



Developing the market to accommodate high levels of wind energy

Energy Ireland - Irish Renewable Energy Summit 2010

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Agenda

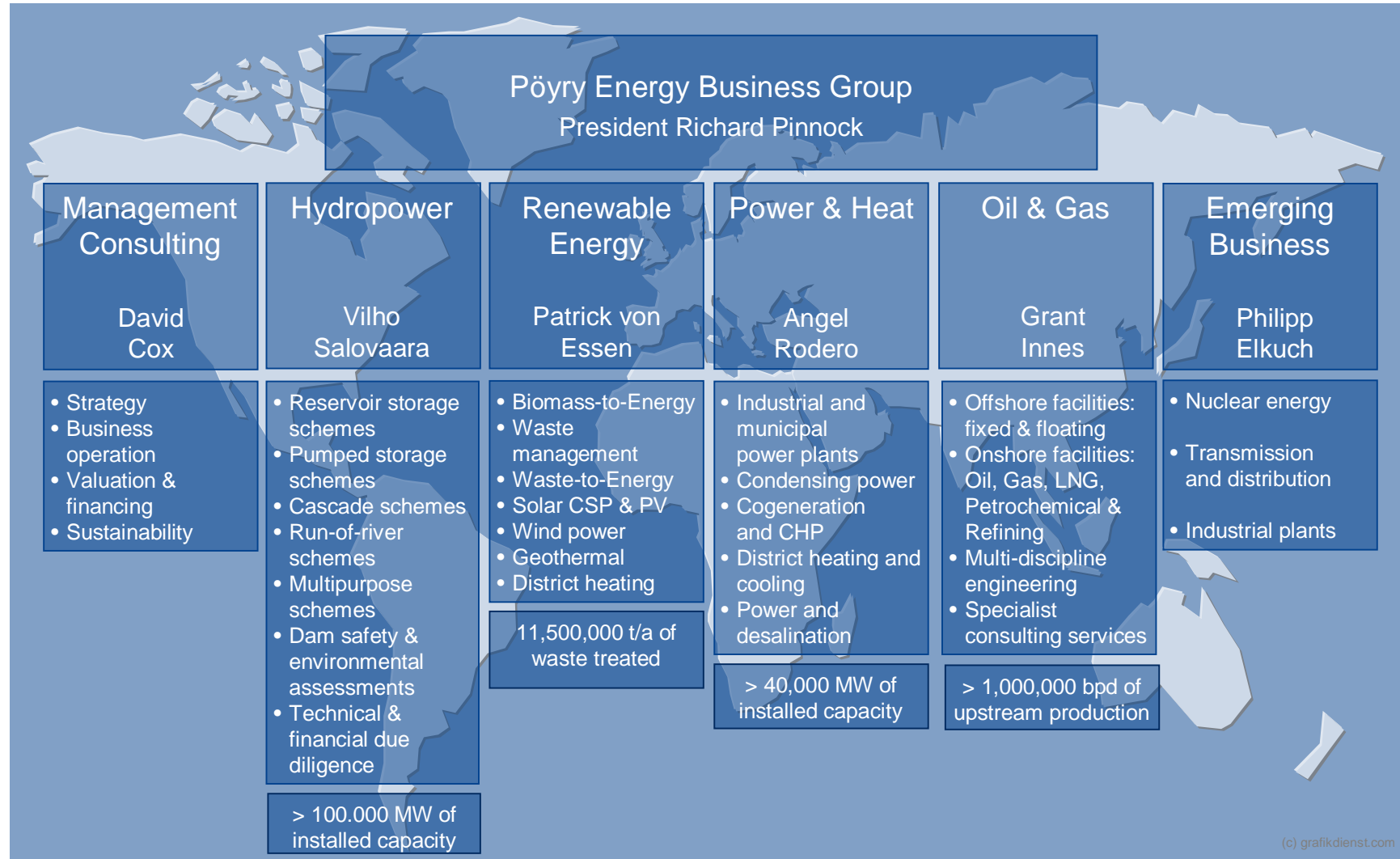
1. About Pöyry Energy Consulting
2. Operation of wind and impact on the SEM
3. Policy response
4. Summary

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Core operations based on five know-how clusters

