

New (Investment) Concepts for the Transmission Grid

*Workshop on: Analysis and Concepts to Address
Electric Infrastructure Needs*

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Raymond L. Coxe, Ph.D.

Senior Vice President – Transmission Marketing

TransÉnergieUS

Member of the Hydro-Québec group

Summary

- New generation technology => paradigm shift
 - CCGT refuted notion of generation as a “natural monopoly”, introduced competition into production
 - Allows the market to plan generation investment
- New transmission technology => another shift
 - Advanced HVDC, SMES, FACTS => modular investments, limited economies of scale
 - The market can now plan transmission investment
- Focus transmission R&D on market needs
 - What does the market want?
 - What will investors support?

Paradigm shift in generation

- Old planning paradigm (ca. 1920-1980)
 - Evolutionary changes in technology
 - Lower cost through bigger, “lumpier” plants
 - “Generation is a natural monopoly”
- What changed
 - Natural gas-fired GTs and CCGTs
 - Modular building blocks matched to demand
 - Learning curve instead of scale economies

Paradigm shift in generation (continued)

- Add in new market structures
 - *Spot Pricing of Electricity*
- Effect of new generation technologies
 - New entrants
 - Lower minimum capital requirements
 - Entry of “non-traditional” entities (gas producers)
 - New market dynamics
 - Short-run prices can support long-run investments
 - Competition in generation now possible

Generation planning today

- Done by the market
 - Investment in generation matched to market demand for new generation capacity
 - Emergence of merchant generation using modular, low-impact technologies
 - Siting now impose much lower burden on affected communities => more siting options
 - No need for centralized process to plan generation investment

New Transmission Technologies

- I'm not an electrical engineer, but
 - New transmission technologies are out there
 - Advanced HVDC (TransÉnergie US & ABB)
 - SMES (ASC)
 - More electronic technologies (FACTS, SVCs, etc.)
 - More are coming
 - ?????
- Common themes:
 - Modularity, low impact, rapid construction

New Transmission Technologies (con.)

- Common effects of new technologies
 - Transmission capacity is now added in smaller increments (100-500 MW ??)
 - Better match to market needs (sizes \approx GT/CCGT)
 - Better match to investment appetite (< \$0.5 B)
 - Lower siting burden => shorter lead time
 - TransÉnergie US goal: 36 month total time
- Also: new property rights for transmission
 - E.g., financial transmission rights
- Result: market can now plan transmission

Market based transmission planning

- How:
 - Locational energy prices signal value
 - Investors can capture value through marketable property rights
 - New transmission built as market requires
- Benefits:
 - Investors assume technology risk
 - Competition drives down prices
 - Profit potential drives innovation

R&D needs for transmission (my view):

- Get more out of the existing wires
 - “Point sources” devices can raise capacity
 - Investors can capture value
 - Market will drive more efficient use of grid
- Keep reducing community impact:
 - Less land, less noise, less visual impacts
- Move construction out of field into factory
 - Modularize, factory test, “plug and play”
- Push the state of the art in cables

Final thoughts

- Expand pool of potential users:
 - New entrants drove GT development
 - TransÉnergie US is (always) interested in better transmission technologies
 - Focus on the needs of a competitive market
 - E.g., minimize new right-of-way required
- For more information:
 - *www.transenergieus.com*
 - *ray.coxe@transenergieus.com*
- Thanks!