# Benchmarking the Reforms of the Electricity Sector in the New Member States

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with input from the study project at TUD

**3rd SESSA-Conference**

**Berlin, 8-10 December 2004**

1. Introduction
2. Survey of the Region
3. Issues
4. Benchmarking Indicators
5. Conclusions

# Agenda

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# 1. Introduction: Much Anew in the East

## Countries covered: EU Accession Countries (May 2004) +

- UCTE: **Poland, Czech Republic, Hungary**, **Slovakia**, Slovenia, Croatia
- Synchronous with 2nd UCTE-region: Romania, Bulgaria, South-East Europe
- UES: Lithuania, Latvia, Estonia
- Indirectly covered: Russia, Ukraine

## State of EU-Integration

- Technical integration succeeded in 1995 already (Centrel/UCTE)
- Economic and institutional integration still in progress
- „Acquis communautaire“, mainly Directive 2003/54 far from being fulfilled (cf. EU Benchmarking Report)
- Critical issues: price adaptation, privatization, competitive market structures
- Fuel diversification, security of (fuel) supply

## Potential impact on EU-15

- Electricity trading
- Transit (of Russian electricity)
- Environment, nuclear, etc., price competition

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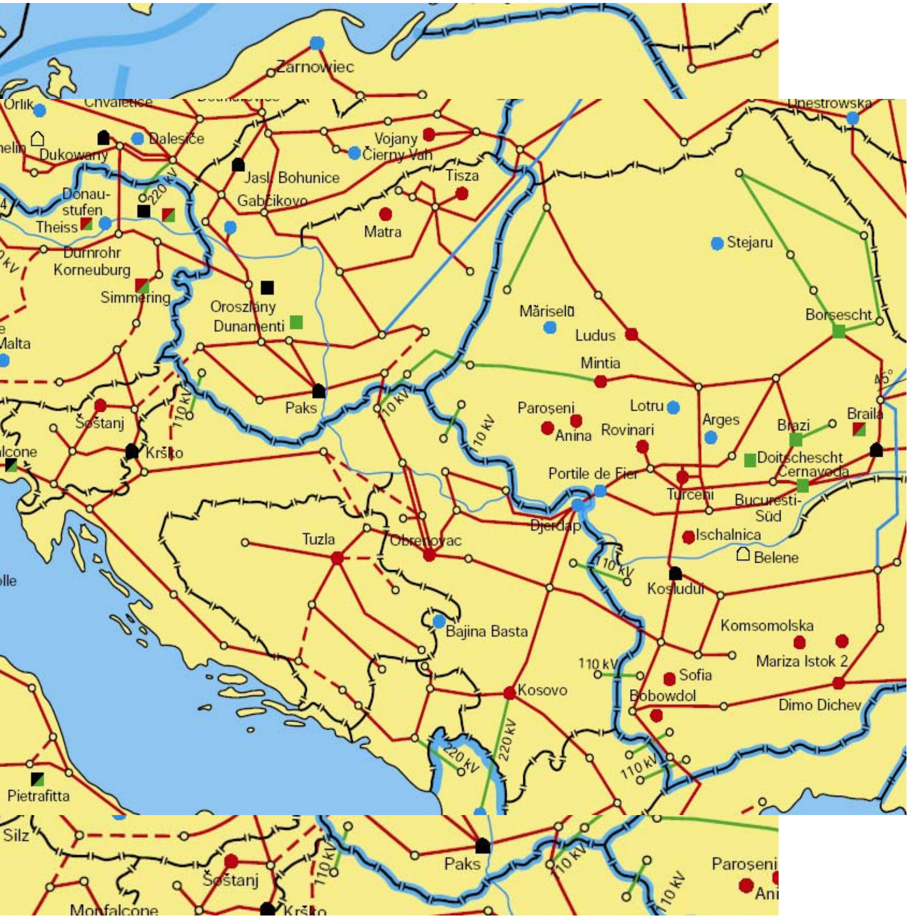
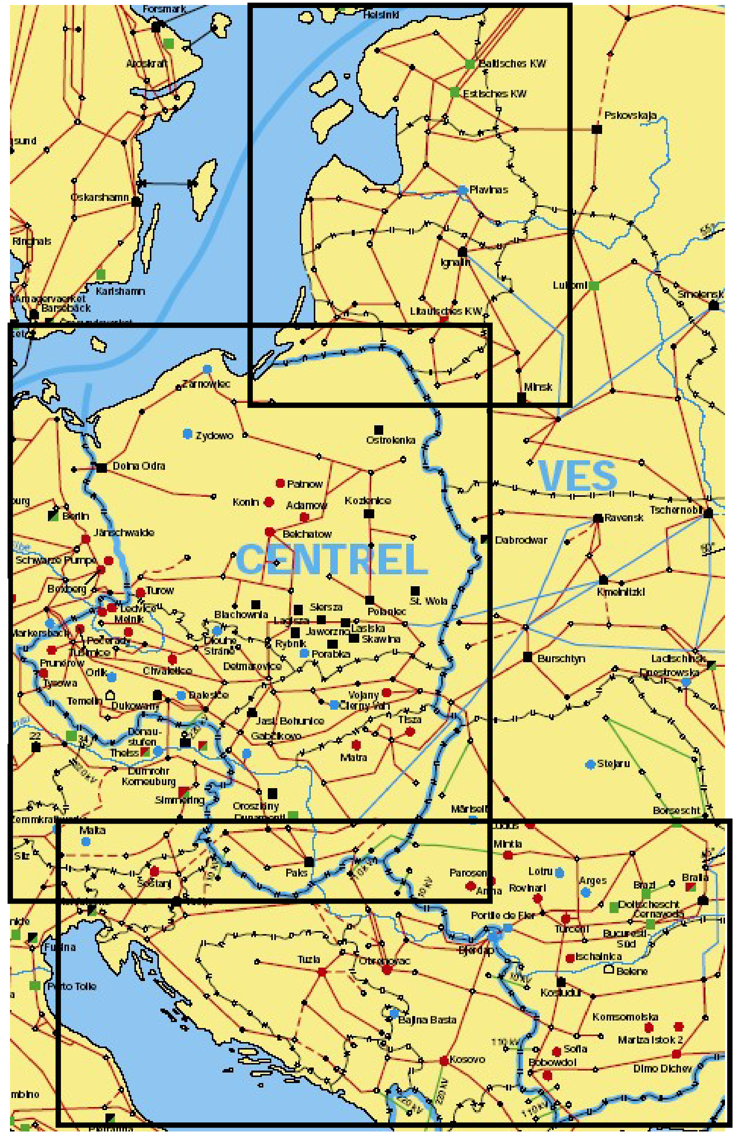
# Survey of the Region: The Electricity Sector in the New Member Countries




