



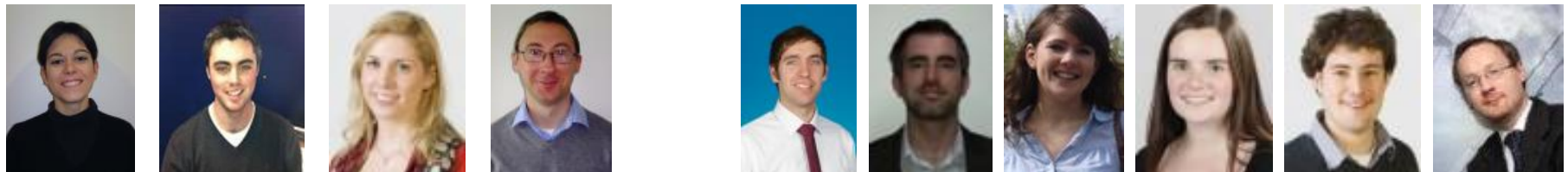
Markets and Regulation

Seán Lyons
Strand Lead



TRINITY
COLLEGE
DUBLIN

- Overview of direct personnel
 - 1 post-docs (ESRI): di Cosmo
 - 1 PhD (TCD): Doyle
 - 1 completed PhD, Apr 13 (TCD): O'Mahoney
 - 1 RA (ESRI): Walsh
 - 4 Economics interns summer 2013
- Others: Farrell, McCoy, Hyland, Lynch, Lannoye, Dillon



- Main research themes:
 - Market design and evolution
 - Issues in market performance and incentives
 - Regulatory control and governance

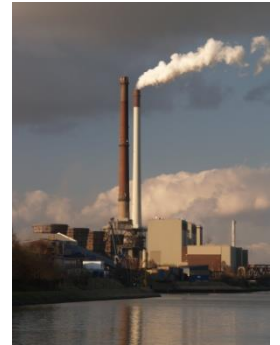
- Currently 24 ongoing pieces of research work
 - Handout with a summary available
 - Overview of two studies ...



- ❑ The Incentive to Invest in Thermal Plants in the Presence of Wind Generation – submitted to *Energy Economics* - V Di Cosmo and L Malaguzzi Valeri (2013)

- ❑ Estimate conventional generator revenues under:
 - ❑ No wind
 - ❑ Wind as in past 3 years
 - ❑ High wind – 3000MW by 2014

- ❑ Econometric simulation study calibrated with 3 years of actual SEM data



- ❑ Wind impacts conventional generator revenues in following ways:
 - ❑ By lowering shadow price
 - ❑ Increasing costs through increased ramping
 - ❑ Decreased utilisation

- ❑ Uplift assumed as average of 2008 – 2011
- ❑ Capacity payment for each unit as average of 2008 – 2011
- ❑ $R = 0.02$ (adjusted for inflation)

- ❑ To maintain system reliability, non-flexible units kept online more than flexible units
 - ❑ Coal units turned on less frequently than CCGT
 - ❑ Increase in costs for CCGT greater than for coal
- ❑ Profit in €/MW

	Gas	Coal	Distillate
Baseline	627,765	432,067	383,657
3000MW	616,526	427,969	383,686
Difference	-1.8%	-0.9%	0.0%

- ❑ Econometric analysis of the drivers of CO₂ emissions in the Irish electricity market – submitted to *Energy Economics* - O'Mahoney, Hobbs, O'Malley, Denny
- ❑ Comparison of wind versus demand reduction in terms of CO₂ abatement
 - ❑ Supply side versus demand side measures



- Results:
- 1 MW reduction in demand per hour :
⇒ Reduction of 0.6 tons of CO₂ per hour
- 1 MW increase in wind
=> Reduction of 0.4 tons of CO₂ per hour
- Supply and demand measures are not equally effective – wind 33% less effective in terms of CO₂ reduction



□ Costs:

- Smart meters cost €219 per meter installed
=> Total for all households: €322 million
- For €322 million could install approx 200 MW wind (SEAI cost estimates)
 - With load factor of 29% => 508,100MWh
- To get similar MWh savings from smart meters need approx 2% average load reduction.
 - Smart meter trial showed average of 2.5%
- For same installation costs, potentially larger CO₂ return from smart meters



