



UNIVERSITY OF
CAMBRIDGE | Electricity Policy
Research Group

Climate Change and Energy Regulation in a Global Context

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Outline

- The traditional regulatory model
- Drivers and premises of future regulation
- The impact of a Global Deal
- Potential for Renewables/Emissions Trading
- Regulatory governance in developing countries
- Role for Global arrangements

The Traditional Best Practice Regulatory Model

- Competition in wholesale market
- Competition in retail market
- Regulation of network services via CPI-X
- Additional incentives for quality of service and loss reduction

- Private ownership model
- Separate regulation of electricity and gas

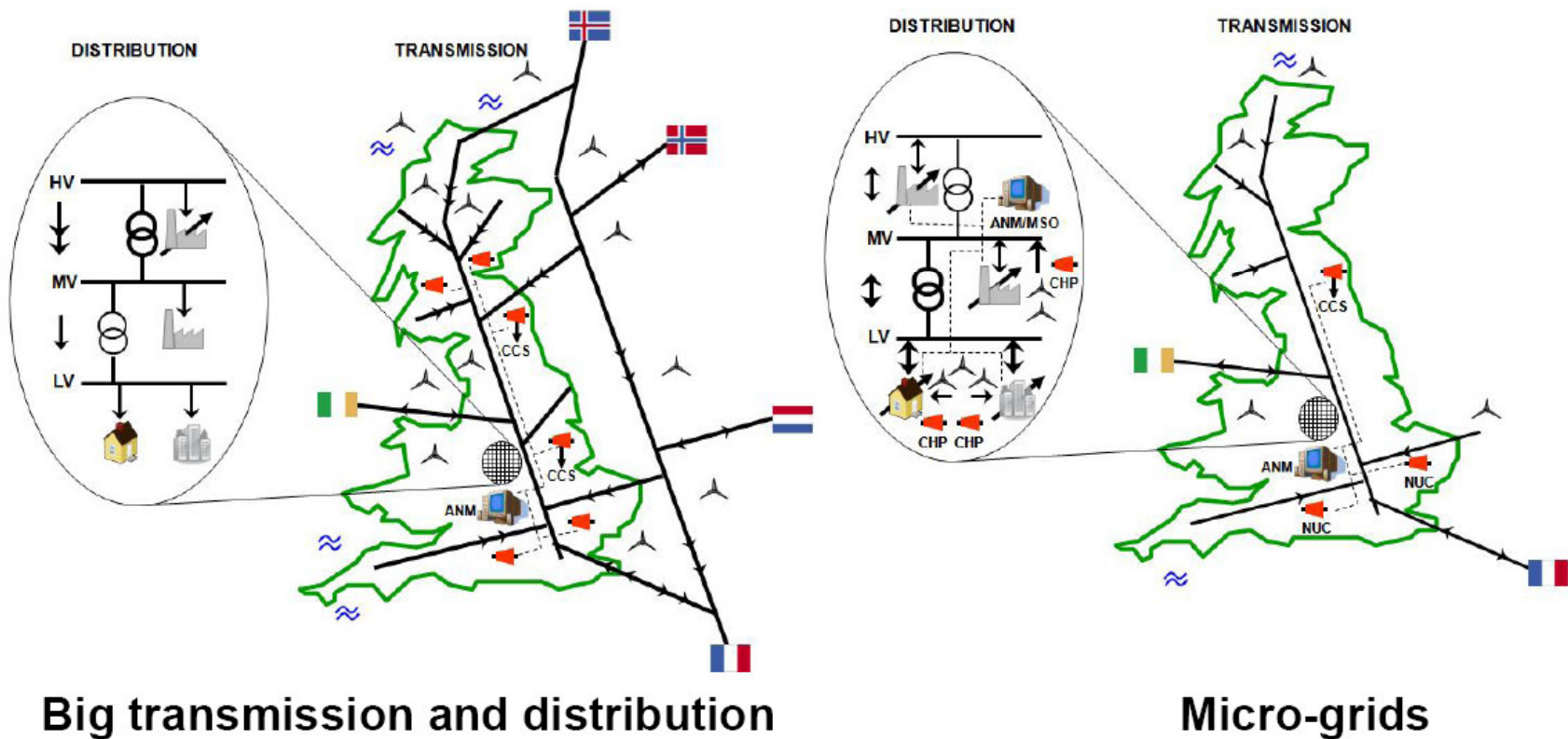
Drivers of Change

- Rising investment requirements
- Growing concerns about fossil fuel supply
- Increasing intermittent renewables on system
- Climate change policy set to tighten substantially
- Reality of climate change likely to lead to adaptation

