Regulation: Approaches and Experiences in the Power Industry

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University of Vienna

This presentation reviews the (de-) regulation, privatization and and IO-characteristics of the power industry from a normative (e.g. natural monopoly) and a positive (e.g. vote maximizing, rent seeking) point of view. These theoretical arguments are complemented by facts and observations from the power industry internationally, the EU and in particular in Austria.

Workshop: **Issues in Regulation of Electricity**
Vienna University of Economics and Business Administration
March 3rd 2006

Content

- **Theory** – normative & positive
- Austria's *socialized* power industry
- Deregulation/privatization international and overall, and
- with respect to electricity (UK, California)
- Electricity liberalization in Austria and in the EU.
- Open and further problems

Normative

- **Natural monopoly**
  sub-additivity, increasing returns
- merit goods, business cycle, etc.
- **Implications**:
  Price Differentiation (*Ramsey-prices*, *peak load pricing*)
- Transaction cost – vertical integration

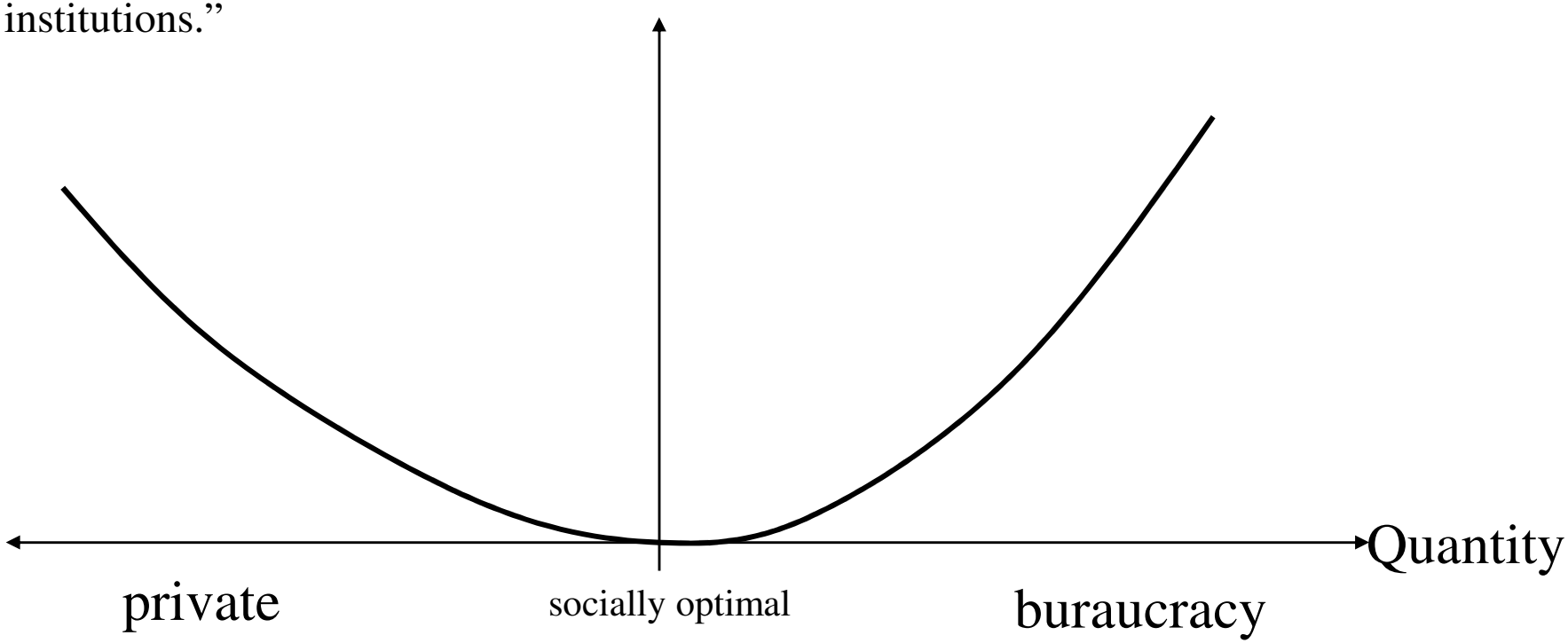
Positive

Buchanan-Tullock “No one seems to have explored carefully the im-plicit assumption that the individual must somehow shift his psychological and morale gears when he moves between the private and social aspects of life. We are therefore placed in the some-what singular position of having to defend the simple as-sumption that the same individual participates in both pro-cesses against the almost certain onslaught of the moralists.”

- Monopoly fallacy
- Tullock rent seeking
- Crew-Rowley
- *Theory of capture*, Stigler, Peltzman
- Becker (1981, 1983)
- Leviathan => forbid price differentiation

Brennan and Buchanan
Framework for institutional decisions

J. S. Mill, *Essays on Politics and Society*, "The very principle of constitutional government requires it to be assumed that political power will be abused to promote the particular purposes of the holder; not because it always is so, but because such is the natural tendency of things to guard against which is the special use of free institutions."



Experience with Austria´s ‘**socialized**’ power industry

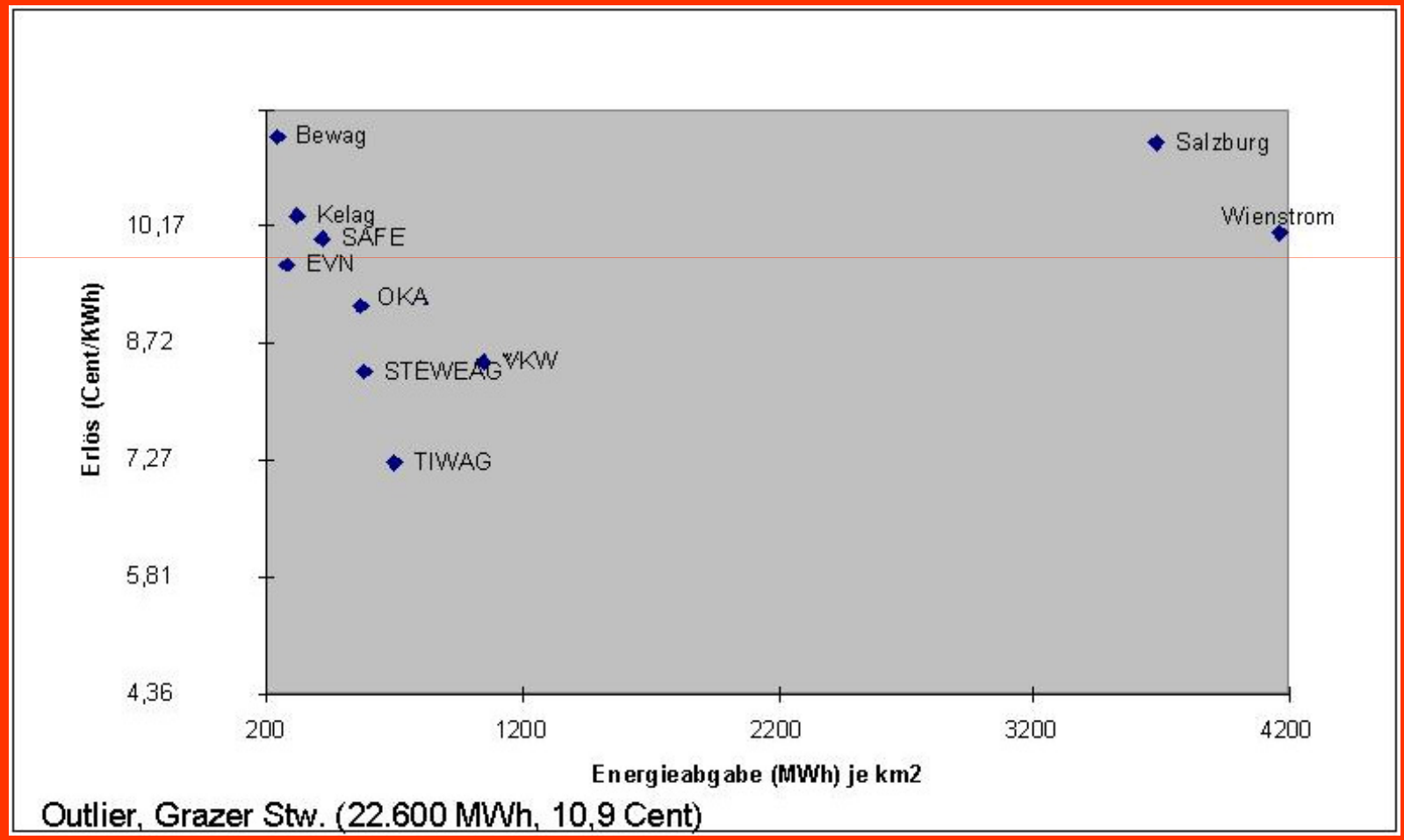
- Scale economies not exploited
- Cost variations (strange)
- No price differentiation
- low efficiency improvements
- others

Scale Economies

Power Stations	MW
E-On Bayern (Durchschnitt)	616
Dürnrohr (Verbund/EVN)	405
Voitsberg (KELAG)	330
Neudorf (STEWEAG)	285
Mellach (STEWEAG)	246
Riedersbach (EnergieAG)	231
Timelbach (EnergieAG)	178
Zeltweg (KELAG)	137
St.Andrä (KELAG)	124
Pernegg (STEWEAG)	100

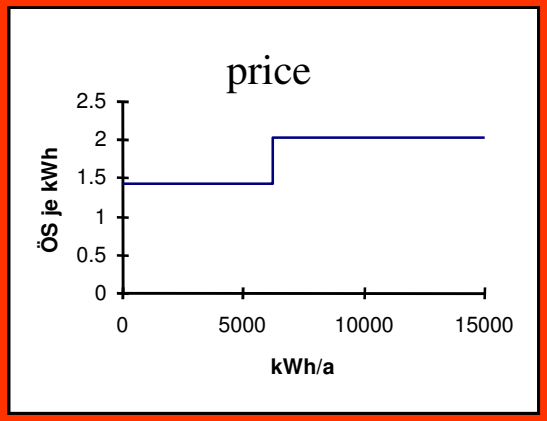
Costs (1993)

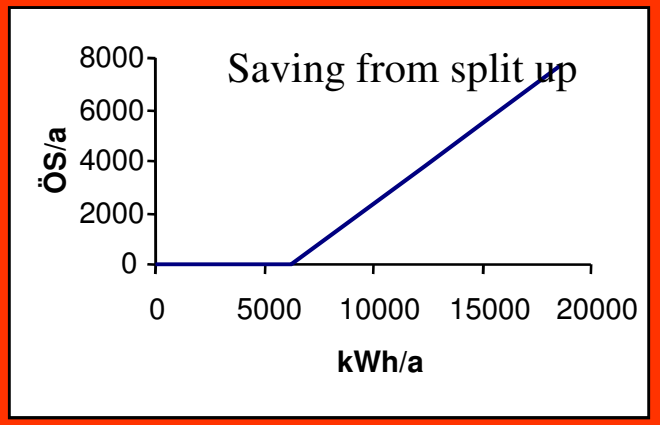
Avg. costs (= avg. revs.) versus demand density



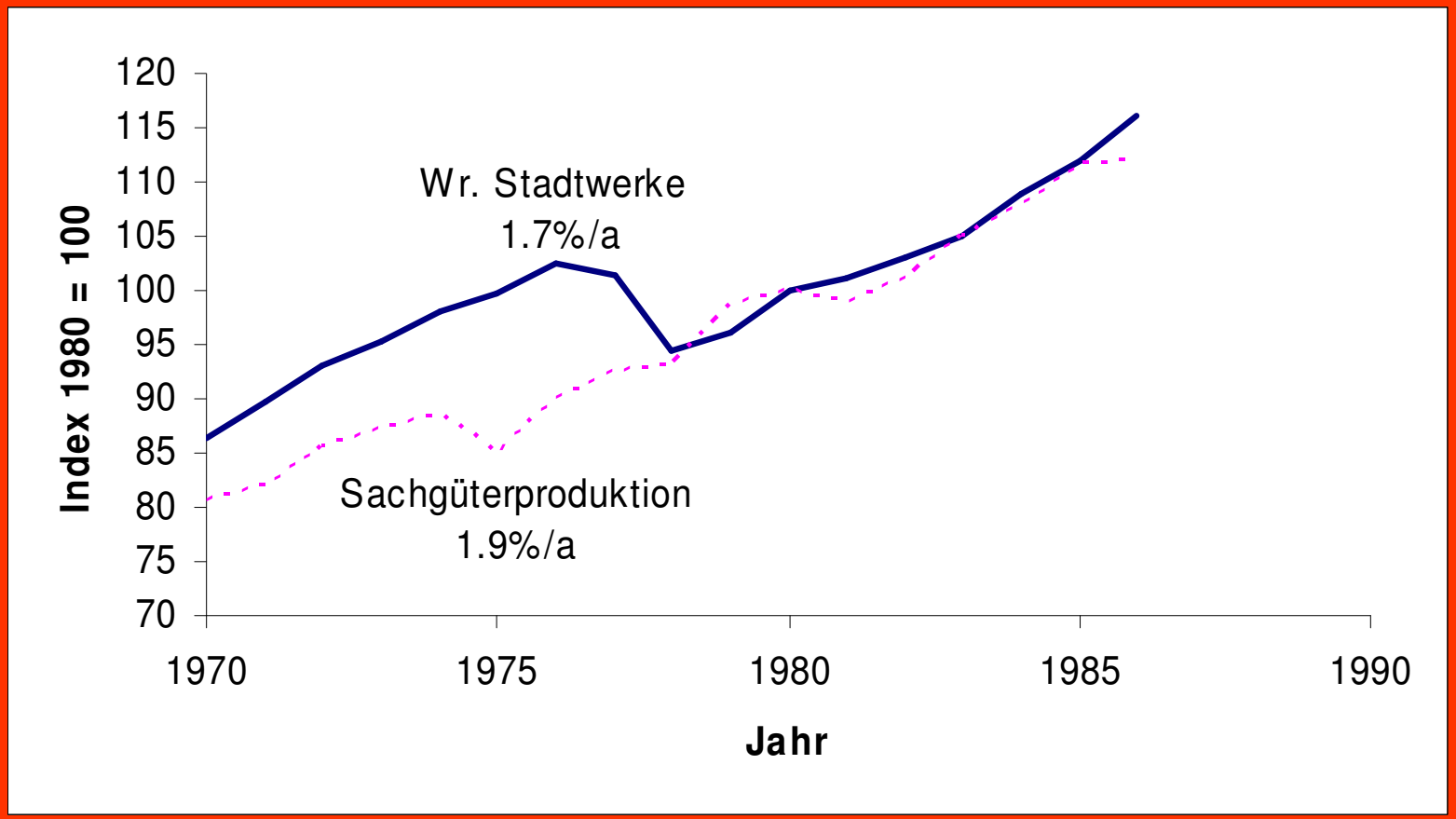
Price differentiation

- No proper peak load pricing
- Absurd price differentiation against commerce (weak political protection)
- *Wienstrom*





Low efficiency improvement
Total factor productivity



Further characteristics

- Vertical integration - Wirl 2003
- Little inner Austrian trade, no market
- Inefficient production (e.g. from storage)
- No or wrong incentives (e.g. maintanance)
- Overcapacity (but high reliability)
- Service – “Amt”
- Strong political influence
- Carreer options for politicians (Welzl, Hirschmann, Dörflinger, etc.)
- **Yet could have been much less efficient!**

Deregulation/Privatization

- International – overall assessment
- Some specifics of electricity
- Power: UK, California
- *Price Caps* & Comp. in *Supply Functions*
- **Austria**
  and in comparison with **EU**

