



Telecommunications • Litigation • Finance • Environment • Energy

# *The Brattle Group*

Toby Brown

## **International Review of Transmission Planning**

**March 12<sup>th</sup> 2008**

rue Ducale 83

Bruxelles 1000

+32.2.790.35.80

[Toby.Brown@brattle.com](mailto:Toby.Brown@brattle.com)

# Transmission planning arrangements—key questions

- What makes regional planning successful?
- How to promote regional integration?
- Can the ISO model deliver investment?

**Context: Sector Inquiry, the Third Package,  
ownership unbundling, E.ON ...**

## An aside: what is “regional” planning?

- Planning with a scope that covers more than one network, eg
  - A new interconnector between two countries
  - Resolving internal congestion that reduces cross-border capacity
- Key points are that
  - Networks are owned by different entities
  - Investments in one network can bring benefits to customers of other networks
  - Planning / investment activities must be co-ordinated

# An evidence base for policy decisions

- All transmission systems have to address challenge of system planning
  - Unless your neighbours are far away, need to think about regional integration too
- Therefore international experience can offer valuable lessons
- Caveats: conclusions rest on comparing different jurisdictions
- *The Brattle Group* has researched
  - US ISO/RTO markets
  - Great Britain
  - Nordpool
  - Australia

This presentation is partly based on recent work by *The Brattle Group* for the Australian Energy Market Commission.

See: <http://www.aemc.gov.au/pdfs/reviews/National%20Transmission%20Planner/brattle.pdf>

# Transmission planning arrangements—key questions

---

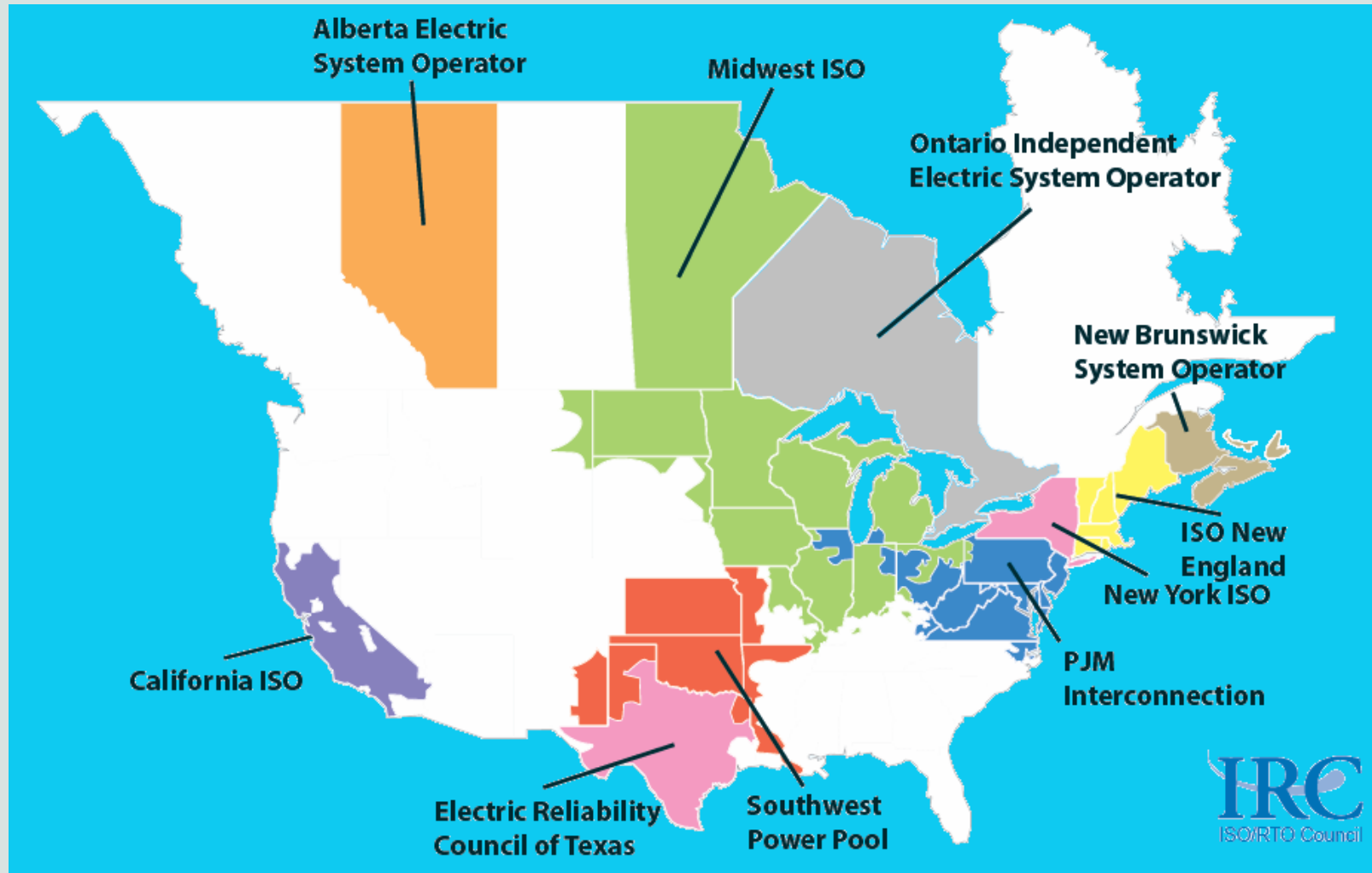
- **What makes regional planning successful?**
- How to promote regional integration?
- Can the ISO model deliver investment?

