The Electric Power System

- Ireland -

Basic facts

❑ Area:	70,273 km^2
❑ Population:	4.7 million
❑ Number of electricity consumers:	2.5 million
❑ Number of TSOs:	1 - EirGrid
❑ Number of DSOs:	1 - ESB
❑ Peak load:	5090 MW
❑ Average interruption of electricity:	0.918 System Minutes

Global map of the grid and of its interconnections

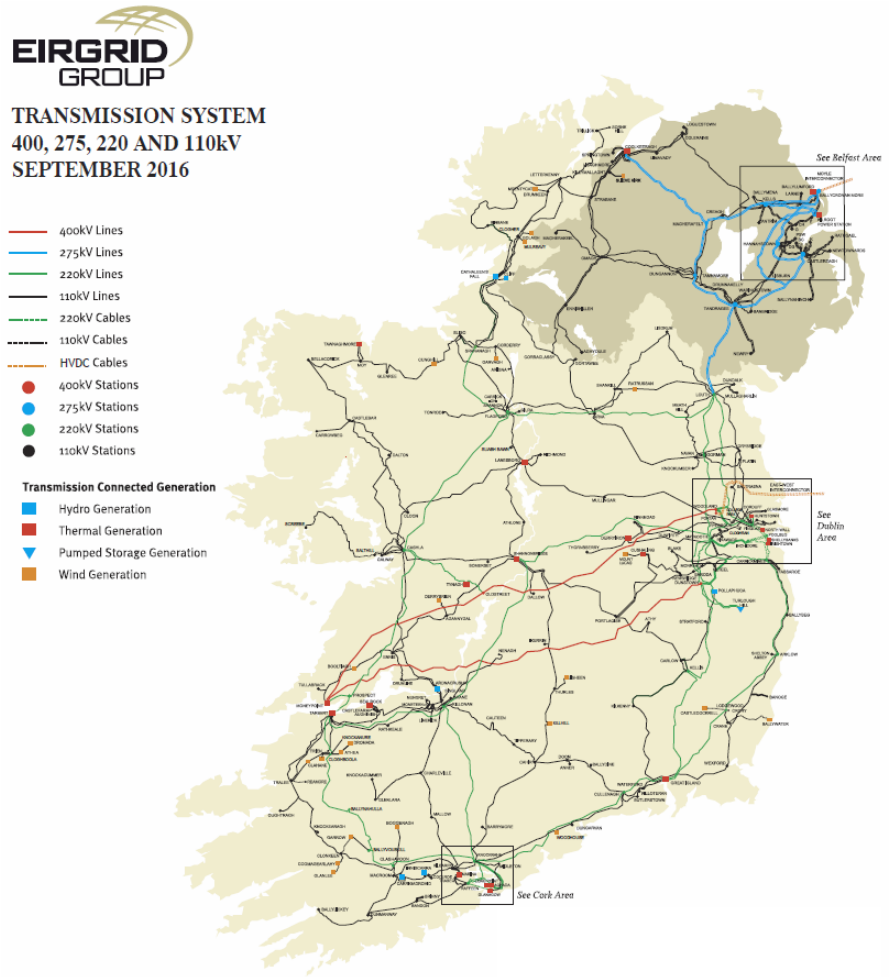
East West Interconnector connects Ireland to Wales

- Rated +/- 500MW
- Technology HVDC VSC

Ireland and Northern Ireland are connected by a double circuit AC 275kV line and two standby 110kV lines

Moyle HVDC Interconnector is part of the Northern Irish Power System

Map of the high voltage grid



Grid facts and characteristics

- Irelands electricity grid consists of a transmission grid (High Voltage) and distribution grids (Medium & Low Voltage)

