



union for the co-ordination of transmission of electricity

# **UCTE-IPS/UPS interconnection: Conclusions of the preliminary Load-Flow Study**

**May 2003**

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# Preliminary statements

- **The distribution of flows is function of:**
  - commercial transactions
    - congestion management methods
    - capacity allocation rules
    - TRM calculations
    - reserves sharing rules
    - ...

# The conclusions of the Study give...

- **...for the studied scenarios:**
  - the distribution of power flows
  - the identification of the main transit corridors
  - the identification of the critical areas
  - an evaluation of a range for the maximum exchange capacity
  - a list of items to be studied in the feasibility study

# The scenarios

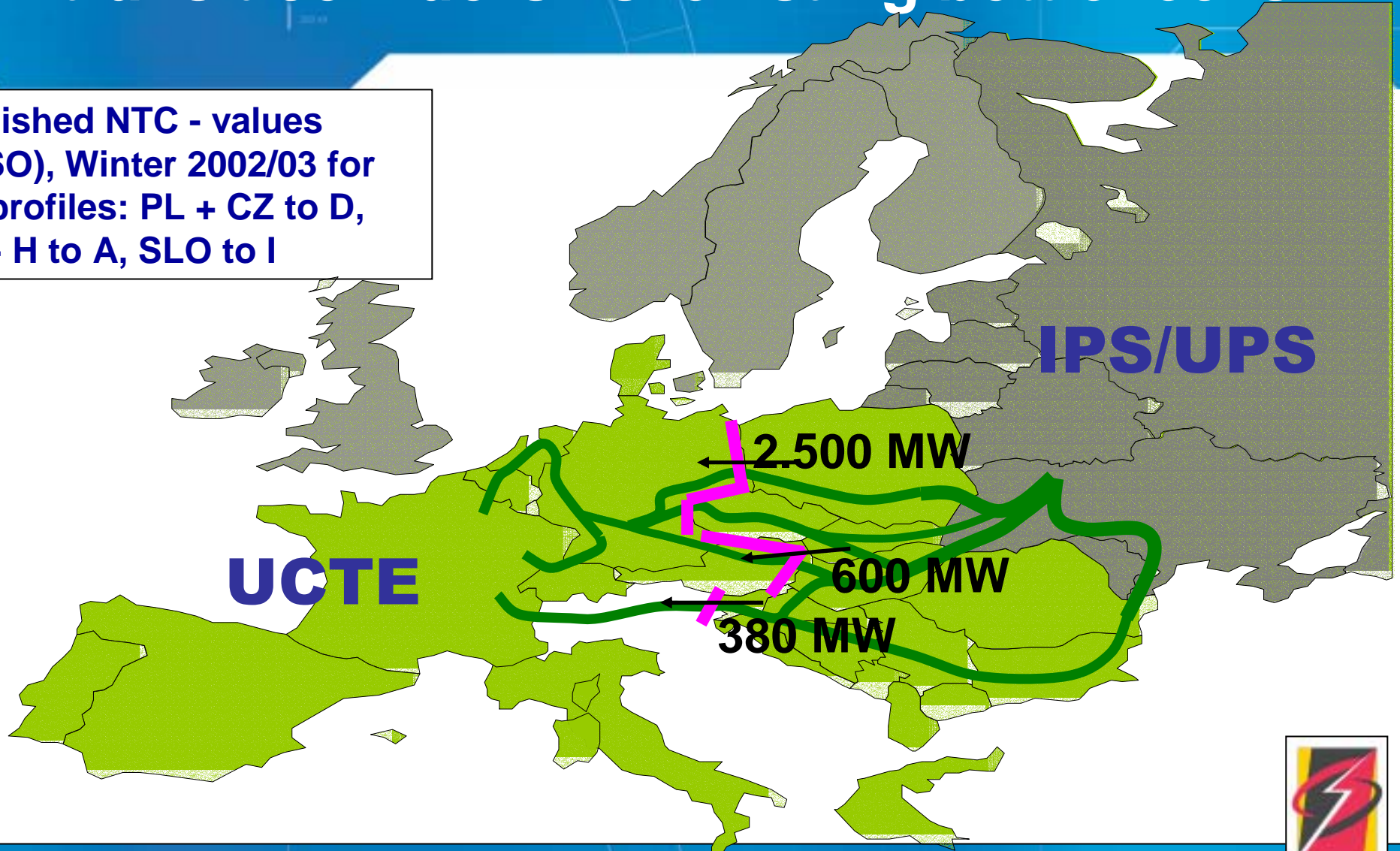
- **Base case from January 2002 with the flow of 500 MW from the 1st to the 2nd UCTE synchronous zone**
- imports from IPS/UPS with reduction of generation:
  - in all countries
  - in importing countries only
  - in exporting countries only

