequently, traditional power stations with capacities equal to 90% of the installed wind power capacity [a little over the maximum historical wind power infeed] must be permanently online in order to guarantee power supply at all times."

Graphs in this report (and the similar 2004 report) show that half of the time, wind power infeed is less than two-thirds of its annual average. It is greater than its annual average only a third of the time. A similar power vs. time curve applies to all wind power facilities, whether their annual average output in relation to rated capacity is higher or lower than those in Germany. The 11-turbine facility in Searsburg, Vermont, produces no power at all more than a third of the time.

"Both cold wintry periods and periods of summer heat are attributable to stable high-pressure weather systems. Low wind levels are meteorologically symptomatic of such high pressure weather systems. This means that in these periods, the contribution made by wind energy to meeting electricity consumption demand is correspondingly low. …

"The feed-in capacity can change frequently within a few hours. This is shown in the Christmas week from 20 to 26 December 2004. Whilst wind power feed-in at 9.15 am on Christmas Eve reached its maximum for the year at 6,024 MW, it fell to below 2,000 MW within only 10 hours, a difference of over 4,000 MW. This corresponds to the capacity of 8 3 500 MW coal fired power station blocks. On Boxing Day, wind power feed-in in the E.ON grid fell to below 40 MW. …

"In 2004 two major German studies investigated the size of contribution that wind farms make towards guaranteed capacity. Both studies separately came to virtually identical conclusions, that wind energy currently contributes to the secure production capacity of the system, **by providing 8% of its installed capacity.** (note my quote: "of its installed capacity, this must be multiplied by the % of wind penetration to give contribution as a % of the entire system, 8 x 18.3% = 1.46%)

"As wind power capacity rises, the lower availability of the wind farms determines the reliability of the system as a whole to an ever increasing extent. Consequently the greater reliability of traditional power stations becomes increasingly eclipsed. **As a result, the relative contribution of wind power to the guaranteed capacity of our supply system up to the year 2020 will fall continuously to around 4%. In concrete terms, this means that in 2020, with a forecast wind power capacity of over 48,000 MW, 2,000 MW of traditional power production can be replaced by these wind farms. … (I underlined this but made no alterations. so 4% x 18.3% = .07% of total, author)**

"The increased use of wind power in Germany has resulted in uncontrollable fluctuations occurring on the generation side due to the random character of wind power feed-in. This significantly increases the demands placed on the control balancing process [and bringing about rising grid costs. The massive increase in the construction of new wind power plants in recent years has greatly increased the need for wind-related reserve capacity. -- *Wind Report 2004*]."

That is, wind power construction must be accompanied by almost equal construction of new conventional power plants, which will be used very nearly as much as if the wind turbines were not there.

Sunday Ind business section 16/9/2009 Permission granted for a 500 MW interconnector. Between Ireland and Wales. It will carry 500 mw equivalents to supply 300,000 homes. This capacity (500 MW) is 10% of peak daily winter demand. (mine= therefore peak winter demand is 500 x 10 = 5000 mw = 5 billion watts.)

Sunday times 4/10/09: Professor David McKay the British government's chief scientific advisor of climate change prevention measures, has proposed quadrupling of British nuclear energy to prevent greenhouse gas emissions. He calculated that renewable energy sources (wind and tidal) can only provide a fraction of Britain energy needs.) He says that whatever energy source is used (the sums must add up). Britain emits 680 million tons of greenhouse gasses each year. Current nuclear output is 12 Gig watts (15% of Britain's needs). He sees that in order to cut emissions from transport, electric powered vehicles will have to be used and this will increase demand for generating capacity. He sees boiler pumps (Geo thermal) to be forced on households. Generating solar power in the deserts of North Africa and transmission through high voltage lines is considered. He says there is a huge political and technical cost. The article goes on to give ways of reducing energy consumption saying roof mounted wind turbines consume more power than they generate.

Article in the Sunday Times Sunday 1st November 2009. Board Gais Energy accuses Airtricity of selling their power to new customers as green/wind energy, when it fact it is nothing of the sort.

Crown estates have will shortly announce the names of companies to be granted licences to build giant off-shore wind farms off the British Coast***. "In theory "*** (note this word in a country with some of the most advanced engineering faculties in the world) the projects will provide one third of the UK's electricity. "Cost is estimated at 125 Billion pounds over 12 years. Off-shore wind is at optimum speed 33% of the time as opposed to 25% for on-shore winds. (This assertion is not supported by evidence and is over optimistic. One would expect that this would reduce electricity costs; on the contrary, the energy regulator estimates that household costs will rise to 2,000 pounds annually from present £1,100. Andy Cox, energy partner at KPMG, said "The hostile operating environment that awaits these projects must be a real concern to investors. Even with the more benign on-shore sector, there have been numerous problems with gearboxes failing and blade issues."