Premises of future regulation

- Markets and incentive regulation can deliver
 - Competition in generation important
 - International trade can have large benefits
 - Incentive regulation of networks necessary
- Processes of regulation need to be improved
 - Smarter and more pro-innovation
 - Old measures of success unreliable
- Delivering emissions targets will be central
- Uncertainty high and good risk allocation important

Uncertainty about the Future: The UK power grid in 2050 (two scenarios)



See: Ault et al., 2008

What climate change means for sector regulation

- Regulation needs to:
 - Effectively internalise environmental externalities.
 - Focus on demand as being as important as supply.
 - Support new entrants as existing incumbents companies not sufficiently responding.
 - Engage with major local initiatives
 - Plan for large scale trials.
- Implies:
 - Close holes in regulation
 - Reorganise existing institutional responsibilities

A Global Deal on Climate Change?

Targets and Trade:

- 50 percent cuts in world emissions by 2050 with rich country cuts at least 75 percent.
- Rich country reductions and trading schemes designed to be open to trade with other countries, including developing countries.
- Supply side from developing countries simplified to allow much bigger markets for emissions reductions: **“carbon flows” to rise to \$50–\$100 billion per annum by 2030.** Role of sectoral or technological benchmarking in “one-sided” trading to give reformed and much bigger CDM market.

Funding Issues:

- Strong initiatives, with public funding, on deforestation to prepare for inclusion in trading. For \$10–15 billion per annum could have a programme which might halve deforestation. Importance of global action and involvement of IFIs.
- Demonstration and sharing of technologies: e.g., \$5 billion per annum commitment to feed-in tariffs for CCS coal could lead to 30 new commercial size plants in the next 7–8 years.
- Rich countries to deliver on Monterrey and Gleneagles commitments on ODA in context of extra costs of development arising from climate change: **potential extra cost of development with climate change upward of \$80 billion per annum.**

(Stern, 2008, p.31)

Memo Items

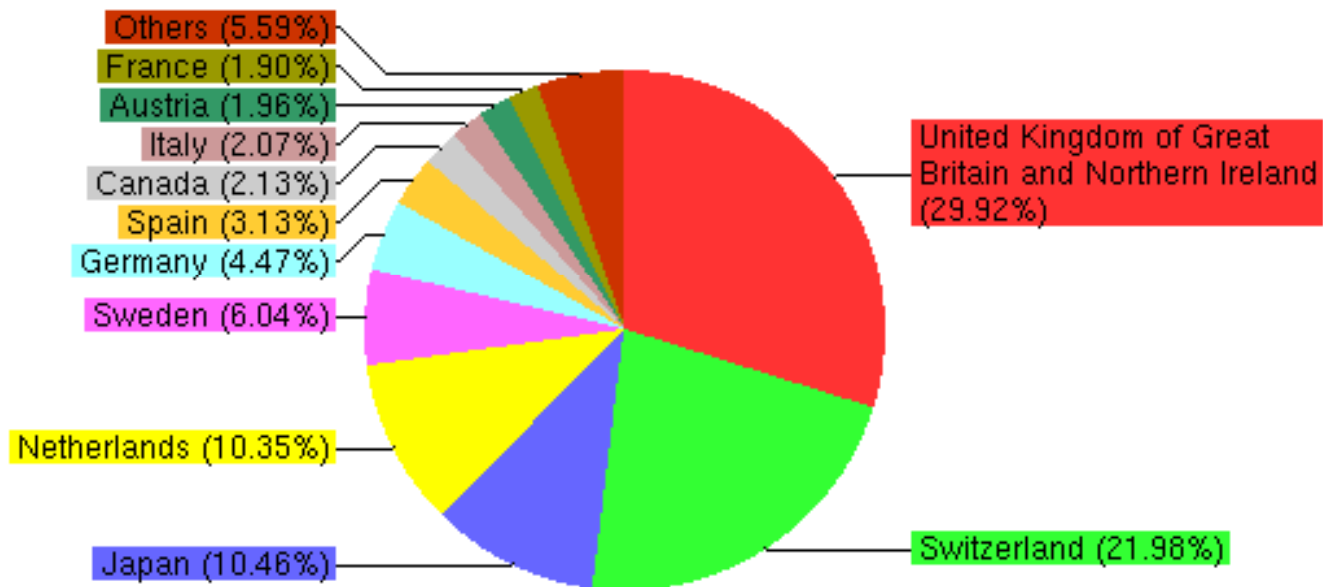
- Level of Development Aid: \$100bn p.a. (2007)
- CDM flow: c.\$6bn p.a.
- Global CO2 equivalent emissions: c.50000mt (2004)
 - Of which US: 7300mt (2007), UK: 637mt (2007)
- Global Electricity Demand: 17300 TWh (2005)
 - Of which US: 3659 TWh (2006), UK: 382 TWh (2006)
- World GDP: \$54,000 bn at nominal e/rs (2007)
 - Of which US: \$13,800 bn; UK: \$2,800 bn

