Delivering a Secure Sustainable System DS3: Facilitating the Island's Changing Fuel mix

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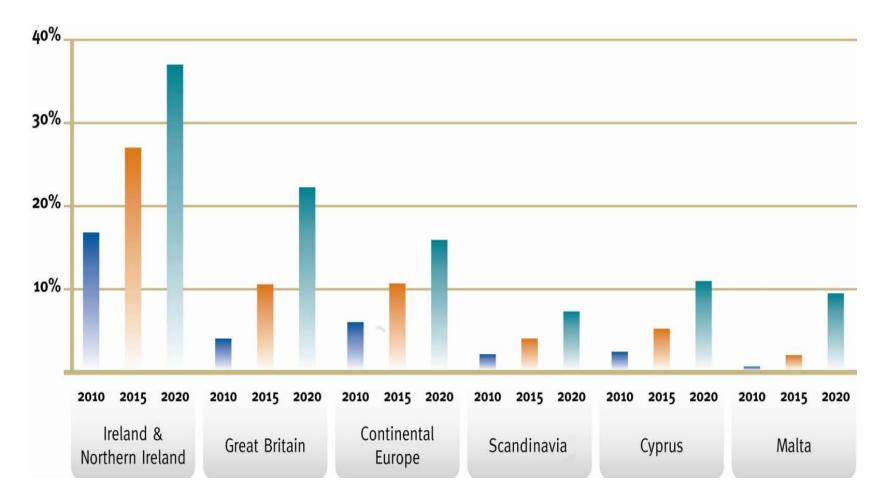
EirGrid Group

October 2013



European Targets

Ireland has ambitious targets for renewables, particularly wind





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

Challenges & Response

Challenges

- System Stability
- Resource Variability
- Complexity
- New connections
- Changed power flows

