

Market Mechanisms for Renewable Integration

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Leaders in the design, implementation and operation of
markets for electricity, gas and water.



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Introduction

- 12 month research study for IEA-RETD
 - identify electricity market products and services needed for the better integration of variable electricity generation
 - how market systems could effectively incorporate variable sources of RE.

■ GB	■ Ireland	■ France	■ Germany
■ Netherlands	■ Italy	■ Denmark	■ Sweden
■ Finland	■ Norway	■ Ontario	■ Alberta

Overall Project Objectives

- Identify innovative electricity market products and services needed for better integration of variable electricity generation
- Provide examples on how market systems could effectively incorporate variable sources of RE.
- Indicate how to prepare markets for dealing with cross-border electricity trade caused by variable supply.
- Identify means for proactive grid planning

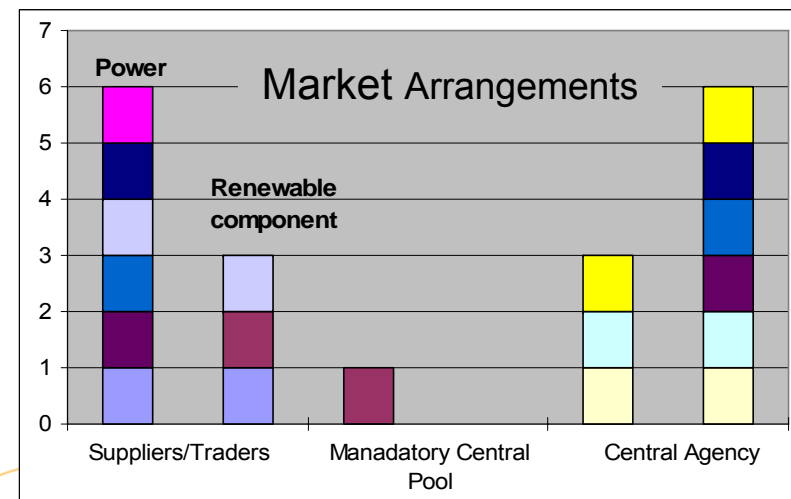
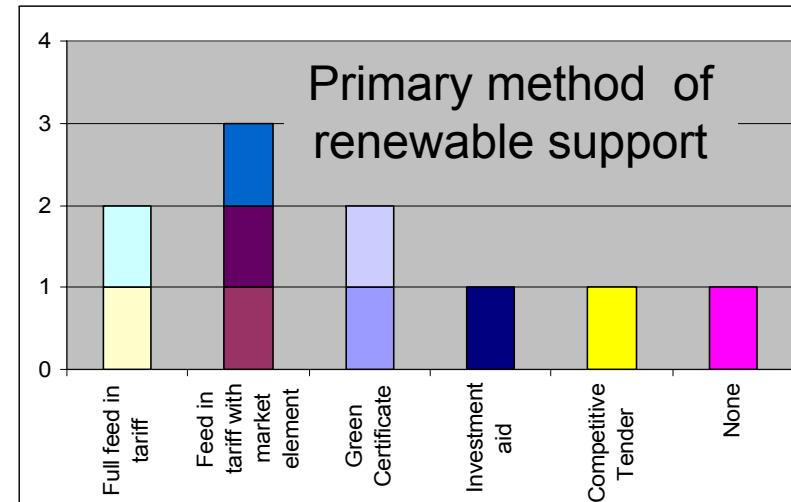
Objectives of Integrating Renewables

- Maximise Renewable Deployment
 - EU target of 20% of energy from renewables by 2020
 - Accept special market treatment & subsidies
- OR
- Minimising Market Distortions
 - Carbon pricing policy for incentivising low carbon generation
 - Remove special market treatment & subsidies over medium term



