

ESI in Ireland and Europe

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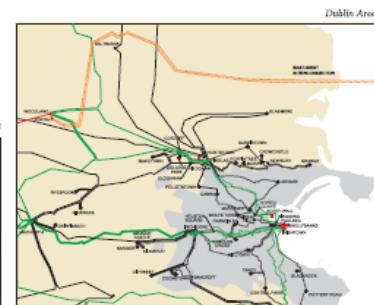
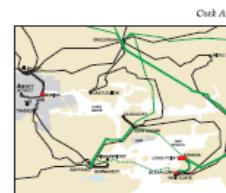
Ireland Power System



TRANSMISSION SYSTEM
400, 275, 220 AND 110kV
JANUARY 2014

- 400kV Lines
- 275kV Lines
- 220kV Lines
- 110kV Lines
- 220kV Cables
- 110kV Cables
- HVDC Cables
- 400kV Stations
- 275kV Stations
- 220kV Stations
- 110kV Stations

- Transmission Connected Generation
- Hydro Generation
 - Thermal Generation
 - ▼ Pumped Storage Generation
 - Wind Generation



Wind **2,500 MW**

Conventional **9,900 MW**

Interconnection **2x500 HVDC**

RES **36 TWh**

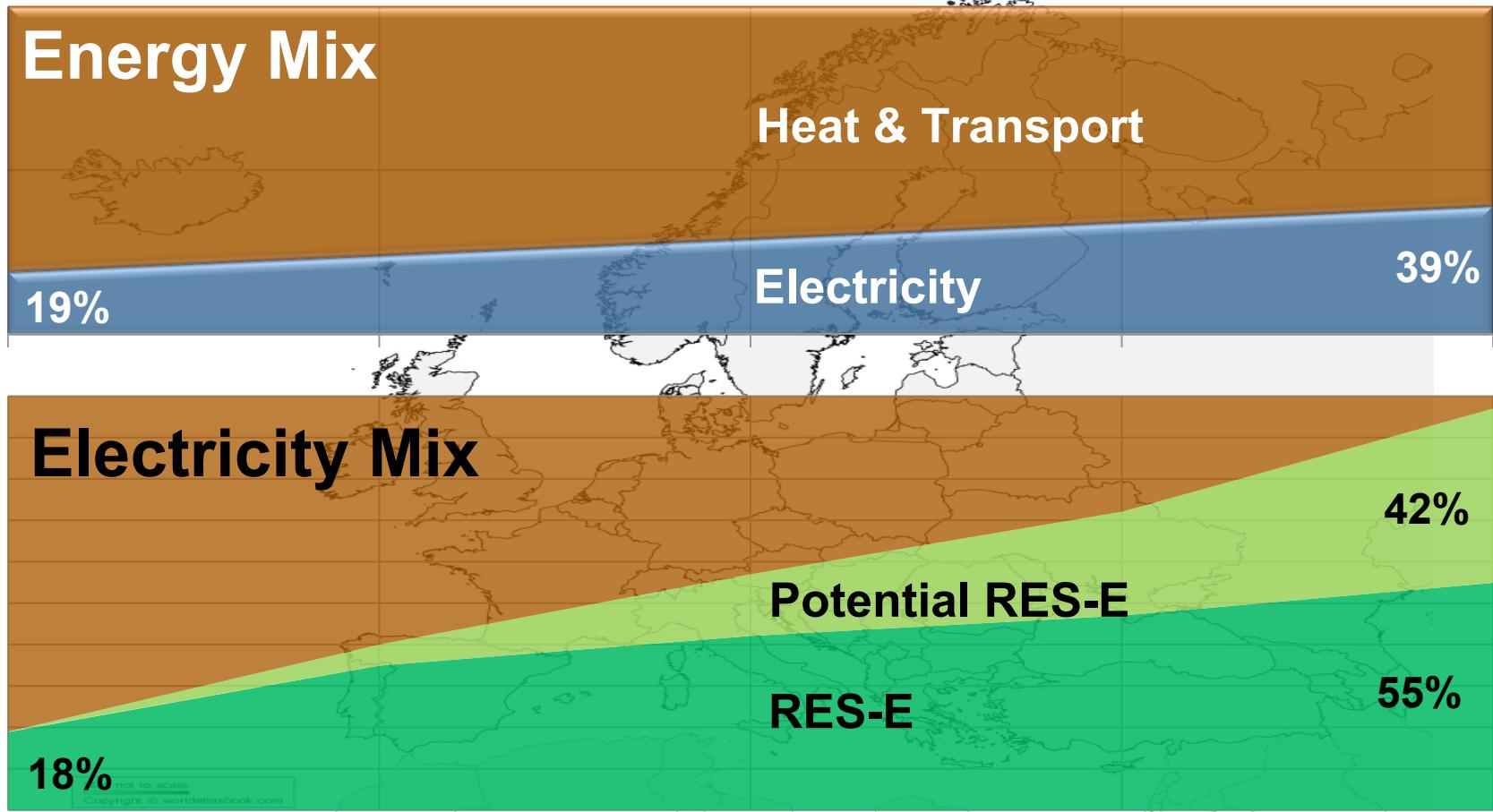
maxload **7,500 MW**

minload **3,000 MW**

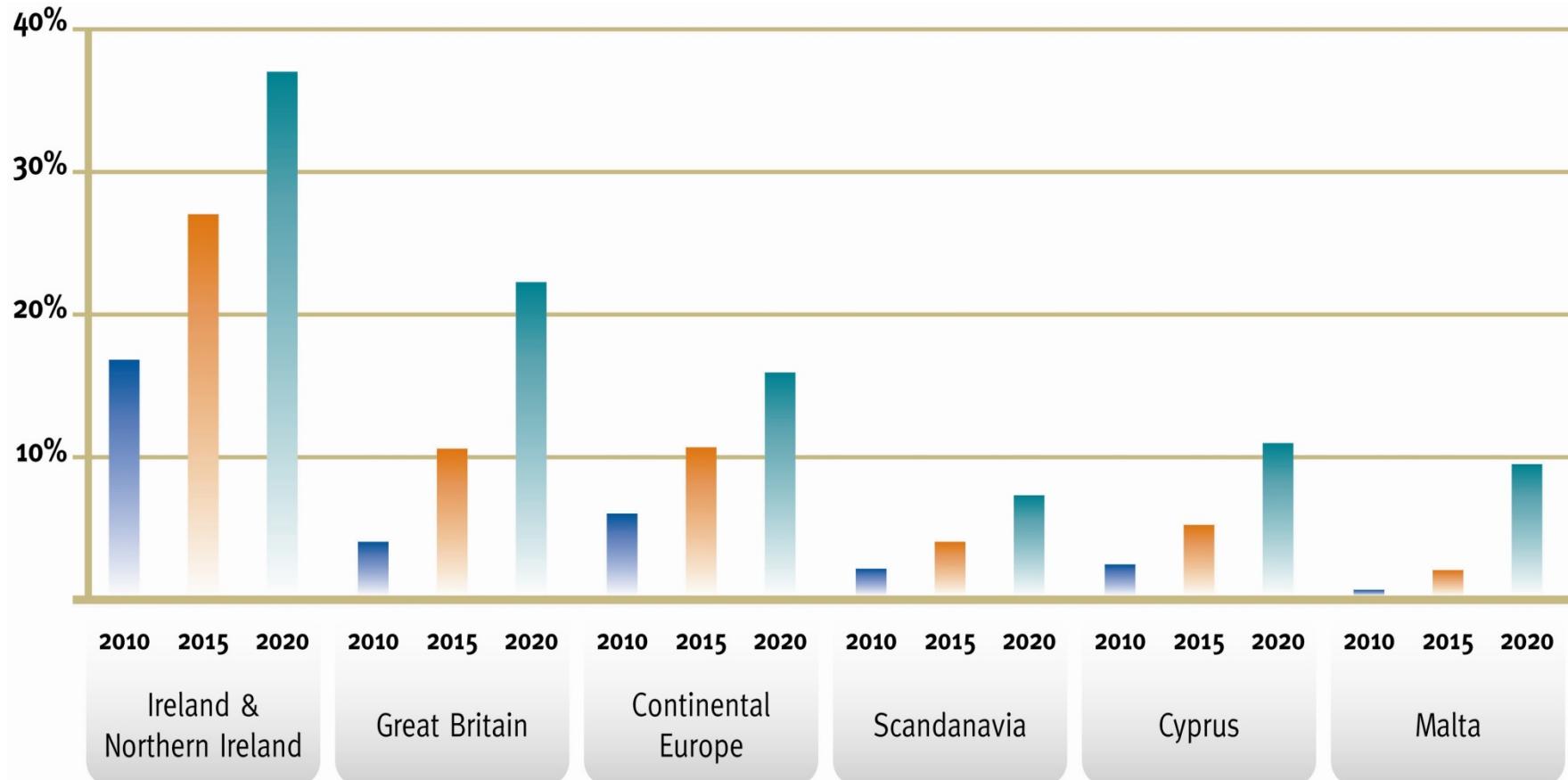
RES **18% RES**

European Energy Roadmap 2050

2010 2020 2030 2040 2050

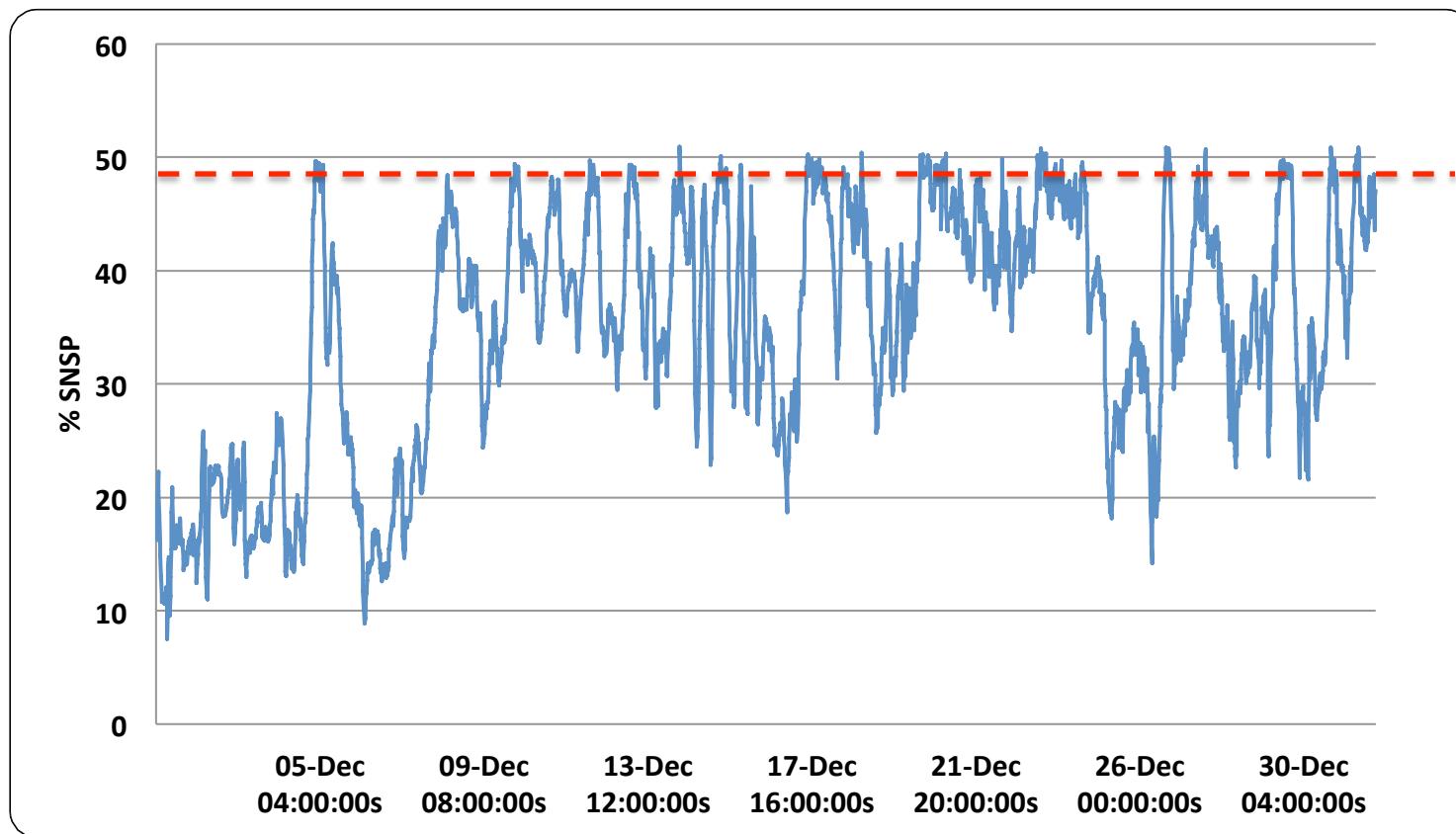


EirGrid is seeing the system impacts first...



