The Brattle Group

Financial Transmission Rights: Necessary or Burdensome?

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IAEE Conference
2006- Potsdam

presented by

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Outline

- What are FTRs? Where are they used?
- Why is it important to get the FTR implementation right?
- Benefits of well-functioning FTR markets
- Potential pitfalls with FTRs
- Illustration
- Conclusions

What are FTRs? Where are they used?

Financial Transmission Rights (FTRs), but also known as TCCs, CRRs, TCRs …

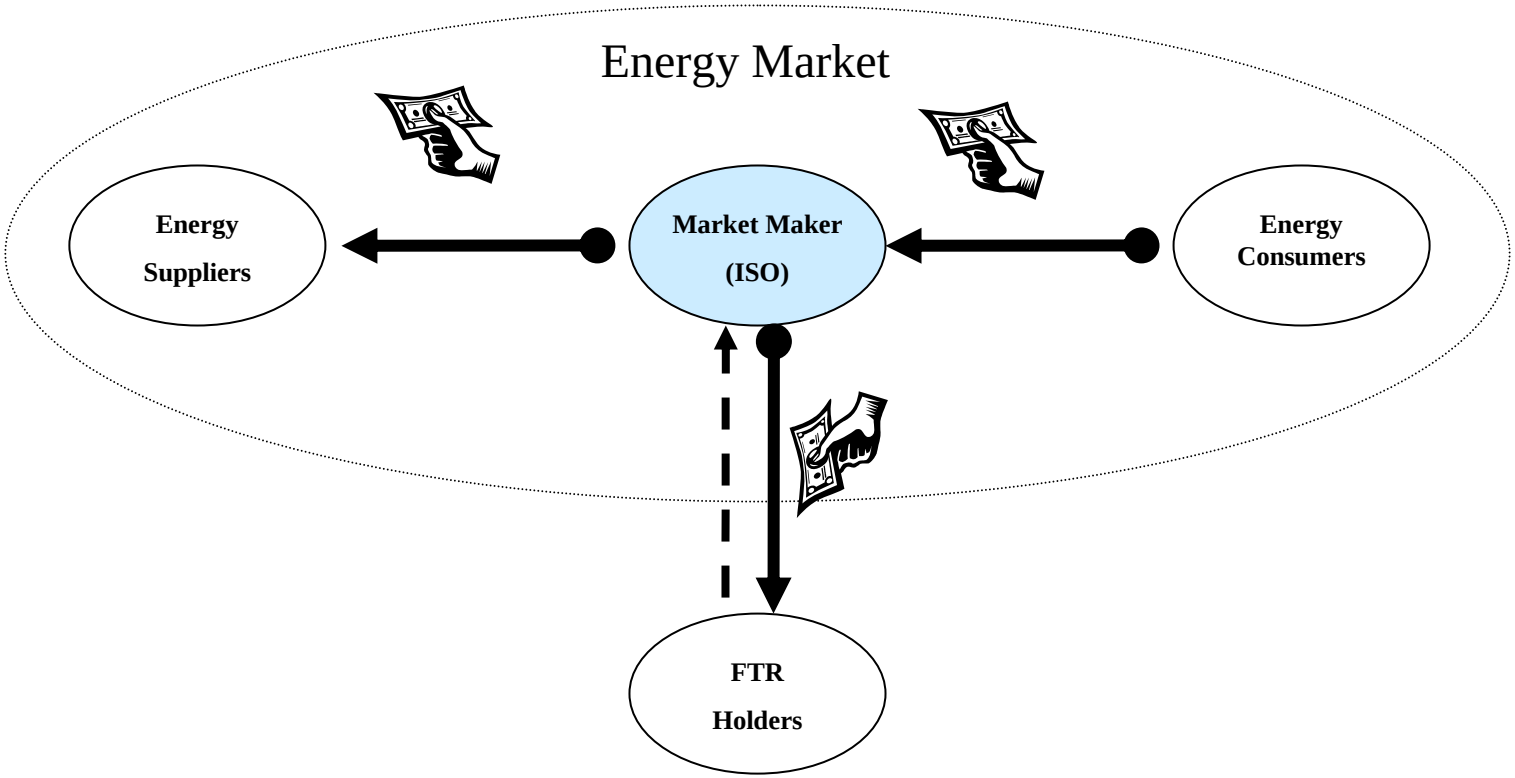
- Financial contracts for hedging congestion cost between two locations (or over a transmission element) in electricity markets
- Typically administered by a centralized market maker (*e.g.*, RTOs, ISOs)
- Applicable in markets with location-based electricity prices
- Value of an FTR from point A to Point B is price at location B minus price at location A.

$$\text{Price of FTR}_{A\text{-->}B} = \text{Price}_B - \text{Price}_A$$

Currently implemented in NYISO, ISO-NE, PJM, MISO, CAISO, ERCOT

FTRs and Energy Markets

Payments to FTR holders are financed by the difference between payments from energy consumers and payments to energy suppliers.