- ❑ Other papers
 - ❑ Interconnection
 - ❑ Retail customers
 - ❑ Impact of UK carbon policy on Irish market
 - ❑ Replacing Moneypoint timing
 - ❑ RES-E incentive design
 - ❑ Carbon emissions
 - ❑ Regulation – governance, market design
 - ❑ Wind export potential





Policy and Social Studies

Eleanor Denny
Strand Lead



TRINITY
COLLEGE
DUBLIN



- Overview of direct personnel
 - 3 post-docs (TCD): Aravena, O'Mahoney, Farrell
 - 4 PhDs (ESRI & TCD): Murray, Carroll, McCoy, Hyland
- Others: Di Cosmo, Curtis, Lynch



- Main research themes:
 - Customer behaviour & pricing
 - Social acceptability & externalities
 - Estimating 'Willingness to pay'
 - Societal benefits of RES-E

- Currently 18 ongoing pieces of research work
 - Overview of two
 - James Carroll (PhD student)
 - Gary O'Callaghan (Siemens Ireland)



- Household willingness to pay for electric vehicles (Aravena, Denny 2013)
- Pilot with 200 responses
- Now rolling out National Survey

- What do people value most about vehicles?
 - Characteristics of car & policy measures
- Stated preference survey with choice sets:



	Electric Vehicle 1	Electric Vehicle 2	Conventional Fueled Vehicle
Driving range on full battery	100 km	200 km	300 km
Battery charging time	6 hours	8 hours	Electric battery not needed but 15 min to fill the tank in a petrol station.
Battery life	12 years	5 years	-
Reduction in CO₂ emissions	30%	50%	0%
Permission to drive in bus lane	Yes	No	No
Street Parking policy	30% off normal price	50% off normal price	Full parking charge
Cost of driving on toll road	50% off normal toll	Free toll	Full toll charge
Purchase Cost	€20,000	€25,000	€ 15,000
TICK YOUR CHOICE			

- Repeat with numerous choices changes

- Can estimate what value people place on each of the characteristics.

- From the pilot, most important attributes:
 - Driving range - €23 per extra km
 - Battery life - €245 per extra year
 - Battery charging time - €464 per reduced hour
 - Policy measures were least important characteristics

- Hedonic valuation of disamenities from wind turbines (Murray, Lyons, Denny 2013)
- Public concerns?
- GIS map of all wind turbine locations and house locations
- Housing data from Property Register and Daft.ie database
- Estimate the impact of wind turbines on house prices



□ James Carroll – retail trial



□ Gary O’Callaghan
– An Enterprising Wind

SIEMENS

IWEA
Irish Wind Energy Association

- *Increasing Efficient Appliance Purchases through Lifetime Consumption Costs* (Carroll, Denny, 2013)

- **The Problem:** The Energy Efficiency Gap
 - Energy Savings > Capital Costs
 - Missed Profitable Investments
 - Result: Over Consumption

- **Understanding the Gap**
 - 1. Imperfect Information
 - 2. Asymmetric Information
 - 3. Uncertainty
 - 4. Inattention
 - **Result:** Heavy discounting of energy savings and/or no NPV calculations

□ The Trial

- Reduce 1-4 by providing lifetime monetary consumption costs
- Appliances: Dryers, TVs and Fridge-Freezers
- Retail data



BOSCH WAQ24461GB

Ten Year Energy Use/Cost

1790 kWh = €340

(Actual costs vary according to use)

This is an estimate based on:

- this unit's energy rating – 1.9 kWh per cycle (full load of cotton at 1000 rpm)
- 800 KG of clothes per year (2.2 full loads per week)
- no increase in electricity prices (19 cents per kWh for the next ten years)

			PERIODS/LABELLING	
			Benchmark (July-Aug)	Trial (Sept-Oct)
GROUPS	CONTROL	20 non-treated outlets	<i>no change</i>	<i>no change</i>
	TREATMENT	4 randomly assigned	<i>no change</i>	<i>10 year labels</i>

- **Data:** Unit sales, product characteristics
- **Progress:** preliminary trial started May 1st

□ **Methods:**

- Compare efficiency Change
- Econometrics: diff-in-diff

□ **Outputs:**

- Possible redesign of labelling requirements

