

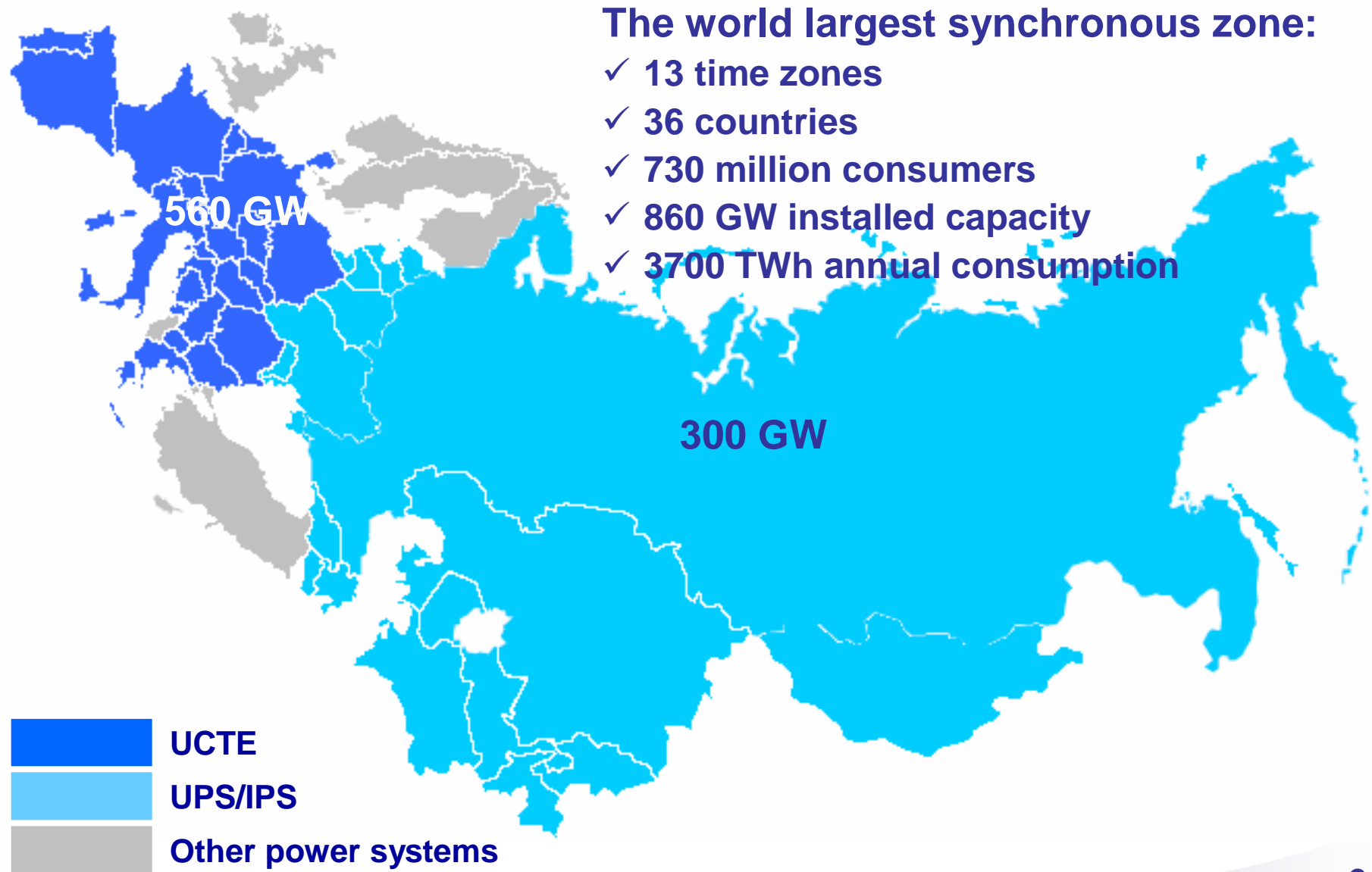


Synchronous Interconnection of IPS/UPS with UCTE - Study Overview

Sergey Kouzmin
Project Manager IPS/UPS, RAO "UES of Russia"

Black Sea Energy Conference
Bucharest, Romania, April 3-5, 2006



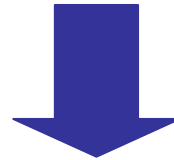


The world largest synchronous zone:

- ✓ 13 time zones
- ✓ 36 countries
- ✓ 730 million consumers
- ✓ 860 GW installed capacity
- ✓ 3700 TWh annual consumption

Driving Forces

- Political and economical integration in Europe
- Need to diversify energy supply
- Powerful grid infrastructure ready
- Efficient power system control




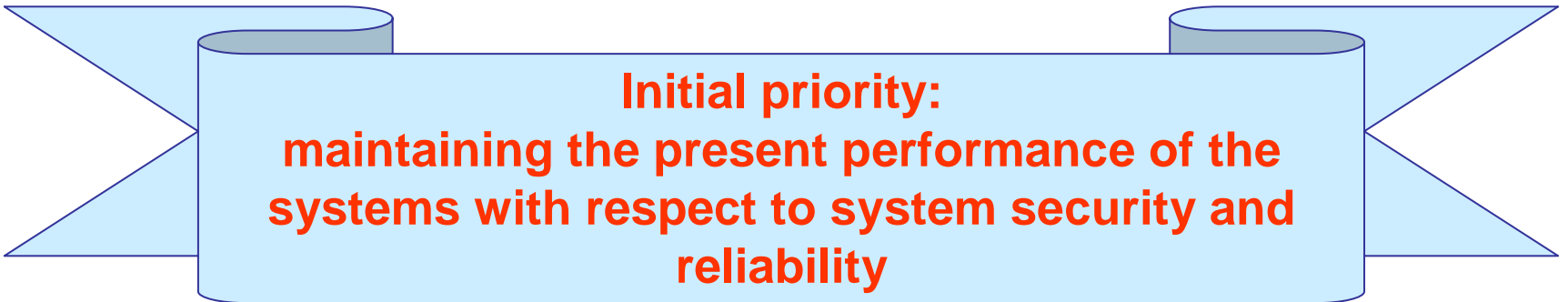
Expected Results

- Creation of a technological infrastructure for a common power trading market place
- Mutual assistance in case of emergency and higher reliability of power supply
- Optimal use of generation capacity and primary resources

Objectives of the Study

Considering technical, operational, organizational and legal issues the study will answer the following questions:

- 
1. **Is a full synchronous interconnection of IPS/UPS with UCTE feasible?**
 2. **What are the mandatory measures and requirements on both sides?**
 3. **What are the associated costs?**



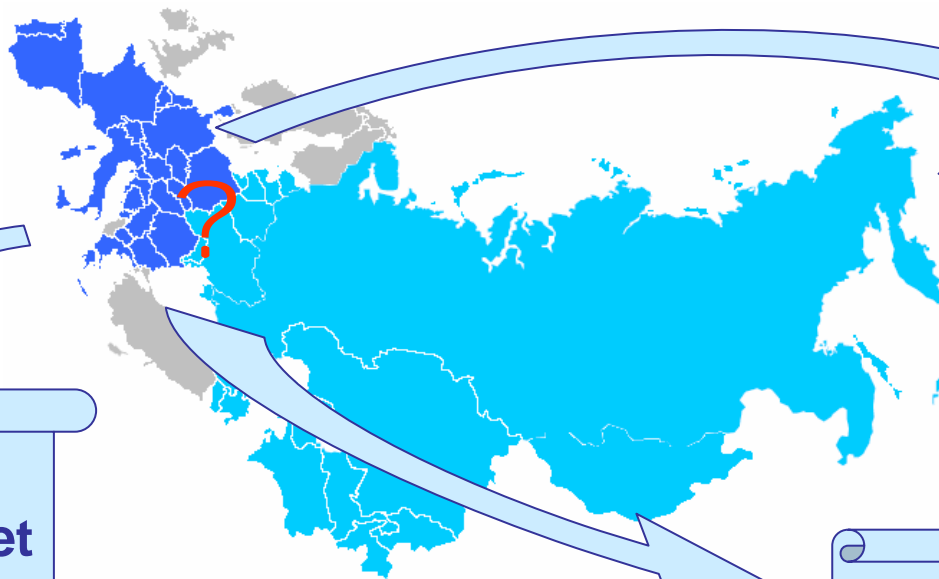
**Initial priority:
maintaining the present performance of the
systems with respect to system security and
reliability**

Additionally, market aspects and environmental issues are building the conditional framework