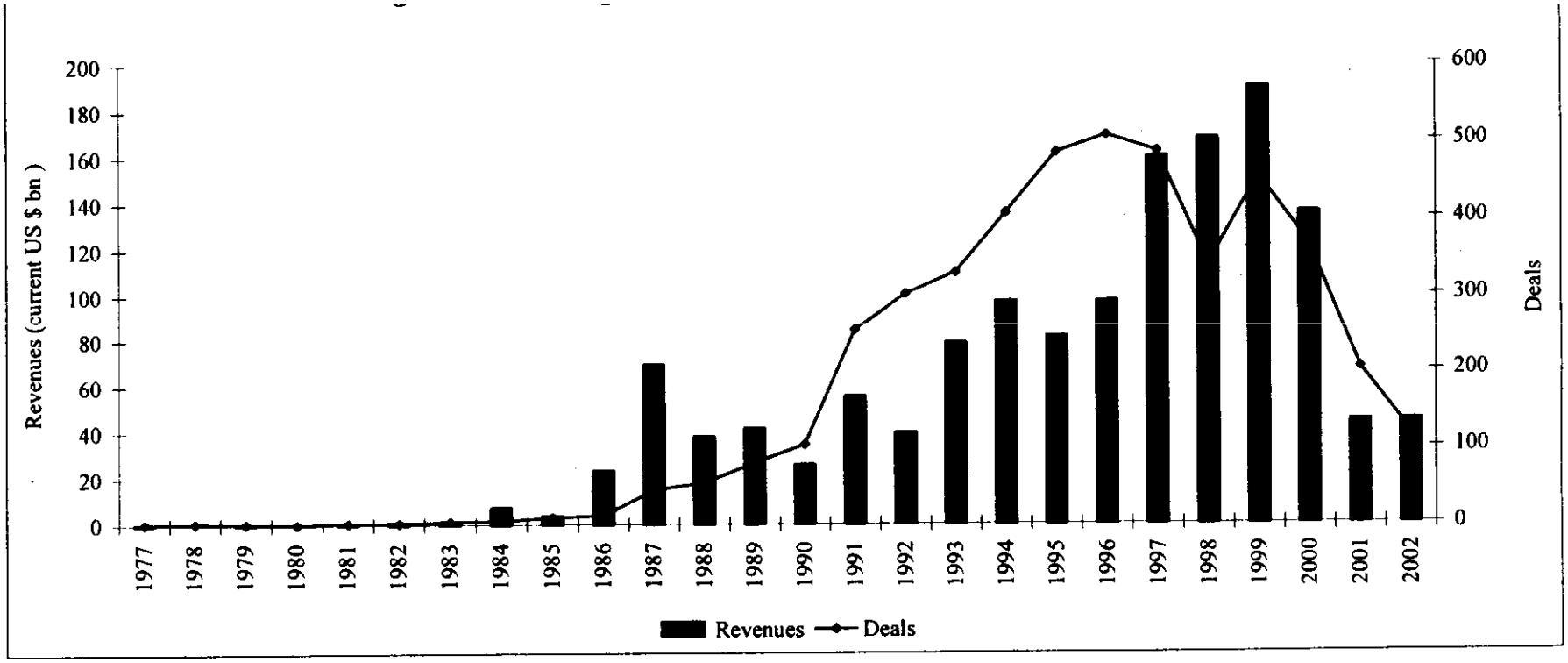
International Experience of Overall Privatizaton/Deregulation

- US deregulation

Gains (billion 1990-$ annually)		from Winston (1993)
Airlines	(13.7, 19.7)	69 %
Rail	(10.4, 12.9)	
Truck	0.6	
Telecomm.	(0.73, 1.6)	52 %
Cable TV	(.37, 1.3)	42 %
Oil ?		
Gas ?		
TOTAL	**(35.8, 46.2)**	

- UK privatization (dilemma) **trade off**: revenues vs markets
- International phenomenon including 3rd world.

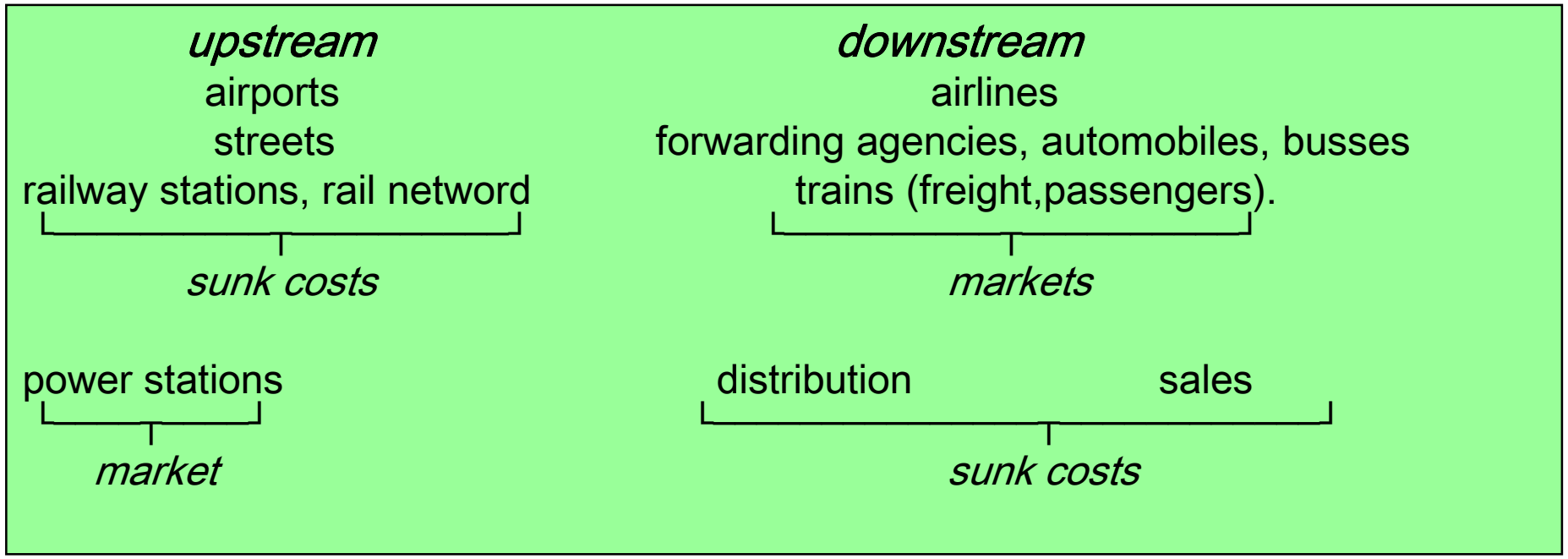
International



Source: Securities Data Corporation

The 34 largest common stock offerings in world financial history were **all** privatization cases.

Electricity
Some Specifics



Supply is not storable (but demand is!)

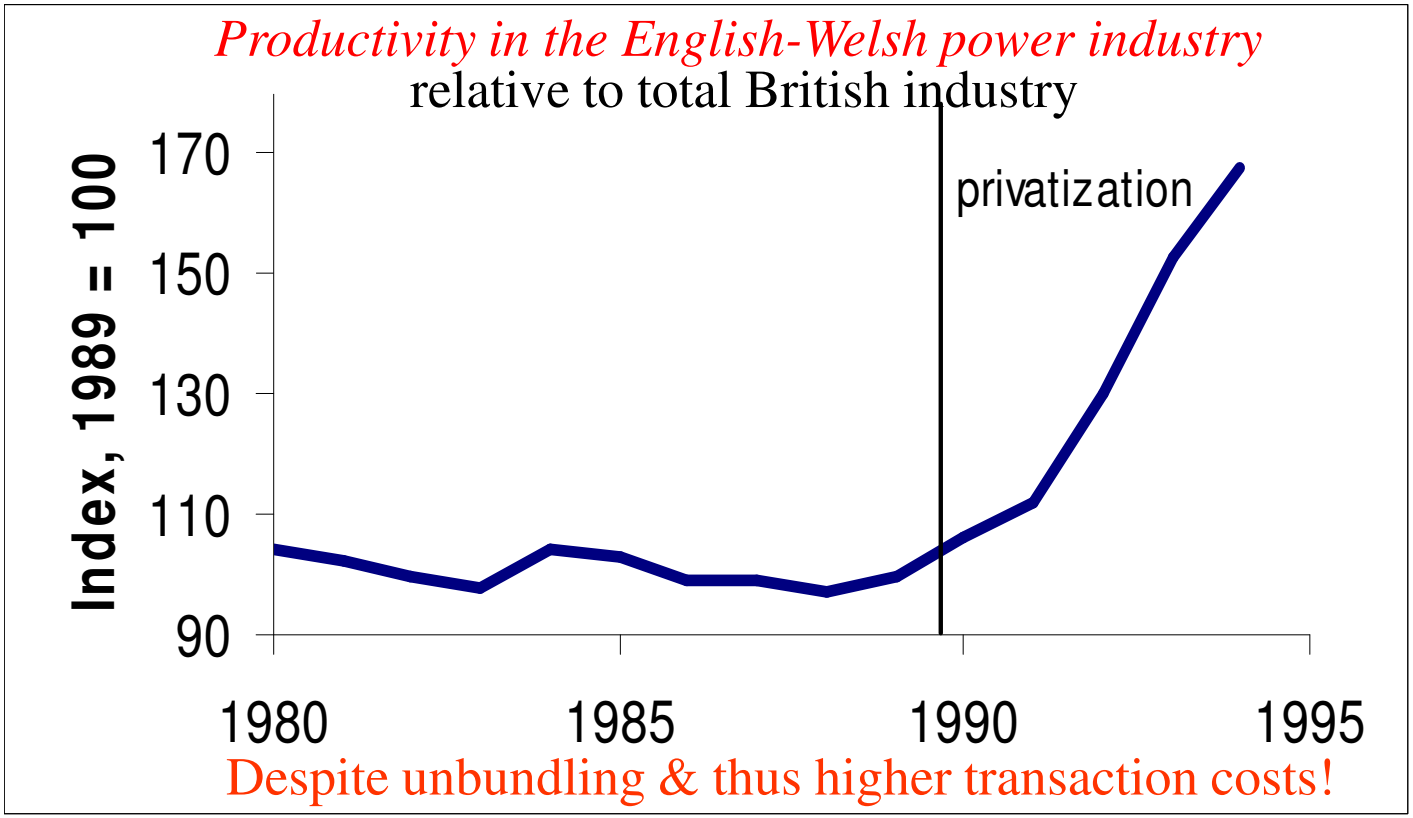
Kirchoffs‘

fluctuations of demand, small short run elasticities

Politics important even after privatization.

UK

Dramatic efficiency improvements in UK



- *National Power*, *PowerGen* & *Nuclear Electric* + heavy entry
- New technology CCGT replaces coal
- First **Pool** then **NETA**
- More efficient than nationalized Scottish and Northern Ireland.

Price Caps

"Austrian" economist **Stephen Littlechild (1983)** proposes**:**

RPI - X

Decoupling of prices from costs.

Goals and advantages

- Incentives to improve efficiency (X-efficient)
- Simple
- Incentives for price differentiation
- Protect consumers (but not A-efficient, in fact not even intended)

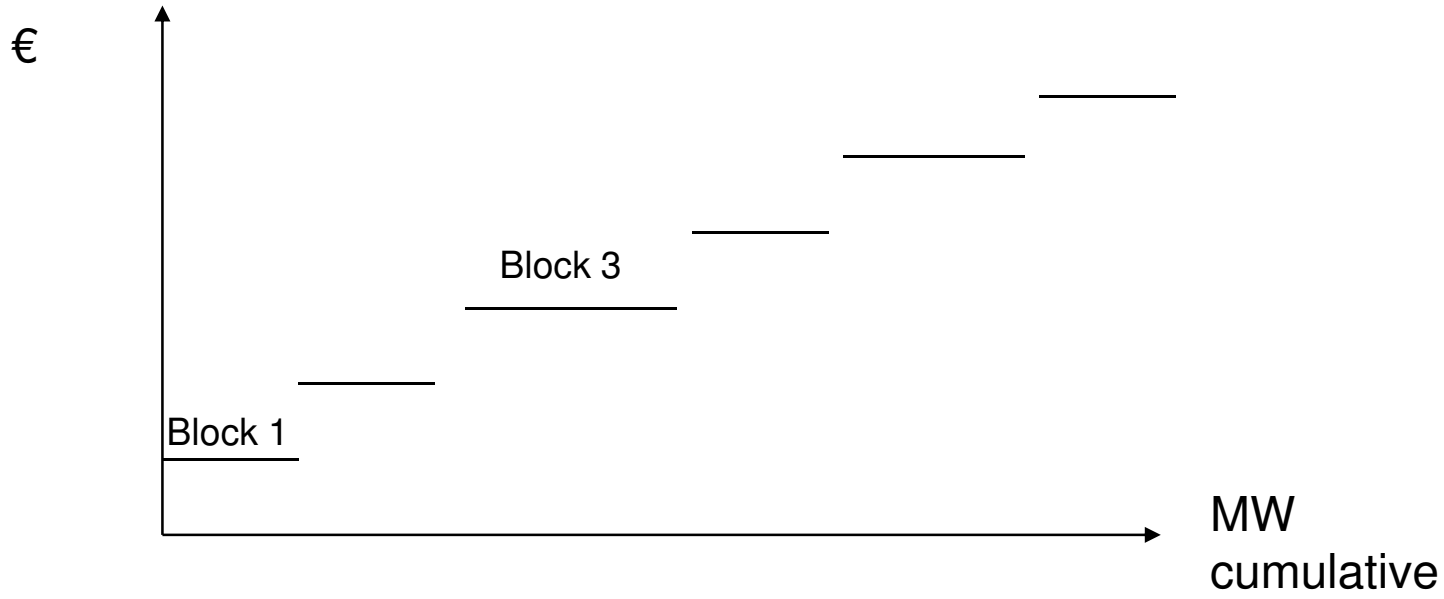
Problems:

a) Lack of commitment of politicians (Kydland-Prescott),
U.K. - windfall profit tax

b) Media "Kronen Zeitung".

c) Despite longer reviews, it might converge to abandonded RoR

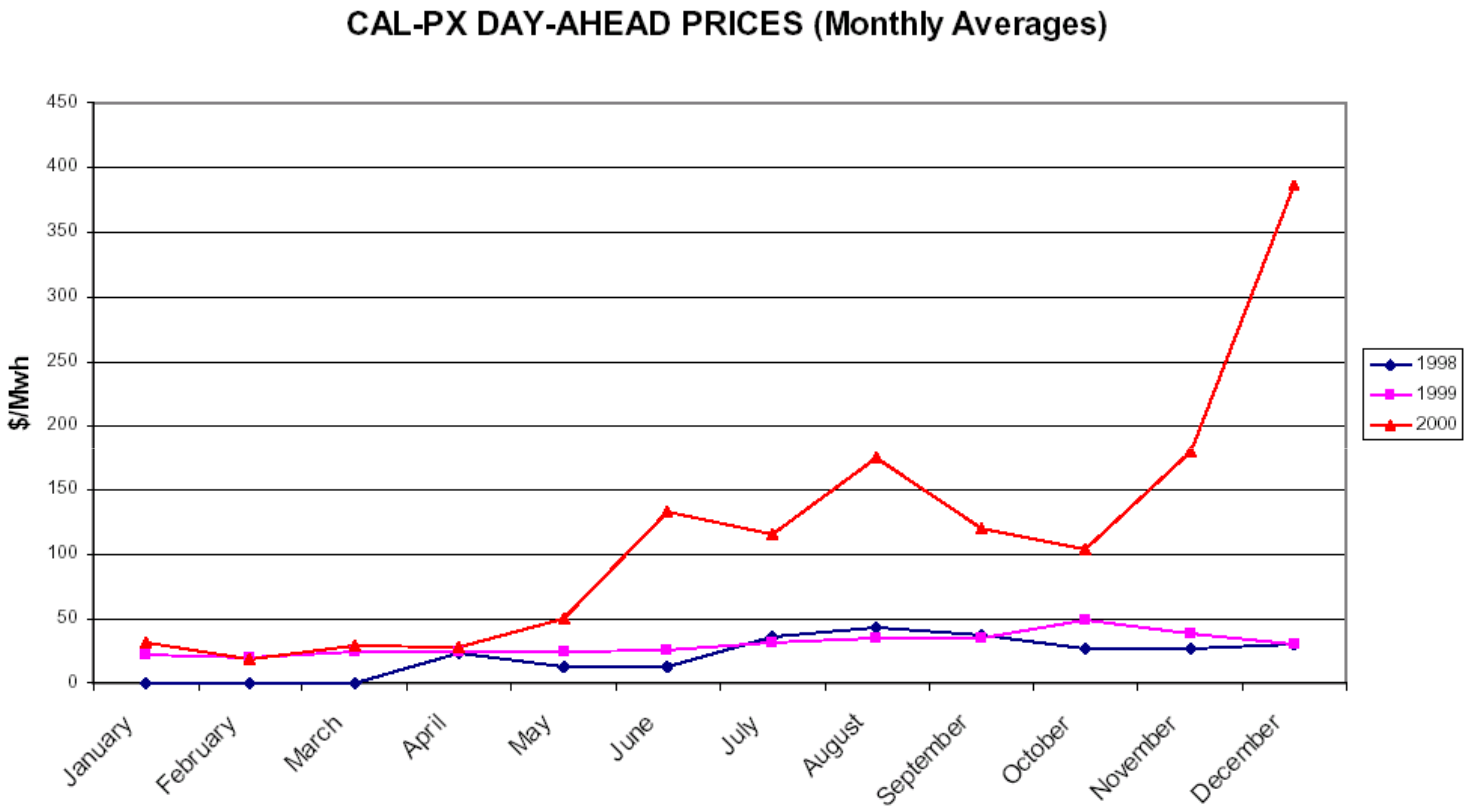
Competition in Supply Functions
Klemperer-Meyer, Newbery-Greene



Consequences

- multiple equilibria
- ranging between marginal cost curves and oligopolistic supply
- daily interactions may foster tacit collusion
- incentives for strategic withdrawals when demand is high, otherwise not.

