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Optimal expansion of the transmission grid: why not?

**By Thomas-Olivier Léautier
and Véronique Thelem**

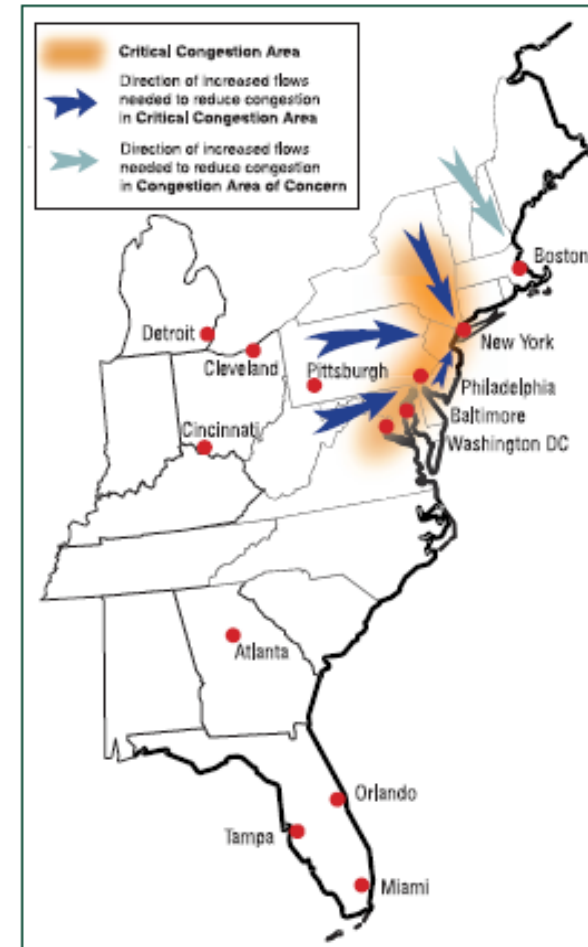
University of Toulouse

Congestion areas in the United States

Figure ES-3. One Critical Congestion Area and Three Congestion Areas of Concern in the Western Interconnection



Figure ES-2. Critical Congestion Area and Congestion Area of Concern in the Eastern Interconnection



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

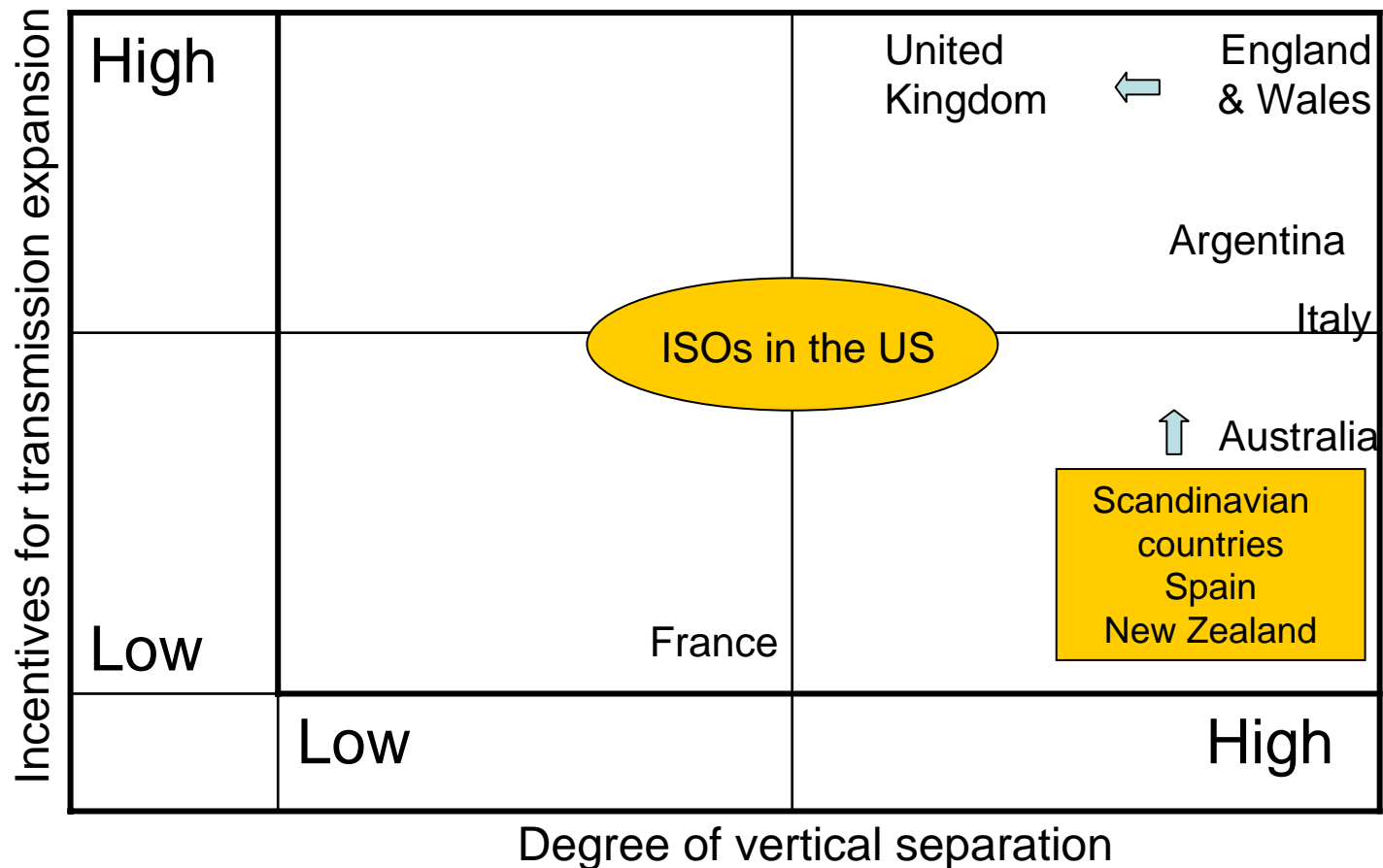
- Transmission asset owners who are also power producers may face conflicting incentives, as network expansion may reduce generation profits

