

Delivering a Secure Sustainable System

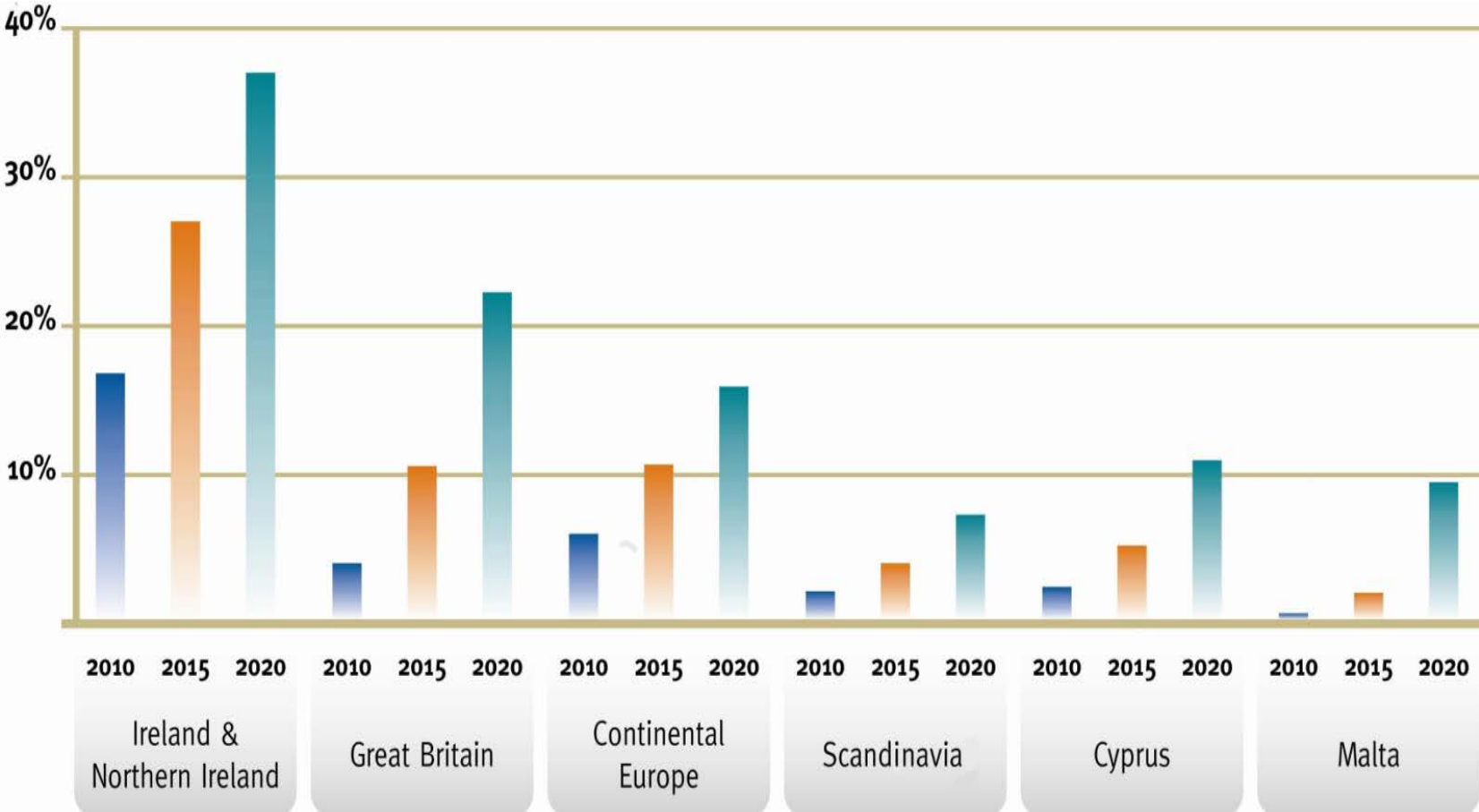
DS3: Facilitating the Island's Changing Fuel mix

Jonathan O'Sullivan
Manager Sustainable Power Systems
EirGrid Group
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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

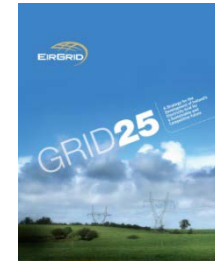
- System Stability
- Resource Variability
- Complexity
- New connections
- Changed power flows



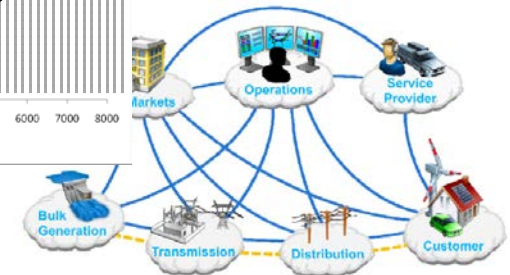
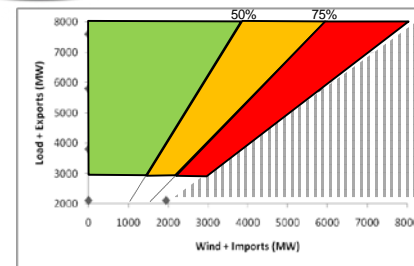
Responses