This implies an upper limit on how many FTRs can be issued (Simultaneous Feasibility Constraint).

FTR Design Choices

- **Financial exposure**
  - Obligation: FTRs may have negative value
    - dependent on direction of FTRs
  - Option: FTRs have strictly non-negative value
    - potentially reduced number of FTRs that can be allocated feasibly
- **Pricing locations**
  - Point-to-Point: From point A to point B
  - Flowgate: On transmission facility F
- **Energy market**
  - Day-ahead: FTRs settle based on day-ahead energy prices
  - Real-time: FTRs settle based on real-time energy prices
- **Allocation and/or auction of FTRs**
  - Reward (hedge) existing firm transmission right holders (native load, long-term transmission users) by allocating FTRs, sell the remaining in auctions
  - Auction FTRs, and allocate to existing users the rights to proceeds from FTR auction

Why is it important to get the FTR design right?

- **Total FTR payments are significant**
  - NYISO: ~ $500 MM in 2004
  - PJM: ~ $800 MM in 2004 ($2.1 billion in 2005)

- **Potential wealth transfers in allocation/auction**

- **The hedging capability of FTRs is fundamental to the decision to adopt LMP-based markets**

Potential benefits of FTRs

- **Provides hedging against congestion costs**
  - Partially "completes" the "Arrow-Debreu" markets with respect to congestion costs

- **Provides signals for new generation and transmission (especially with long-term FTRs)**

- **FTRs cannot be withheld to raise energy prices (as opposed to physical transmission rights)**

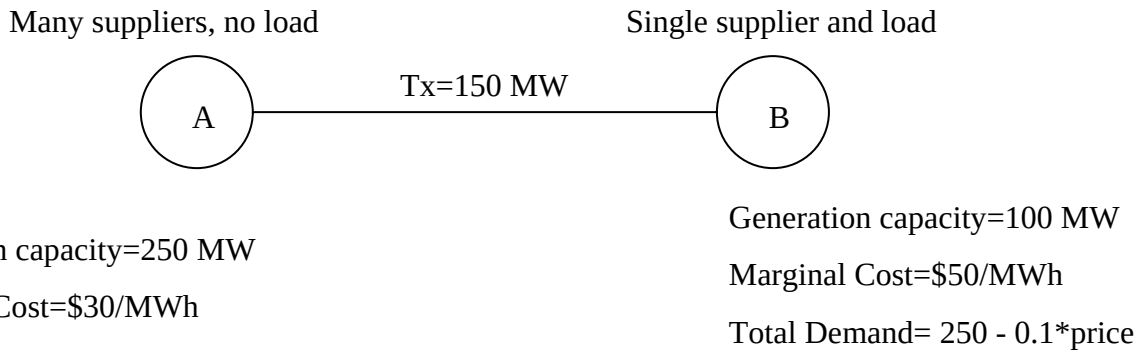
Potential pitfalls with FTRs

- **FTR market performance is directly affected by the performance of energy markets**
  - Distorted electricity prices ➔ distorted FTR prices
- **Potential for significant wealth transfers in allocation**
  - Which/how much of FTRs to which existing customers? Especially an issue with customers that have "seller's choice" contracts
  - Frequency of re-allocation as the "needs" of existing customer change?
- **May enhance suppliers' market power in energy markets**
  - Owning FTRs into a highly congested load-pocket may effectively increase a supplier's inframarginal generation in that load-pocket

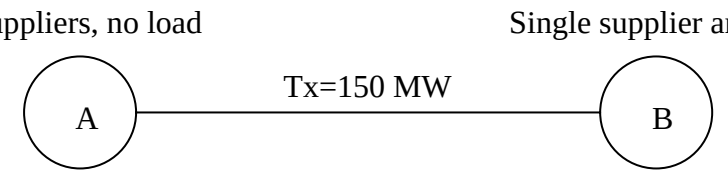
Conclusions

- **FTRs are fundamental to LMP markets**
  - LMP markets cannot operate without them
- **FTRs have different flavors**
  - Obligation, option
  - Point-to-Point, Flowgate,
  - etc.
- **FTRs, like any other economic tool, needs to be implemented carefully**
  - Distorted energy markets yield distorted FTRs,
  - Restrictions on generation suppliers' acquisition of certain FTRs may be needed in markets with significant supplier market power,
  - Benefits of issuing shorter-term FTRs to reduce wealth transfers should be weighed against more stable FTR hedge under longer-term FTRs.