# Observation 1: institutional arrangements

- Network owners do not always take a “regional” perspective
- A better outcome results if there is a planning process where
  - Participation by network owners is compulsory
  - There is a central co-ordinating institution
  - The central institution has strong powers

ie, customers across the region are better off on average, or overall economic welfare is increased

# North American ISO/RTO markets

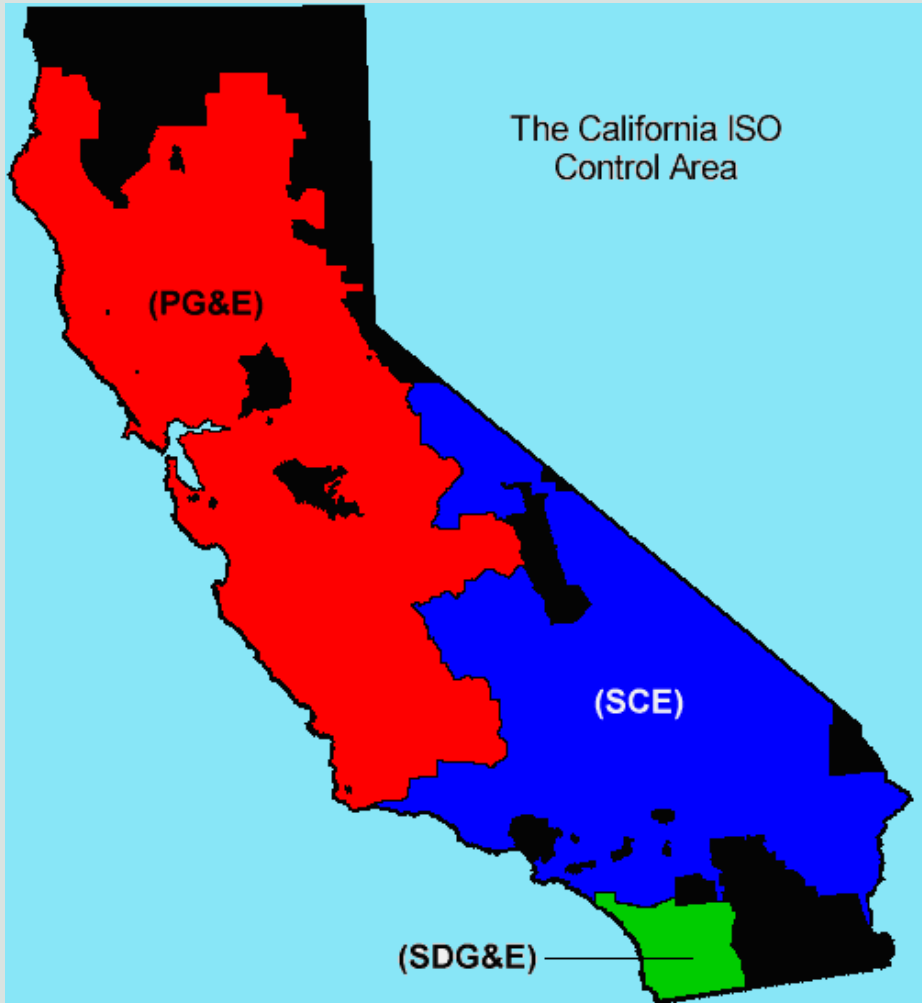


# Federal legislation

- RTO/ISO characteristics and functions set out in legislation
- Order 2000: minimum characteristics and functions of ISOs/RTOs, eg
  - Independence
  - Must have a planning process
- Order 890: strengthened rules for transmission owners, eg
  - Must participate in regional planning
  - Must carry out upgrade studies on request



# California Independent System Operator (CAISO)

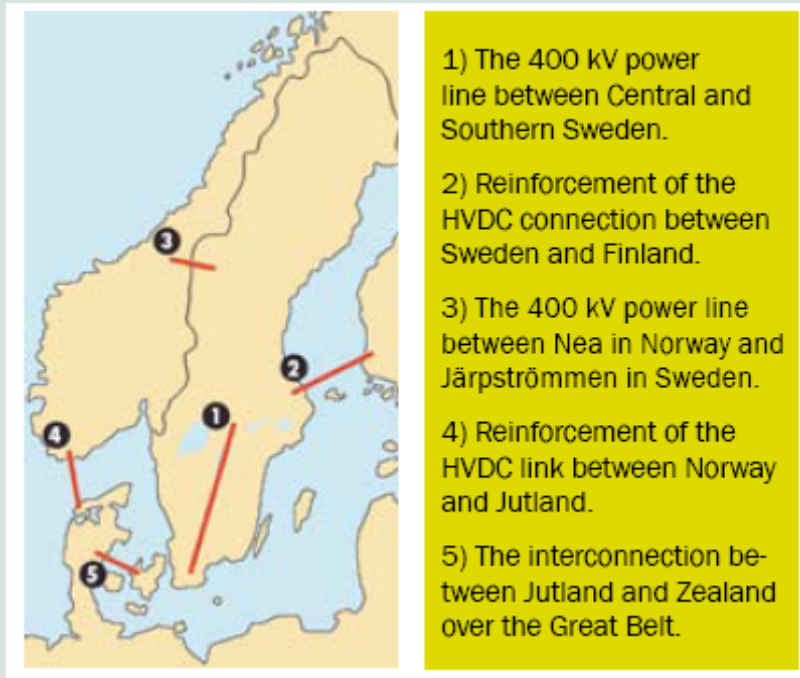


- 50 GW peak demand
- Three large transmission owners, several smaller ones
- Large networks privately owned
- Enabling legislation in 1996
- “Regional” tariffs since 2001
- ISO-led planning from 2007

# Key features of CAISO planning process

- CAISO plays central role
  - Reviews TO plans
  - Checks for consistency of planning assumptions
- Over time ISO role has grown
