Economic Cost-Benefit Estimates from Offshore Wind Investment in Ireland

Presentation to NOW Ireland Conference by

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September 2008

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Agenda

- Introduction and overview
  - Current landscape
  - Objectives
  - Methodology
- Key results
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    - Breakdown of costs/benefits
  - Other cost/benefit estimates
- Understanding the results
  - Fuel & carbon savings & merit order effect
  - Selected aspects of methodology
  - Sensitivities and limitations
- Conclusions

Introduction and overview: Current landscape

- Challenges for Ireland
  - Meeting renewables targets
  - Emissions reductions
  - Impact from rising fuel prices on economy
- Challenges to offshore wind still exist (e.g., planning, grid connection, etc)
- Comprehensive review of the economic fundamentals of offshore wind investment needed

Introduction and overview: Objectives

- Independent estimate of net cost/benefit from offshore wind investment in Ireland from Irish macroeconomic perspective ("Ireland Inc")
  - Objective 1: Estimate net cost/benefit for enhanced offshore wind development in Ireland
  - Objective 2: Estimate other benefits
    - Non-GHG emissions abatement, Kyoto compliance, tax and employment, fuel-price risk reduction, etc

Introduction and overview: Methodology

- Objective 1: Primary net cost/benefit estimation
  - Financial model of generic 1000MW offshore wind investment developed
    - 15 year project commencing 2012
  - Primary benefits: electricity dispatch model
    - Reduced expenditure on fossil fuel imports
    - Reduced carbon emissions
  - Primary Costs
    - Investment cost
    - Additional operation and maintenance

Introduction and overview: Methodology

- Objective 2: Other benefits estimation
  - Merit order effect
    - Electricity price forecasting model predicts competitive price reductions
  - NOx and SOx emissions reductions
    - Estimates total emissions savings value using marginal abatement costs
  - CBA
    - Standard DoF cost-benefit appraisal approach
  - Kyoto compliance
    - Possible fine avoidance given BAU and in proportion to carbon reduction estimates
  - Risk reduction
    - Modelled market price of risk and estimated total generation fuel bill volatility reduction from addition of 1000MW wind

Key results: Financial model

Estimated Overall Net Cost-benefit of 1,000 MW of Additional Offshore Wind Capacity (€m) – Key Financial Model Results

Overall Net Benefit	Low Fuel Forecast	Medium Fuel Forecast	High Fuel Forecast
High Demand (Low Discount Rate)	562.6	972.5	1,722.4
Low Demand (High Discount Rate)	-168.3	147.0	778.8

Source: Indecon analysis.

- Figures are NPVs 2012 to 2027
- Supply & demand forecasts consistent with Eirgrid-GAR, SONI, and SEM/AIP public data
- Discount rates: Low (7%) and High (9%)
- Fuel price forecasts (average oil price over period)
  - Low ($155/bbl), Medium ($161/bbl), High ($167/bbl)

Key Results: Financial model-breakdown

Breakdown of Estimated Overall Net Cost-benefit of 1,000 MW of Additional Offshore Wind Capacity (€m) – Selected Medium Fuel Price Scenarios

	High Demand (Low Discount)		Low Demand (High Discount)	
		€ Millions		€ Millions
Costs				
Capital Cost		3,500.0		3,500.0
Additional Cost of Wind Penetration		133.3		118.0
Expected Increase in Variable O&M		253.2		224.1
Additional Capacity Cost of New Peaking Capacity		94.4		94.4
		3,980.9		3,936.4
Benefits				
Fuel Cost Savings	2,870.8		2,466.6	
CO_2 Savings	537.2	3,408.1	467.4	2,934.0
Terminal Value of Investment		1,228.3		832.4
Capacity Saving		317.0		317.0
		4,953.4		4,083.5
Overall Net Benefit		*972.5*		***147.0***

Source: Indecon analysis.

