

Unbundling and Independent System Operators: Key Issues

Workshop BNetzA
Bonn, April 12, 2007

Gert Brunekreeft

Jacobs University Bremen & Bremer Energie Institut

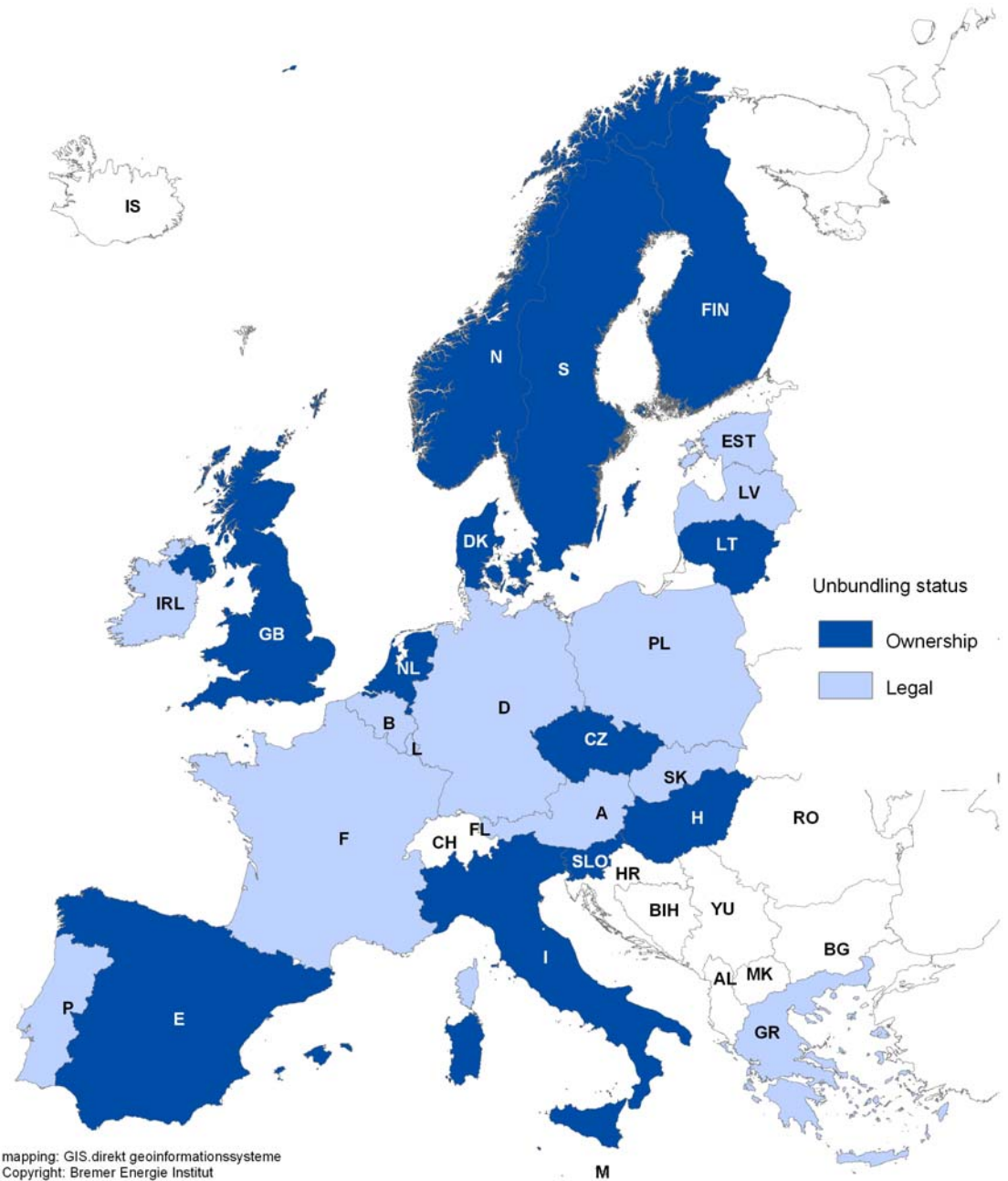
g.brunekreeft@iu-bremen.de

www.unecom.de

Background: Vertical unbundling

- **Supply security: possibility of shortage of capacity gets real**
 - **Generation & Network**
 - **Interconnector capacity is very short**
- **Sector Inquiry - 10 January 2007:**
 - **Competition on European energy markets disappointing**
- **One of the major policy steps proposed by the commission:**
 - **Vertical unbundling of transmission network**
 - **Should improve competition**
 - **Should enhance network investment**
 - **Should improve competition**
 - **Should improve supply security**