Infrastructure: EWIC & Grid25



Operational: DS3 and Smart Grids



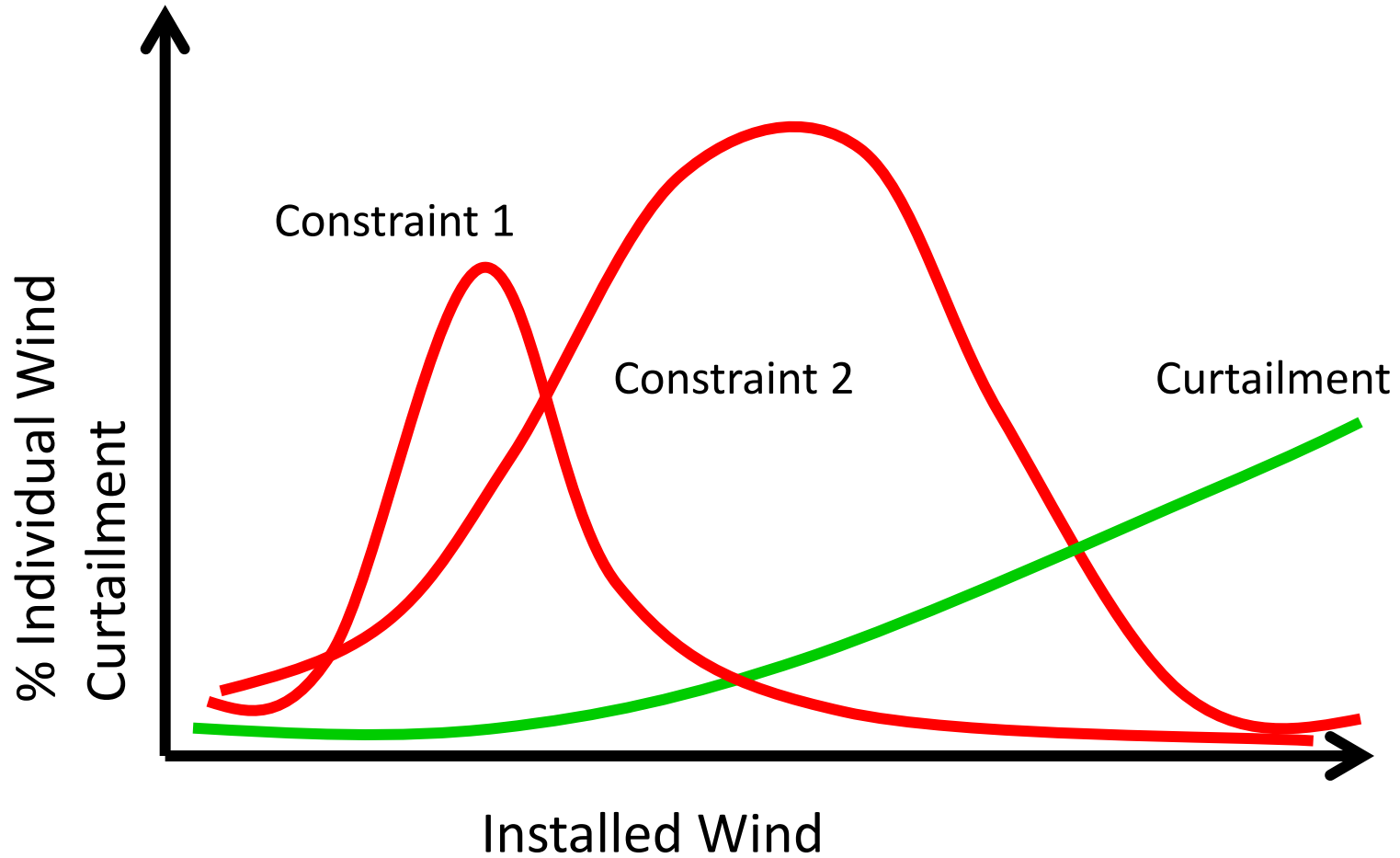
NIST Smart Grid Framework 1.0 Sept 2006



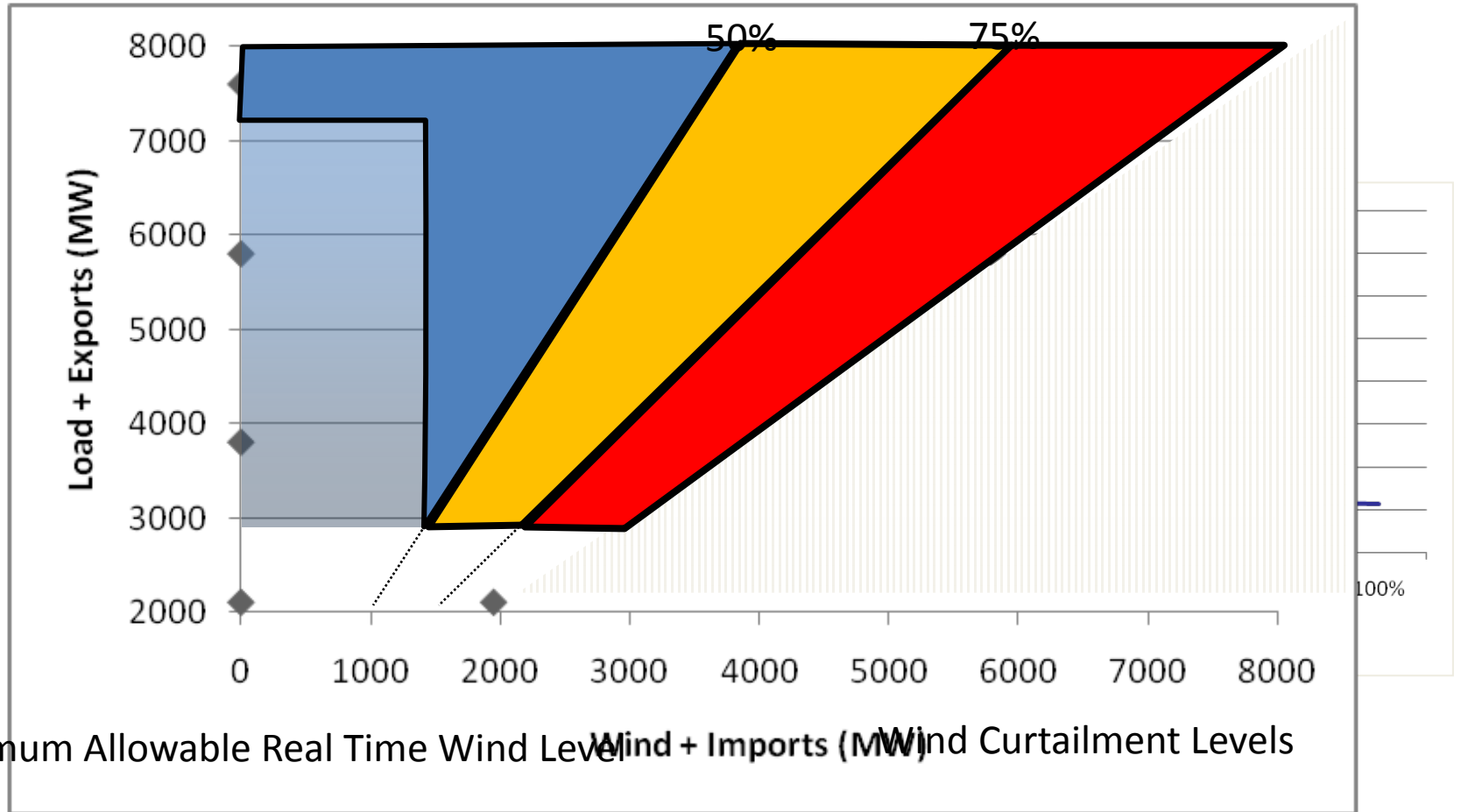
