



Energy Planning Scenario Ireland 2040

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Disclaimers

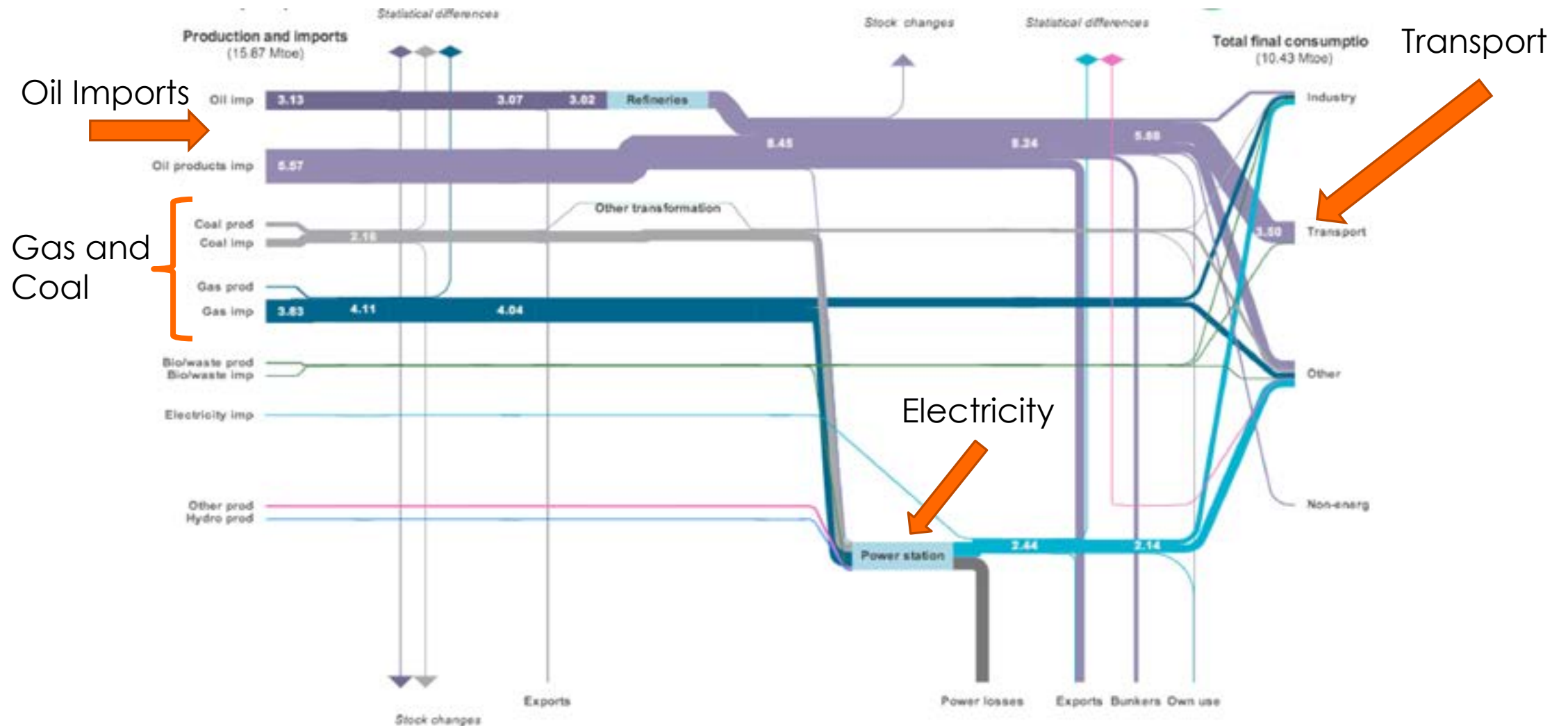
- This presentation is prepared from publicly available data in the internet, mostly IEA and ERIGRID.
- A better analysis can be made with a mathematical optimization model considering LCOE, primary fuel constraints and different objective functions.
- A convergence between the transportation and the electric sector is not considered, given that there is no evidence it will happen or is considered.

Presentation outline

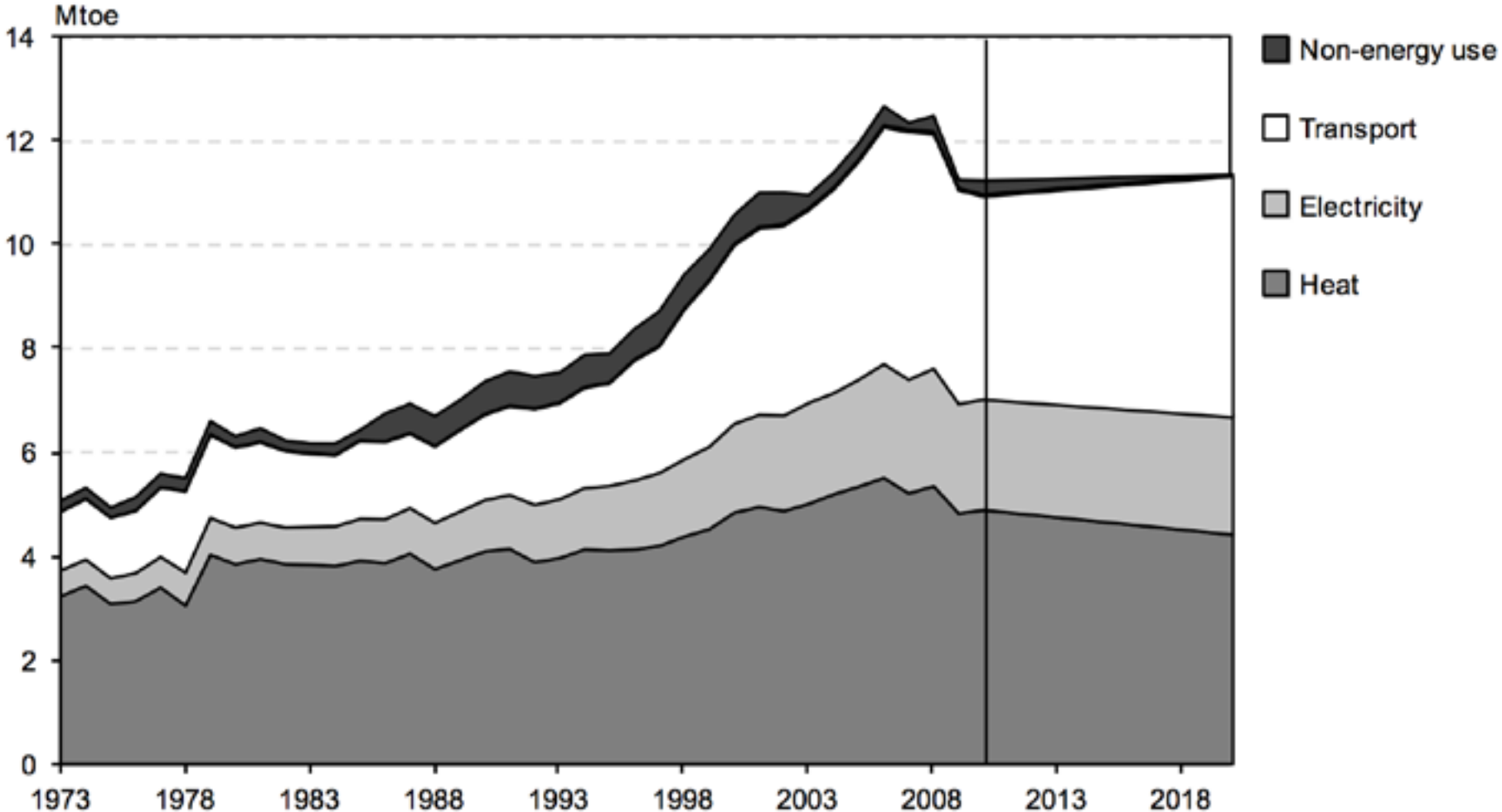
- Current status of the energy sector.
- Electricity sector analysis.
- What will be the energy mix of this region and how “integrated” will the energy system be in 2030 & 2050.
- Non-conventional approaches
- Conclusive remarks