Unbundling in Europe



The VIU-argument

- Are incentives of vertically integrated utilities (VIU's) to invest in new transmission capacity low?
- The argument: strategic investment withholding
 - Building new and larger interconnector capacity creates stronger competition for the competitive businesses
 - Hence, integrated utility will hesitate to invest in new T
 - The same may hold for new connections of power plants
- Argument is basically correct
 - Important in the USA as well
 - One of the drivers behind ISO's and RTO's
- However, there are limits to the VIU-argument

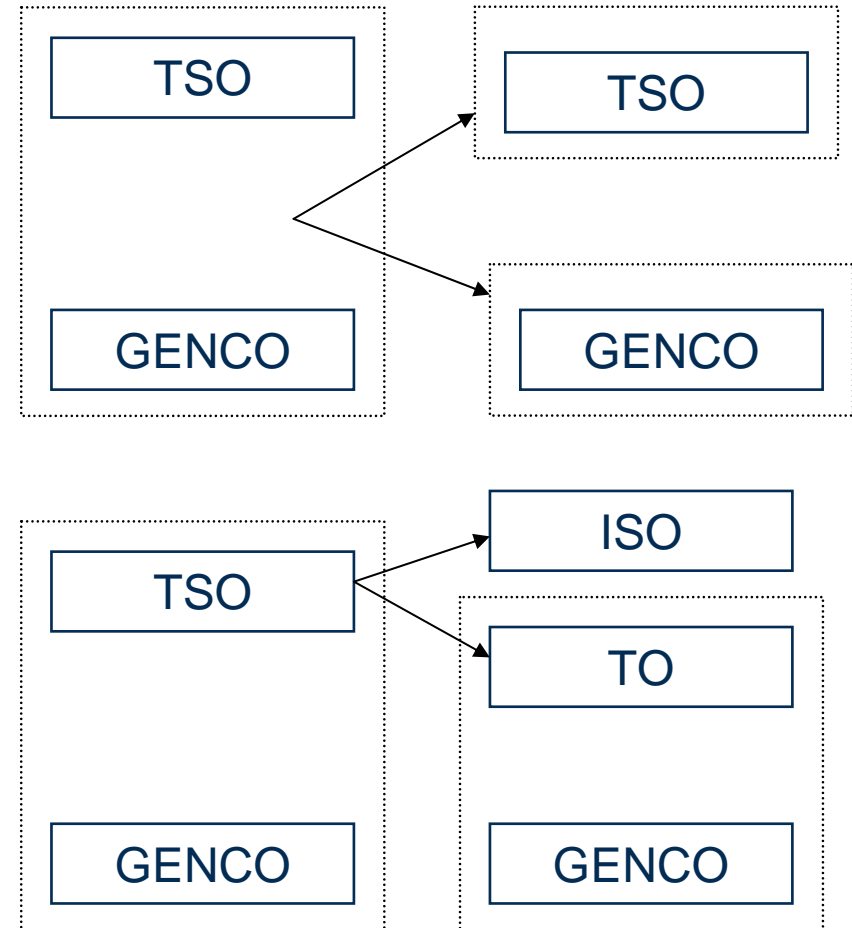
Limits to the VIU argument

- VIU's may be short on generation side and long on purchase side
 - Additional T-capacity increases buying power and thereby increases competitiveness
- VIU's may have low-cost, excess generation capacity
 - Additional T-capacity allows larger market
- Exporting VIU's can actually decrease competitiveness on own market
 - For instance: residual supply index
 - If demand D goes up, RSI goes down
- External effects between G and T-investment:
 - Can they be adequately internalised?

$$RSI_j = \frac{\sum_{i \neq j} Q_i}{D}$$

Vertical unbundling

- **What are the options?**
 - **Full ownership unbundling of TSO**
 - Takes away incentives to discriminate
 - But: externalities between new power plant and new network
 - **Independent System Operators (ISO's)**
 - Split of transmission owner (TO) and system operator (SO)
 - TO can stay at VIU
 - SO: ‚independent‘



