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energy supply: electricity mix updates

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Overview

- countries covered
- changes and improvements implemented
- the role of certified electricity
- comparison of results
- Conclusions



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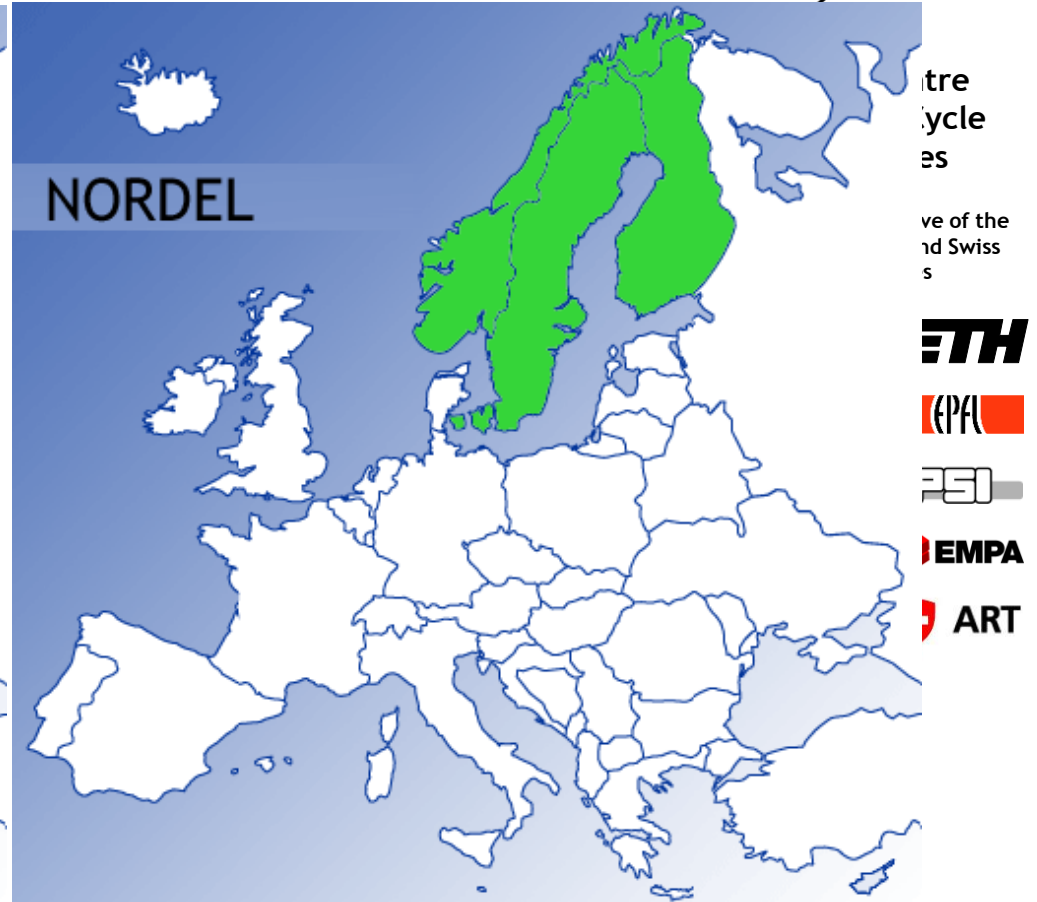
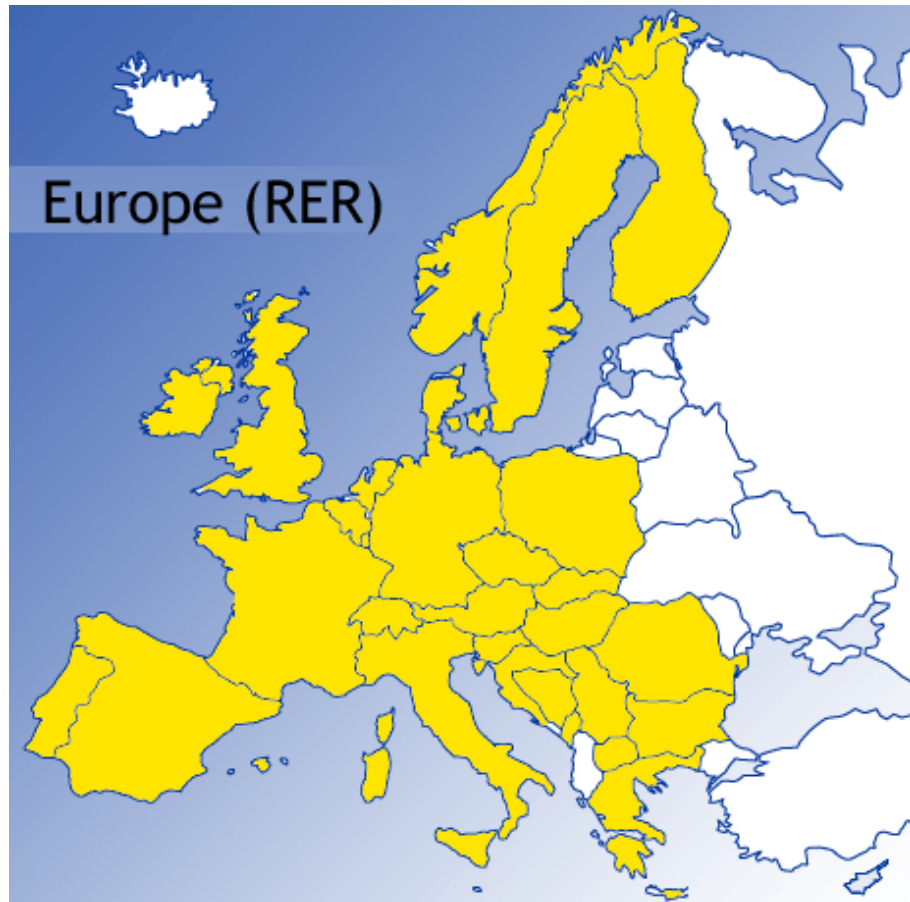
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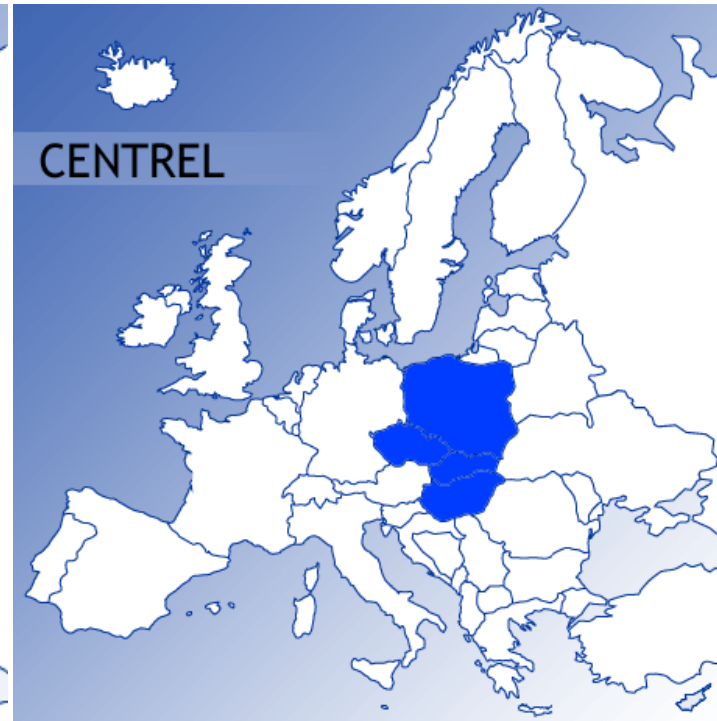
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countries covered (2004/5)