Current status of the energy sector.

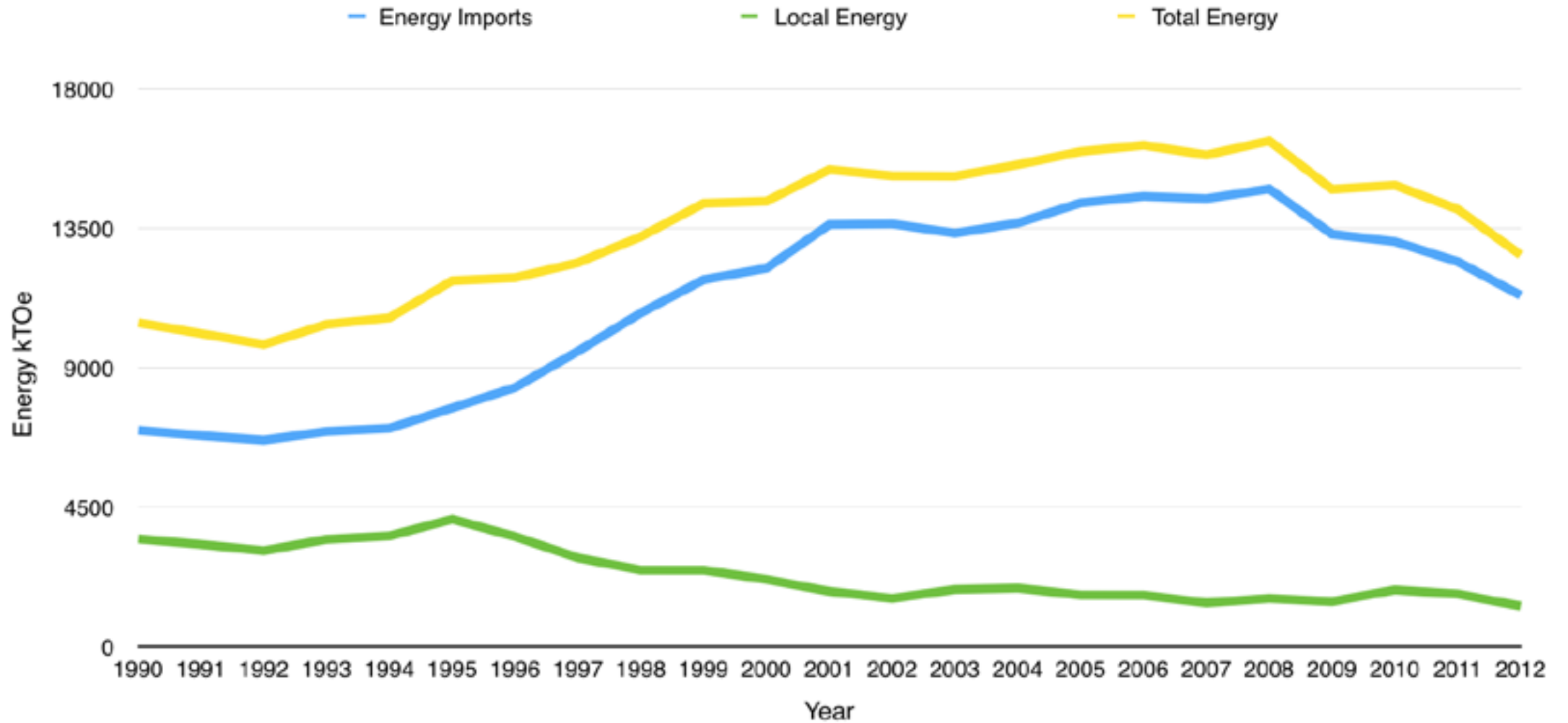
Energy Balance – 2011



IEA predictions of energy use



Primary energy sources



Electricity sector analysis

Current Energy Situation Remarks

- Post-crisis economic growth is slow and it is likely to be almost static over time.
- The transportation sector and the electricity sector are decoupled since they do not share primary energy sources.
- Both sectors face a problem from the energy independence point of view given that most of the fuel is imported (i.e. gas, coal and oil).
- Hydro Power has been stalled over time with no more addition over the years.
- Ireland's current policy is to aim towards wind.