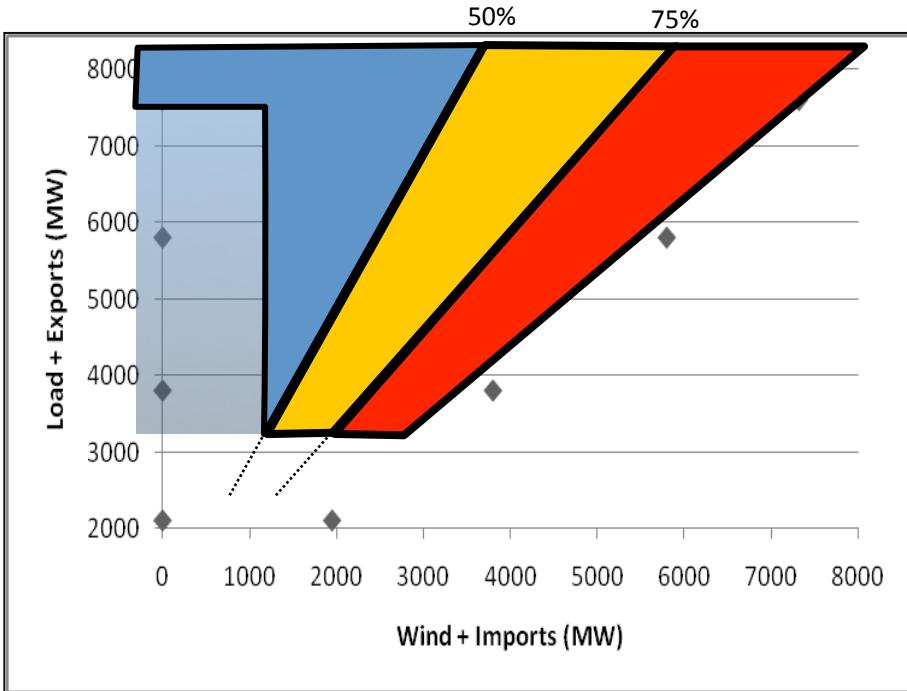
* Based on analysis of National Renewable Energy Action Plans (NREAPs) as submitted by Member States

...and is already managing high RES integration

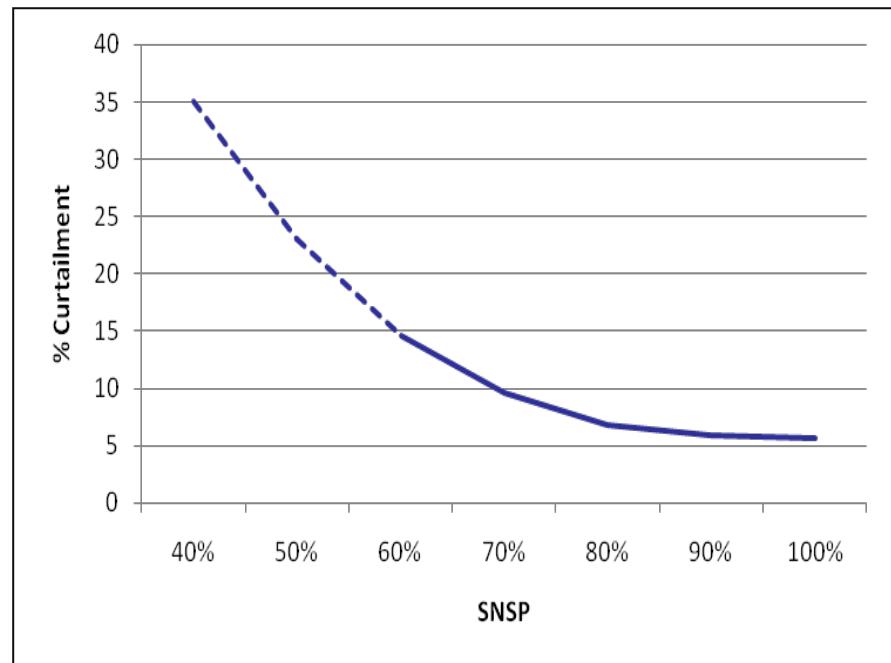


Month	Nov-2013	Dec-2013	Jan-2014	Feb-2014	Mar-2014	Apr-2014	May-2014	Jun-2014	Jul-2014	Aug-2014	Sep-2014	Oct-2014
Hours>45%	5%	24%	21%	27%	18%	10%	16%	3%	1%	7%	0%	23%

Real Time Operational Limits



Maximum Allowable Real Time Wind Level



Wind Curtailment Levels

We are solving the challenges ...