	Voltage Level	Length (approx.)	Responsibilty
Transmission grid	400 kV	450 km	EirGrid (TSO)
Transmission grid	220 kV	2,000 km	EirGrid
Transmission grid	110 kV	5,000 km	EirGrid & ESB Networks (DSO)
Medium Voltage	38 kV	6,700 km	ESB Networks (DSO)
Medium Voltage	20 kV	45,000 km	ESB Networks (DSO)
Medium Voltage	10 kV	47,500 km	ESB Networks (DSO)
Low Voltage	230 V & 400 V	240,000 km	ESB Networks (DSO)

Information on TSO(s)

- Name: EirGrid
- Network length (km) 7,450
- Served area (km²) 70,273
- Annual transmitted energy (TWh) 26
- website: http://www.eirgridgroup.com

Cooperation of TSO and DSOs

- In Ireland, the transmission network is planned and operated by EirGrid. The distribution network is planned and operated by ESB Networks. The TSO and DSO cooperate in operating the power system and have several interface agreements and operating protocols. The TSO dispatches generation units >5MW on the distribution system.
- The Grid Code and Distribution Code set the rules for all users of both systems

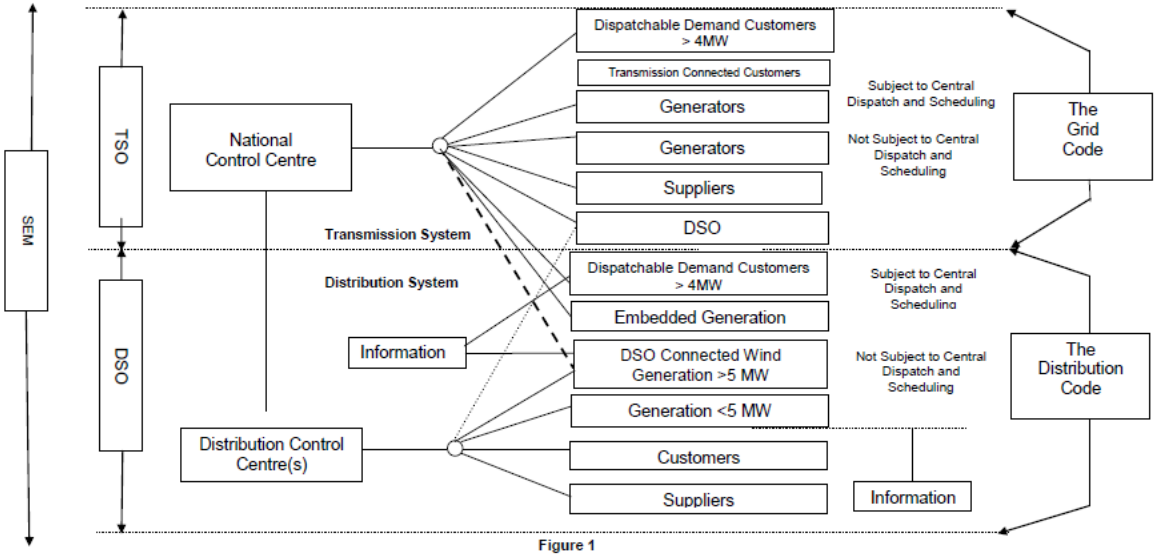
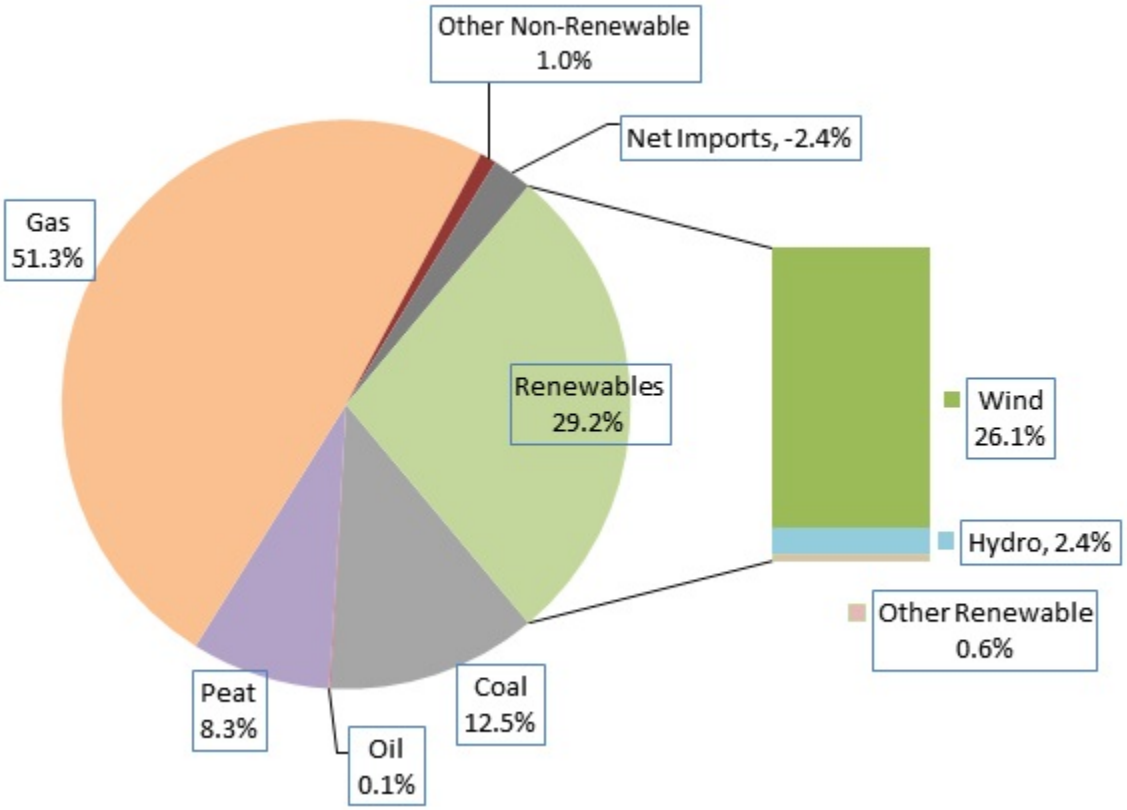