Major Challenge:

Connection of two huge synchronous systems with different:

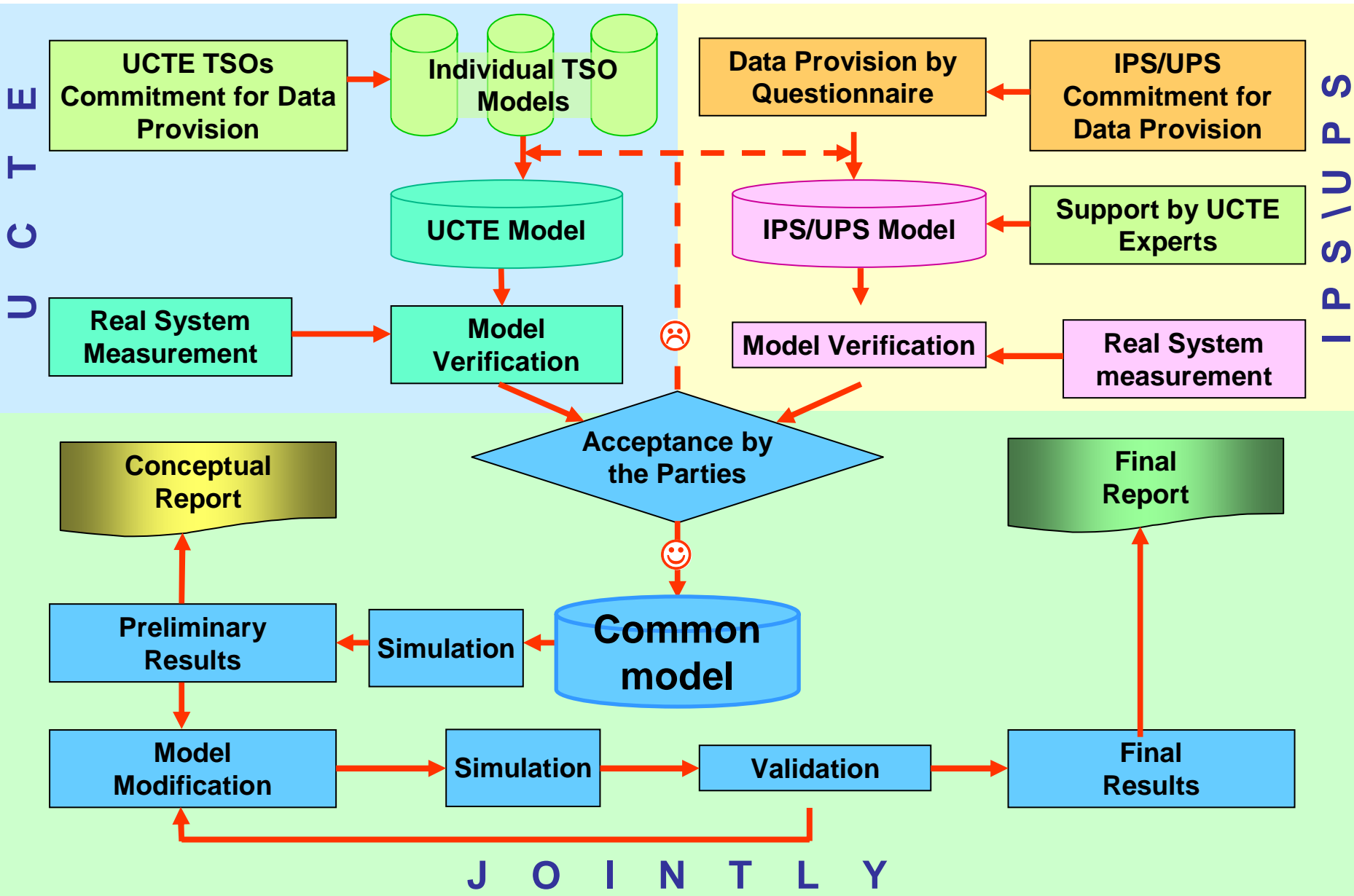
- ✓ **geographical extensions**
- ✓ **generation and network structures**
- ✓ **norms and standards**
- ✓ **rules and operation philosophies**