  - Now CAISO can propose investments to the TOs, rather than the other way around
  - CAISO can compel investment
  - Takes a comprehensive view of benefits of investment, with a regional perspective

# Nordel investment plans: “Prioritised cross-sections”



Taken from *The Swedish Electricity Market and the Role of Svenska Kraftnät*, Svenska Kraftnät, 2007.

- Participation is voluntary
- A long decision process (2002 to end 2006)
- Individual networks take investment decision
- Unclear what decision criteria are used

## Observation 2: cost sharing mechanisms

- Often investment in one network benefits customers elsewhere
- A better outcome results if
  - Costs of “regional” investments can be shared region-wide by those who benefit
  - Cost-sharing rules are simple
  - Cost-sharing mechanism is centrally operated

# Nordel “prioritised cross-sections”: investment costs

Investment costs (€m)

Link	Denmark	Finland	Norway	Sweden
Fenno-Skan 2		117		140
Nea-Järpströmmen			37	29
South Link				190
Skagerrak IV	130		130	
The Great Belt	160			
Total	290	117	167	359

Notes

Based on figures in *Prioritised cross-sections-Reinforcement measures within the Nordic countries-Status June 2007*, Nordel.

Figures include both interconnector and local reinforcement costs.

We assume that costs of interconnector assets are shared equally.

