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Financial Transmission Rights

David Newbery

University of Cambridge

Cambridge Winter Research Seminar
9th December 2011

Outline and context

- Obstacles to the Single Electricity Market
  - Lack of price convergence
  - Market power
  - Lack of interconnection
- Solutions
  - Market coupling
  - More investment and

Firm FTRs: our study for DG-ENER

Objectives of the SEM

- Deliver secure sustainable electricity efficiently

⇒ competitive markets, full use of ICs (inter-connectors), efficient & timely T & G investment

⇒But most markets becoming **more concentrated**

- => unbundle transmission ownership
- Target Electricity Model couples markets
  - Provides liquid reference price
- Competition aided by long-term FTR ***obligations***
  - Can be netted to increase effective contestability
  - Price discovery guides transmission investment

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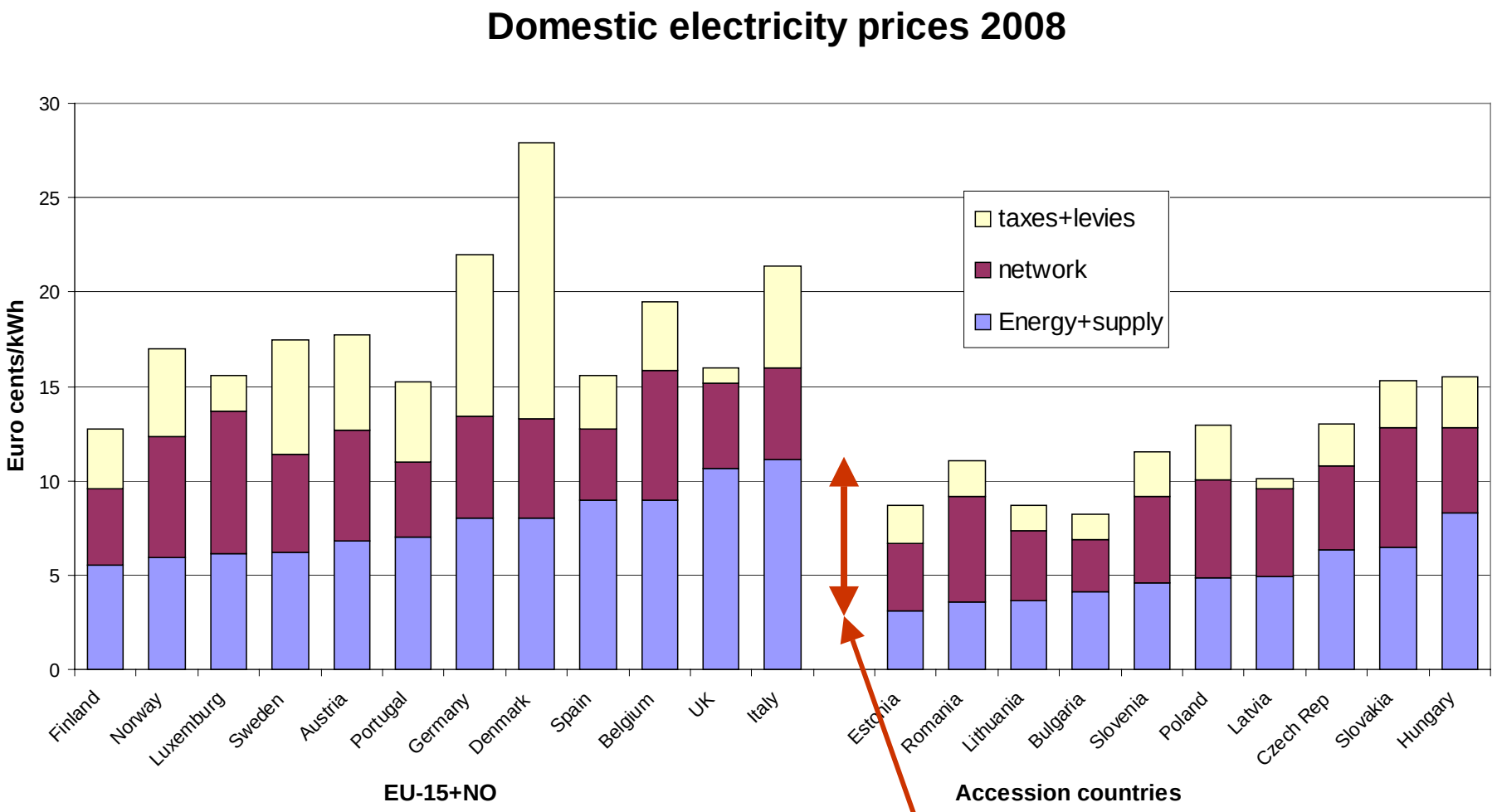
No single energy price in the SEM



