



HEC Focus on Europe

Europe, Energy, Electricity... Challenges Ahead!

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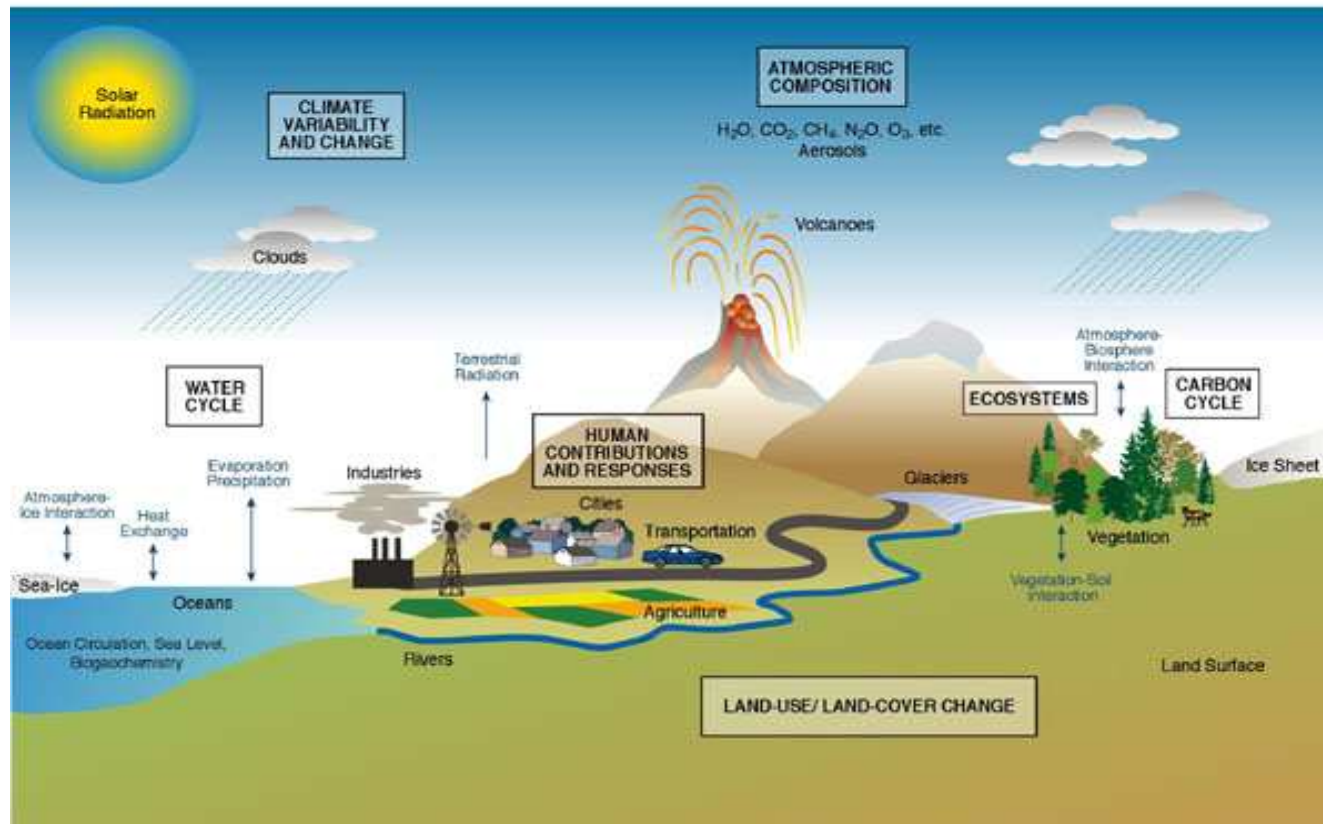
Head of Generation and Energy Policy Unit - EURELECTRIC

HEC Focus on Europe, Paris February 3rd 2011





Climate change...





Climate Change...US...





Energy Security

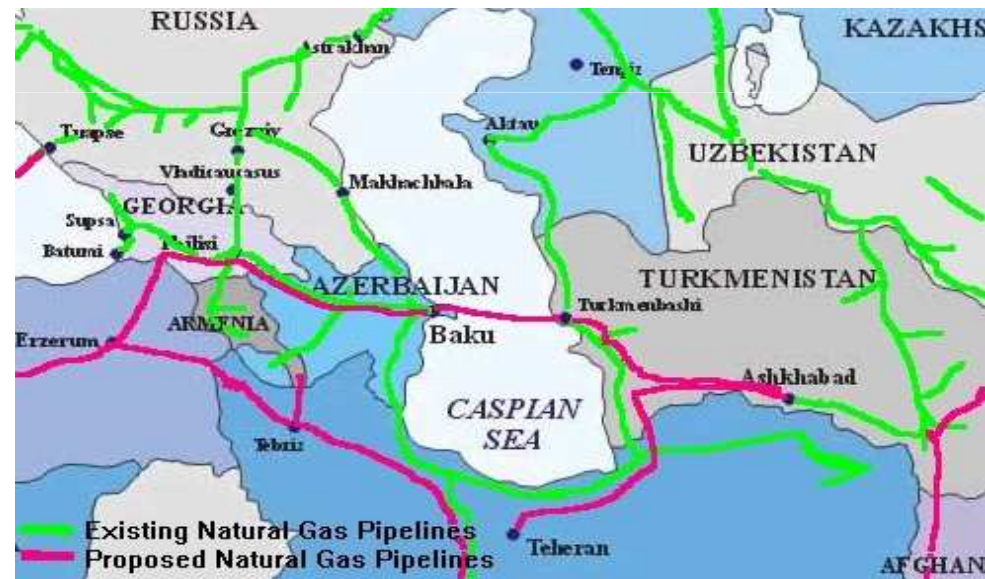






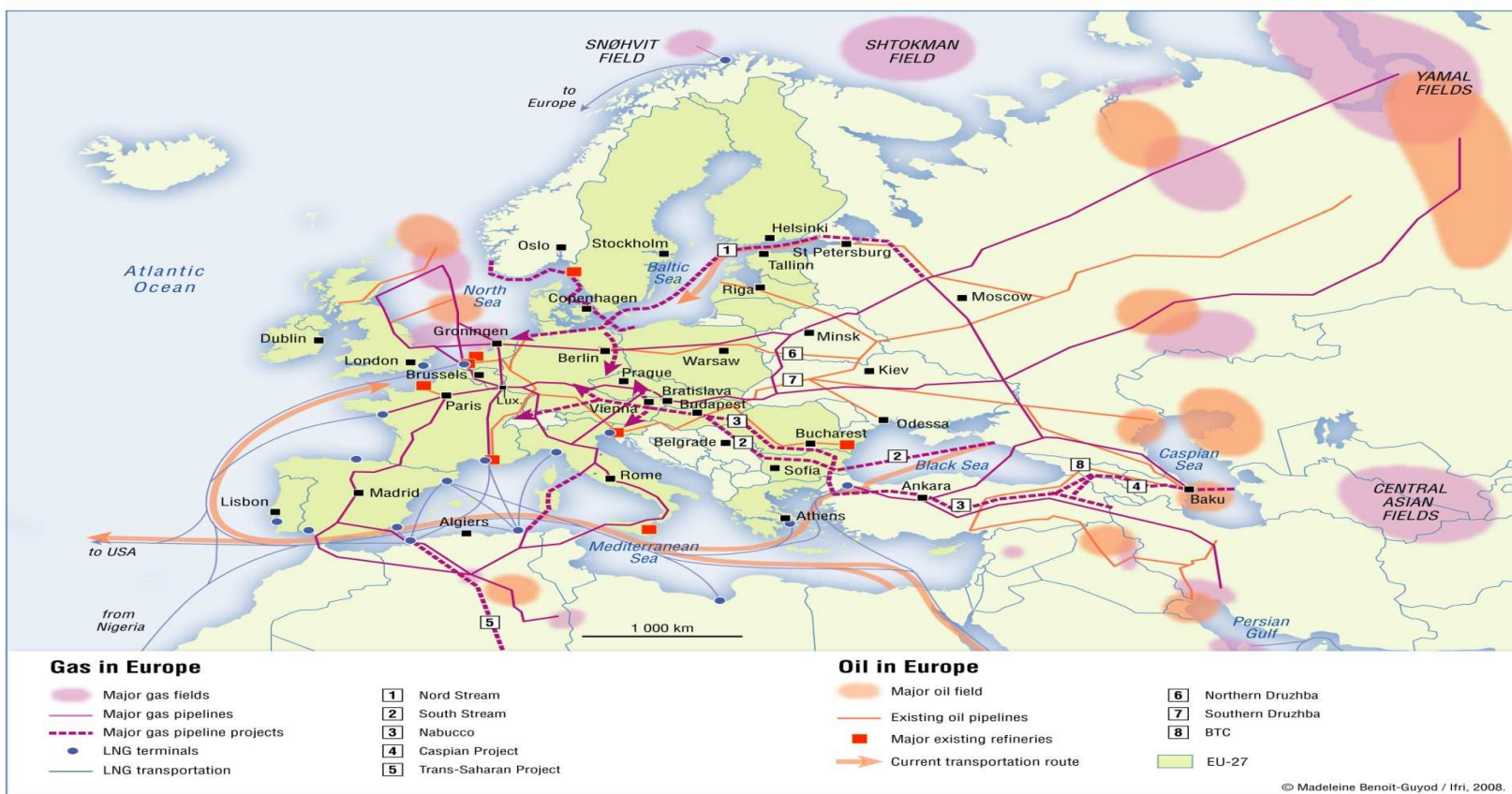


Energy Security Europe...





