

# The Strategic Role and Challenge of EHV Power Grid in the New Context of the European Energy Policy

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# WHAT IS CIGRE ?

## *How CIGRE works*

- ***Conferences***
  - \*Session, every other year***
  - \*Symposium: 2 in between***
  - \*Other meetings – National, Regional, Colloquium...***
- ***Study Committees and WGs***
  - \* Permanent structures***
  - \*Scopes cover all the issues concerning Power***
- ***Dissemination***
  - \*Publication, Tutorials...***
  - \*Technical library: e-cigre***

# CIGRE OBJECT

- *Produce engineering knowledge*
- *Facilitate exchange of information*
- *Deliver high quality publications*
- *Its domain: Power Electric Systems*
  - \*Starting on electric side of generation; excluding usages*
  - \*Covering all issues: technical, environmental, markets...*

## *Why CIGRE is different ?*

- *More technical than scientific*
- *Collective work and added value through permanent structures – SCs & WGs*
- *All profiles of the ESI : unbiased information*
- *Really worldwide -> 80 countries*
- *Not produce standards*

## *How CIGRE works*

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# SC organisation

**A1**  
ROTATING  
ELECTRICAL MACHINES

**A2**  
TRANSFORMERS

**A3**  
HIGH VOLTAGE  
EQUIPMENT

**B1**  
INSULATED  
CABLES

**B2**  
OVERHEAD  
LINES

**B**  
SUBSTATIONS

**B4**  
HVDC & POWER  
ELECTRONICS

**B5**  
PROTECTION &  
AUTOMATION

**C1**  
SYSTEM DEVELOPMENT  
& ECONOMICS

**C2**  
SYSTEM OPERATION  
& CONTROL

**C3**  
SYSTEM ENVIRONMENTAL  
PERFORMANCE

**C4**  
SYSTEM TECHNICAL  
PERFORMANCE

**C5**  
ELECTRICITY MARKETS  
& REGULATION

**C6**  
DISTRIBUTION SYSTEMS  
& DISPERSED GENERATION

**D1**  
MATERIALS & EMERGING  
TEST TECHNIQUES

**D2**  
INFORMATION SYSTEMS  
& TELECOMMUNICATIONS

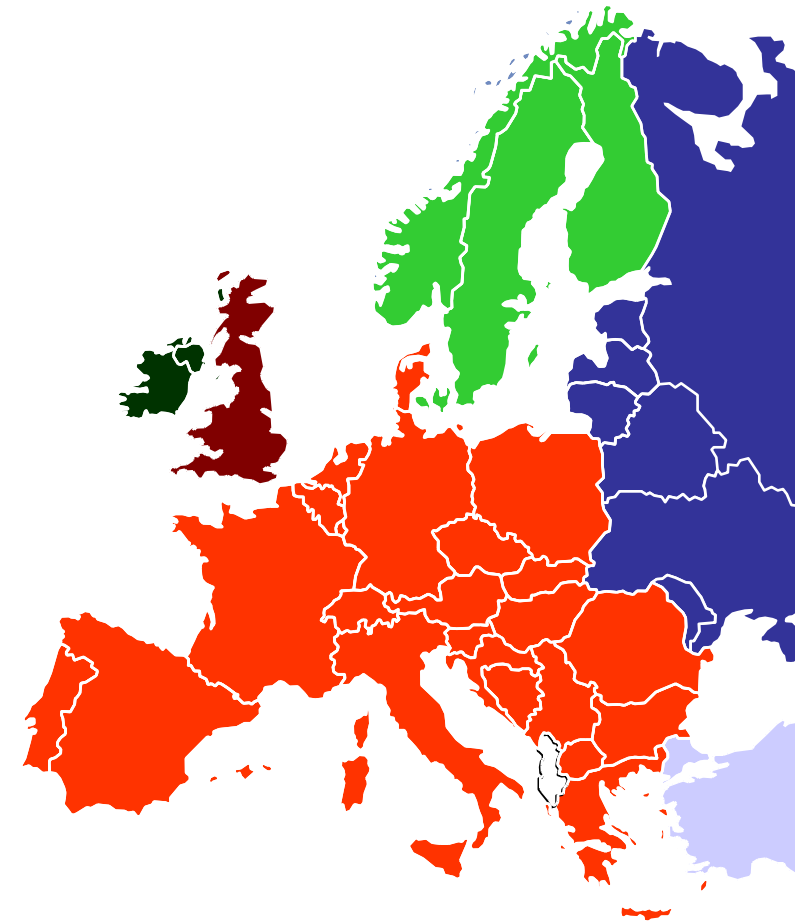


**Electricity will play a more and more important role in order to achieve the three main goals of the EU Energy Policy :**

- **Reduction of the CO2 emissions**
- **Increase of security of supply**
- **More competitiveness of EU economy**

- **In the demand side, it allows a high energy efficiency**
- **In the supply side it allows a strong development of low carbon energy sources (wind, hydro, geothermal, nuclear)**

# Europe of electricity



**29 interconnected countries (22 EU Member states)**

**Four synchronous blocks:**

**Nordic countries, United Kingdom, Ireland and Continental Europe.**

**Installed Capacity: more than 650 GW,**

**Annual electricity demand: around 3000 TWh**

**Physical flows exchange between countries:**

**around 300 TWh**

## EU 27 GROSS ELECTRICITY GENERATION 2005 (TWh)

54,6%	}	COAL	940	28,4 %
		OIL	139	4,2%
		GAS	694	21,0%
		OTHERS	40	1,2%
45,4%	}	NUCLEAR	998	30,2%
		HYDRO	341	10,4%
		RENEWABLES	157	4,8%
Total			3309	

## EU 27 GROSS ELECTRICITY GENERATION IN 2020

- 2/3d OF THE GENERATION FROM LOW CARBON SOURCES
- 1/3d FROM NUCLEAR
- 1/3d FROM RENEWABLES  
WIND ENERGY COULD SHARE 13% ( 1,9% in 2005 )

**13% of electricity mix in 2020  
will represent more than 500 TWh out  
of a total of 4 000 TWh**

- **To generate such an output, between 200 and 250 GW of wind capacity should be connected to the European grid out of a total of 1 000 GW installed capacity.**



## IN 2050

- **WHEN CARBON CAPTURE AND SEQUESTRATION WILL BE AVAILABLE, IT IS POSSIBLE TO IMAGINE AN ALMOST CO<sub>2</sub> FREE EU POWER SYSTEM**

- **SUCH A DRASTIC CHANGE IN POWER SYSTEMS WILL NEED A STRONG EVOLUTION OF POWER GRIDS**

## Why such a need ?

- **To allow integration of large quantity of intermittent renewable energy (wind and later on solar)**
- **To increase the security of supply for mutual back-up of neighbouring member state power grids and regional neighbouring systems**
- **To achieve a better integration of the EU electricity market**

## What does it mean for the EU high voltage grid ?

- **A strong increase of the interconnections within the EU grid**
- **An extension of the interconnections beyond the present EU grid limit (around the Mediterranean sea, with the Russian IPS UPS system)**
- **A better efficiency of the operation of the EU grid**

## Some available technologies to meet these challenges

- Hybrid high voltage grids (AC+DC)
- Underground and submarine EHV synthetic cables (AC+DC)
- AC gas insulated link
- More intelligence in the grid (from a European control centre to the end users)

## **4 priority development plans for the EU electricity grid \***

- **A Baltic interconnection plan**
- **A Mediterranean power ring plan**
- **A North South power interconnection plan  
within Central and South East Europe**
- **A North sea offshore grid plan**

**\*Second strategic energy review of the European Commission  
( October 2008)**

