Long-Term Efficiency in Decentralized Electricity Markets:
The Need of Adaptation of Institutions and industrial Organisation

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Introduction

– Focus of the reforms: market rules and to a lesser extent on the industrial organisation
  • Forget the investment issue
  • General situation of overcapacity in Europe (except Italy, Spain)
  • Market has all the virtues in such a situation

– Focus of the presentation

  • Flaws of the decentralised electricity market

  • Disincentives to invest in generation in the good mix of equipments and in a timely way to limit high price volatility

  • Needs of long term contracts and vertical integration

  • Annex question: Vertical integration with market concentration
1. Investment in the decentralised electricity market

1.1. Reference to the standard competitive model in electricity

- Restriction on long term contract
  - between producers/wholesale buyers
  - between suppliers and large customers

- Restriction to market concentration (divesture)

- Reference business model in generation: Merchant plants
• Investment and confidence in the market signals:

  – timely investments and capacity development towards optimal mix benchmark

  – Market price is a combination of short term marginal cost (energy price) and scarcity rent (power price) (with perfect competition)

  – Large revenue during peak period over the marginal cost for capital intensive equipment

  – Investor Risks: manageable by long term forward and portfolio

• Confidence of lenders to merchant plants: project finance with high leverage (20% equity; 80% debt)
1.2. Limitation of the decentralised market model for generation investment

- **Cyclical effects of uncoordinated investments:**
  - Failure of the merchant plant model
  - After *power price downturn and gas price doubling*, bankruptcy of entrants in the USA (Northeast).
  - Needs of downstream supply business to share risks

- **End of the wave of IPP projects backed to long-term PPAs** with the ending of the franchise in **Britain**

- **After 2001, No confidence of traders and banks in the foreseeability of the electricity market price**
  - Hard conditions for bankability of projects (need of PPA)
  - Corporate financing to company with diversified portfolio
1.3. Four institutional and market failures for investment in electricity markets

I. Inherent: Complexity and continuous adaption of market rules

Exogeneous: CO2 regulation, licensing and siting

II. Long term market power

• Self-Interest in a « wait and see » attitude
• Barriers to entries (problem of independent)
• Price effects (higher surplus)

III. Specific risk for peaking units investment:

• Level of price and large volatility (demand elasticity, market power)
• Duration of peak
• « Missing money » and collective good
  – Reserve margin and adequacy conditions of short term reliability
iv. Great difficulty of lisibility of the spot and futures markets in terms of scarcity signal

Specific risk = radical uncertainty

- no counterpart for financial contracts,
- no long-term forward
- Consequence: Sub optimal investment in time and mix
1.4. TCE perspective on difficulties to secure generation investments

• Reluctance to contract up to one or two years:
  – Risk aversion of the suppliers/large consumers
  – Interpretation in terms of opportunism

• If long term contracts is possible, risk of suppliers opportunism:
  in case of wholesale price downturn:
  • break of contracts with producers to avoid entries and loss of market share
  • Risk of bankruptcy (TXU-Europe)

• Regulatory restriction on long term contracts: Regulator’s « opportunism »?
  – To privilegiate short term regulation to long term efficiency
2. Needs of vertical integration and long term contracts

- **Investors seek protection for this type of risk**
  - Through long term contracts
  - Through vertical integration

- **Conditions of the stability of the model:**
  - Limiting the risks of opportunism of buyers by institutional conditions
  - Suppliers « transform » short term forward contracts in retail in long term contracts in their wholesale purchase

- **need of important quasi-captive markets**
  - Consumer franchise with regulated tariffs (Cost pass-through) (Green 2002, Newbery, 2004)
  - or Sticky customers (Joskow, 2006)
2.1. Long-term contracts associated to new equipment

- **Need of long term contracts with fixed price:**
  - no indexation on the spot price
  - Indexation on the fuel price (risk on the buyer)

- **Contracts with large consumers,**
  - **Scheme one: Association producers – industrial consumes**
    - Hostages with common subsidiary
    - Use of secondary fuel or use of cogenerated heat
  - **Scheme two: consortium/cooperative of buyers**
    - Long term commitment: definition of terms of the exit
    - Problem with competition rules?
    - Exemple Exeltium (35 TWh/y; no link with a new equipment, ref price of nuclear plant 35€/MWh)
  - **Limits of the opportunities of large contracts**

- **Contracts with suppliers and feasability**
  - Central problem when divergence between contractual price and spot price
2.2. Long term contracts generator- supplier versus Vertical integration

- **TCE**: not identity of vertical integration and long term contract

- **Contracts with large suppliers**:
  - several parties share the risk
  - transactions costs

- **Vertical integration**
  - Monopsony power of buyers is suppressed
  - Low transaction costs between divisions

  - **One firm bears the risk**:
    - Balancing risks between upstream and downstream activities
    - Easier way to transmit wholesale price move to consumers or conversely to slow down the wholesale price downturn