DS3

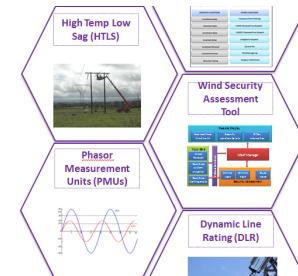


DS3 -

Smart Grid
Technology



Smart Grid Technology



Smart Grid
Innovation Hub



Smart Grid Innovation Hub



Demo
Projects



Demonstration Projects

Enernet

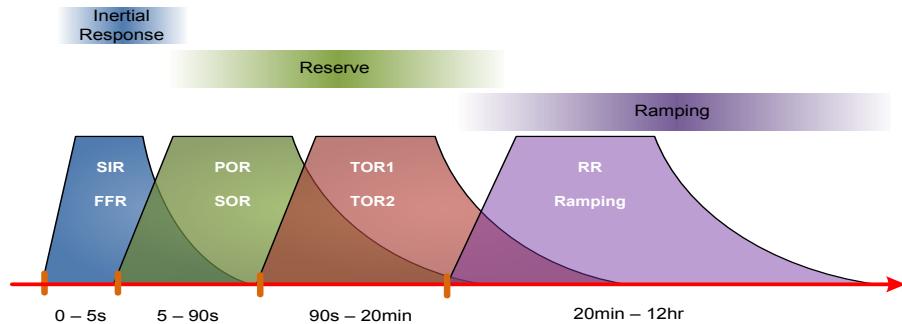
(Aggregating Storage
& response from
Home Heating)



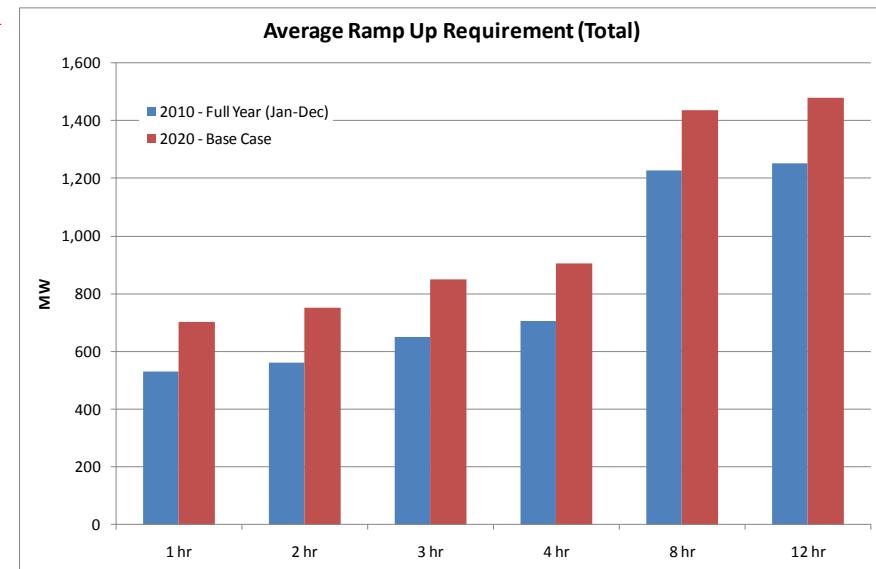
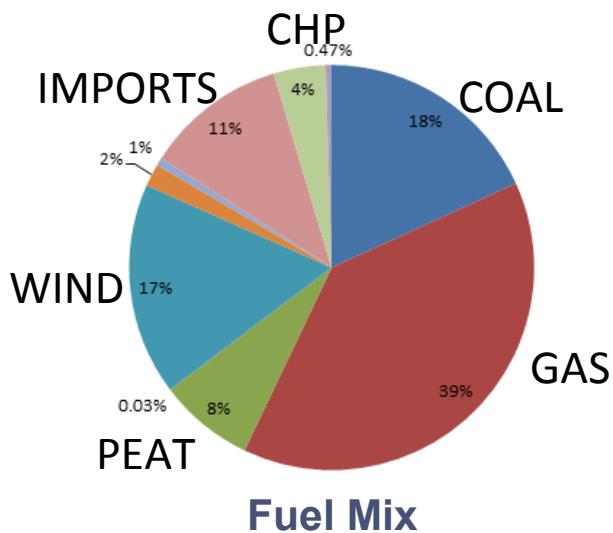
Superconducting
Fault Current
Limiter



