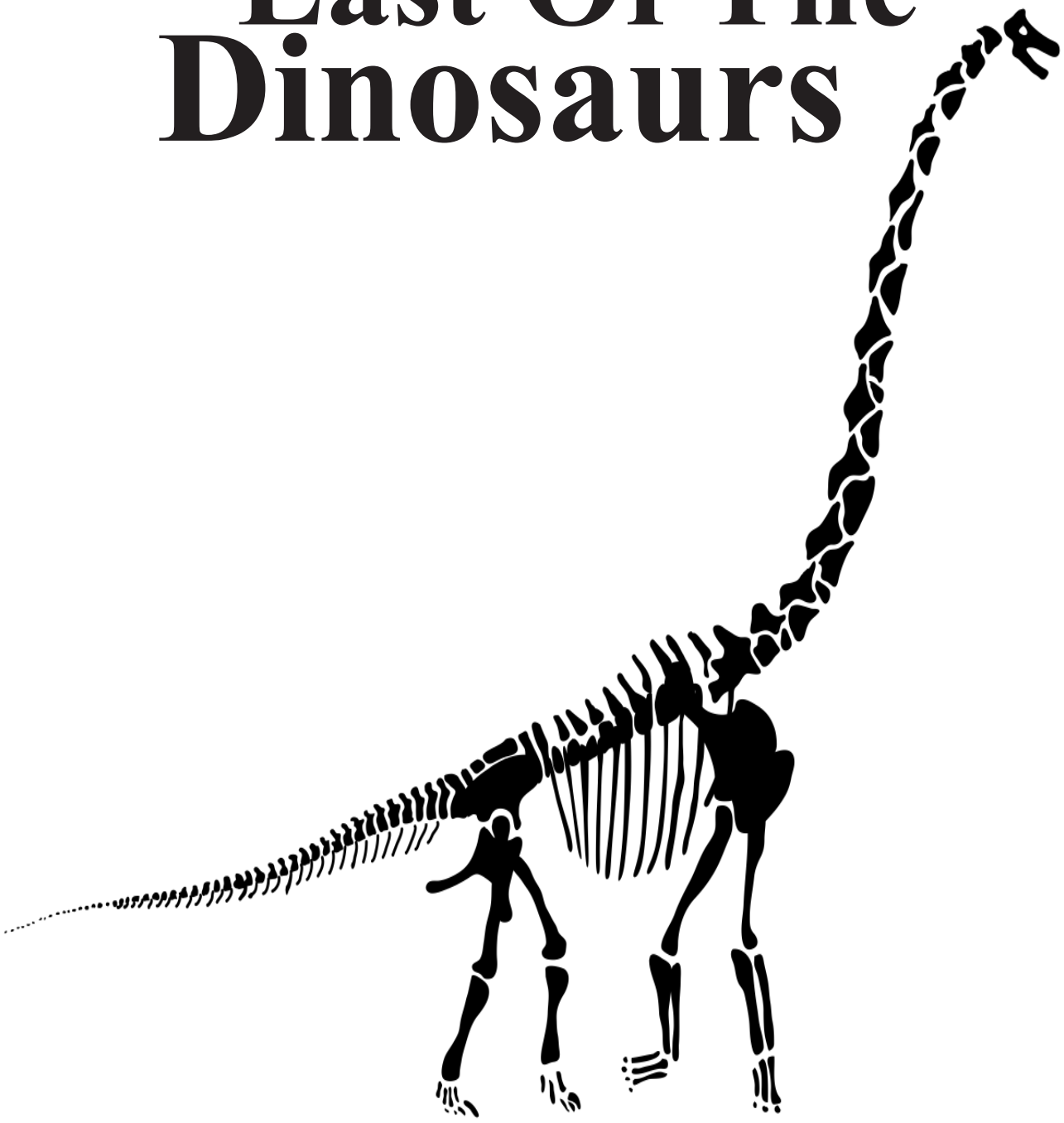
The Last Of The Dinosaurs



Electricity Generation

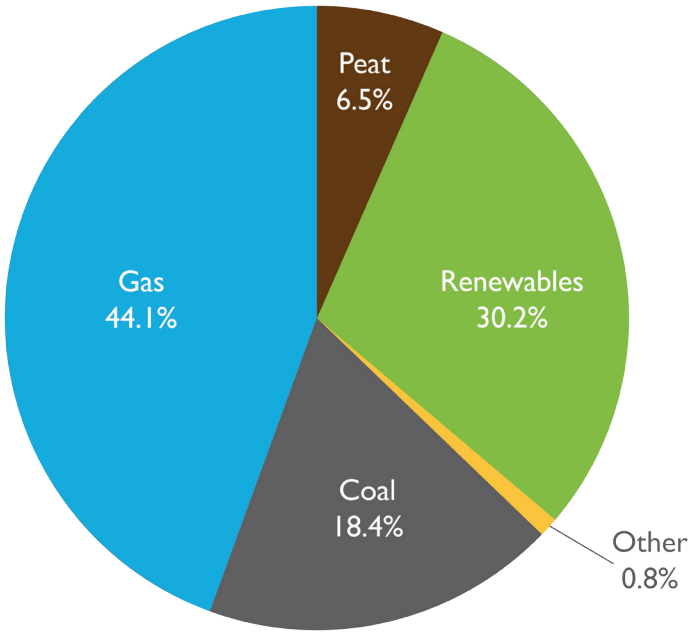
The Wisdom of Hindsight

Knowing what we now know about the finite nature of fossil fuels and the environmental damage caused by burning them, if we were starting today with a blank canvas to design an electricity production and distribution system, Centralised Power Production would not even be considered as a possible option due to poor efficiency. With Centralised Power Production just 40% of the energy in the Primary Fuel is put to good use, 60% is wasted.

To put a perspective on the sheer quantity of fuel burned in Ireland every year, Moneypoint Power Station in Co. Clare, generates 