Source: ERGEG (2009) Status Review

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Integrating EU electricity markets

- Most markets are concentrated
- Imports can increase competition
- But interconnections limit trade
  - were inefficiently used
  - expansion resisted by incumbents
- Market coupling improves efficiency
- FTR obligations makes markets contestable

Together clarify where T investment needed

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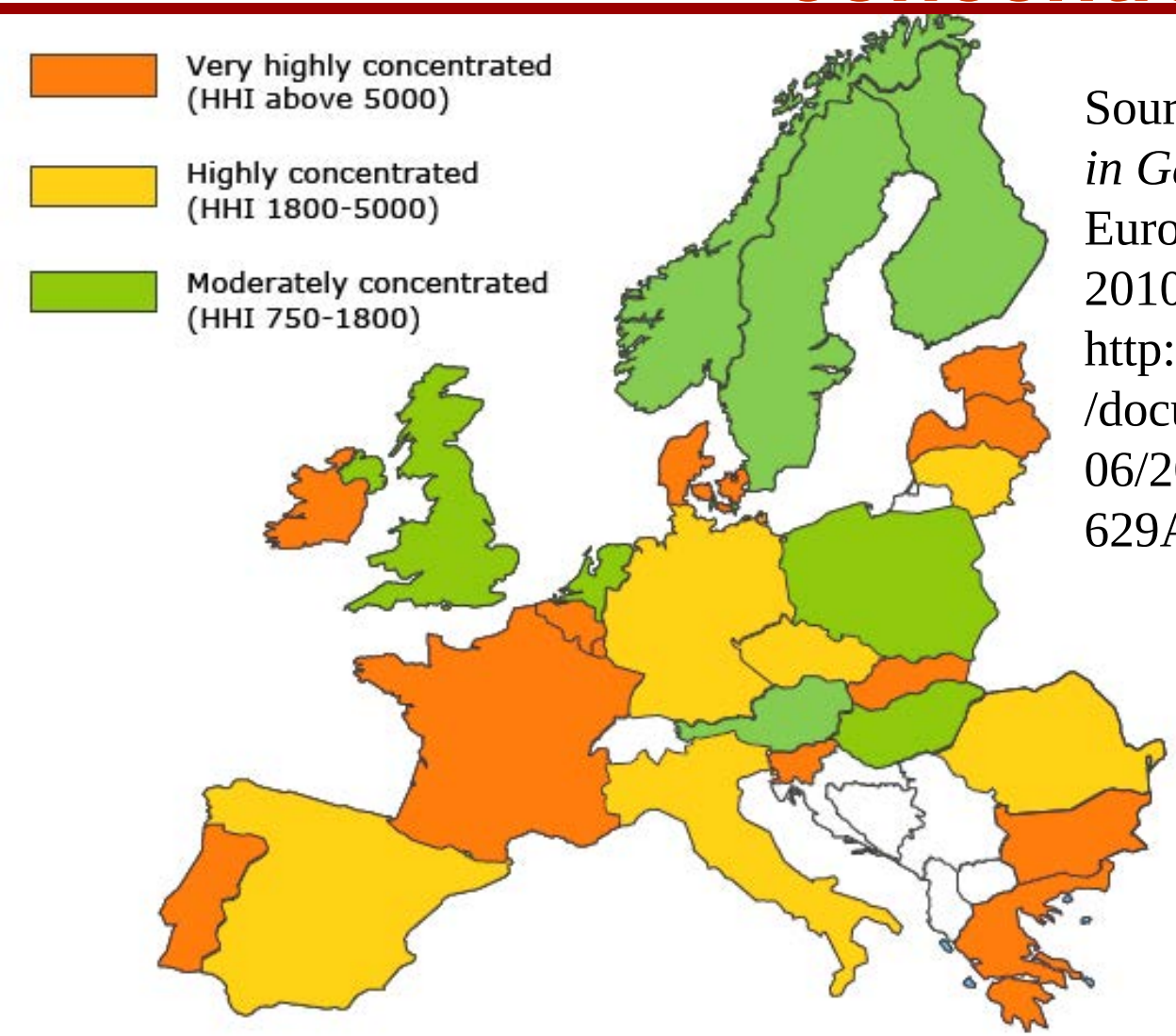
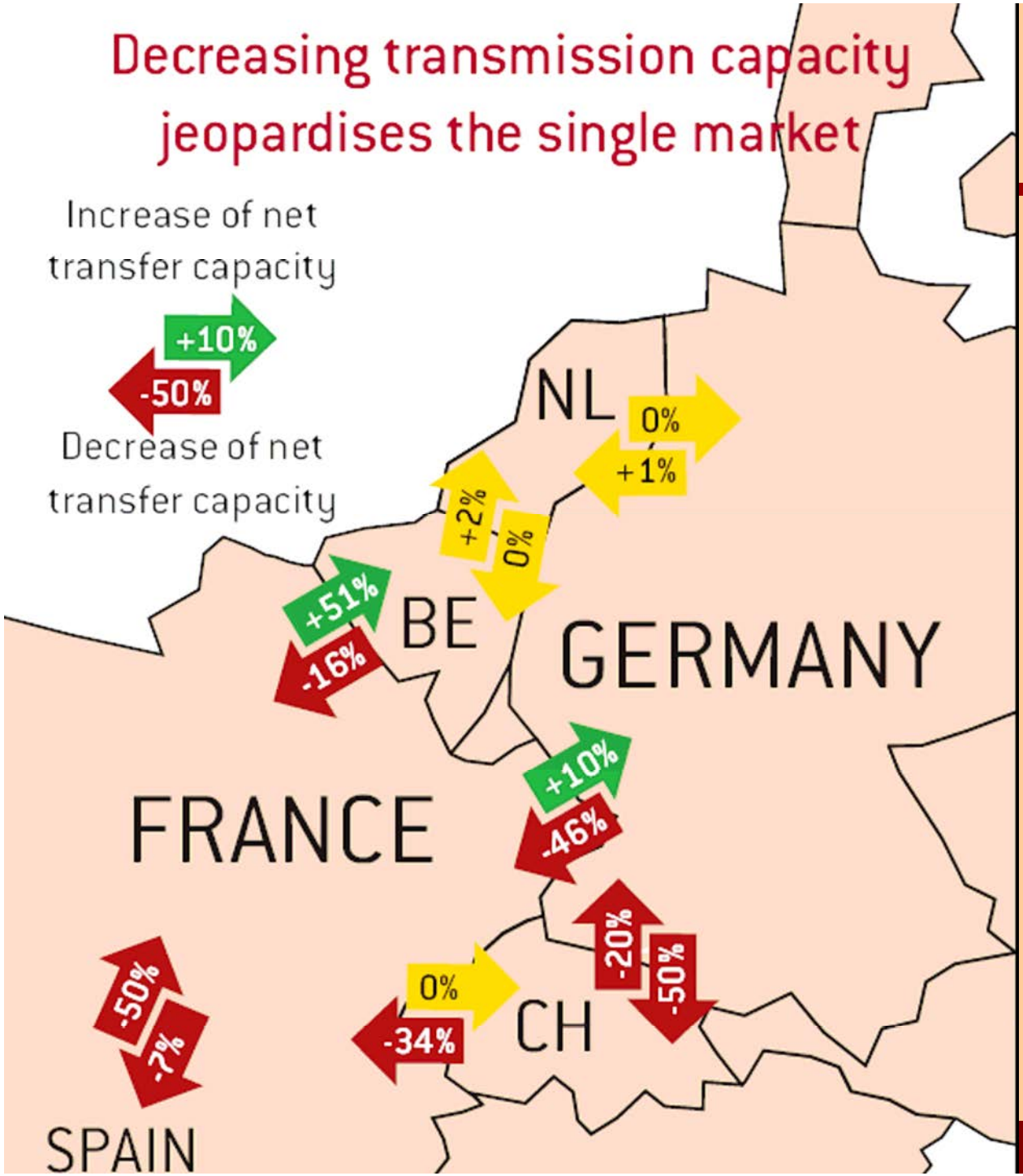
10 countries increased concentration in 2008



Source: *EU Energy Markets in Gas and Electricity*, European Parliament 2010 at http://www.europarl.europa.eu/document/activities/cont/201106/20110629ATT22899/20110629ATT22899EN.pdf