Source: VGE 2000

# Survey of the Region:
# Electric Power Generation in Eastern Europe

| Country | Total Power Plant Capacity in MW | Total Generation in billion kWh |
|---|---:|---:|
| Bulgaria | 10.384 | 36,5 |
| Estonia | 2.428 | 7,5 |
| Latvia | 2.173 | 3,8 |
| Lithunia | 6.156 | 15,6 |
| Poland | 33.941 | 143,3 |
| Romania | 18.157 | 50,1 |
| Slovenia | 2.729 | 13,7 |
| Slovakia | 8.318 | 32,8 |
| Czech Republic | 16.311 | 76 |
| Hungary | 8.311 | 35 |
| **CEE-Countries** | **108.908** | **414,30** |
| **EU 15** | **601.572** | **2.556,70** |

2002
Source: Eurelectric

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1. **Introduction**
2. **Survey of the Region**
3. **Issues**
    1. Market structure
    2. Trade and interconnection
    3. Sustainability and fuel mix
4. **Benchmarking Indicators**
5. **Conclusions**

# Issues: Market Structure Ownership and Concentration

## All CEE countries still away from the unbundled, fully privatized and deconcentrated benchmark case !

**Hungary** – mainly privatised generation, fully privatised distribution, but integration of TSO and state owned generator

**Czech R**
**Slovakia**
**Poland** – Partialy privatised generation, partly privatised distribution

**Romania**
**Bulgaria**
**Lithunia** – State owned generation, partly privatised distribution

**Slovenia** – Unbundled state owned generation and distribution

**Estonia**
**Croatia**
**Latvia** – Vertically integrated state owned monopolies

# Electricity prices (without Taxes, as of Jan. 2004)

| Country | market size in TWh/year | price for industry ¢/kWh* | residential price ¢/kWh** |
|---|---|---|---|
| **Bulgaria** | **36,41** | **4,4** | **4,4** |
| **Croatia** | **14,46** | **5,6** | **6,4** |
| **Czech Republic** | **54,8** | **4,49** | **6,6** |
| **Estonia** | **5,37** | **4,69** | **5,5** |
| **Hungary** | **38,57** | **6,03** | **7,94** |
| **Latvia** | **6,2** | **3,87** | **4,87** |
| **Lithuania** | **7,5** | **5,13** | **7,26** |
| **Poland** | **113,7** | **4,22** | **6,13** |
| **Romania** | **47,9** | **4,51** | **5,55** |
| **Slovenia** | **11,8** | **5,1** | **8,3** |
| **Slovak Republic** | **54,7** | **5,06** | **8,69** |

* Ø annual consumption of 10 Mio. kWh/a and annual utilisation of 4000 h
** Ø annual consumption of 3500 kWh/a

Sources: EUROSTAT - Statistics in Focus
Energy Regulators Regional Association ERRA - http://www.erranet.org,
Energy Agency of the Republic of Slovenia - http://www.agen-rs.si/eng/frames.asp
Regulatory Office for Network Industries URSO - http://www.urso.gov.sk/
Romanian Energy Regulatory Authority ANRE - www.anre.ro

# Issues: Trade and Interconnection

## Central Europe:

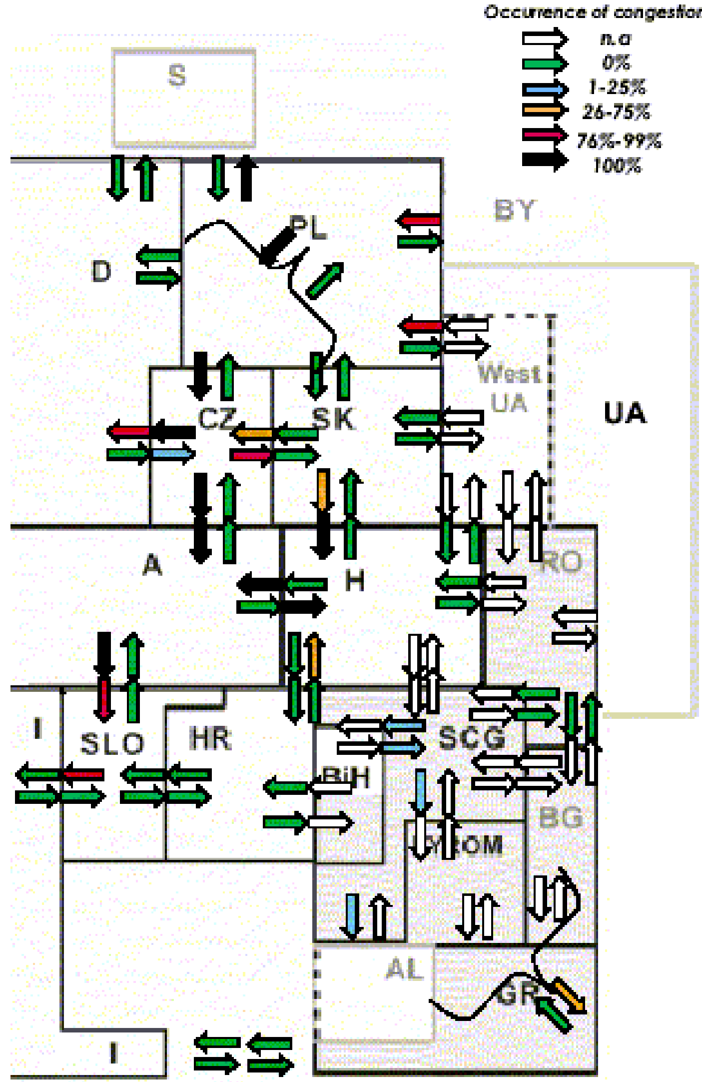
- Slovakia mainly trades from north to south. But there is an insuffecent link for the profitable exports to Hungary
- The CR has strong interconnections with the neighboring countries and significant cheap surplus capacities after the full commissioning of NPP Temelin
- Hungary imports power form Slovakia and Ukraine. Export mainly goes to Croatia, where the fluctuating hydro capacities often result in good prices for transit or even for expensive Hungarian electricity
- Poland is less inclined to import electricity, may be because of its production overcapacity.