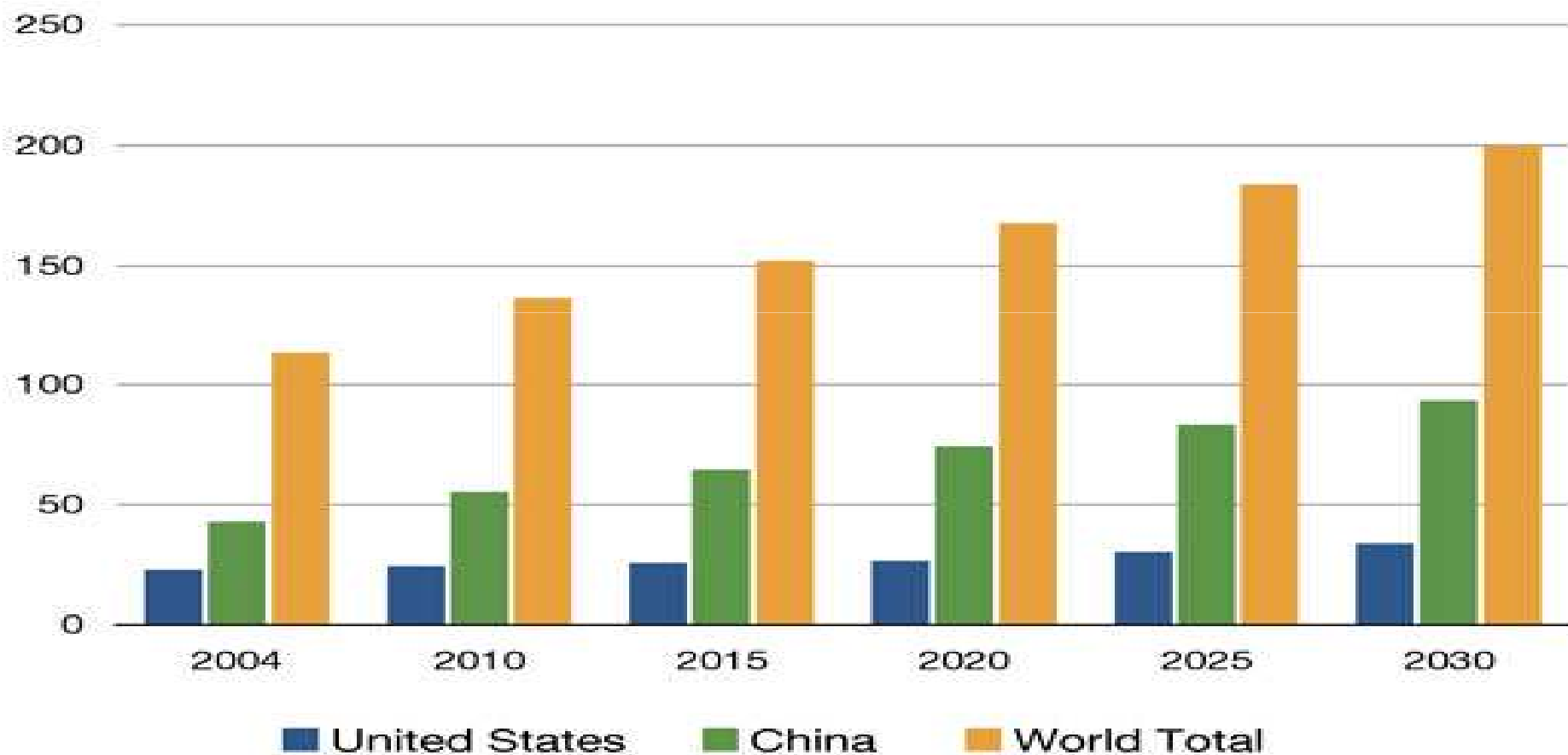
Oil and Gas Europe...





Infrastructure...and old grids and blackouts...







Electricity Overview

- **What is electricity?**
- **Producing electricity**
- **Stocking electricity**
- **Transporting electricity**
- **Functioning of electricity markets**

What is electricity?

- **Vague notion: stems from elektron, greek, meaning amber;**
- **Series of physical phenomena resulting from the presence and flow of electrical charge**
- **Thus electricity is not a primary energy, but a derived energy**
- **Studies of the phenomenon since antiquity, but progress on the issue only since 17th/18th century**



Electricity and modern industrial society

- **Became the backbone!**
- **Benjamin Franklin, extensive research**
- **19th century: electrical engineering: Tesla, Edison, Westinghouse, see « War of Currents »: in late 1880s with George Westinghouse and Thomas Edison opposing each other on direct current (DC) or alternating current (AC) advocated by Westinghouse/ Tesla.**



Electricity generation

- **Coal plants**
- **Gas plants**
- **Nuclear power plants**
- **Renewables**

Storage and DSM

- **Big challenge**
 - **Hydro- and pumpstorage**
 - **Electric cars batteries**
 - **DSM: Internet 3.0, from Supply to Demand side management?**
- =towards a new flexibility**



Questions related to electricity

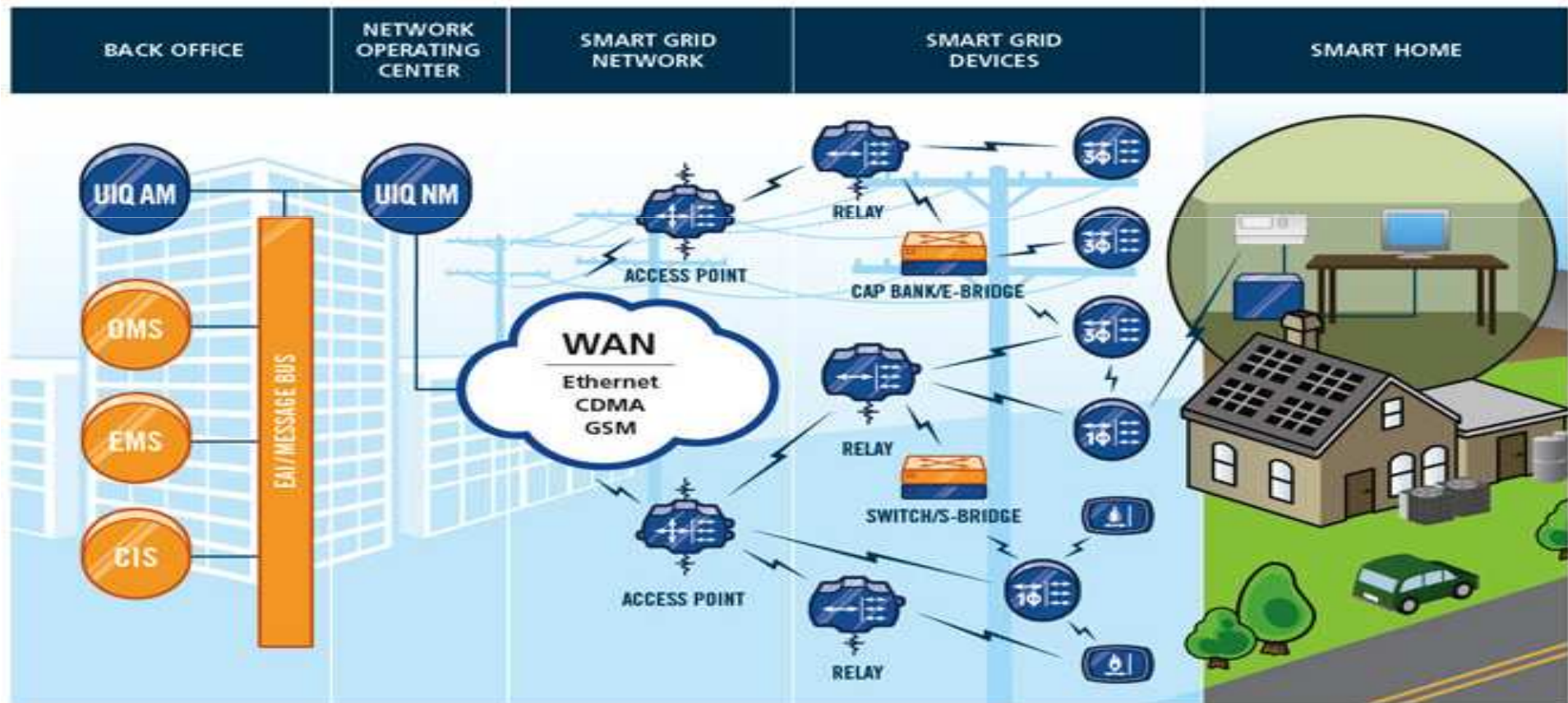
- Which generation for this epoch?
- CCS, climate change?
- Wind energy
- How to adapt grids to today's new ways of generation electricity?
- Development and electricity
- Energy efficiency: smart grids: what are smart grids?

Smart Grids

- **Delivers electricity from suppliers to consumers using digital technology to save energy and cost**
- **= modernized electricity network**
- **« transparent » citizen?**
- **Metering: to exactly explore use when and by whom**
- **Efficient electricity use: using all the existing capacities without producing new; especially night; peak and non-peak moments...**
- **Problem with smart grids: system security; also protection from terrorist attacks. Problem: institutional risk aversion**
- **Today's alternating grid stems from 1896, Tesla (design by Tesla, 1888)**
- **In many senses no important technological change since 19th century, despite technological revolution of 1990s**



Smart Grids and ICT (Information and Communication Technologies)