including Bulgaria and Romania

countries covered (2004/5)



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including CENTREL countries

Additional countries and mixes:

- Brazil, China, Japan, USA
- Aluminium industry
- Swiss Railways

Datasets per electricity mix



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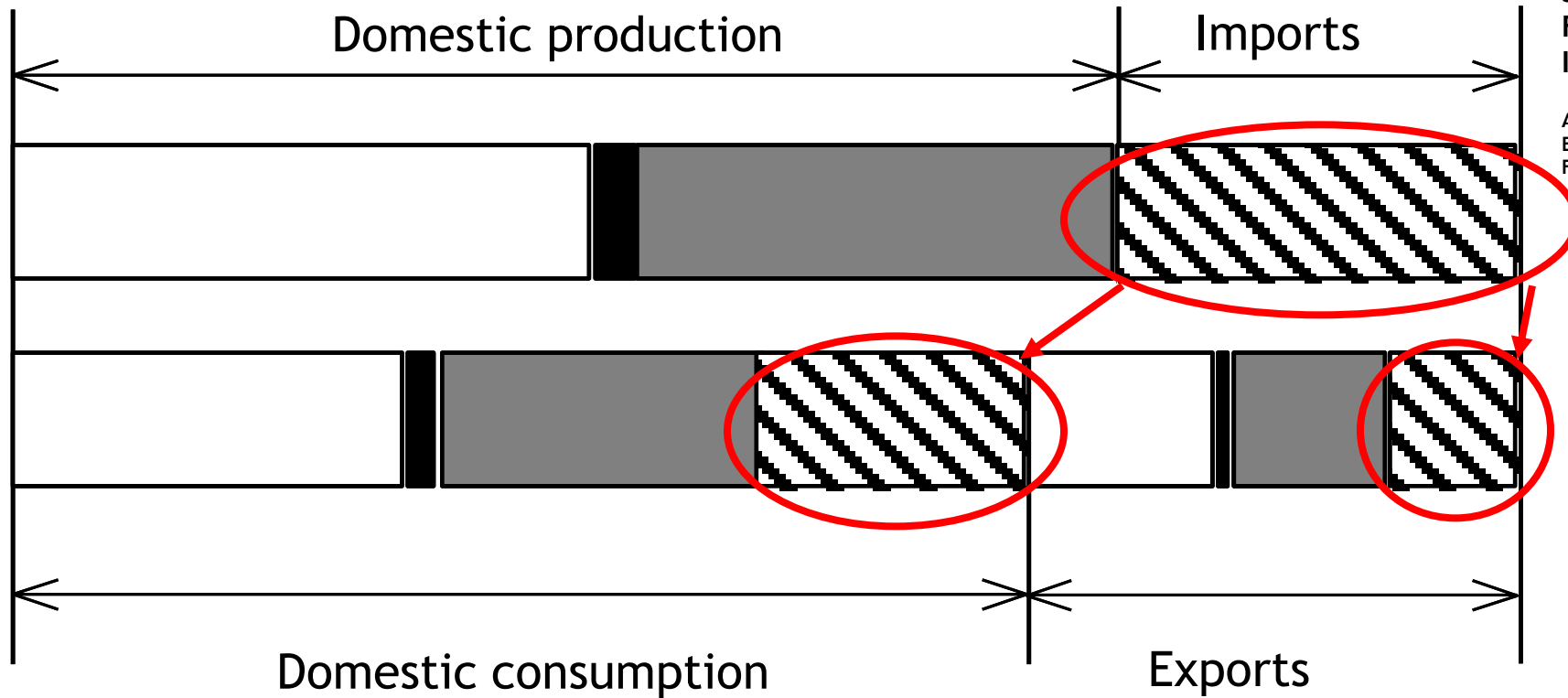
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- Different voltages:
 - at the busbar
 - High voltage $>24\text{kV}$
 - Medium voltage $1\text{-}24\text{kV}$
 - Low voltage $<1\text{kV}$
- Different mixes:
 - Production mix (domestic production only)
 - Supply mix (domestic production plus imports)

Electricity model



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Mix domestic production plus Mix Imports = Supply mix

Power plant technologies

- Hard coal and lignite *
- Heavy fuel oil *, Diesel CHP
- Natural gas (also CHP) and Industrial gases *
- Hydroelectric power (run of river and storage)
- Pumping storage hydroelectric power *
- Nuclear power (pressurised and boiling water reactors) *
- Photovoltaic (average yield) *
- Wind power (also offshore, Baltic Sea case study)
- Biomass (Wood CHP)
- Biogas (from sewage sludge and biowaste)

* country specific



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Electricity network



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- High / medium voltage:
SF₆-losses in Switchyards considered
- Low voltage:
Heavy metal leachate from use phase of treated
wood poles
- Country specific losses;
between about 3.5% in Finland and nearly 19% in the
successor states of the former Yugoslavia.