915MW, 18.4% of the total electricity requirement and consumes 7,000 tonnes of coal a day to produce it. This is roughly 2.5 million tonnes a year.

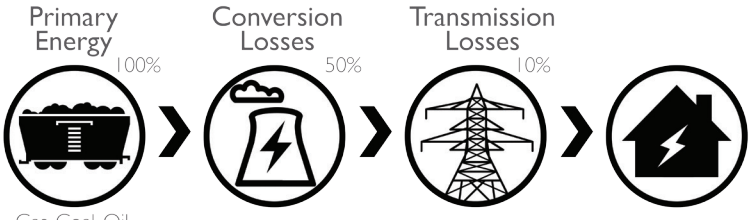
With an overall system efficiency of just 40%, 1.5 million tonnes annually does nothing useful and, literally, 'goes up in smoke' and CO2.

Now if we look at the 69% of electricity we generate using fossil fuels, and imagine that this was just coal, it would amount to 9.5 million tonnes a year or a staggering 25,000 tonnes a day. With a system effeciency of 40%, just 3.8 million tonnes does anything useful, 5.6 million tonnes are wasted.



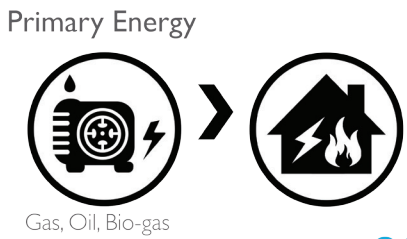
All Island Electricity Generation
Fuel Mix 2013