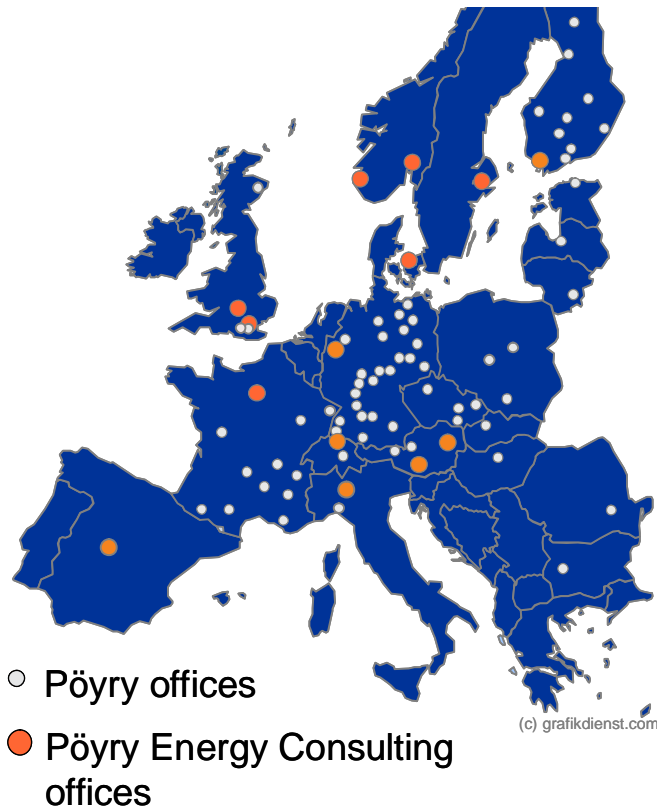


The Pöyry Energy Business Group is split into six Business Areas



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Strategy



Business Operation



Valuation &
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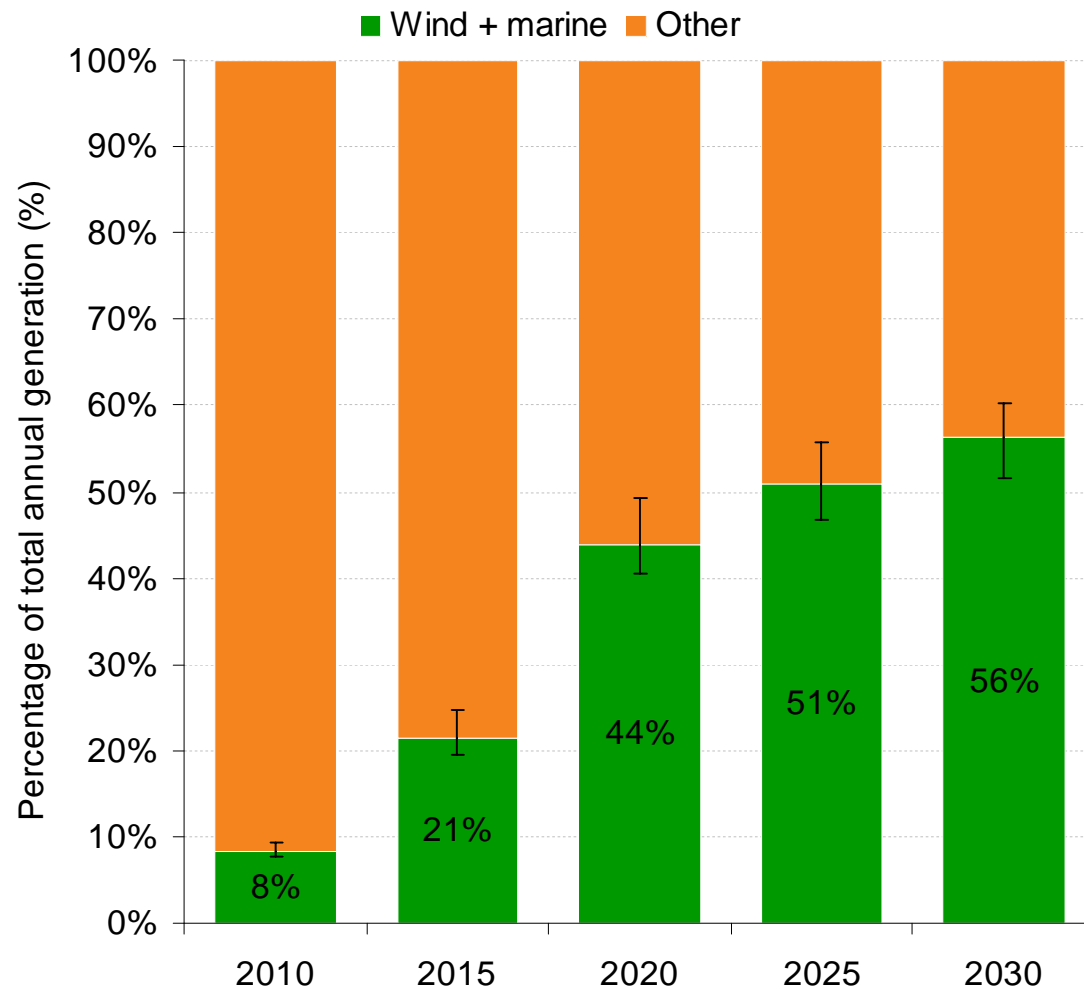
Sustainability