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Features of v2 modelling



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- CENTREL countries (PL, HU, CS, CZ) now included in UCTE
- emission factors of CENTREL fossil power plants updated
- LNG supply of Japan modelled separately
- Greenhouse gas emissions of Brazil hydroelectric power plants: 104 g “CO₂, land transformation” per kWh
- NEW EU 27 mix, applicable where no specific information available on
 - product provenience (production phase) or
 - product destination (use phase)
- Certified electricity production modelled separately

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Roles of certified electricity



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- 12% of Swiss hydro power, and 26% of new renewable power is certified and sold separately
- Swiss production mix includes certified electricity
- Swiss supply mix excludes certified electricity
- No differentiation in all other country mixes
- Separation of “green” electricity from grid supply mix gets more important in the future

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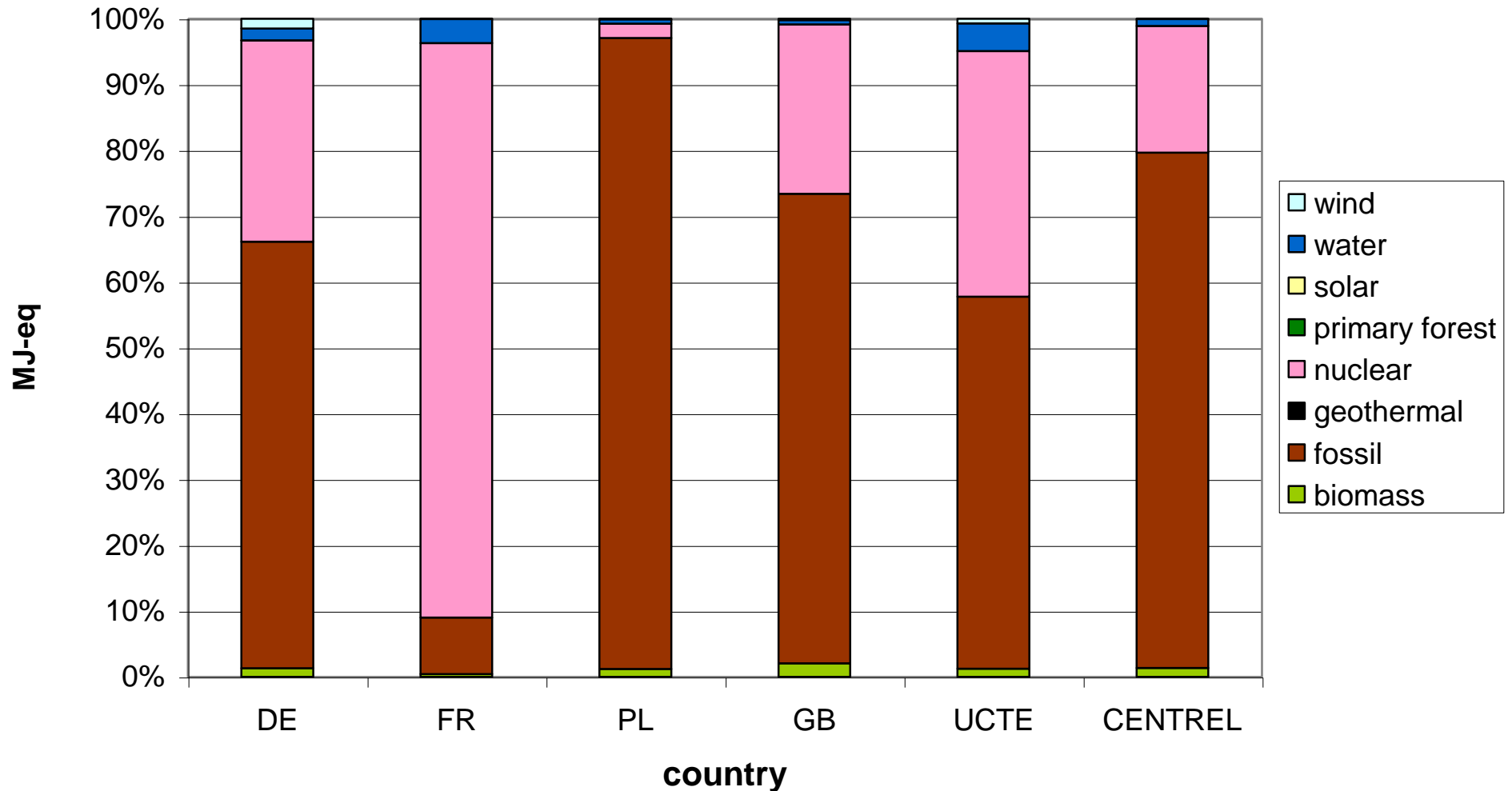
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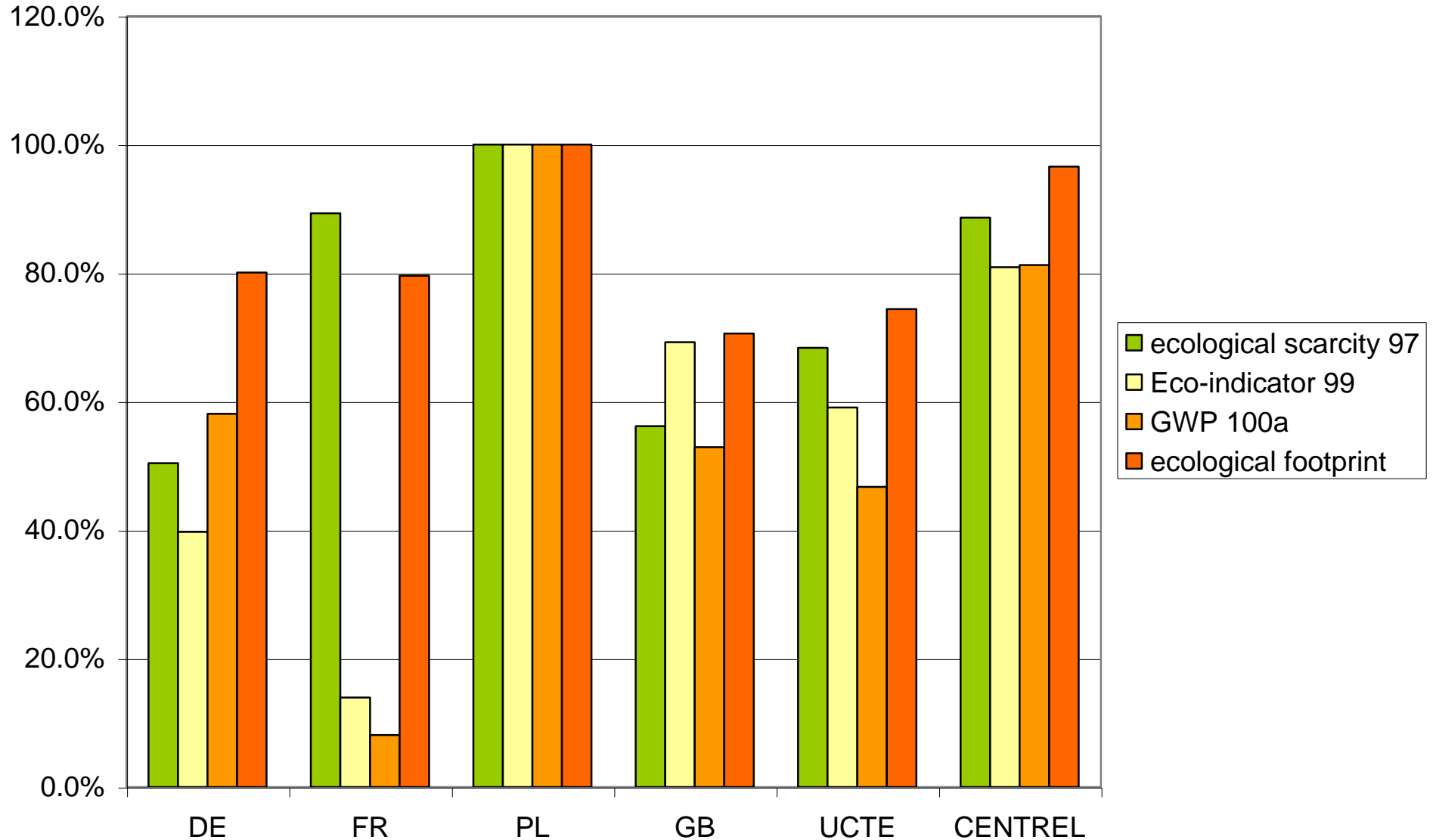
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CED electricity supply mix