## Baltic States:

- Lithunia, Latvia, Estonia: Baltic electricity network is technically well developed with strong interconnections between the three countries and eastern neighbours; UCTE-future in dobut.

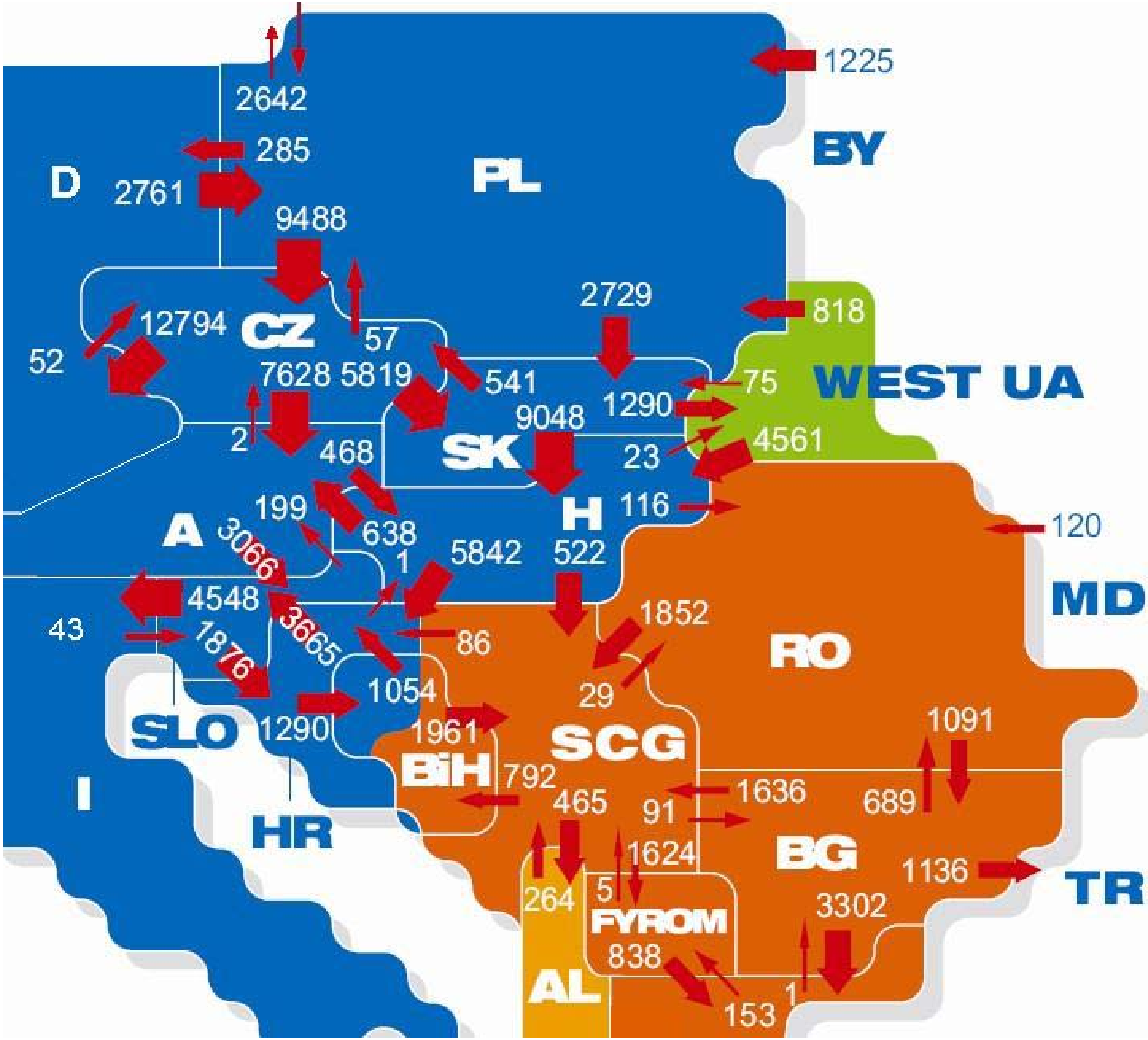
## Balkan:

- Slovenia: congestion on the borders with Austria and Italy.
- Romania: plans to become a large regional electricity exporter by targeting neighboring countries; possible markets include Greece, Turkey, and Italy.
- Bulgaria:Interconnection with Albania, FYROM, Turkey and Greece is under development.