California 2000



- US utilities private (80%) thus **no privatization** only **deregulation**
- multiple causes (gas prices, hydro power shortage, pool) & regulatory uncertainty
- price caps to recover stranded costs (except San Diego)
- Austrian: experts fail
- policy failures.

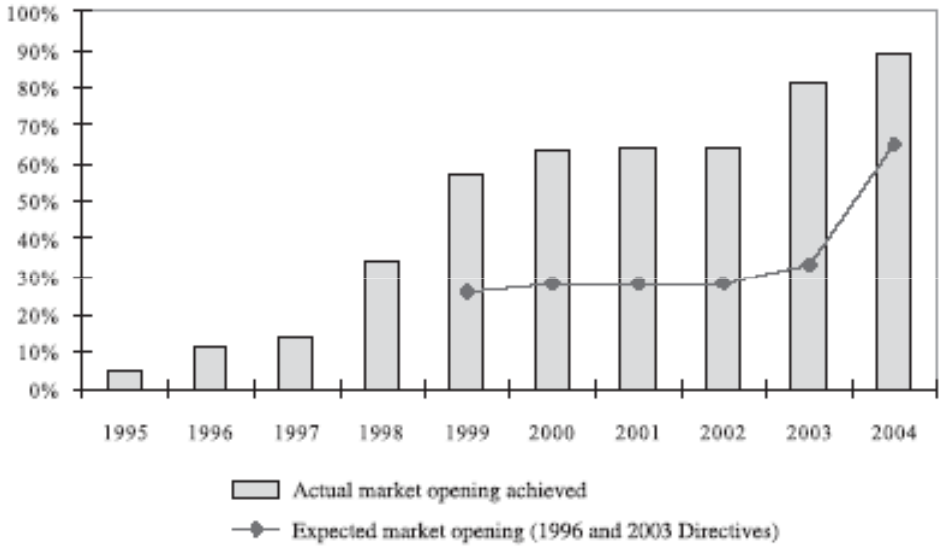
Privatization & liberalization AUSTRIA

- Partial privatization
- Associated option value ignored!
- ElBRL $\Rightarrow$ ELWOG (1998): 51% for public ownership
- EnlibG $\Rightarrow$ market-opening, Oct. 1st 2001.
- Referee: *E-Control*
- Regulated access (to the grid)
- Competition in distribution (EVUs + switch, MyElectric, Ökostrom, RWW)
- Cross ownerships, alliances, *österreichische Lösung*

EU – Directive

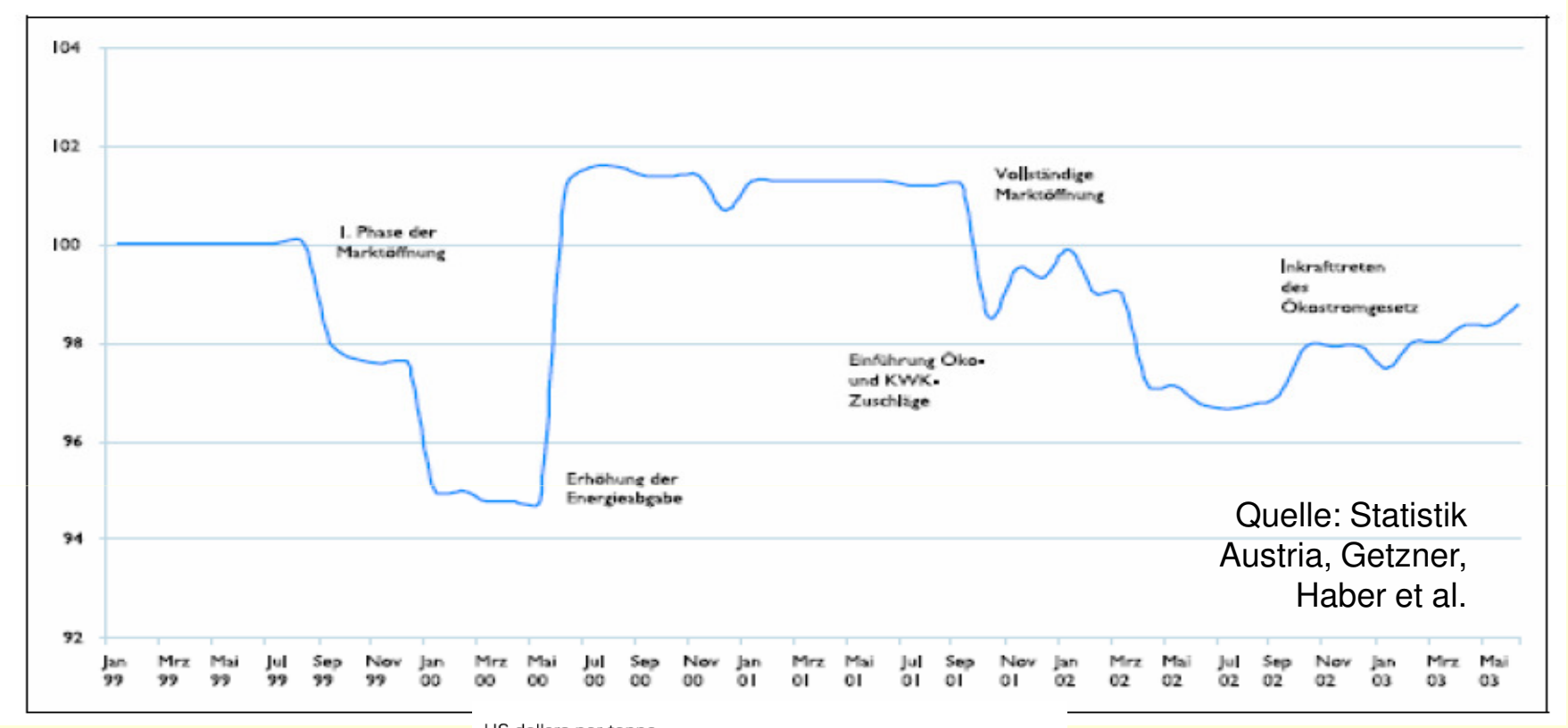
from Tooraj Jamasband and Michael Pollit (2005)

Figure 4. Actual and Expected Levels of Market Opening (by units sold)

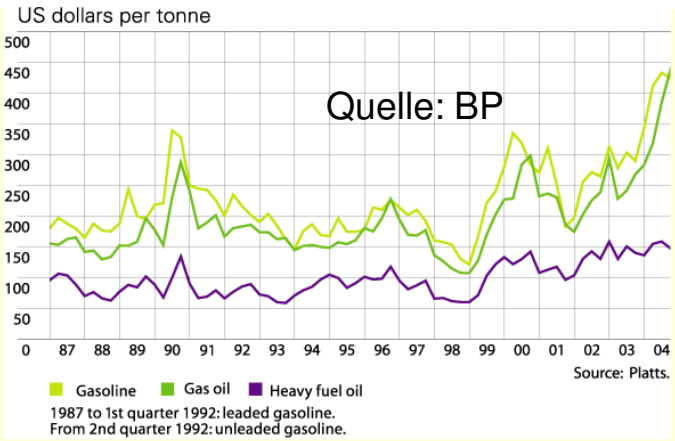


Source: European Commission (2004b, 2005) and own Calculations

Aggr. electricity price index 1999 – 2003



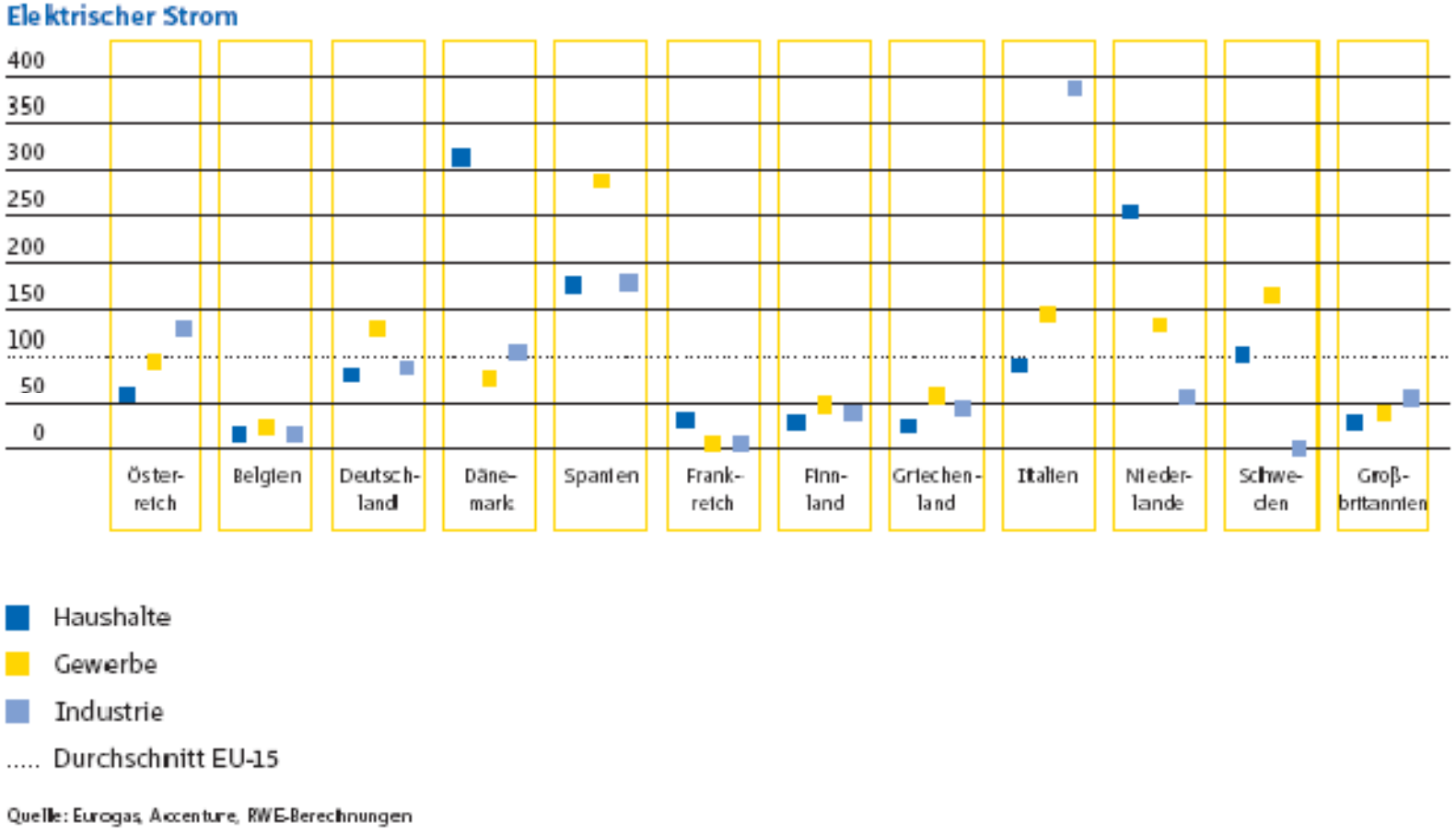
Quelle: Statistik Austria, Getzner, Haber et al.



Quelle: BP

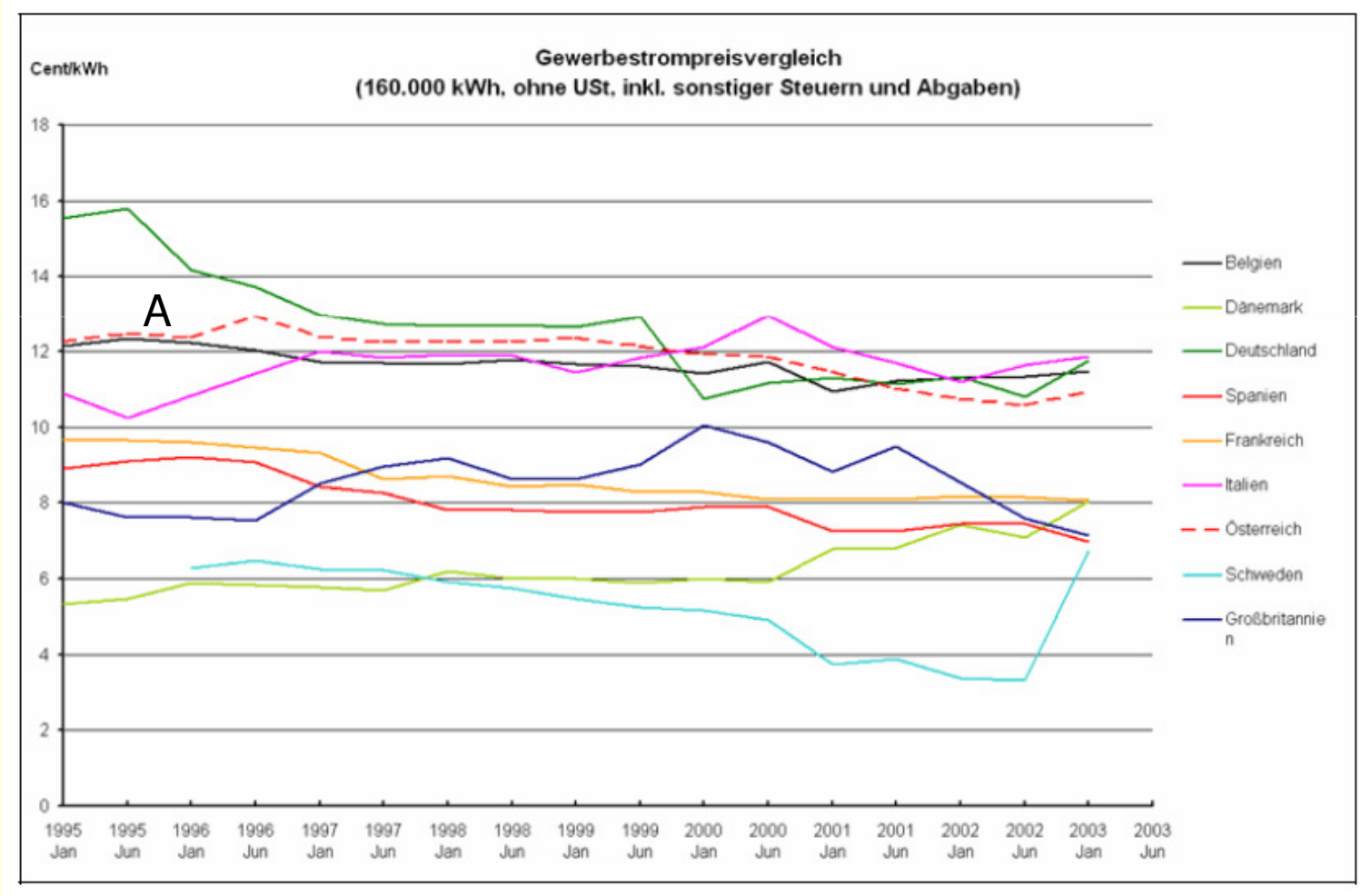
Taxes

Abb. 33: Spezifische Steuerbelastung des Strom- und Gasverbrauchs im Vergleich west- und südeuropäischer Industrieländer
(Durchschnitt EU-15 = 100)