Policy Goals - Supply

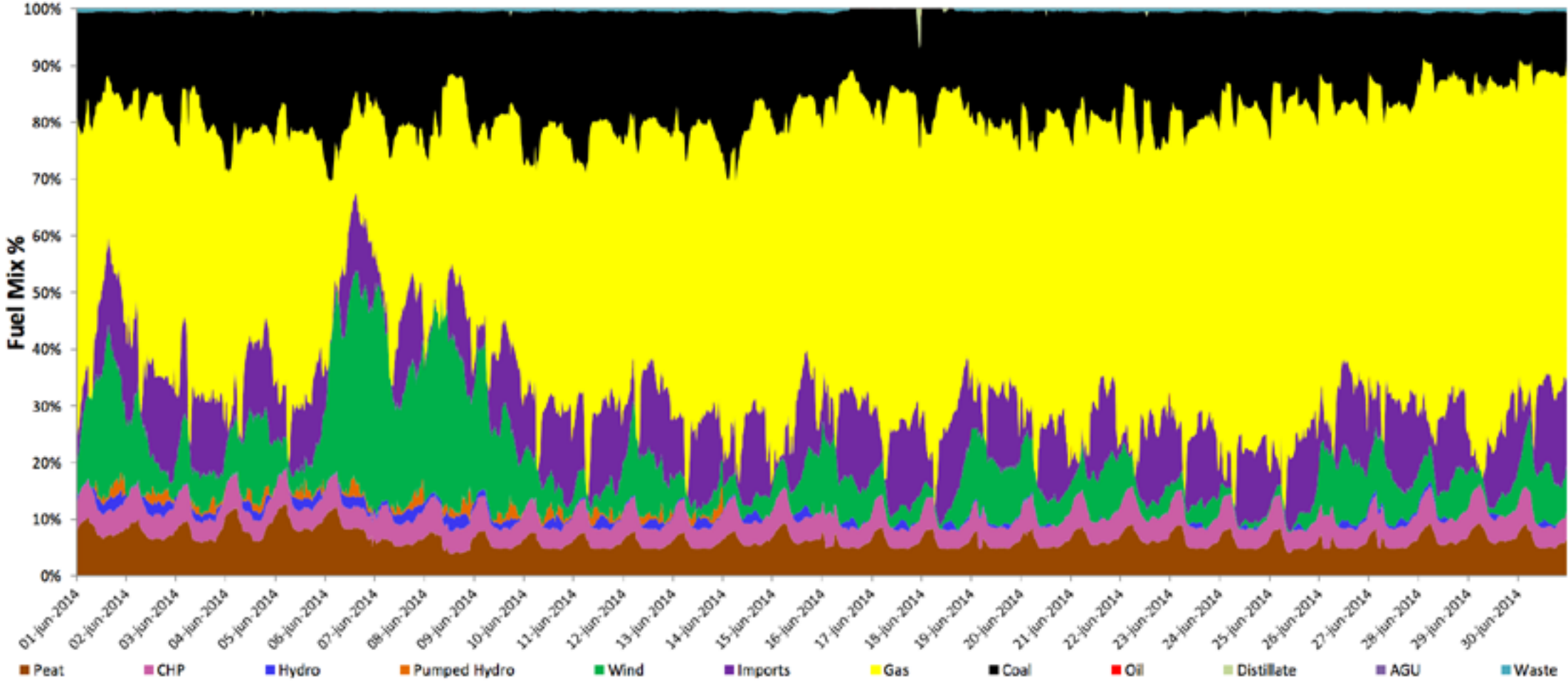
National Climate Change Strategy

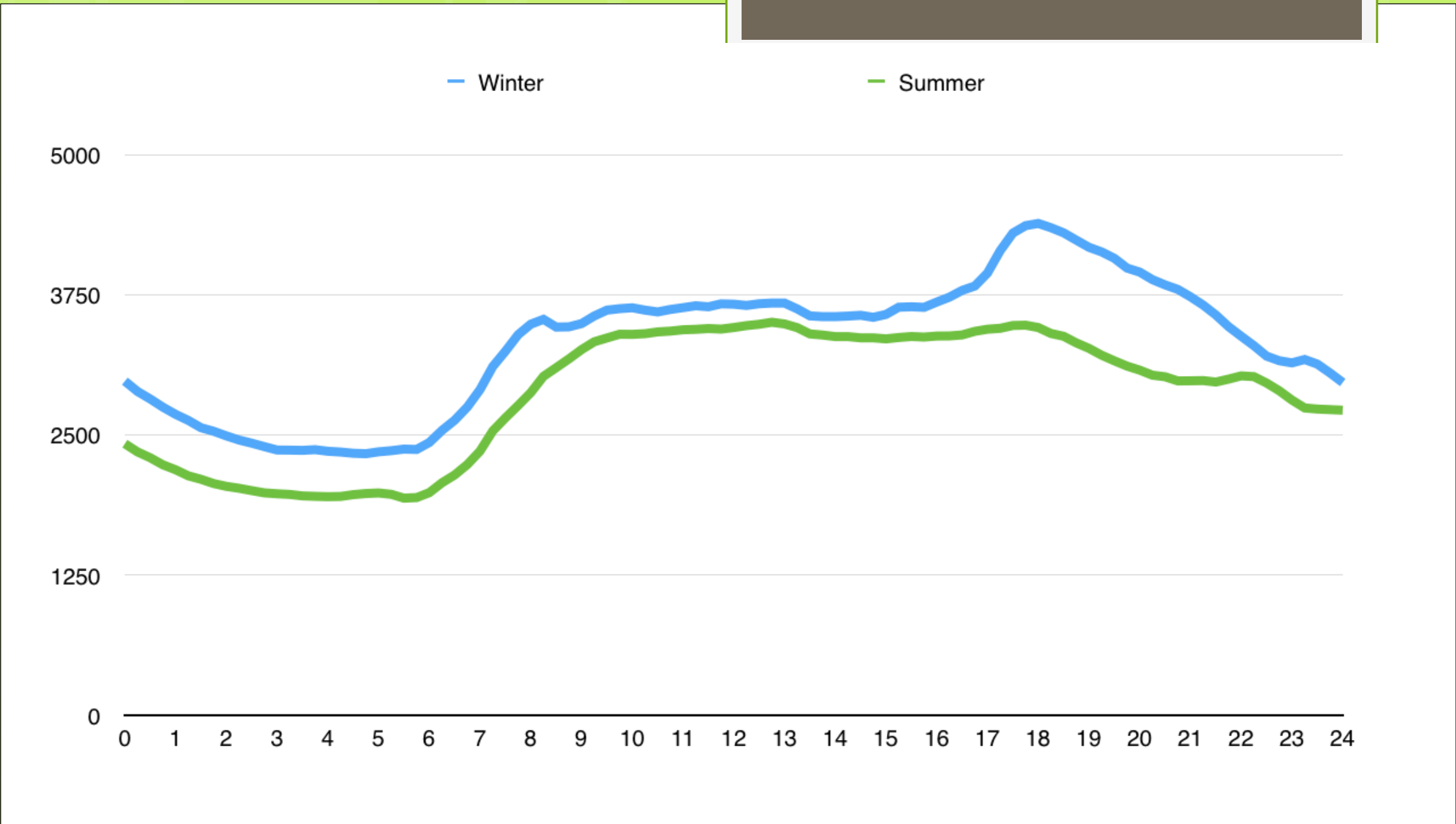
- 15% of electricity to be generated from renewable sources by 2010 and 33% by 2020
- **Biomass to contribute up to 30% of energy input at peat stations by 2015**
- Support for Combined Heat and Power projects
- National Ocean Energy Strategy