# The scenarios

- **Exports from UCTE with the increase of generation**
  - in all UCTE countries
  - in exporting countries only
- **Imports from IPS/UPS to second zone:**
  - shutdown of Kozloduy (2 units)
  - reduction in all 2nd zone countries
- **Primary frequency control effects**

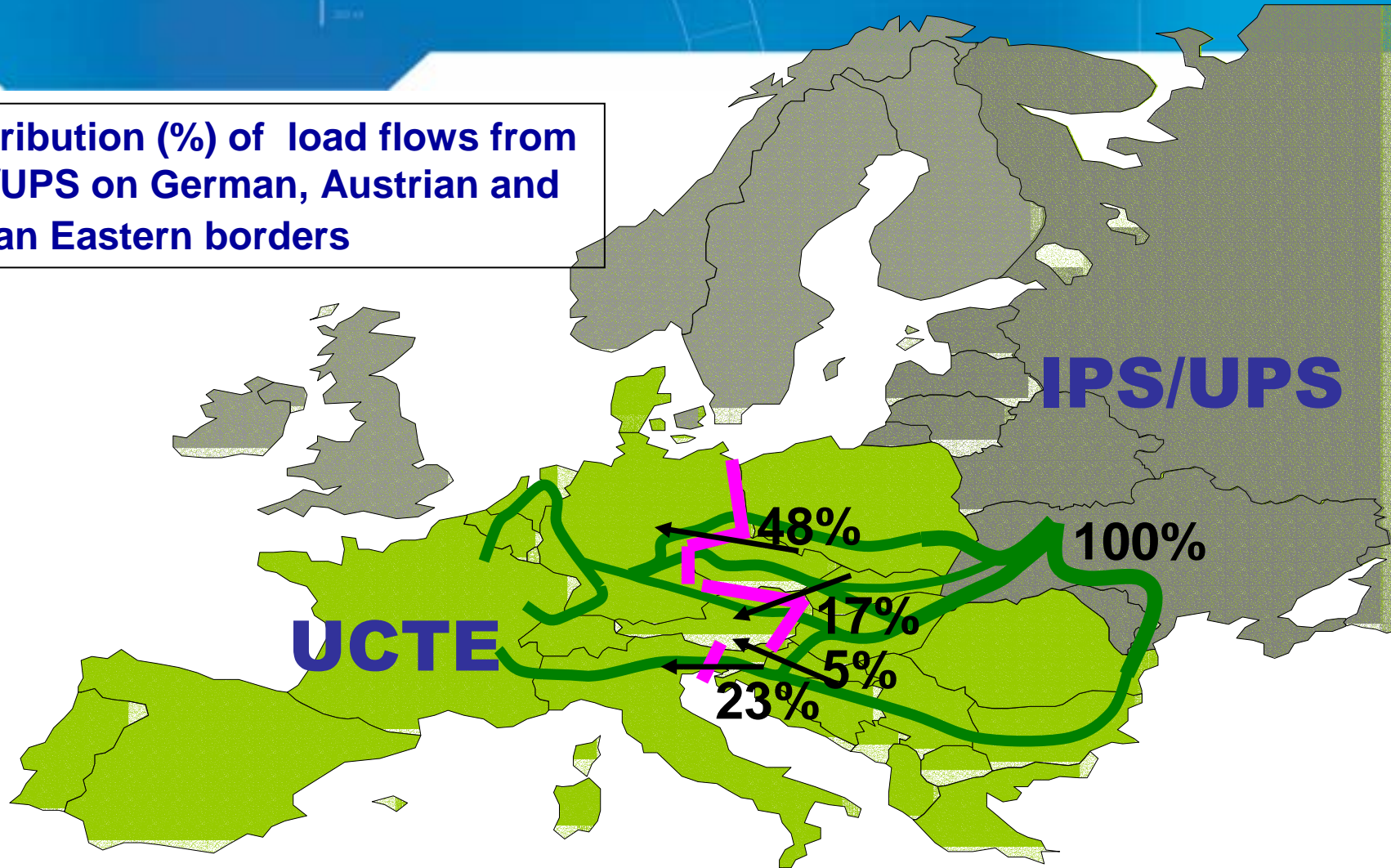
# Main transit corridors vs. existing bottlenecks

Published NTC - values  
(ETSO), Winter 2002/03 for  
the profiles: PL + CZ to D,  
CZ + H to A, SLO to I



# Sharing of the load flow through existing bottlenecks

Distribution (%) of load flows from IPS/UPS on German, Austrian and Italian Eastern borders



# Conclusions from the existing bottlenecks

Transits from IPS/UPS must pass congested lines!