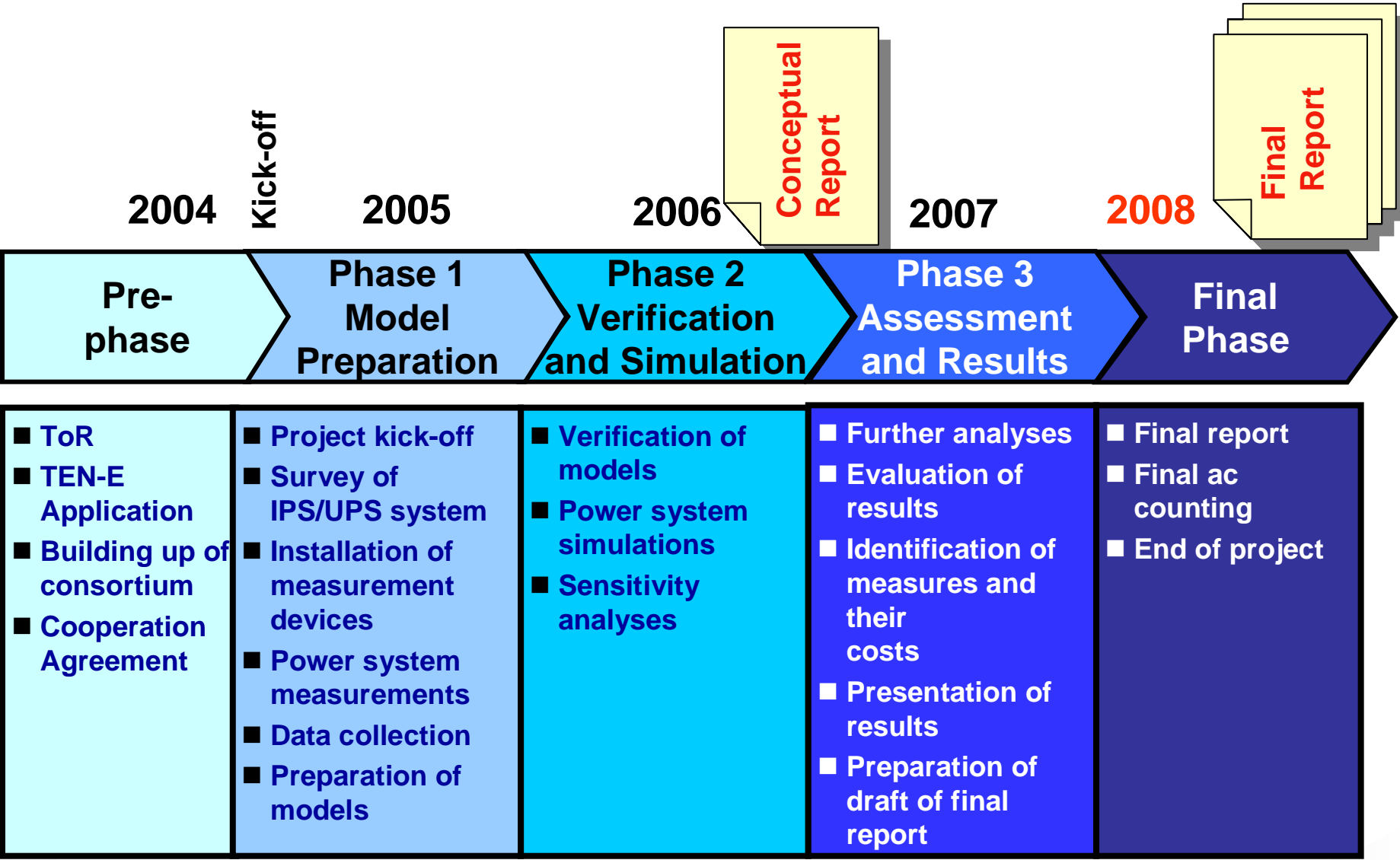
**Minimum
mandatory set
of technical
requirements**

