Centre for Energy and Environmental Markets

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DISTRIBUTIONAL EFFECTS OF THE AUSTRALIAN RENEWABLE ENERGY TARGET (RET) THROUGH WHOLESALE AND RETAIL ELECTRICITY PRICE IMPACTS

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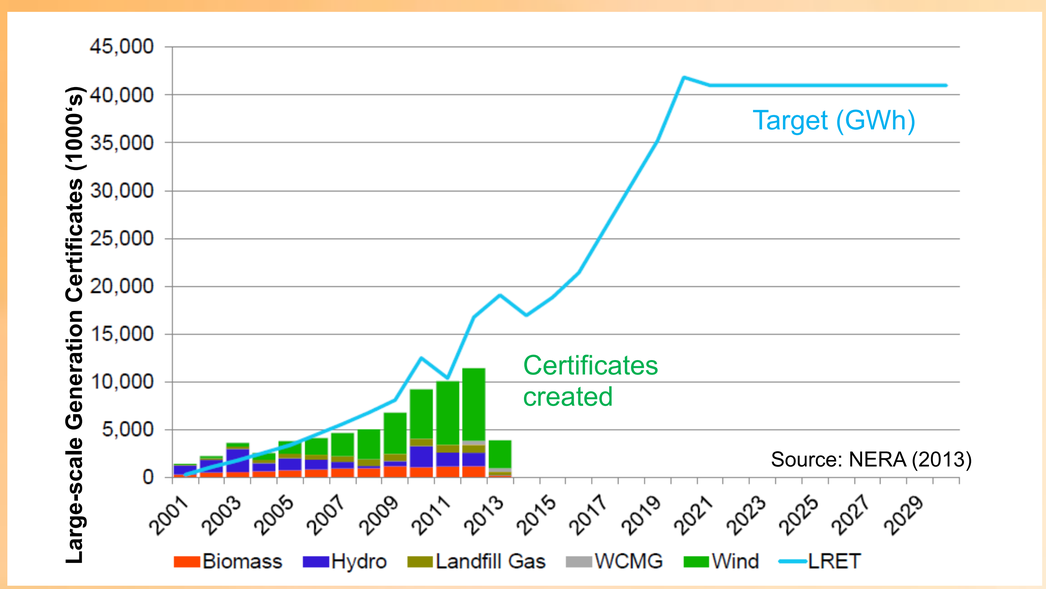
The Australian Renewable Energy Target

- **Goal: 20% of electricity demand met by RES by 2020**
- **Review of RET currently underway —> Future uncertain**
- **Separate large-scale (LRET) and small-scale (SRES) schemes**
  - ⇒ This research: Focus on LRET
- **Liable parties (mainly retailers) must purchase certificates on the market**



Distributional Effects of the RET

Benefit

- **Wholesale prices lower due to merit order effect of wind generation**

Cost

- **Retail prices increase due to cost of policy being passed through to consumers**

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- **Net effect depends**
  - ⇒ Exemptions for industry ***Policy design***
  - ⇒ Pass-through of costs and benefits ***Wholesale and retail market design and structure***

The Merit Order Effect of Wind

- **Time-series estimation of merit order effect of wind generation in the Australian National Electricity Market (NEM)**

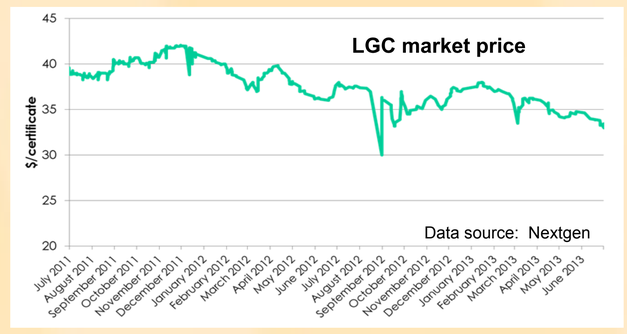
$$\ln(price_t) = c + \gamma \ln(price_{t-1}) + \alpha_1 wind_t + \beta_1 demand_t + \sum_j \mu_j S_{jt} + \eta_1 W_t + \varepsilon_t$$

  - ⇒ Volume-weighted average price (truncated to reflect 'normal operating conditions')
  - ⇒ Dependent on total demand (assumption: inelastic in the short-run), wind feed-in, seasonal and weekend dummies
  - ⇒ Tobit model employed

2011-12				**2012-13**			
R-squared		0.6594		R-squared		0.5301	
Root MSE		0.1908		Root MSE		0.2078	
Observations		17,568		Observations		17,520	
	Coefficient	S.E.	t-stat		Coefficient	S.E.	t-stat
Price (t-1)	0.587338	0.006109	96.140	Price (t-1)	0.577430	0.007144	80.83
Wind	-0.000060	0.000005	-12.530	Wind	-0.000039	0.000005	-7.48
Demand	0.000030	0.000001	23.600	Demand	0.000032	0.000001	22.31
Constant	0.791780	0.033021	23.980	Constant	1.062013	0.039886	26.63
Add. Controls: Dummies for seasonal trends and weekends							
Total MO Effect	**-2.30**	**$/MWh**		**Total MO Effect**	**-3.29**	**$/MWh**	

Indicative LRET Costs

- **LRET costs for a retailer ($/MWh) = Renewable Power Percentage x Certificate price ($/MWh)**
- **Indicative LRET costs: Weighted average of LRET allowance in regulated retail tariffs**
  - ⇒ 3.38 $/MWh for 2011-12
  - ⇒ 5.29 $/MWh for 2012-13



- **Industry exemptions (equ. to ~15% of demand)**
  - ⇒ 90% highly emissions intensive (esp. Aluminium)
  - ⇒ 60% moderately emissions intensive

Indicative Net Effects ($/MWh)

2011-12		Pass-through RET costs 100%	40%	10%
Pass-through merit order effect	0%	3.38	1.35	0.34
	50%	2.23	0.20	-0.81
	100%	1.08	-0.95	-1.96

Small customer on regualted tariff

Large customer on negotiated tariff

Large exempt user

2012-13		Pass-through RET costs 100%	40%	10%
Pass-through merit order effect	0%	5.29	2.11	0.53
	50%	3.64	0.47	-1.12
	100%	1.99	-1.18	-2.77

- **Impact highly dependent on assumed pass-through rates**
  - ⇒ Household price likely to rise
  - ⇒ Exempt industry price likely to fall ...*at least in the short-run*

The Role of Regulators

- **Pass-through of merit order effect into regulated retail prices depends on methodology of estimating wholesale costs**
  - ⇒ Standalone Long-run Marginal Cost (LRMC) approach fails to adequately consider impact of renewables on wholesale price
  - ⇒ Move to market-based methods in a number of jurisdictions

Political Implications

- **Benefits and costs of RET could be distributed more equally**
  - ⇒ Merit order effect likely overcompensates emissions intensive industry for contribution to cost of RET
  - ⇒ Costs to households could be reduced if exempt industry contributed to a larger extent and ...
  - ⇒ ... if methods for calculating wholesale costs in regulated retail tariffs reflected merit order effects

Limitations

- **Long-term effects**
  - ⇒ Retirement of generation as a result of expansion of wind
  - ⇒ Investment in generation / network capacity
  - ⇒ Environmental and energy security benefits

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