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„Renewable Energies“

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1. The energy issue in Germany – two major current challenges

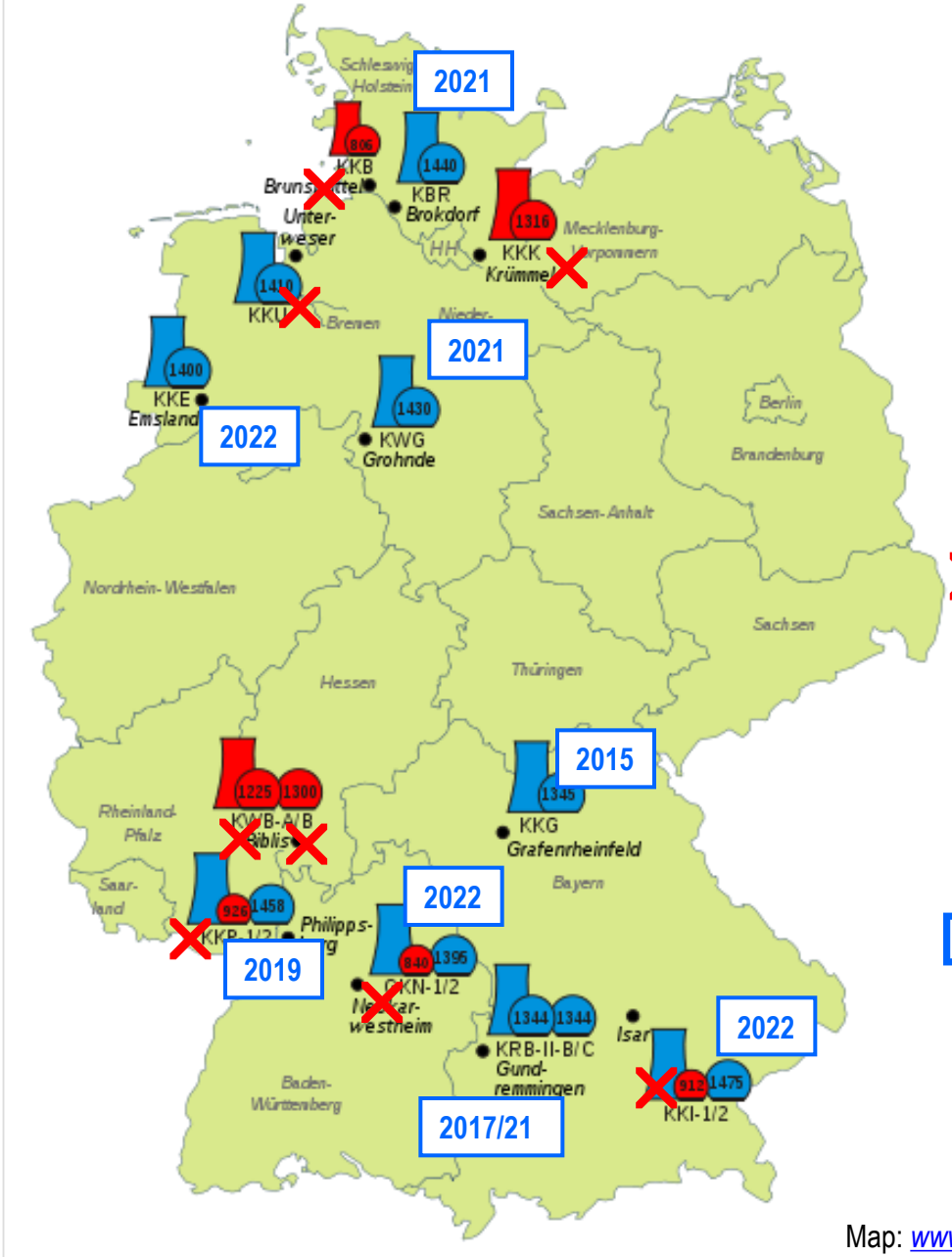
Energy & Climate Concept (Sep 2010)
setting primary targets for 2020 and 2050

- GHG emissions *): ➔ -40% ➔ -80/95%
- RES share (final energy consumption): ➔ 18% ➔ 60%
- RES share (final electricty consumpt.): ➔ 35% ➔ 80%
- Efficiency (primary energy consump.**) ➔ -20% ➔ -50%

„Energiewende“answering Fukushima (June 2011):

- closing all nuclear power plants until 2022 (some already 2011)
- causing the needs for basic transmission grid improvements