**Legal
agreements**

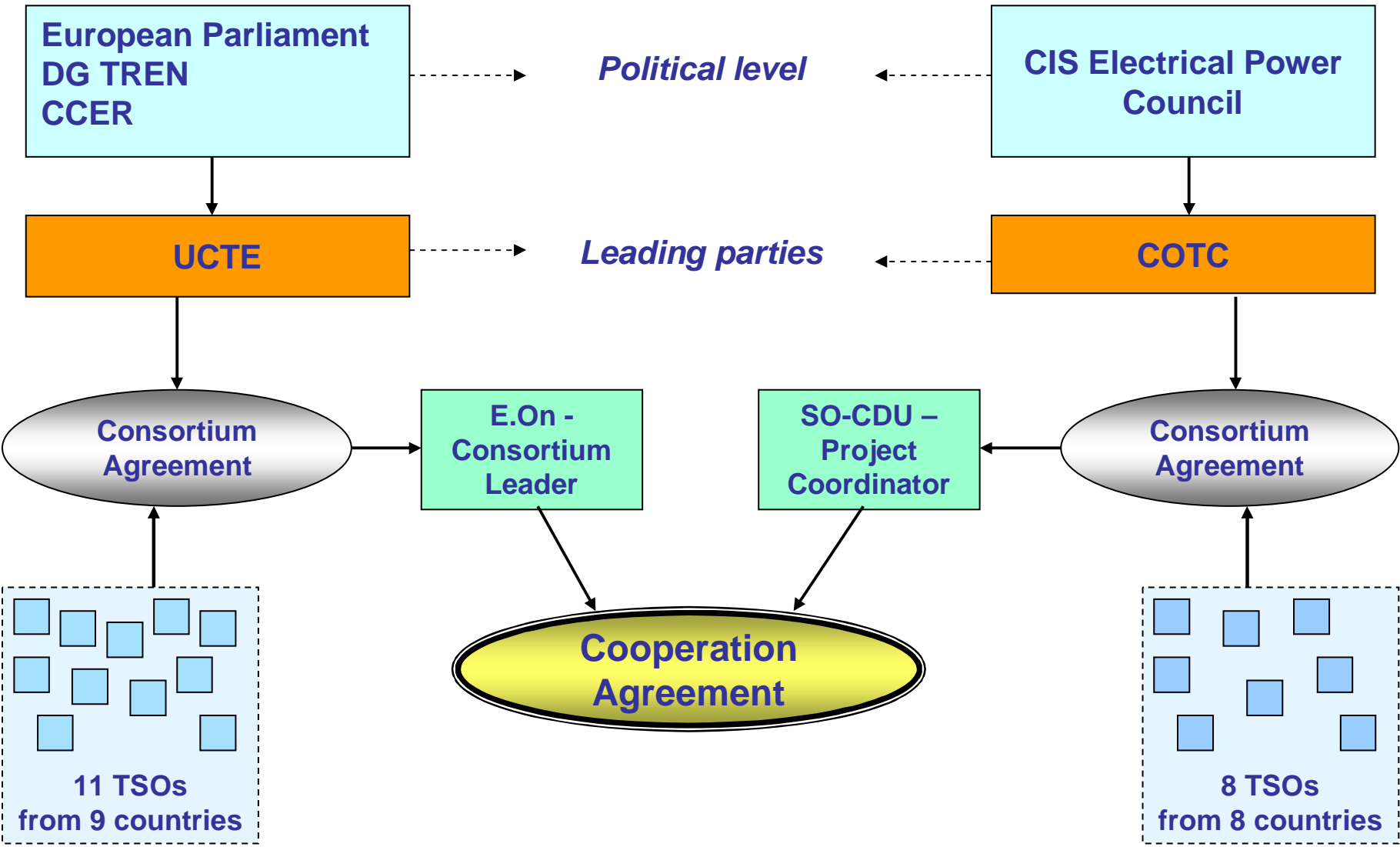
**Organizational
structures and
procedures**