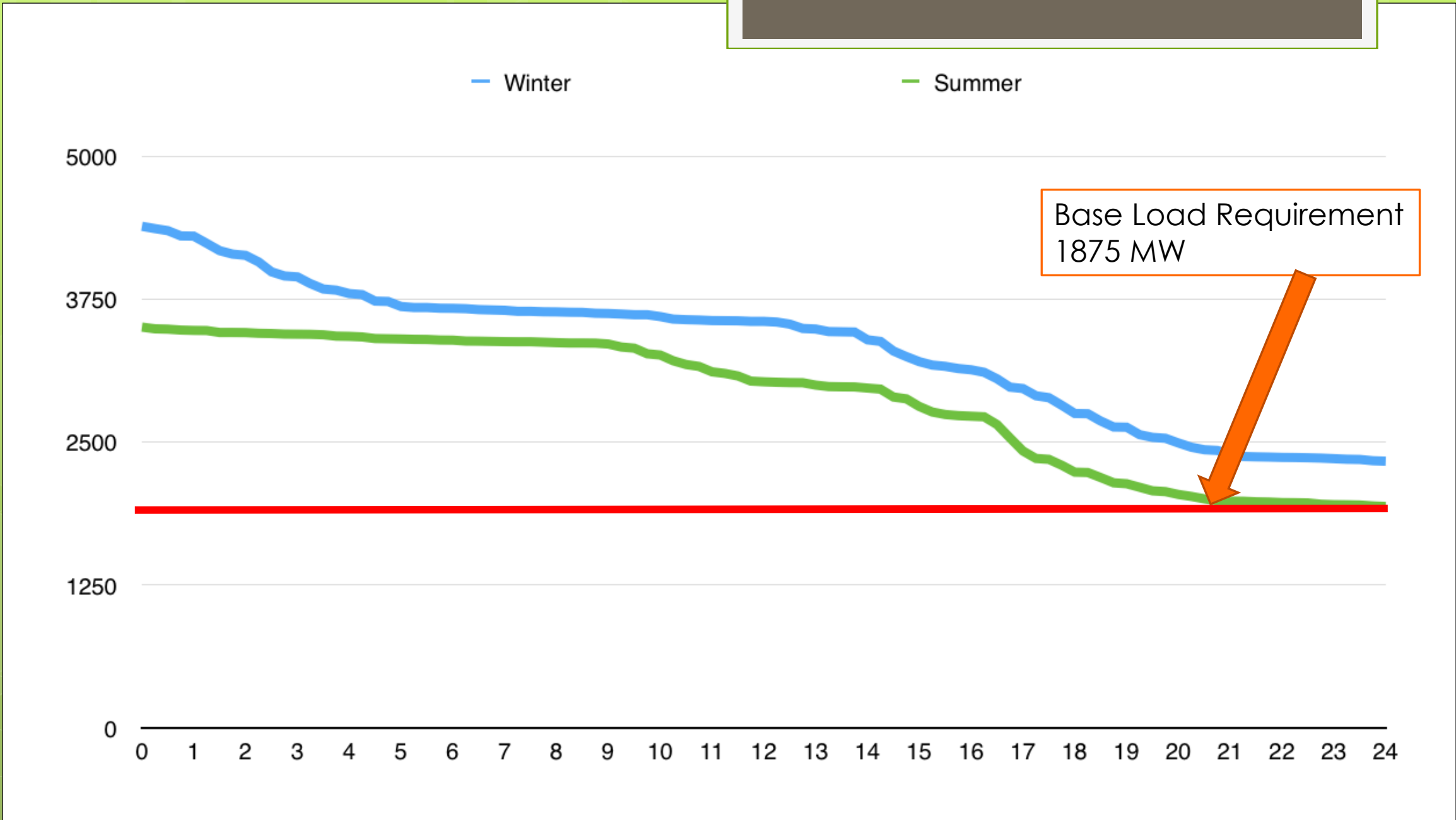
Policy Goals – Demand Side

- Residential - Revised Building Regulations in 2008 to aim for 40% improvement on current thermal performance standards
- Public Sector
 - Energy Efficiency Programmed with target of 33% energy savings across public sector by 2020
 - All public sector fleets to be required to move to biofuel blend
 - Biomass heating in schools

Current Fuel Mix.