Regional Emissions Markets

- EU ETS (operating since 2005)
 - 1800m CO2 EUAs (50% of CO2, 40% of CO2e) in market
 - Say 10% coming externally
 - ~\$6bn p.a. at 30 euro per tonne
- US Scheme (Obama proposals)
 - 7300m CO2 equivalent units in market
 - Say 5% coming externally
 - ~at \$5 bn p.a at \$10 per tonne
- Mechanisms for extra-territorial trading:
 - CDM – clean development mechanism
 - Imports of renewable electricity

Current CDM Purchasers

Registered projects by AI and NAI investor parties

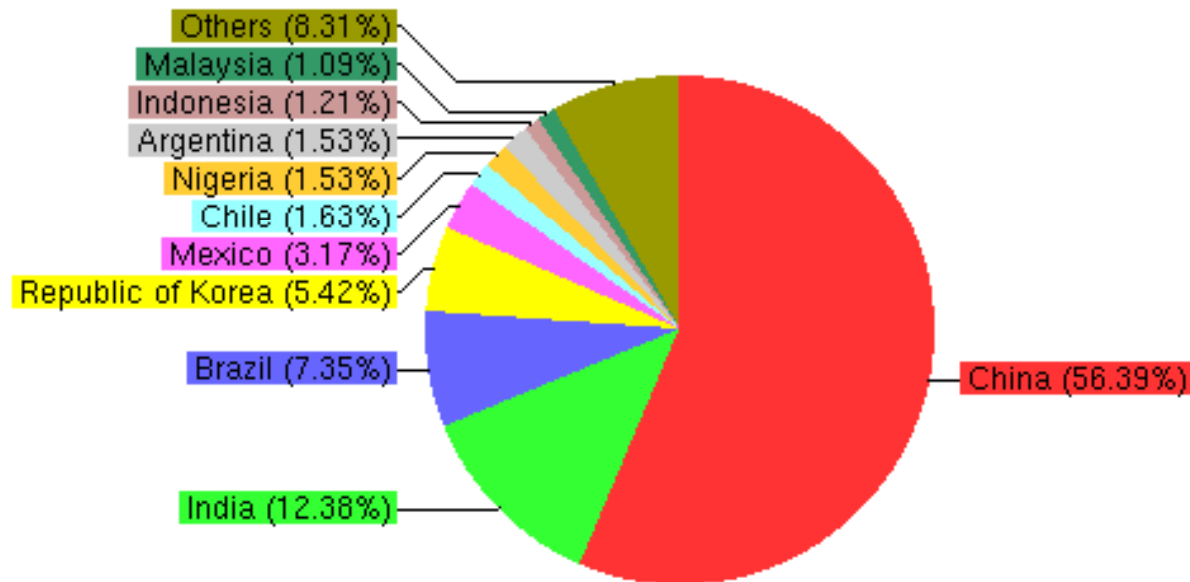


<http://cdm.unfccc.int> (c) 11.03.2009 18:53

By number of projects
Total projects - 1448

Current CDM Providers

Expected average annual CERs from registered projects by host party. Total: 269,668,620



1 CER = 1 tonne of CO₂

Current market ~0.5% of global emissions

<http://cdm.unfccc.int> (c) 11.03.2009 18:52

Potential for Emissions Trading between developed and developing countries (Stern, 2008)

- Assume:
 - Developed countries cut 20-40% on 1990 by 2020
 - 30% (2-3000m tonnes CO₂e) purchased from developing countries.
 - Price \$10-25 per tonne
- Implies:
 - Flow \$20-75bn by 2020, increasing thereafter.