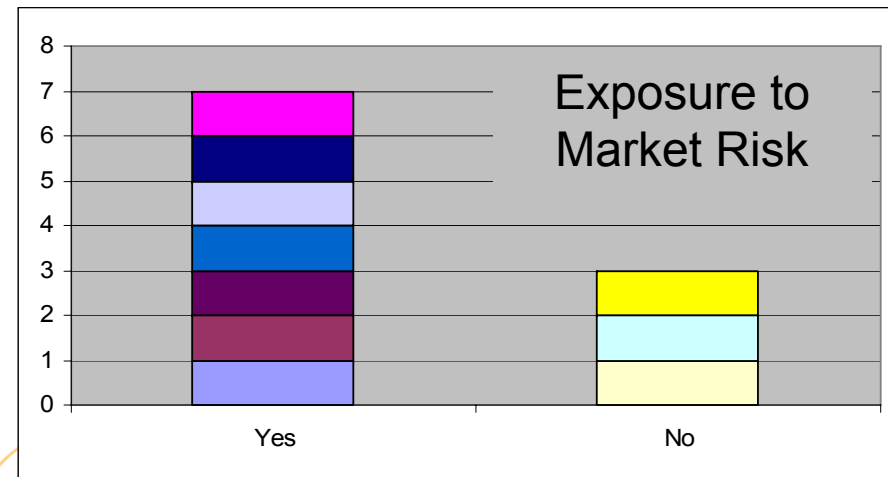
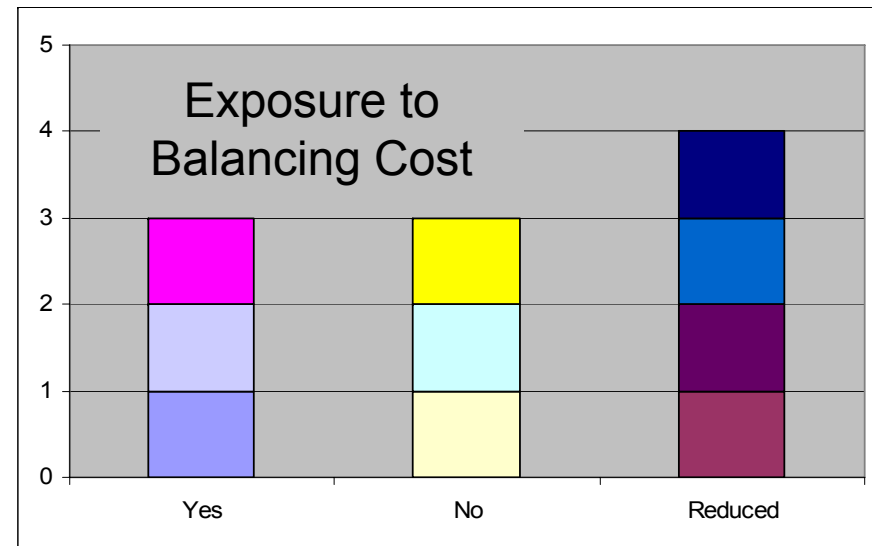
Market Integration

- Renewable generation requires financial support
 - Most countries provide support mechanisms
 - Level/types of market integration varies
- What level of Market Integration can be achieved
 - Remove central purchasing agencies?



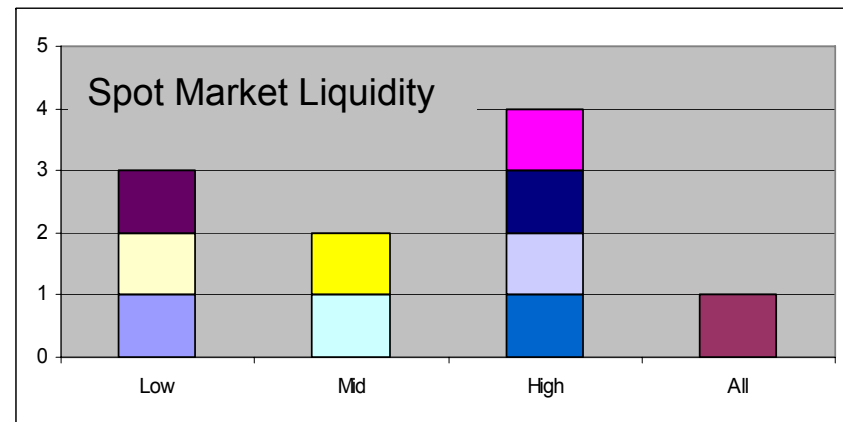
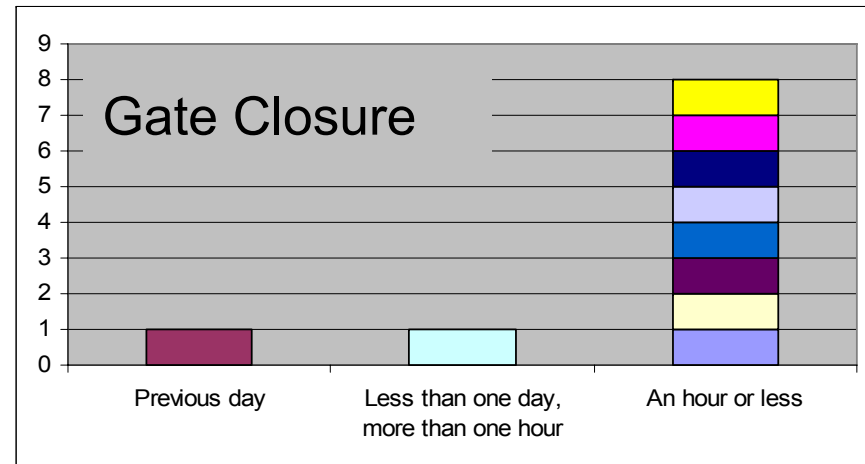
Market Risk