Responses



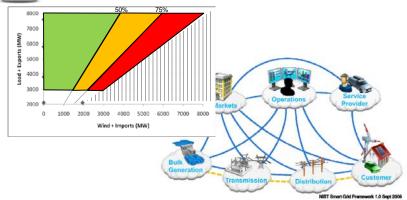
Infrastructure: EWIC & Grid25





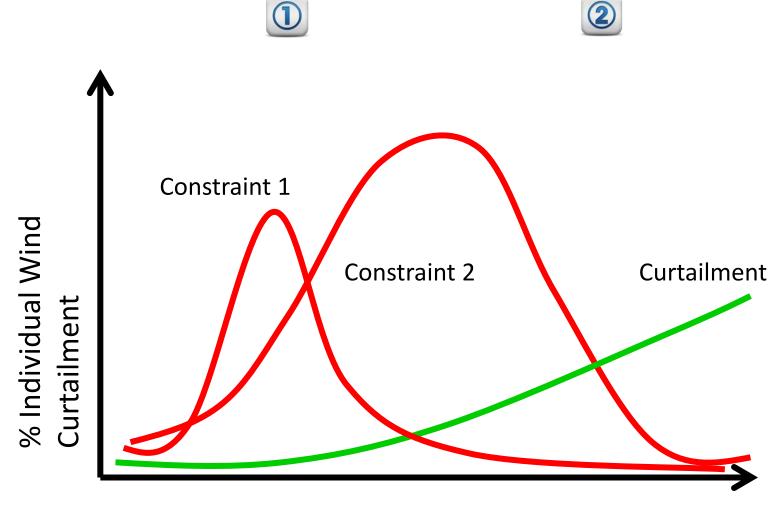


Operational: DS3 and Smart Grids





Constraints vs Curtailment

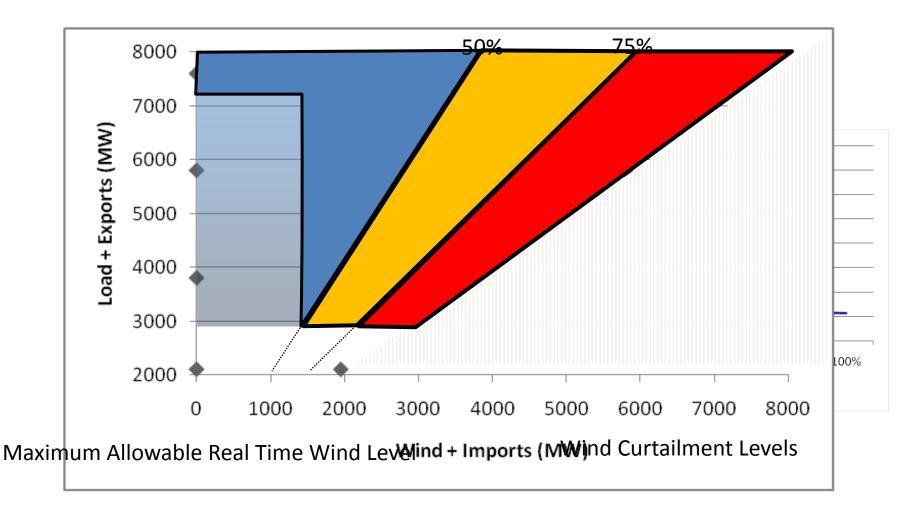


Installed Wind



Real Time Limit Operational Limits







Background – Operations and DS3







Detailed Technical Analysis

2008 - All Island Grid Study

2010 - Facilitation of Renewables

2011 - Ensuring a Secure

Sustainable System



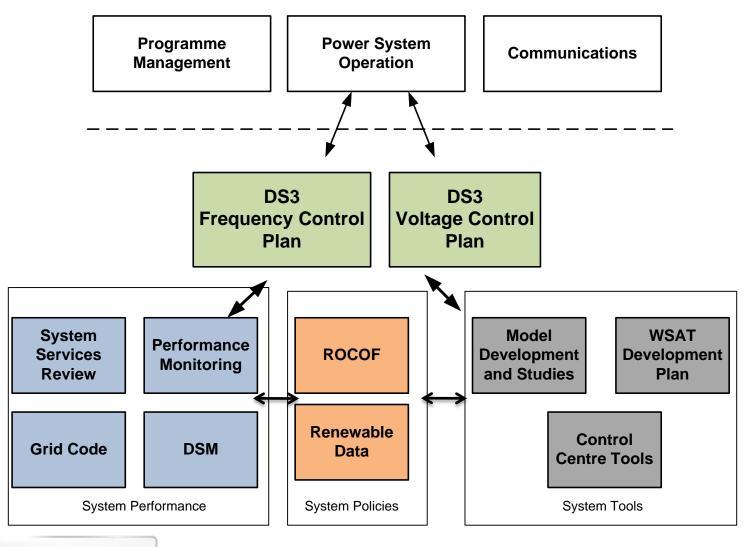
Delivering a Secure Sustainable System

- 2011 Programme established
- Meeting the RES Policy Objectives efficiently while maintaining system security
- Holistically considering technical, commercial and regulatory needs of the system
- Engaging with all industry stakeholders



DS3: Programme Overview











To achieve 75%.....



RoCoF cascade failure

- Loss of mains protection (G59)
- Generator capability

Ramping

- Increased Variability and Uncertainty over hours
- Require increased margin and performance to manage

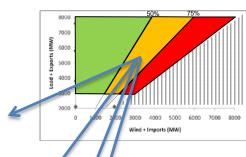
System Voltage Control (Reactive)

- 25% reduction in Tx online reactive power by 2020
- 50% of new windfarms in distribution including embedded generators

Maintaining System Transient Stability

- Increased electrical distance between remaining conventional gen
- Require improved dynamic reactive response from

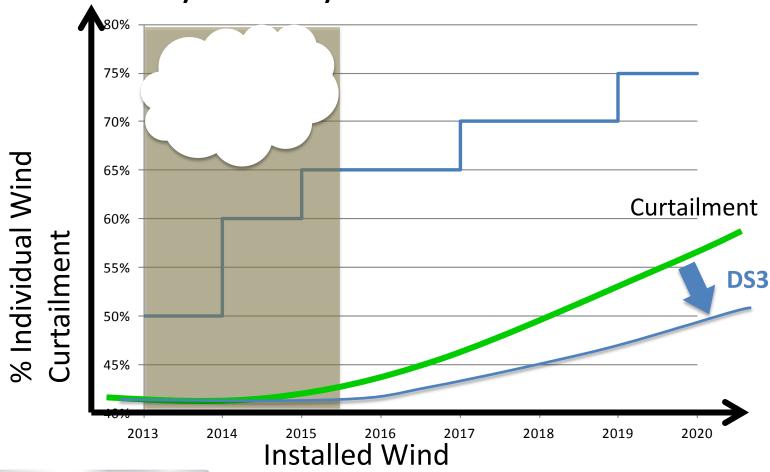




So what does it all mean?