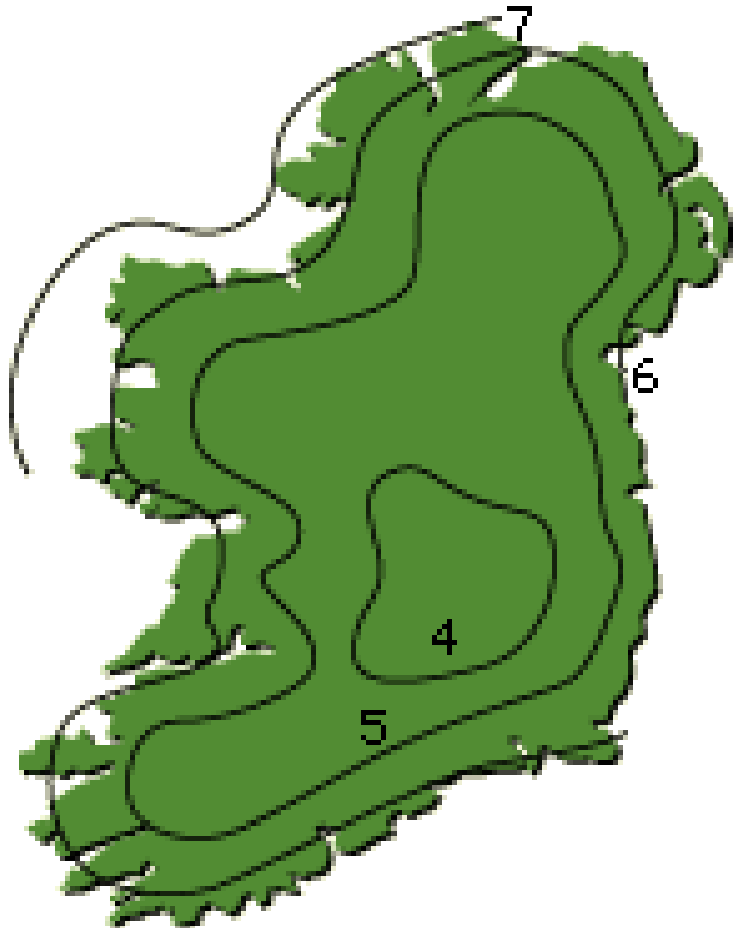
Base Load Requirement
1875 MW



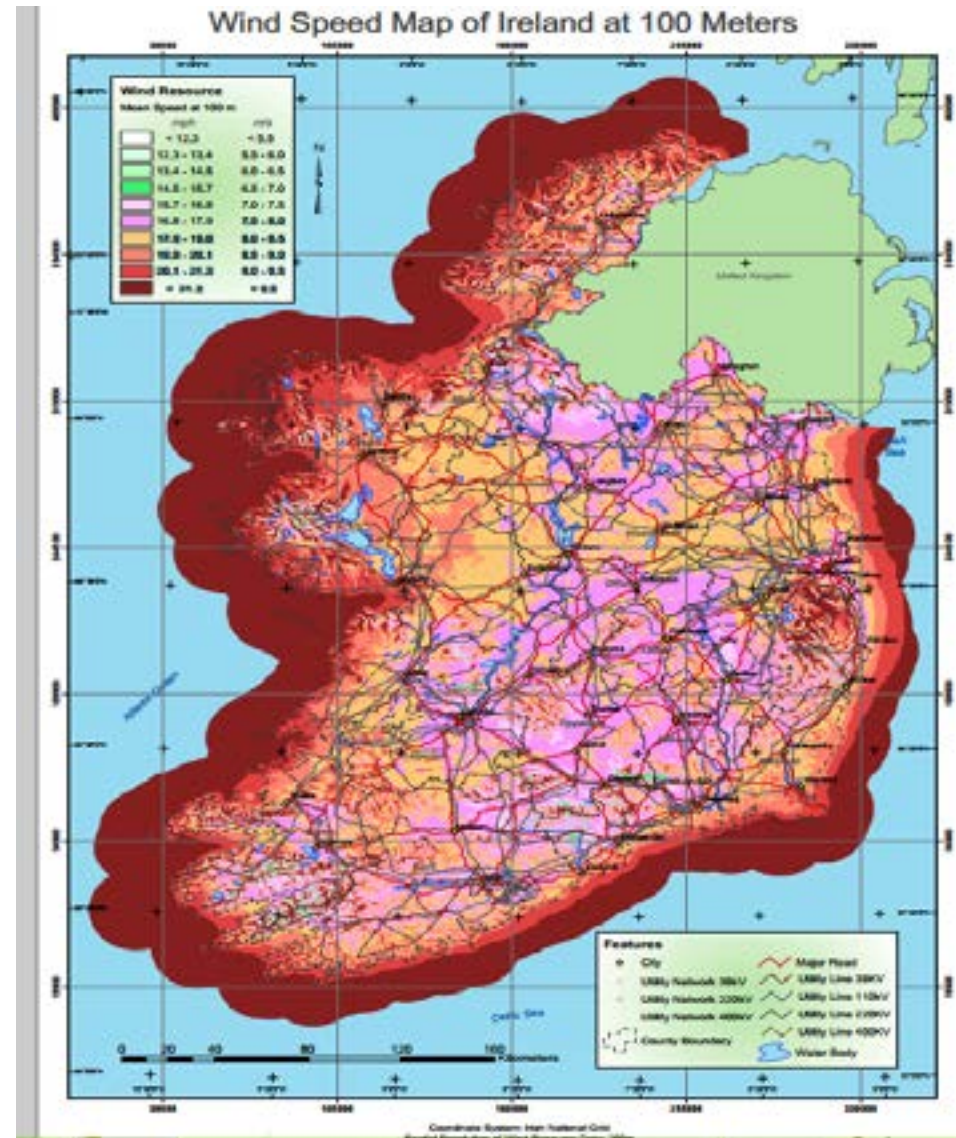


What will be the energy mix of this region and how “integrated” will the energy system be in 2030 & 2050.