Constraints vs Curtailment

①

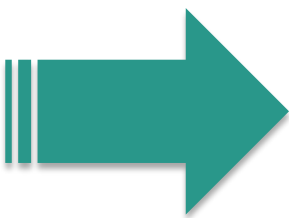
②



Real Time Limit Operational Limits



Background – Operations and DS3



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

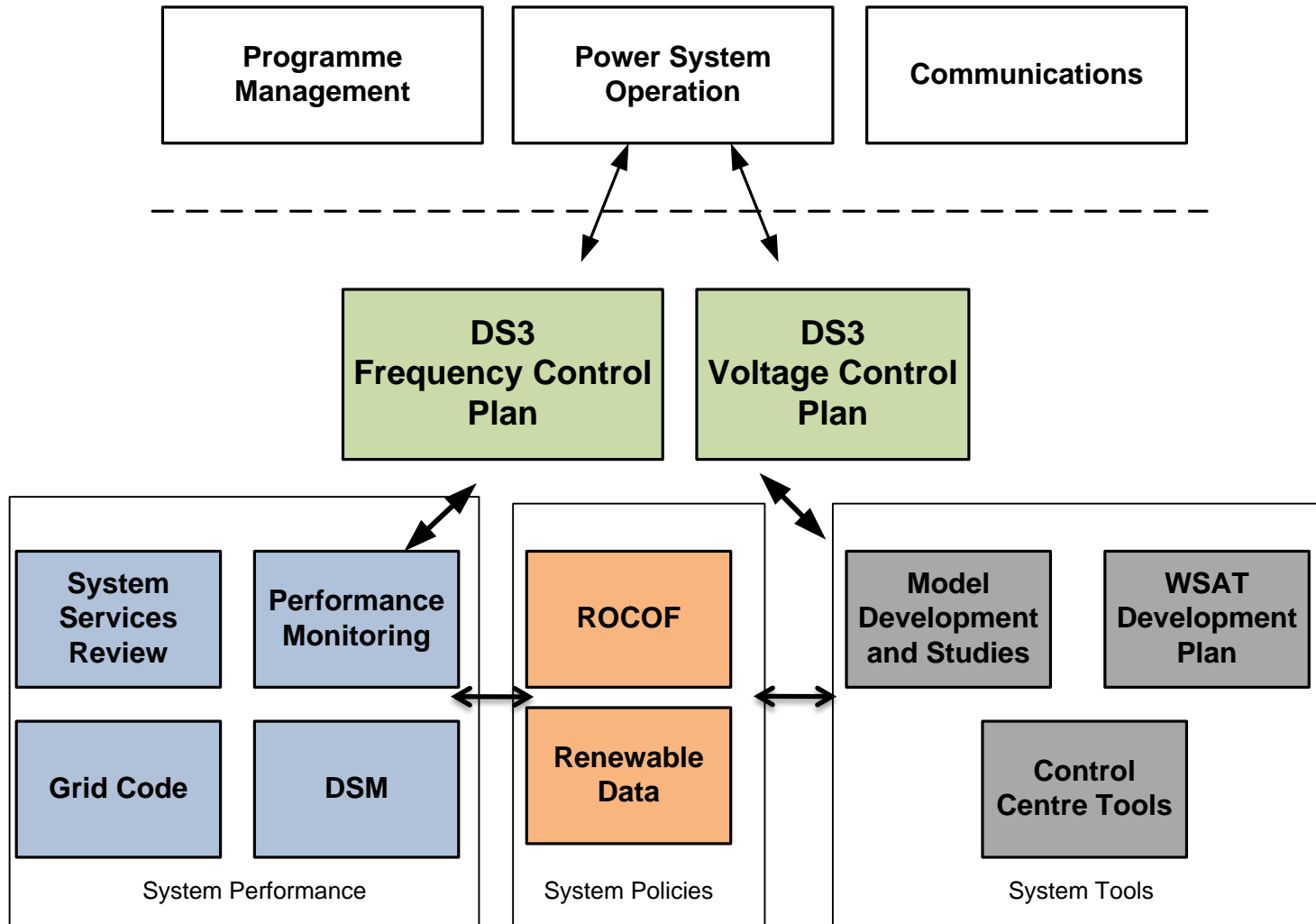


Detailed Technical Analysis

2008 - All Island Grid Study
2010 - Facilitation of Renewables
2011 - Ensuring a Secure Sustainable System