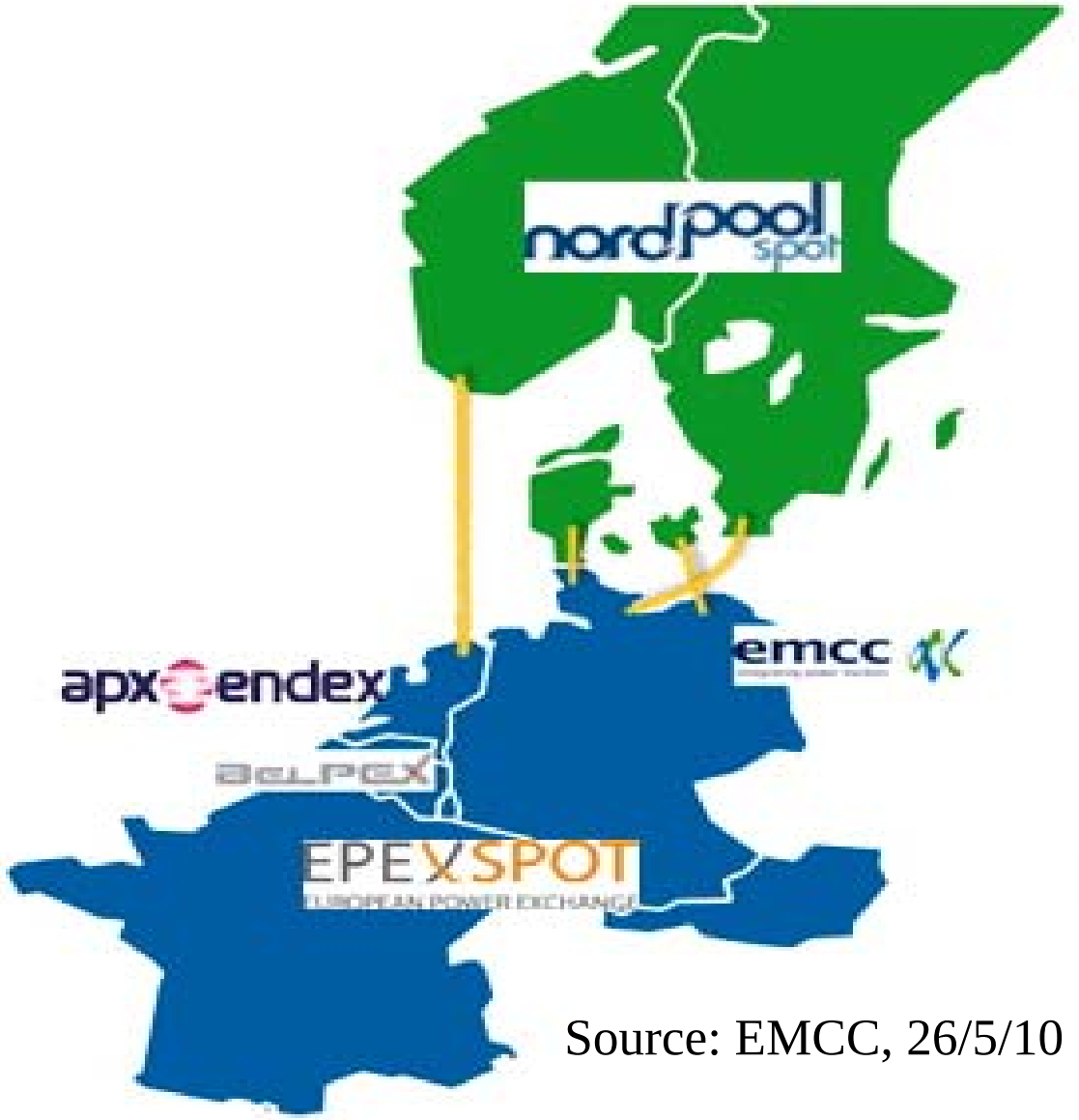
Change in net transfer capacities between winter 2004/05 and winter 2009/10

- mostly decreases

Source: Zachman (2010) from ENTSO-E. Figure shows change in net transfer capacities between winter 2004/05 and winter 2009/10 in direction of arrow

Market coupling

- Market coupling makes efficient use of interconnectors
- Markets are cleared at a single price over largest area
- Transmission constraints determine price zones
- 9 Nov 2010 Central West Europe moves to Interim Tight Volume Coupling