Environmental constraints

- (Most) communities opposed to construction of new lines

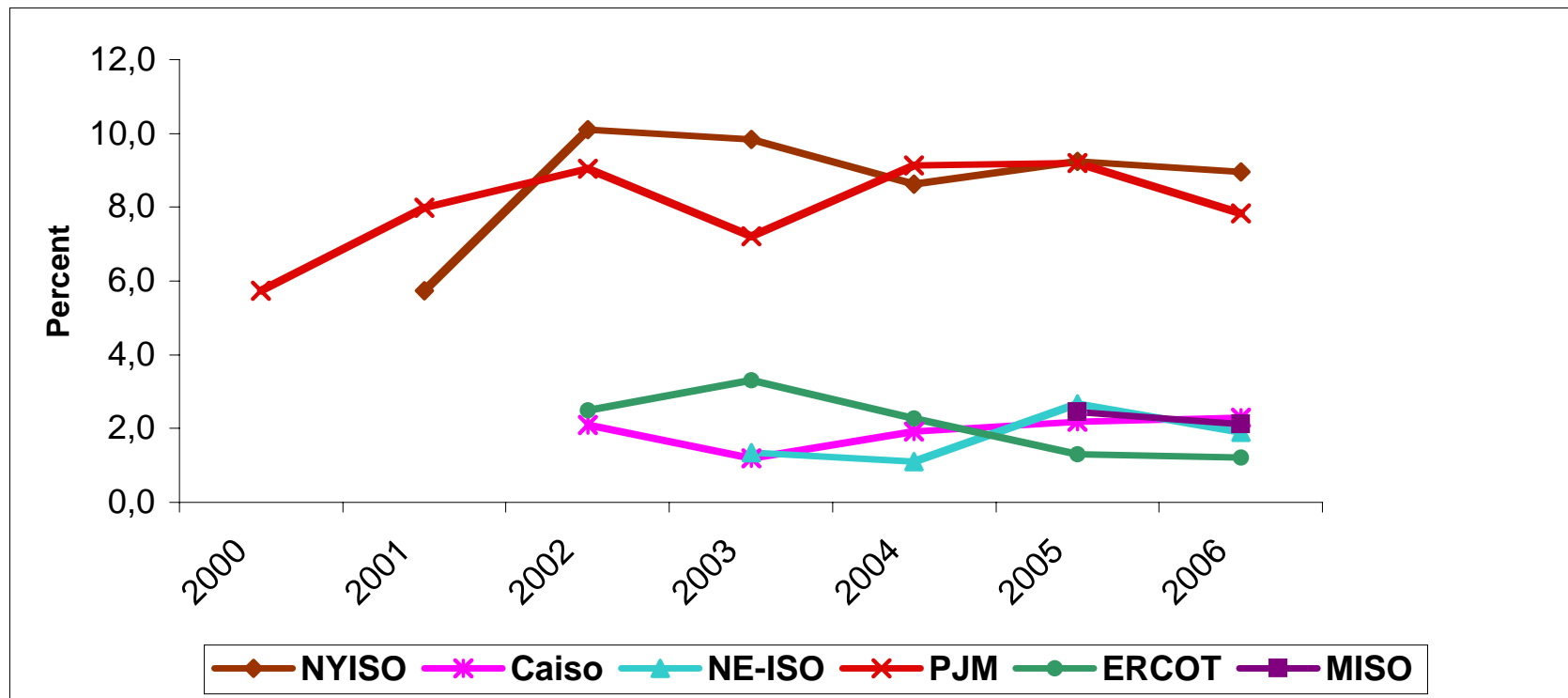
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- Enhancement of existing facilities and changes in operating procedures essential to grid expansion
 - Strong incentives to be provided to overcome these challenges