Source: UCTE System Adequacy Retrospect 200

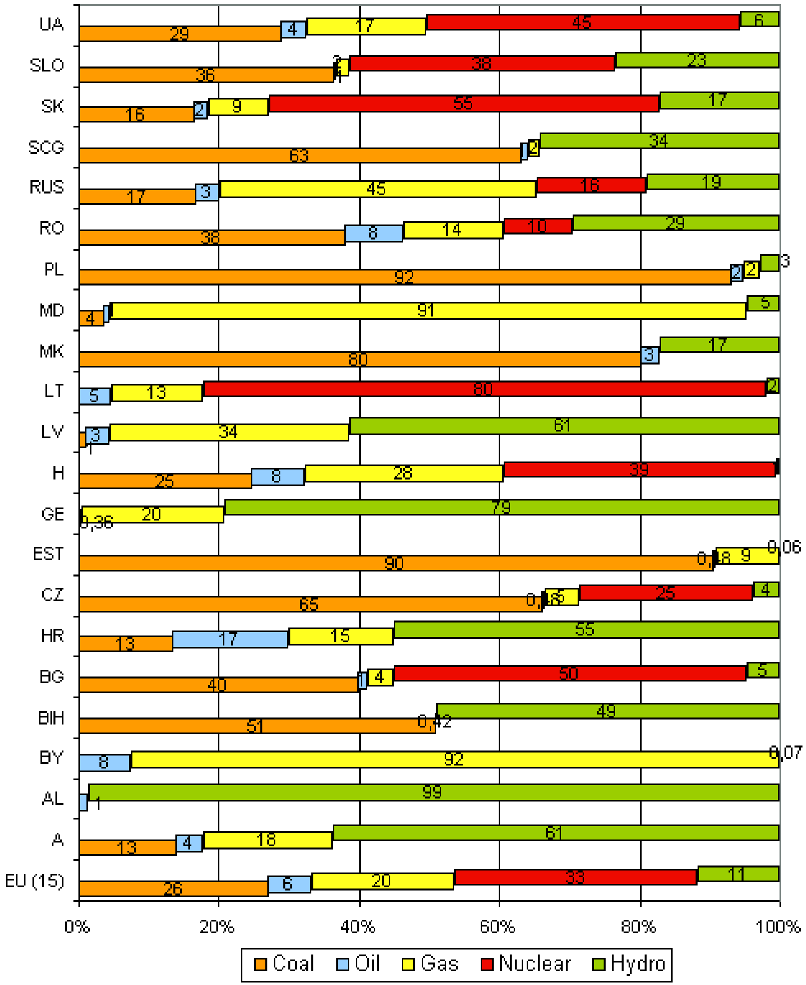
# Survey of the Region: Physical Electricity Exchanges in CEE Countries 2003 in GWh