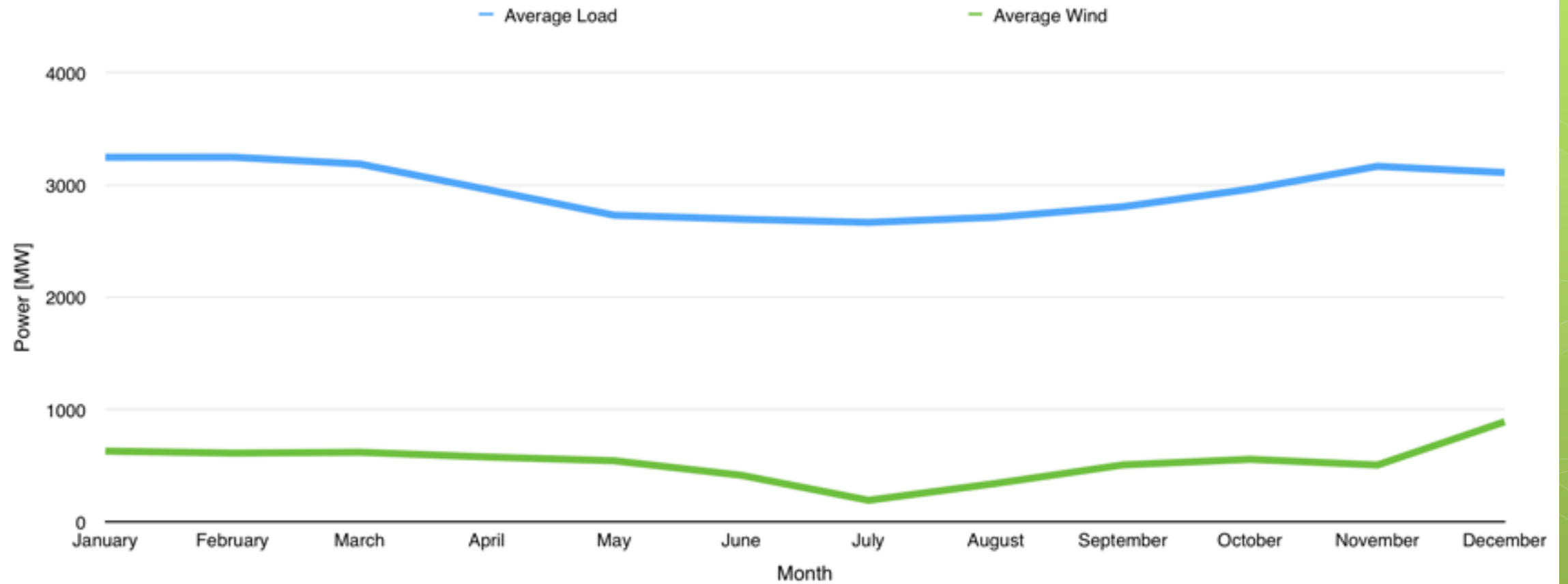
Wind Resource

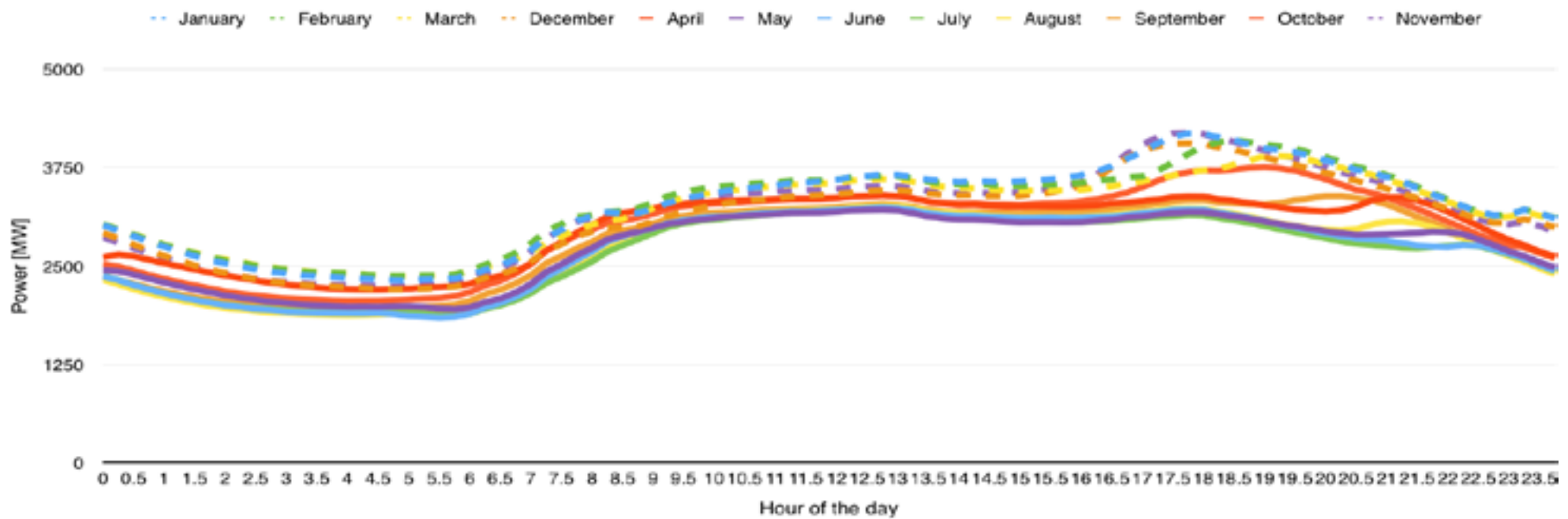
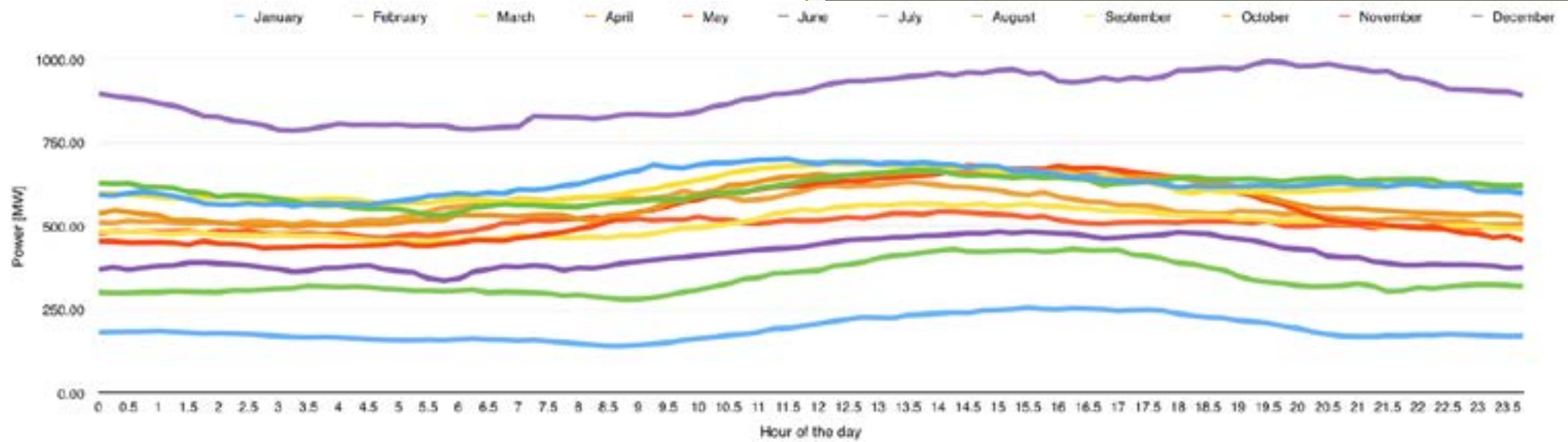


Mean annual wind speed
(units in m/s)



Wind Correlation





Wind Potential

- From the data, makes sense to push forward for more wind given the seasonal and daily correlation.
- Policies in this line will allow Ireland to achieve higher energy independence, which at this times is a weakness of the system.
- The increase in wind power installation is also related to a big increase in gas powered units.