# Impact of South Link on TSO costs

- No mechanism for sharing investment costs: costs lie where they fall

Investment costs (€m)

Link	Denmark	Finland	Norway	Sweden
South Link	0	0	0	190



# Impact of South Link on wholesale prices

- Benefits to Danish consumers from wholesale price falls
  - Indicative estimate from dispute over congestion management:

**higher spot prices cost Danish consumers at least 800 million DKK since 2000 ( $\approx$ €15m per annum)**

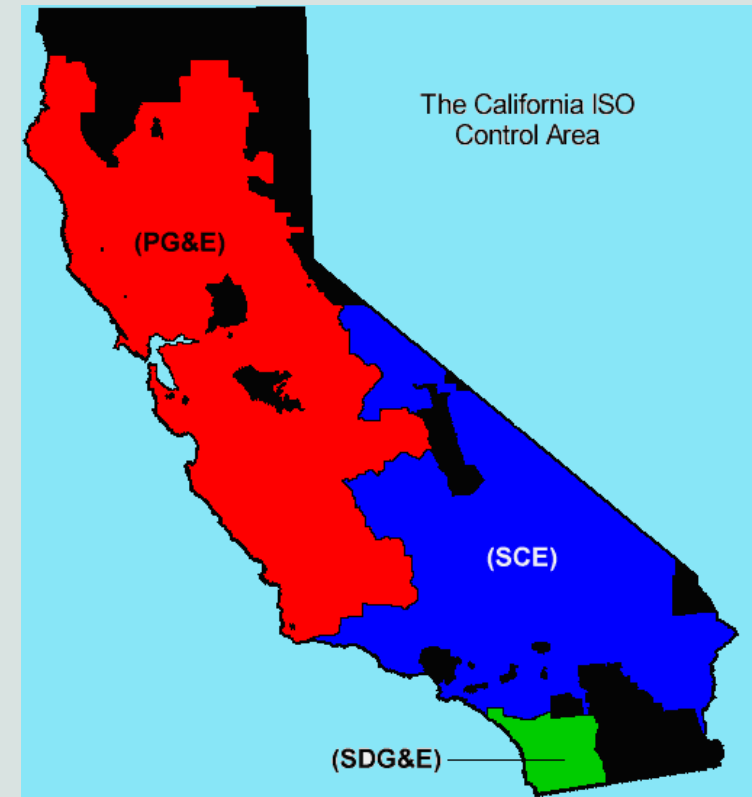
*The economic consequences of capacity limitations on the Øresund connection, Copenhagen Economics (2006).*

- Swedish prices rise
- Similar distributional impacts on generators
- **Conclusion: distribution of costs can be very different from distribution of benefits**



# In contrast: the CAISO approach

- High-voltage (>200 kV) assets considered be “regional”
  - Because customers throughout CAISO area benefit
- All new “regional” assets go into “region-wide” asset base
  - Customers across CAISO area pay
  - Doesn’t matter which network owns the assets
- Existing “regional” assets moved gradually into region-wide asset base
- CAISO collects the tariffs, so no inter-TO payments needed





# Transmission planning arrangements—key questions

---

- What makes regional planning successful?
- **How to promote regional integration?**
- Can the ISO model deliver investment?

- Long history of Nordic co-operation, but some strong criticisms
  - Statnett: “We have been and remain concerned to see a more binding collaboration taking shape, as the current form of collaboration within Nordel is not sufficiently robust. It is also extremely time-consuming.”  
*Grid Development Plan 2005–2020, Statnett 2005.*
  - Vattenfall: “Expansion plans are currently very restrained, so these differences [in prices in the different price areas] will most likely remain in the foreseeable future.”  
*Annual Report 2006.*
  - Market participants: “Investment planning is presently made primarily from national perspectives despite the fact that investments in one country often have significant implications for the neighbouring countries.”  
*Industry associations and others, press release, September 2007.*
  - Complaints over Svenska Kraftnät congestion management (ongoing inquiries).  
*Dansk Energi, formal complaint to DG COMP, July 2006.*