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Wind generation in the SEM will need to grow rapidly to meet ambitious renewable targets

% of generation in SEM produced by wind
– core scenario from Pöyry's intermittency study



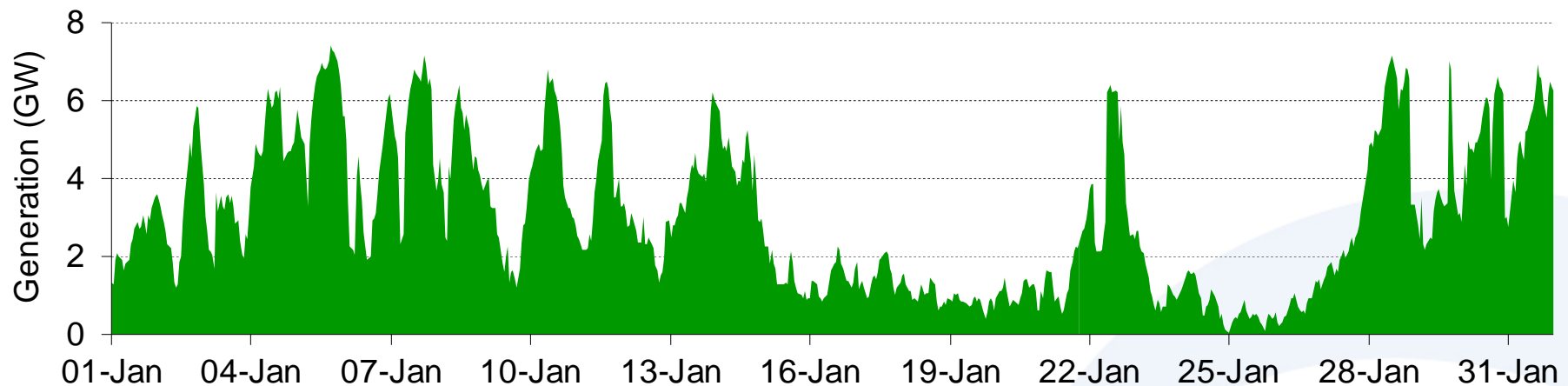
Source: Pöyry intermittency study for GB and Ireland, 2009

- 40% renewable electricity target for 2020 in Republic of Ireland and in Northern Ireland
- REFIT covers 1500MW of plant
- 3900MW of wind generation has offers in Gate 3
- Projections in chart are based on 6000MW of wind capacity by 2020 and 8000MW by 2030.
- 500MW target for marine generation by 2020 in Republic of Ireland
- Annual average penetration masks year-on-year variations in wind output

Wind and wave have a combination of technical and commercial characteristics that challenge the operation of electricity markets

	Gas/ coal	Nuclear	Wind	Tidal	Wave	CCS	Biomass
Price sensitive?	✓	✗	✗	✗	✗	?	✗
Reliable when needed?	✓	✓	✗	✗	✗	✓	✓
Predictable?	✓	✓	✗	✓	✗	✓	✓

Wind generation in Jan 2030 – core scenario (2000 weather)



