INTER-REGIONAL TRANSMISSION REQUIREMENTS

Compared to current transmission infrastructure, the requirements for transmission capacity between the regions defined in the technical report are significant.

1 Demand response as used in this paper refers to changing a customer's electricity demand in response to dynamic pricing or price signals through communications technologies. In the Volume 1 analysis, it is assumed that any such changes retained the total energy consumed within the day, that is, moved or shifted demand rather than reduced total daily consumption.

NOTE: Iberia France link is challenging and maybe refued by different solar/wind mix.

SOURCE: Roadmap 2050 Technical Analysis.

2010 Existing Capacity

2050 Total Transmission Requirements
Assuming 80% RES & 20% DR

1GW

10GW

20GW
RES DIVERSITY CONTRIBUTES TO CONSISTENT SUPPLY

Over the course of the year, the integration of Europe allows for some energy sources to compensate for the lack of others based on seasonal availability.
EU ENERGY RESOURCE MOSAIC

Overlay of current energy use and those regions with the highest energy potential.

Energy types:
- Geothermal existing
- Geothermal potential
- Hydropower existing
- Hydropower potential
- Wind existing
- Wind potential
- Solar existing
- Solar potential
- Tidal potential
- CCS / Biomass existing
- CCS / Biomass potential
- Nuclear existing
- Nuclear potential
BERGHEIM NOW

Location: Bergheim, Germany

Photo taken by: Ralph Orlowski/Getty Images
Location: Bergheim, Germany
Article online: nytimes.com/2008/04/23/world/europe/23local.html
BERGHEIM IN ENEROPA
ISLES OF WIND
VRANIA
North Africa is well located to take advantage of the high solar potential and relative proximity to the EU-27.

Solar Insolation
- 7.0-7.5
- 6.5-7.0
- 6.0-6.5
- 5.5-6.0
- 5.0-5.5
- 4.5-5.0
- 4.0-4.5

Solar Energy Potential
- 7.0-7.5
- 6.5-7.0
- 6.0-6.5
- 5.5-6.0
EU ENERGY GRID

Including North Africa in the European Energy Grid increases capacity.
Breakthrough Technologies Increasingly appear in the everyday.

- LED Low-Energy lights
- Heating from Enhanced Geothermal Energy
- Solar Cell Coating for Building Exterior
- Energy Efficient Windows
- Utilities Powered by Local Renewable Energy Sources
- Personal Electric Power Generation from Thermal Gradients and Motion
- EV Vehicles
- Public Transport Schedules Linked to PDA devices
- Algae Biofuel
- Solar Cell Plant
- Power Generation from Vibrations
If you thought the European Energy Grid was just a dream...

2009
The Copenhagen failure

2014
EU energy planning process begins

2015
EU launches ‘smart infrastructure’ campaign

2010
Roadmap 2050 launched at the ‘World Energy Summit’

2011
Russia turns off the gas

2016
Petrol engines to be phased out

2016
Sustainability race between EU & USA heats up

2012
EU carbon tax is introduced

2013
EU begins building on EU network

2018
Construction starts on the EU energy grid

2019
Construction begins on European Union Energy Grid
EXISTING EUROPEAN GRID

EXISTING POWER DISTRIBUTION

- SOLAR POWER
- WATER POWER PLANTS
- BIOMASS PLANTS
- WIND POWER
- GEOTHERMAL
- COAL-OIL-GAS
- NUCLEAR POWER PLANTS
GRID PHASING

EXISTING POWER DISTRIBUTION

- SOLAR POWER
- WATER POWER PLANTS
- BIOMASS PLANTS
- WIND POWER
- GEOTHERMAL
- COAL-OIL-GAS
- NUCLEAR POWER PLANTS
COMPLETE GRID

DECARBONIZED GRID POWER DISTRIBUTION

- SOLAR POWER
- WATER POWER PLANTS
- BIOMASS PLANTS
- WIND POWER
- GEOTHERMAL
- COAL-OIL-GAS
- NUCLEAR POWER PLANTS
2050 EUROPEAN ENERGY GRID

DECARBONIZED GRID POWER DISTRIBUTION
- SOLAR POWER
- WATER POWER PLANTS
- BIOMASS PLANTS
- WIND POWER
- GEOTHERMAL
- COAL-OIL-GAS
- NUCLEAR POWER PLANTS
The new energy grid can be combined with transport and data links to provide an efficient post-carbon distribution system.
IF YOU THOUGHT THE EUROPEAN ENERGY GRID WAS JUST A DREAM...

...THINK AGAIN.