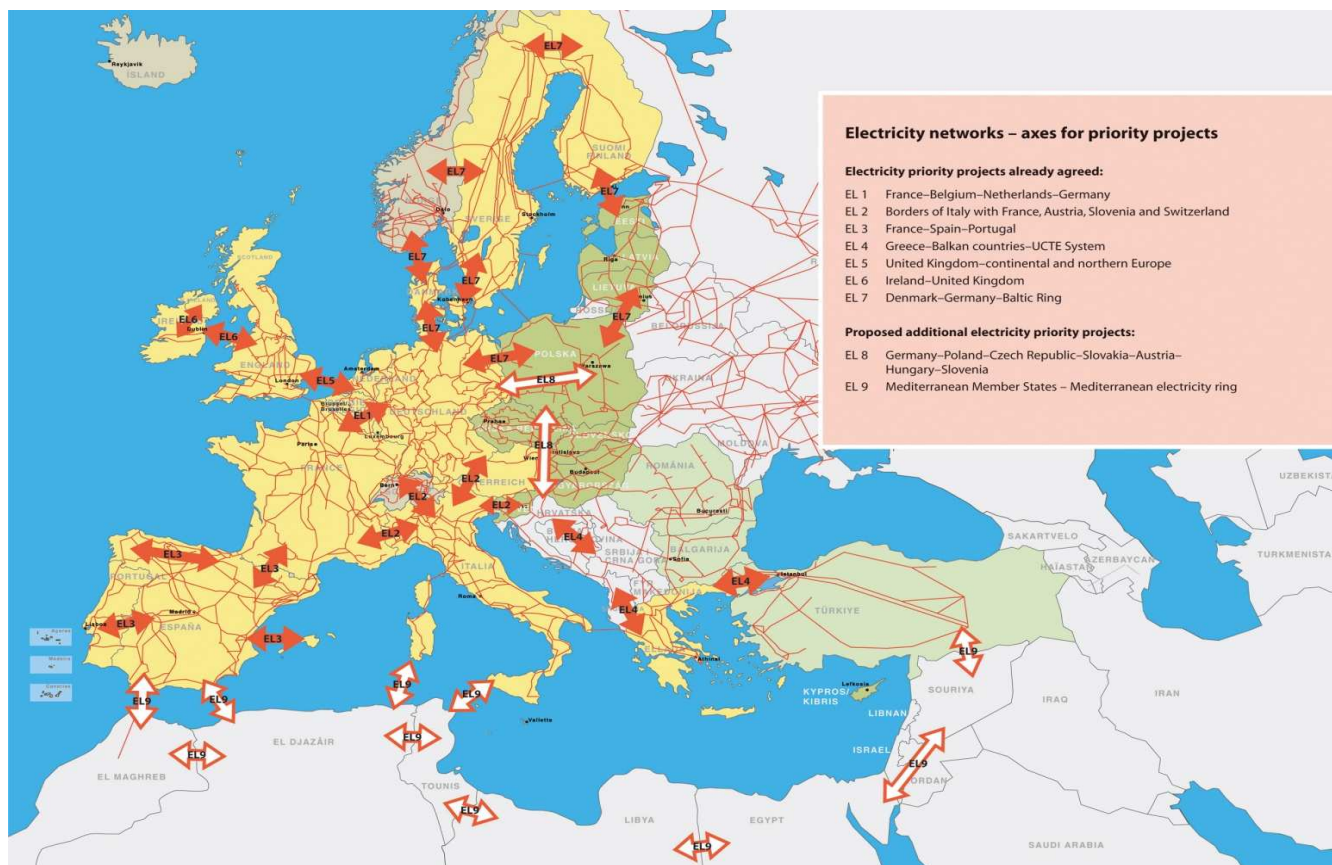


Governance of electricity

- **Which policies?**
- **Pricing: unbundling and competition**
- **Opacity of pricing in Europe**
- **Nuclear energy debate: yes or no?**
- **ACER or the common EU regulator**