ISOs: key questions

- **Social costs and benefits of ISO vis-a-vis:**
 - Vertically integrated utilities (VIU)
 - Full ownership unbundling (TSO)
 - See also: www.unecom.de
- **What is an ISO?**
 - Tasks, authorities and duties
- **Who is an ISO?**
 - What exactly is meant by „independent“?
 - Role of stakeholders?
- **Who decides on transmission-investment?**
 - TO or ISO, or hybrid solution?
- ▶ **Investment problem is achilles heel of the ISO model**

ISOs: examples

Northamerica	Southamerica	Europe	Australia
USA with 7 ISOs <ul style="list-style-type: none">• CAISO• ERCOT• ISO NE• MISO• NYISO• PJM• SPP Canada with 2 ISOs <ul style="list-style-type: none">• AESO• IESO	Argentina <ul style="list-style-type: none">• CAMMESA Brasil <ul style="list-style-type: none">• ONS	Scotland <ul style="list-style-type: none">• NG Irland <ul style="list-style-type: none">• EirGrid Bosna and Herzegovina <ul style="list-style-type: none">• ISO B&H Switzerland <ul style="list-style-type: none">• Swissgrid	<ul style="list-style-type: none">• NEMMCO

ISO examples: PJM in the US

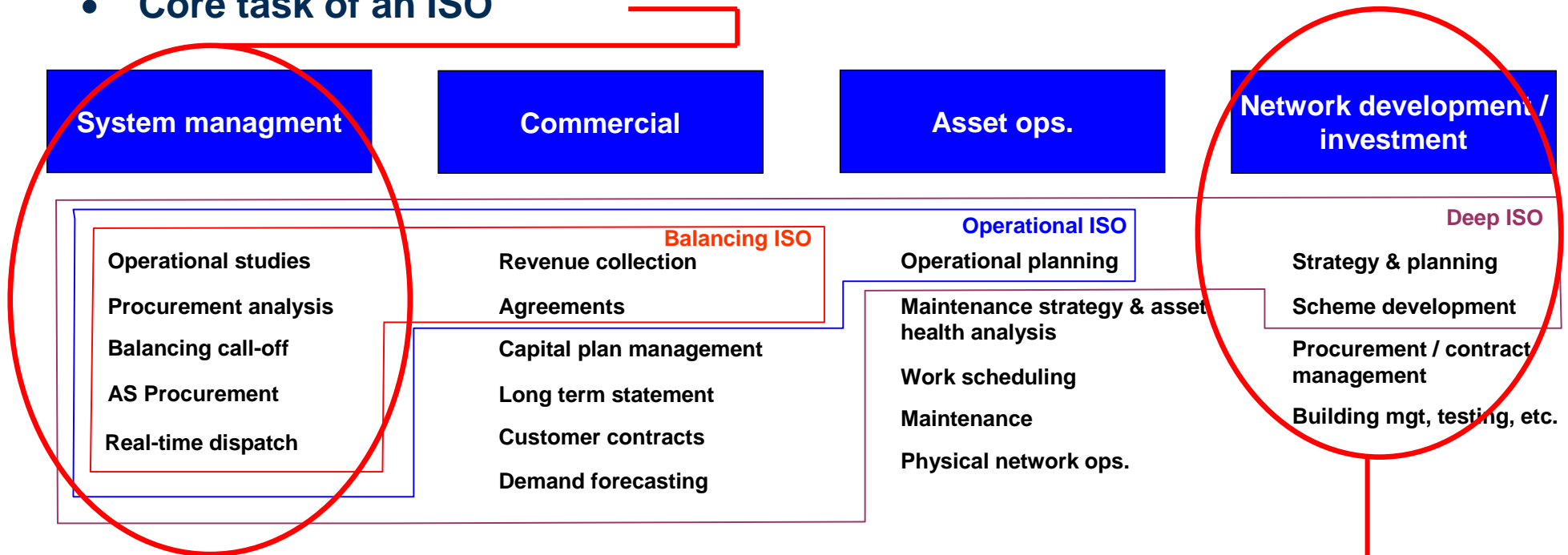
- **USA:**
 - **Mostly privately owned utilities**
 - **Largely vertically integrated (at least G and T)**
 - **Strongly fragmented networks**
 - **Relatively weak interconnectors**
 - **Sometimes poor coordination between TSOs**
 - **Many state regulators & one federal regulator (FERC)**
- **FERC policy:**
 - **Standard Market Design (SMD) around 2001**
 - **Didn't make it politically, but many feature were implemented nevertheless or had already been implemented**
 - **PJM was source of inspiration for SMD**

