

Paying for Transmission

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December 15, 2004

Where We Agree

- **An extensive, well-maintained, secure transmission grid is needed for dereg**
- **Vertically integrated utilities had proper incentives for transmission operation & investment – Except too reliable**
- **Dereg needs a larger transmission grid**
- **If possible, incentives (prices) are better than command and control**
- **Dereg has resulted in less than the desired level of transmission investment**

Where We Might Disagree

- **RTO should own & operate transmission**
- **Large customers must face real time prices**
- **RTO should control the location of new generators, large customers, & new lines**
- **Congestion should be managed explicitly, but LMP are too sensitive**
- **Transmission should support long-term contracts**

Open Issues

- **When & where to build transmission?**
- **How transmission should be billed?**
- **Who should pay for transmission?**
- **What are the rights of incumbents?**
- **Ability to hedge against uncertainty?**

Criteria for Choosing Allocation

- **Equity:** Who paid for grid? Who was served in the past? Who “endures” it?
- **Efficiency:** Maximize value of grid throughput now & in the future
- **Administrative simplicity:** Minimize transactions costs
- **Public & Political Appeal:** Political feasibility
- **Goal Attainment:** Supporting a more competitive market

RTO Should Own & Operate Transmission

- **Myriad daily decisions about tree trimming, inspection, spare parts and units**
- **Speed of getting system back into service after a disruption**
- **Investment decisions: Construction standards, upgrades, new lines**
- **Tradeoff: Protecting equipment vs. preventing blackout**
- **Need to lower transactions costs for RTO to acquire grid – owner gets sunk costs**

Large Customers Must Face Real Time Prices

- **Peak demand is six times lowest demand**
- **Leveling load can lower costs significantly**
- **Want to get $MC = MB$ – including generation and transmission**
- **Large peaks foster market power**
- **Cost of equipment for RTP falling**
- **Use electronic energy managers & power line signals for real time response**

RTO Should Control Location of IPP, Customers, & New Lines

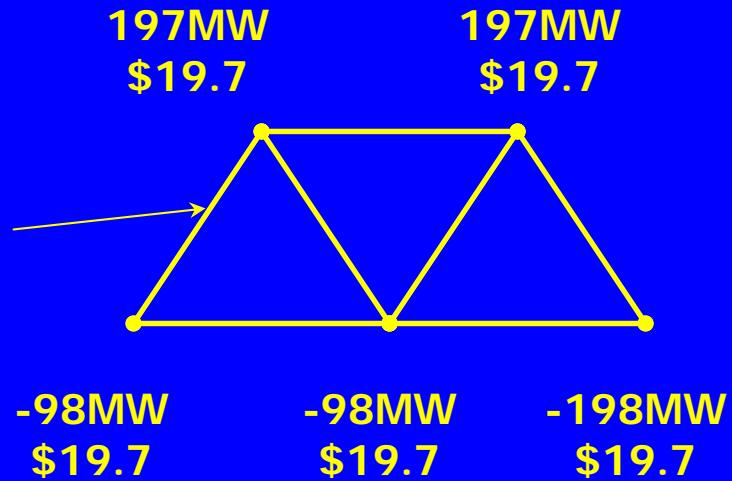
- **Kirchoff's laws: Power does not flow where desired: There are large externalities**
- **Adding a generator or line can lower transmission capacity**
- **New customer can raise costs to existing customers, raising system costs too much**
- **Use Command & Control or pricing?**
- **RTO buys transmission at appraised value – present value of cash flows**