Source: EMCC, 26/5/10

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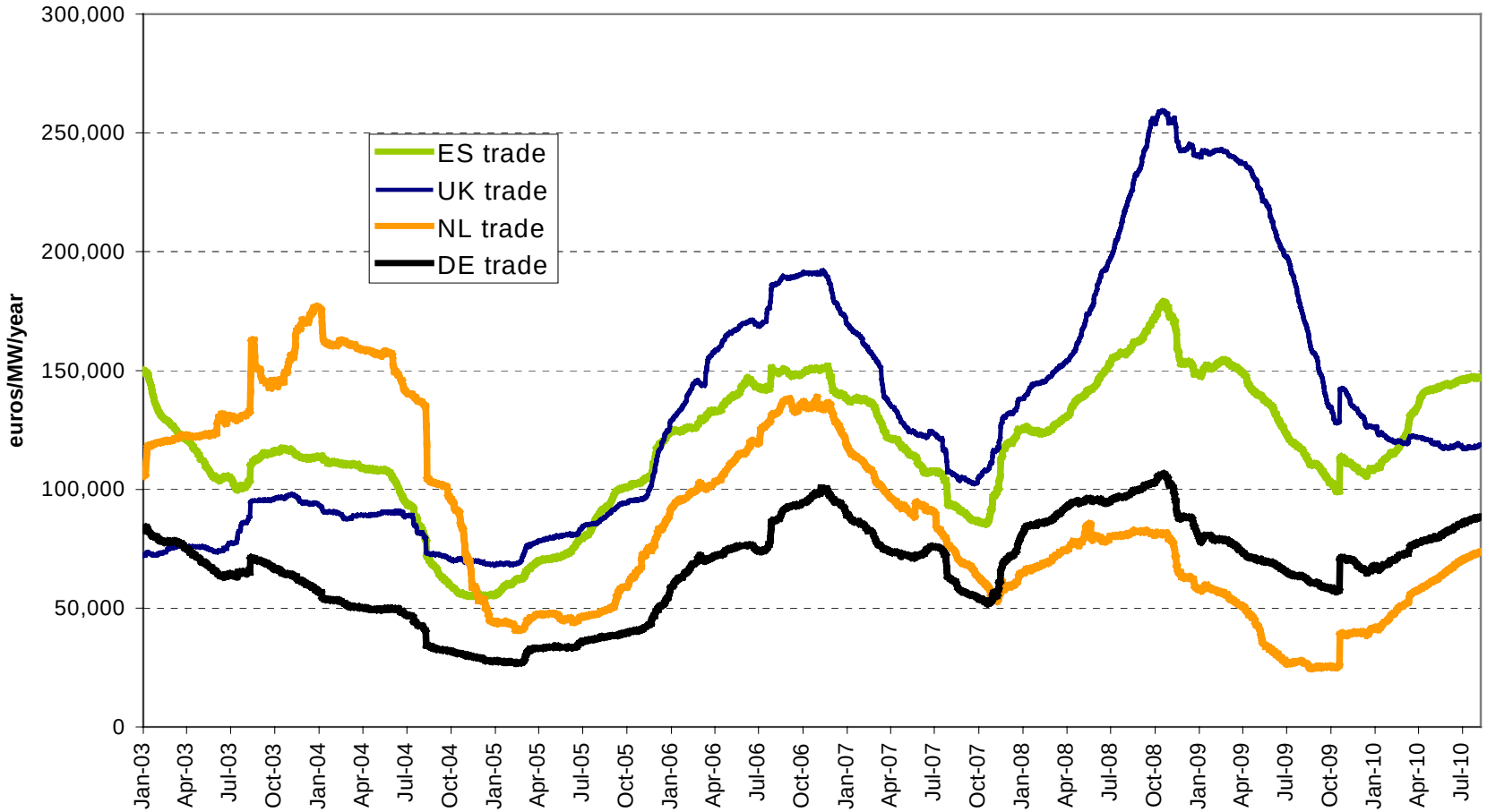
Absolute hourly difference relative to France 2005-10

Annual value of trade between France and other countries



Background

- DG-ENER commissioned Booz&Co for study
  - *Physical and Financial Capacity Rights for Cross-Border Trade* by David Newbery and Goran Strbac
  - Contributes to 3rd Package Target Electricity Model
- Consulted with ENTSO-E; CEER/ ERGEG/ ACER; CEFIC; Euroelectric; EFET; IFIEC
- Presented to Northern European Regional TSO meeting and Florence Forum (interim & final)

Study objectives

- Identify **advantages and disadvantages** of tradability of long-term Transmission Rights
- Should rights be **financial transmission rights** (FTRs) or **physical transmission rights** (PTRs), (or variants/hybrids);
- Propose **practical recommendations**, including the **preconditions necessary, for a facilitating a market in the rights**
  - which will meet the needs of participants, and deliver efficient and reliable long-term price signals