Figure 1

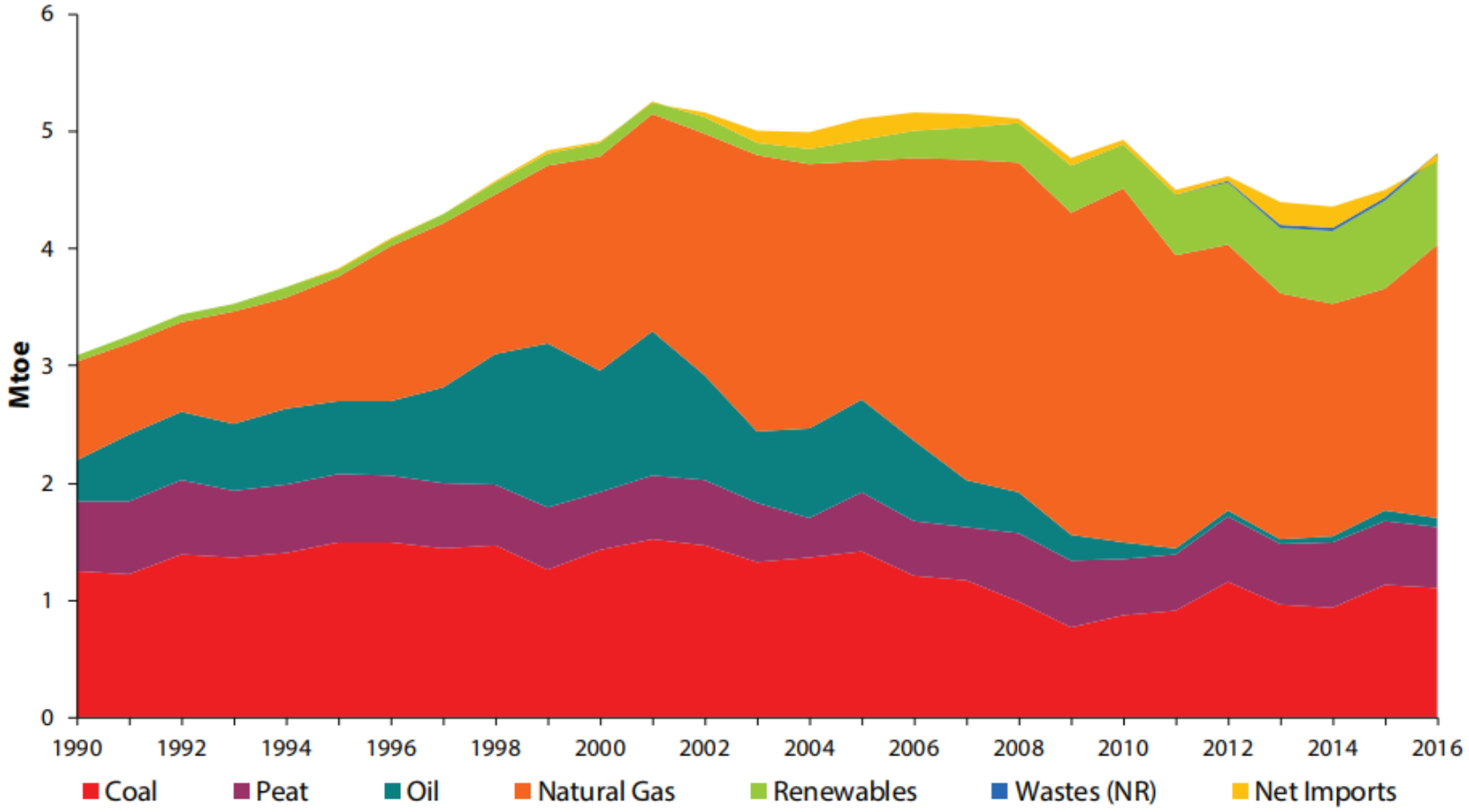
Responsibilities of TSO & DSOs

- The TSO operates the Transmission System. The transmission system transports the electricity, generated by Generating Units, to and from the Distribution System, through which most Customers will be supplied. Some Generating Plant is connected directly to the Distribution System. EirGrid holds the TSO Licence.
- The DSO is responsible for operating the distribution system in accordance with its DSO licence obligations. The Distribution System transports electricity to or from the Transmission System or from Generation Units to the final Customer. ESB Networks holds the DSO licence.
- Suppliers supply electricity to Customers. For this purpose, suppliers are entitled to use both the Transmission System and the Distribution System for the transport of electricity from Generating Units to Customers.
- Generators generate electricity which is fed onto the Transmission or Distribution Systems. Generating Units are classified according to their voltage, output power and whether or not they are subject to central dispatch by the TSO.
- The Commission for Regulation of Utilities (CRU) regulates the electricity industry.
- The Single Electricity Market (SEM) Committee regulates the all-island electricity market

Production Fuel Mix 2017



Ireland Fuel Mix 1990-2016



Electricity Wholesale Market

- Currently a Single Electricity Market (SEM)
  - Single Market for Ireland and Northern Ireland
  - Dual Currency
- Gross Mandatory Pool
- Ex-Post Pricing
- 3 Revenue Streams for Generating Units:
  - Energy Market
  - Ancillary Services
  - Capacity Market
- The All-Island Wind Energy record was broken on 14 March 2018 with 3,655 MW of wind on the system
- Demand Side Participation increasingly active
- Integrated Single Electricity Market (I-SEM)
  - Integrate the All-Island Electricity Market with European Electricity Markets, enabling the free flow of energy across borders
  - Go-Live date set for 1 October 2018