SMD in the USA: 6 points

- **Independent System Operators**
 - **Regional Transmission Operators (RTOs)**
 - **Locational Marginal Pricing (Nodal Spot Pricing)**
 - **Plus Financial Transmission Rights (FTR)**
 - **Transmission pricing**
 - **Licence plates**
 - **Resource adequacy requirement**
 - **Regional transmission expansion planning**
 - **Including merchant transmission investment**
 - **Market power mitigation: Bid caps (\$1000/MWh)**
- ▶ **Big picture: inadequate G and T capacity**

What is an ISO?

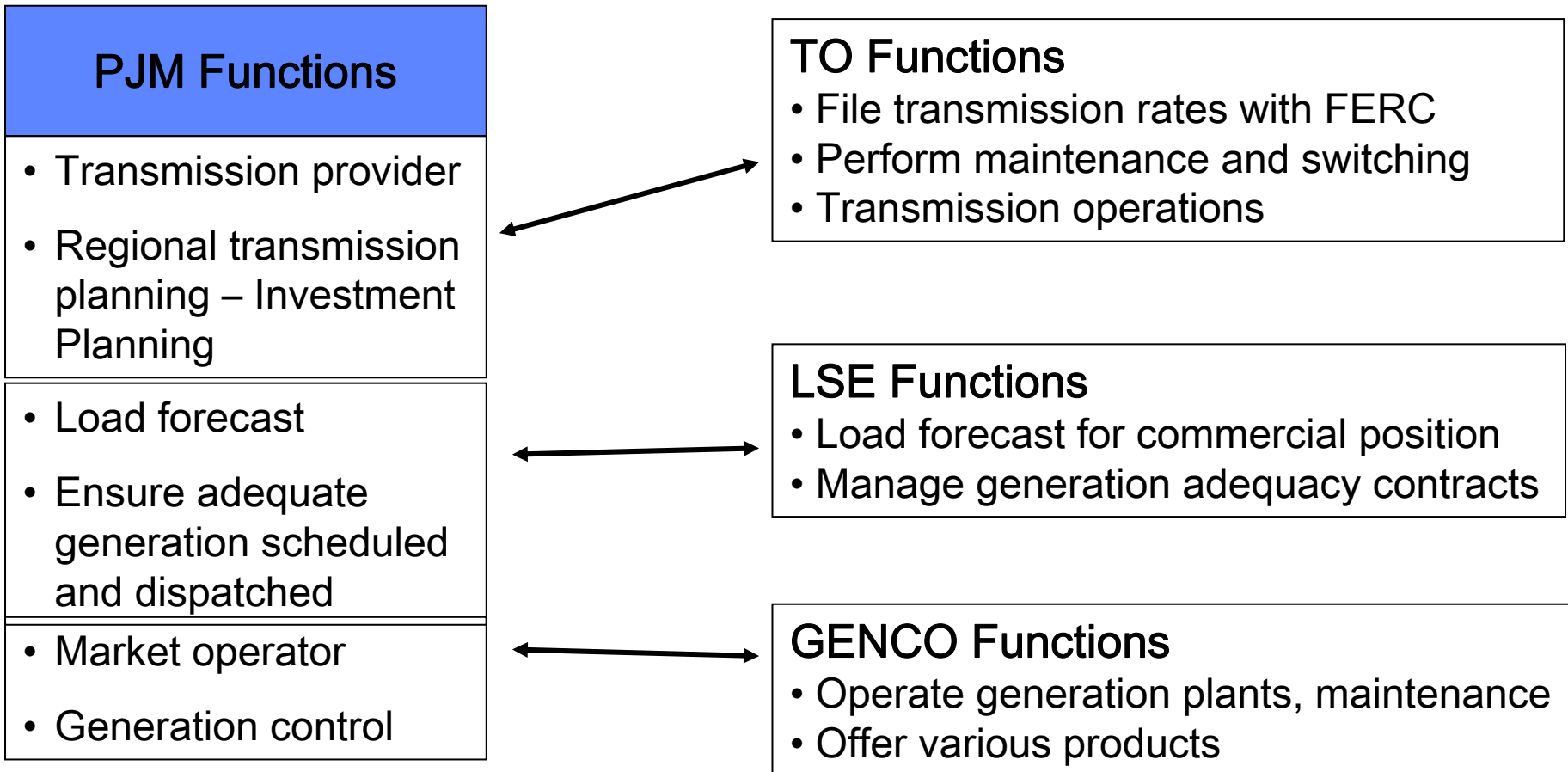
- Core task of an ISO



- PJM is a „deep ISO“

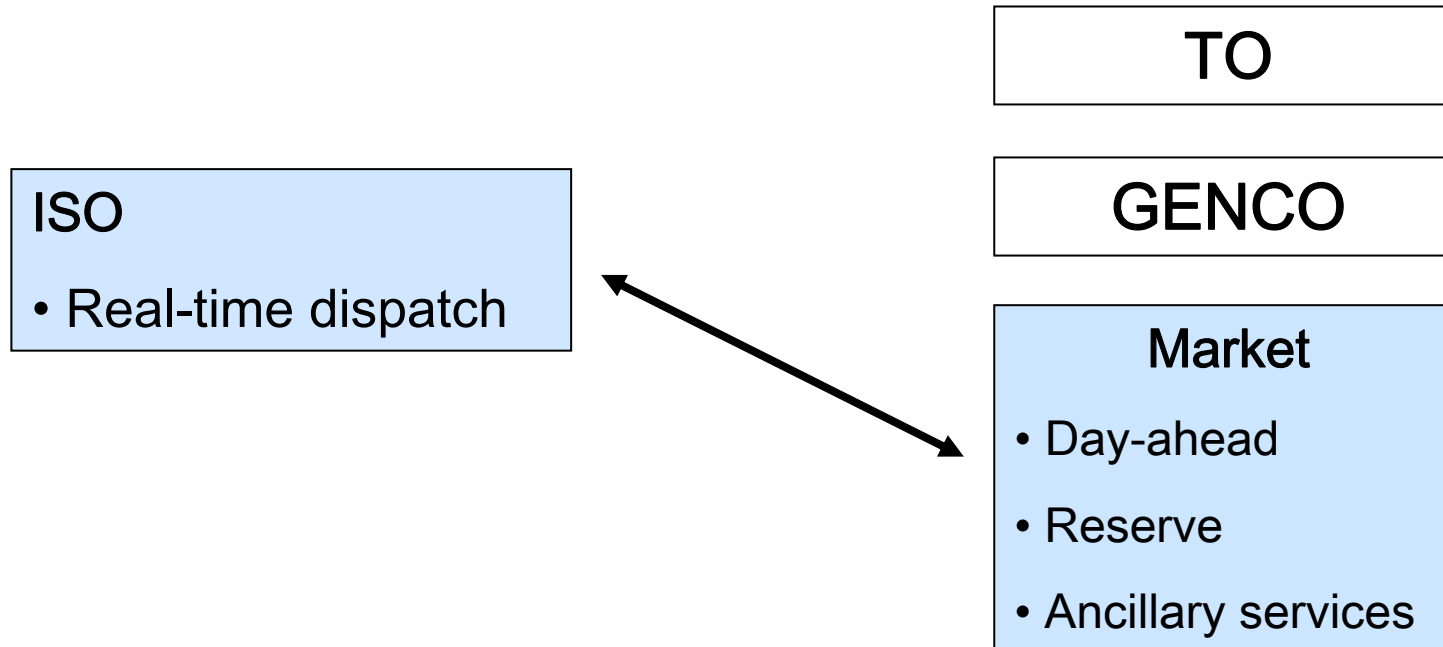
Source: the figure relies on Frontier Economics, 2007

What is PJM?