Status quo

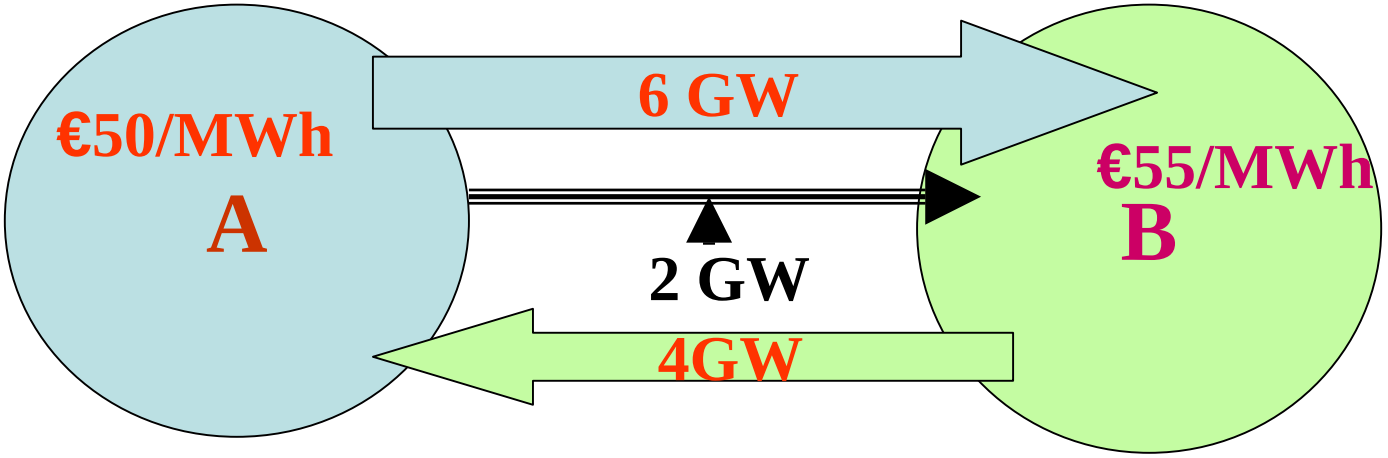
- TSOs offer 1 yr PTRs (one-sided options)
  - Use it (nominate) or sell it (UIOSI) day-ahead
  - Sale transforms PTR into financial instrument
  - Effectively becomes an FTR day-ahead
- TSOs and incumbents like PTRs - “reflects physical reality”
  - one-sided options restrict trade as cannot be netted
  - **protect incumbents, impedes competition**

Benefits of TRs

- Promotes **efficiency** in the use of interconnectors (ICs)
- Promotes generation **competition** across borders
- Tends to **mitigate market power** in generation
- Price differences identify required IC **investment**
- Allocates **risk** efficiently to TSOs and rewards them appropriately
- Accommodates **intermittent** generation

Firm FTRs allow netting

- 2 GW interconnector between countries A & B
- FTRs obligations trade at **€5**



Netting can dramatically increase imported competition

FTR obligations increase competition

- Consider an IC ATC = 2 GW connecting two concentrated markets, A, B (peak L = 20 GW)
- Large Industrial Consumers (LIC) demand = 8 GW
  - PTRs only release 1 GW in each direction
  - 87% of market dominated by incumbent G

➢ Now SO issues 2 GW FTR ***obligations*** each way

  - Initially LICs buy 2 GW A→B, G_B loses 2 GW custom, sells to A, FTR of 2 GW B→A nets to zero; SO continues to issue FTRs subject to net value of 2 GW

- Generators in each country vulnerable to competition from abroad *for any customer in their market*

Obligations and options

- All US nodal markets offer long-term **FTR obligations**: market participants happy
- PJM and CAISO offer FTR options (for Merchant Transmission projects)
- **Market demand for FTR options < 1%**
- Many ISOs have looked at issuing FTR options
  - Reluctant to issue/administer FTR options market because of challenge in designing a set of options while ensuring TSO revenue adequacy
  - Hard to price FTR options => concerns about liquidity of secondary markets
  - nothing stops traders issuing them

=> Offer FTR options and obligations if market demands

Problems with TEM

- Target Electricity Model has zonal not nodal prices
- FTRs are from zone-to-zone
- But flows depend on which nodes inject and withdraw

=> ATC depends on which nodal flows, so market condition dependent

=> TSOs provide nodal load flow data to maximize day-ahead ATCs

- Simultaneous Feasibility Test: ATC does not depend on market conditions

Simultaneous Feasibility Test (SFT)