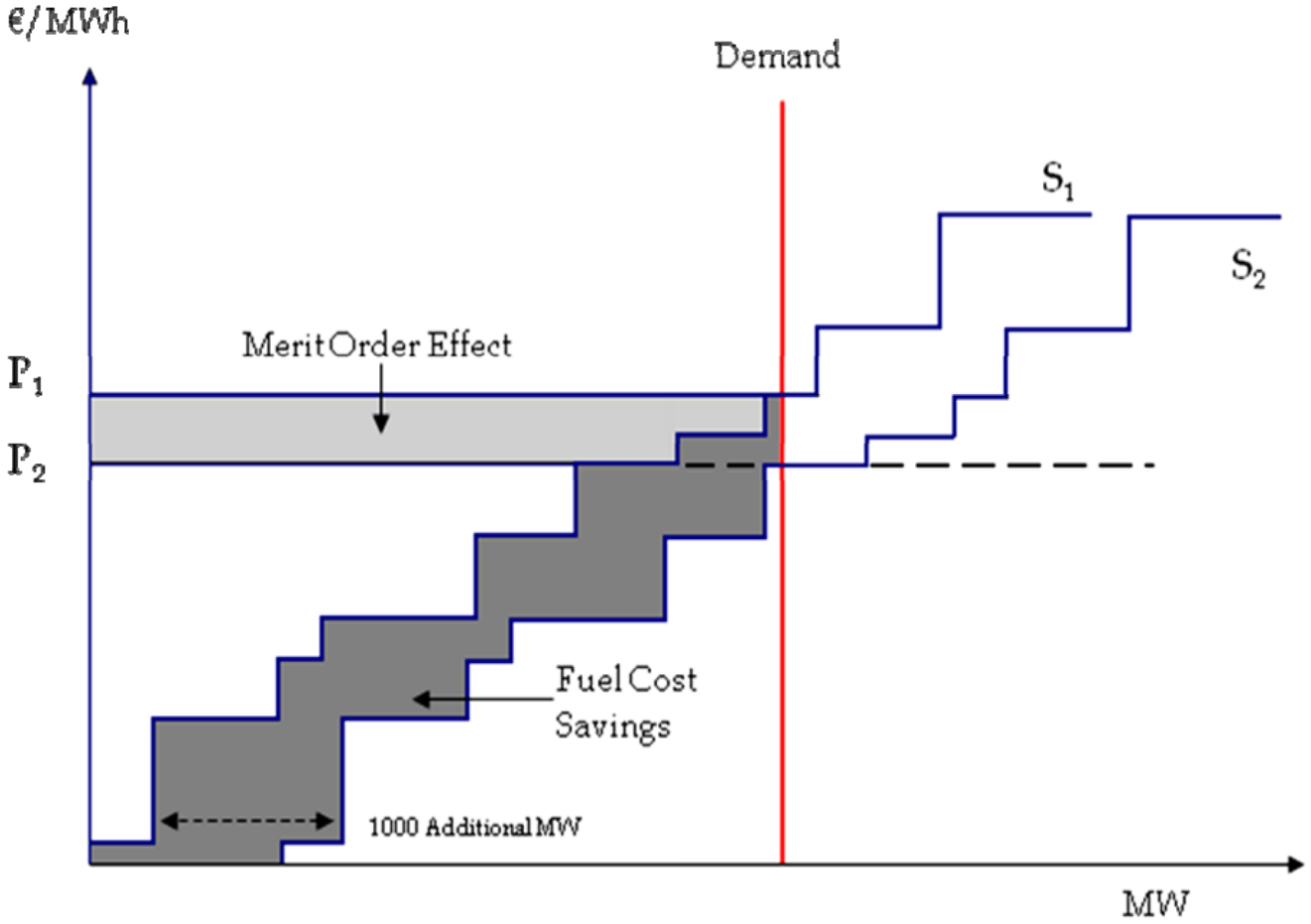
Key Results: Other benefits

Summary of Additional Estimated Benefits

	€ Millions
Merit Order Effect	1,580.0
Savings Associated with Reduced NO_x & SO_x Emissions	87.0
Estimate of Carbon Fines Avoided (2008 – 2012 only)	70.4
Macroeconomic Benefit	105.8
Estimate of Fuel Risk Reduction	287.0
Total of Additional Quantifiable Benefits	***2,130.2***

Source: Indecon analysis.

Understanding the results: Fuel savings and merit order effect



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Understanding the results: Selected details of methodology

- Fuel price forecasts
  - Based on summer 08 forward curve+ 3%(L), 5%(M), 7%(H)
- Fuel and carbon cost savings
  - Includes CO_2 cost using EU ETS allowance price forecasts
- Capital cost of wind
  - All-in capital cost *including* grid connection
  - Higher than EU Commission report–conservative estimate
- Thermal capacity cost-benefit
  - Avoid building one 400MW CCGT
  - Additional 150-200MW OCGT needed
- Merit-order effect
  - (Electricity price difference with/without 1000MW) x Demand
- Macro cost-benefit
  - Based on DoF appraisal guidelines

Understanding the results: Sensitivities and limitations

- Key sensitivities
  - Discount rate
  - Fuel price forecasts
  - Capital cost of wind
- Results less sensitive to
  - Demand forecast
  - Interconnection
  - Additional costs of wind penetration
- Study approach uses “generic” additional 1000MW of offshore wind
  - Results may vary with significantly higher MWs
  - Note: industry planning approx 2000MW and 5000MW possible in near term according to NOW

Conclusions

- Additional 1000MW offshore wind vìs-a-vìs BAU in most cases represents a net benefit for Ireland
  - Financial model scenarios showed positive NPV for majority of cases
    - Scenarios developed as representative of range of likely future values
  - Sensitivity to
    - discount rate
    - fuel prices
    - capacity cost
- Additional benefits (merit order, NOx & SOx, employment and tax, Kyoto, etc) potentially large but not added to fundamentals
- Results indicate significant economic benefit in medium and high fuel price cases