**) compared to 1990*
***) compared to 2008*



Decommissioning German nuclear until 2022

- ✕ **8 out of 17** reactors shut down already definitely (= 8,735 MW installed capacity)
- ☐ **9 reactors** to follow by 2015-2022 (= 12,432 MW installed capacity)

Map: www.wkipedia.org0

Major grid infrastructure challenges…

1. Future power production centres (wind onshore/offshore - North/East) instead of nuclear require
   ➔ new transmission capacity to consumption centres (West/South), calculated to 3,400-3,600 km until 2020
2. decentralised power generation (PV, biomass, wind)
   ➔ improved distribution grid structure needed (incl two-ways power flow)
3. Seriously variable RES power generation (sun, wind)
   ➔ highly efficient power storage capacities

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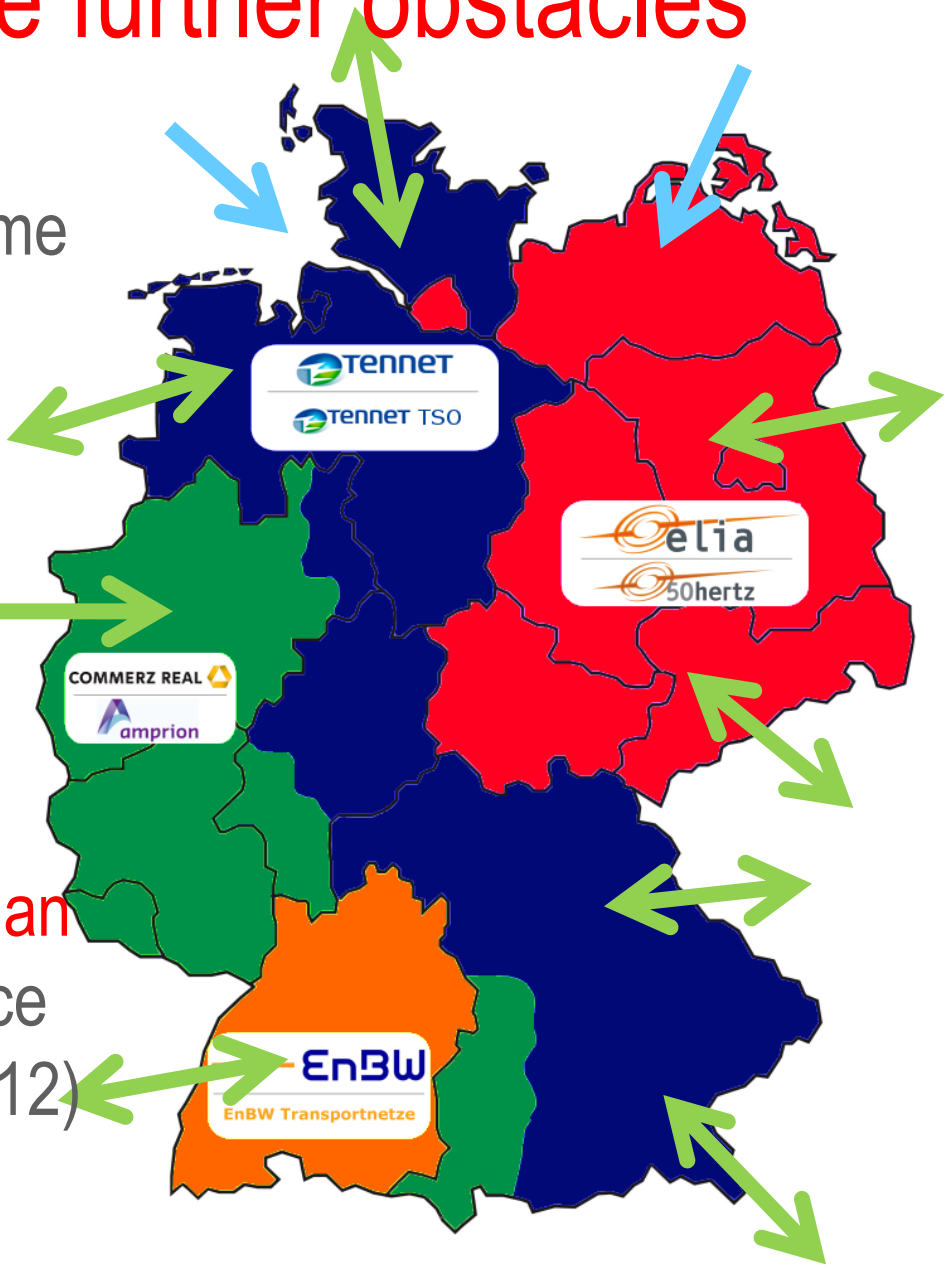
…added by some further obstacles