Natural gas generation.

- Given the increase in the wind power penetration, Ireland has rapidly expanded its gas fleet to provide flexibility to the system.
- There is an attempt to substitute some coal in the base load with CCGT.
- There is a strong nexus between the wind generation and gas prices, which will be inversely correlated with the seasonal wind profiles.
- Since virtually all gas is imported, Ireland is vulnerable to gas price fluctuations, hence, vulnerable to electricity price variations.

Coal generation.

- Total Coal is ~1200 MW.
- Money Point Coal plant is close to end of life, the question is what should substitute it, since it is the largest generation plant 915 MW.
- The substitution of Money Point will set the type of energy future for Ireland, given that three options are available.
- **Some reports claim, this coal facility will be transformed into biomass.**



Base load substitution alternatives

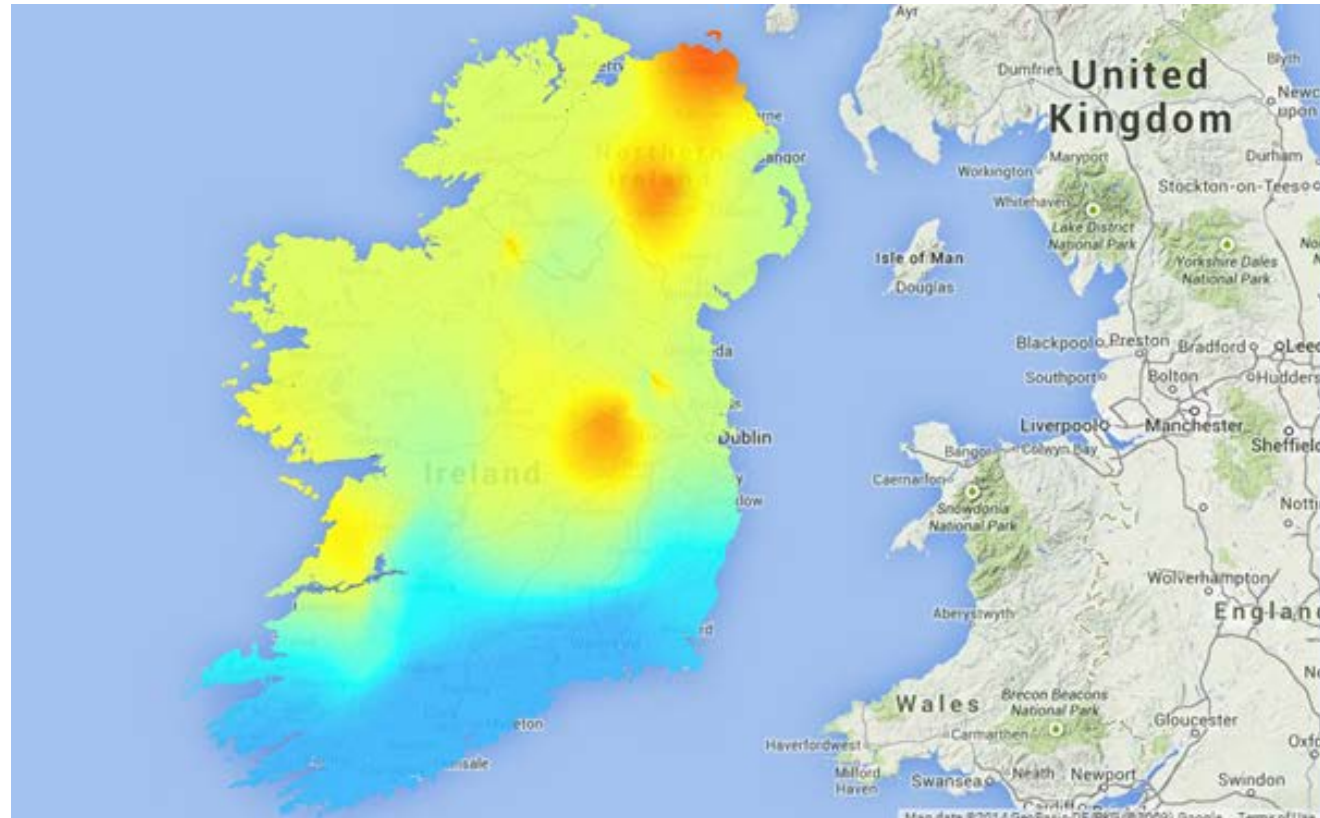
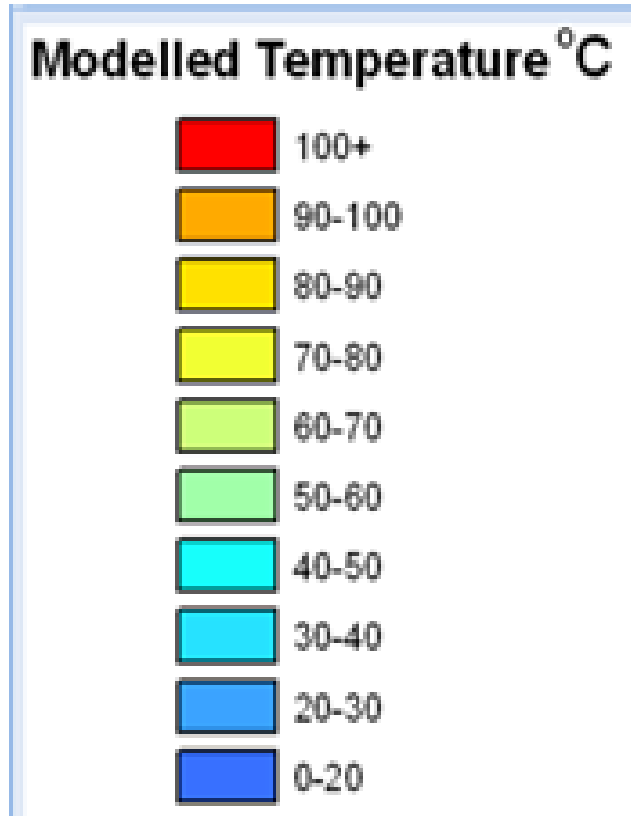
1. **Replace coal with coal:** The system will keep current diversity, but it will be “dirty” power.
2. **Replace coal with gas:** The system will be marginally cleaner, but it will lose diversity.
3. **Replace coal with nuclear:** The system will be a lot cleaner, but nuclear costs and regulation are prohibitive.

