Contracting with Government for low carbon technologies: Designing the Visible Hand

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Long-term contracting in electricity markets

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Outline

• What market failures need addressing?
• State aid guidance on correcting market failure
• Why are long-term contracts needed?
  – What form should they take?
  – How do different models compare?
• How should they be financed?
Correcting market failures

- **ETS** to price CO\(_2\)
  - to support *mature* low-C options
  - fixes quantity not price => poor guide for low-C
- **20-20-20 Renewables Directive:**
  - demand pull for *not-yet-commercial* renewables
  - justified by learning spillovers and burden sharing
- **EU Strategic Energy Technologies (SET) Plan**
  - to double 2007 R&D spend
  - R&D to support *less mature* low-C options
Carbon prices have crashed
EUA price October 2004-March 2013

Source: EEX
Failures of ETS

• Current ETS sets quota of total EU emissions
• 20-20-20 Renewables Directive increases RES
  => increased RES does not reduce CO₂
  => reduces carbon price
  => prejudices other low-C generation like nuclear
• Risks undermining support for RES

  Solution: fix carbon price instead of quota

  Plan B: each country has carbon price floor
The case for a carbon tax

• Each country imposes a Carbon tax
  – tax bads not goods as part of fiscal adjustment
  – rebated by EUA price for covered sector
  – can start low: €20/t CO₂ and escalate at 5% p.a.
    above RPI = €34/t by 2020

• Tax can finance research and renewables

Message: setting a carbon tax is better than trading carbon permits
UK’s Carbon Price Floor - in Budget of 3/11
EUA price second period and CPF £(2012)/tonne

Corrective tax
Forward prices

Source: EEX and DECC Consultation
State aids

• DG COMP’s State aid guidelines designed to prevent market distortions
  – to be updated for energy 2014

• intervention justified by irreparable market failures

• Test of intervention: “is the aid measure proportional, namely could the same change in behaviour be obtained with less aid?”

• So what market failures justify Government contracts?

• and what form should they take?
Low-C market failures

- Carbon price too low; hard to reform ETS
  => country-specific Carbon Price Floor
    - but that distorts trade
    - and is not credibly durable without contractual underwriting
- What about a Government subsidy?
  - not credibly durable without contractual underwriting
- RES not commercial even with adequate C price
  => devise additional support for RES
  => a premium FiT, a fixed price FiT or CfD?
  => which is most efficient/least cost?
Long-term contracts

- CO$_2$ price unpredictable, CPF not credible
- Electricity prices risky to non-fossil gen

=> long-term contract enforceable in courts

- but technologies differ and so should contracts
  => simple FIT for on-shore wind
  => tender auctions for wind?
  => CfD for nuclear, subsidy to capital for demo CCS?

Need satisfactory counter-party = Government

Need to adapt contract to technology
Prices for base-load 2010 delivery

Correlation of coal+EUA on gas+EUA high

Source: Bloomberg
Contract design

- Efficiency => least total system cost
  => including costs for transmission, balancing, inertia, etc
- least cost to consumers => avoid excessive rent
  - wind resource varies with location

Solution A - PFiT: efficiently price all costs, pay fixed premium per MWh, otherwise leave to market (UK)

- Problems: hard to locationally price extra T for wind
  - after location choice, wind & PV are largely uncontrollable
  - forecasting more efficient if aggregated
  - balancing markets often imperfect, costly for small firms
  - market risk raises cost of capital, discourages entry
Support to Wind under the ROC Scheme (real prices)

Sources: APX, Ofgem
CfD (UK model)

- Government announces strike prices and annual subsidy limit
  - uniform by technology (except Island wind), set 2014-17
  - runs in parallel with ROCs (pFiTs) to 2017
  => has to be made as attractive as ROCs
  => comparable rate of return (rather high for on-shore wind)
  => undermines logic of lowering cost by lowering risk
  => relies on locational grid signals (still under discussion)
- may lead to tender auctions if levy control breached
  => could then lead to better market-led outcome
Feed-in tariffs

- Pay fixed price per MWh for $n$ years (DE)
  - measure output for three years to estimate market revenue
  - $n$ set to cover excess cost relative to market revenue
    - low in windy places extracts (share of) excess rent
  - requires good locational signals for transmission costs
  - SO responsible for dispatch, weather forecasting etc
- **Auction** for FiT to connect to specified grid points
  - TSO assess all extra costs (transmission balancing etc)
  - developers assess local RES resource, choose best site, specify price level, contract length, constrained off payment
  - SO select least cost to system; developer pays local connex
Immature low-carbon

- CCS and wave/tidal stream at pre-deployment stage
  - arguably off-shore wind as well
- need demo plants to assess cost and more R&D
- What is the best form of support?
- Competition - as for CCS, with support for major risk
  -> capital subsidy with large cost share
- arguably also appropriate for first nuclear plant
- Competition for R&D projects
  - need criteria to select and terminate
How should they be funded?

- Reducing carbon, creating learning and knowledge are all **PUBLIC GOODS**
  
  => finance out of public funds, **not levies** on electricity

- current policies exempt some industries in some countries from such levies
  
  – legally discriminatory, violates State aids, DG COMP cross

  => Solution = ALL industry should be exempt from distortionary taxes => fall on final consumers (VAT)

**Make Energy policy consistent with good public finance**
Conclusions

• Long-term contracts needed as no credible futures markets for corrective carbon tax

• Near-market renewables needs extra support
  – long-term contracts hedge political risk
  – contact design needs improvement
  – auctioned contracts better if adequate competition

• Immature technologies need targeted competitively bid support

• Subsidies should come from general taxation
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Acronyms

CCS  Carbon capture and storage
CfD  Contract for Difference - pays (charges) difference between strike price and reference market price
CPF  carbon price floor
ETS  Emissions Trading System
EUA  EU Allowance for 1 tonne CO₂
FiT  Feed-in tariff
pFiT Premium FiT
RES  Renewable Electricity Supply
ROC  Renewable Obligation Certificate
SC  Scotland
SO  System Operator
T  Transmission
TSO  Transmission System Operator
TEM  Target Electricity Market