- a pan-European power transmission area to become a bottleneck (N/S, E/W)
- GER transmission grid run by 4 different TSO's
- Financial markets not providing sufficient capital for due investments

➢ GER grid development plan to mobilise capital & enforce investment planning (Jun '12)



2. How does SH figure in this puzzle?

- Pioneering RES (in particular: Wind) since early 90ies
  – supported by Federal RES Act (EEG) since 2000
- RES share (final energy consumption)
  by 2010: **SH = 16%** ← **GER = 11%**
- RES share (final electricity consumption)
  by 2010: **SH = 49%** ← **GER = 17%**
- SH RES generation (2010): 52% biomass, 42% wind
- A net power exporting country (2/3 of generated power)
  – even after decommissioning of 2 nuclear power plants

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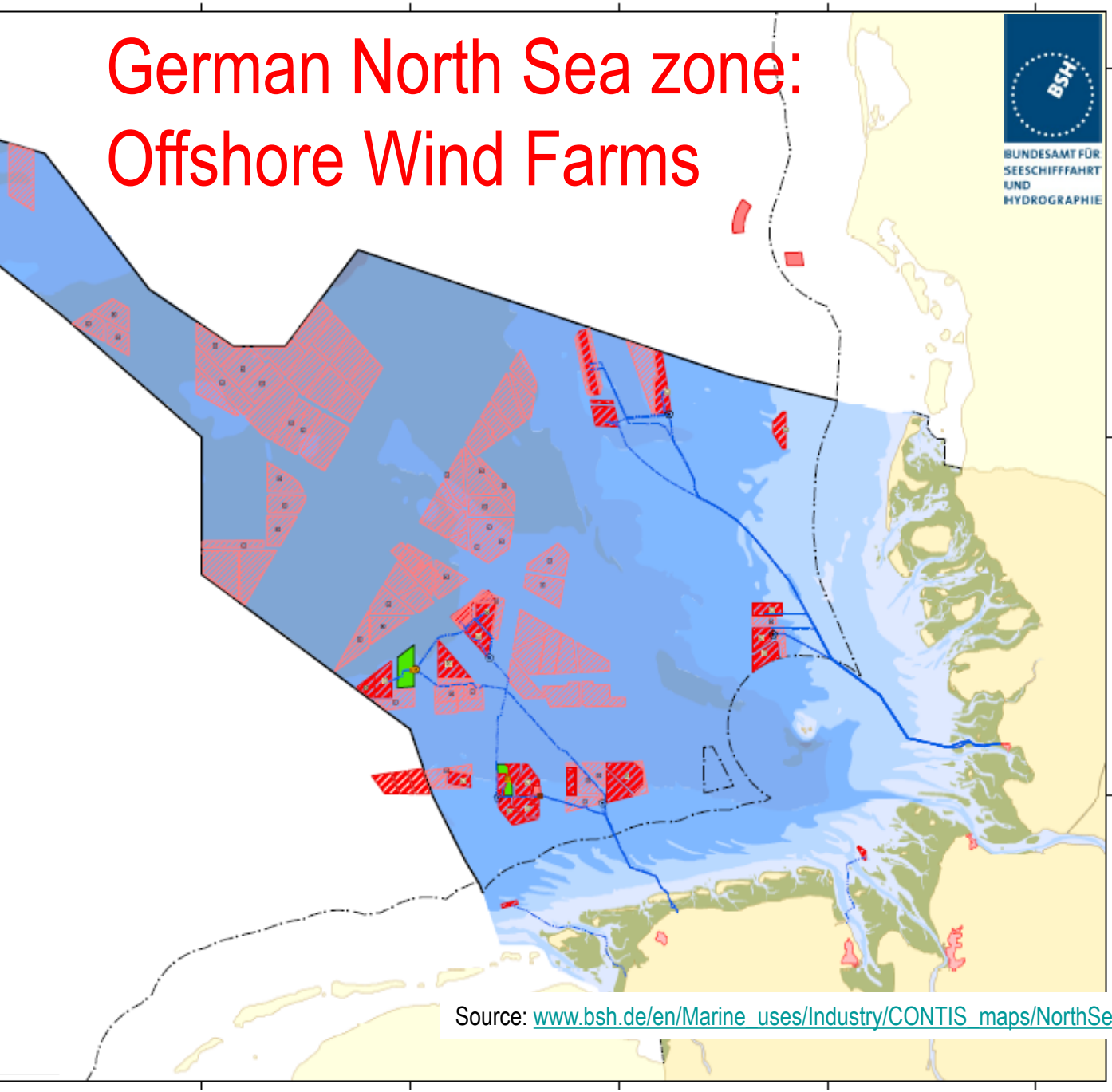
New 2020 RES targets for SH