A Simple Example



Case 1: Marginal-Cost Bidding



Generation amount=150 MWh

Equilibrium Price=$30/MWh

Generation amount=95 MWh

Equilibrium Price=$50/MWh

Total Demand= 245 MWh (250 - 0.1*50)

Payment by load = $12,250 (245 * 50)

Payment to Suppliers in A = $4,500 (150 * 30)

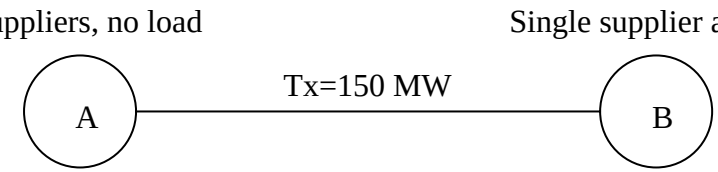
Payment to Supplier in B = $4,750 (95 * 50)

Merchandizing Surplus = $3,000 (12,250 - 4,500 - 4,750)

Price of FTR (from A to B) = $20/MWh (50 - 30)

Total Value of FTRs = $3,000 (150 *20)

Case 2: Strategic Bidding



Generation amount=150 MWh

Equilibrium Price=$30/MWh

Generation amount=47.5 MWh

Equilibrium Price=$525/MWh

Total Demand= 197.5 MWh (250 - 0.1*525)

Payment by load = $103,687.5 (197.5 * 525)

Payment to Suppliers in A = $4,500 (150 * 30)

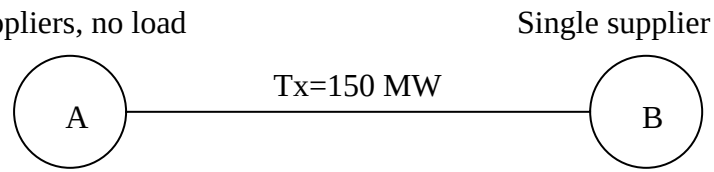
Payment to Supplier in B = $24,937.5 (47.5 * 525)

Merchandizing Surplus = $74,250 (103,687.5 - 4,500 - 24,937.5)

Price of FTR (from A to B) = $495/MWh (525 - 30)

Total Value of FTRs = $74,250 (150 * 495)

Case 3: Strategic Bidding, Supplier in B owns 10% of FTRs



Generation amount=150 MWh

Equilibrium Price=$30/MWh

Generation amount=40 MWh

Equilibrium Price=$600/MWh

Total Demand= 190 MWh (250 - 0.1*600)

Payment by load = $114,000 (190 * 600)

Payment to Suppliers in A = $4,500 (150 * 30)

Payment to Supplier in B = $24,000 (40 * 600)

Merchandizing Surplus = $85,500 (114,000 - 4,500 - 24,000)

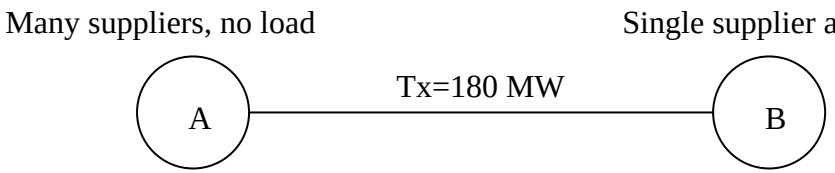
Price of FTR (from A to B) = $570/MWh (600 - 30)

Total Value of FTRs = $85,500 (150 * 570)

FTR receipts of Supplier in B = $8,550 (15 * 570)

Total receipts by Supplier in B = $32,550 (24,000 + 8,550)

Case 4: Value of 30 MW Transmission under Marginal-Cost Bidding



Generation amount=180 MWh

Equilibrium Price=$30/MWh

Generation amount=65 MWh

Equilibrium Price=$50/MWh

Total Demand= 245 MWh (250 - 0.1*50)

Payment by load = $12,250 (245 * 50)

Payment to Suppliers in A = $5,400 (180 * 30)

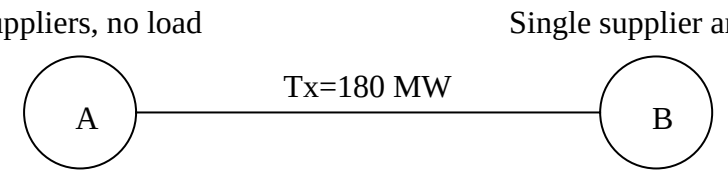
Payment to Supplier in B = $3,250 (65 * 50)

Merchandizing Surplus = $3,600 (12,250 - 5,400 - 3,250)

Price of FTR (from A to B) = $20/MWh (50 - 30)

Total Value of FTRs = $3,600 (180 *20)

Case 4: Value of 30 MW Transmission under Strategic Bidding



Generation amount=180 MWh

Equilibrium Price=$30/MWh

Generation amount=32.5 MWh

Equilibrium Price=$375/MWh

Total Demand= 212.5 MWh (250 - 0.1*375)

Payment by load = $79,687.5 (212.5 * 375)

Payment to Suppliers in A = $5,400 (180 * 30)

Payment to Supplier in B = $12,187.5 (32.5 * 375)

Merchandizing Surplus = $62,100 (79,687.5 - 5,400 - 12,187.5)

Price of FTR (from A to B) = $345/MWh (375 - 30)

Total Value of FTRs = $62,100 (180 * 345)