Institutional approaches selected by different jurisdictions



Evolution of congestion in the United States

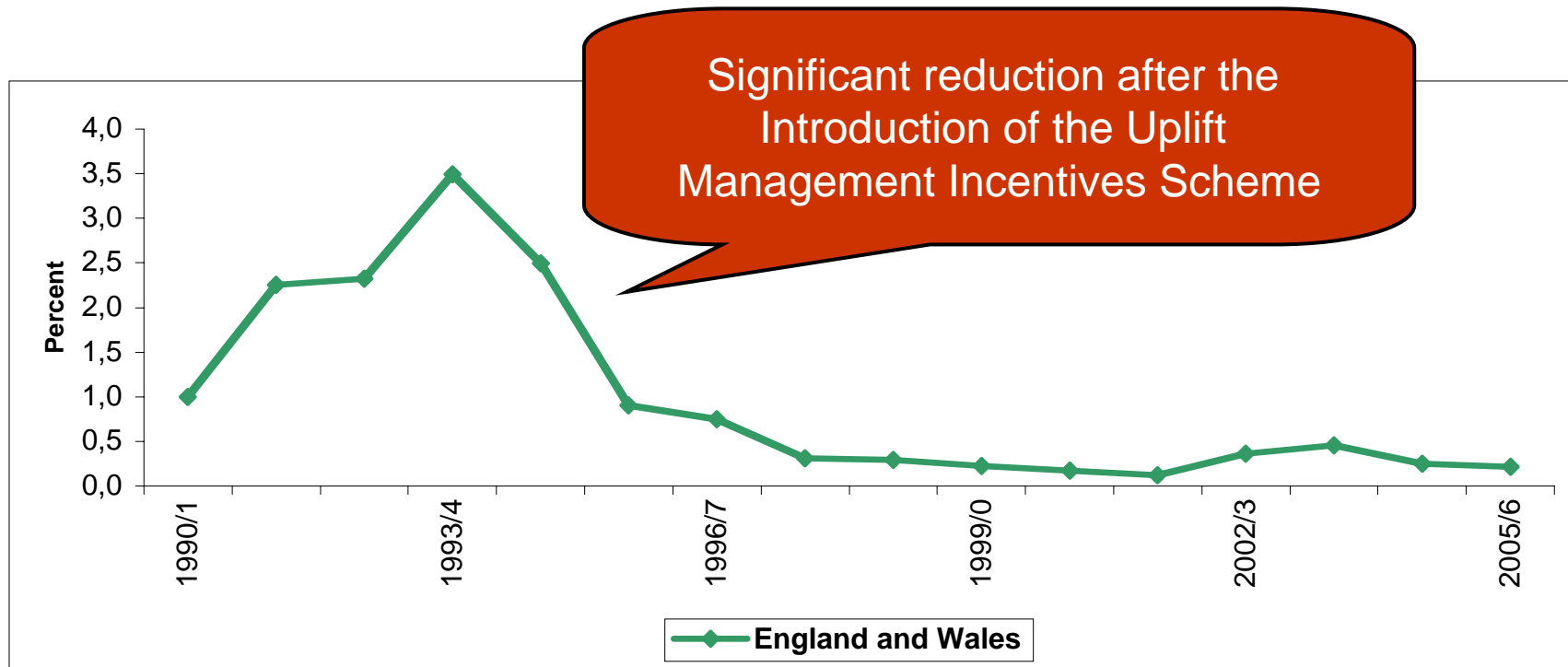
Congestion cost as a percentage of total value of power