DS3 Ramping



New System services products



Increased Ramping requirement

European Network of Transmission System Operators (ENTSO-E)



41 TSOs
from 34 countries



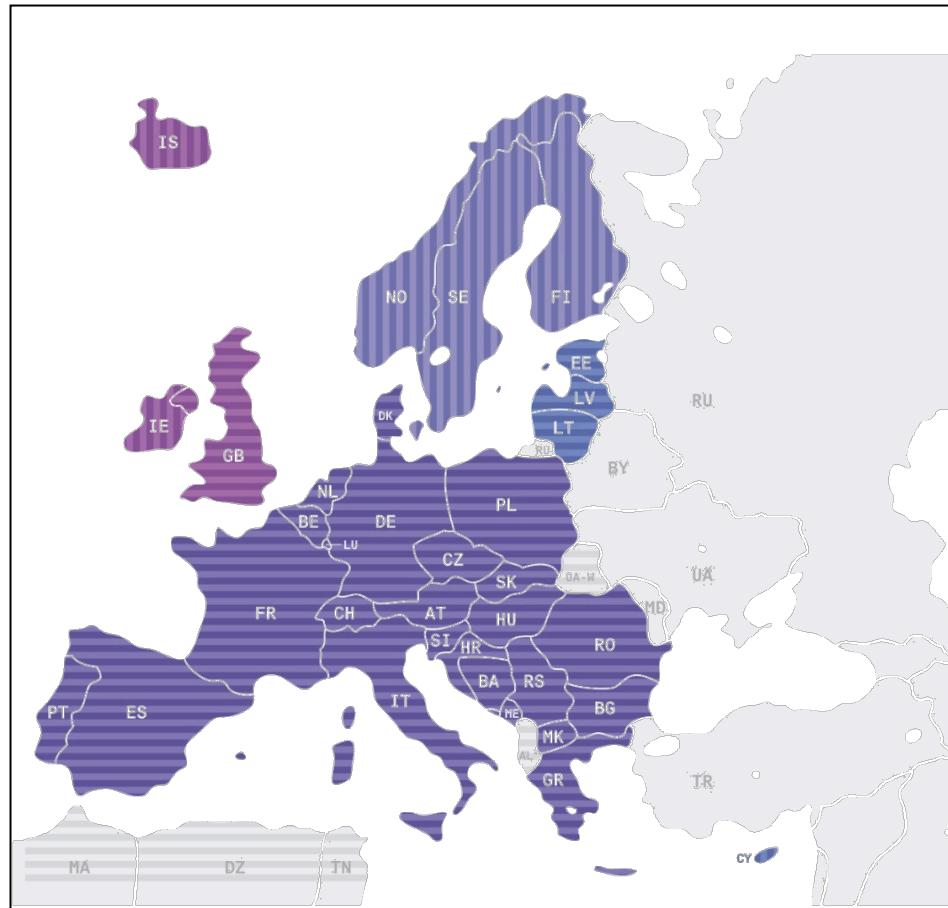
532 million
citizens served



828 GW
generation

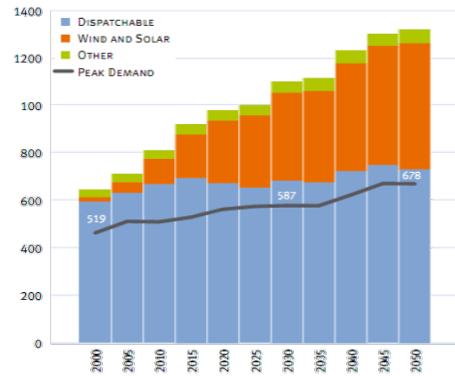


305 Thousand Km
of transmission lines

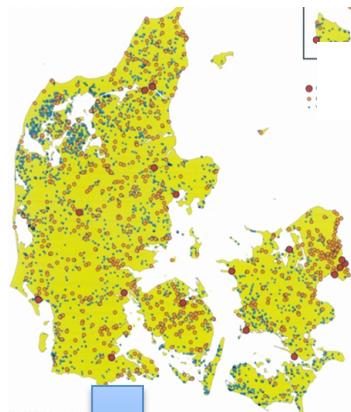


2020 - Europe's changing energy landscape...