Source: Pöyry intermittency study for GB and Ireland, 2009

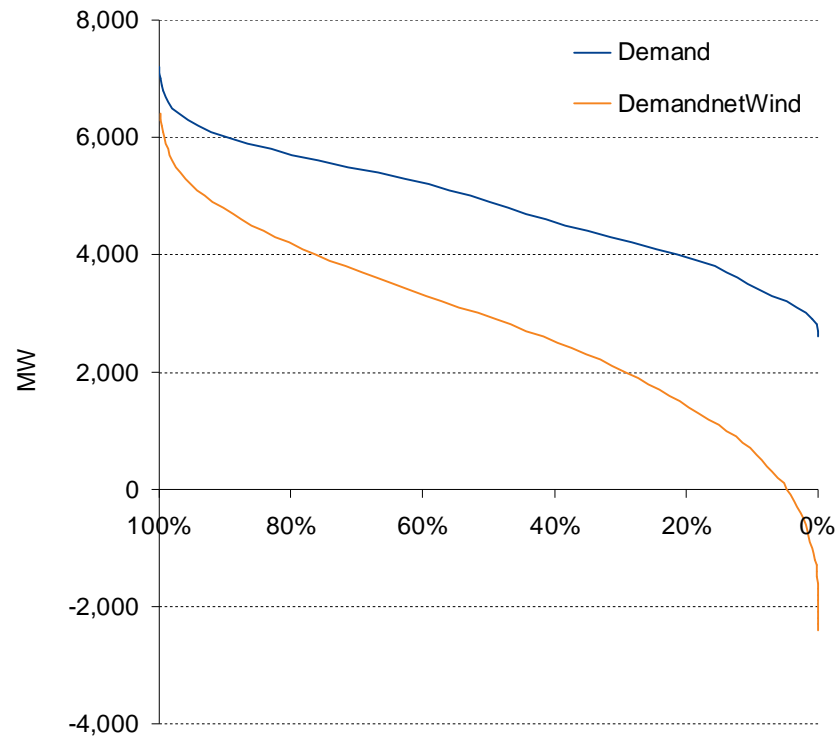
High wind penetration will challenge existing commercial arrangements in SEM

- Price insensitivity of wind exacerbated by per MWh support schemes
 - wind generation projected to exceed demand with increasing frequency
- Widening gap between unconstrained market schedule and SO dispatch
 - is (absolute) priority dispatch sustainable?
- Flexible response required from the rest of the market
 - SEM arrangements should incentivise demand and supply side flexibility
 - will high wind deployment complicate the deployment of other forms of low-carbon generation?

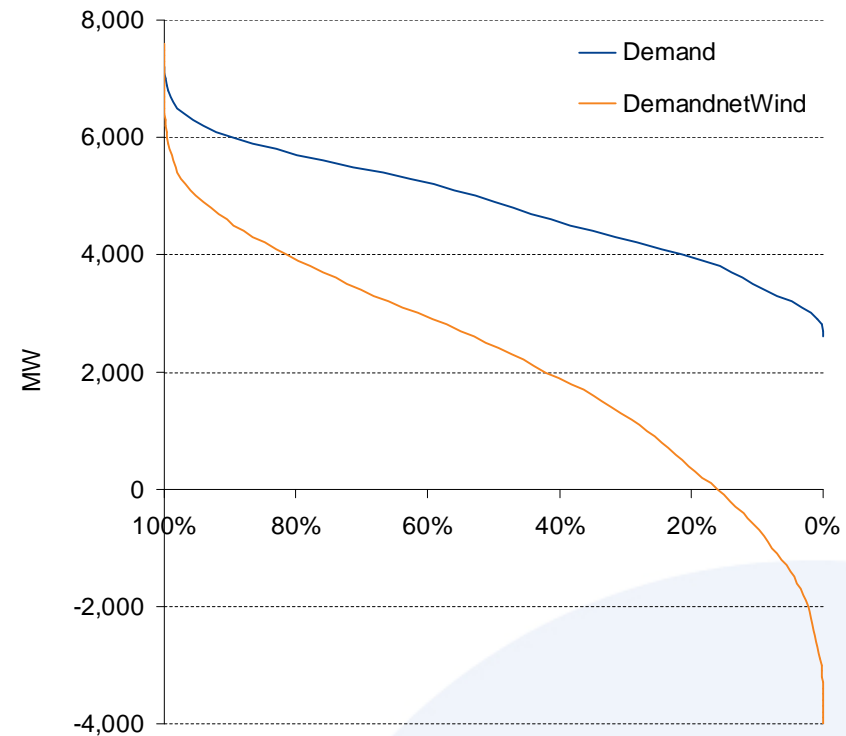
Wind generation will exceed demand with increasing frequency

Interconnection may not be able to fully absorb the excess

2020 - Demand duration curve
(core scenario)