Source: Ott, A, PJM

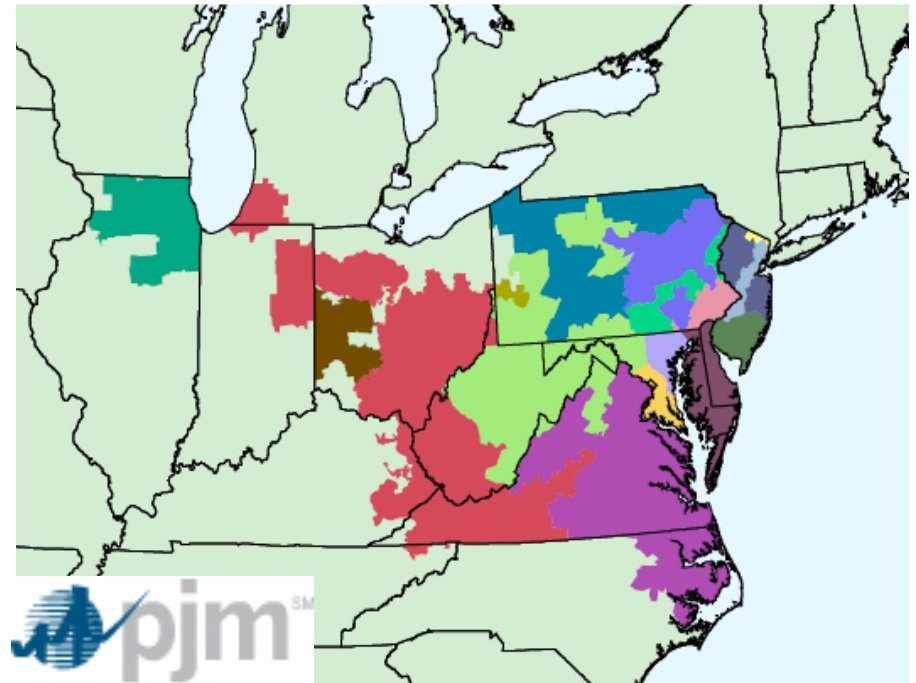
Integration of market operations and ISO



- **Question: (When) Will it be economic to integrate market operations into the ISOs responsibility?**
- **Integration will be essential with nodal/zonal pricing.**

Who is PJM?

- **PJM operates the largest electricity transmission network in the world, with**
 - 51 millions of residents
 - 90,270 km transmission lines
 - 13 U.S. states & D.C.
- **PJM operations cost about 0,37 \$/MWh compared to a wholesale power price of around 58 \$/MWh (March 2006).**