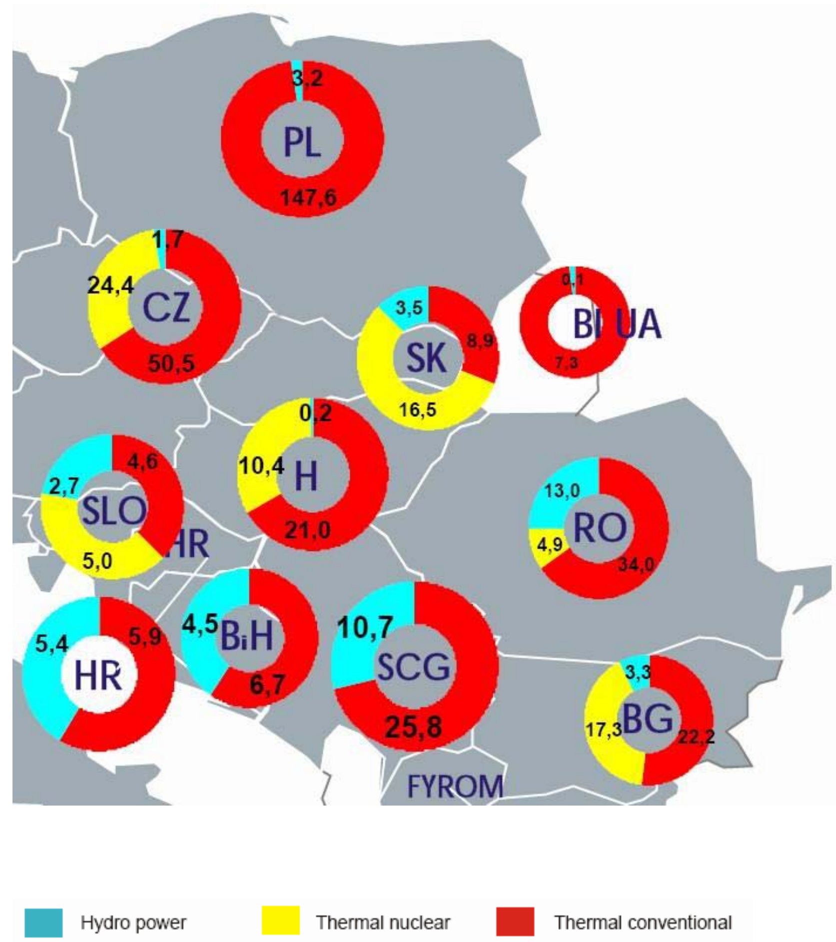

2002
Source:UCTE

# Issues: Fuel Mix

**Production of Electricity According to Energy Sources** in Central and Eastern Europe, and the EU15

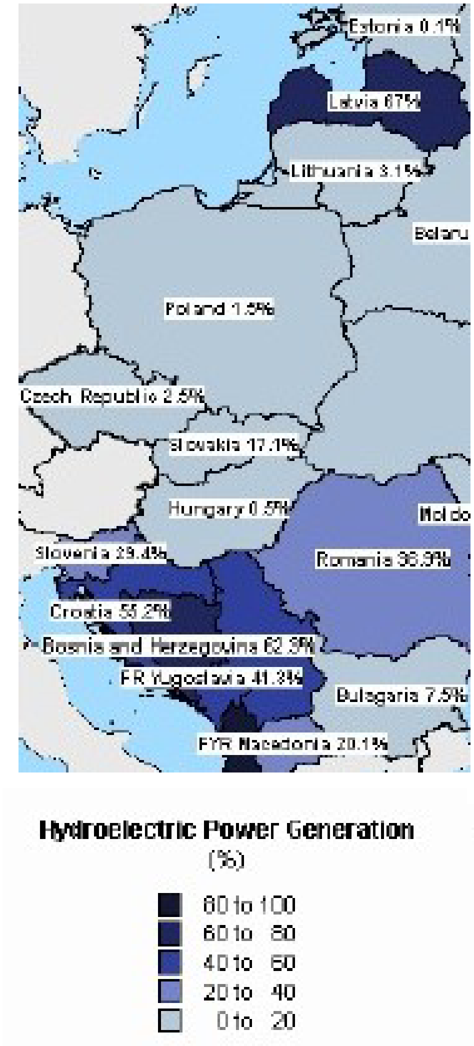


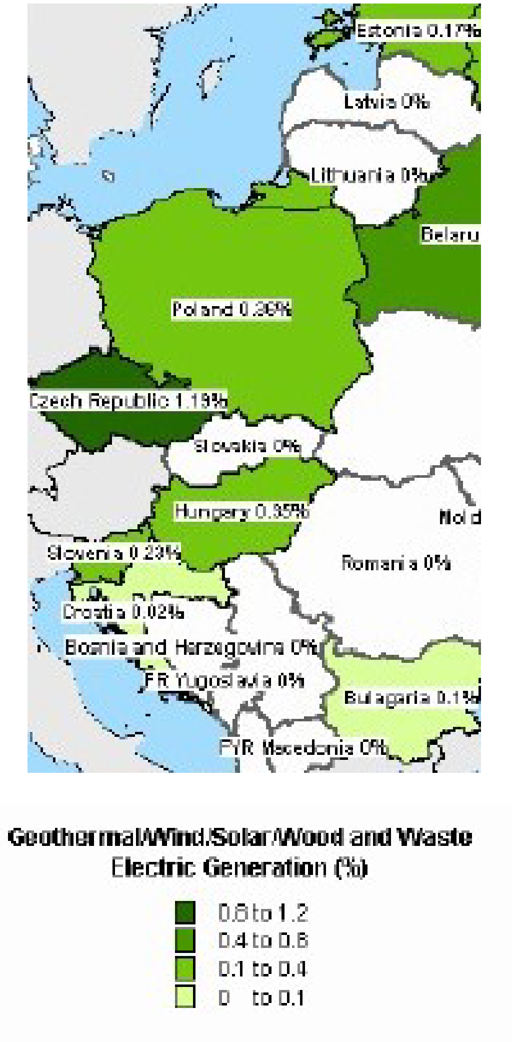

**Net production** 2003 in TWh*




* Provisional values as of 31.03.2004

# Issues: Sustainability




## Estimated Renewable Energy Mid Term (2020) Technical Potential in MW

| | Wind | Geo. | Biomass | Hydro | Total |
|---|---|---|---|---|---|
| Bulgaria | 3400 | 200 | 3371 | 1070 | 8041 |
| Croatia | 1000 | 48 | 575 | 642 | 2265 |
| CzechRepublic | 2200 | 0 | 819 | 285 | 3304 |
| Estonia | 500 | 0 | 248 | 0 | 748 |
| Hungary | 500 | 0 | 983 | 357 | 1840 |
| Latvia | 550 | 0 | 325 | 428 | 1303 |
| Lithuania | 500 | 0 | 318 | 214 | 1032 |
| Poland | 4000 | 0 | 4160 | 999 | 9159 |
| Romania | 3000 | 15 | 1919 | 2568 | 7502 |
| Slovakia | 250 | 0 | 273 | 499 | 1023 |
| Slovenia | 100 | 10 | 135 | 642 | 887 |

## Installed and In-construction Renewable Energy Capacity.

| | Wind | Geo. | Biomass | Hydro <100MW | Total |
|---|---|---|---|---|---|
| Bulgaria | 0,0 | 107 | 977 | 63 | 1147,2 |
| Croatia | 0,0 | 114 | 7 | 655 | 776,1 |
| Czech Republic | 23,0 | 13 | 775 | 283 | 1094,0 |
| Estonia | 6,2 | 0 | 917 | 4 | 927,5 |
| Hungary | 2,8 | 350 | 573 | 44 | 969,6 |
| Latvia | 22,8 | 0 | 70 | 65 | 157,3 |
| Lithuania | 0,0 | 21 | 285 | 118 | 424,0 |
| Poland | 73,0 | 69 | 6425 | 790 | 7356,7 |
| Romania | 1,0 | 137 | 4036 | 2598 | 6772,0 |
| Slovakia | 0,0 | 132 | 88 | 684 | 904,2 |
| Slovenia | 0,0 | 42 | 364 | 520 | 926,0 |

Source: EBRD Renewable Energy Resource Assessment

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3. **Issues**
4. **Benchmarking Indicators**
    1. EU Benchmarking Report
    2. EBRD
    3. OXERA-based TUD
5. **Conclusions**

# 4.1 According to the EU Benchmarking Report, most Acession Countries have yet to Implement Substantial Reforms

| | Declared market opening (%) | Unbundling : transmission system operator /owner | Unbundling: Distribution system operator | Regulator | Balancing conditions favourable to entry | Biggest generators' share of capacity (%) | Biggest 3 generators' share of capacity (%) |
|---|---|---|---|---|---|---|---|
| Estonia | 10 | Accounts | Accounts | ex-ante | unfavourab. | 15 | 21 |
| Lativa | 11 | Legal | Legal | ex-ante | n.k. | 0 | 0 |
| Lithuania | 17 | Legal | Legal | ex-ante | moderate | 0 | 29 |
| Poland | 51 | Management | Accounts | ex-ante | moderate | 4 | 25 |
| Czech R. | 30 | Legal | Accounts | ex-ante | unfavourab. | 43 | 53 |
| Slovakia | 41 | Legal | Legal | ex-ante | moderate | 29 | 40 |
| Hungary | 30 | Accounts | Accounts | n.k. | moderate | 5 | 41 |
| Slovenia | 64 | Legal | Accounts | ex-ante | unfavourab. | 16 | 43 |
| Romania | 33 | Legal | Accounts | ex-ante | moderate | n.k. | 44 |
| Bulgaria | 15 | Accounts | Accounts | ex-ante | moderate | n.k. | 45 |
| Germany | 100 | Legal | Accounts | planned | unfavourab. | 23 | 61 |
| UK | 100 | Ownership | Legal | ex-ante | favourable | 16 | 37 |