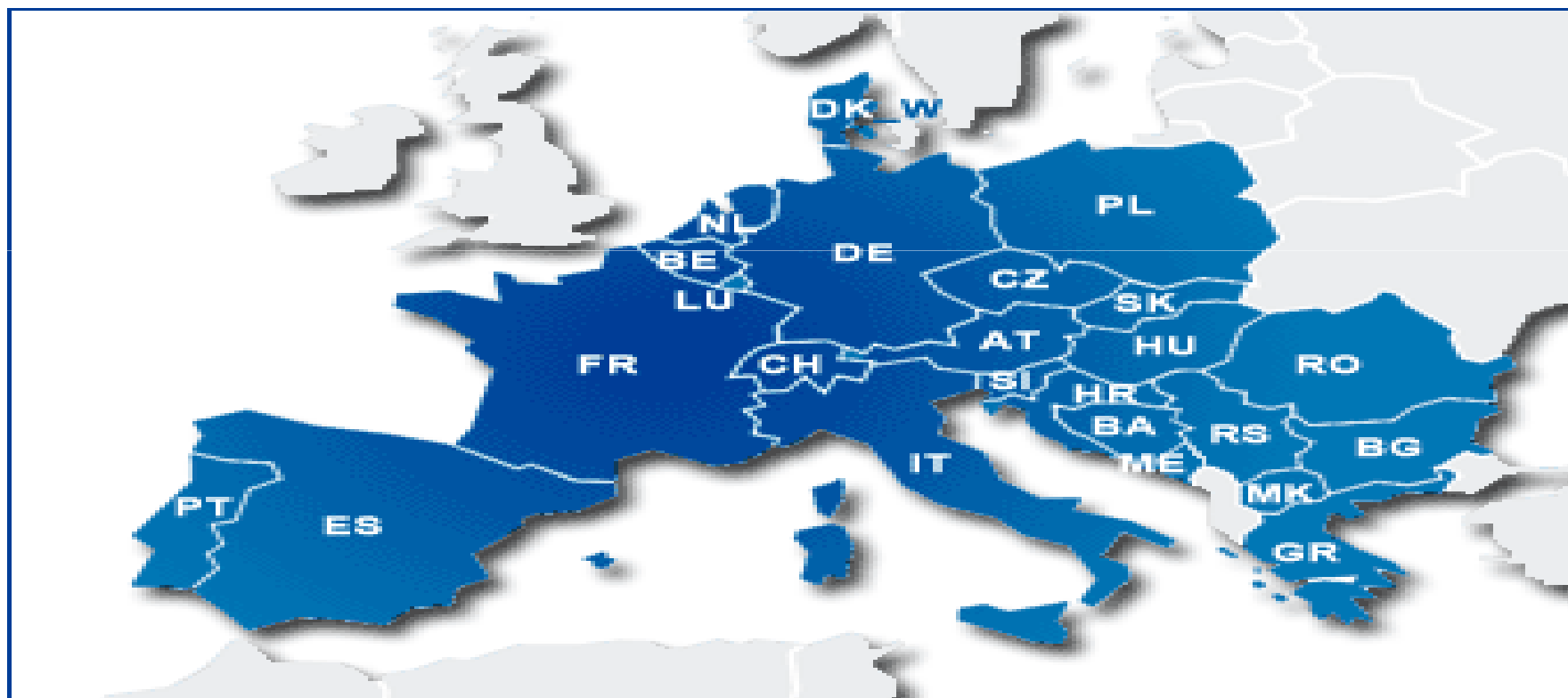


Electricity Networks and Priority Axes





UCTE Members



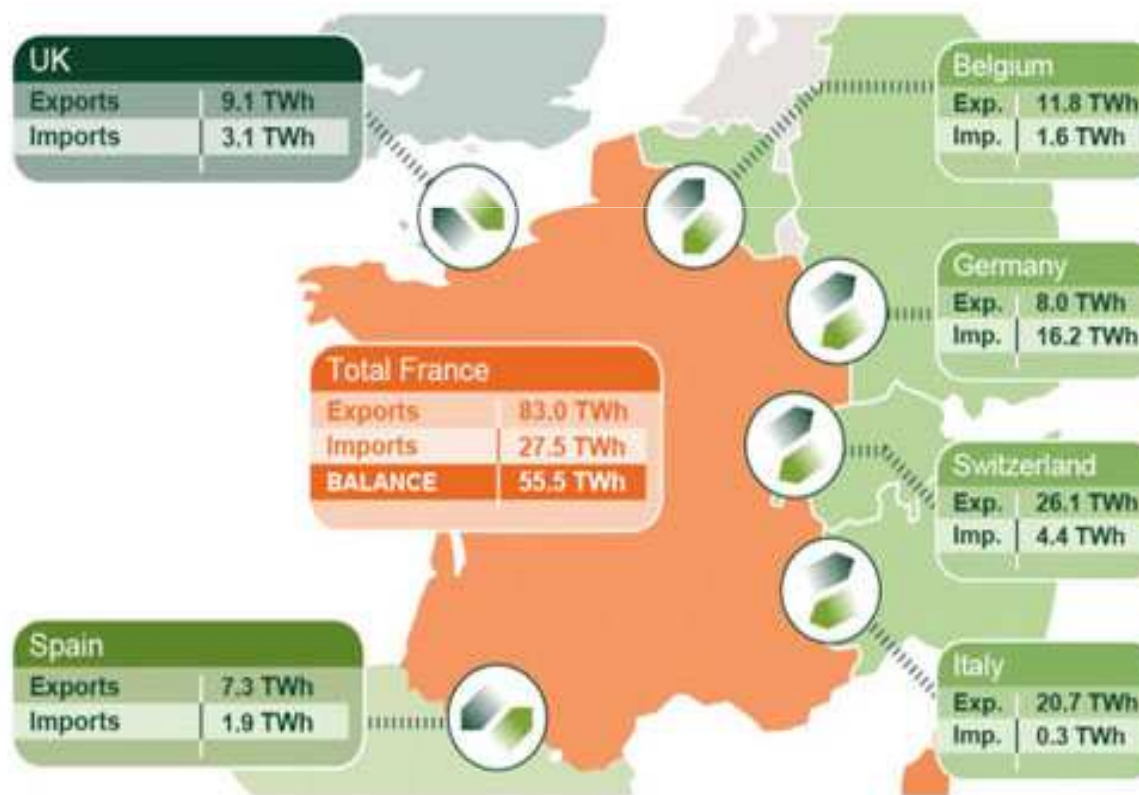


ETSO/ ENTSO-E Members



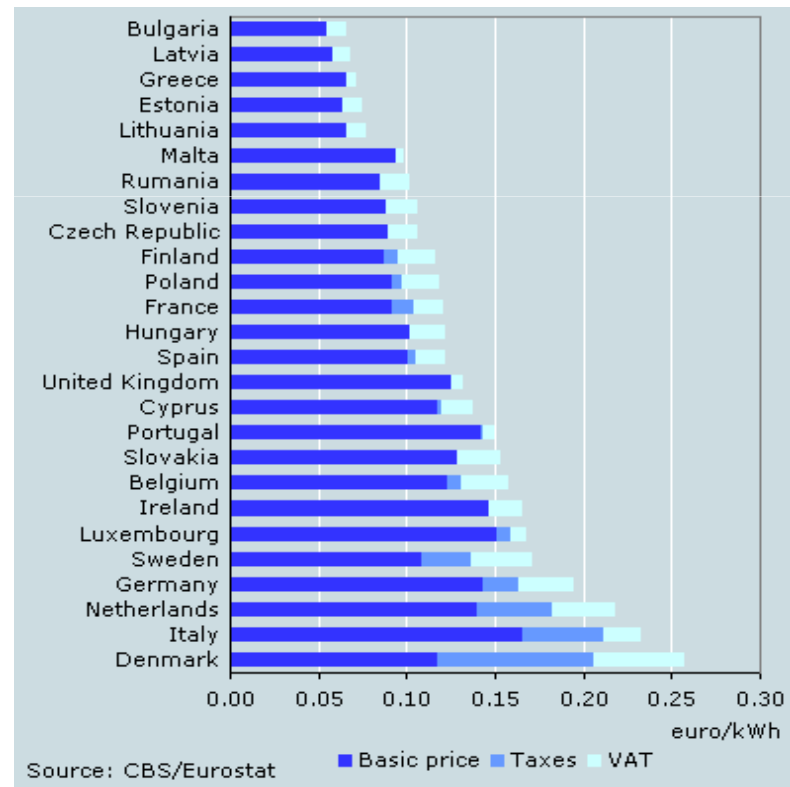


Electricity Exchanges: Case Study France





EU Electricity Prices 2008





The case of the Baltics: Electricity





IPS/ UPS





The Limits of Synchronisation

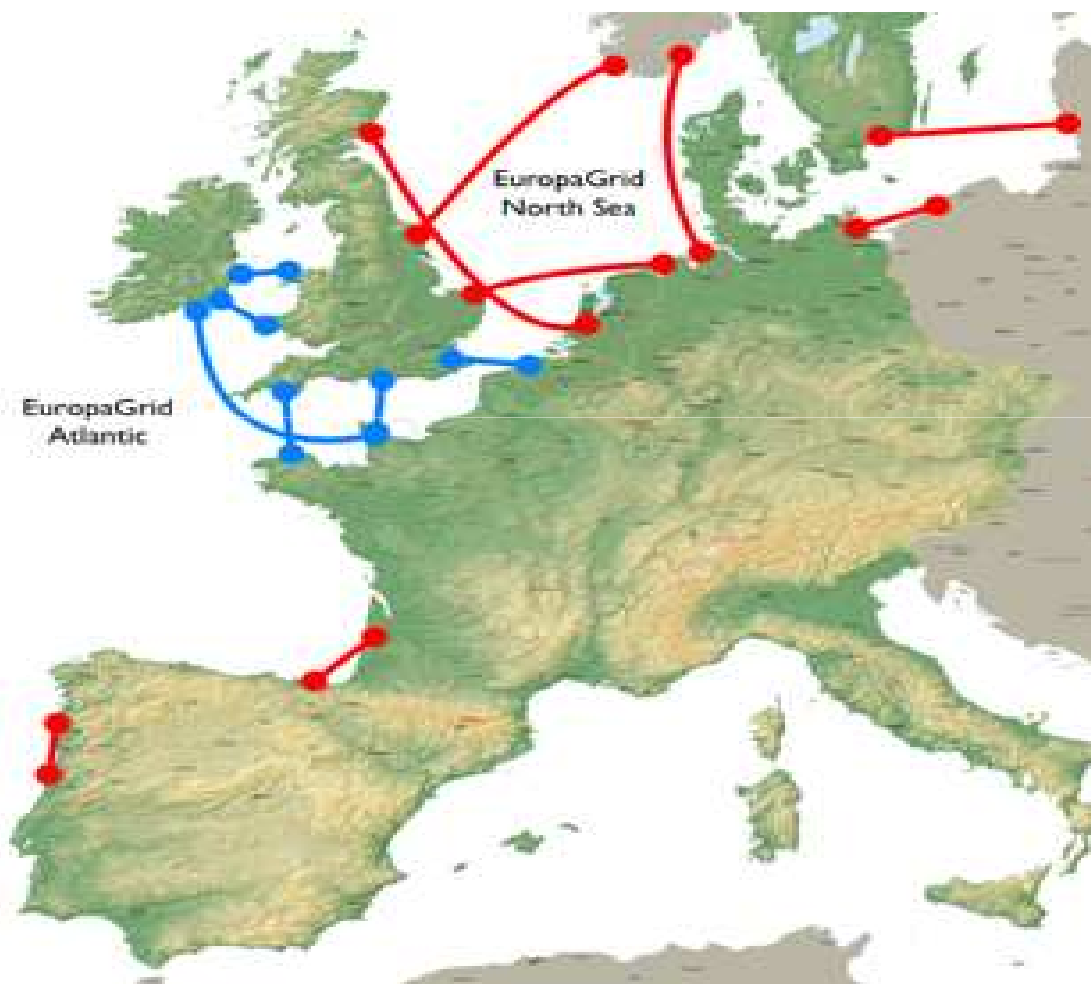
- EU-Mediterranean Ring (UCTE)
- UCTE-IPS/UPS
- Always as a first step: synchronisation, if successful, integration
- Risks: speed of light... blackouts, but also governance
- Open question: any limit to synchronisation?





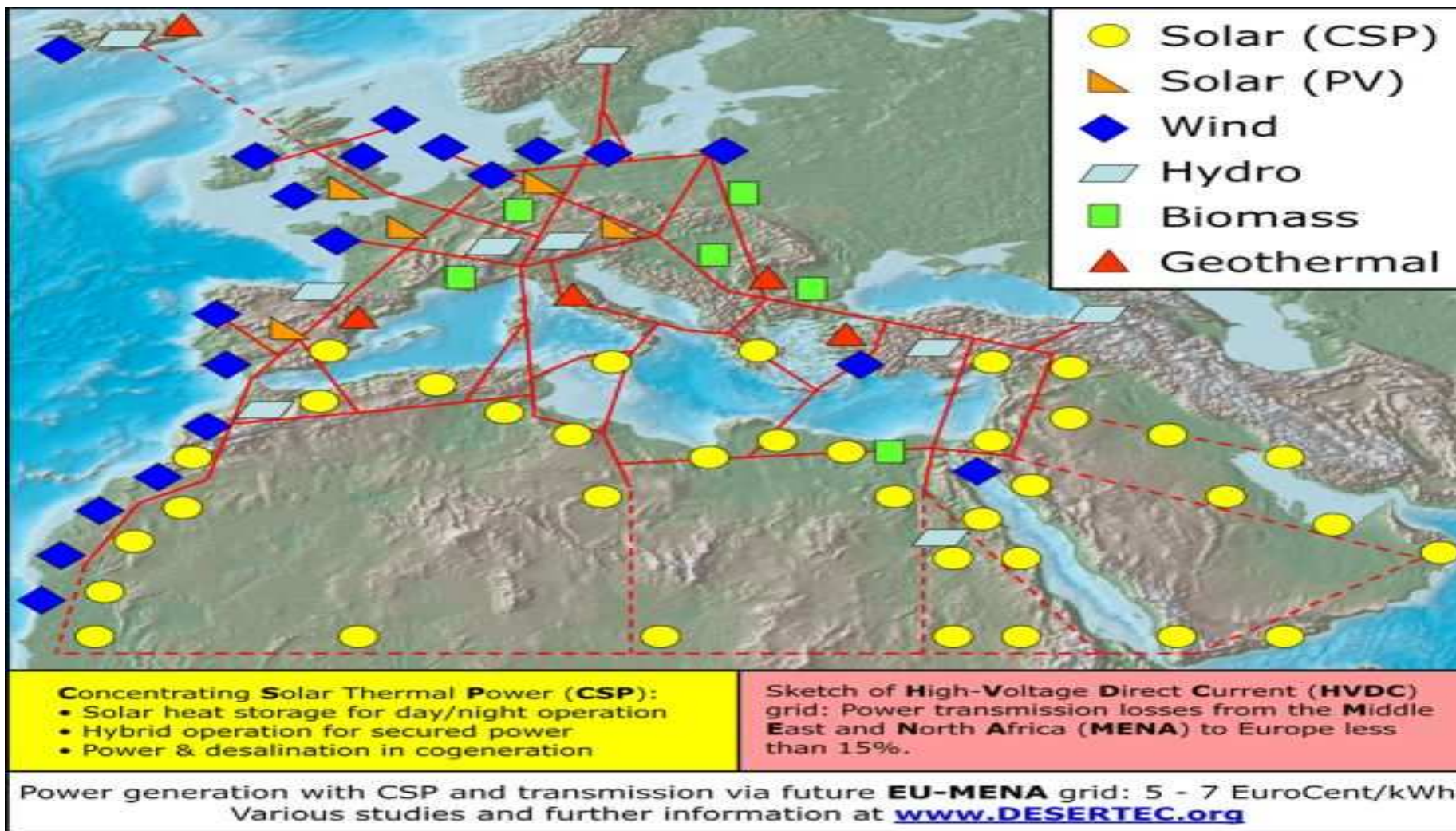
PHASE ONE

- Imera Projects Already Under Development
- Suitable for Offshore Windfarm Connection





Renewables – a Future Pan European





'Energy and climate are today's coal and steel'

- *“Turning climate change challenge to our competitive advantage”*
- *“Europe to lead on climate change”*
- *“Maintain momentum towards decarbonising our electricity supply and the transport sector as well as the development of electric cars.”*



*“Political guidelines for the next Commission” – Jose Manuel Barroso,
3.9.2009*



The new European Commission (2010-2014):

- **EUROPE 2020 Strategy:**

“ Support the shift towards a resource efficient and low-carbon economy - “20-20-20 climate/energy targets should be met”



Key focus areas for the new Commission: EURELECTRIC view

- **European electricity market integration**
- **Carbon-neutral vision for 2050**
- **Implementation of RES Directive:
National RES plans**

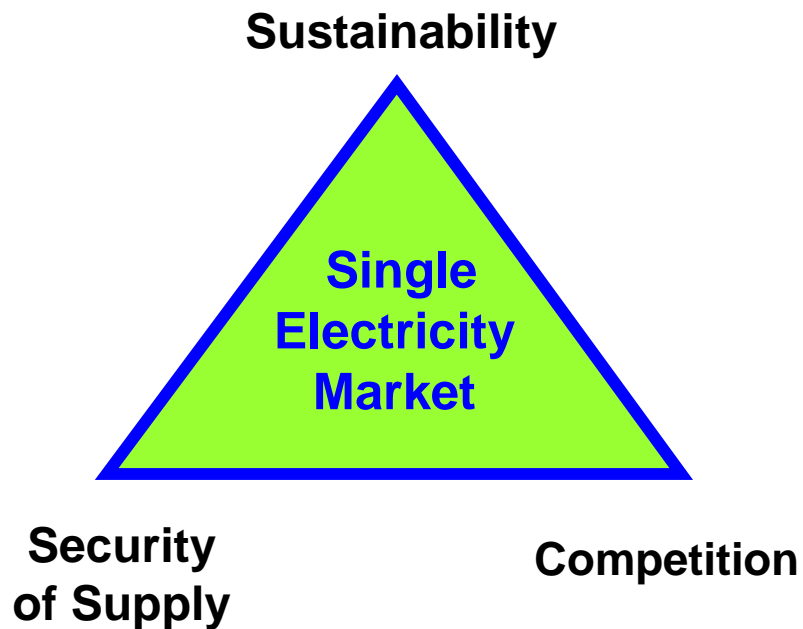


***The Road to a Pan-European Market:
Obstacles and Solutions to achieve full
Market Integration***



A Single Electricity Market: part of all policy solutions

Benefits of a single EU market:



- Most efficient way of achieving the 20-20 targets
- Price convergence and EU wide competition (higher liquidity, more new entrants)
- Alleviate concerns of market concentration
- More customer choice and increased social welfare
- Enhanced Security of Supply