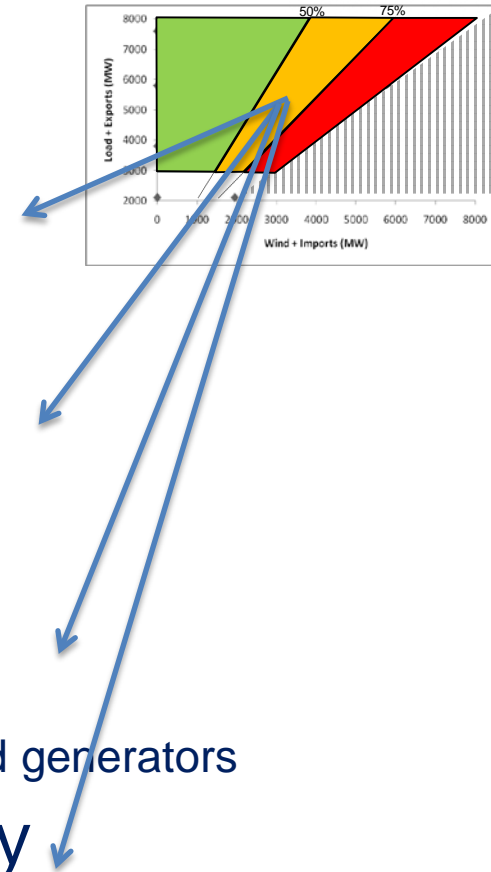
DS3: Programme Overview



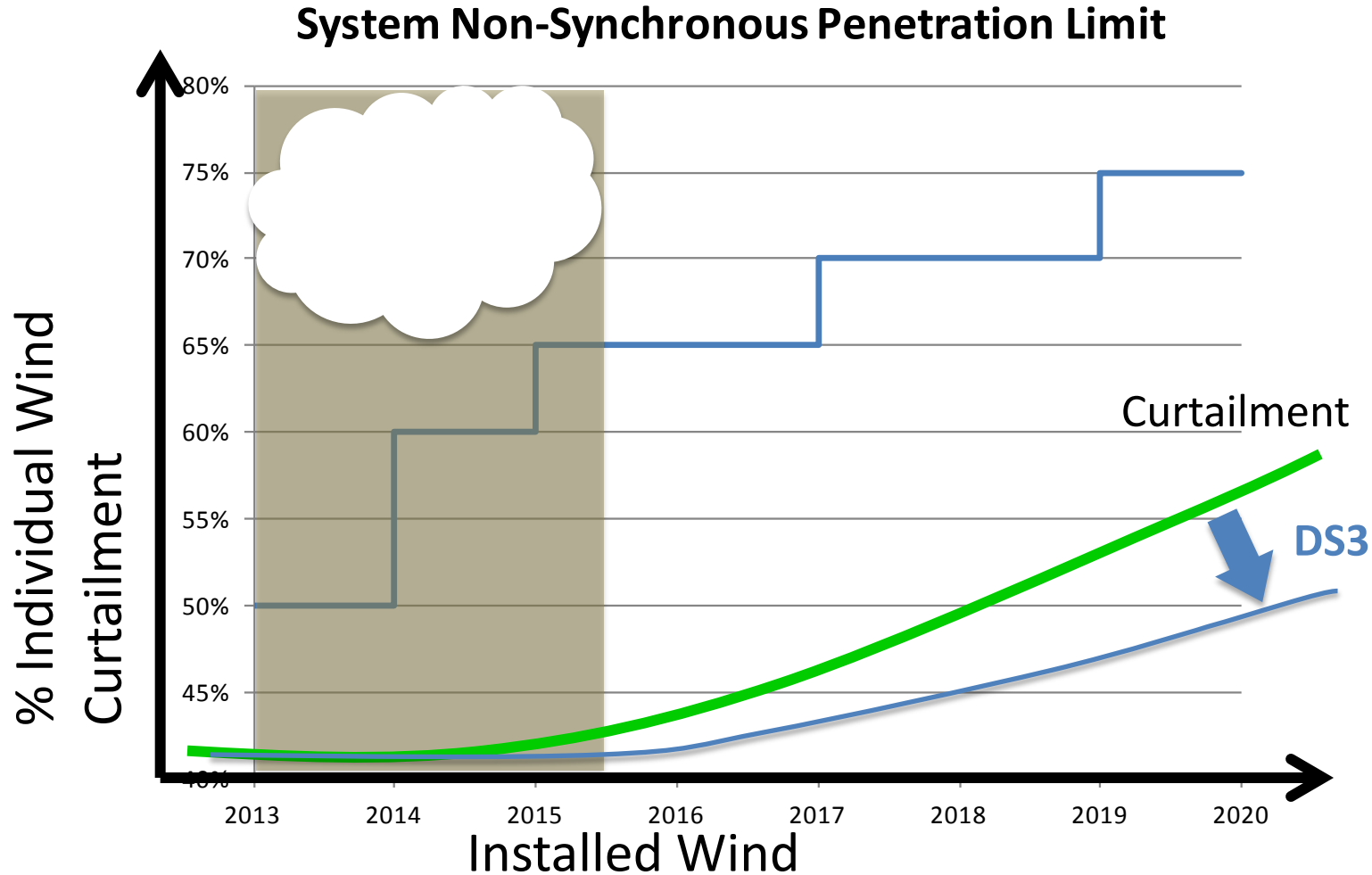
To achieve 75%.....



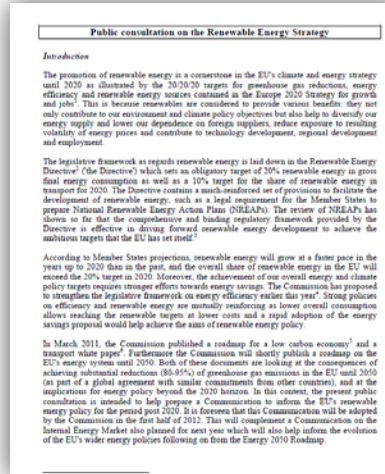
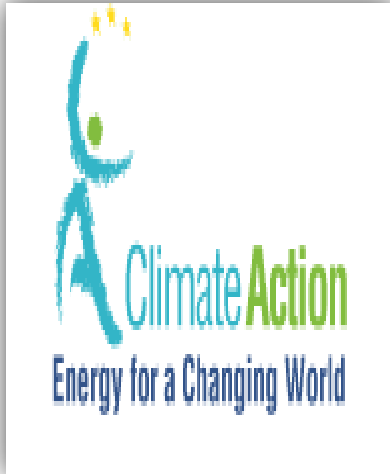
- **RoCoF cascade failure**
 - Loss of mains protection (G59)
 - Generator capability
- **Ramping**
 - Increased Variability and Uncertainty over hours
 - Require increased margin and performance to manage
- **System Voltage Control (Reactive)**
 - 25% reduction in Tx online reactive power by 2020
 - 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?