Centralised Power Production



Available Energy for End User: **40%**

Local Power Production



Available Energy for End User: >**90%**

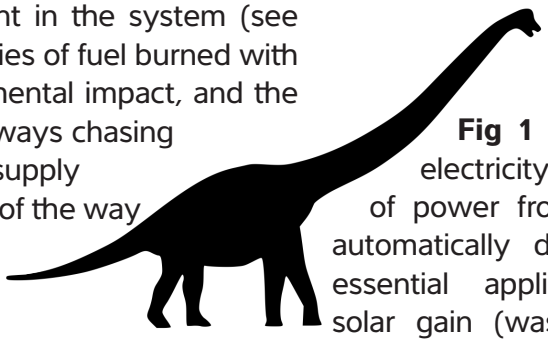
Combined Heat & Power – CHP

A generator burning a fuel will produce roughly twice as much heat energy as electrical energy. In large power stations this heat is wasted hence the very poor efficiency. Local electricity production, where the resulting heat is put to good use , can result in over 90% of the energy in the fuel being harvested. A Micro CHP, burning bio gas or wood gas, can supply an individual home with much of its electricity and all of its heating needeven making off-grid living a possibility.

Centralised Electricity Production

The Last of The Dinosaurs

Electricity Supply Companies the world over are slowly realising that centralized power production is yesterday's technology. Although it does function, the huge inefficiencies inherent in the system (see Pie Chart), the massive quantities of fuel burned with consequent negative environmental impact, and the prohibitive costs involved in always chasing additional demand with more supply capacity, have forced a rethink of the way electricity is generated and distributed.



The solution is obvious - generate power close to where it is required using renewable sources (solar, wind, hydro & biomass) and manage the demand rather than the supply using digital communication technology.

This is the so called **'Smart Grid'**, the Energy Internet. Some of the benefits of such a modernized electricity network include:

1) The ability to reduce power consumption at the consumer side during peak hours (demand side management)

2) Enable grid connection of distributed generation power (PV arrays, micro hydro, wind or Combined Heat and Power generators)

3) Incorporate grid energy storage for distributed generation load balancing

Fig 1

Flexible Storage

Fig 1 illustrates a typical 'smart' domestic electricity arrangement. Best use is made of power from the roof mounted PV array by automatically delaying switch-on of certain non essential appliances until time of maximum solar gain (washing machine, dish washer, heat pump, water heating etc.), while excess PV output is stored in a battery bank for use when needed.

This type of 'flexible storage' arrangement is available today and is designed to work with today's 'stupid grid', i.e. all power management communication happens within the building. But with a truly 'smart grid' every home will receive power management instructions from the grid itself greatly enhancing system flexibility.

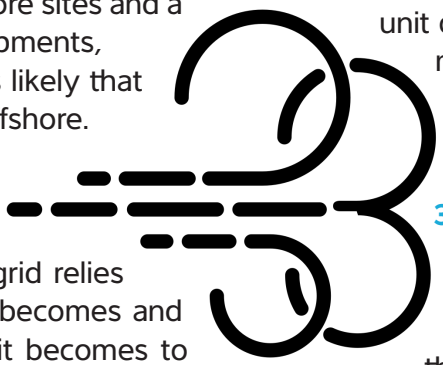
While the 'Smart Grid' concept might seem like an obvious step to take power generation into the 21st century, it requires Electricity Supply Companies to completely rethink how they do things. The proposal to scatter generating assets far and wide, back to local communities and even individual households, is guaranteed to be met with resistance. And in our high-energy-use western democracies, Electrical Utilities, most of them State owned monopolies up until very recently, wield huge power. No politician wants to stand in front of the people trying to explain why, on their watch, the lights went out or even dimmed a little!

It is not hard to see how these Utilities can veto any suggestion of change.

Winds of Change Are Blowing

But change in the way we generate and distribute electricity is inevitable. Already Ireland has committed to generating 40% of our electricity from Renewable Energy by 2020 and there are more onerous CO2 reduction targets to come.

While sticking with the Central Power Generation model, and all the time planning for a growth in electricity demand into the future, we are hoping to reduce our CO2 emissions by the addition of more large scale wind generation capacity with some Solar PV (Photo Voltaic) and Biomass thrown in. As there are few remaining suitable onshore sites and a growing hostility to wind farm developments, pylons etc among the population, it is likely that wind turbines in future will be sited offshore.



But the wind is an unpredictable energy source and does not blow all the time. The more an electrical grid relies on wind power the more unstable it becomes and the more expensive and impractical it becomes to keep conventional Thermal Power Stations idle in reserve, ready to take up the slack when the wind stops blowing.

