Grid Planning and Expansion: Who, Where, When?

Who: Competing transmitters, given the right prices
Where: At the right places, given the right prices
When: At the right time, given the right prices

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Fundamental assumptions about lowering electricity prices through competition

#1 In the short term, spot market pricing based on competitive behavior increases productive efficiency

#2 In the medium term, decentralized investment based on market prices increases allocative efficiency

#3 In the long term, technical innovation responding to market opportunities increases dynamic efficiency

- The goal of electricity restructuring should be to maximize these efficiencies.

- With these pillars (and the right details), merchant transmission is the logical vehicle for grid expansion

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Starting Point & High-Level Conclusions

- The electricity market in a FERC-approved RTO
  - Market-based mechanisms to manage congestion
    - LBMPs and FTRs are most likely (only?) outcome
  - Biggest unresolved issue: grid expansion
    - Expansions for reliability (social decisions)
    - Expansions for congestion relief (commercial decisions)

- Our conclusions about merchant transmission:
  - Financeable via FTRs (or variants thereof)
  - Efficient (right projects at the right places & times)
  - Feasible (TEUS Australian project now in service)

- Merchant transmission unlocks dynamic efficiencies
  - Entrepreneurs (and incumbents) can now respond to market opportunities => Innovation (think CCGTs)
Grid expansion issues with LBMPs

- New transmission has **commercial** implications
  - Grid expansion helps some generators, hurt others
  - Potential for "gridlock in grid expansion"
- Option #1 (require "full integration" of new generators)
  - Require new generators to fund "enough" transmission
    - Who determines "enough"? Generator? RTO? Load?
  - Rejected by FERC in Bucksport decision
- Option #2 (use central planning to relieve congestion)
  - Generators seek low busbar cost, not low delivered cost
  - Central planner (RTO?) must guess about loads, fuel costs, generation => new stranded transmission costs
- Option #3 (allow market to decide what gets built)
  - Result: merchant transmission investments

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How does merchant transmission work?

- What drives value of (and prices for) FTRs?
  - Expected differences in LBMPs
  - Risk aversion of market participants (more later)
- Competing transmitters evaluate new projects
  - Forecast value of new FTRs (difficult but feasible)
  - If market value > project costs, project proceeds
  - Free entry prevents monopoly rents
- Siting of a merchant transmission line
  - No *eminent domain* powers => underground cables
- Many financing options for a competitive transmitter:
  - Pre-sell or auction FTRs to other market participants
  - Retain FTRs and realize their value
But what about the existing wires?

- **Existing** wires will provide most FTRs for some time
  - LBMPs and FTRs efficiently price *use* of those assets
- But sunk cost allocation issues arise:
  - FTR value may not (will not?) equal regulated cost
  - No efficiency answer re allocating this delta
- One idea: treat sunk transmission costs in the same manner as sunk generation costs
  - Market pricing for FTRs associated with existing grid
  - Include delta (+/-) in non-bypassable grid access fee
  - Owners of existing grid assets receive regulated costs
  - Captive ratepayers pay (or get) the market delta
  - Use allocation principle for **existing** wires as was used for **existing** generation assets put into the market

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Benefits of merchant transmission

- No further stranded transmission costs
- Dynamic efficiency (a.k.a. technical innovation)
  - HVDC, FACTS, super-conducting cables, etc.
- More level competition among all customer options:
  - Remote generation + new merchant transmission vs.
  - “Downtown” generation options (e.g., fuel cells) vs.
  - Consumer responses (particularly at peak periods)
- Better RTOs:
  - Focus on reliability, transparency, market success
  - Less arguments over “what gets built” and “who pays”
  - No need to incentivize existing wires
- Better transmission siting rules for congestion relief
  - Merchant projects won’t get police powers

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Any role for new regulated transmission?

- Yes, as backstop to ensure reliability:
  - But raising the risk of congestion costs can suffice
- For reliability-based transmission, RTO should competitively bid construction, financing & ownership
  - Let competition set the ROE for new regulated assets
  - Owning transmission assets is not natural monopoly
  - Competition to own assets consistent with RTO model
- New regulated transmission for congestion relief?
  - No - the markets can work, if given a chance
  - Captive ratepayers will pay for central planning errors
- New regulated transmission to mitigate market power?
  - No - better, cheaper (behavioral) solutions exist

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FAQ #1: can free riders be addressed? (Yes)

- Hypothesis: Bankruptcy is bad
- Corollary: Price volatility and risk aversion will largely prevent (or eliminate) free riders
  - Who was short in New England on May 8, 2000?
  - Will they ever be short again?
- Volatility => expected spot prices ≠ market values
  - If you play the expected values, you will go bankrupt
  - Firm sale obligations + volatility => “hedge thyself”
  - In well-designed markets, free riders are sufficiently discouraged (or quickly thrown from the train)
- New technologies => more control over free riding

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FAQ #2: What about economies of scale?

- Presumed scale economies => commercially efficient amount of transmission < social optimum
- Market demand for assets can match social demand
  - Risk aversion + volatility = increased market demand
- Society has a rheostat:
  - If too little (transmission or generation) is built, raise the pain of not being hedged during scarcity
  - RTO can match commercial incentives to social value
  - Same issue exists for merchant generation
- New transmission technologies are more modular
  - Economies of scale are lower
  - Free rider issues are further reduced

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More FAQs

- Is it worth the effort?
  - Cost of existing transmission ~ 5% of total cost **but**
  - Marginal cost of transmission >> average cost (10x?)
  - Get the prices right at the margin (efficiency)

- What prevents a merchant transmitter from collecting monopoly rents for new assets?
  - Competition (existing grid, free entry, local options)
  - Overall market monitoring function of RTOs
  - How can a new resource **create** monopoly rents?

- How can merchant transmission be sited?
  - Existing rights-of-way, underground cables
Closing remarks

- LBMPs, FTRs, & merchant transmission promote productive, allocative, and dynamic efficiencies
  - Technology deployment requires market opportunities
- Merchant transmission helps RTOs
  - No further stranded transmission costs
  - Enhanced grid reliability at no cost to captive ratepayers
  - Avoids need to incentivize existing wires
- Requirements for merchant transmission
  - LBMPs (with volatility) and tradable property rights
  - Level playing field vis-à-vis:
    - Regulated transmission (no regulated congestion relief)
    - Siting of merchant generation plants
- Australian experience proves feasibility

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