Global Time Schedule



Project Structure



elia

e-on Netz

MAVIR

Nationalna Elektricheska Kompania EAD

PSE SA

RED ELÉCTRICA DE ESPAÑA

RTE
Gestionnaire du Réseau de Transport d'Électricité

RWE

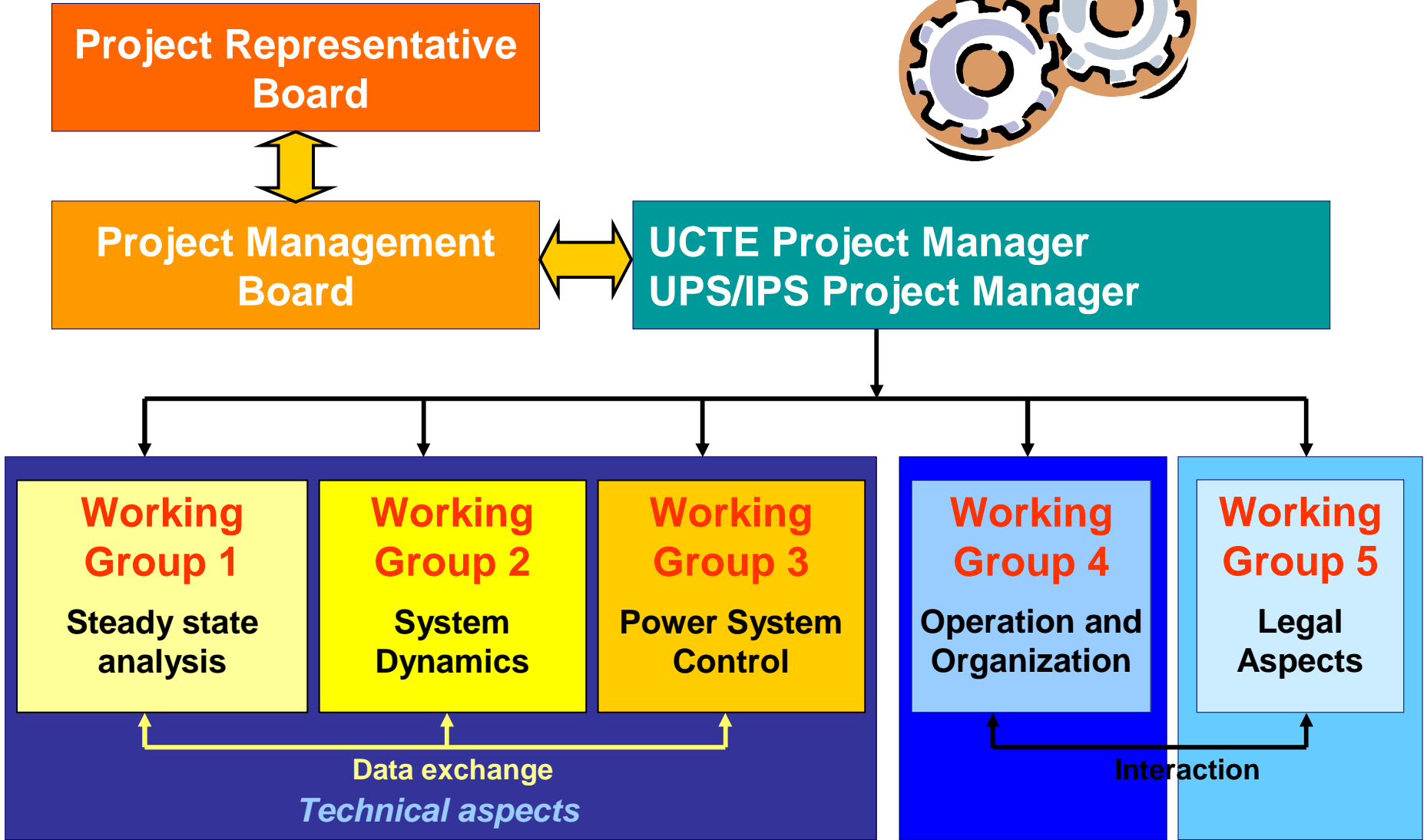
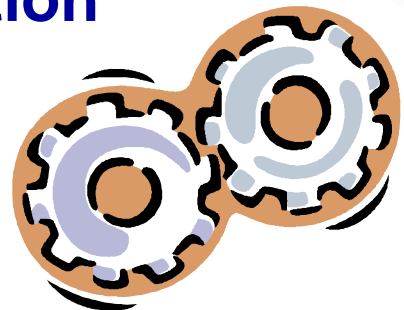
SEP

COMPAÑIA NACIONAL DE TRANSPORT AL ENERGIJA ELECTRICA
TRANSELECTRICA SA
SUCURSALA DE TRANSPORT SIBU
de Compania Centrala de Transport Electrice SIBU, Romania
tel: (+40) 259-527700 fax: (+40) 259-527701 e-mail: sib@sepsib.ro