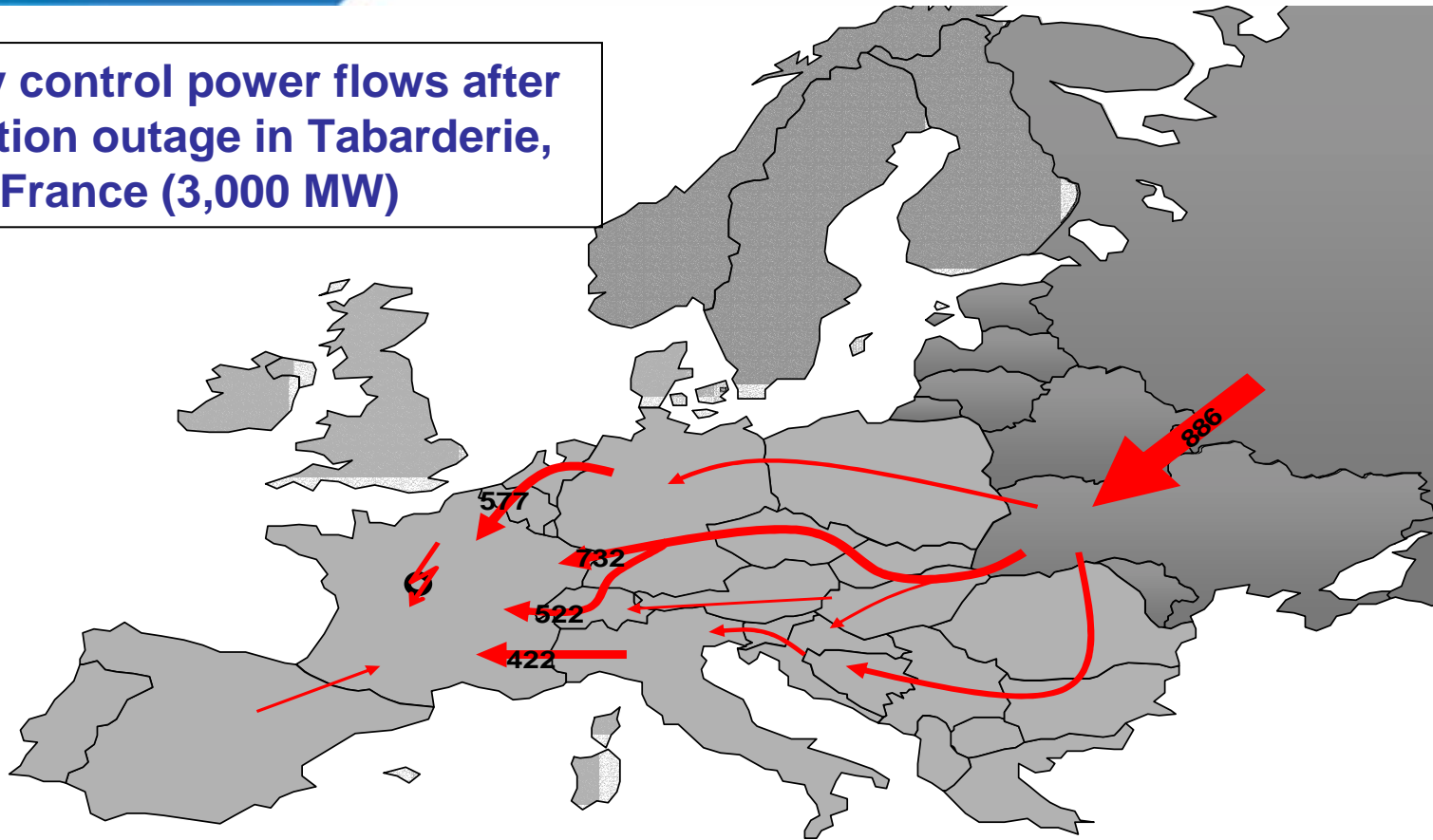
<u>Congested lines</u>		<u>Present</u>	<u>additional</u>	
		<u>NTC value</u>	<u>transit</u>	
Czech Rep. + Poland	⇒	Germany	2,500 MW	+ 48 %
Czech Rep. + Hungary	⇒	Austria	600 MW	+ 17 %
Slovenia	⇒	Italy	380 MW	+ 23 %

- There are no significant changes of NTC-values in the future.
- The bottlenecks on the „congestion line“ are working at full capacity.
- The East - West transits cannot be increased significantly in future.
- Therefore, import from IPS/UPS would replace mainly generation in the eastern part of UCTE.

