My wound is Argentina...

Expansion of Transmission by Market Participants in the World’s First LMP Market

Disclaimer: Opinions and ideas are my own, derived from experience under prior employers.

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Argentina: The First LMP Market

- Argentina implemented locational marginal pricing, with congestion and losses, in late 1992.

- In early 1993, I went to Argentina as part of a bid team to purchase hydroelectric plants.

  - There was no observable history, little data.
  - There were no market rules written in English.
  - There were no applicable handy industry acronyms. (ISO, LMP, FTR, etc.)
  - There were people being “truthful but not helpful.”

Note: Chile had earlier implemented pricing with locational loss adjustments, but without congestion.
Learned From the First LMP Market

- Importance of *marginal losses* in LMP
- Meaning of *congestion* in an LMP market*
- Implications of congestion pricing
  (violence, bloody wounds, pain, scar tissue...)
- The importance of LMP
to *Successful Market Design*

* Distinct from its meaning in the physical bilateral markets.
Learned from the First LMP Market

Transmission enhancements *can* be brought into being by market participants guided by locational pricing signals.

- LMP is necessary.
- LMP is *not* sufficient.
- FTRs may help, but FTRs are not enough.

Market structures beyond LMP are required.

- Specific assignment of transmission responsibilities among market participants
- Specific, rational process for project proposal and approval
- Regulatory mechanism for cost recovery, including allocation of costs to beneficiaries
Did Argentina pioneer Participant Funding?

- People using the term in the U.S. would likely say it does not apply to Argentina’s method.

- Transmission added under Argentina’s method becomes part of the regulated system.
  - Revenue Requirements recovered through tariff
  - Tariff allocates costs to beneficiaries
  - Transmission owners are not dependent on outcomes in the energy market (LMPs, FTRs)
  - Regulatory cost recovery makes projects financeable.

- The *proposal and approval process* is key.
Responsibilities of the Participants

**The Major Transmitter**
- Responsible for availability of its assets
- Responsible for operating transmission system
- Participates in technical evaluation of proposed projects
- Responsible for remunerating independent transmitters

**Independent Transmitters**
- Responsible for constructing projects to agreed-upon specifications
- Responsible for availability of their assets

**Users of the Network (Generators, LSEs, Large Consumers)**
- Responsible for proposing expansion projects
- Responsible for revenue requirements from projects
Process for Enhancing Network

- Feasibility study and full-spec proposal by market participants
- Approval study by Major Transmitter and ISO
- Determination of Beneficiaries
- Acceptance as a Project by ISO and Beneficiaries (70%)
- Project is put out for construct/own/operate bids.
- Revenue requirement allocation to Beneficiaries

Hydro, oil, gas

Hydro

Nuclear

Buenos Aires

800+ miles
Feasibility Study and Proposal

- Generators or Distributors suffer congestion costs or losses in an electric region.
- Those who would benefit from an enhancement create a consortium to seek technical solutions.
- Consortium commissions technical study of situation.
- Proposal, complete with “design, construct, & own” bid, is submitted to ISO.
- Proposal specifies long-term annual revenue requirements.
Approval Study by Major Transmitter and ISO

- ISO studies feasibility of the proposed project.

- The ISO determines global costs/benefits, negotiates changes.

- The ISO identifies all beneficiaries of the project.
Beneficiaries of a Transmission Project

- Beneficiaries are
  - producers whose energy prices will rise in response
  - distributors or users whose energy prices will drop

- Beneficiaries are important because they must
  - Agree that the project can go forward
  - Pay the fixed revenue requirements for the enhancement once it is built.

- Fixed revenue requirements are to be allocated by pro rata share of the project benefits*

* As Littlechild reports, they actually allocated by “transmission usage” rather than by “benefits.”
"Usage" is a peak-load flow-based allocator that can be disproportionate to cumulative benefits.
Acceptance by ISO and Beneficiaries (70%)

- The ISO determines global costs/benefits
- The ISO identifies all beneficiaries of the project

IF

- the project is beneficial to the system, and
- sufficient beneficiaries (70%) agree to allow it...

then the project is officially approved.
Construction Project Put Out for Bids

- The approved project is put out for competitive bids.
- Substitute competing projects may be proposed! (The ISO and Transmitter will have to study competing projects.)
- The project may be built, owned, and operated by an independent party unrelated to the original consortium.

Line owned by an Independent Carrier
The winning bid included annual revenue requirements.

The project must perform as promised to receive full revenue requirements.

The major transmitter collects the revenue requirements through the single system-wide tariff.

The tariff allocates fixed costs of the transmission system to all users through a load flow method and MW-mile rates.

(Note: The tariff rate/MW-mile is low relative to incremental construction.)

The tariff likely will not cover full cost of the new project.

The residual cost of the project is allocated directly to the project beneficiaries, pro rata to their benefits.
Comahue Transfer Limitation

500 kV
- Hydro
- Sub

2,600 MW Limit

Buenos Aires
Market Node

Fourth Line added by consortium in late 90s.

4,474 MW

Cerros
Colorados
El Chocón
Piedra del Aguila
Alicurá

400 MW

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Special Circumstances

- This market was designed and implemented, then divested by the government.
  - *Caveat emptor*: They won’t change the rules for you.

- There were strange legacy inefficiencies that could be explained only anecdotally.
  - This was not a coherent optimally planned system.
  - Conversion to a market with LMP set corrective forces in motion.
Re-emphasis:

- Only beneficiaries can propose and approve projects.
- Only beneficiaries (>30%) can block a project.
- Construction procured through a competitive process.
- Recovery of revenue requirements by the project owner is contingent on availability performance, not on power flows or prices. (Behaves very much like regulatory protection.)
- Projects can be project financed.
- No other special incentives are required.
- The ROE of a project is not known.
Difficulties with this Approach

- At first: Having market participants realize their leadership role in the process.
  - Eventually, consultants will be all over it.

- Getting agreement among beneficiaries
  - Broad consortium building is necessary

- Allocation of the benefits & costs:
  - based on forward-looking models
  - plenty of room for disagreement
  - how to re-allocate beneficiaries over time?