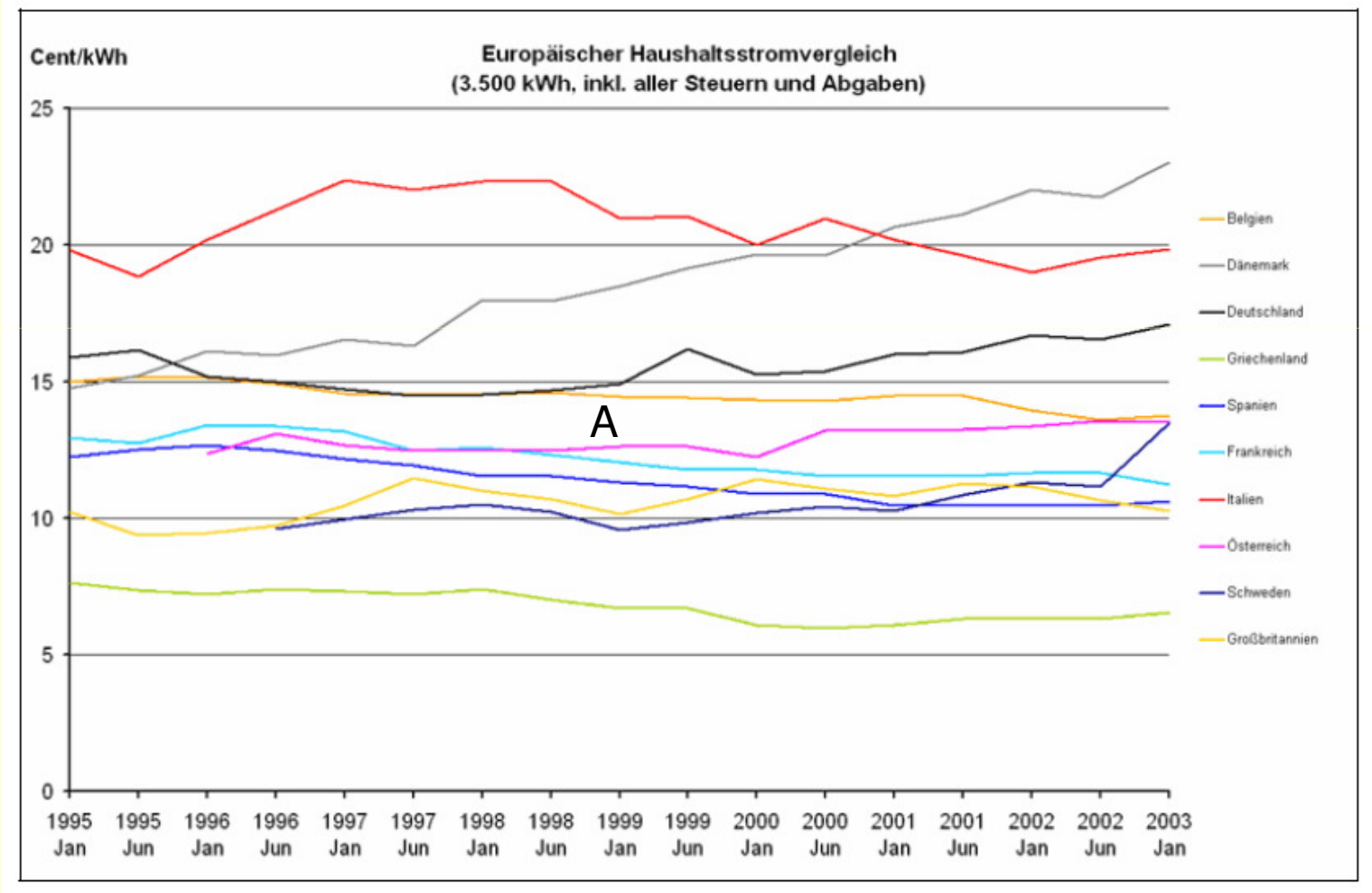
Quelle: Eurogas, Accenture, RWE-Berechnungen

Comparison of European Commercial Electricity Prices 1995 - 2003

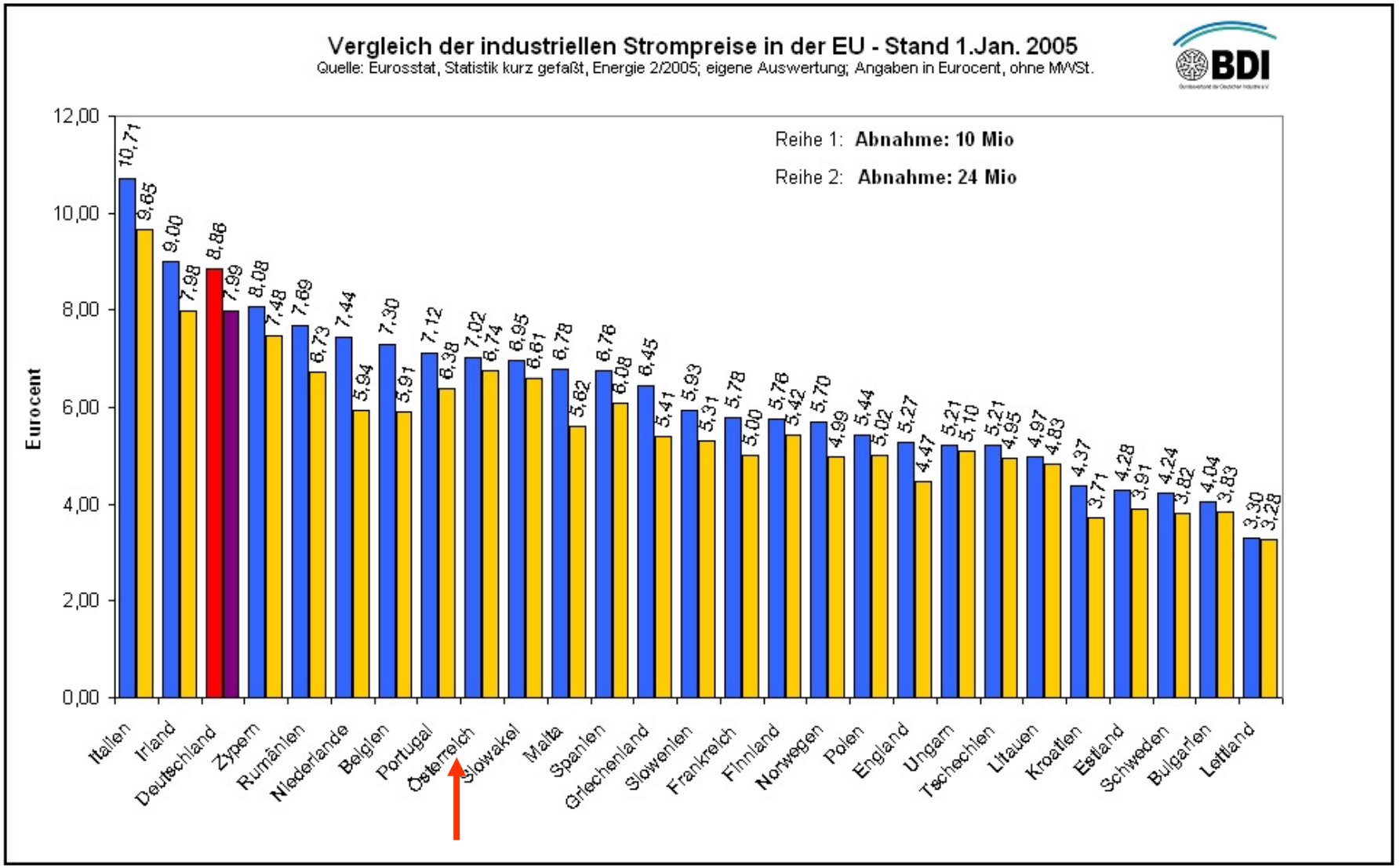


Quelle: e-control

Comparison of European Residential Electricity Prices 1995 - 2003



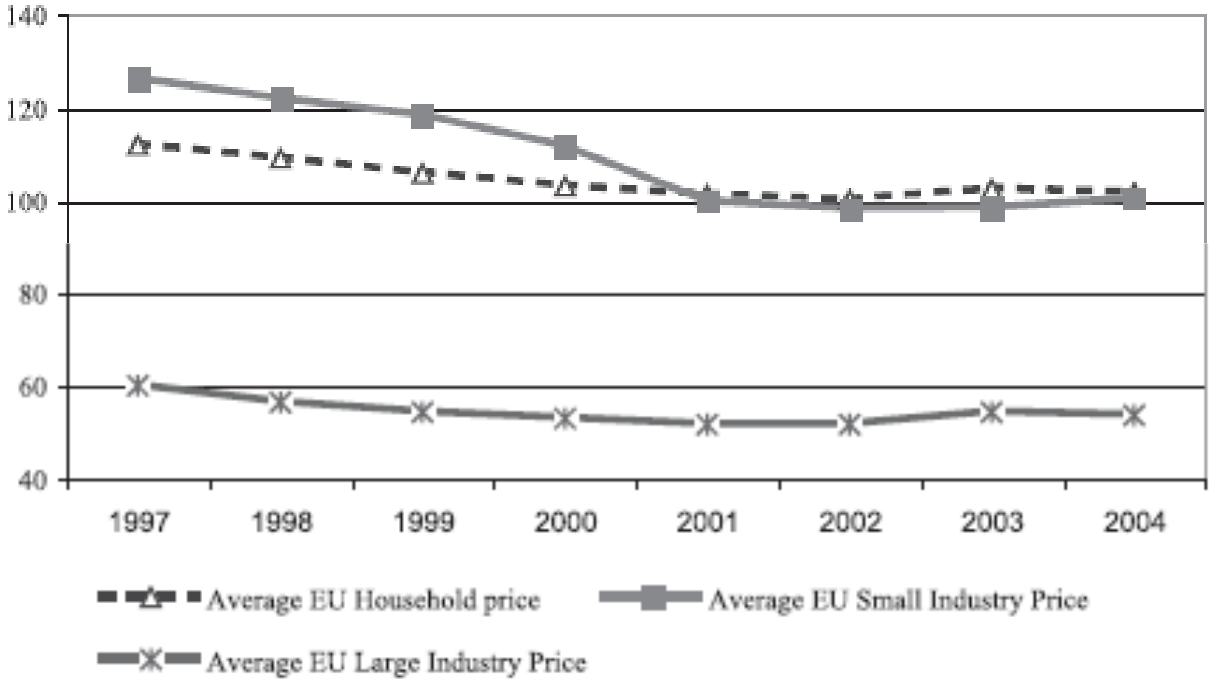
Quelle: e-control


Vergleich der industriellen Strompreise in der EU - Stand 1.Jan. 2005
Quelle: Eurosstat, Statistik kurz gefaßt, Energie 2/2005; eigene Auswertung; Angaben in Eurocent, ohne MWSt.
BDI
Reihe 1: Abnahme: 10 Mio
Reihe 2: Abnahme: 24 Mio
Eurocent
12,00
10,00
8,00
6,00
4,00
2,00
0,00
10,71 9,65
9,00 7,98
8,86 7,99
8,08 7,48
7,69 6,73
7,44 5,94
7,30 5,91
7,12 6,38
7,02 6,74
6,95 6,61
6,78 5,62
6,76 6,08
6,45 5,41
5,93 5,31
5,78 5,00
5,76 5,42
5,70 4,99
5,44 5,02
5,27 4,47
5,21 5,10
5,21 4,95
4,97 4,83
4,37 3,71
4,28 3,91
4,24 3,82
4,04 3,83
3,30 3,28
Italien
Irland
Deutschland
Zypern
Rumänien
Niederlande
Belgien
Portugal
Österreich
Slowakei
Malta
Spanien
Griechenland
Slowenien
Frankreich
Finnland
Norwegen
Polen
England
Ungarn
Tschechien
Litauen
Kroatien
Estland
Schweden
Bulgarien
Lettland

Effects of Reform EU

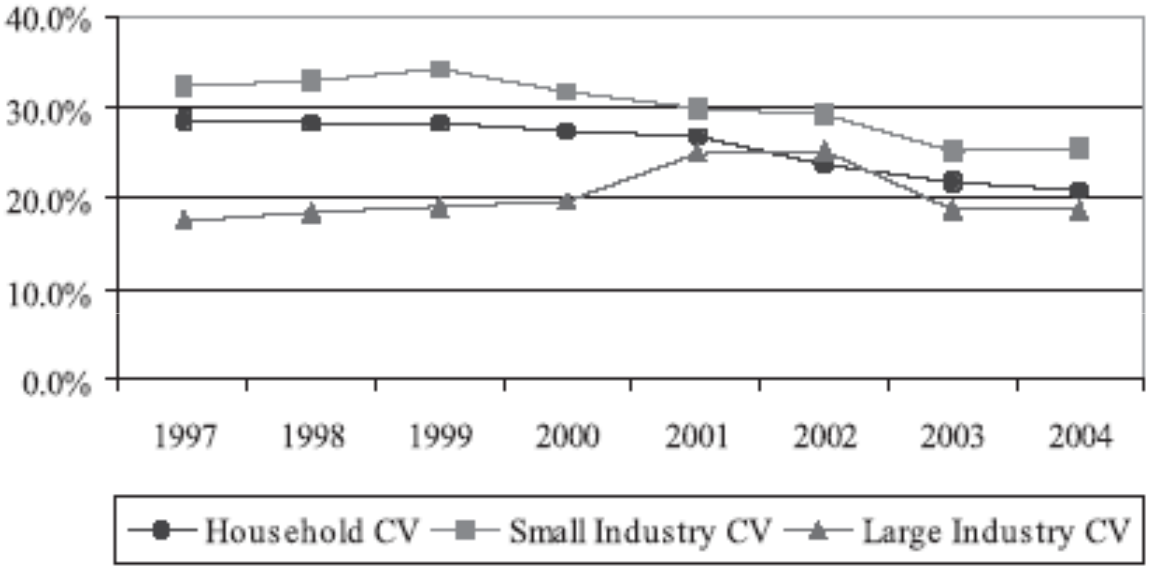
from Tooraj Jamasband and Michael Pollit (2005)

Figure 7. EU Average Real Price (2004 Euro per MWh)