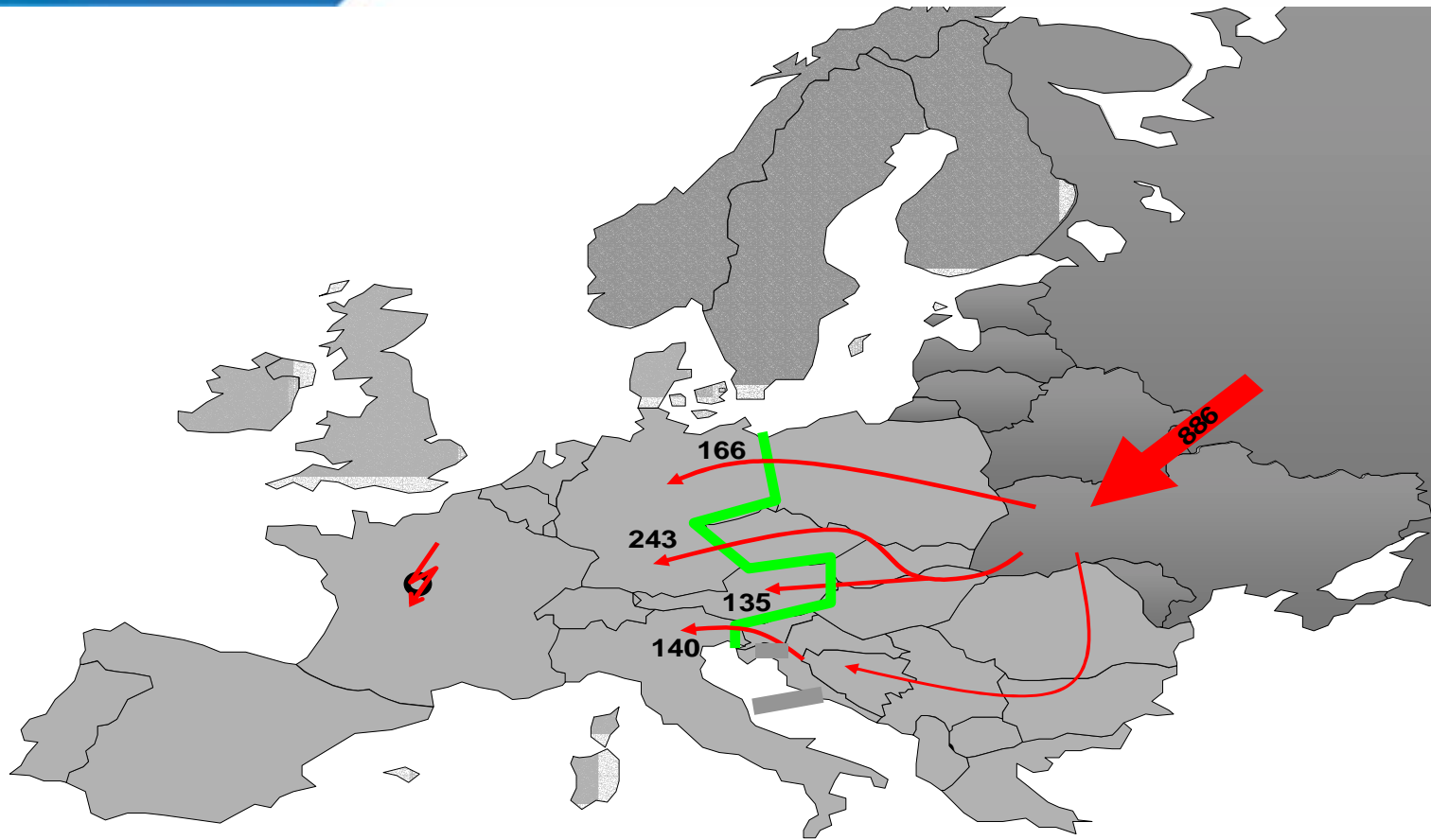


# Primary control power flow with IPS/UPS

Primary control power flows after generation outage in Tabarderie, France (3,000 MW)



# Additional primary frequency-control power flows (MW) with the IPS/UPS system synchronised



# Conclusions based on primary control power flows

Primary control from IPS/UPS must pass congested lines.

		<u>additional LF with IPS/UPS</u>	<i>present TRM-value</i>
Czech Rep. + Poland	⇒ Germany	410 MW	280 MW
Czech Rep. + Hungary	⇒ Austria	140 MW	240 MW
Slovenia	⇒ Italy	140 MW	170 MW

- Transmission capacity of around 700 MW must be provided for regulating purpose.
- TRM (Transmission Reliability Margin) has to be adapted.
- The available capacities for transits would be lower to increased TRM.

# Executive Summary

- The central European grids are already operating near the limits.
- These limits on the congested borders cannot be exceeded.
- Therefore, the East - West transits cannot be increased significantly in future.
- The import from IPS/UPS will replace mainly generation in the eastern part of UCTE. Nevertheless, the possible power transit has to be limited considerably below the physical capacity of the interconnection lines between the two systems.
- The synchronous interconnection requires additional transmission capacity in special areas to guarantee security of the system. This would result in lower NTC-values and additional investments over future years.
- The synchronous operation with IPS/UPS would decrease the transmission capacities presently available to the IEM.