- Central agencies
 - Remove market risk
 - Remove balancing risk
 - Reduces risk/cost of renewables
- Renewables can be exposed to risk
 - Similar to conventional generation
 - Dependence on short term markets
 - Higher exposure to balancing



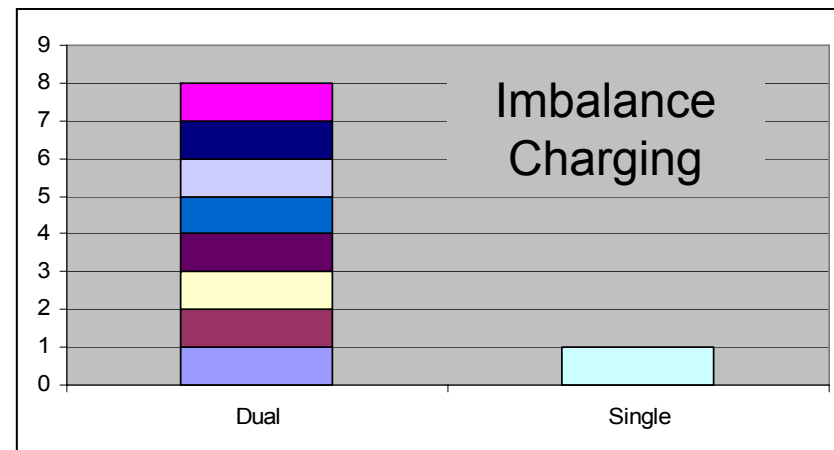
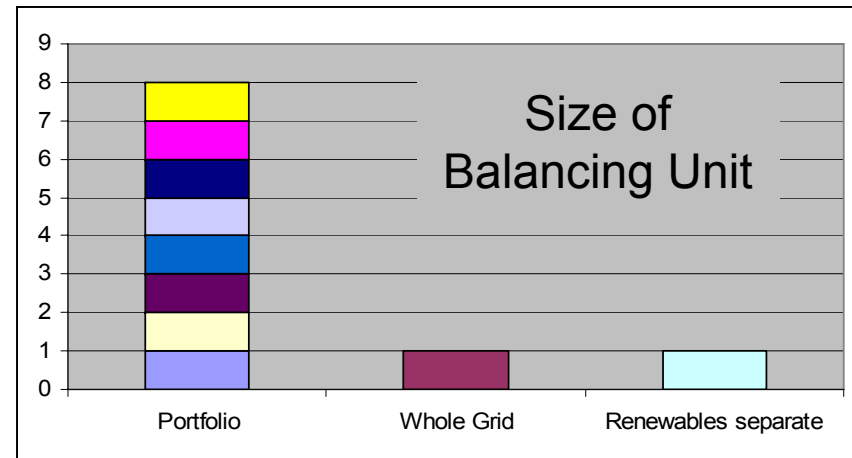
Market Trading