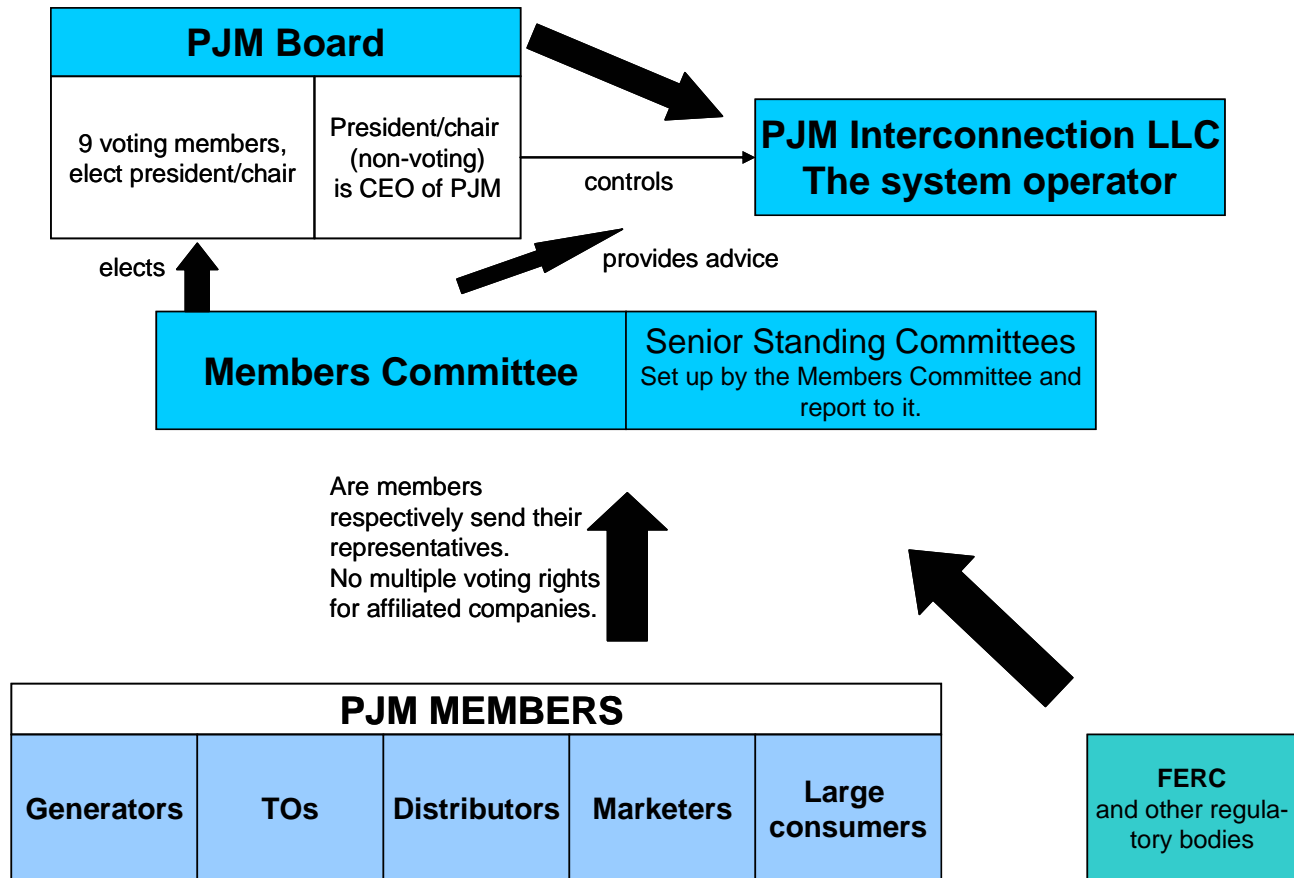
Who is PJM?

- **PJM is a club**
 - **Large ISO/RTO at east-coast of US**
 - **PJM is owned and governed by its members**
 - **Members are:**
 - **Generators**
 - **Transmission owners (TOs)**
 - **Suppliers and traders**
 - **Distributors**
 - **Large end-users**
 - **Members determine a board of independent executives**

- ▶ **Note: the utilities are part of the Independent-SO!**

Who is PJM?

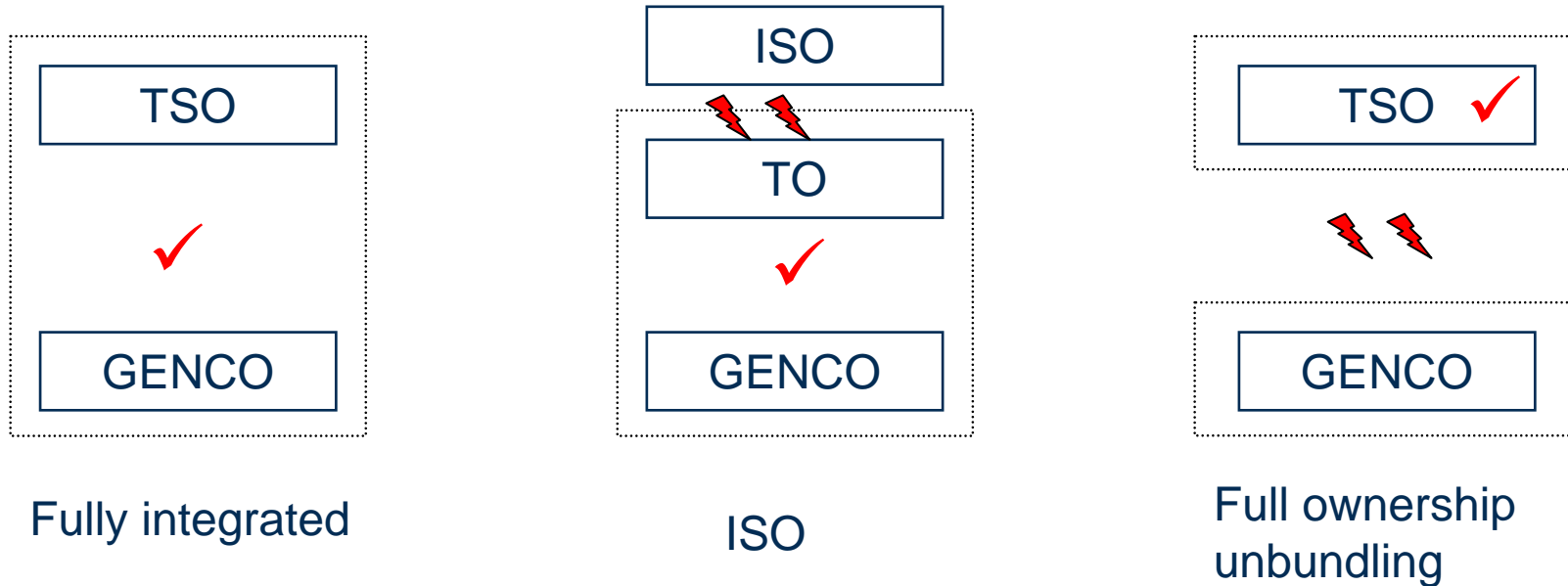
- supervises and ensures the fulfilment of PJM's duties
- adopts the budget
- approves the *Regional Transmission Expansion Plan*