- SFT needed to maximise ATC
  - ⇒ Represent all FTRs in network model + all external loop flows
  - ⇒ Solve for network flows pre- and post-contingency states
- guarantees if all FTRs exercised to support IC transfers then no constraint or ATC exceeded
- Provided topology unchanged, TSO congestion ***revenues will be "adequate"***
  - – to settle all FTRs

Merchant / Subsea links

- Subsea links face higher and longer outage risks
  - => Firm contracts could rapidly bankrupt owner
  - => Should be permitted to offer interruptible service
  - – guaranteeing firm service likely needs a large insurance premium provided by asset-adequate insurance firm
- If NRAs impose new conditions on merchants
  - – Merchants should retain existing property rights
  - – Can negotiate compensation for less favourable terms
- EC/ACER consider merchant regulation carefully
  - – Currently discourages new merchant links when more ICs needed

What are the problems?

- TSOs prefer 1 yr PTRs not 3+ yr FTRs
  - Defending incumbents from competition?

⇒ NRAs need to take tougher line

⇒ **no discrimination** - treat domestic and external access alike

- MiFID subjects TSOs to financial regulation?
  - But NRAs better regulators
  - SFT ensures revenue adequacy
    - but NRAs must assure compensation for *force majeure*

Conclusions

- **Firm** long-term TRs are desirable
  - TSOs need regulatory assurance to recoup losses
  - within country transmission is firm - need EU non-discrimination
  - Only undersea & merchant IC's should be **exempt** from firmness
- **Anything PTRs can do FTRs can do better**
- FTR obligations increase competition and efficiency
  - nettting allows more competitors into each market
  - but zonal pricing is an impediment to full market integration
  - Inter-zonal ATC calculation is **market-condition dependent**
    - does not respect the physics (loop flows, internal congestion)

    => under-declaration and inefficient use of capacity

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Appendix

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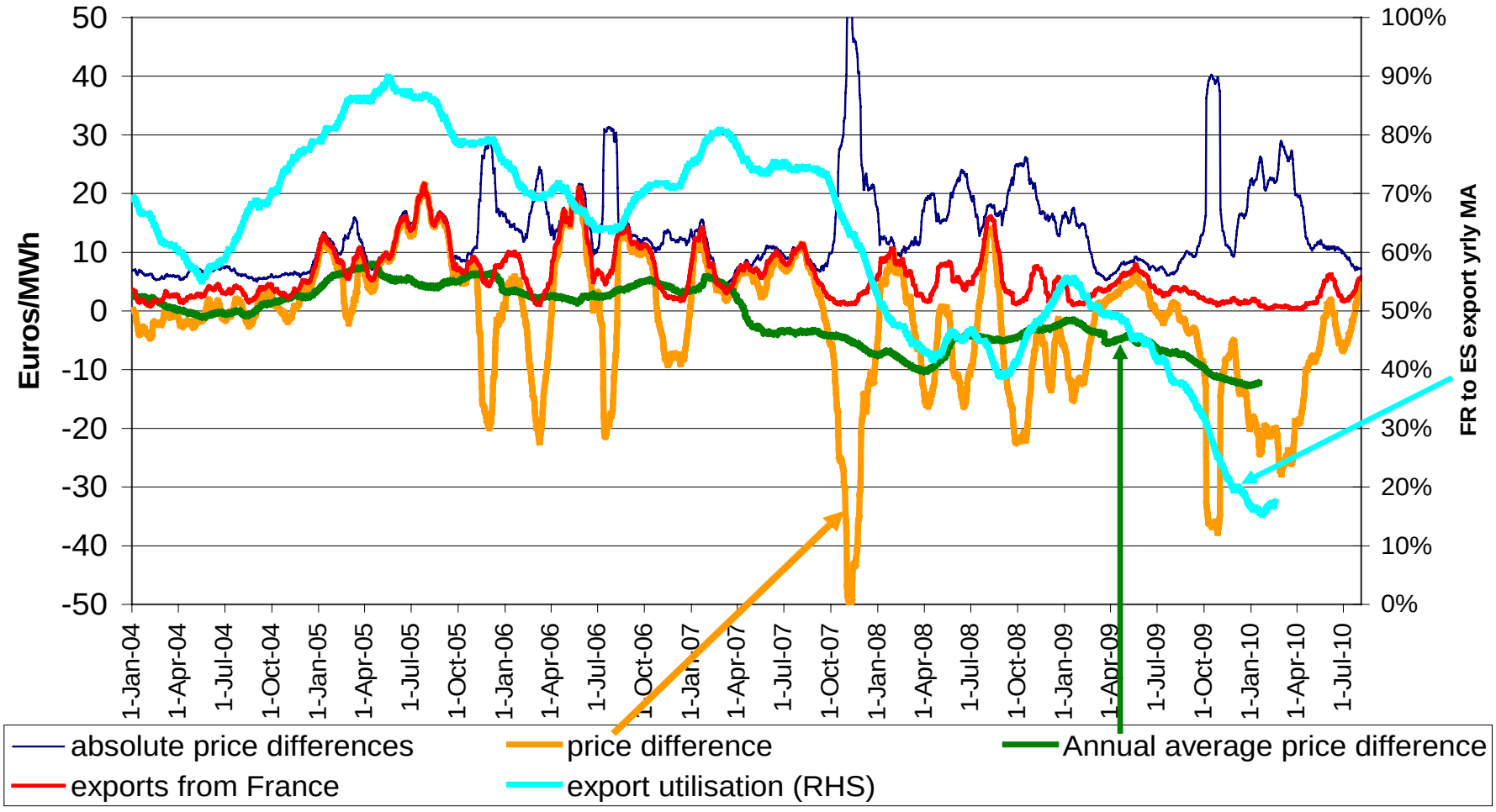
Price differences, Spain-France