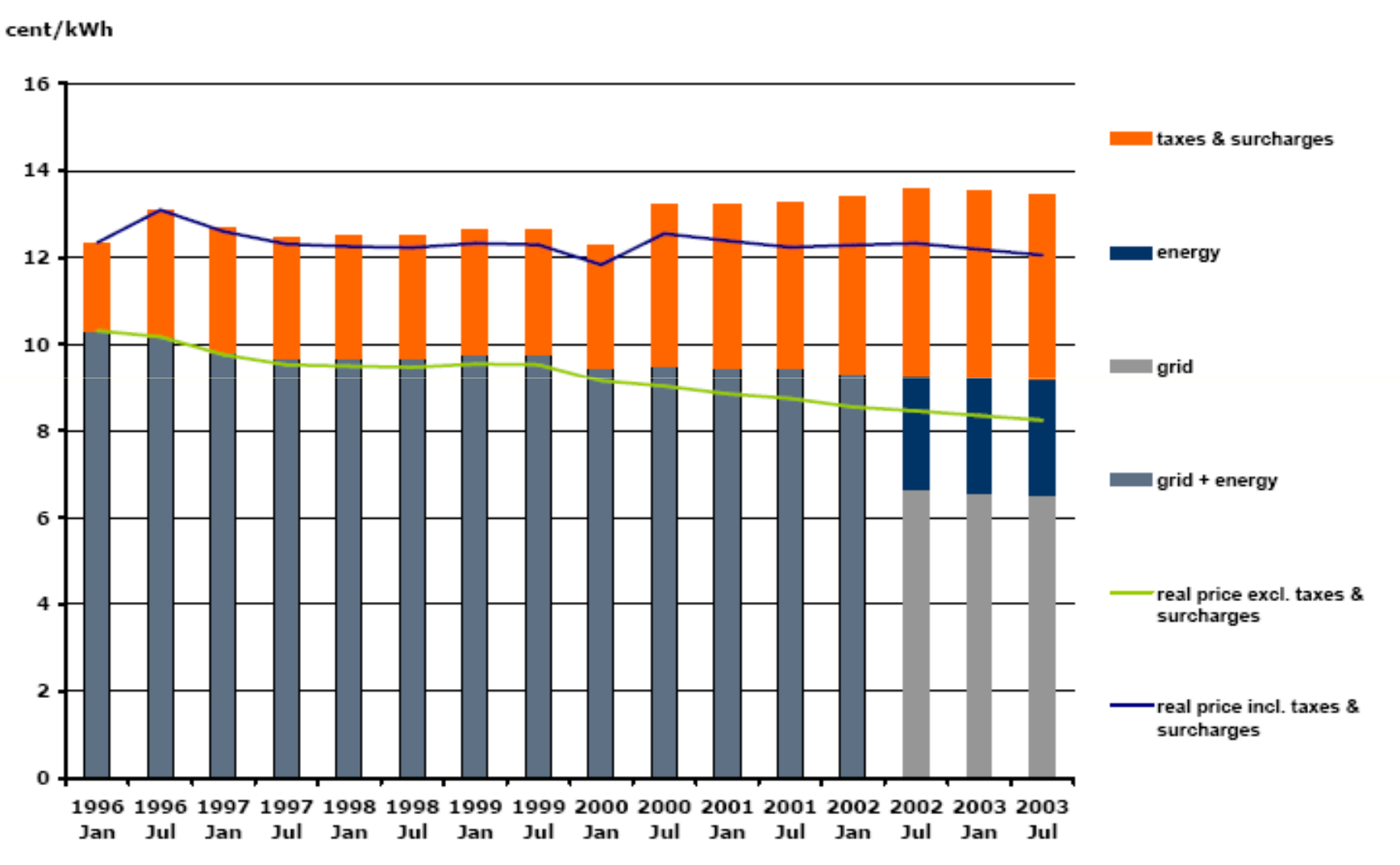
Source: Own Calculations Based on EU Data and Inflation Rate (Unweighted)

Figure 8. Price Convergence - Coefficient of Variation (CV)



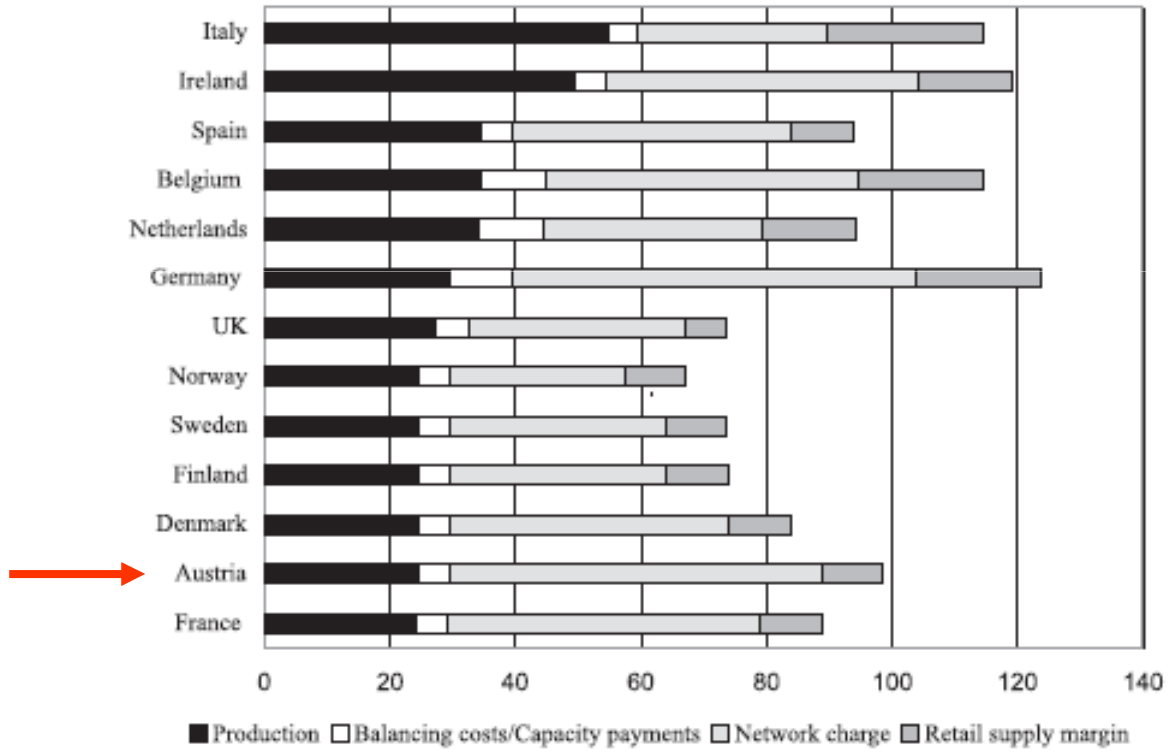
Source: Based on European Commission (2004b, 2005)

Aggr. electricity price index 1999 – 2003
(1999 = 100)



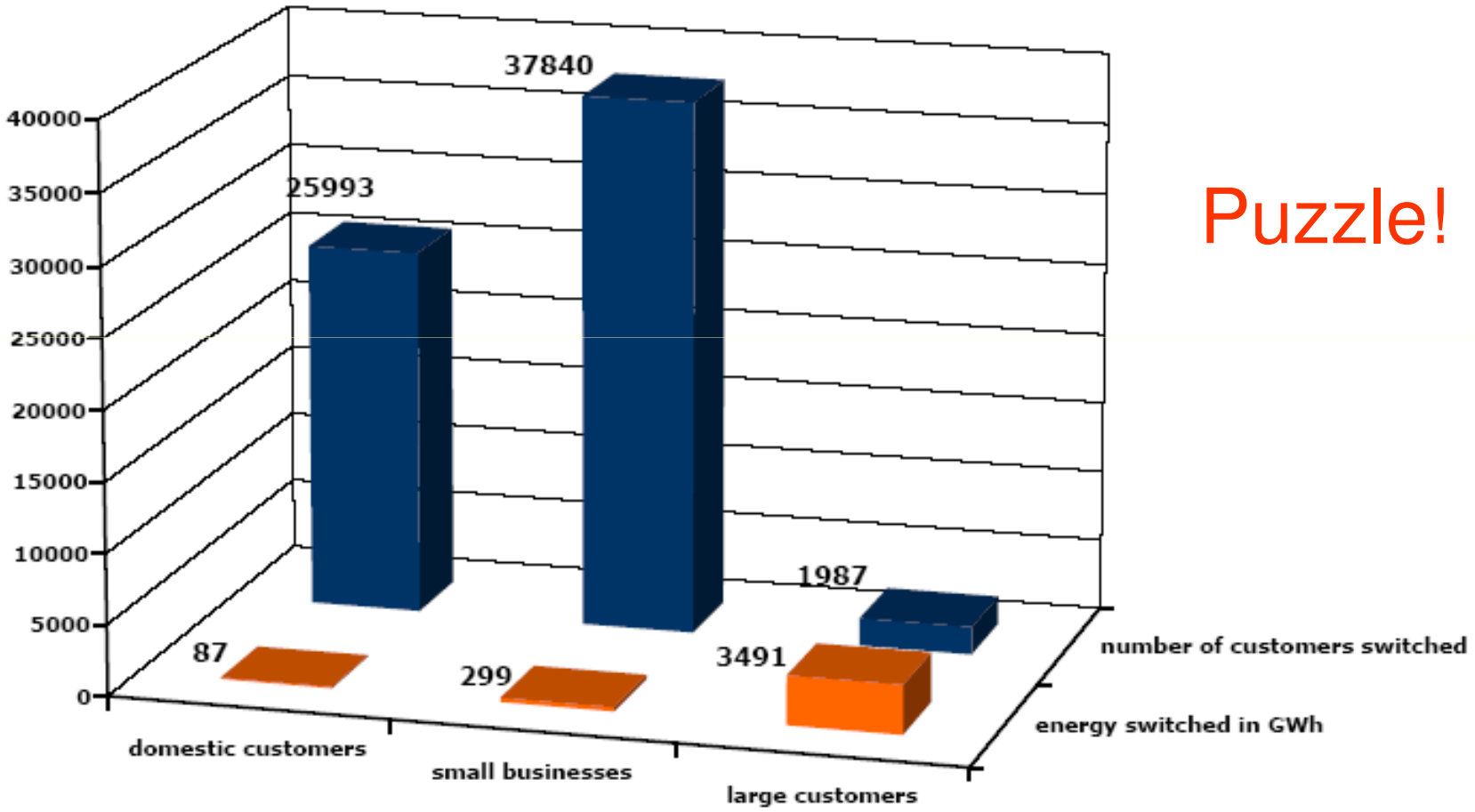
Quelle: Eurostat, e-control

Figure 6. Estimated Breakdown of Expected Electricity Prices 2004 (50 MWh/year Customer (euro/MWh, before Taxes)



Source: European Commission (2004b)

Switching by costumer group - A



Puzzle!

Quelle: e-control

Table 5. Customer Switching - % Switched / Renegotiated in 2003 & 2002*

	Large Eligible Industrial Users[a]	Small Commercial / Domestic
Austria	(15%) 7%	(5%) 1%
Belgium	(5% b) 8%	19%
Denmark	(45%) 22%	5%
Finland	(c) 16%	(10%) 4%
France	(15%) n.k.	
Germany	(20%) n.k.	(5%) n.k.
Greece	(0%) 0%	
Ireland	(20%) 6%	(2%) 1%
Italy	(15%) n.k.	
Luxembourg	(10% d) n.k.	
Netherlands	(20%) n.k.	n.k.
Portugal	(10%) 7%	1%
Spain	(20%) 5%	0%
Sweden	(a) 5%	(10% e) 10%
UK	(15%) n.k.	(12%) 22%
Norway	(12%) 15%	(14%) 19%

* 2002 figures in parenthesis.
a In general refers to clients consuming more than 1GWh/year.
b 40% have renegotiated their contract.
c Most large users in Finland and Sweden tender every year for a new supplier.
d 15% have renegotiated their contract.
e Cumulative 40% since 1998.
Source: European Commission (2004b, 2005)

Problems

- Stranded Costs
- KWK-Zuschlag
- Tax increases

→ - price reductions missed
+ documenting cross subsidies

- Anomalies in Commerce
- Grid tariffs
- Puzzle: litlle switching
- *Commitment*
- Pool – Competition in bid functions
- Strategic withdrawals
- Despite success often not popular (Alesina)
- Regulating mergers

Further Open Problems

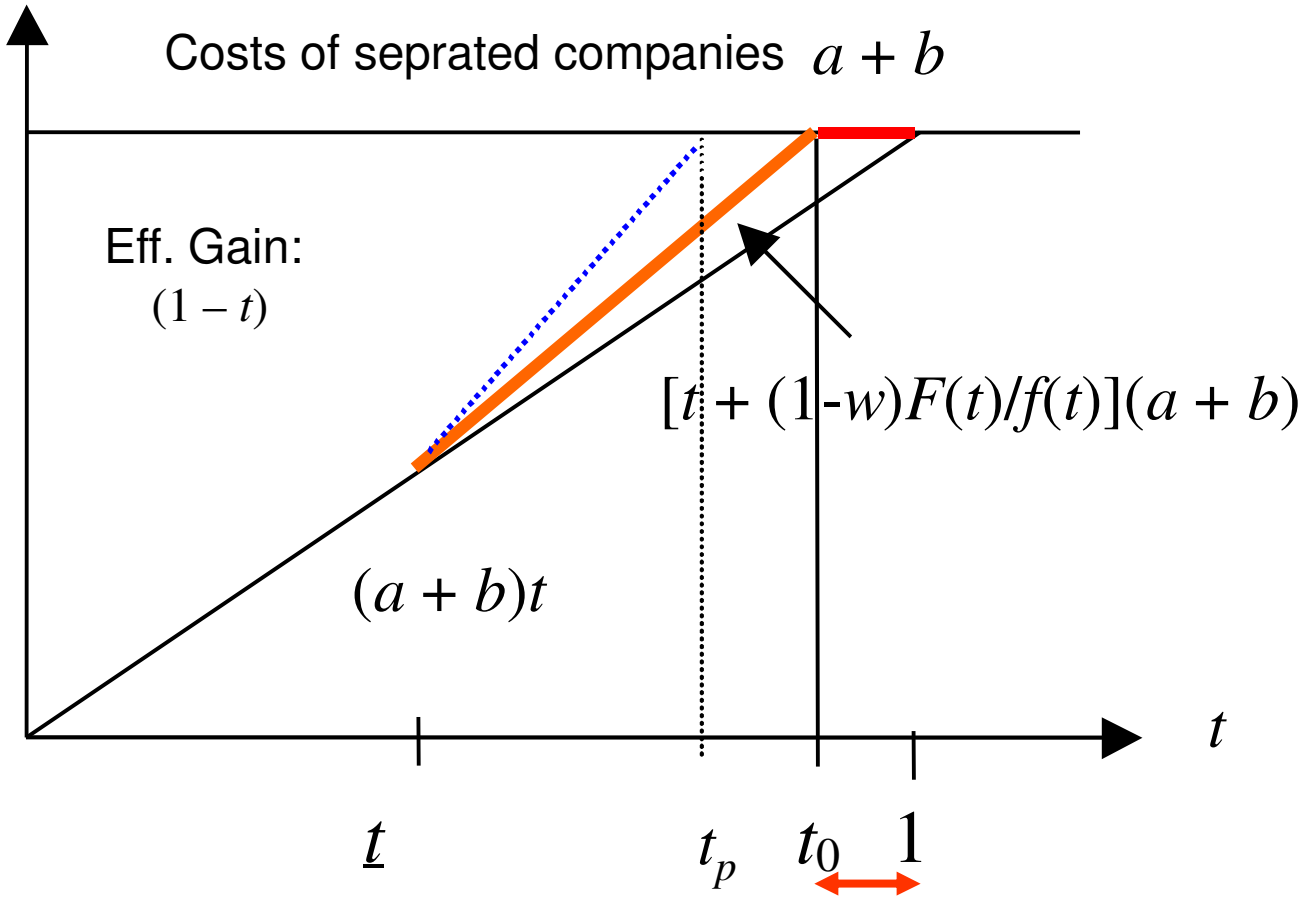
- Adequate incentives for capacity?
  (a *trust business* a la McAfee?)
- Rewarding for shortage can be strategically abused (*UK Pool*).
- First and second type errors of any regulation
- Threat of infinite regress
- Benchmarking (***DEA***) – recently settled (?)
- Nevertheless, still *soft budget constraint* because **bankruptcy** is ruled out!
- *Public-Private-Partnerships* – part. ill conceived

Unbundling – private information

Wirl 2003, Regulating vertically integrated utilities when transfers are costly but revenues are beneficial, *Public Choice* **114**, 175-195.