Source: Léautier and Thelem (2008)

Evolution of congestion cost in England and Wales

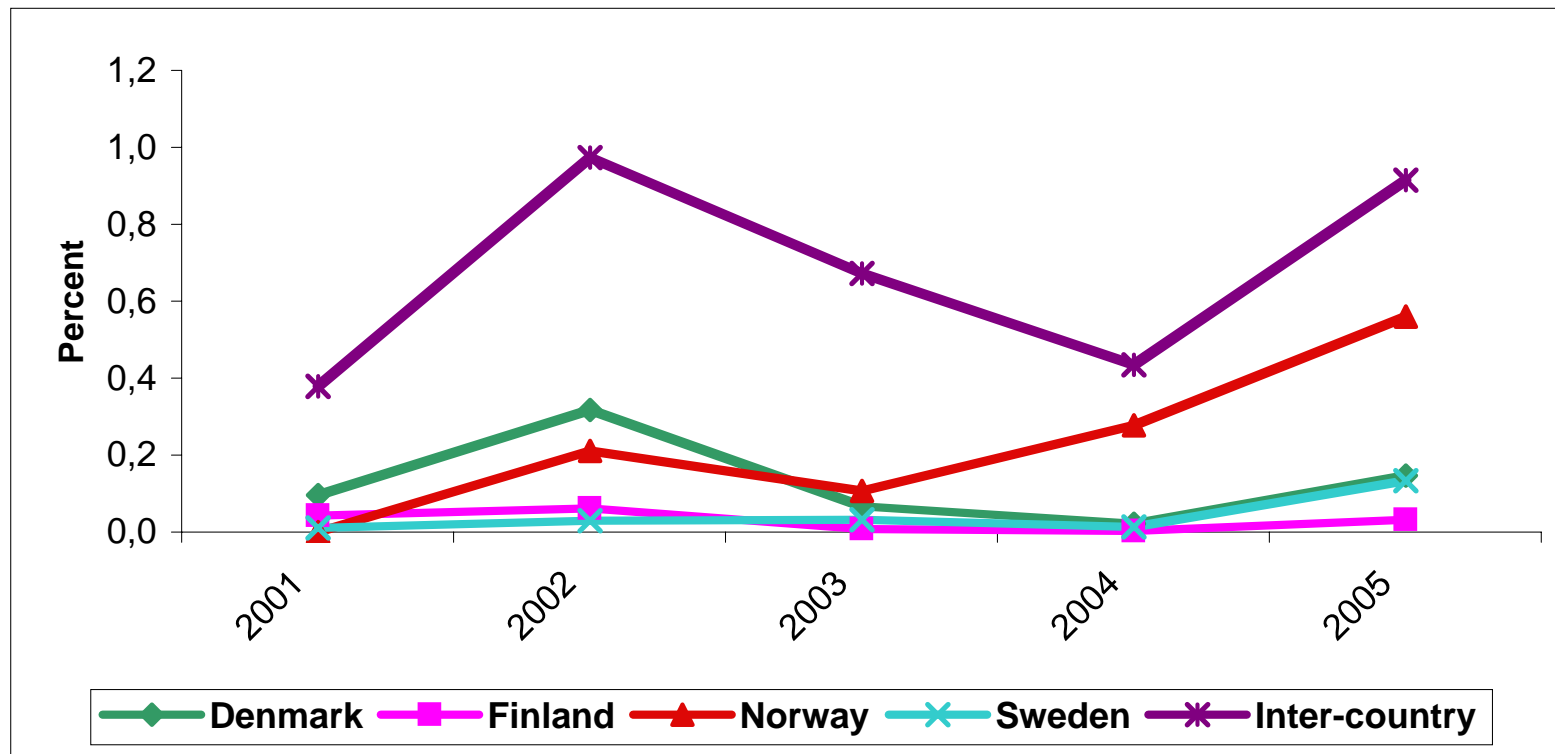
Congestion cost as a percentage of total value of power