Who is PJM?

- **Club**
 - Stakeholders are owners and members
 - About 450 members
- **Governance**
 - Stakeholders are involved indirectly
 - They appoint a members committee
 - Members committee elects PJM Board
 - One member, one vote
 - FERC is ex-officio member
- **The Board**
 - The board members are independent from the sector
 - PJM board is supervisory board
 - Board president is CEO of the PJM's Executive Board

The investment problem



- **ISO: Who decides?**
 - **If TO, then investment withholding issue not adequately addressed**
 - **If ISO, then split between DMU (ISO) and risk taker (TO)**

PJM and investment

- **Transmission Investment**
 - **Regional Transmission Expansion Plan**
 - ISO develops RTEP
 - Utilities and TOs are heavily involved in the consultation process
 - **The ISO identifies necessary enforcements**
 - **Actual investment:**
 - **First the market**
 - **Window of opportunity for merchants (paid by FTRs)**
 - **Then handed over to TO**
 - **In last instance, TO is ordered by ISO**
 - **Assets included in regulatory asset base**
- ▶ **Ultimately PJM decides on investment!**
 - **Deep ISO**

ISO and investment

- **If TO decides:**
 - The original investment withholding is not addressed
 - Trade-off between short-run management and long-run investment to resolve congestion may be suboptimal
 - Depends on regulatory details
 - Internalises G- and T-investment externalities
 - DMU bears risk
- **If ISO decides:**
 - DMU does not bear the risk
 - Who is liable if things go badly wrong?
 - ISO has no assets
 - Depends on legal status of ISO
 - Role of regulator?

Ideas: two-tier governance and ISO-plus-minus

- **Two-tier ISO governance?**
 - **One-party, one-vote for the board election**
 - **Votes proportional to market size for ISO-rules**
 - **ISO Members may be allowed to vote on (constitutional) rules rather than on Board members**
 - **Justifiable veto right for TO against ordered investment**
- **ISO-plus-minus: Tendered T-investment**
 - **ISO designates required T-investment**
 - **Tender for the investment, allowing third parties**
 - **Avoids expropriation of assets**
 - **Avoids investment obligation for TO**
 - **Avoids strategic investment withholding**
 - **DMU bears risk**

Conclusions

- **Investment (in T and G) is downside of unbundling**
 - Full OU: split between T and G investment
 - ISO: who decides? TO or ISO?
- ▶ **Clearly, investment issue is achilles heel of ISO model**
- **ISO membership and governance is tedious but solvable**
 - Tension between independence and coordination
- **Next steps for discussion:**
 - Two-tier ISO governance
 - ISO-plus-minus: tendered T-investment

Thank you for your attention!

Gert Brunekreeft

Jacobs University Bremen & Bremer Energie Institut

g.brunekreeft@iu-bremen.de