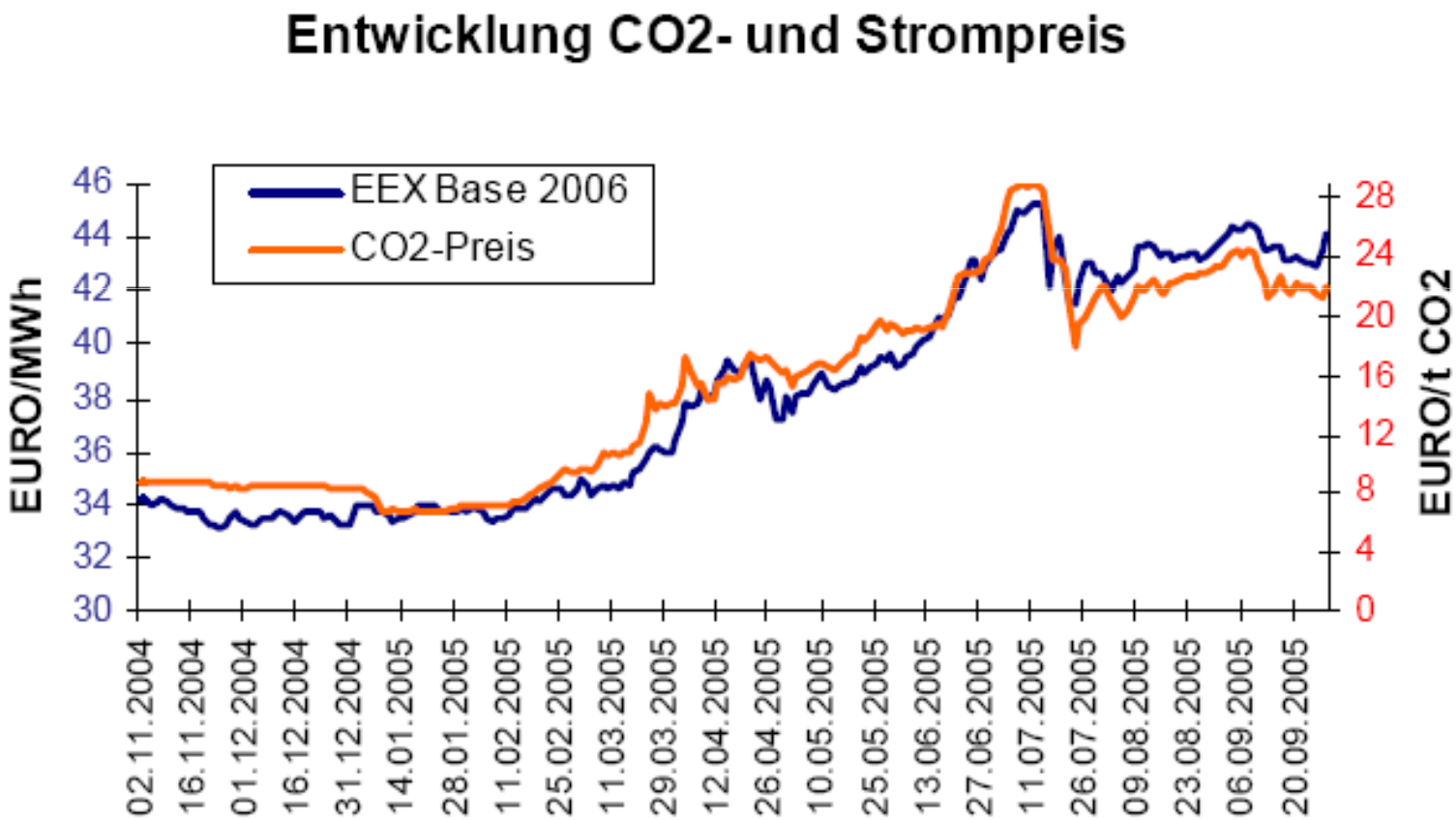
Topical:

Unbundling of grid-companies by *e-control*



Break up of cost efficient integration!

Electricity prices and CO2 permit prices



Austrian solution

Summary

- Comparison with the theoretical optimum is inadequate.
- Therefore *worst case* – comparison: *bureaucratic* vs *private-enterprise*.
- Politics remains important
- *Time Inconsistency due to lack of commitment*
- Little competition on both sides
- Information gain (more open).
- “Austrian” Surprises: California -, Information +
- **Σ = Advantages dominate**
- But even “success” is no guarantee for popularity.

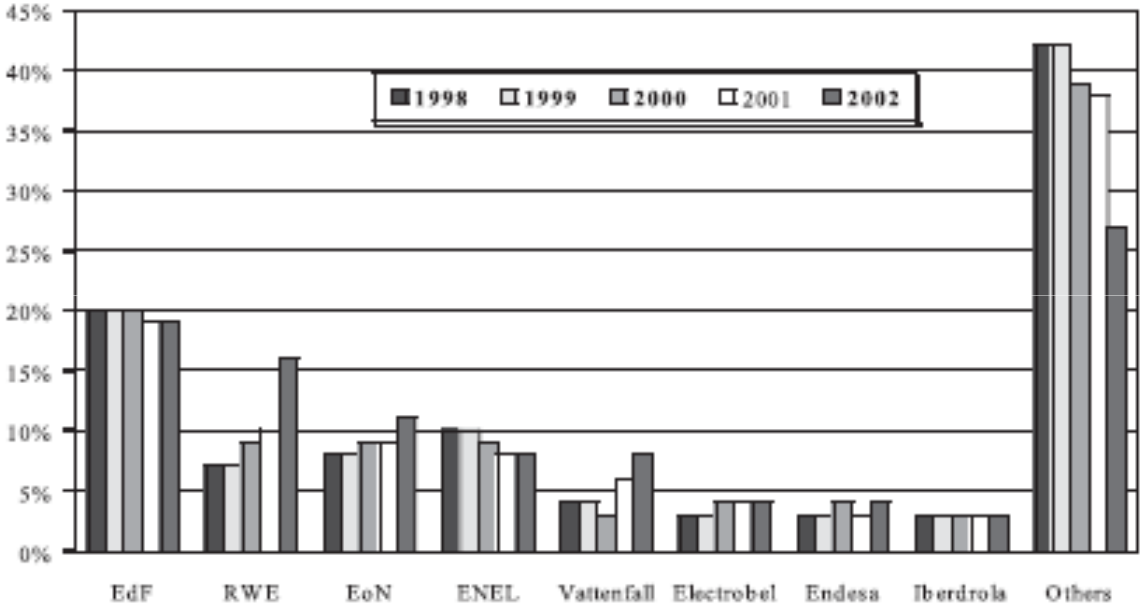

Thank You for Your Attention!

Table 3. Unbundling the Networks (from Both Generation and Retailing)

	Transmission System Operators	Distribution System Operators
Austria	Legal	Legal
Belgium	Legal	Legal
Denmark	Legal	Legal
Finland	Ownership	Accounting
France	Legal/	Management
Germany	Legal	Accounting
Greece	Legal	None
Ireland	Legal	Management
Italy	Own	Legal
Luxembourg	Management	Management
Netherlands	Ownership	Legal
Portugal	Ownership	Accounting
Spain	Ownership	Legal
Sweden	Ownership	Legal
UK	Ownership	Legal
Norway	Ownership	Legal/Accounting

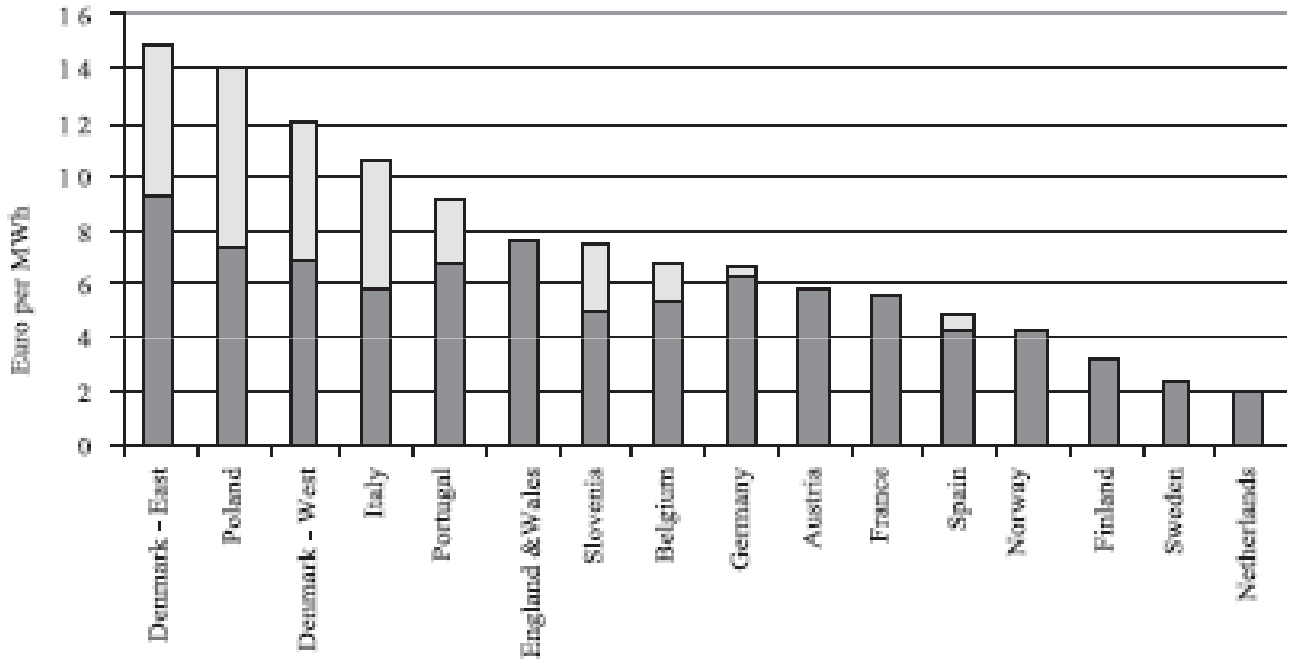
Source: European Commission (2005)

Figure 5. Generation Market Shares in Western Europe



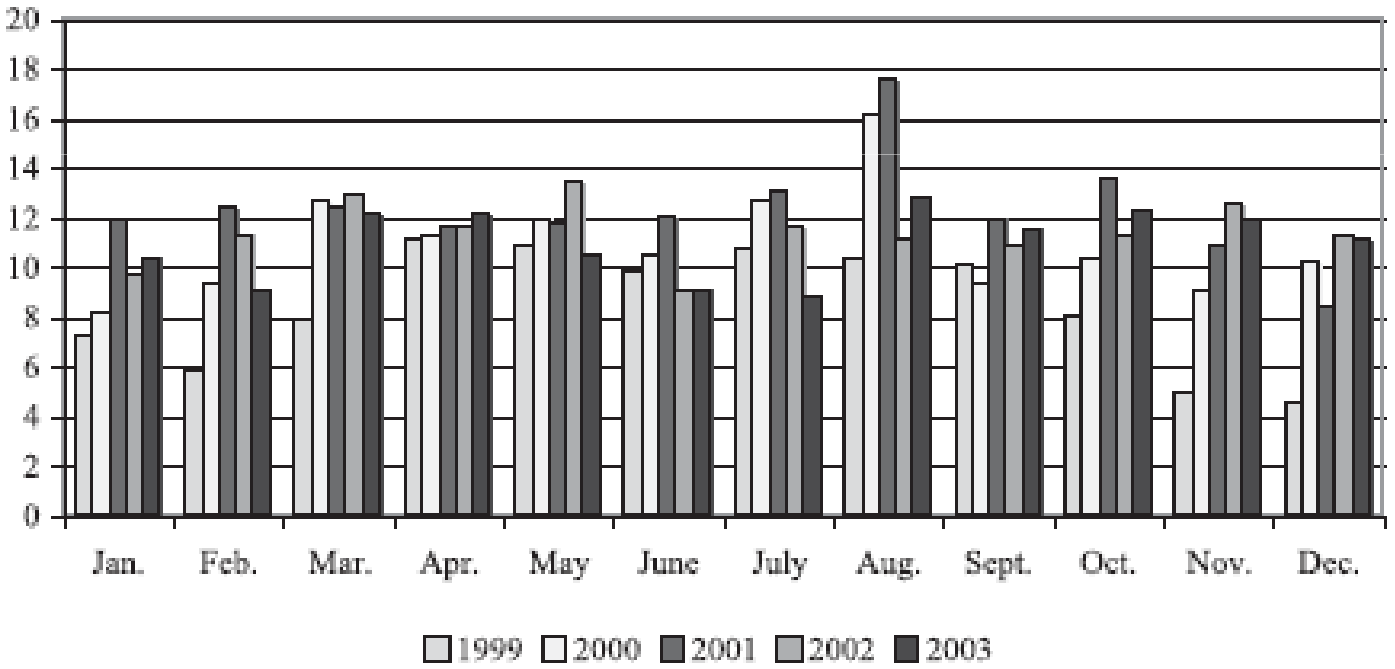
Source: Codognet et al. (2002), Energia Klub (2002), and Own Calculations

Figure 9. Comparison of Transmission Invoices (2003): Producers and Consumers Connected at EHV (Utilisation Time 5,000 hrs/y)[23]



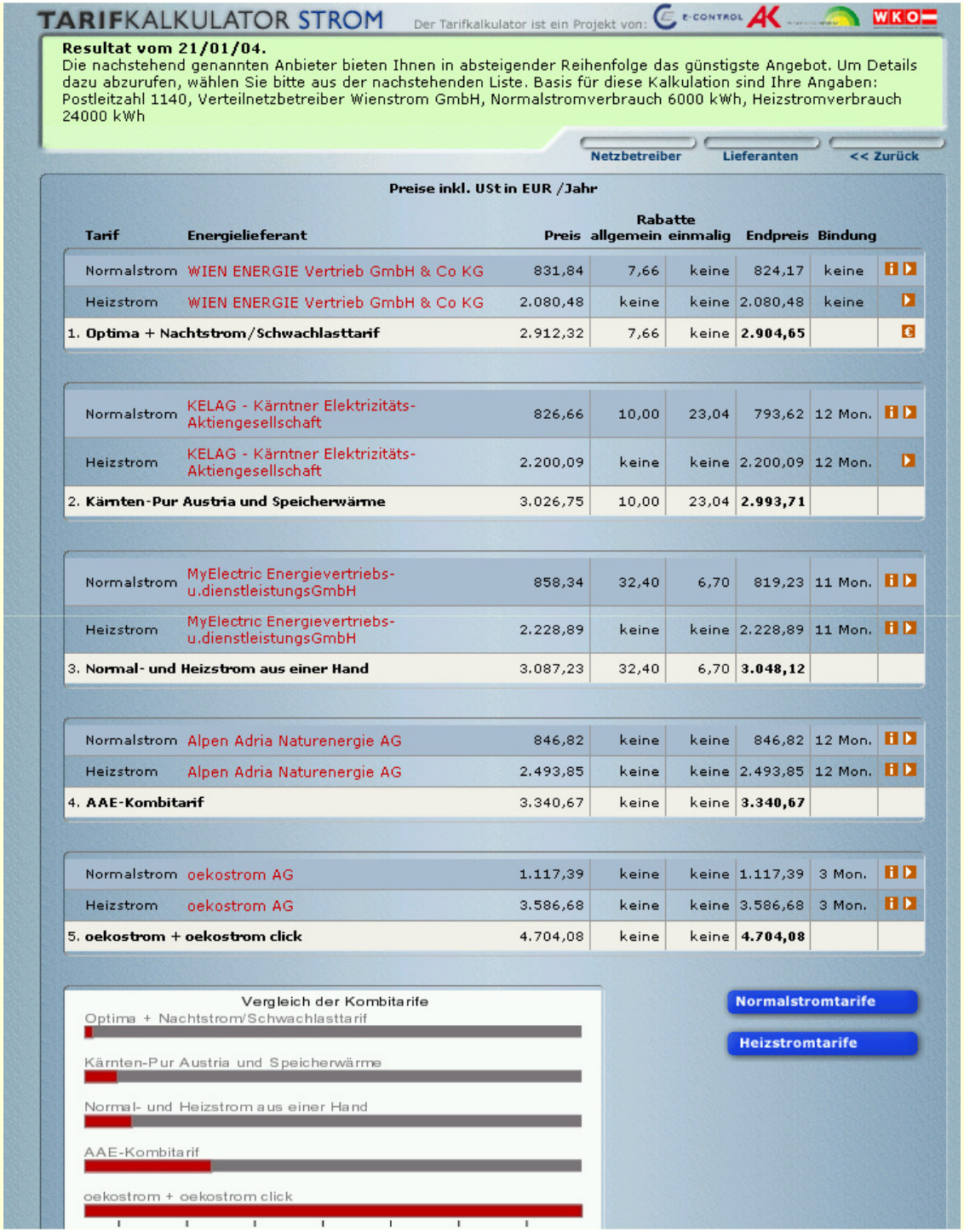
Source: ETSO (2004)

Figure 11. Remaining Capacity without Exchanges as Percentage of Total Generating Capacity in UCTE



Source: UCTE (1999, 2000, 2003)

www.e-control.at



TARIFKALKULATOR STROM

Der Tarifkalkulator ist ein Projekt von: E-CONTROL AK WKO

Resultat vom 21/01/04.