Non-conventional approaches

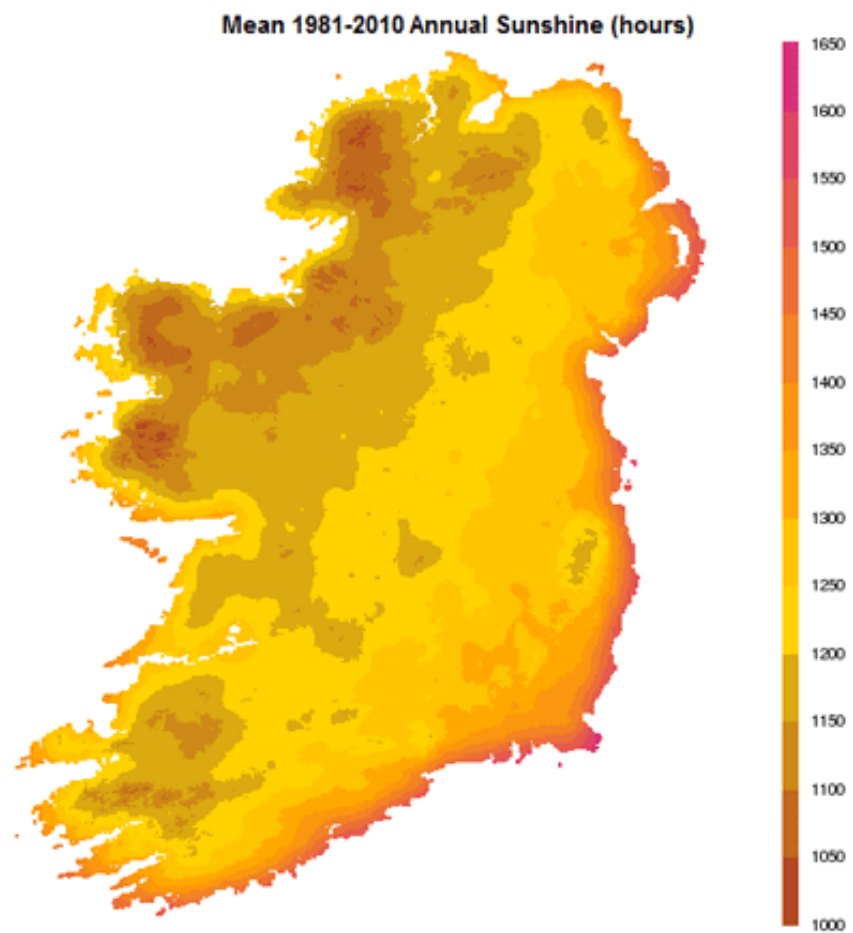
The following are energy sources currently not explored by Ireland's official energy policies.

There is not available data about the feasibility of taking advantage of this sources.

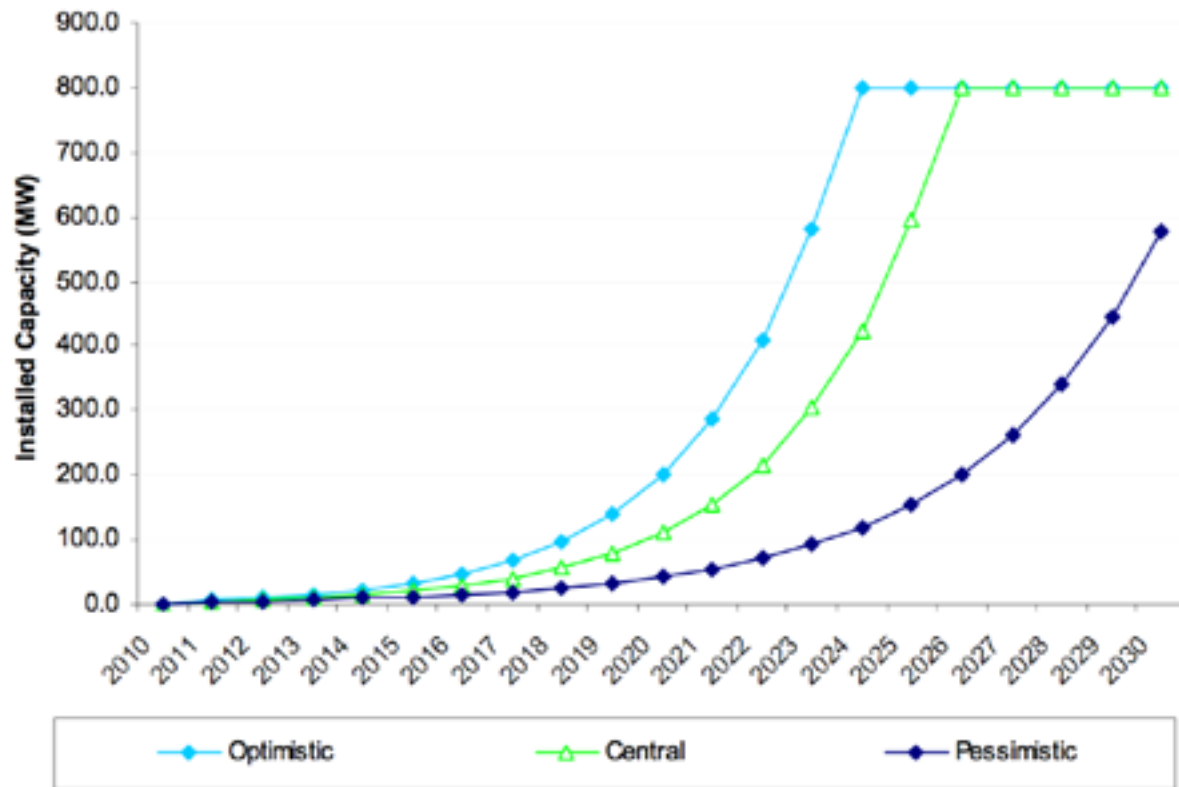
Geothermal Temperatures at 2,500 m



Solar Resource - 5 to 6.5 hrs/day



Tidal Power.



Conclusions

- The main challenges for Ireland energy sector is to achieve more independence from imported sources.
- In fact, given that the imported sources are mainly “dirty” sources, more local production will also mean a reduction on the emission levels from the energy sector.
- The development of gas and wind show an increased coupling in the policy.
- New alternatives have to be explored in order to solve the base load challenges.
- The final mix is likely to follow the current trend of gas+wind+coal