Variable generation



Thousands of small units



Huge flows all over Europe



Ten Year Network Development Plan

R&D

Tools for Market Integration

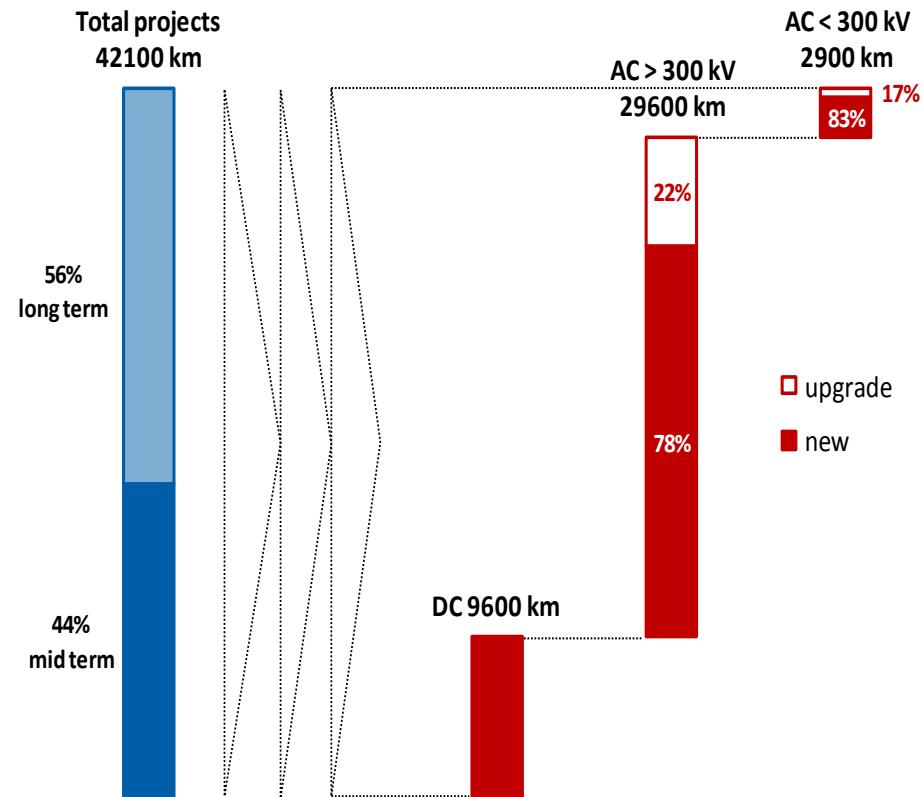
Network Codes

Adequacy Forecasts

Ten Year Network Development Plan (TYNDP)

A pan-European development plan for transmission investment projects that answer the three pillars of EU energy policy;

- Security of Supply
- Integration of RES
- Completion of the IEM



Research and innovation is critical

Research clusters harness expertise across industry and academia

Electricity Research Centre (ERC) & Sustainable Electrical Energy Systems (SEES) Cluster

Academic & Industry Partners



Research Strands



In conclusion

- Energy system in transition.
- Energy System Integration is both a consequence and a requirement of this transition.
- Europe has an outstanding opportunity to exploit synergies by working towards a shared energy vision.
- EirGrid is leading the way in RES integration.
- Research, innovation and collaboration are key.



Thank you



Additional slides



R&D Roadmap 2013-2022

“When you are face to face with a difficulty, you are up against a discovery.”

WILLIAM THOMSON, 1ST BARON KELVIN

R&D at the TSO-level plays a crucial role in Europe’s ability to meet its low carbon objectives

Key areas of focus:

- Integration of new network technologies;
- Pan-European standardisation of system modelling;
- Operations and data exchange;
- Exchange of knowledge.



Ten Year Network Development Plan (TYNDP)



- Identifies pan-European investment needs for electricity transmission systems.
- Published biennially (Dec 2014).
- Formal mandate to develop under Regulation (EC) 714/2009 & 347/2013.
- Sole instrument for selecting EU Projects of Common Interest (PCIs).