Congestion Should be Managed Explicitly, But LMP Too Sensitive

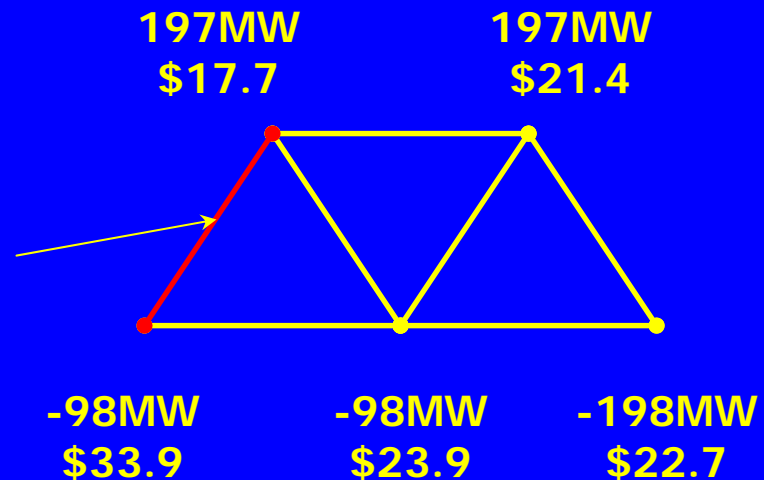
- **Congestion important due to high peak demand**
- **Need incentives for bilateral contracts, hourly demand, generation patterns - RTP**
- **LMP too sensitive for planning**
- **Trade some efficiency for predictability**

No constrained lines:

Line flow 93MW



Line constrained at
90MW
Line expansion
value:
\$26.2



LMP: A Less Volatile Approach

- **Fix LMP in advance to aid decision making**
- **Fix zonal prices**
- **Tradeoff predictability for efficiency: How much loss in efficiency? How much value to predictability in day ahead market?**

Transmission Should Support Long-Term Contracts

- **Efficiency & controlling market power requires moving 90-95% of transactions from daily market to long-term contracts**
- **Fixing price or giving transmission rights compromises efficient operation**
- **Someone must absorb uncertainty of LMP**
- **Contract price: Includes LMP? Add LMP?**
- **RTO sells transmission right: OK if right can be resold in real market**

When & Where to Build Transmission?

- RTO should bear risks of overbuilding
- Inherent controversy: NIMBY, reducing blackout risks, promoting efficiency, regional development, low costs
- Inherently political process – need public participation, good engineering, demand forecasts, sharing of burdens
- Need regional, not state, decision making

What Price for Transmission?

- **Today: Congestion charge plus MWh-mile charge for additional costs**
- **Total charge pays for costs of acquiring transmission & proper maintenance**
- **RTO analysis of upgrading system: Construction standards, redundancy, spare parts, SCADA, sensing & monitoring, personnel, training, simulators**

Who Pays for Expansion?

- **Approach 1: Everyone pays equally**
- **Approach 2: Incremental Expansion: IPP or customer pays direct & external costs**
- **Approach 3: RTO determines investment needs & people pay in proportion to benefit**
- **Problems: Economies of scale for a single line (130 KV AC line vs. 700 KV DV line)**
- **Expanding grid: Large + & - externalities**
- **Rights of incumbents: Equity vs. Efficiently**

Approach 1: Everyone Pays

- **Anyone can build & then system pays**
- **Incumbents subsidize entrants**
- **Encourages bad investment**
- **Encourages too much investment**

Approach 2: Entrant Pays

- **IPP or Customer wanting new line or expanded transmission pays direct & external costs**
- **Encourages too little investment**
- **IPP needs to organize group to co-locate, but this lower return**
- **Can result in suboptimal or even pernicious investment – unplanned system**

Approach 3: RTO Invests

- **Entrants & incumbents pay in proportion to benefits**
- **Results in planned network**
- **RTO may be slow or not recognize need or incumbents might delay expansion**
- **Estimating benefits may be difficult**

Financial Transmission Rights

- Hedging good – as long as no one can manipulate the market
- Gives valuable information about future LMP

Conclusions: Where We Agree

- An extensive, well-maintained, secure transmission grid is needed for dereg
- Vertically integrated utilities had proper incentives for transmission operation & investment – Except too reliable
- Dereg needs a larger transmission grid
- If possible, incentives (prices) are better than command and control
- Dereg has resulted in less than the desired level of transmission investment

Where I Hope We Agree

- **RTO should own & operate transmission**
- **Large customers must face real time prices**
- **RTO should control the location of new generators, large customers, & new lines**
- **Manage Congestion: LMP vs. zonal pricing: Predictability vs. efficiency**
- **Transmission should support long-term contracts – Auction transmission rights**

Open Issues

- **When & where to build transmission? – RTO plans expansion**
- **How transmission should be billed? - Congestion charge + MWh-Mile charge**
- **Who should pay for transmission? – RTO divides costs in proportion to benefits**
- **Ability to hedge against uncertainty? – RTO sells LMP futures in FTR market**