Transmission Investments and Markets

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Outline

- Background and History
- Public, monopoly or private good
- Who pays?
- What do you get?
- Investment incentives
Transitioning from planning and cost-based regulation to markets and market-based regulation
The politics of paradigm shifts and cultural shibboleths

“there is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its outcome, than to take the lead in introducing a new order of things”
Niccolo Machiavelli

It takes a decades to change a cultural paradigm. Williamson

Jargon traps you in the old system

Tipping point: Do you need a crisis?

Efficiency not competition is the end goal

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Could the Copernican model pass a cost/benefit?

1543: Copernicus claims the earth circles the sun then dies. Church doctrine: earth is the center of the universe. Galileo publishes the *Dialogue*. Agrees with Copernicus. Copernican model cannot answer all questions.

If the earth moves how do we stay on it?

Ptolemy's geocentric model is a better predictor.

(Does Ptolemy the patron saint of econometricians?)

fails benefits test!!!!!!! Heresy!

c. 1600: Kepler adds elliptical orbits to model

1642: Newton is born; discovers gravity

1835: *Dialogue* removed from the Index

pass after 300 years

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### Analogies and their problems

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Merger Policy

Pre-888

- open access “required”
- system optimization benefit studies
- post-888 policy
- initial decision in 150 days
- system optimization to competition
- vertical separation: join ISO
- post-RTO policy?
Order 888

- open access via functional unbundling
- e-commerce via OASIS
- ATC: available transmission capacity
- cost-based ancillary services
- stranded cost recovery: 100% of reasonable expectations
- ISO principles
- capacity reservation charge proposal
ISO Principles
(for control area operators)

- Non-discriminatory governance
- No financial interest in market
- Open-access transmission with single tariff
- Rates promote efficient use of grid
- Short-term reliability/relieve constraints
- Control of transmission facilities
- Incentives to be efficient
- Open information system
- Coordinate with neighbors
- ADR process
Order 888 tariff

- Discountable postage stamp rate
- 'Or' pricing
- Generation redispatch
- Post 'ATC' and TLR
- Ancillary services: monopsony buyer and monopoly seller
- IPPs have little incentive and no right to supply reactive power
Order 888

transmission access

↓ Schedule using contract path
↓ unschedule using TLRs
  ↓ neglect economics
  ↓ blunt interim solution; overkill
  ↓ MRD experiment (99) did not solve the problem
↓ discriminatory access to
  ↓ dispatch: real-time access blocked
  ↓ ancillary service
  ↓ imbalance
RTO Rule: O2K
Dec 1999

Characteristics
- independence
- appropriate regional configuration
- operational authority
- short-term reliability

Functions
- tariff adm and design
- congestion management
- parallel path flows
- ancillary services supplier
- real-time balancing market
- efficient rate designs

Information:
- OASIS/TTC/ATC
- market monitoring
- planning and expansion
- open architecture
The Outage

The lack of software SMES
Caused trips by trees
That no one sees
The northeast went black
When the system no longer had slack
Utilities argued no liability
Since no one required reliability
The utilities were sad
The pols got mad
And required reliability adds
Energy Policy Act of 200X:

• Reliability must be examined for competition effect
• Sense of Congress
  – Open nondiscriminatory access to transmission
  – Facilitate wholesale competition
  – Transmission utilities become members of RTOs
• Native Load is entitled to
  – Firm transmission rights
  – Real time prices on an hourly basis
• Study how
  – Nonutility generation can be included in economic dispatch
  – To honor preexisting transmission service contracts
• PURPA
  – Access to independent auction-based DA and RT markets
  – Nondiscriminatory access transmission services
• Market price availability on a timely basis
Voluntary Transmission Pricing Plans

- Plans include costs that are:
  - Directly assigned
  - Participant funded
  - Rolled into regional or sub-regional rates

- Not assigned costs + (embedded with - embedded without)

- Receive:
  - Credit against transmission charges
  - Appropriate financial or physical rights or
  - Other Comm. Approved method
Pre-day-ahead markets
- for transmission rights: CRT/TCC/TRCs/FGRs
- for generation capacity/reserves (ICAP)
- market power mitigation via options contracts

Day-ahead market for reliability (valium substitute)
- simultaneous nodal market-clearing auctions for energy, ancillary services and congestion
- allow multi-part bidding
- higher of market or bid cost recovery
- allow self scheduling
- allow price limit bids on ancillary and congestion

Real-time balancing myopic market
- markets are nodal-based LMP with fish protection
Is transmission a public or private good?

- **Public good**
  - Non-excludable: can you stop people from using it? Yes, but is it practical
  - Non-rival: does consumption by one prevent consumption by others; zero opportunity cost
  - It gets congested.
  - Not a pure public good

- **Is it a natural monopoly? No, reliability limits scale economies**

- **Is it a private good? Excludable?**
Existing Transmission Rights

- **Existing rights**
  - Strong physical: right to withhold
  - Weak physical: use or lose
  - Financial: rights to rents

- Conversion from option rights and redispatch to
- Obligations and no dispatch

- Marginal opportunity costs:
  - Marginal losses + physical depreciation until congestion
  - Then marginal losses + physical depreciation + congestion
Why compartmentalize? Tradeoffs between transmission and generation

Complements for generators on the export side
Competitors for generators on the import side
differences
  - Life of asset
  - freq of outage: maintenance and forced
  - marginal costs
Who can supply transmission?
  - Generator and consumption? Yes via ‘counterflow’
  - Via inertia in load pockets (SF nomogram)
Not perfect substitutes
  - Capacitors can change admittance and PTDFs
  - Reactive power generation v. shunt capacitor not quite
Who should pay what for transmission?

- 7777 is not Boeing’s next airplane, but FERC’s longest case.
- Issue: transmission access; took only 19 years
- What is participant funding? Should non-beneficiaries pay? No
- Since the fixed and sunk costs are high, discriminatory pricing may be appropriate
- Some think it is
  - ‘and’ pricing
  - ‘Or’ pricing: ‘higher of’ embedded and inc
  - Incremental pricing:
Transmission rights are underdeveloped

- Without physical failure: physical = financial
- With physical failure Firm Transmission Rights have priority
- Obligations, options and hybrids
- No withholding of capacity
- Dormant secondary markets
- Reliability markets: CBM should be priced
- Transenergie proposal for market-based rates; Conn says no to the line!
What do you get when you pay?

- How lumpy are capacity additions?
- Weak property rights: use or lose
  - Network, point-to-point, FTR
- Without the ability to withhold, face a free rider problem.
- Strong property rights:
  - Reservation bids
  - Merchant transmission
- Dispatchable transmission
Liability standards

- Customers now bear the risk
- No transmission liability insurance
- negligence, gross negligence, willful misconduct
- Which describes Homer Simpson?
- Outages: unruly vegetation; trips by trees
- NYISO is changing its cost allocation for outages

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I'm building a merchant transmission line