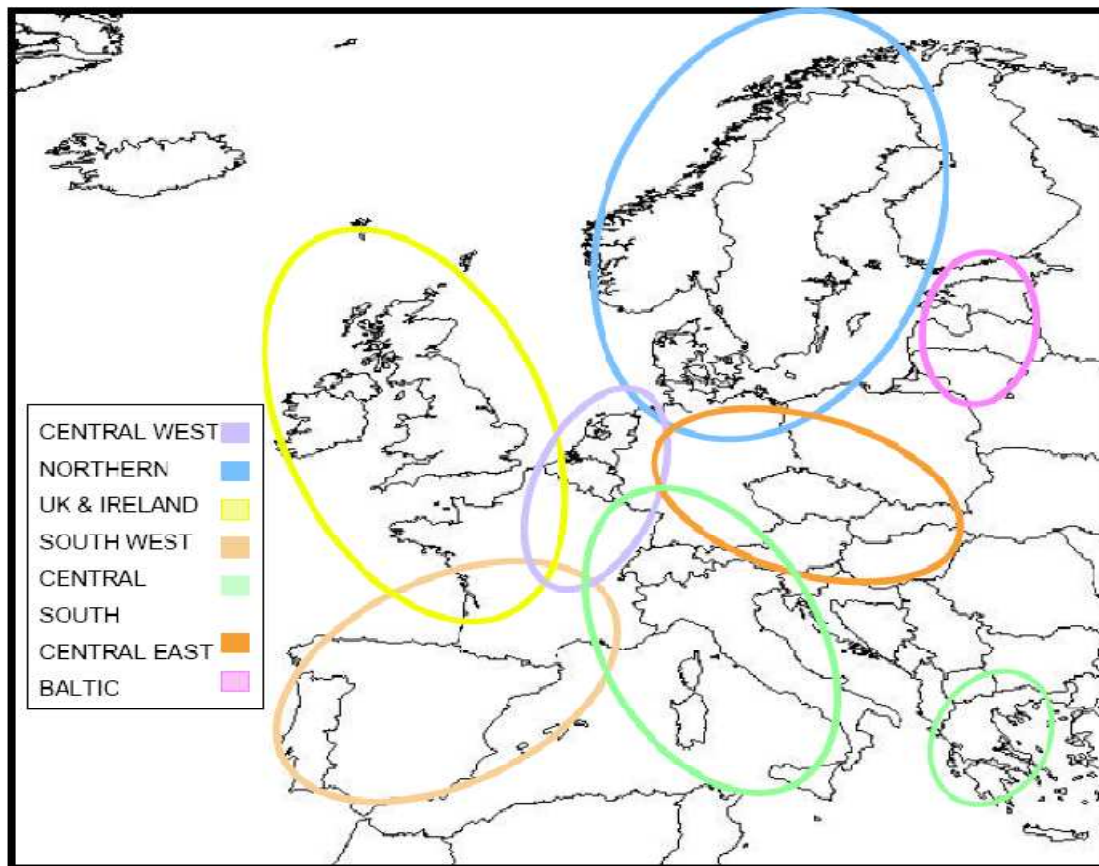


Since 2000 the European electricity sector has seen good progress,...

- **Power exchanges in every Member State, growing liquidity of trading markets**
- **Removal of long-term contracts and TPA regulated access to the grid**
- **Abolishment of transit and import/export feeds within the EU**
- **Restructuring of electricity companies and expansion across Europe**
- **Moderate increase of end-user electricity prices**



... regional integration process has been initiated, ...

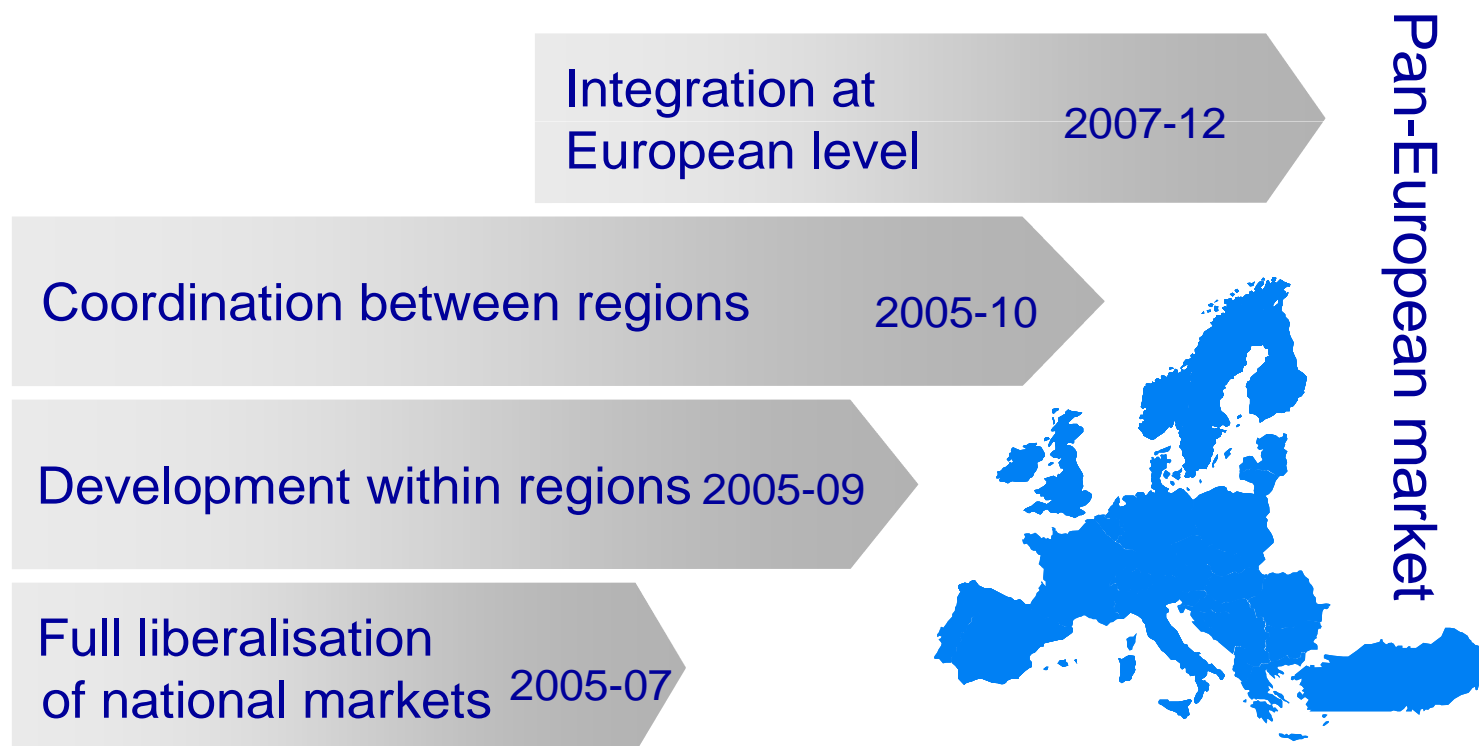


- Early 2000s - Florence Forum - focus on obstacles to cross-border electricity trade
- 2006 – establishment 7 Electricity Regional Initiatives (ERI) by ERGEG



... but a Pan-European market is still not within reach

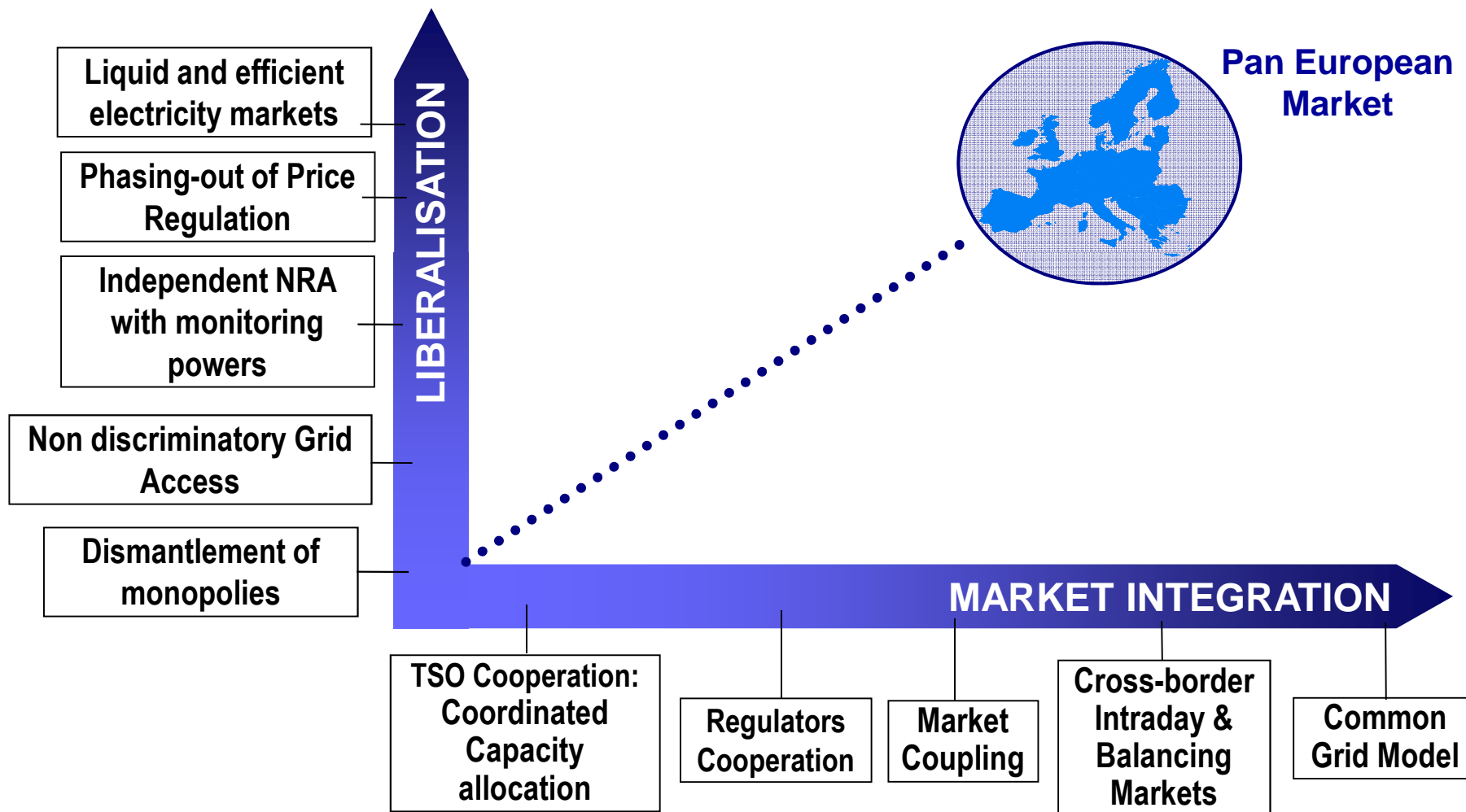
ROAD MAP TO A EUROPEAN ELECTRICITY MARKET: Parallel Approach