- Market focus on reducing gate closure
 - Final Notifications < hour
 - Place emphasis on market participants to balance
 - Wind has uncertain output profiles
 - Independents require liquid spot markets to balance
- Q: Short gate closures required for economically efficient markets?
 - Liquid spot markets
 - TSO actions are efficient & targeted



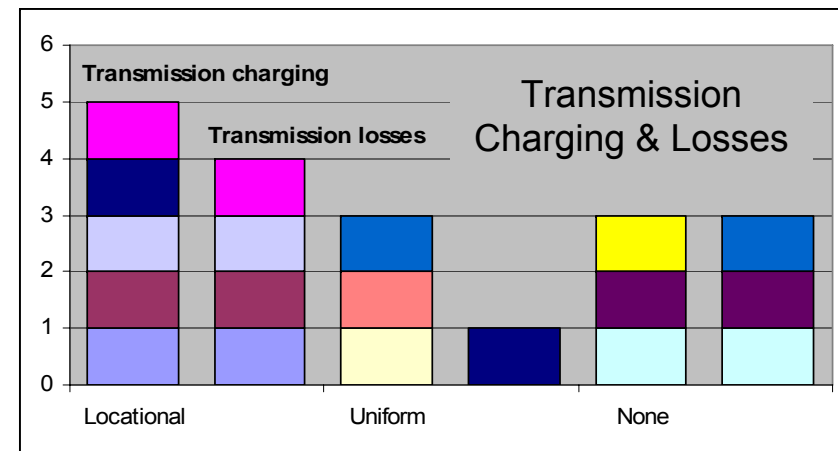
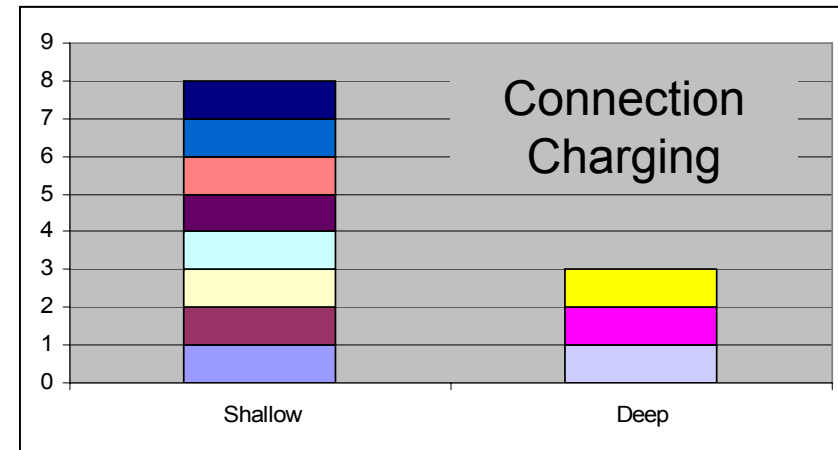
Balancing Costs

- Balancing unit size
 - Portfolio benefit from averaging
- Renewables can give rise to higher balancing costs
 - Costs may be targeted through imbalance prices
 - Volatile, marginal prices
 - Reserve capacity costs may be socialised
 - Wind may have limited ability to avoid imbalances
- Q: Does targeted recovery have to be through volatile prices?



Transmission Access

- Renewables site where there is resource
 - Network reinforcement
 - Shallow connection
 - Costs may be socialised
- Transmission access
 - Renewables - intermittent use of transmission system
 - Transmission charging
- Q: How to reform long term access signals and short term access rights?
 - Learn from power markets?



Barriers to Entry

- Differences between renewables & conventional plant
 - Variable output
 - Greater exposure to short term market and balancing
 - Lower load factors/smaller projects
 - Complex markets & market costs
 - Proportionate cost targeting
 - Transmission Requirements
 - Access: Lower load factors & intermittent use
 - Planning: Transmission development & SoS Standards
 - Technical
 - Different capabilities to provide system services
 - Derogations from Grid codes – BUT target costs

Conclusions

- Define our objectives
 - Maximise Renewable Deployment
 - Minimising Market Distortions
- Economically Efficient Markets
 - Which elements of market design are necessary for efficient operation?
 - What elements are necessary for integration of renewables?
 - Non-discriminatory treatment for all generation technologies??
 - What level of change could be justified?