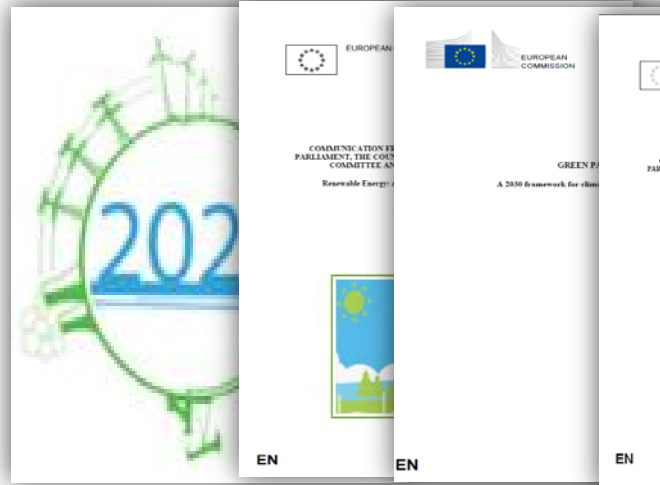
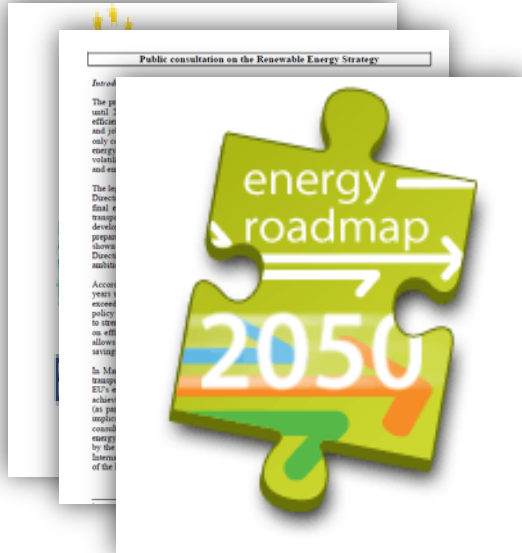
European Policy - The emerging challenge with high levels of RES.....



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

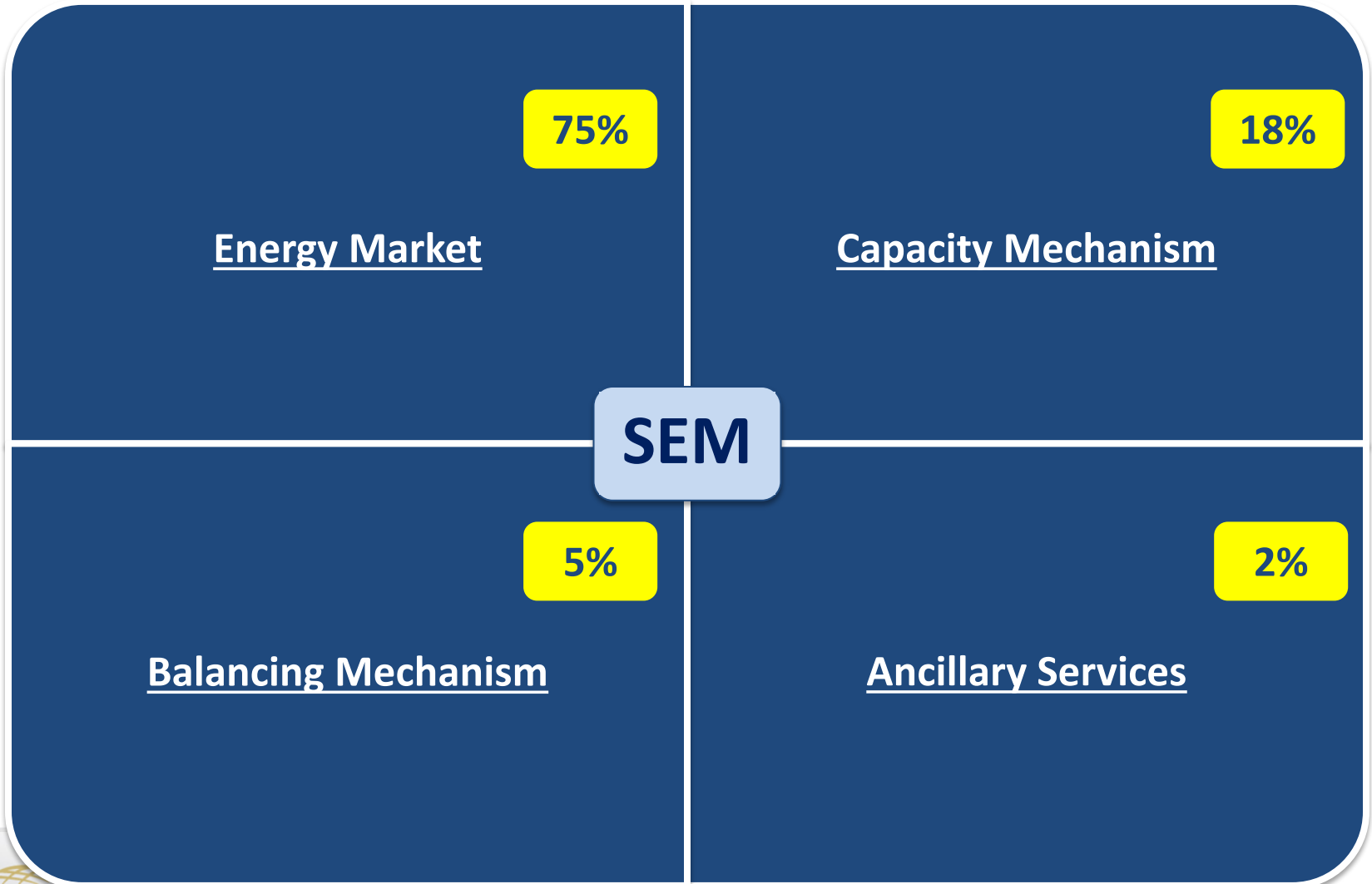
Internal Market is necessary but will not solve
on the RES policy