This is where Interconnection between Ireland and the UK comes into the picture. An Interconnector is an undersea cable which can carry large amounts of electricity in either direction. There are two undersea Interconnectors currently operating, one between Northern Ireland and Scotland and another between North Dublin and Wales with a third one planned. The possibility of an Interconnector between Cork & Brittany to connect us to the wider Continental Grid is being looked at. These Interconnectors are an integral part of the plan to increase the percentage of wind on the Irish Grid. They would permit export of excess wind power to the UK and, more importantly, allow import of power from the much larger UK grid.

This, it is hoped, will guarantee the stability of the Irish Grid during windless periods.

But There Are Problems With This Plan

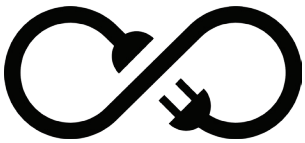
1) The electricity market in Ireland is relatively small and offshore wind developments are hugely expensive and will have to be subsidised. So be prepared to see your two monthly PSO (Public Service Obligation) levy increase! Alternatively be prepared to accept yet more pylons crossing the country from west to east carrying power towards the Interconnectors and on to the UK.

2) Interconnectors are also very expensive to develop and are inevitably operated as commercial ventures. They function like a toll bridge – each unit of electricity carried in either direction must be paid for. This will add further upward pressure to the price of electricity to the end user.

3) The UK generates a sizable portion of its electricity from Nuclear Power, and unlike many of our European neighbours, they are not about to abandon this technology. But the more Industrial Scale Wind Power we connect to our grid here, the more we will become reliant on the UK grid for stability of supply. Does this not, in effect, make us a Nuclear Power? Are we happy to go along with this? Don't be surprised that you have never been asked!

4) The Grid Architecture, which we currently have, was developed with fossil fuel powered generators in mind and attempting to shoehorn renewable energy resources into this framework, just succeeds in making the whole teetering structure more fragile and prone to collapse. Better to accept that the thing is a Dinosaur, is no longer fit for purpose and move on! It is time to look to engineering alternatives which are better suited to our times and circumstances.

But There Is An Alternative



Before investing massive sums trying to 'green' our existing electricity production and distribution system, in effect making the already bloated Dinosaur even bigger, we need to reflect very carefully.

For a small island nation with no history of heavy industry and no plan to develop heavy industry in the future, could this be the wrong path? We in the Transition Kerry Energy Group feel very strongly that it is. Looking at trends elsewhere in the world, it is obvious that the future for electricity production & distribution in Ireland lies in widely distributed small scale renewable energy generation deployed over a Smart Grid.

We are aware that what is proposed here is nothing short of an Energy Revolution which, were it to happen, would empower communities and individuals, making them responsible for their own energy production, management and use, taking it out of the hands of Corporations and Investors. And, as with all revolutions, this one will only happen from the bottom up.

Do not expect those in charge of our electricity system to agree to any idea, no matter how valid, if it might result in their empire being downsized even if it is in the best interests of the Nation and the correct thing to do. The woeful mismanagement and collapse of our economy has surely taught us to be wary of vested interests. Our recent history also tells us that institutions set up to serve the people inevitably end up serving themselves.

But How Can This Be Done

The fact is that, as things stand at the moment, it is possible for every home in Ireland to generate all of its own electricity by installing a rooftop solar PV system and connecting it to the Grid! Every home can become carbon neutral and even become a net electricity exporter.

Obviously the solar resource is seasonal, there is excess in summer and not enough in winter. But over the year we can easily arrive at a Net Grid Electricity Usage of zero. But this does not help the Utility which must still supply the full load in winter while having to accept a loss of earnings during the summer.

The addition of a battery bank to our PV array greatly increases the 'self consumption', with the battery powering loads at night and the PV recharging the battery during the day. This type of 'flexible storage' arrangement is very much shaping up as the future of electricity production/ usage at a domestic level. With this system the home is still connected to the Grid but through so called 'Thin Pipes'.