monthly moving averages of hourly differences



Trading example: Spain – France in 2006

- 1 yr base contract €50.65/MWh in Spain; €48.13 in France
- But PTR FR→ES worth €8.49/MWh (value of exports only)
  - does this mean L_S cannot bid for PTR when $Ep_F - Ep_S$ = €2.52/MWh?
- No: not if LIC actively trades
  - G_F has MC €30/MWh, contract to sell to L_S who holds PTR at €48.13/MWh
  - 19 July 2006: p_F = €116.83/MWh, p_S = €55.30/MWh, $p_F - p_S$ = €61.53/MWh
  - L_S sells into FR market, profit = €116.83 - 48.13/MWh = €67.87/MWh, releases PTR (value = 0), having paid €8.49/MWh, buys in ES at €55.30/MWh rather than at contract of €48.13/MWh, loss of (€7.17)/MWh,
  - net gain = €67.87- €7.17- €8.49 = € 52.21/MWh *on this day*
- same as L_S holding Spanish CfD for €48.13/MWh and one-sided FTR FR→ES for €8.49/MWh

Contracting *within* a price zone

(all prices /MWh)

- Generator G has variable cost €30, sells to L at €40, issues L 2-sided CfD with strike price *P* = €40
- G offers into PX at €30, L bids at limit price e.g. €9,999
- Spot *P* = €25, G does not generate, L buys at €25, L pays G €40-25= €15 on CfD, G makes profit of €15 > strike price less MC = €10
- Spot price = €50, G generates, sells at €50, L buys at €50, G pays L €50-40= €10 on CfD (can afford to), reducing G's sales revenue to €40 = strike price. Profit = €10
- **Credit risk: L defaults on CfD (contract stranded)**

Contracting *across* price zones: FTRs *(all prices /MWh)*

- Generator G in A MC= €30, sells to L in B at €40, issues L 2-sided CfD with strike *P* = €40, buys FTR A=>B for €5

- G offers into PX at €30, L bids at limit price e.g. €9,999

- P_A = €25, G does not generate, P_B = €35; L buys at €35, L pays G €40-35= €5 on CfD, G collects €35- €25 = €10 on FTR, makes generating profit of €15 > strike price less MC = €10 (less FTR €5)

- P_A = €50, G generates, sells at €50, P_B = €45, L buys at €45, G pays L €45-40= €5 on CfD, G pays €5 on FTR, G's revenue to €50—5-5=40 = strike price. Profit = €10 (less FTR €5)

Credit risks: buyer defaults on CfD

Acronyms

- •ATC: available transfer capacity
- •CfD Contract for Difference
- •FTR financial transmission right
- •HHI: Herfindahl–Hirschman Index (measure of concentration)
- •IC: interconnector
- •ISO Independent System Operator
- •MC Marginal cost
- •MiFID Markets in Financial Instruments Directive 2004/39/EC
- •NRA: National Regulatory Agency/Authority
- •PTR: physical transmission right
- •PX Power exchange
- •SEM Single (or integrated) electricity market
- •SFT: Simultaneous Feasibility Test
- •TEM: Target Electricity Model
- •TSO Transmission System Operator