Some of the farms proposed will be 150 miles off shore in deep water. In the event of breakdown it could take weeks for suitable weather conditions to allow repair by ship. More special ships will have to be built. The industry has now made desperate requests to Government for aid on top of an already subsidised package. Government responded by increasing the subsidy by a third and immediately costs were ratcheted up by exactly that amount. Lack of competition meant that the cost of off-shore equipment has doubled in the last 3 years despite the fact the material cost have

halved. **Government subsidies have been passed directly on to equipment manufacturers** – said Mortimer Menzel, a banker at Augusta & Co. (Sunday Tomes 8/11/2009). They want to build these huge projects, but they cannot afford it. The article goes on to say that unless Centricity gets investment backing, they will go bankrupt.

There is no such thing as a free lunch! Apply common sense; should a high wave reach the revolving turbine, there will be damage!

Irish Daily mail, 6th December, 2009. Irish Finance Section. Board Gais energy have bought West Cork, **SWS Natural resources** for more than 500million. The ESB backed out of a similar deal because the price was too high. SWS have seven existing wind farms. ----- Now get this ----- "they are "**PROJECTED" (repeat) "PROJECTED"** to turn an operational profit in 2010 of 35 million. I would ask where their profit is for 2008 and 2009, heh? The article goes on to say that the minister for finance must approve the deal. Could it be that he will have to fund the project in whole or part, "not the purchase" but the "future projected profit"? The Sunday Times the following week carried an article – "Anglo Irish clients who invested 700 million in equity (shares) and 30 million in loan notes (loans) stand to make a 15% annualised return following the sale of the Company. The deal put a 500m enterprise value (like 2 fellas in a pub judging the value of a lorry load of cattle heading for the mart) and an equity value (projected value of shares) of 300 m Euros. Bord Gais (a state-backed company funded by your taxes) intends to pump in 700 m euro to expand the project. Author's note: Imagine pumping 700 million Euros into a wind farm that only has wind blowing 24% of the time. Get it 700 million Euros.

Sunday Times 7th Dec, 2009.

Just outside the heavily polluted city of Baotou, Inner Mongolia lies a lake with no name. It oozes a viscous red liquid where toxic material is stored for further processing. Farming has been wiped out and the water is poisoned. This is the price Chinese peasants are paying for our low carbon future. Rare earths are a class of metallic element that are highly reactive but essential for the next generation of green technologies. The battery of the Toyota Prius contains more than 22lbs of lanthanum. Low energy light bulbs contain terbium. The permanent magnets in a 3 MW wind turbine contain use 2 tons of neodymium and other rare earths. Unprotected workers watch over vats of acid and other chemicals as they stir and bag liquid and powder oxides for making into batteries and magnets. They breathe it and handle it without any protective clothing. In Jiangxi province 1,000 miles away, they pump acid into the earth. Locals protest that their lives are being ruined. A woman says "we farmed rice and grew fruit, but not anymore, she was afraid to give her name because her husband is still in prison for protesting. Even the weeds died", she weeps. Government efforts to improve things have been thwarted by mafia and local communist party members. China produces 95% of rare earth materials. The chief executive of the US Molycorp

Minerals Mark Smith (*his grandfather may have come from Cavan*)"joke" said we are trading dependence on foreign oil for dependence of Chinese rare earths. If we cannot get our own supplies new green technologies will not be possible." Global demand is expected to reach 140,000 in 2010. China's then leader Deng Xiaoping said, "*the Middle East has oil but China has rare earths*." End. *In fairness China is trying to get into the high end manufacture of these products, but the west cannot compete with Chinese "almost complete absence" of health and safety controls. Those driving the new "environmentally friendly" hybrid cars, might temper their green credentials with a thought for the thousands of Chinese people and their families whose lives have and continue to be destroyed by this self-same technology. You won't see that on the news!*

There is a conference planned in late March in Dublin. The subject is renewable energy. It is sponsored by Siemens and other interested parties. There are at least 4 eminent speakers. I decided I would breeze in and maybe learn something, even ask a question or two. Guess the admission fee: **- *480 Euros*** - Information is expensive; well I have given it here free!

Useful references.

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Books on home wind energy available from Camden Steam, "Google" Camden Books web sit

The Sunday Times

The Great Wind farm Scam by john Etherington published by Stacy International available from good book shops and on-line. Price under £10. Less from Amazon, highly recommended.

Further studies are required and information will be sought. . That's all I can tell you for now;

Thanks for your time.