Source: EURELECTRIC report "Integrating Electricity Markets through Wholesale Markets: EURELECTRIC Road Map to a Pan-European Market" (June 2005)



The road to the Single EU Market: A Process with 2 dimensions





More integrated markets will mean... more Renewables

- Climate Change Package: **35 % of electricity consumption** will have to come **from RES** by 2020
- Accommodation of large scale RES (mainly wind) will require much more flexibility throughout Europe
- **Integrated wholesale markets** (intra-day and balancing) and **grid development** (resolving large bottlenecks) are **the key** to meeting the RES 2020 target timely and in the most cost efficient way



EURELECTRIC is calling for an EU Market Integration Strategy

- **Political commitment and culture of cooperation**
- **EU-wide target models for congestion management and roadmaps** to implement them: start with most advanced markets and spread best practices
- **Effective EU-level governance and coordination:** a supervisory and advisory body (ACER)
- **The target models – input for the EU 3rd Energy Package legal framework** (Framework Guidelines/Network Codes) to ensure achieving an integrated EU market by 2015



***Vision for a carbon neutral power sector
by 2050: EURELECTRIC's Power
Choices project***



EURELECTRIC CEO Declaration

18 March 2009

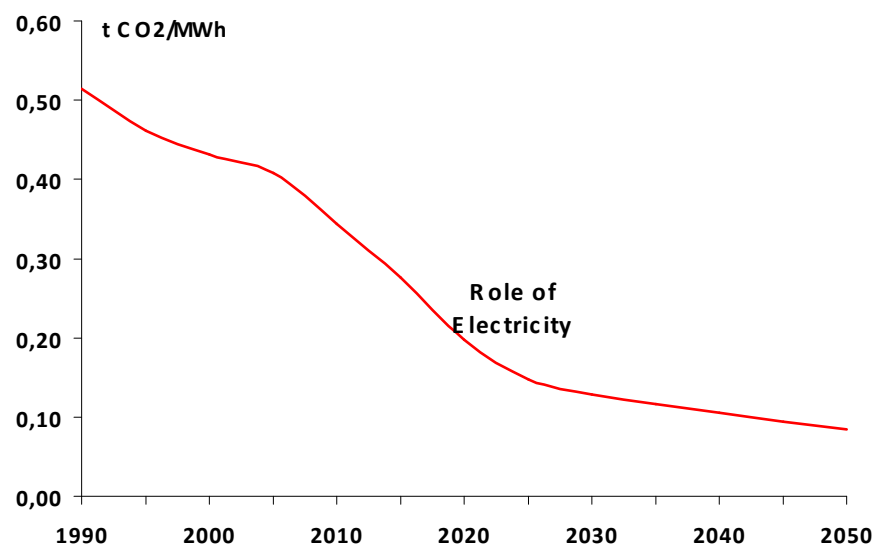


- 1. Carbon-neutral power in Europe by 2050**
- 2. Cost-efficient, reliable supply through an integrated market**
- 3. Energy efficiency & electricity use as solutions to mitigate climate change**



Background: EURELECTRIC studies

2007 - Role of Electricity:
EU 50% reduction target.
CO₂ from power reduces from
0.45 to 0.10t CO₂/MWh



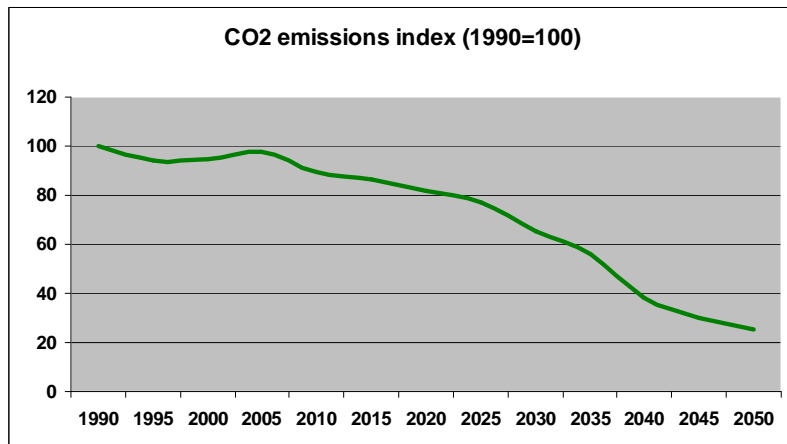
2009 - Power Choices:

- Review the 2007 study, aiming at *carbon-neutral power by 2050* under an EU target of -75% CO₂
- Investigate needed technology development, costs & regulatory framework



Main assumptions for Power Choices scenario

75% GHG cut EU-wide

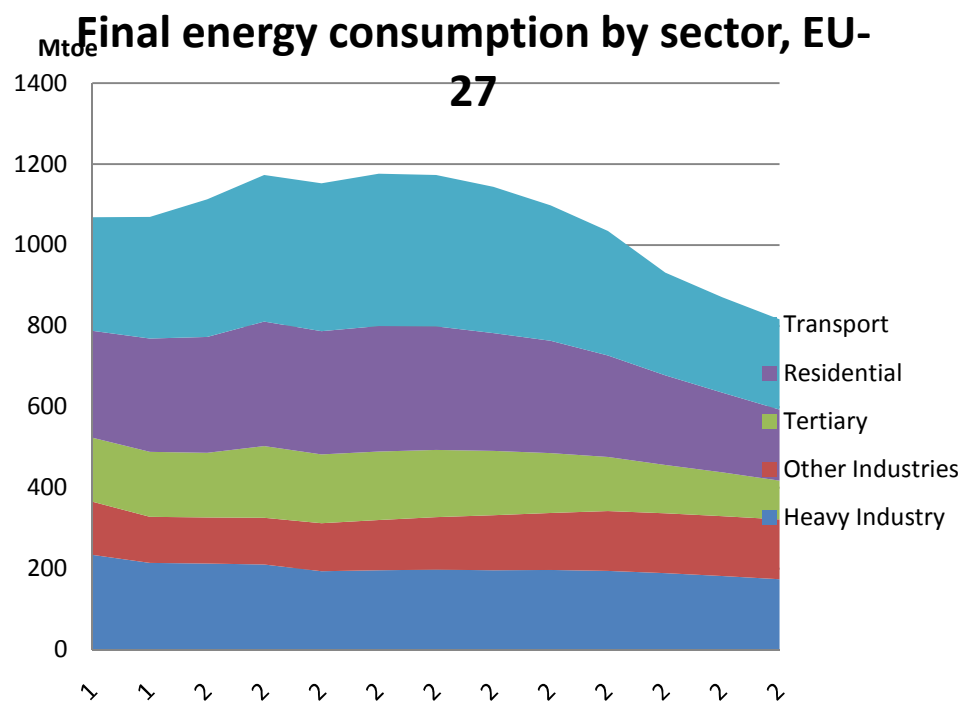


POWER CHOICES SCENARIO

- 75% GHG cut across whole EU economy
- CO₂ price applied uniformly to all sectors
- Power becomes major transport fuel
- All power generation options available (with CCS commercially available as of 2025)
- Major policy push in energy efficiency
- No binding RES target post-2020
- CO₂ price is the only driver for low-carbon generation post 2030



Decrease in energy demand



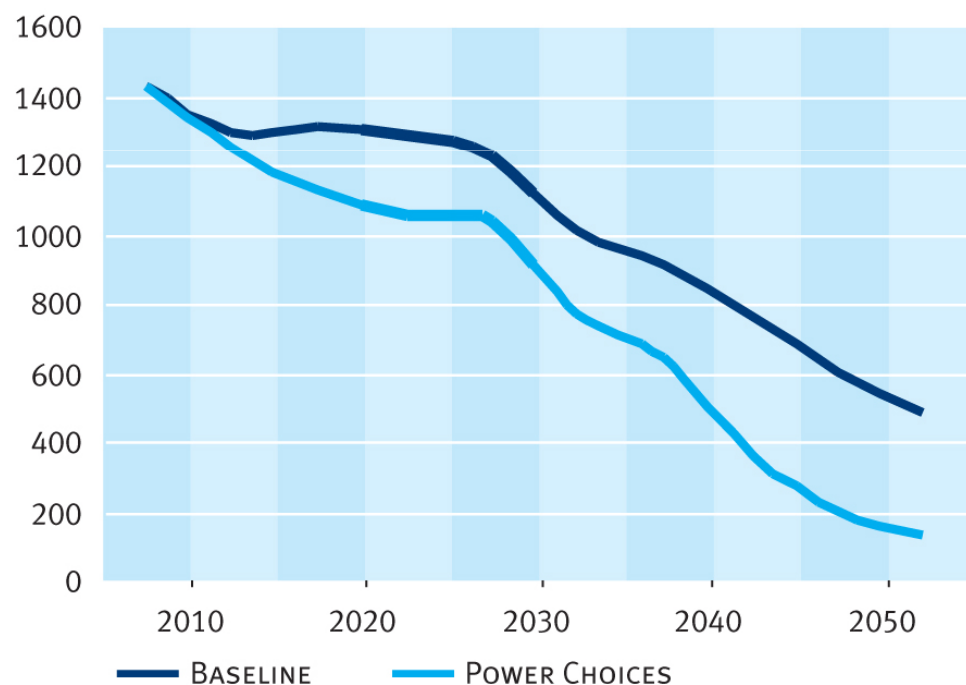
➔ **Paradigm shift to efficient electric technologies**

➔ **More electricity = less energy**



Carbon emissions from power fall by 90%

CO₂ EMISSIONS (IN Mt CO₂)