# Australia's National Electricity Market (NEM)

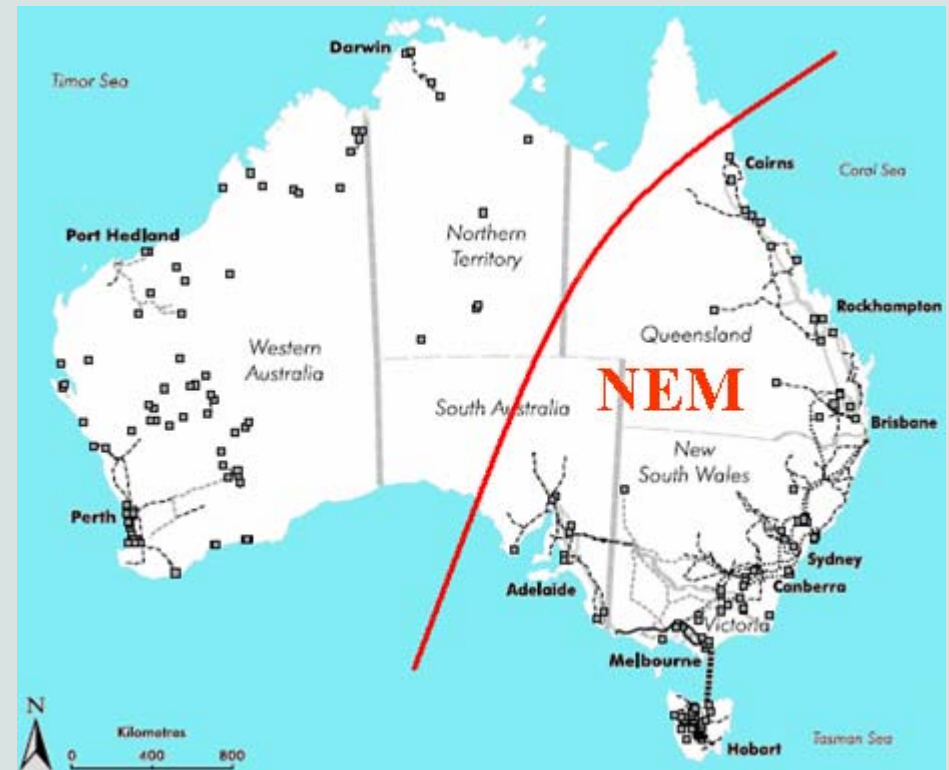
- Government/regulator developing new “National Transmission Planner”

- “investment decision making is biased toward investment within each state rather than ... having a true national character ... opportunities for efficient investment opportunities have been missed in the past.”

*Energy Reform - The way forward for Australia - A report to the Council of Australian Governments, Energy Reform Implementation Group, January 2007.*

- “It appears unlikely that the current framework is achieving efficient investment, taking account of costs and benefits across the NEM as a whole.”

*Firecone, consultants to the Energy Reform Implementation Group.*



# Does voluntary co-operation for investment planning work?

- Nordpool and Australia's NEM are working regional markets
- Both appear well set up to make voluntary co-operation work
  - Australia has a federal system with a central regulator and system operator
  - Nordpool has strong political backing for co-operation
  - Both have significant levels of state ownership
- But both systems seem to struggle with planning and investment
  - Not surprising, given that costs and benefits can be distributed differently
  - US ISO markets have evolved mechanisms to cope with this

# Transmission planning arrangements—key questions

- What makes regional planning successful?
- How to promote regional integration?
- **Can the ISO model deliver investment?**

# The ISO model and network investment

- European Commission's Third Package Impact Assessment
  - “under-investment is ‘the Achilles’ heel’ of the ISO model”
  - “[g]enerally, the ISO models in the US suffer from a lack of investment in generation and transmission”
- What is the evidence on US ISOs/RTOs\* and network investment?

\*Note: in the US context, ISO (Independent System Operator) and RTO (Regional Transmission Organisation) are very similar concepts.

# Comparing RTO and non-RTO investment

- Measure transmission investment in RTO and non-RTO areas
- Compare with total electricity sales in RTO and non-RTO areas