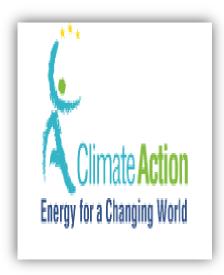








European Policy – The emerging challenge with high levels of RES......



Public consultation on the Renewable Energy Strategy

Introduction

The promotion of towership energy is a consustance in the LU clausts and energy integer and 1300 as dismosted by the 13000 targets for greateness gas reductions, energy efficiency and renerable energy sources contained in the Europe 2005 Statisty the great globe. This is because inserable are considered to provide warmen benefits they not any lobe. The is the causes interesting an excession of the property containing the energy supply and lower cost dependence on foreign suppliers, trebute exposure to resultantly of energy process of contribute to technology development, regional evolutions and the contribution of the energy suppliers and contribute to technology development, regional evolutions and the contribution of the contribution

The legislative framework is regards reservable energy is laid down in the Enerwhite Energy Director's 'the Director's which sets as obligatory togger of 20% mentals energy in grow reasons of the Control of the Contr

According to Member States projections, senseable energy will grow at a faster pace in the years up to 2000 them as the past, and the overall share of reseable energy in the EU will received the 2004 signs at 2000. Moreover, the abstractment of our overall energy and climate energy and the state of the

In Murch 2011, the Commission published a roadmap for a low curbon economy' and a manuport white paper," Furthermore the Commission with abority politics is roadmap on the analysis of the contraction of the Commission in the first half of 1017. This will complement a Commissionism on the latental Benery Market sheep planned for next year which will also bely inform the evolution of the EUV water energy politics following on from the Europy 2007 Rendamy.



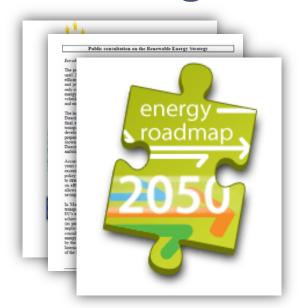
Renewables will be a significant increasing part of the future energy mix







European Policy – The emerging challenge with high levels of RES......





IEM necessary

Concerns:

Plethora of CRM

Poor uptake of DSM/Storage

Materiality of Support schemes

Internal Market is necessary but will not sol on the RES policy

Answer:

Reward flexibility

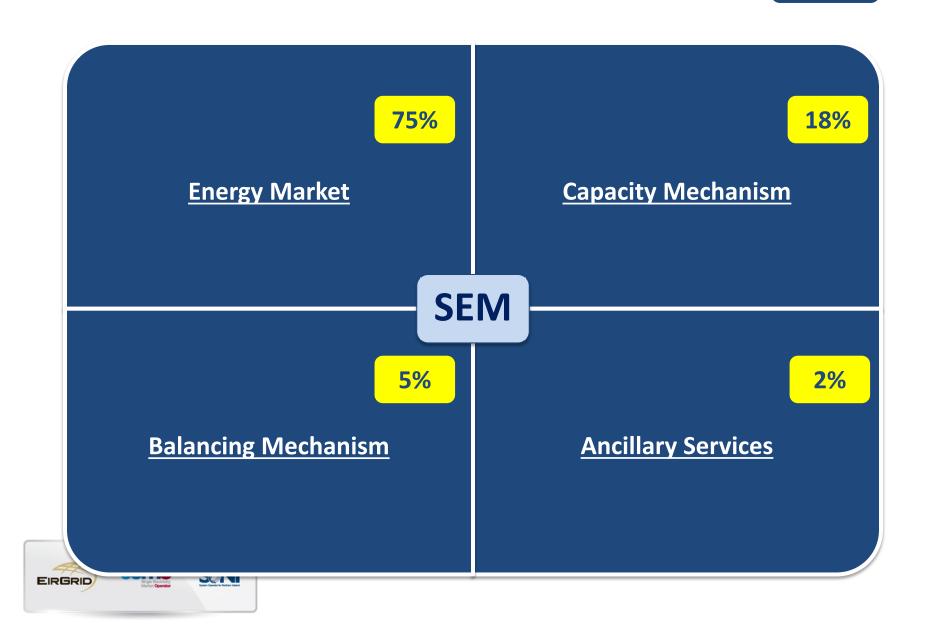




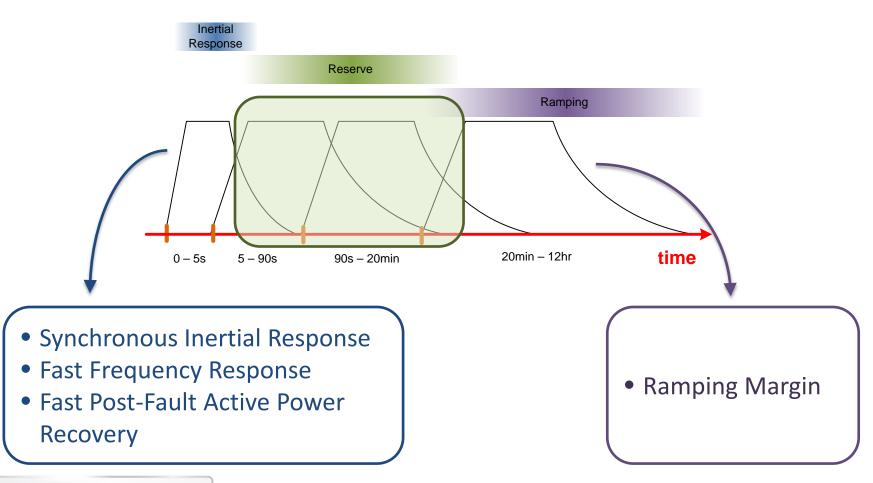


Market Overview: SEM

€3.0bn

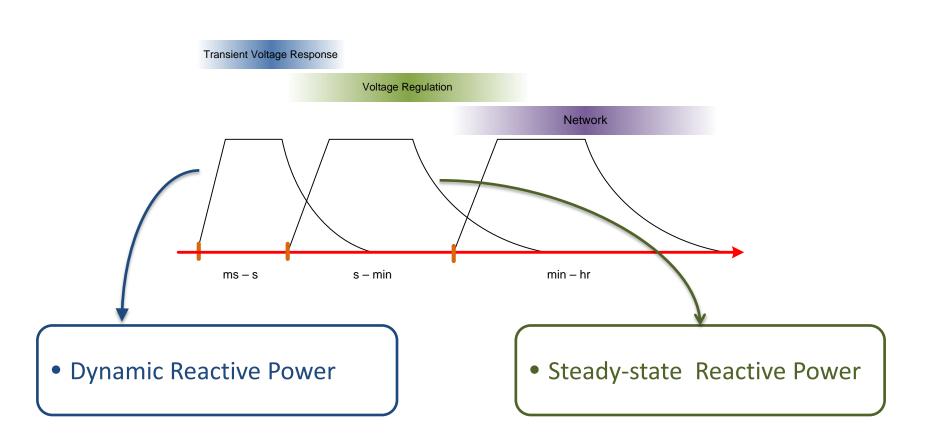


DS3 System Services Frequency Products





DS3 System Services Voltage Products

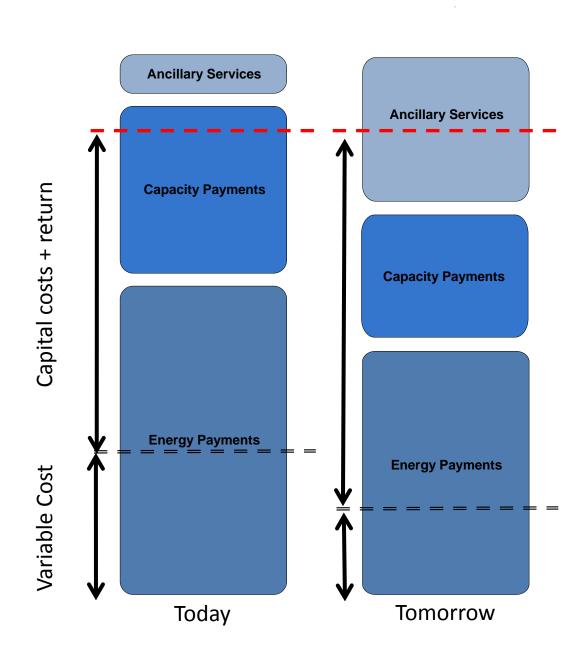




Incentivising the Portfolio: Market Signals

- Financial Mix will move to higher capital lower variable cost technologies
- Incentivise
 performance to obtain
 the plant mix that
 matches the system
 requirements and
 achieves the policy
 objectives





European Energy Roadmap 2050

2010 2020 2030 2040 2050 **Energy Mix Heat & Transport** 39% **Electricity** 19% 12 **Electricity Mix** 42% **Potential RES-E** 55% **RES-E** 18%