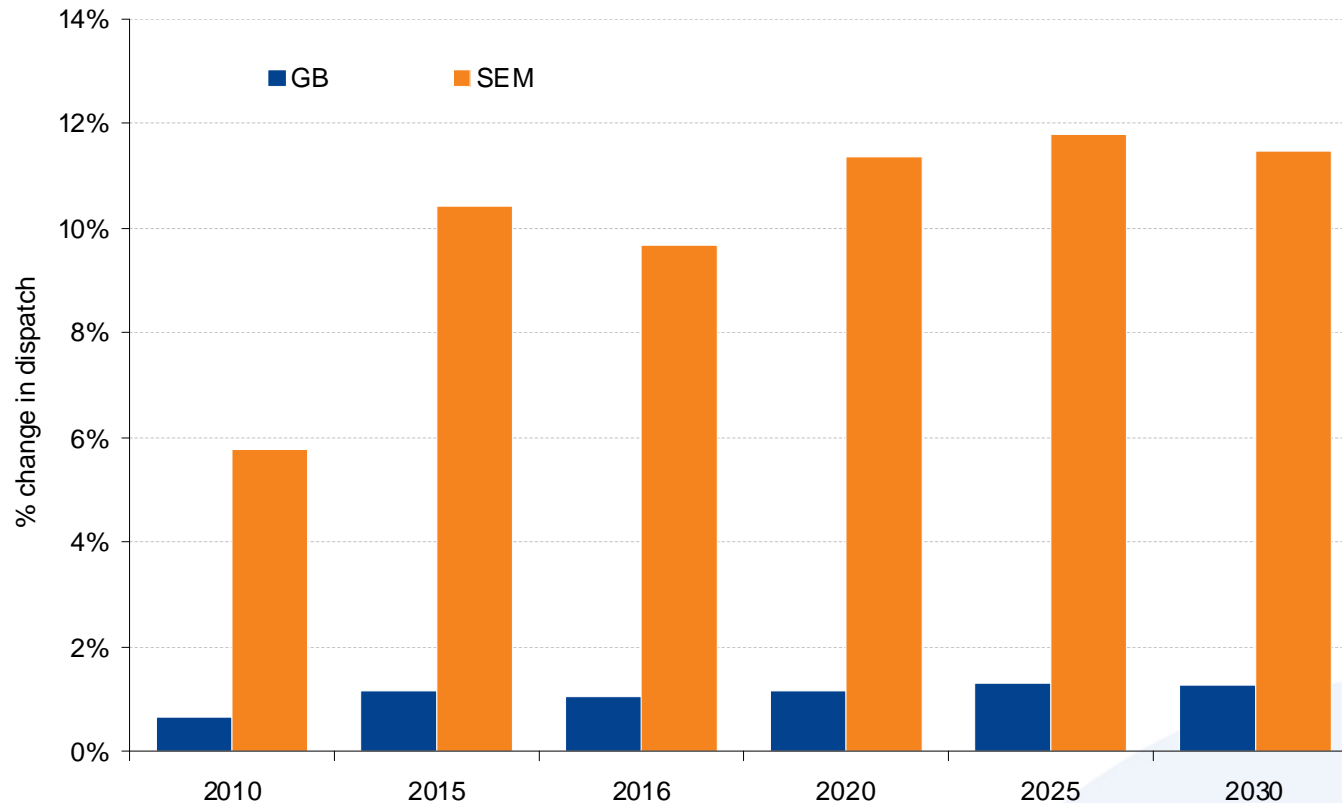
2030 - Demand duration curve
(core scenario)



Source: Pöyry intermittency study for GB and Ireland, 2009

Widening gap between SEM schedule and dispatch

Re-dispatch for reserve, response and the limited transmission constraints modelled is material in SEM (over 10% of total generation) but far lower in GB (around 1%).