production mix, per kWh_{el}

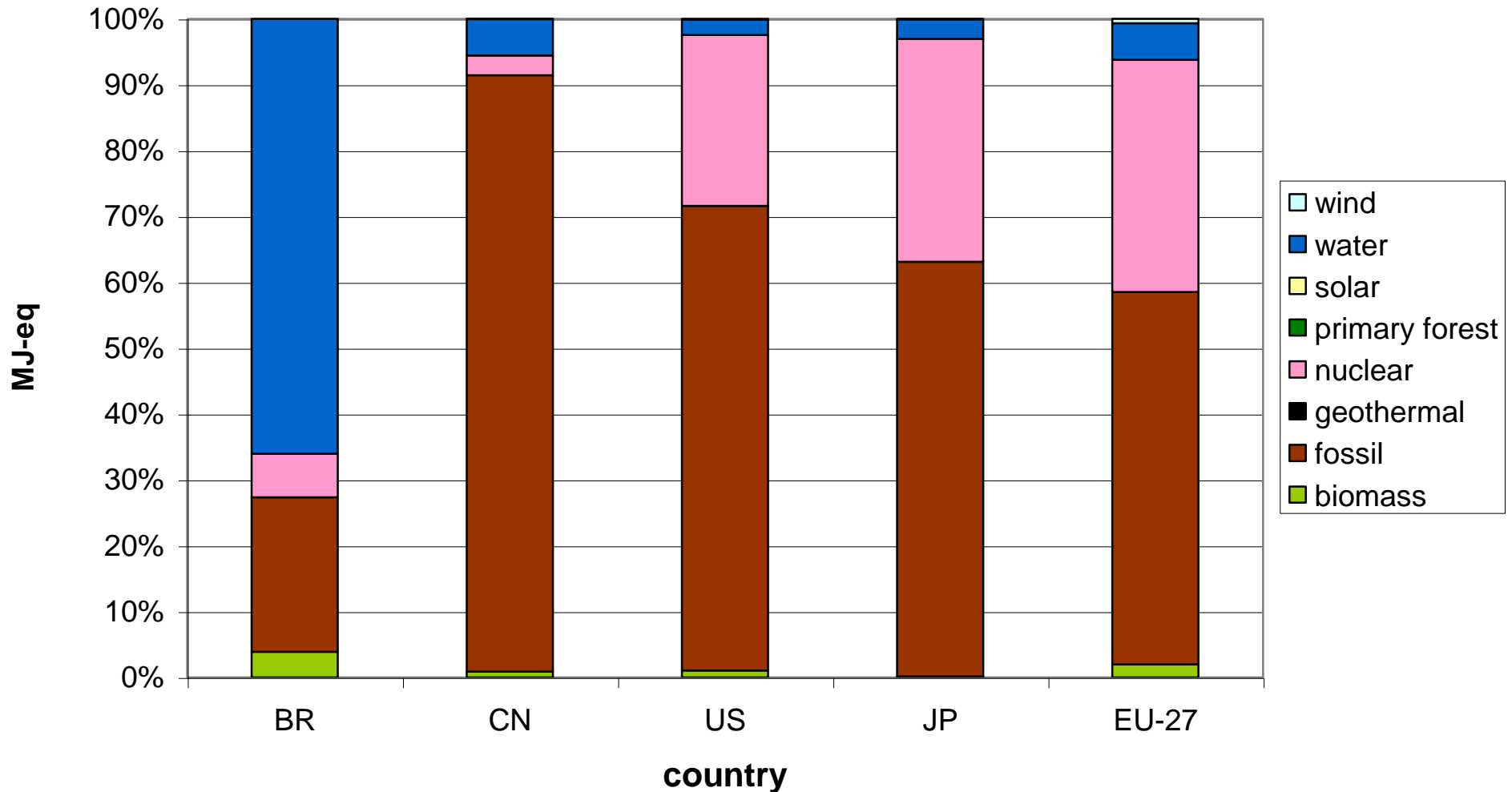


Comparison electricity supply mixes

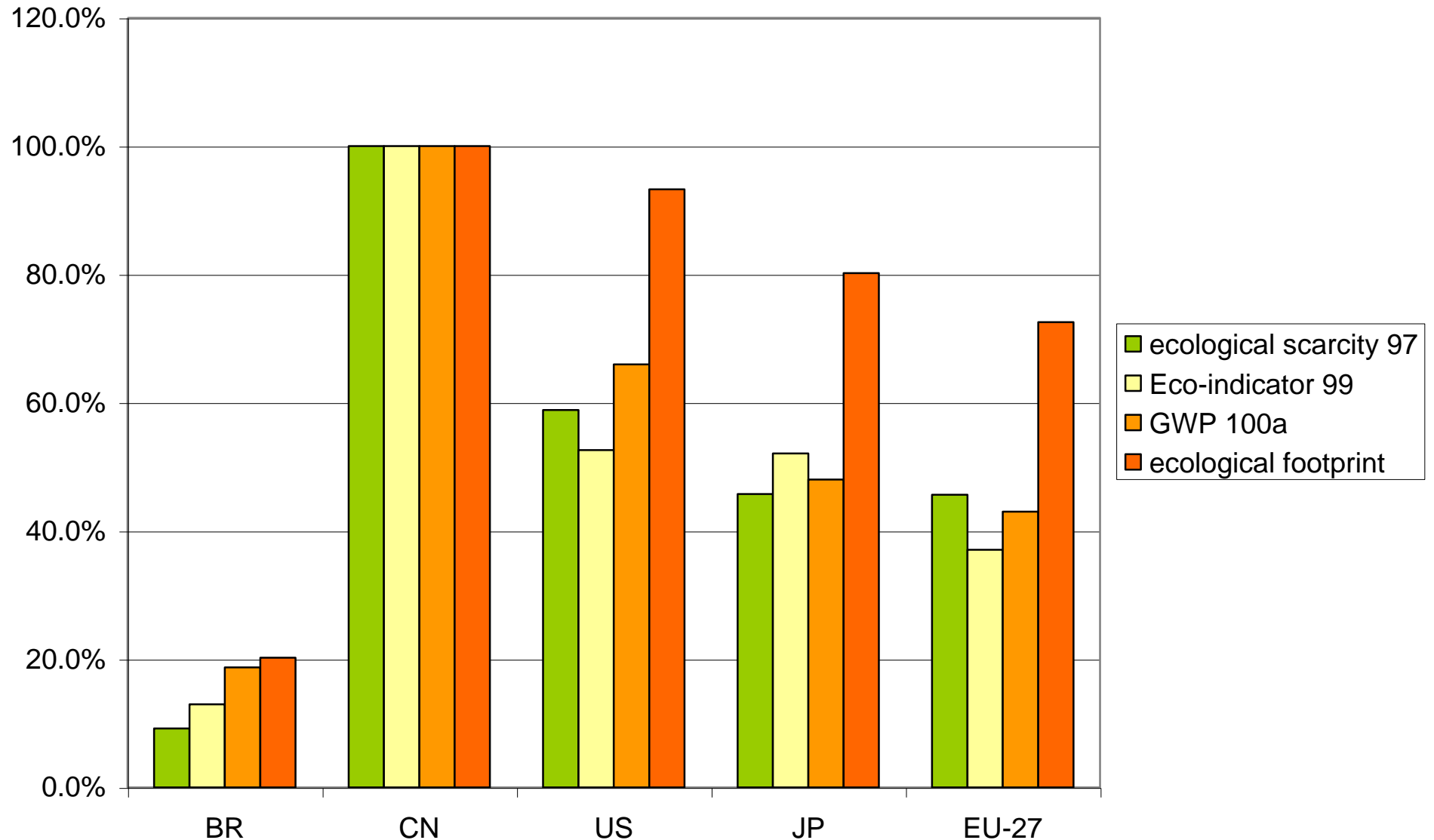


CED electricity supply mix

production mix, per kWh_{el}

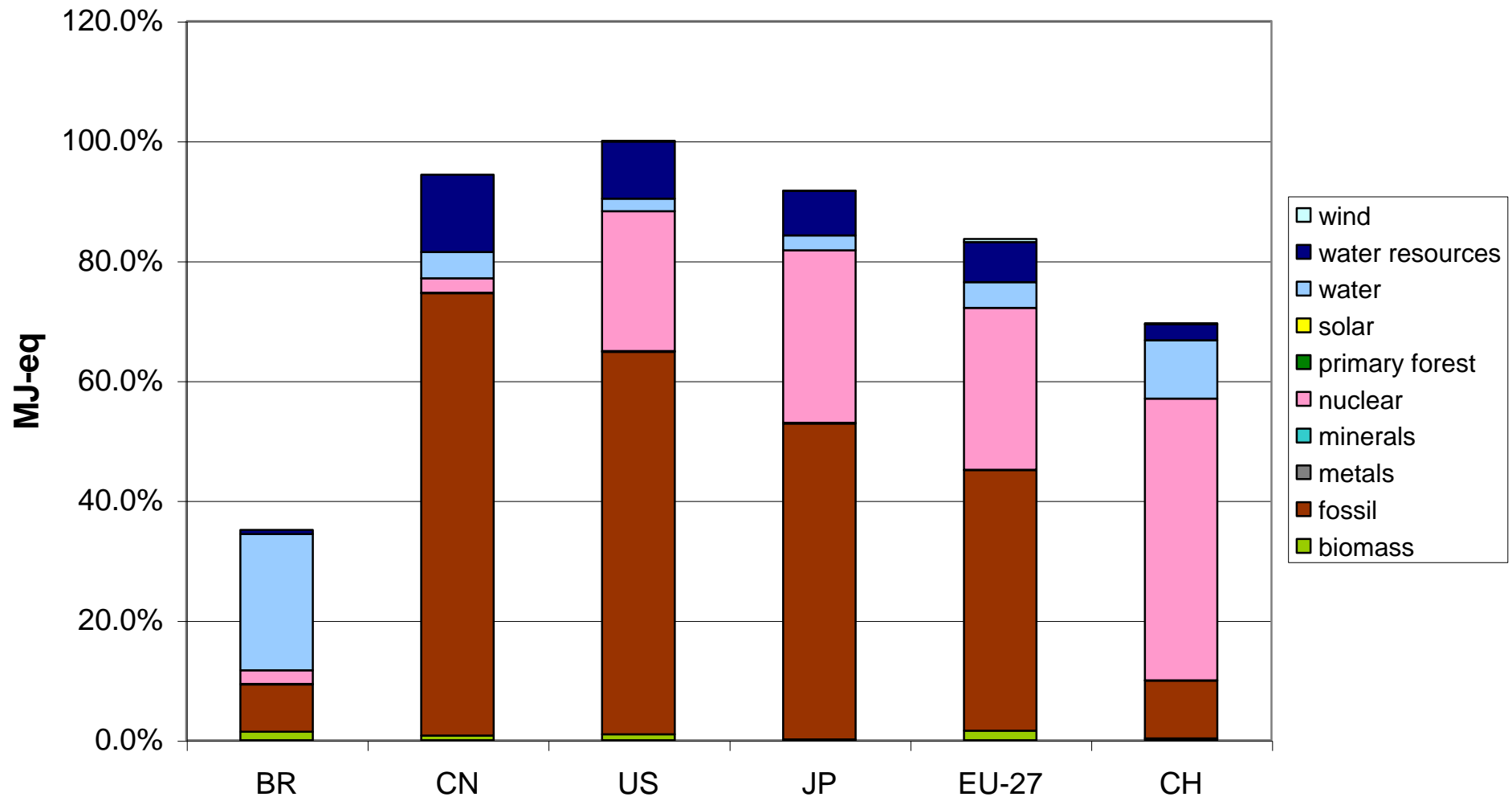


Comparison electricity supply mixes



Cumulative Exergy Demand (CExD)

production mix, per kWh_{el}



Differences LCI-results ecoinvent v2.01 vs. v1.3



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per kWh	UBP'97	EI'99 (H,A)	GWP 100
DE	-4.5%	4.2%	-2.4%
FR	0.5%	0.2%	-4.8%
PL	-18.2%	-15.6%	-1.3%
GB	-3.5%	1.2%	3.2%
UCTE	-2.9%	6.0%	9.1%
CENTREL	-16.4%	-15.3%	-4.1%

How to choose the correct dataset



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- Relevant for LCAs: Supply mix
 - > Data sets with name „electricity, medium voltage, at grid“
 - NOT „electricity, medium voltage, production SE, at grid“
- Except for countries / networks with no electricity imports:
 - > „production mix“
- If electricity demand anywhere in Europe:
 - use the NEW EU 27 electricity mix
 - „electricity, medium voltage, production RER, at grid“

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