**Deep emission cuts
take place between
2025-2040.**

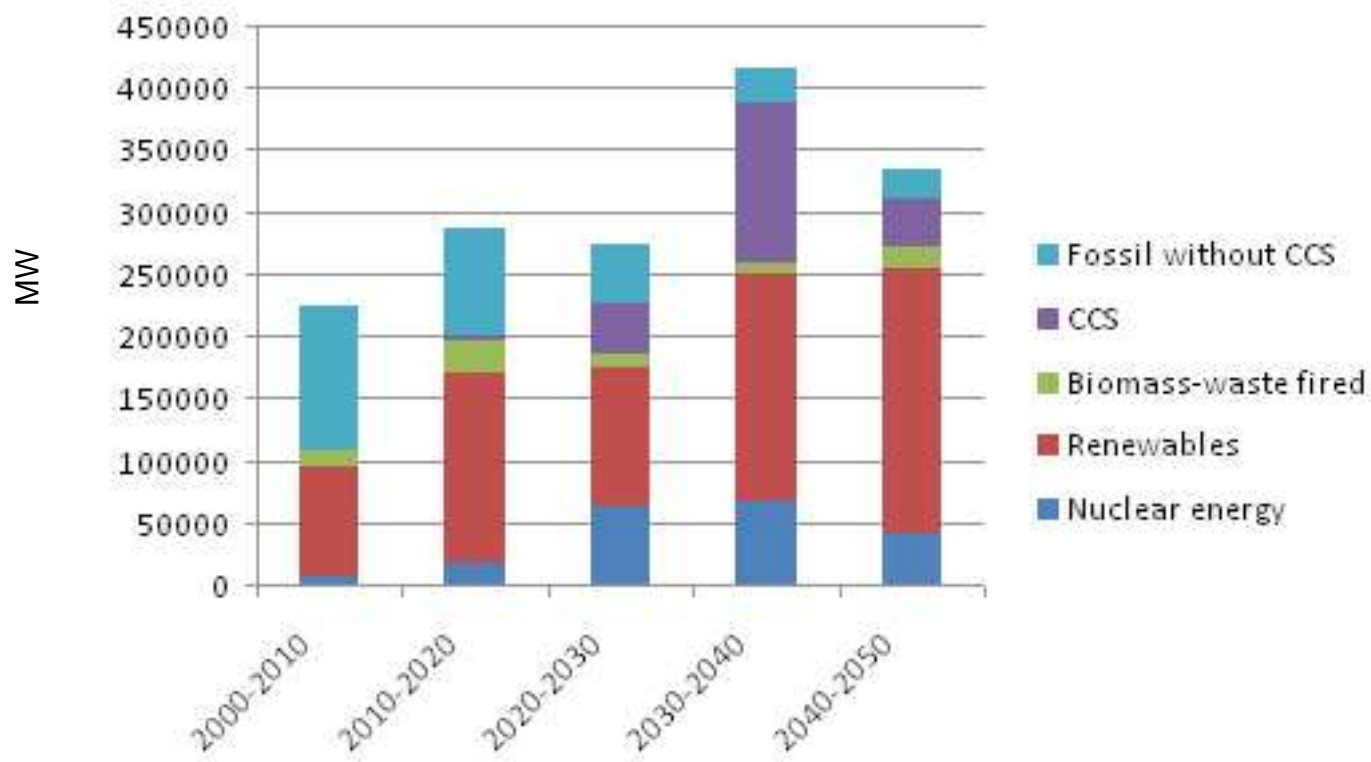
**But investments are
needed NOW!**

**NOW: 1423 MtCO₂
2050: 128 MtCO₂**



Investment needed across the period

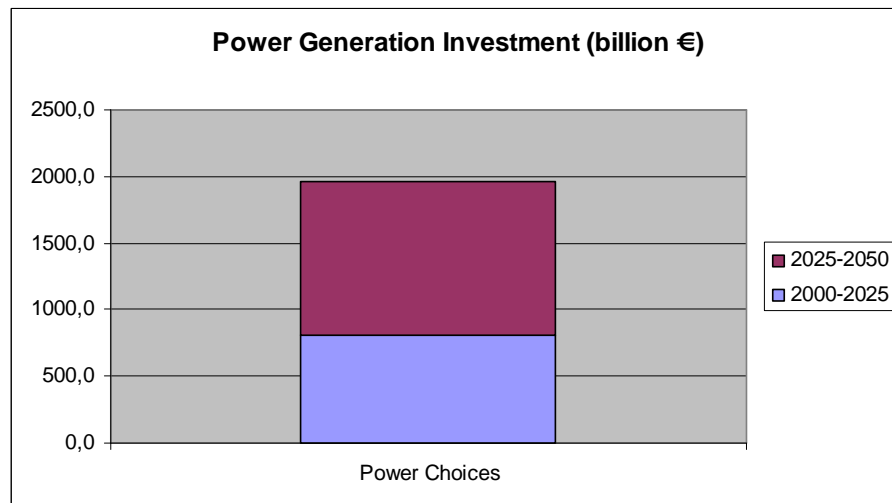
Gross investment in generation capacity



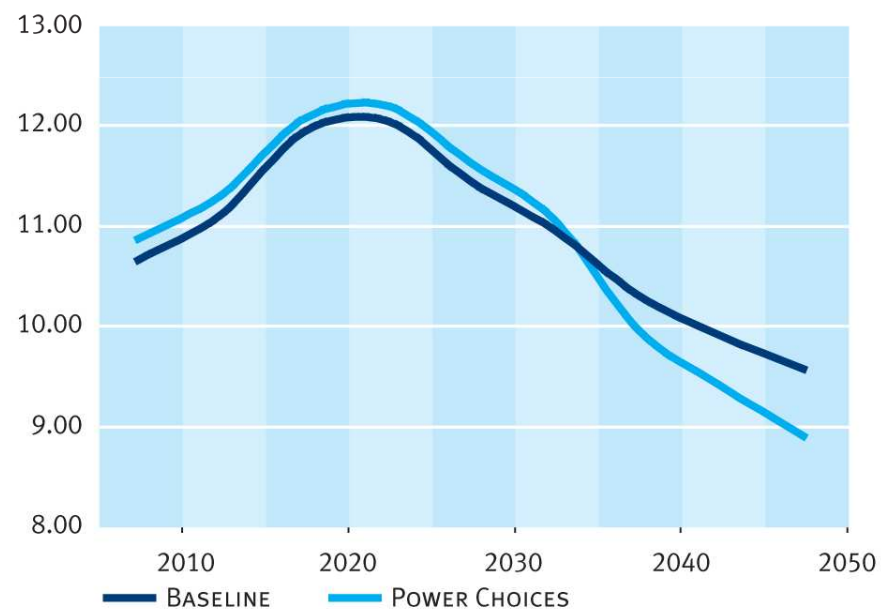


Significant investments... ... but a reasonable cost for society

Investment needed in power generation by 2050: €2 trillion



TOTAL COST OF ENERGY AS % OF GDP



Key outcomes

- **EU carbon-neutral power by 2050 is realistic**
 - ➔ **-75% GHG on whole economy can be reached**
- **All power generation options needed**
- **Electrification of the demand side essential**
- **Significant investment but at acceptable cost to society**
- **The major CO₂ reductions in power are achieved from 2025 onwards**
- **CCS delayed &/or nuclear phase-out = slower CO₂ reduction**



Policy recommendations

CO₂ reductions

- Support CO₂ market to deliver cap at least cost
- All sectors to internalise cost of GHGs
- Promote an international agreement on climate

Technology choices

- Enable the use of all low-carbon options for power generation
- Encourage public support for modern energy infrastructure: onshore wind, CCS, smart grids...

Cost

- Significant investment cost but reduction in share of GDP
- Recognise that cost of technology deployment differs substantially across the EU

Demand-side

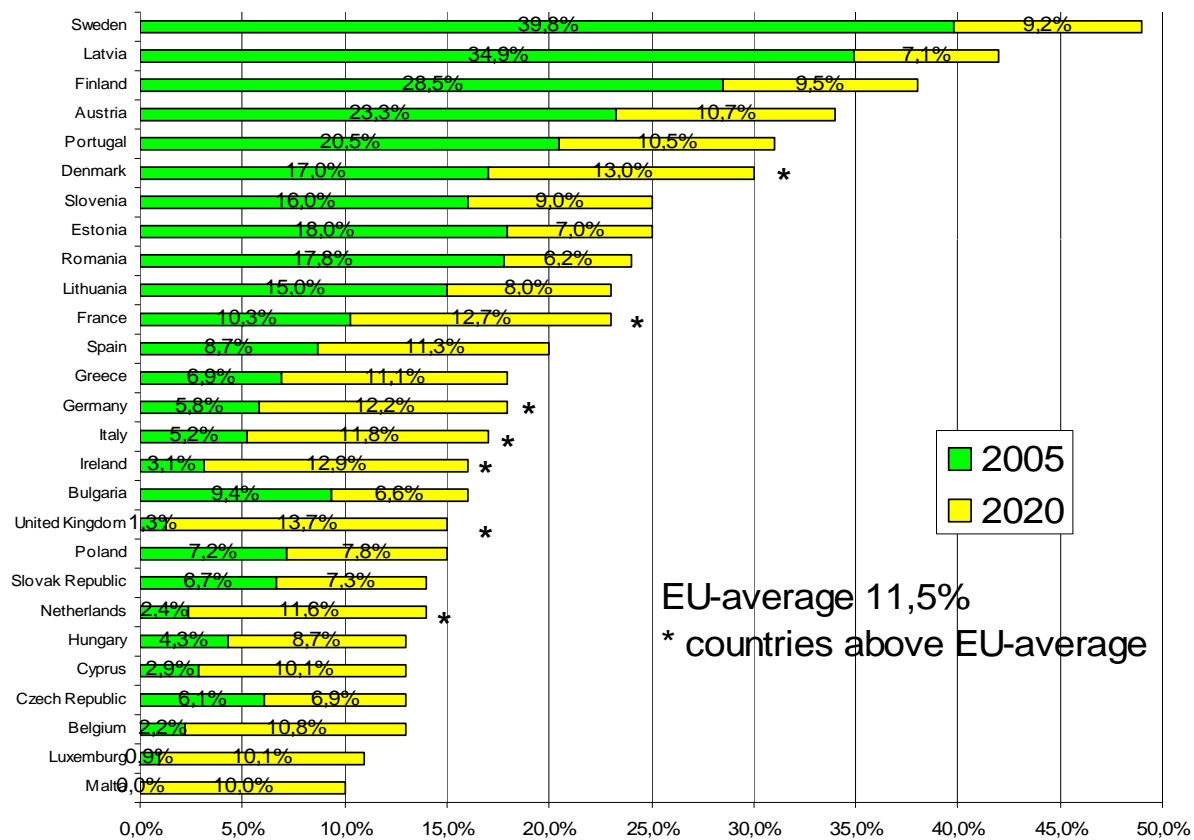
- Facilitate electrification of road transport and spatial heating & cooling
- Major policy push in energy efficiency