- **Note that increasing trend to vertical integration**:
  - Dynamic evolution towards less spot market transactions because less and less liquidity
2.3. Vertical integration and horizontal concentration

- Large sized companies and scale economies:
  - Portfolio of different types of assets
  - Ability to operate in different markets (compensation of market risks)
  - Better financing conditions:
    • Corporate financing instead of project financing
  - Capacity of controlling investment cost:
    • large contracting with electrotechnical industries
    • Engineering capacity
  - Capacity of control of input costs (diversification towards gas)

- Use of market power:
  - confer sufficient market power to increase the price-cost margin to the point that investment becomes attractive
• Two models of large sized companies
  – US model and dispersion of generation between several markets
  – European model and concentration in national basis

• Effective risk of abuse of market power if market concentration
  – Undue high price
  – Voluntary delay in the decision to invest
  – Use of the surplus for stockholders or diversification or M&A

• Solution?
  – Contestability by foreign producers if integration but but problem of the multi-market competition
  – Discipline under of the treat of entries (barriers, need of marketing business)

• Need of strong regulatory surveillance

• Risk of regulatory capture
2.4. Some rapid empirical proofs

Main frameworks of investment in generation since liberalisation:

- **Long term contract with efficient risk sharing**
  - CCGTs in UK: long term contracts with former RECs consumers franchise
    - Finland: TVO’s Nuclear plant:
      - contracts with papermills and distributors which are owners of TVO

- **Alliances suppliers and entrants:** Verbund & Poweo in France

- **Vertical integration with franchise or base of sticky consumers**
  - Spain, Italy,
  - American markets and now UK

- **Vertical integration and market concentration with weak competition:**
  - Spain, Italy, with CCGTs
  - France with the new nuclear plant Flamanville
  - New CCGT and coal investment in Germany
<table>
<thead>
<tr>
<th>Country</th>
<th>Market share in production Top 1</th>
<th>Market share in production 2004 Top 3</th>
<th>Market share in supply-distribution Top 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>85%</td>
<td>95%</td>
<td>90%</td>
</tr>
<tr>
<td>France</td>
<td>87</td>
<td>96%</td>
<td>88%</td>
</tr>
<tr>
<td>Germany</td>
<td>30</td>
<td>72%</td>
<td>50%</td>
</tr>
<tr>
<td>Italy</td>
<td>55</td>
<td>65%</td>
<td>35% / 95%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>25</td>
<td>69%</td>
<td>88%</td>
</tr>
<tr>
<td>Spain</td>
<td>40</td>
<td>69%</td>
<td>85%</td>
</tr>
<tr>
<td>Sweden</td>
<td>45</td>
<td>79%</td>
<td>70%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>15</td>
<td>39%</td>
<td>60%</td>
</tr>
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3. To conclude

• Is time not coming for leaving pure market doctrine?
  – Re-focus on long term issues rather than only efficiency of market rules

• To recognise that energy investments are « sunk costs » in risky environment
  – need long term contracts and vertical integration

• Tensions with competition principles
  • Hypothesis of big competitors’ benevolence

  • Equilibrium between the regulatory threat (mandatory divestiture) and the oligopoly power

• Regulators’ acceptability: Acceptability will be associated to IEM realisation

• Difference between the market culture in the different countries
ANNEX 1.
Characteristics of generation investment

• Large upfront investment and Long lived equipment

• Traditional uncertainties
  • Fuel prices, technological costs, demand development

• An new environment of uncertainties (market, quantity risk, regulatory risk)

• Impact of cost of capital : (From 5% to a WACC of 10-12%)

• Risk aversion to capital intensive equipment : focus on CCGT with risk exposure
<table>
<thead>
<tr>
<th>Technology</th>
<th>Capital Size per unit</th>
<th>Lead time</th>
<th>Capital cost share</th>
<th>Fuel cost share</th>
<th>CO2 cost</th>
<th>Fuel price risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCGT</td>
<td>Low (€100-200 millions)</td>
<td>Short</td>
<td>Low</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Coal</td>
<td>Large (€700 millions)</td>
<td>Long</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Nuclear</td>
<td>Very large (€2-3 billions)</td>
<td>Long</td>
<td>High</td>
<td>Low</td>
<td>Nil</td>
<td>Low</td>
</tr>
</tbody>
</table>
Annex 2 Case study: institutional conditions to invest in new nuclear plants?

• Hypothesis: political and social acceptation (open decision making, acceptation of waste management, etc.)

• Basic conditions of nuclear investment: € 3 billion, long lead-time, series effect, regulatory risk
• **Scheme 1: Long term contracts with large consumers**
  – Finnish model …where consumers owns the power company and where vendors takes construction risk by a turnkey contract

• **Scheme 2: large sized and verticalized company with large base of sticky consumers**
  – French model

• **Scheme 3: what else in other models?**
  – Consortium of suppliers with long term contracts nuclear producers -suppliers
  – Imbalance of risks with the non–committed suppliers
  – Need of a nuclear obligation?