Answer:

Reward flexibility

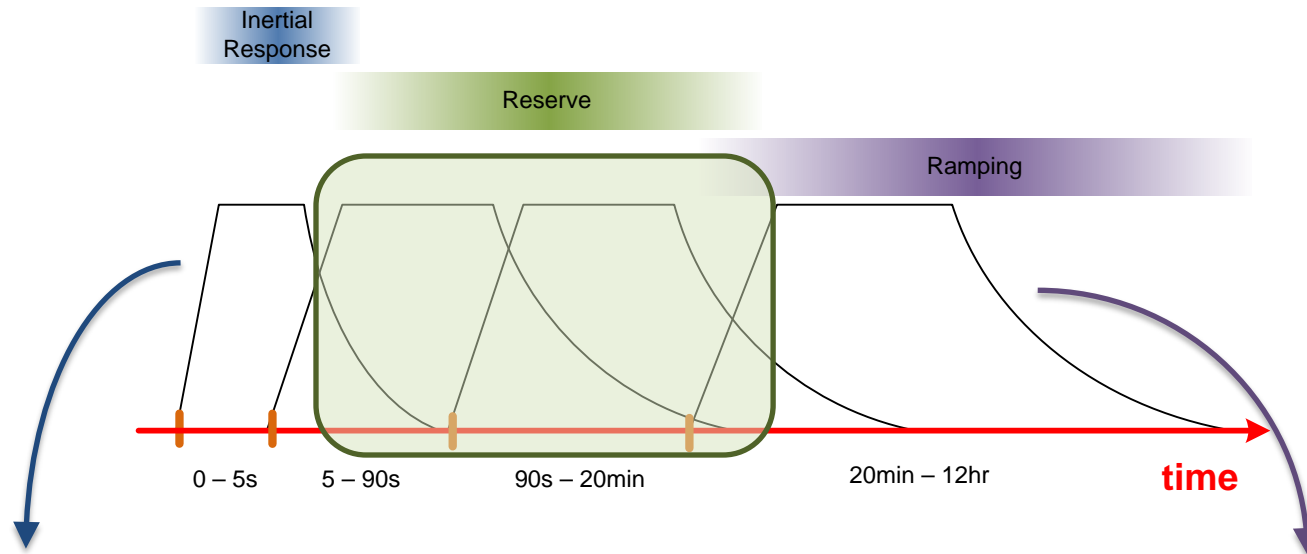
Market Overview: SEM

€3.0bn



SEM

DS3 System Services Frequency Products



- Synchronous Inertial Response
- Fast Frequency Response
- Fast Post-Fault Active Power Recovery

