Optimal expansion of the transmission grid: why not?

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Congestion areas in the United States

Key challenges facing transmission grid expansion

Cost and benefits allocation
- Benefits sometimes difficult to evaluate (e.g., reliability) and to allocate
- Beneficiaries of network expansion do not always coincide with payers

Conflicting incentives
- Transmission asset owners who are also power producers may face conflicting incentives, as network expansion may reduce generation profits

Environmental constraints
- (Most) communities opposed to construction of new lines

- Enhancement of existing facilities and changes in operating procedures essential to grid expansion
- Strong incentives to be provided to overcome these challenges
Institutional approaches selected by different jurisdictions

Source: Léautier and Thelem (2008)
Evolution of congestion in the United States

Congestion cost as a percentage of total value of power

Source: Léautier and Thelem (2008)
Evolution of congestion cost in England and Wales

Congestion cost as a percentage of total value of power

Source: Léautier and Thelem (2008)

Significant reduction after the Introduction of the Uplift Management Incentives Scheme
Evolution of congestion cost in Scandinavia

Congestion cost as a percentage of total value of power

Source: Léautier and Thelem (2008)
Institutional arrangements and congestion evolution

Congestion reduction
Stable congestion
Congestion worsening

Source: Léautier and Thelem (2008)
Conclusions

Observations

- Vertical separation and strong incentives are conducive to congestion alleviation
- Vertical separation alone is not sufficient to reduce congestion
- The ISO model in the US has delivered mixed congestion reduction performance

Policy implications

- When Independent Transmission System Owners/Operators exist, develop specific congestion alleviation incentives schemes, taking regional coordination into account
- Vertical separation useful if it facilitates/enables implementation of congestion alleviation incentives scheme