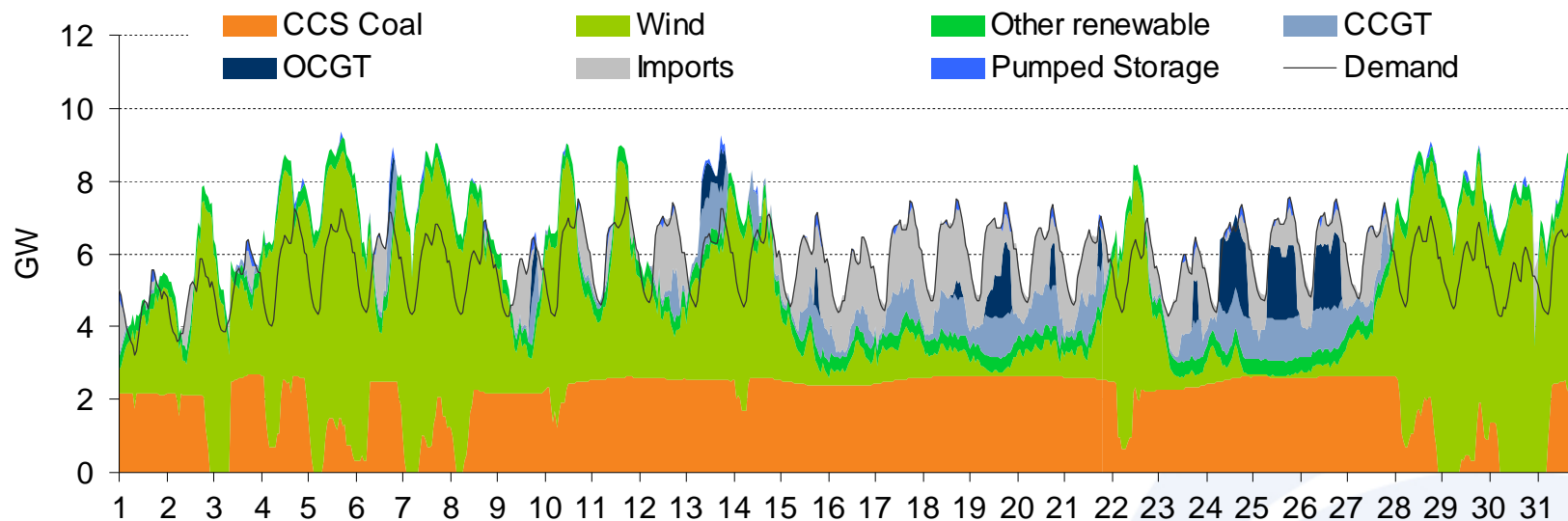
% change in dispatch defined as summing half of the absolute MW re-dispatch for each generation technology in each hour, and dividing the resultant MW total by annual demand.

Source: Pöyry intermittency study for GB and Ireland, 2009

Operation of wind increases flexibility requirements

- High wind penetration increases flexibility required from rest of the power sector
 - number of starts
 - ramping requirements (not modelled)
- May complicate subsequent deployment of other low-carbon technologies
 - flexible operation may present economic and technical challenges for CCS coal

SO dispatch pattern in Jan 2035
– EirGrid study on generation portfolio options



Source: Pöyry study for EirGrid on generation portfolios in Ireland, 2010

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Wind generation should be more responsive to demand

Tension

electricity markets require 'efficient' generation decisions

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renewable targets need maximisation of renewable generation

- Straw-man support scheme for wind based on available capacity
 - per kW incentives more closely follow cost structure
 - verify by linking support to max kW delivered
- Challenges for 'capacity-based' support scheme
 - financing costs from exposing wind plants to market price risk
 - maintaining levels of available capacity
 - lower load factors lead to higher cost per MWh of wind output delivered

Incentives should support whole-system carbon reduction

- Reduce gap between schedule and dispatch
 - introduce ‘energy’ constraints into the schedule
- Introduce additional revenue stream for provision of flexibility?
 - no single measure for energy flexibility
- Important to appropriately incentivise demand-side response
 - increase flexibility of whole system
- Encourage more flexible operation of the interconnectors
 - SEM review of interconnection arrangements in light of new infrastructure and EU requirements
 - more flexible interconnection could increase prices in the SEM

Policy changes may be required in near-term even if policy targets are far-off

- Benefits of early policy reforms
 - set clear investment signals in line with technology lead times
 - delays will worsen legacy issues
 - if market participants believe policy change will be required in the future, this can undermine credibility of current policy regime
- Reasons to delay policy reforms
 - greater certainty for policy-makers about issues to be addressed
 - regulatory risk from introducing reforms soon after introduction of the SEM
 - is there a risk of undermining development of wind generation?
- Can no-regrets reforms be identified?

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Summary

- Rapid growth in wind **generation** in Ireland to meet renewable targets
- This raises a number of policy challenges – excess generation, power sector flexibility and long-term decarbonisation
- Policy reforms should ensure that market prices correctly incentivise most efficient generation and consumption decisions
 - operational and investment timescales
 - encourage appropriate demand-side response
- Policy framework must make wind commercially viable without undermining incentive to respond to market signals
 - differentiate between marginal and average revenue per MWh



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