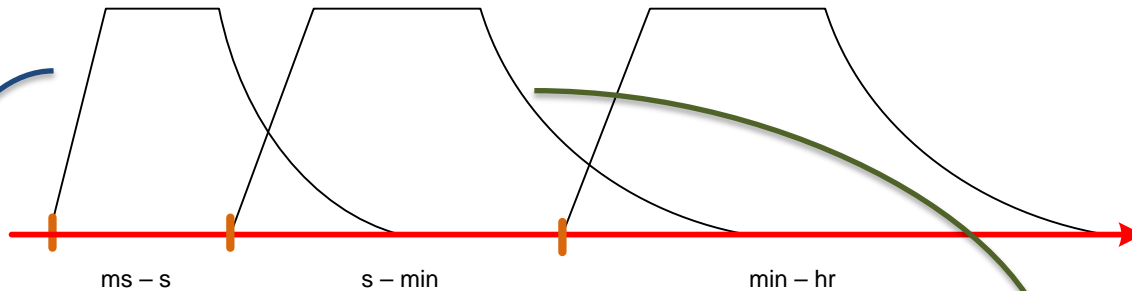
- Ramping Margin

DS3 System Services Voltage Products

Transient Voltage Response

Voltage Regulation

Network



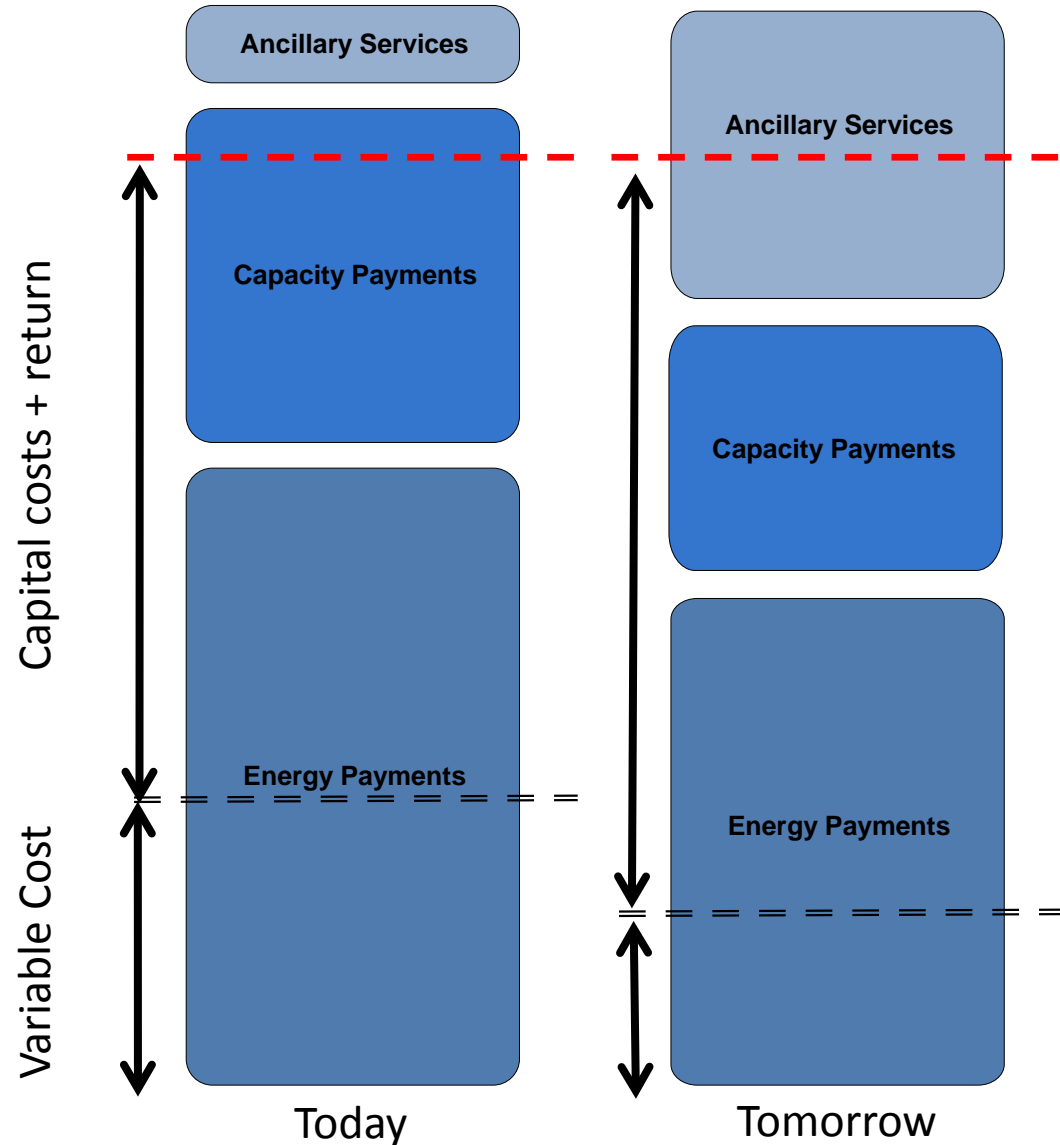
• Dynamic Reactive Power

• Steady-state Reactive Power



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