2006 figures

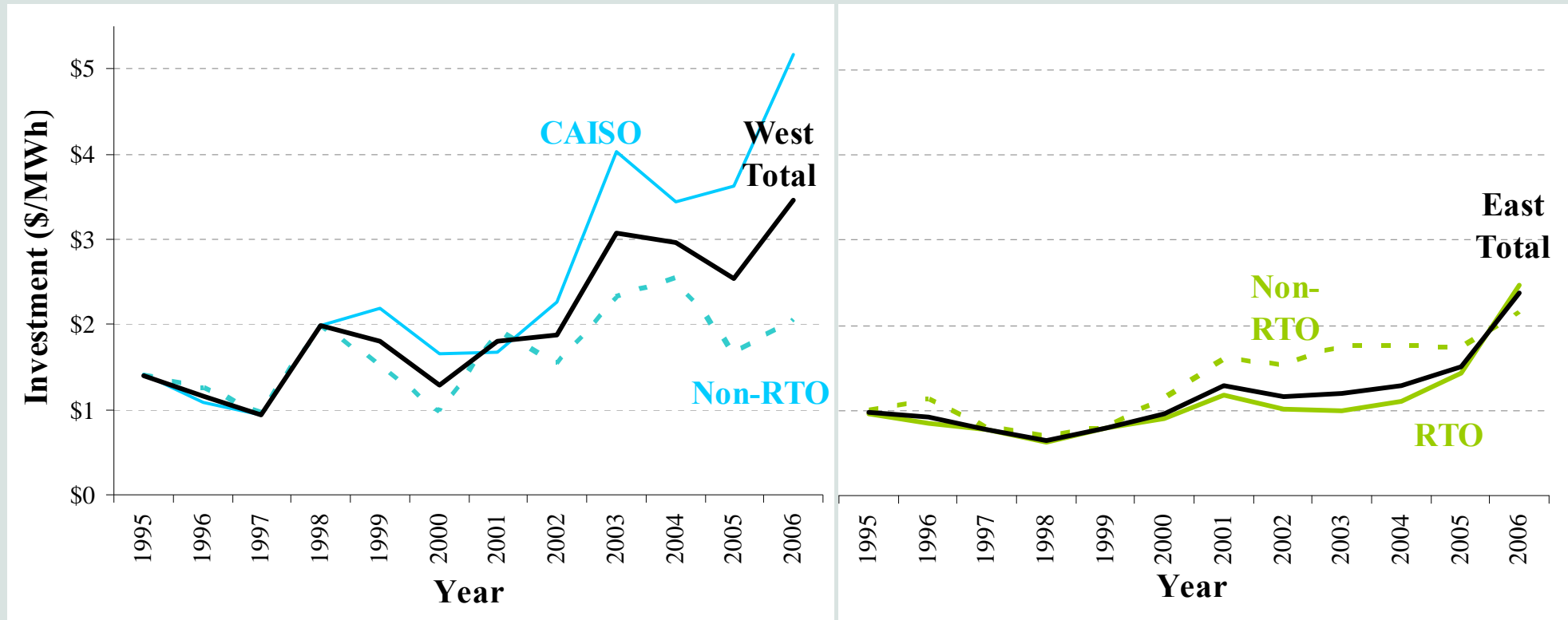
	Share of total investment	Share of total retail sales	Ratio of investment to sales
RTO	73%	68%	1.07
Non-RTO	27%	32%	0.84

Notes

*The Brattle Group* analysis of FERC and EIA data compiled by Global Energy Decisions, Inc., The Velocity Suite.

Note: these and subsequent figures exclude publicly-owned networks (a minority of the total).

# Normalised transmission investment by private US utilities



Source: *The Brattle Group* analysis of FERC Form 1 and EIA Form 861 data compiled by Global Energy Decisions, The Velocity Suite.



# US conclusions

---

- Latest figures do not back up European Commission's concerns
  - In 2006 ISOs/RTOs invested more than non-ISO/RTO regions
- CAISO has consistently invested more than non-ISO/RTO regions
- Eastern ISO/RTOs lagged behind initially, but are now catching up

# Transmission planning arrangements—conclusions

- What makes regional planning successful?
  - A strong central institution, and mandatory participation by network owners
  - Ability to share the costs of “regional” investments
- How to promote regional integration?
  - Difficult with only voluntary co-operation
  - A central institution helps
  - Need to be able to share investment costs
- Can the ISO model deliver investment?
  - Yes, if well implemented—ISO needs to be properly designed



Telecommunications • Litigation • Finance • Environment • Energy

# *The Brattle Group*

Toby Brown

## **International Review of Transmission Planning**

**March 12<sup>th</sup> 2008**

rue Ducale 83

Bruxelles 1000

+32.2.790.35.80

[Toby.Brown@brattle.com](mailto:Toby.Brown@brattle.com)