Die nachstehend genannten Anbieter bieten Ihnen in absteigender Reihenfolge das günstigste Angebot. Um Details dazu abzurufen, wählen Sie bitte aus der nachstehenden Liste. Basis für diese Kalkulation sind Ihre Angaben: Postleitzahl 1140, Verteilnetzbetreiber Wienstrom GmbH, Normalstromverbrauch 6000 kWh, Heizstromverbrauch 24000 kWh

Netzbetreiber | Lieferanten | << Zurück

Preise inkl. USt in EUR /Jahr

Tarif	Energielieferant	Preis	Rabatte allgemein	Rabatte einmalig	Endpreis	Bindung	
Normalstrom	WIEN ENERGIE Vertrieb GmbH & Co KG	831,84	7,66	keine	824,17	keine	
Heizstrom	WIEN ENERGIE Vertrieb GmbH & Co KG	2.080,48	keine	keine	2.080,48	keine	
1. **Optima + Nachtstrom/Schwachlasttarif**		2.912,32	7,66	keine	**2.904,65**		
Normalstrom	KELAG - Kärntner Elektrizitäts-Aktiengesellschaft	826,66	10,00	23,04	793,62	12 Mon.	
Heizstrom	KELAG - Kärntner Elektrizitäts-Aktiengesellschaft	2.200,09	keine	keine	2.200,09	12 Mon.	
2. **Kärnten-Pur Austria und Speicherwärme**		3.026,75	10,00	23,04	**2.993,71**		
Normalstrom	MyElectric Energievertriebs-u.dienstleistungsGmbH	858,34	32,40	6,70	819,23	11 Mon.	
Heizstrom	MyElectric Energievertriebs-u.dienstleistungsGmbH	2.228,89	keine	keine	2.228,89	11 Mon.	
3. **Normal- und Heizstrom aus einer Hand**		3.087,23	32,40	6,70	**3.048,12**		
Normalstrom	Alpen Adria Naturenergie AG	846,82	keine	keine	846,82	12 Mon.	
Heizstrom	Alpen Adria Naturenergie AG	2.493,85	keine	keine	2.493,85	12 Mon.	
4. **AAE-Kombitarif**		3.340,67	keine	keine	**3.340,67**		
Normalstrom	oekostrom AG	1.117,39	keine	keine	1.117,39	3 Mon.	
Heizstrom	oekostrom AG	3.586,68	keine	keine	3.586,68	3 Mon.	
5. **oekostrom + oekostrom click**		4.704,08	keine	keine	**4.704,08**		

Vergleich der Kombitarife

Optima + Nachtstrom/Schwachlasttarif

Kärnten-Pur Austria und Speicherwärme

Normal- und Heizstrom aus einer Hand

AAE-Kombitarif

oekostrom + oekostrom click

Normalstromtarife

Heizstromtarife

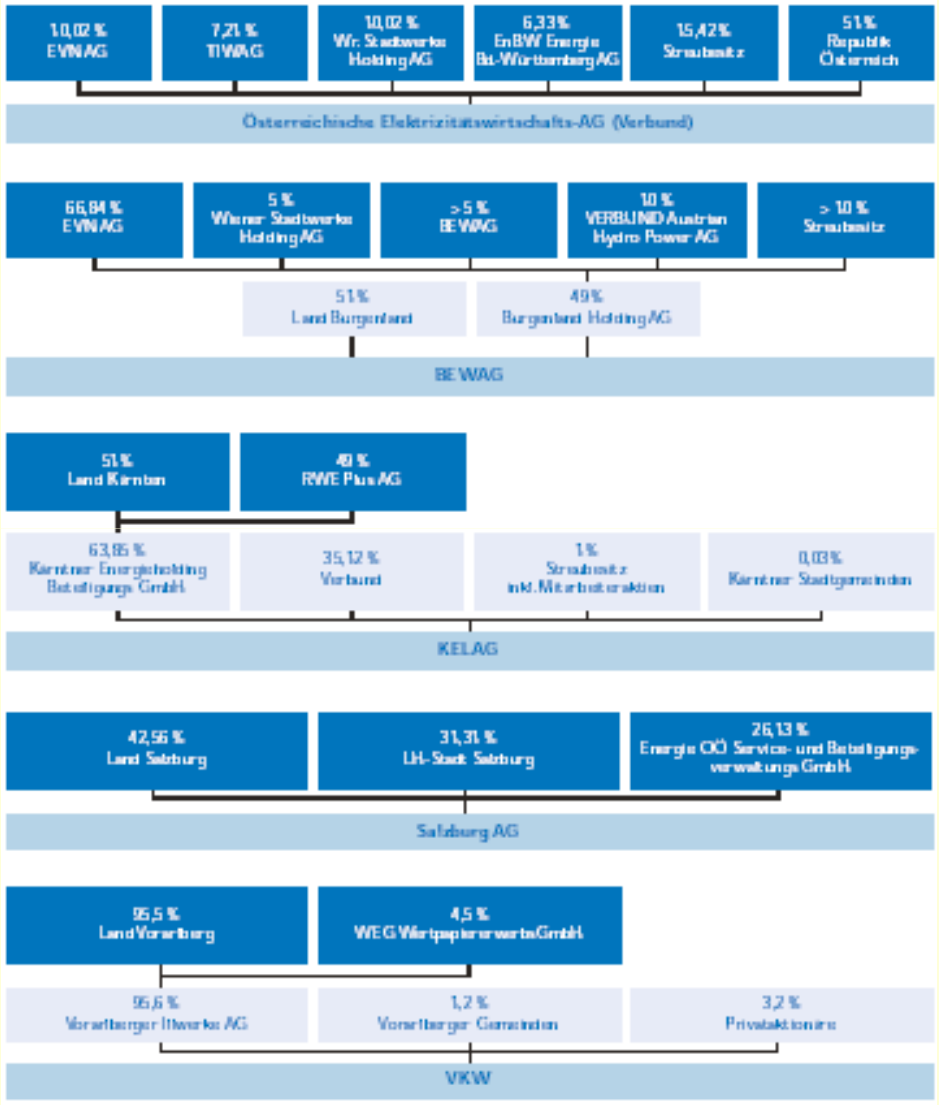
Switching Consumers

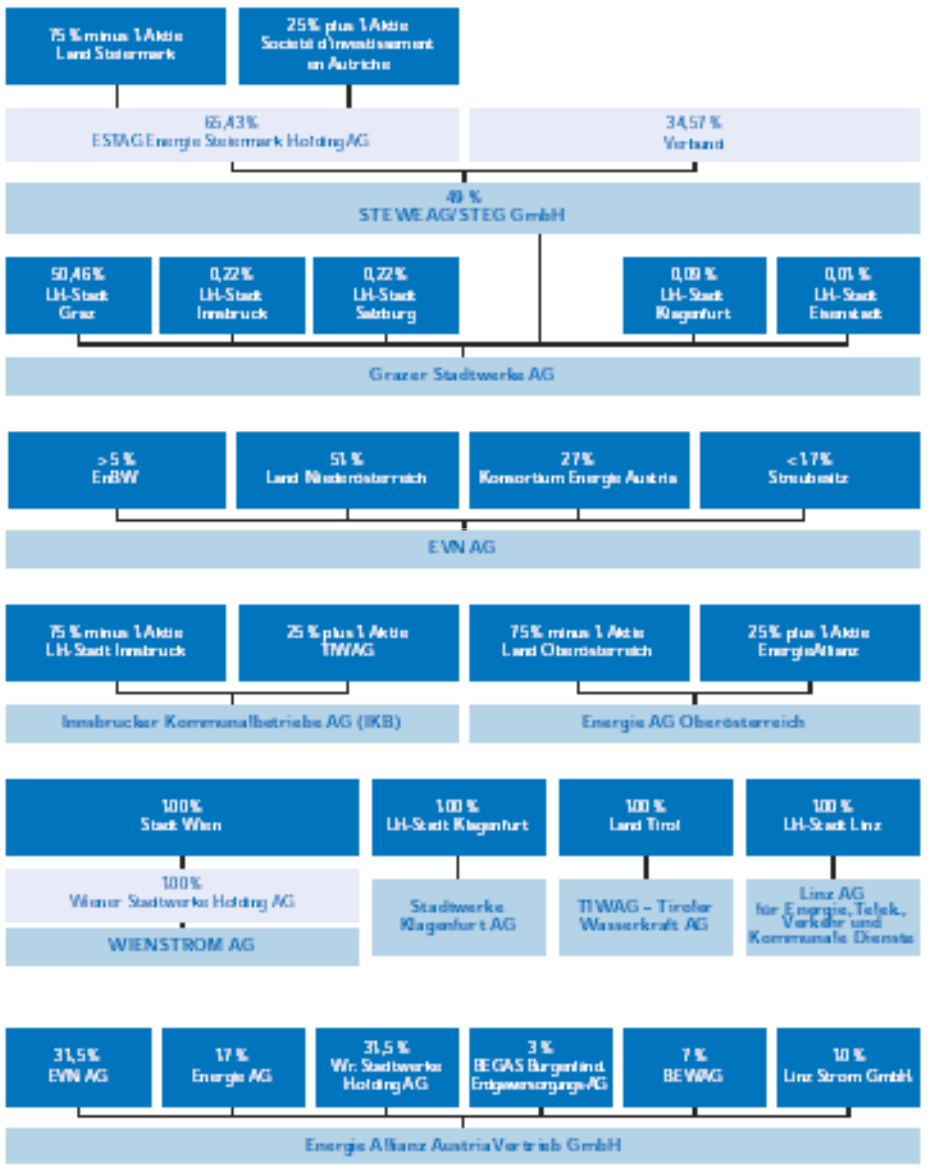
http://www.e-control.at/pls/econtrol/docs/FOLDER/STROM/PUBLIKATIONEN/WORKING_PAPER_SERIES/FILES/WP14.PDF

Endabnehmer-kategorie	Versorgerwechsel - Elektrizitätsmarkt				
	2001	2001 / 02	2002 / 03	2003 / 04	Insgesamt
Haushalte	0	26.077	40.986	34.813	101.876
Sonstige Kleinabnehmer	181	37.776	20.102	31.314	89.373
Leistungsgemessene	318	1.775	1.701	2.943	6.737
Insgesamt	**499**	**65.628**	**62.789**	**69.070**	**197.986**
Haushalte	0,0%	0,7%	1,1%	0,9%	2,8%
Sonstige Kleinabnehmer	0,0%	2,7%	1,4%	2,3%	6,4%
Leistungsgemessene	1,2%	6,6%	6,3%	10,9%	25,0%
Insgesamt	**0,0%**	**1,3%**	**1,2%**	**1,3%**	**3,9%**

Endabnehmer-kategorie	Versorgerwechsel - Gasmarkt				
	2002	2002 / 03	2003 / 04		Insgesamt
Haushalte	0	8.645	11.774		20.419
Sonstige Kleinabnehmer	0	450	900		1.350
Leistungsgemessene	0	12	72		84
Insgesamt	**0**	**9.107**	**12.746**		**21.853**
Haushalte	0,0%	0,7%	0,9%		1,6%
Sonstige Kleinabnehmer	0,0%	1,1%	2,3%		3,4%
Leistungsgemessene	0,0%	0,6%	3,6%		4,2%
Insgesamt	**0,0%**	**0,7%**	**1,0%**		**1,7%**