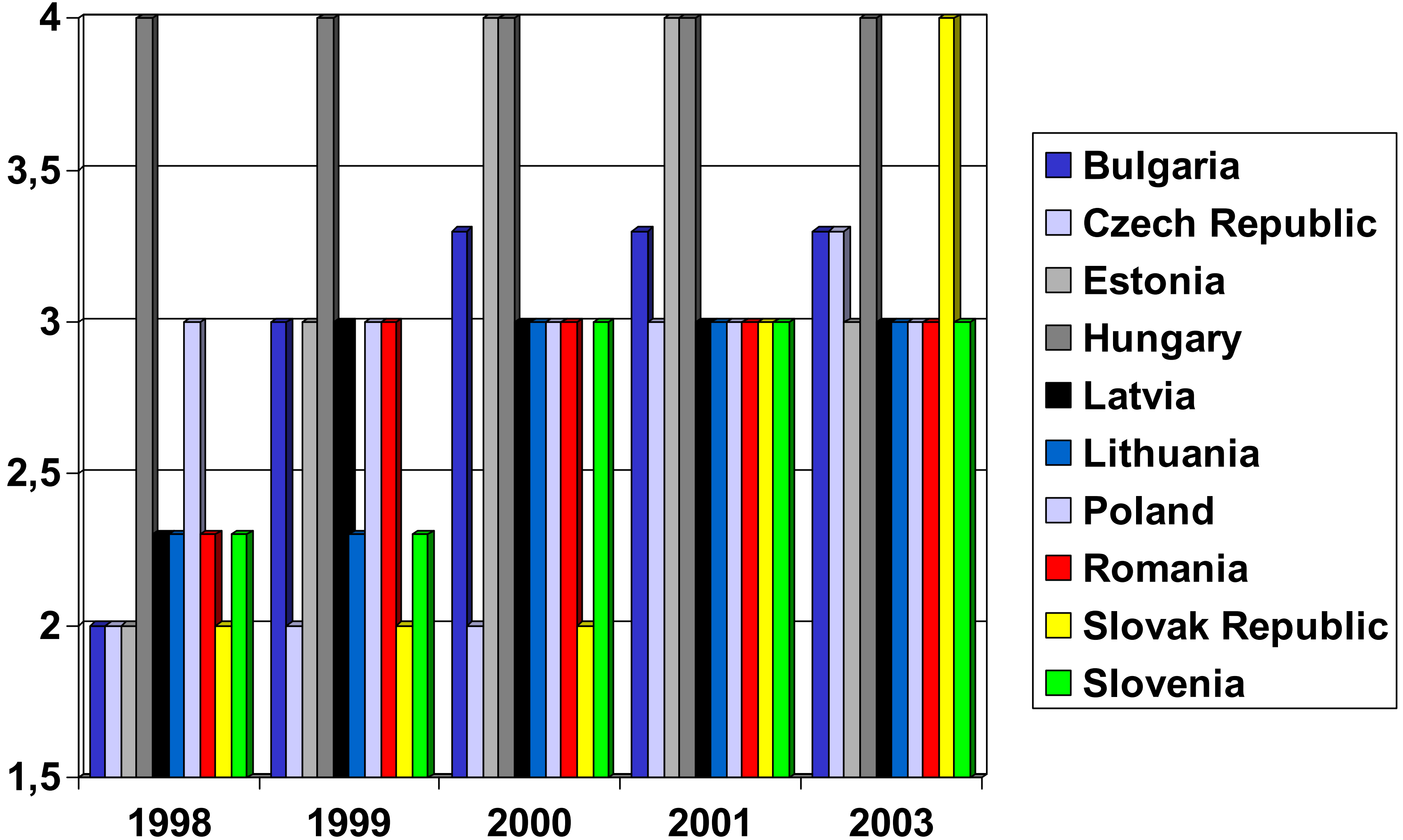
Source: Commission of the European Communities (2004), 4.

# Market Structure in Import and Production of Gas

| | | | | | | | | Security of Supply Position 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | % of gas from dom. Prod | % of gas from imp (no. of srcs) | Comp. with at least 5% share of avail. Gas | % of avail. gas controlled by largest comp. | Gas release prog. | Cr. border pipline cap. as % of cons. | LNG import capacity as % of consumption | Cons (bcm) | Amount of local prod. | Import cap. | Incr. in consu. 2002 vs 2001 (% p.a.) |
| **Estonia** | **0** | **100 (1)** | **1** | **100** | **No** | **0** | **0** | **n.k.** | **n.k.** | **n.k.** | **n.k.** |
| **Lativa** | **0** | **100 (1)** | **1** | **100** | **no** | **0** | **0** | **1.5** | **0.0** | **1.5** | **+1.0** |
| **Lithuania** | **0** | **100 (1)** | **4** | **43** | **no** | **0** | **0** | **2.6** | **0.0** | **6.0** | **+1.5** |
| **Poland** | **34** | **66(3)** | **1** | **100** | **no** | **>100** | **0** | **12.4** | **4.0** | **7.8** | **-1.5** |
| **Czech R.** | **1** | **99 (2)** | **1** | **99** | **no** | **>100** | **0** | **9.6** | **0.1** | **12.0** | **-3.0** |
| **Slovakia** | **3** | **97 (1)** | **1** | **97** | **no** | **>100** | **0** | **7.5** | **0.2** | **7.3** | **+5.4** |
| **Hungary** | **25** | **75 (2)** | **1** | **100** | **no** | **10** | **0** | **12.8** | **3.1** | **13.3** | **+0.0** |
| **Slovenia** | **0** | **100 (3)** | **1** | **100** | **no** | **>100** | **0** | **1.0** | **0.0** | **3.5** | **-3.6** |
| **Romania** | **80** | **20 (1)** | **7** | **n.k.** | **no** | **0** | **0** | **15.0** | **12.0** | **12.0** | **-0.6** |
| **Bulgaria** | **1** | **99 (1)** | **1** | **100** | **yes** | **>100** | **0** | **3.0** | **0.0** | **6.0** | **-9.0** |
| **Germany** | **18** | **82 (5)** | **9** | **c. 50** | **yes** | **>100** | **15** | **98.4** | **20.2** | **87.0** | **+0.5** |
| **UK** | **90** | **10** | **6** | **c.25** | **compl.** | **10** | **0** | **94.0** | **112.0** | **9.5** | **-4.0** |