VATTENFALL



Project Organization



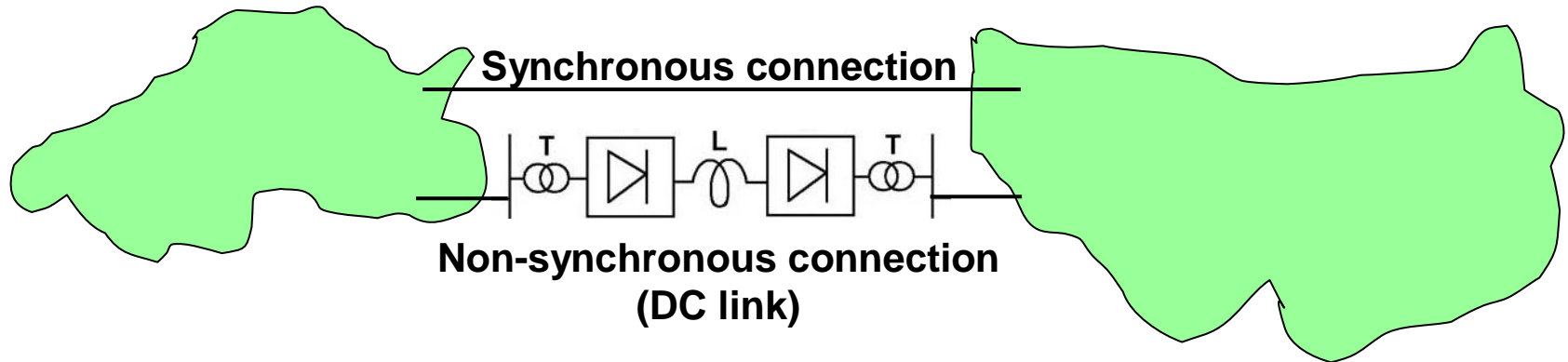
More than 80 experts from 17 countries

- All WGs started activity
- IPS/UPS System Survey report ready
- Data acquisition completed
- Steady state load flow individual models ready
- Dynamic models under development
- WAMS in IPS/UPS
- WG meetings and workshops, 2 PMB meetings
- 1st PRB meeting 16.11.2005 in Brussels
- Consideration of non-synchronous links



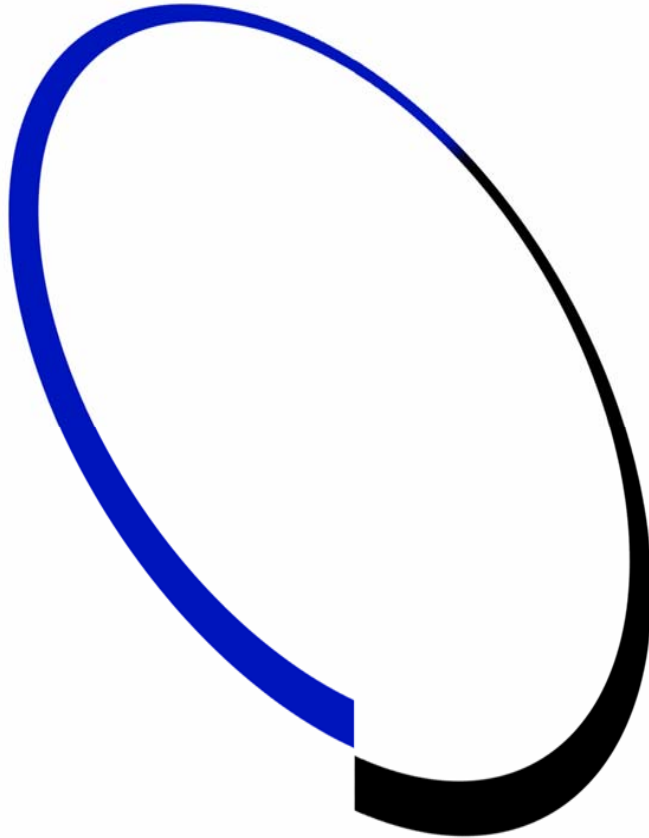
Conclusion after recent large-scale system blackouts in the US, Europe and Russia:

Reliability is a factor of top importance for integrating systems



- Proven and reliable technology
- Operate well within synchronously operated power systems: Sweden – Finland, Russia – Ukraine, Italy – Greece, Japan, USA, China
- Minimal influence of connected power systems on each other – easy to implement
- Will be considered in the study

www.ucte-ipsups.org



UCTE
IPSUPS
study