Fig 2 illustrates the principle using a water analogy. 'Thin pipe' (weak grid supply) fills the tank (battery) slowly, mostly at night, while the tank is also filled from the roof (PV array). A larger pipe carries a larger flow of water (power) to the house from the tank.

Research in Holland has demonstrated that a Grid electricity supply limited to just 6 amps (1,5kW) to a house fitted with PV and battery storage is perfectly adequate for normal domestic electricity use. From the Utility point of view, this is a major improvement on the 63 amps (15kW) which can be demanded at any time by the typical domestic customer. The more houses which are fitted with flexible storage and supplied by 'thin pipes', the smaller the peaks in demand on the generating system. Smaller peaks mean less redundant and expensive generating capacity sitting around idle, waiting for the next peak in demand!

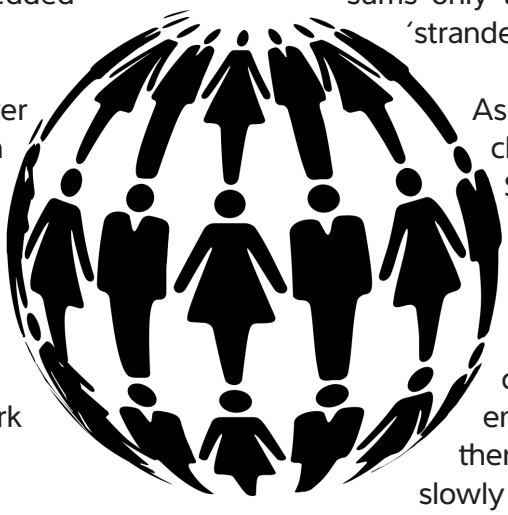
The renewable energy source can of course be wind or hydro but PV will be the most popular as every home has access to solar energy. The technology to manage these flexible storage arrangements and manage demand within the house is readily available today and can be installed in any home in the country.

New Countrywide Movement

Sustainable Energy Co-Operatives

If enough individuals, communities, villages & towns all over Kerry install renewable electricity systems it will not go unnoticed. Ultimately we would hope that this will become a Countrywide Energy Cooperative Movement with a large membership and therefore real clout at a political level.

Large numbers of small scale 'embedded generators' in the system make the network operators nervous. The network is structured to export power outwards, but not receive power in the opposite direction, so all of this additional generation capacity is invisible and difficult to manage. In other countries where this has happened, the reaction of the Utilities has been to limit the numbers connecting to the network in this way.



This is where the discussion becomes political – as a nation are we encouraging sustainable energy generation or are we not? Are we serious about this or just Greenwashing?! If we are genuinely committed as a nation to No Carbon Electricity Production, then the structure of the network needs to change to accommodate the new reality.

After all it is our network. We (and our parents and grandparents) paid for it through our taxes and we are entitled to make best use of it as we, the citizens, see fit! If this requires transformation to a Smart Grid then let the transformation begin!

The truth is that, as a small island on the periphery of Europe, we are in a unique position to develop Smart Grid technology and apply it to our own network. It is the power technology of the future, so either we develop it for ourselves or we will buy it later from others. If we invest in the wrong technology at this stage, propping up the Dinosaur, we risk spending vast sums only to end up with a lot of worthless 'stranded assets'.

As a group we understand that these changes cannot happen overnight. Security of supply demands that nothing be done to destabilize the existing system therefore fossil fuel will have a central role in power generation for some time to come. But once the decision to embrace this new technology is made then, beginning at a local level, we can slowly shift the emphasis away from the unsustainable path we are on at the moment.

The Kerry Sustainable Energy Cooperative hopes to facilitate member's quest for greater energy independence and resilience. When it comes to electricity production, we hope to encourage the maximum number of individuals to generate their own electricity using the technology most appropriate to their circumstances. Members will benefit from independent expert advice on how best to proceed with their power generation ambitions and better pricing resulting from bulk purchasing power.

Join Us Now!