# 4.2 EBRD Infrastructure Indicators of New Member States

**source: EBRD Transition Reports, 0 (no reform) – 4 („market economy“)**



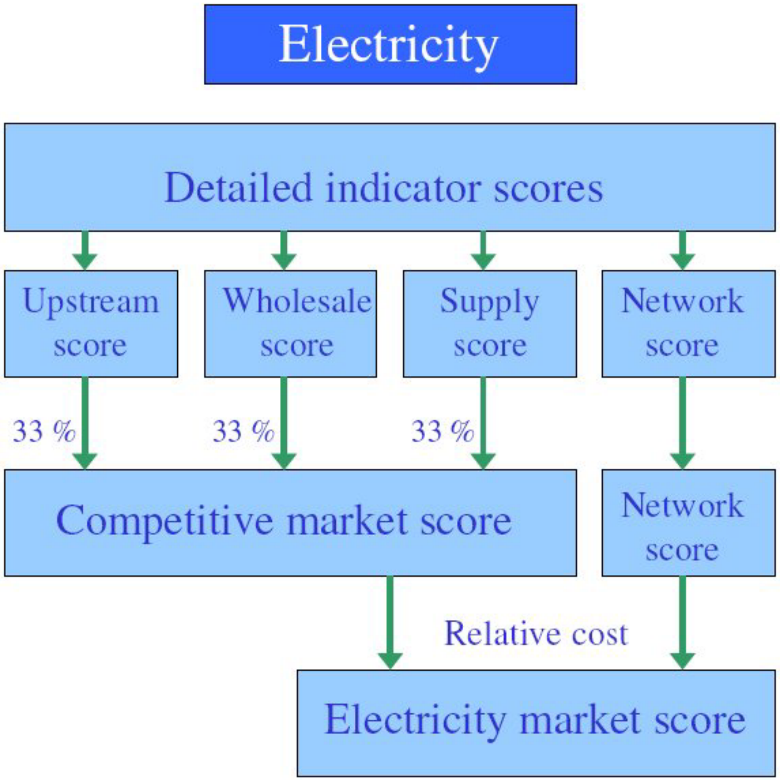
# 4.3 OXERA-based TUD

- According to the Oxera scheme liberalisation is measured by the competitive market score and the network score

- The competitive market score consists of the upstream score, the wholesale score and the supply score beeing weighted equally

- For the final score, the competitive market score is weighted with 0,7 and the network score with 0,3

- The initial filtering that was done by Oxera was not taken over




source:(Qxera,Energy Market competition in the EU and the G7, September 2003, p. 4)

# Quantitative measurement of liberalisation

## The detailed scores on the example of Slovenia:

- The upstream score depends on the market shares of the biggest generators
- According to the market concentration 70 % of the score is fixed. Technical market opening and the mechanism of import deliver equally the other 30 %.
- The network score takes into account if there is unbundling and reg. TPA
- Unbundling delivers 30 % of the score and re. TPA delivers 20 % of the score; for transmission and distribution, respectively
- Wholesale and downstream are calculated in a similar way

| | | | |
|---|---|---|---|
| upstream | market share of biggest generator | % | 66,20% |
| | market share of biggest 2 generators | % | 90,40% |
| | market share of biggest 3 generators | % | 96,30% |
| | technical market opening (export/import) | % | 0,00% |
| | mechanism of import | R, A oder V | A |
| wholesale | price reports | J/N | J |
| | share of daily trades covered by price reports | % | 3,11 |
| | normed contracts | J/N | market share of biggest 2 suppliers |

| | | | |
|---|---|---|---|
| network | unbundling transmission | J/N | J |
| | reg.TPA transmission | J/N | J |
| | unbundling distribution | J/N | J |
| | reg.TPA distribution | J/N | J |

Disclaimer:

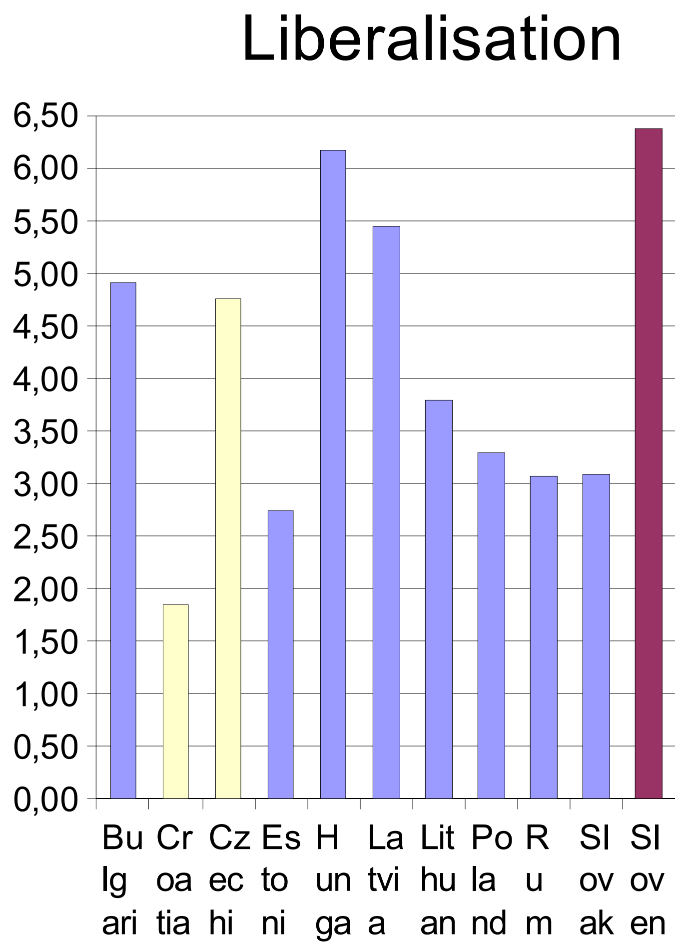
Sources of data are documented in the appendix of the study report

# Divergence Concerning Reforms Between the Countries

- Slovenia achieves a level comparable to Western European countries

- Overall modest results concerning the OXERA-score

- Reforms are seemingly independent from geographical position and size



# Quantitative measurement of liberalisation

- The very bad results for Croatia root in the monopolistic supply structures. HSE is the only relevant supplier of size
- In the wholesale market there are no price reports
- Concerning the network score there is only unbundling concerning the accounts, but no legal unbundling (not shown)

- In Czechia the market is already opened to nearly one third of the customers
- There is also a quite high rate of customers who were changing their supplier
- On the network side they only lack of unbundled distribution companies
- The market concentration on the generation side is quite big even though not monopolistic.