- set by „SH Energy & Climate Concept“ (as of Sep ’12)
  - ➔ **8-10%** of **entire** GER final electricity consumption
  - ➔ equivalling **300-400%** of **SH** final electricity consumption*)
- basically based on steadily increasing wind power rates – current prognoses: 9 GW onshore & 3 GW offshore already possible by 2015 *(a target once set for 2020…)*
- serious improvement of transmission grid provided
  - ➔ *integrating North Sea offshore wind power,*
  - ➔ *further south/west transmission within GER,*
  - ➔ *access to storage capacities – Norway?*

**) predictions as of 2010 talking about 100%; GER 2020 = 35%*

German North Sea zone: Offshore Wind Farms



Offshore Windfarms
- in use
- under construction
- approved
- planned

Platforms
- E-Transformer, in use
- E-Transformer, under construction
- E-Transformer, approved
- E-Transformer, planned
- E-Converter, under construction
- E-Converter, planned

Cables (Offshore Windfarms)
- in use
- under construction
- approved
- planned

Boundaries
- Territorial Sea
- ContinentalShelf/EEZ
- International Boundary

Map Projection:

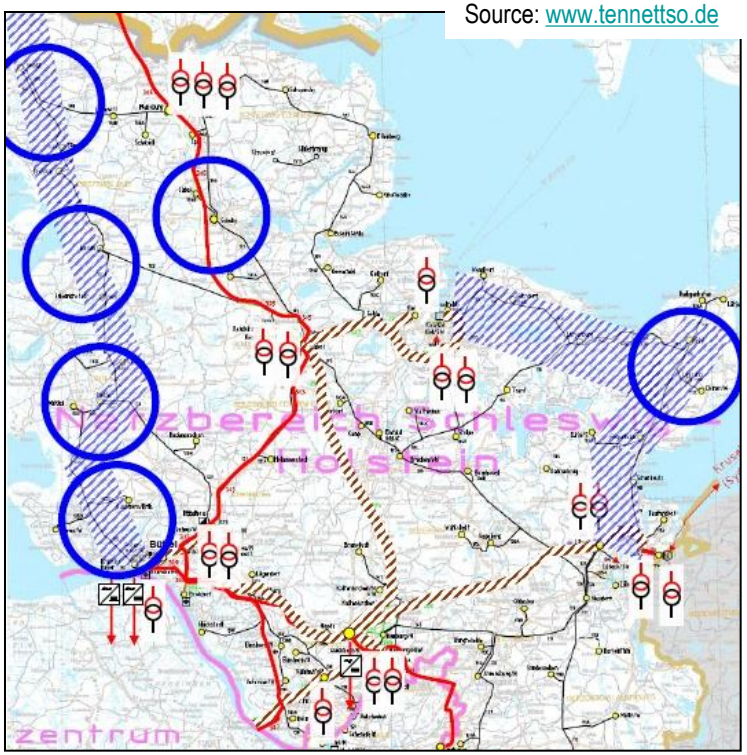
Source: www.bsh.de/en/Marine_uses/Industry/CONTIS_maps/NorthSeaOffshoreWindfarmsPilotProjects.pdf

BSH / M5 - 27.03.2012

Major focus of SH own Energy policy

- SH Grid Development Initiative to accelerate planning/permitting procedures and to enhance public acceptance (late 2010)
- support frame conditions of RES investments (wind, biomass), incl. use of EU funds (ERDF, EAFRD)
- strengthen SH RES expertise: CE's Wind & Biomass, Cluster „windcomm sh“
- partner in North Sea Countries Offshore Grid Initiative (NSCOGI)