***Efficiency of subsidies on renewables:
Reaching 2020 targets at reasonable costs***



RES targets from 2005 to 2020



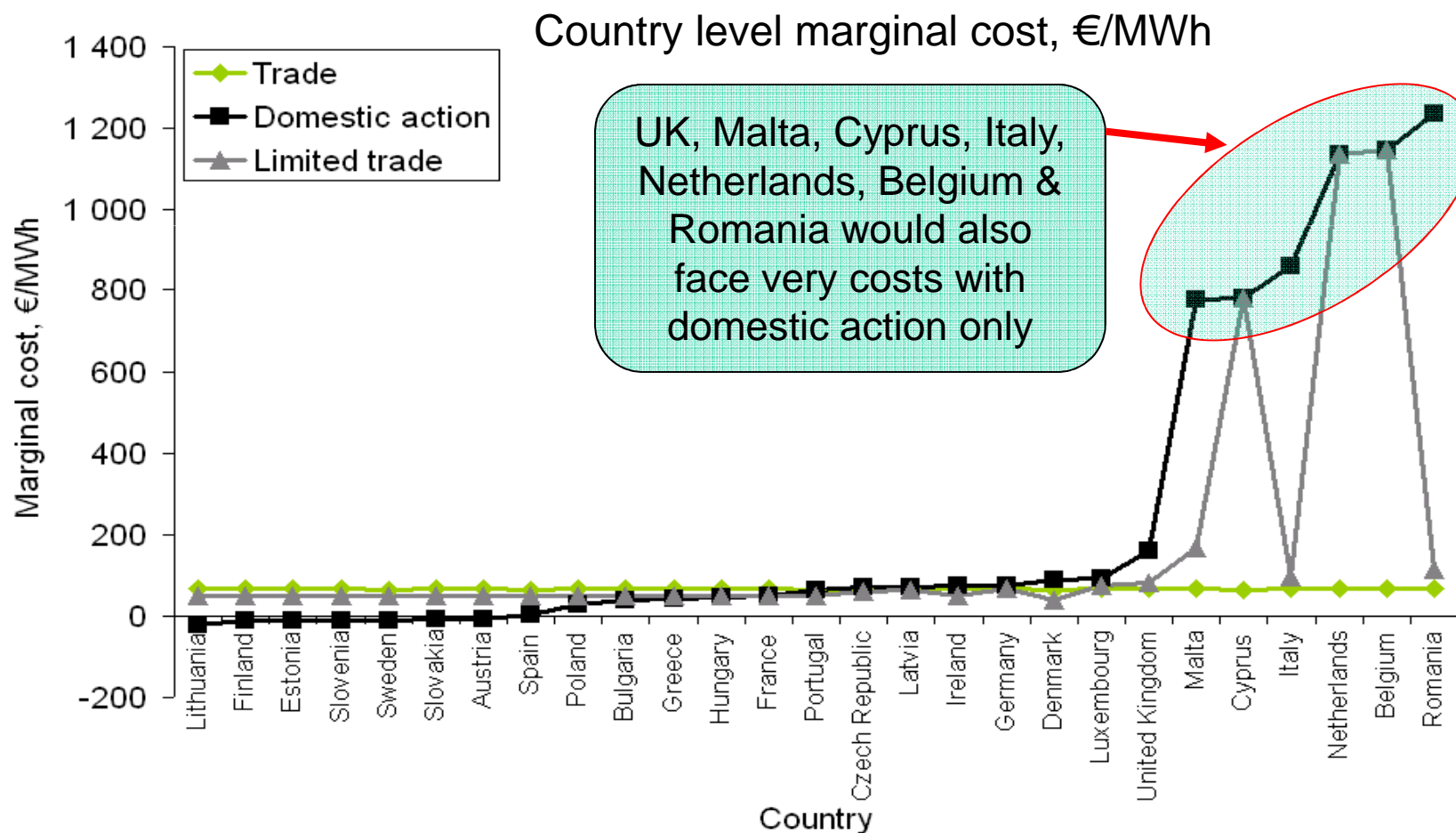


Renewables Directive National forecasts (Feb 2010): the picture is not very realistic

<i>Member state</i>	<i>Exceed/Achieve/Shortfall?</i>	<i>RES % 2005</i>	<i>RES target 2020</i>
Italy	Shortfall	5.2%	17%
Luxembourg	Shortfall	0.9%	11%
Malta	Shortfall	0%	10%
Belgium	Shortfall	2.2%	13%
Bulgaria	Shortfall	9.4%	16%
Denmark	Shortfall	17%	30%



EUR-Poyry report: Some Member states will suffer disproportionately from lack of trade





Solution – make best use of co-operation mechanisms under RES directive: An efficient joint project market is needed

2009 Renewables Directive does not allow for full Renewables trading, but does allow for limited trading under “co-operation mechanisms:

- >>Most promising co-op mechanism is Joint Project concept

- >>EURELECTRIC suggests that rather than Joint projects being developed slowly, and in piecemeal fashion, that the European Commission promote the create of a more liquid “Joint Project Market”



No RES targets after 2020




We stand behind a strong Emission Trading System

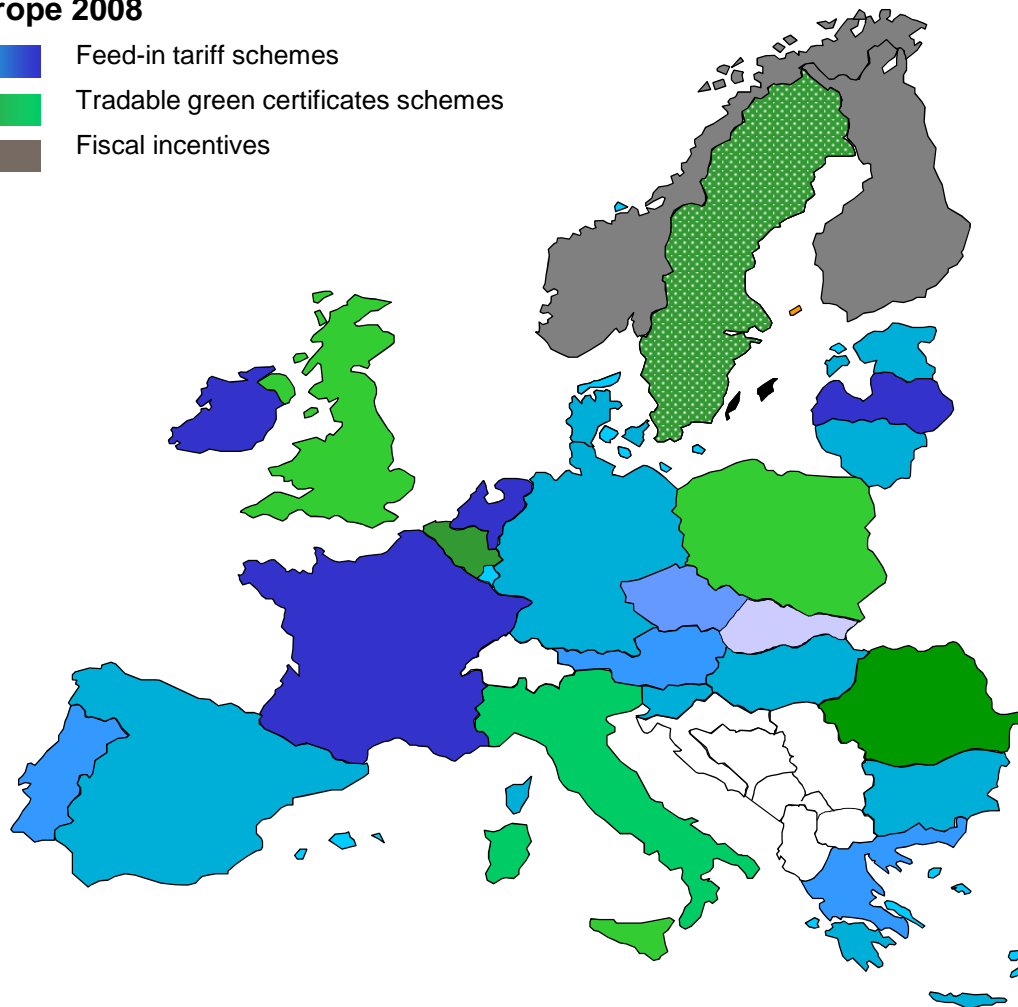
Beyond 2020 a strong carbon market will drive uptake of Renewables – a separate target will only further distort the market and increase costs – and decrease the economic feasibility of meeting ambitious carbon targets!



Some 30 different support schemes today

Europe 2008

-  Feed-in tariff schemes
-  Tradable green certificates schemes
-  Fiscal incentives



- > The Directive maintains Member States as key decision maker
- > More buyers than sellers?
- > Revision clause in 2014



Renewables subsidies will not provide additional emission reductions

- Renewable electricity subsidies will not produce additional emission reductions over the 21% cut to 2020 set within emissions trading:
 - The ETS cap is pre-defined and is not changed by the Renewables target or RES subsidies
 - Renewables subsidies depress the carbon price – as the extra subsidy for Renewables ensures that they “appear” to be a more economic way to cut carbon emissions
 - Depressing the carbon price implies that some otherwise viable carbon reduction technologies are shut out of the market



RES 2020: EURELECTRIC Action Plan

As share of variable RES increases, challenges arise in both “technical” aspects of the electricity supply system, as well as from “commercial” aspects

1. Networks & DSM

- 1.1. Planning of future grid infrastructure.
- 1.2. Role of smart networks & metering.
- 1.3. Role of flexible loads & storage.

2. Generation impact

- 2.1. Future Business case for conventional power generation, incl. impact assessment on (existing and new build) nuclear. Risk exposure of the industry.
- 2.2. Requirements for flexible back-up capacity.
- 2.3. Role of biomass.

3. Wholesale markets

- 3.1. Impact on wholesale electricity & carbon markets.
- 3.2. Possible need of reviewing market design; assess risks and propose alternative solutions.
- 3.3. Urgent need of Cross-border intra-day and balancing markets.

4. Competitive & sustainable RES

- 4.1. Analysis of Member states' NAPs.
- 4.2. Harnessing EU synergies: cooperation mechanisms.
- 4.3. Competitive subsidy mechanisms & harmonisation.
- 4.4 How best to foster R&D of RES technologies.
- 4.5 Life cycle analysis of RES technologies.

Comprehensive strategy and recommendations on the role and contribution of RES for EU energy policy goals.



Result of Action Plan:
**A comprehensive EURELECTRIC vision
and strategy on the role of RES**

- **RES as an attractive business opportunity**
- **Markets at the heart of RES development**
- **From incentive schemes to no specific subsidies nor preferential treatment**
- **Necessary infrastructure developed to accommodate RES**
- **Avoidance of stranded (conventional) assets**
- **Ensured system flexibility: flexible capacity and DSM**
- **A competitive portfolio of low-carbon production technologies defined by the market**



Summary: Priorities for the next commission

- **Promote pan-European electricity market**
- **Ensure a strong emission trading system, and set longer term carbon targets to give visibility to investors – 2050 vision**
- **Facilitate joint project market for Renewables – ensure 2020 Renewables target can be met at reasonable costs**



**Thank you for your attention.
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Representing the European Electricity Industry