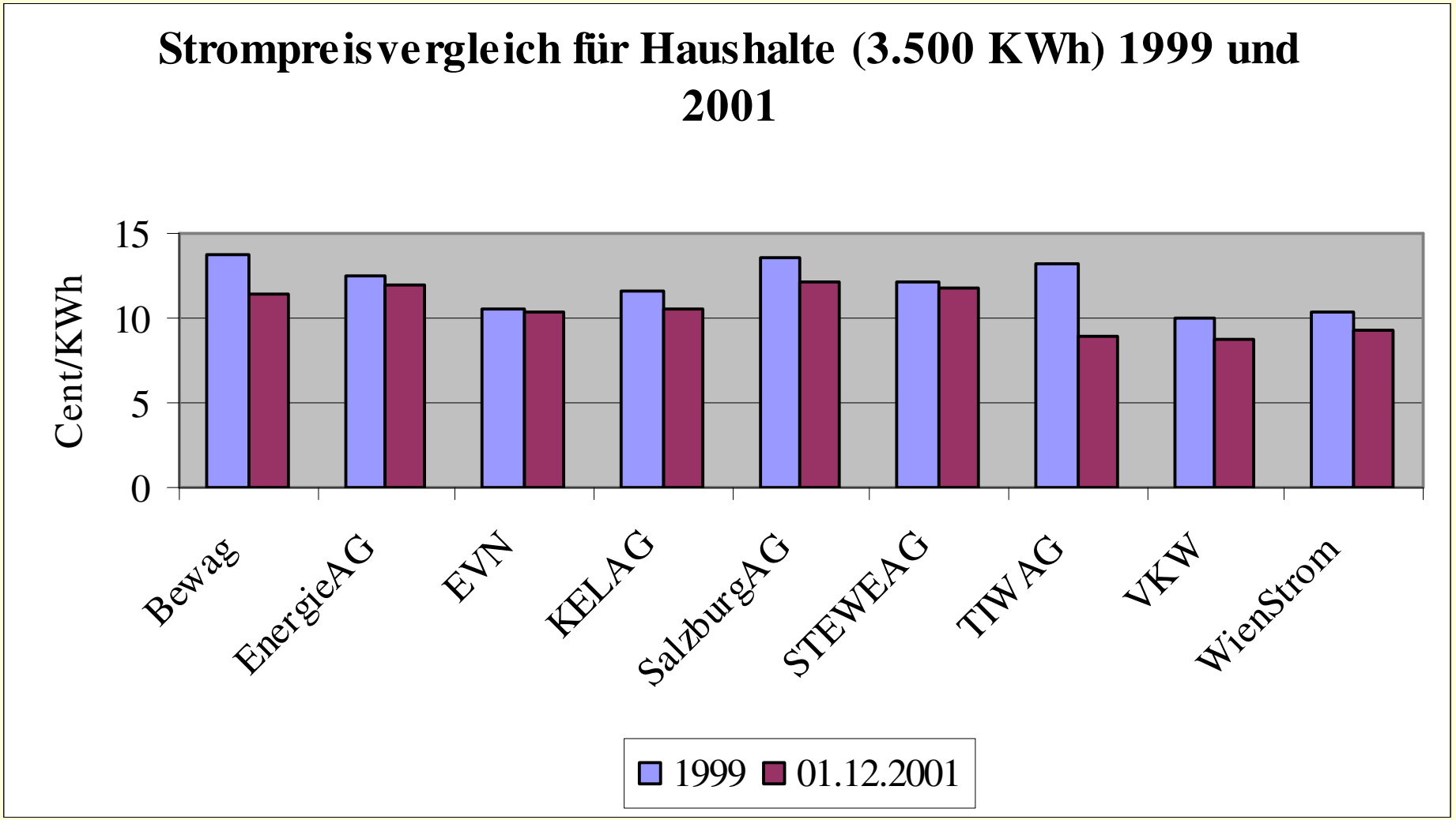
Participations & Austrian solution



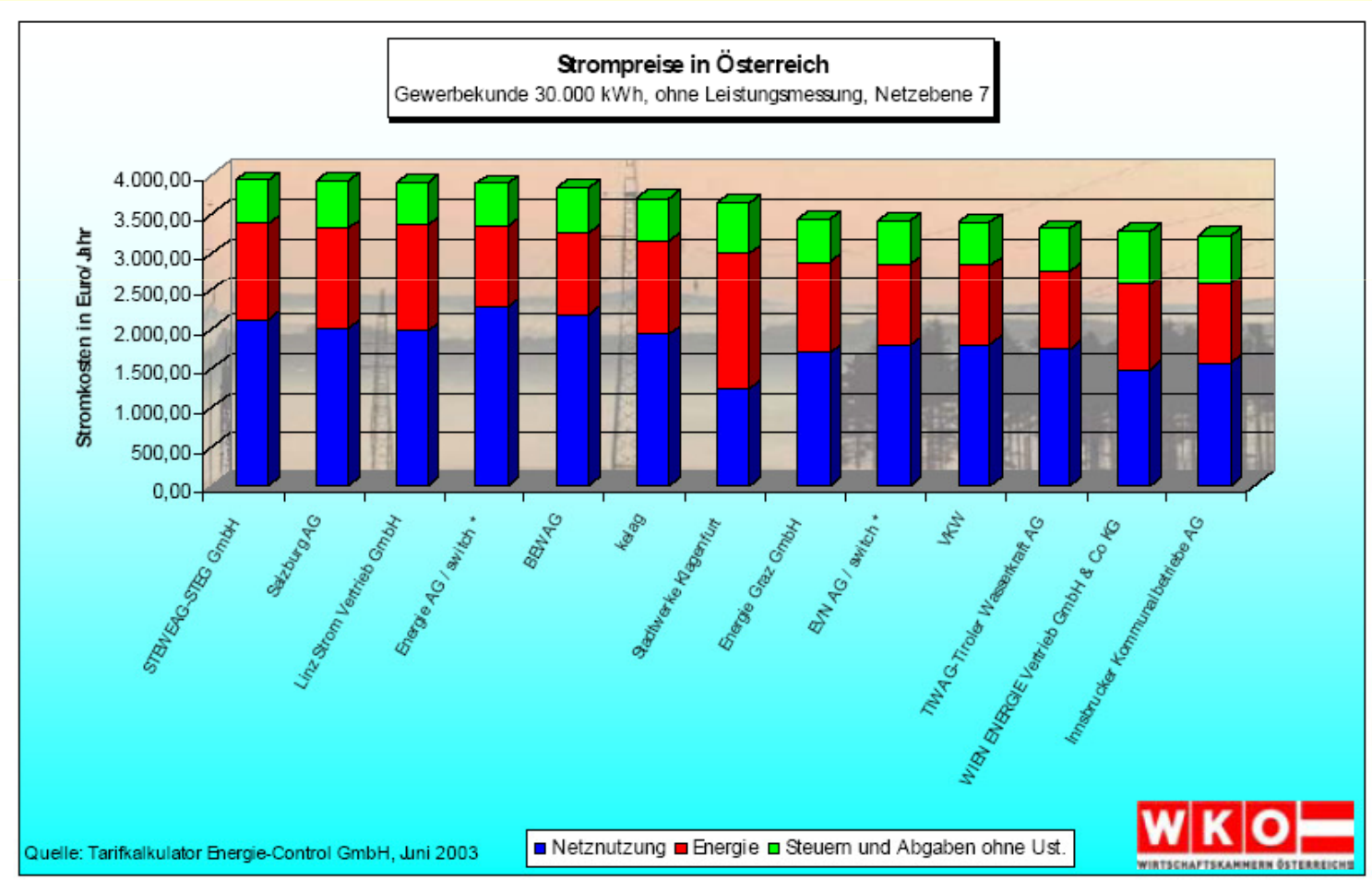


Quelle: E-Control, Stichtag 31.12.2002

Effect of the liberalization

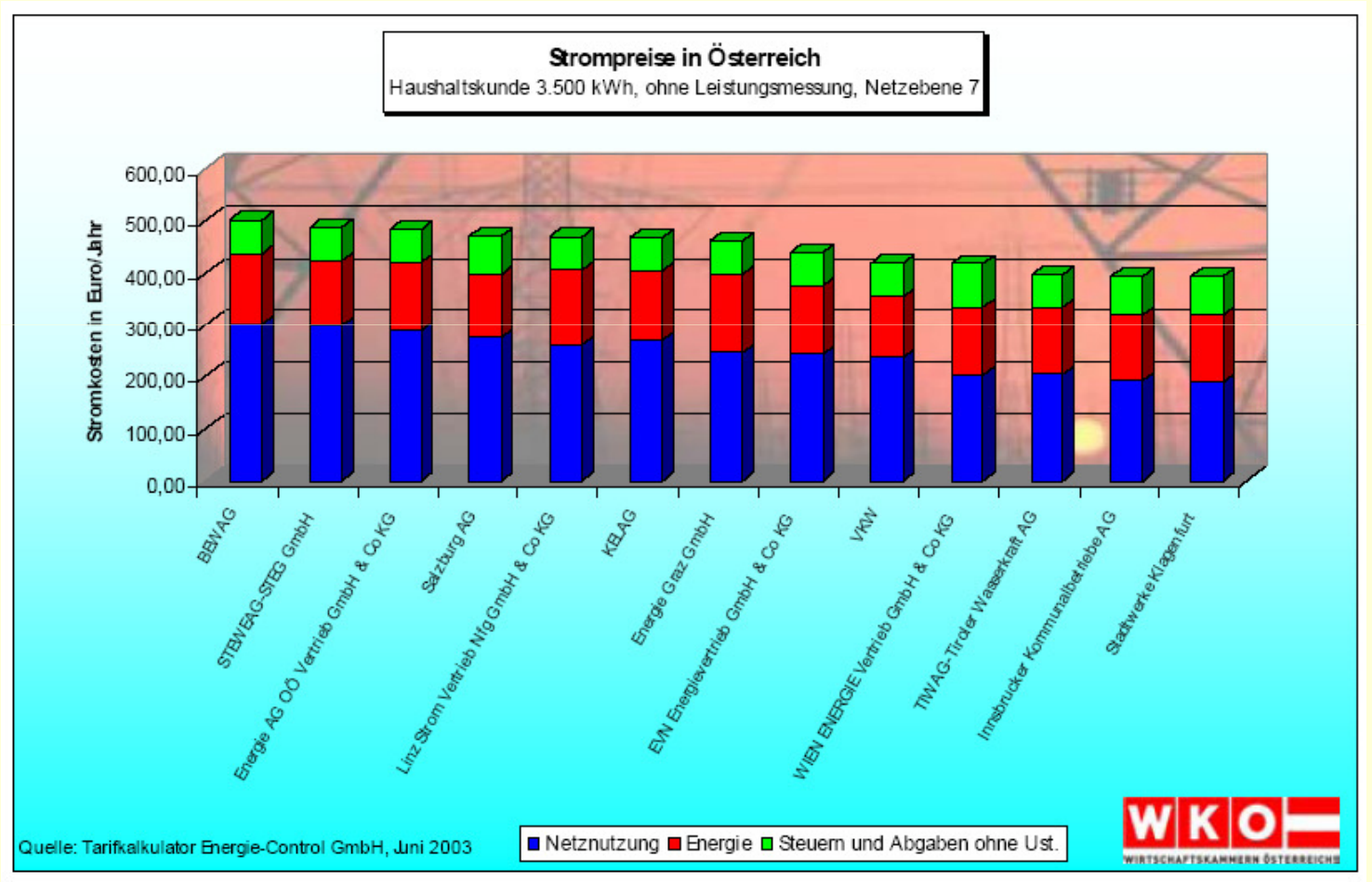


Electricity Prices Austria (Commerce June 2003)



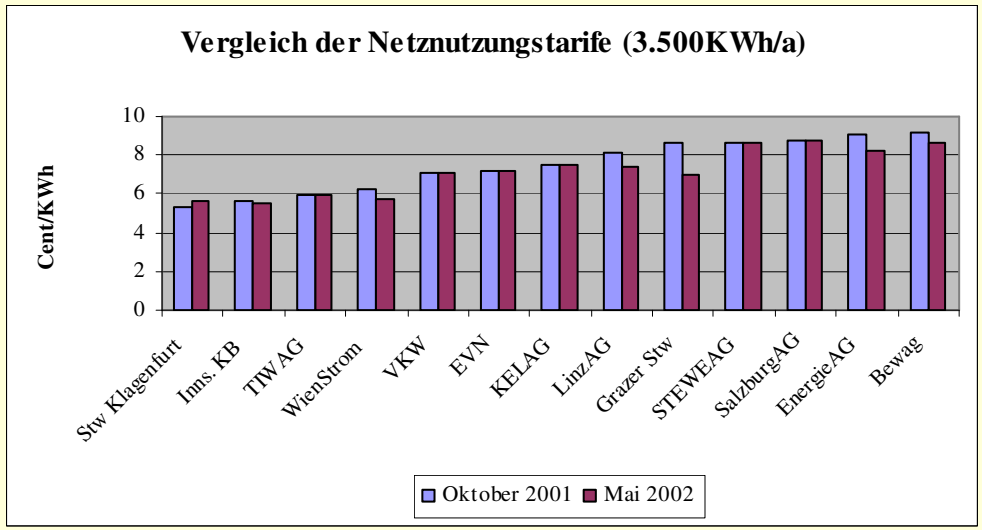
Quelle: WKO, nach dem Tarifkalkulator der e-control

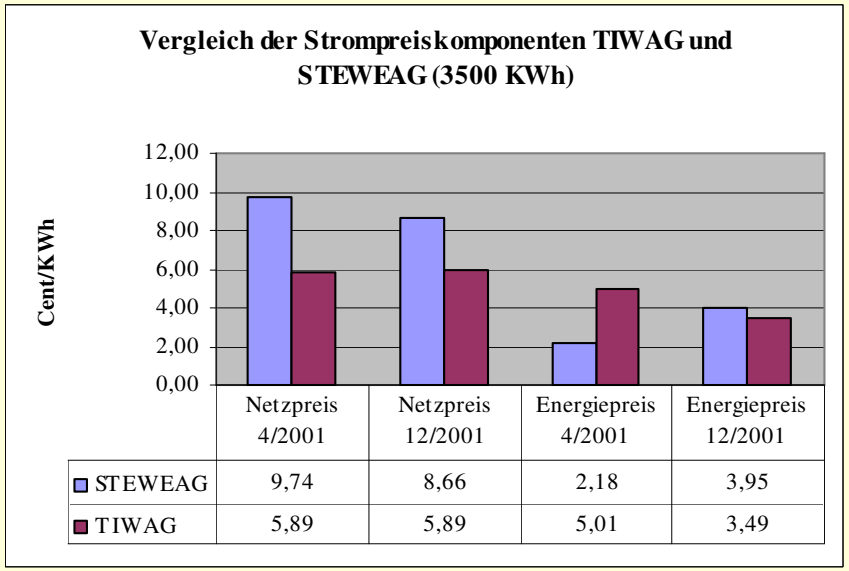
Residential Electricity Prices Austria November 2003



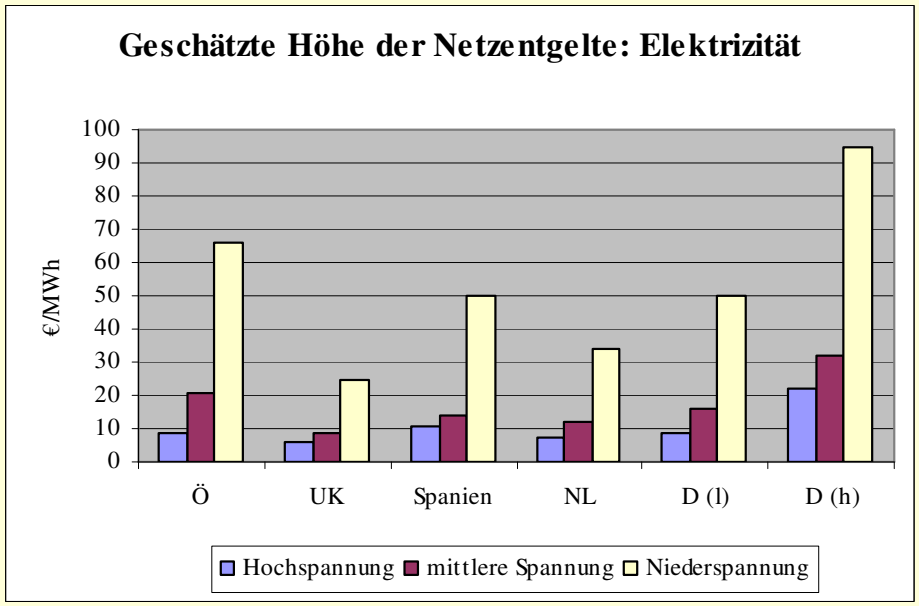
Quelle: WKO, nach dem Tarifkalkulator der e-control

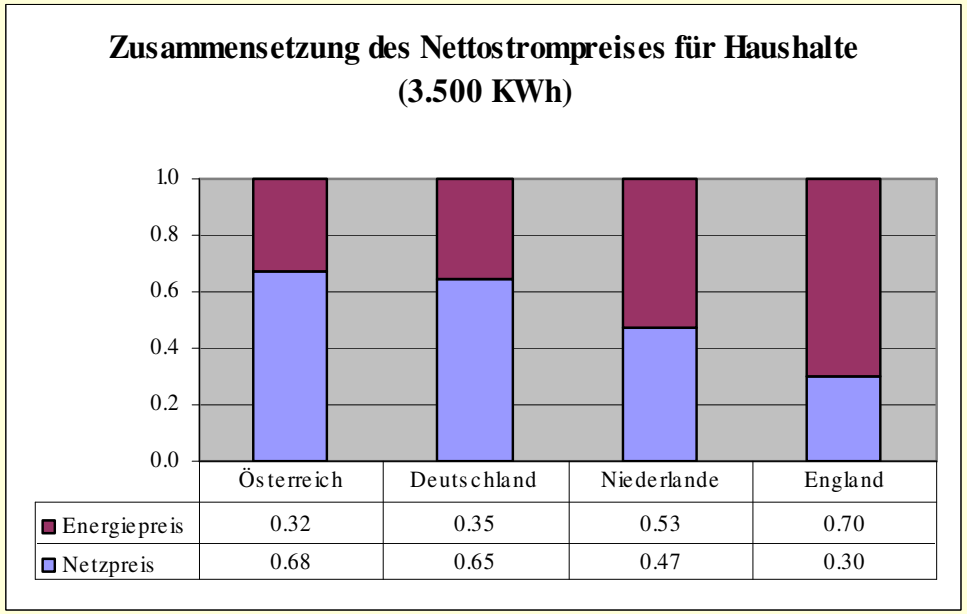
Problem: Grid charges





	Netzpreis 4/2001	Netzpreis 12/2001	Energiepreis 4/2001	Energiepreis 12/2001
STEWEAG	9,74	8,66	2,18	3,95
TIWAG	5,89	5,89	5,01	3,49





	Österreich	Deutschland	Niederlande	England
Energiepreis	0.32	0.35	0.53	0.70
Netzpreis	0.68	0.65	0.47	0.30