Potential for Renewable Electricity Trading

If Saudi Arabia sold 2000 TWh p.a. at 5c per KWh, sales would be \$100bn relative to GDP of \$380bn in 2007. (1TWh=10⁹ KWh)

Country	Economic potential (TWh/y)	Coastal potential (TWh/y)
Algeria	169 000	60
Libya	140 000	500
Saudi Arabia	125 000	2 000
Egypt	74 000	500
Iraq	29 000	60
Morocco	20 000	300
Oman	19 000	500
Syria	10 000	0
Tunisia	9 200	350
Jordan	6 400	0
Yemen	5 100	390
Israel	3 100	1
UAE	2 000	540
Kuwait	1 500	130
Spain	1 300	70
Qatar	800	320
Portugal	140	7
Turkey	130	12
Total	620 000 (70 000 GW)	6 000 (650 GW)

Solar (concentrating) potential of Different countries (MacKay, 2008, p.180) 14

Issues for sector regulators in developing countries

- New wave of foreign investment possible.
- This investment requires technical expertise and the rule of law.
- Existing quality of property rights protection and market governance will be tested.
- CDM projects may induce rebound effect and also result in rent collection (Neuhoff, 2009).
- Drivers of CDM and non-CDM investment may conflict e.g. desire for grid extension.
- Local power management issues due to extra renewables or generation for export.
- Possibly separate governance arrangements for internal market and market for exports (Rodrik, 2008).

Competition and Cooperation

- All countries have interest in tackling global warming.
- There is a need to set aside traditional concerns about national energy security and consider global climate security.
- Any global deal relies on well-regulated market based solutions.
- Competition within energy markets and widespread trading necessary to supply low carbon sources at low cost.
- Cooperation required to accommodate needs of global trading system and domestic market.
- This means a clash of world prices and internal prices common to much trade liberalisation.

Role for Global Governance

(see Goldthau and Witte, 2009)

- **Regulation required** to ensure global trading in renewable energy and permits can work.
- **Energy still beset by security of supply concerns.** A global market for gas still missing and may be important in short run.
- National and international rules differ, conflict and are unclear.
Standardisation necessary.
- **Further liberalisation of related markets required** e.g. ethanol classified as agricultural good vs biodiesel classified as industrial good.
- **WTO / UNCTAD may have role** in opening up trade in electricity, biofuels and carbon credits.
- **Border tax adjustments** (on non-participants) and **state aids** (to help with adjustment) may be necessary but need policing.
- **Optimal action required to occur soon**, starting high and diminish over time as all countries adjust.

References

- Ault, G., Frame, D. and Hughes, N.(2008), *Electricity Network Scenarios in Great Britain for 2050, Final Report for Ofgem's LENS project*, London: Ofgem.
- Goldthau, A. and Witte, J.M. (2009), 'Back to the future or forward to the past? Strengthening markets and rules for effective global energy governance', *International Affairs*, 85 (2), pp.373-390.
- MacKay, D. (2008), *Sustainable Energy - Without the Hot Air*, Cambridge: UIT.
- Neuhoff, K. (2009), *International Support for Domestic Climate Policies*, EPRG Working Paper, No.0907.
- Pollitt, M. (2008), 'The Future of Electricity (and Gas) Regulation in Low-carbon policy world', *The Energy Journal*, Special Issue in Honor of David Newbery, pp.63-94. Available at <http://www.ofgem.gov.uk/Networks/rpix20/forum/Documents1/1a.pdf>
- Rodrik, D. (2008), *Second-Best Institutions*, Harvard University, Mimeo.
- Stern, N. (2008), *Key Elements of A Global Deal on Climate Change*, London School of Economics.
- Stern, N. (2008), 'The Economics of Climate Change', *American Economic Review*, Papers and Proceedings, Vol.98 (2), pp.1-37.