→leads to a scoring in the midrange

Croatia:

| | | | |
|---|---|---|---|
| **upstream** | market share of biggest supplier | % | 100,( |
| | market share of biggest 2 suppliers | % | 100,( |
| | market share of biggest 3 suppliers | % | 100,( |
| | technical market opening (export/import) | % | 0,0( |
| | mechanism of import | R, A oder V | R |
| **wholesale** | price reports | J/N | N |

Czechia:

| | | | |
|---|---|---|---|
| **Industry** | market opening | % of all consumers | 30% |
| | market share biggest supplier | % ot total supply | 27% |
| | market share biggest 2 suppliers | look upon | 47% |
| | market share biggest 3 suppliers | look upon | 62% |
| | customers changing supplier since liberalisation | yearly rate of all customers | 8% |
| **Households** | market opening | % of all consumers | 30% |
| | market share biggest supplier | % ot total supply | 23% |
| | market share biggest 2 suppliers | look upon | 42% |
| | market share biggest 3 suppliers | look upon | 59% |
| | customers changing supplier since liberalisation | yearly rate of all customers | 8% |

# 5. Conclusions

-The transition from socialist power systems to market-oriented electricity sectors has not proceeded as planned, but some progress has been made: all CEE countries still away from the unbundled, fully privatized and deconcentrated benchmark case

- Three regional markets (Baltic, Balkan, CENTREL) are developing in CEEC‘s; infrastructure, congestion and market structure factors are preventing the development of an integrated market; however, successful technical integration into the UCTE. Further market integration will be a slow process, with a likely focus on the core countries

- New member states are unlikely to become forerunners of a sustainable energy future: limited potential of renewables, focus on coal and nuclear energy

- For the “old” EU-15, electricity enlargement entails both elements of cooperation and competition

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# Electricity: Market Opening Basic Data

| | Market opening (%) | Size of open market TWh | Eligibility threshold | Unbundling | | Network access |
|---|---|---|---|---|---|---|
| | | | | TSO | DSOs | |
| Estonia | 10 | <1 | 40GWh. | acc. | acc. | Reg. |
| Lativa | 11 | <1 | 40GWh. | leg. | leg. | Reg. |
| Lithuania | 17 | <1 | 9GWh. | leg. | leg. | Reg. |
| Poland | 51 | 48 | 10GWh. | man. | acc. | Reg. |
| Czech R. | 30 | 15 | 40GWh. | leg. | leg. | Reg. |
| Slovakia | 41 | 4 | 40GWh. | leg. | leg. | Reg. |
| Hungary | 30-35 | 9 | 6.5GWh. | leg. | acc. | Reg. |
| Slovenia | 64 | 6 | 41kW. | leg. | acc. | Reg. |
| Romania | 33 | 11 | 40GWh. | leg. | leg. | Reg. |
| Bulgaria | 19 | 4 | 100GWh. | acc. | leg. | Reg. |
| Germany | 100 | 490 | - | leg. | acc. | Neg. |
| UK | 100 | 335 | - | own. | leg. | Reg. |

Source: Commission of the European Communities (2004), 13.

# Electricity Balancing Arrangements

| | Balancing period (minutes) | How are charges set | Supern. [S] National [N] or Regional [R] Balancing | Balanc. Groups allowed | Intraday market possible | Gate closure | Dom. single gen. within balanc. area? | % of balanc. energy supplied by cons. during 2002 | % of balanc. energy supplied by non nat. sites 2002 |
|---|---|---|---|---|---|---|---|---|---|
| **Estonia** | **60** | **TSO** | **N** | **n.k.** | **N** | **day ahead** | **Y** | **n.k.** | **n.k.** |
| **Lativa** | **60** | **n.k.** | **S** | **n.k.** | **N** | **day ahead** | **N** | **n.k.** | **some** |
| **Lithuania** | **60** | **Reg/mkt** | **N** | **N** | **N** | **day ahead** | **N** | **n.k.** | **n.k.** |
| **Poland** | **60** | **market** | **N** | **Y** | **N** | **day ahead** | **N** | **3** | **0** |
| **Czech R.** | **60** | **market** | **N** | **Y** | **N** | **day ahead** | **Y** | **n.k.** | **n.k.** |
| **Slovakia** | **60** | **reg.** | **N** | **n.k.** | **N** | **day ahead** | **Y** | **n.k.** | **n.k.** |
| **Hungary** | **15** | **reg.** | **N** | **Y** | **N** | **day ahead** | **N** | **0.5** | **0** |
| **Slovenia** | **60** | **TSO** | **N** | **Y** | **N** | **day ahead** | **Y** | **n.k.** | **n.k.** |
| **Romania** | **60** | **market** | **N** | **n.k.** | **N** | **n.k.** | **N** | **0** | **0** |
| **Bulgaria** | **60** | **regulator** | **N** | **N** | **Y** | **n.k.** | **N** | **0** | **0** |
| **Germany** | **15** | **market** | **R** | **Y** | **Y** | **day ahead** | **Y** | **0** | **0** |
| **UK** | **30** | **market** | **N** | **Y** | **Y** | **1 hour** | **N** | **0** | **0** |

Source: Commission of the European Communities (2004), 18