Source: www.tennettso.de



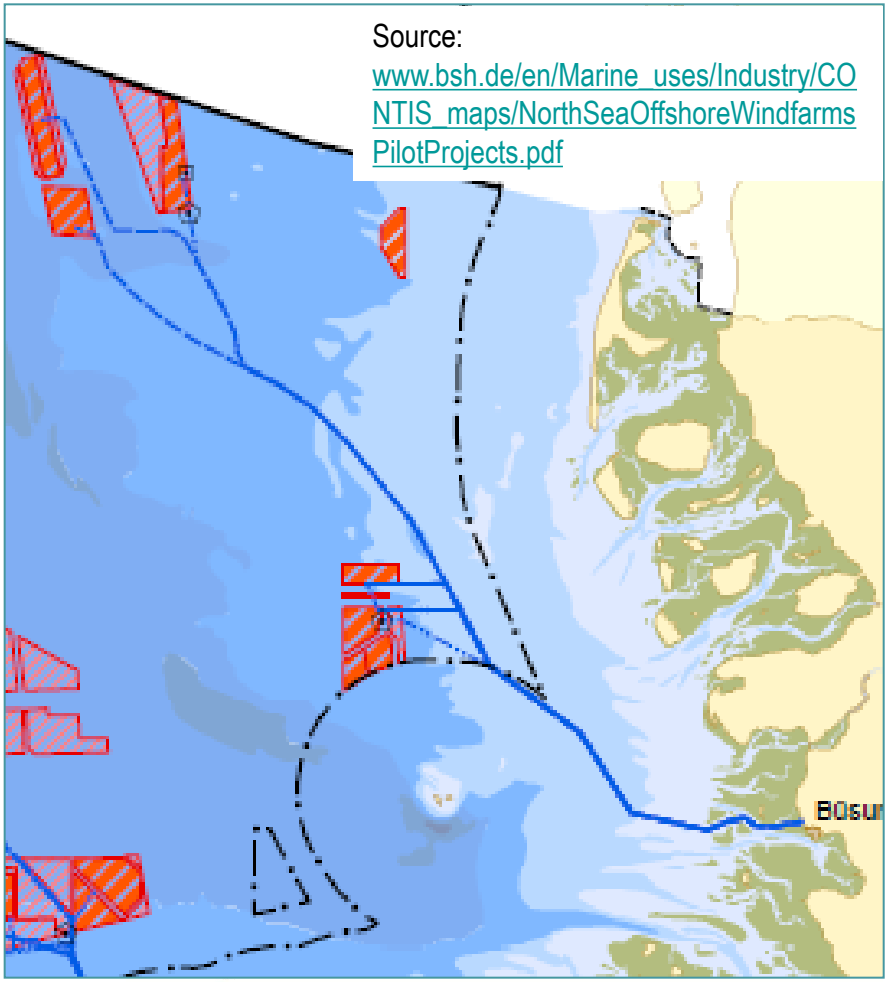
existing 380 kV line

new 380 kV line corridor considered

new 380 kV line using existing 220 kV line corridor

Some related grid improvement needs…

- integrating Offshore wind:
- accessing storage capacities:



…connecting to TenneT's grid strategy?

focussing on

- **GER: >20,000 MW** RES power until 2020
- **SH:** a share of **>9,000 MW** RES power already by 2015??
- combining the grid potentials at **Dutch and German** Tennet TSO's grounds

Source: www.tennettso.de

3. How does/may the energy issue affect bilateral partnership?

- agreed to be a common issue at CC meeting 2010, re-called at CC meeting 2011 ➔ taking stock of
  - current EU Energy Policy framework,
  - North Sea Countries Offshore Grid Initiative *(encompassing about 90% of European offshore wind potentials by 2020)*
  - bilateral SH/NOR grid issues (the Nord.Link cable project)

  ➔ raising open questions on wind & bio energy *(ENCN)*
- CC meeting 2011 added by visits to local RES initiatives (wind, biomass/gas, citizen/community owned projects, local biogas based heating models)

Agreements from CC meeting 2011

- further promote subsea cable project NORD-LINK with a view to speedy authorization and realization
- forward some data required from SH
- investigate possible cooperation projects (based on best practises, exchange of experience & information within wind power and bio-energy)
- Persons to keep in touch on energy: Thomas Pfannkuch (SH), Ole Haabeth/Joakim Svelien (Østfold)

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What to keep in mind when reflecting further?

- any tentative cooperation idea be based on interests to be defined as precise as possible
- SH side: due to structures given, it may be necessary to find an institution inside SH for cooperation (then the Ministries to act as intermediator)
- ENCN: a project not necessarily needs to comprise all fylker = 1 ENCN member to take the lead (work), regardless of whether all or some fylker be involved

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