Designing the European Gas Market: More Liquid but Less Natural by Entry-Exit Zonal Tariff

Miguel Vazquez, Michelle Hallack and Jean-Michel Glachant
The problems we were trying to solve (in the EU)
One rarely finds the one-size-fits-all solution

Tariffs with reduced efficiency
Different cost allocation creates advantages to certain paths

Investment in the cross-border
Not obvious how to combine two zones as the simplification hides information

The EU regulatory path

The logic for that path
NIE: Trade-off efficiency vs liquidity

Capacity allocation in the cross-border
Contractual congestions and some remedies

Options
Central planning, auctions and open seasons
### Liberalization paths

**GB**
- **1965** – Discovery of large reserves in the North Sea
- **1986** – Gas Act. It opened competition in the industry through common carriers
- **1988** – Significant problems with access to transmission system
- **1996** – Network Code. Introduces entry/exit capacity charges

**US**
- **1935** – Public Utility Act. Unbundling of gas distribution
- **1938** – Natural Gas Act. It establishes private carriers
- **1992** – Commodities Clause. Unbundling of transmission

We were primarily concerned with access to pipelines…
The EU regulatory path

**First Directive:**
Principle of the single European gas market and timetable for market opening
nTPA or rTPA on the national transmission network
1998

**Second Directive:**
rTPA for national transmission network and LNG terminals
nTPA or rTPA for storage
Legal unbundling
2003

**Third Directive and Gas Regulation**
- Ownership unbundling or Independent System Operator
- Creation of ACER
2007

**Framework Guidelines**
Capacity Allocation, Gas Balancing, Interoperability and Tariffs
Released by ACER
2009

**Implementation of the Network Code**
by ENTSOG
2009

**Completion of the sector inquiry**
led by DG COMP
1998

**EU Third Package**
2007
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The logic for the model

- Gas systems are subject to significant asset specificity
  - The model is based on creating commercial networks
  - Which in turn creates an homogeneous commodity and hence lowers transaction costs
- This is a general strategy that is discussed in New Institutional Economics (Riordan and Williamson)
  - Specificity as a design variable
  - When you separate activities you reduce the specificity of trading gas
  - But you also reduce efficiency
- How much should I reduce?
  - In theory, only what one needs to avoid the need for vertical integration…
  - …But that depends on the estimation of the designer
The model in the short run

- Promoting liquidity sacrificing efficiency

Point-to-point with time flexibility

Simple Entry-Exit (without time flexibility)

Entry-Exit with time flexibility
Challenges of entry/exit systems

Capacity allocation

- Max capacity: 100 MW

- Injection commercial capacity up to 100 MW

- TSOs do not know the gas path in advance

- TSO can sell 200 MW entry capacity if ½ goes to Bologna and ½ to Torino
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Cross-border trading
Challenges of entry/exit systems
Possible remedies for cross-border trading

- Under entry-exit, system constraints are concentrated in definition of available capacity in the border
- Contractual congestion between the zones, as once within the zone the shipper has the right to use the system

<table>
<thead>
<tr>
<th>Proposals</th>
<th>Drawbacks</th>
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<tbody>
<tr>
<td>Market Merger</td>
<td>Higher socialization costs</td>
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<tr>
<td>Market Coupling</td>
<td>Separation of the capacity right and the right to use the network</td>
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Challenges of entry/exit systems
Spatial flexibility in tariffs

Tariffs cannot be cost-reflective

Gas through CD is subsidized by AD

Tariffs are calculated to represent such cost

I assume that all the gas exiting at XD comes from NA
Challenges of entry/exit systems
Spatial flexibility in tariffs in the cross-border

Zone B
- XG
  - Cost(GF)
  - Cost(HG)

Zone A
- NC
  - Cost(BC)

- NA
  - Cost(AB)
  - Cost(AD)

- XD
  - Cost(DF)
  - Cost(CD)

- ND

Receiving two subsidies (Anti-Pancaking)

Paying two subsidies (Pancaking)
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Investment in the cross border

- We have purposely created an untraceable commodity
  - So we have put gas networks very close to power networks
  - We know that cross-border trading of electricity is a serious challenge
- Distortions coming from tariffs are not easily solved in the short run
  - We do not have strong property rights
  - We need specific solutions for the long run
- Cost reflectivity
  - Difficulties to investment when costs are not efficiently allocated
- Capacity allocation
  - Lack of strong property rights makes difficult to implement non-centralized solutions
Outline

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• At some extent, central planning is going to have a role in the interconnection of the EU gas systems

• Since October, the EU has a list of Projects of Common Interest
  • Projects are subject to a selection process which can be viewed as centrally planned through member states, NRAs and the European Commission
  • That selection of capacity expansion projects will be subject to a cost-benefit analysis to be undertaken by ENTSOG

• In addition, TSOs are supposed to coordinate through the Regional Initiatives of the Ten Years Network Development Plan
Integrated auctions (GB domestic transmission), bundling entry and exit points

This approach needs an underlying costing model (for instance, LRMC) and a clear cost allocation policy between entry and exit points

It generally features ascending auction rounds by price block

There are no practical super-national examples of such auctions in the EU
In this case, the TSO does not run an auction for new or incremental capacity by price blocks.

Instead, it sets the terms and conditions of capacity expansion based on its own proposed models and put the plans forward to the industry.

The industry chooses:

- If it needs the capacity, they will contract in advance.
- If they do not need it, they will not contract.

Requirements:

- An investment and costing model must be prepared by the TSO(s).
- Prospective transportation tariffs must be known.
• Ideally, they represent a halfway between central planning and auction-based approaches
  • Complex expansions will be not easy to handle through auctions
  • Open seasons might be a solution
• In any case, market testing without regulatory certainty (or with different approaches on either side of interconnection points) will probably become problematic
Conclusions

- The need to interact with other entry/exit zones was never part of the plan
  - Congestion was summarized in the borders
  - Never meant to be computed in accordance to other zones

- Many of the additional problems in the cross-border comes from the fact that aggregating simplifications is difficult

- Implementing “American” solutions alone will not be enough

- A possible way forward is to coordinate that simplification as a part of the existing cooperation between European TSOs
Thank you

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Tariffs

- We first review the LRMC methodology
  - One finds significant difficulties
  - Most of them already found in power systems
- We then analyze possibilities for cross-border trades
The basic idea is to measure the incremental capital cost of an additional flow at either an entry point or an exit point.

Start with a ‘baseline’ level of supply and demand at all the exit points.

Measure the total distance that gas flows.

Increase flow at e.g. one entry point, and measure the change in total flow distances.

Convert this change in flow distance to a cost, using a £/GWh/km factor.
LRMC entry tariff methodology – how is it set? (1)

An example of LRMC determination:
LRMC entry tariff methodology – how is it set? (1)

+1 Supply at NA
+1 Demand at the reference node

It travels 100km to reach Ref
LRMC entry tariff methodology – how is it set? (1)

+1 Supply at NE
+1 Demand at the reference node

It travels 10km to reach XD
-1 will NOT travel from B to D (20km)
-1 from Ref to XB (50km)

10 – 20 – 50 = -60
LRMC entry tariff methodology – how is it set? (5)

LRMCs (km to) summary table:

<table>
<thead>
<tr>
<th>Entry points</th>
<th>Raw LRMC</th>
<th>No negative LRMC</th>
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<tbody>
<tr>
<td>A</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>E</td>
<td>-8</td>
<td>0</td>
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<tr>
<td><strong>Average</strong></td>
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