Source: Léautier and Thelem (2008)

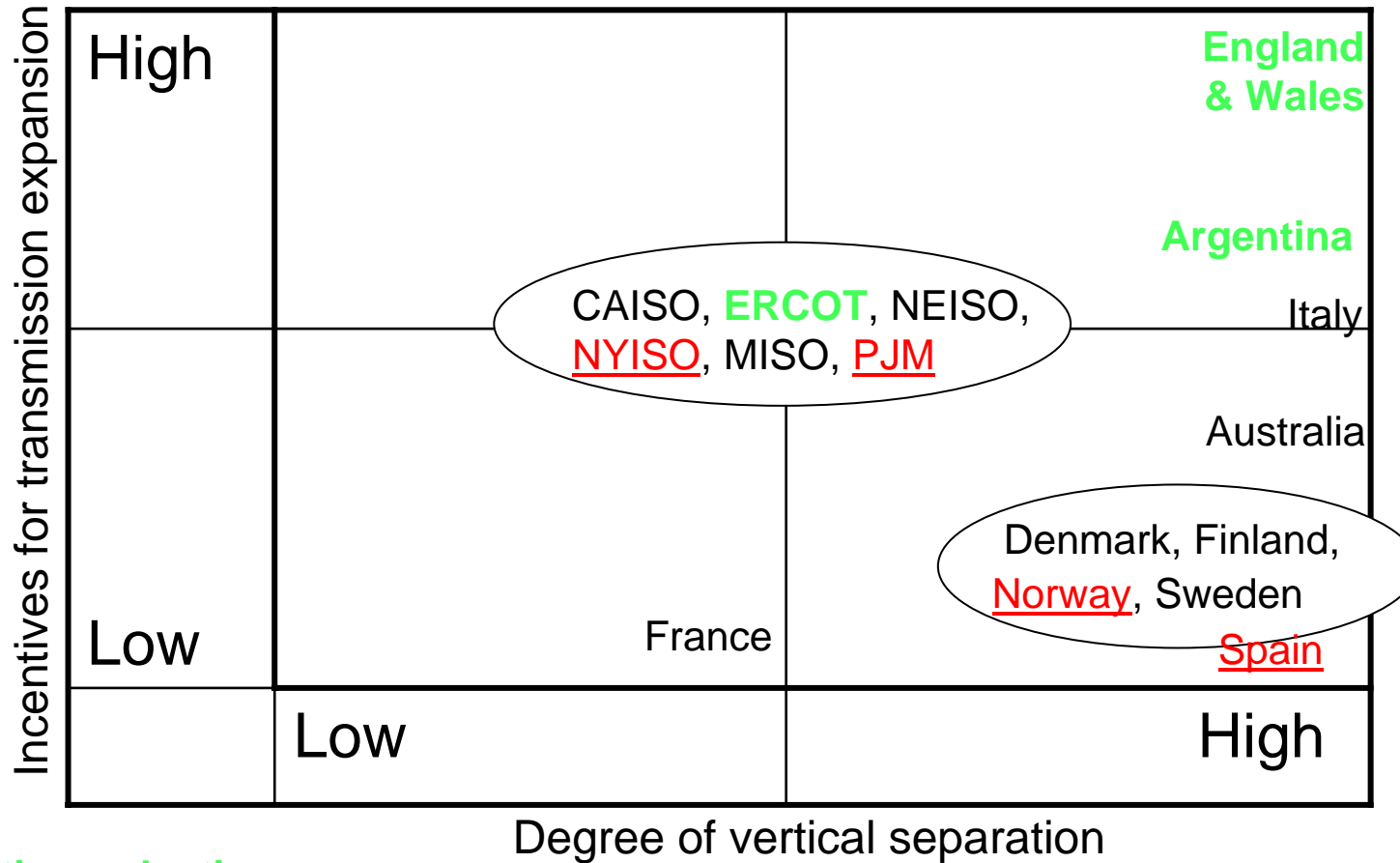
Evolution of congestion cost in Scandinavia

Congestion cost as a percentage of total value of power



Source: Léautier and Thelem (2008)

Institutional arrangements and congestion evolution



Source: Léautier and Thelem (2008)

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