

ENTSO-E

Project Ten-Year Network Development Plan 2012

Released for 8-week public consultation

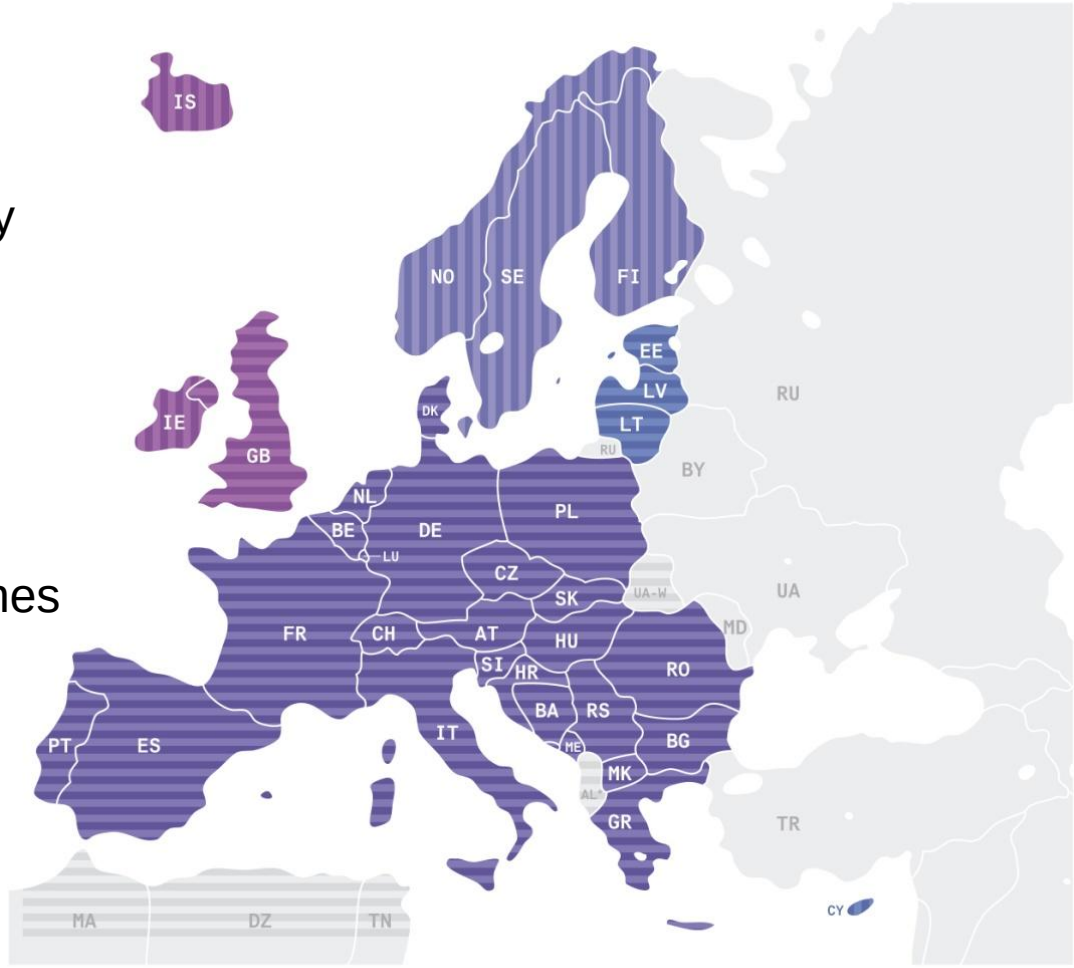
Overview, February 2012

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Reliable Sustainable Connected

We are ENTSO-E

- **41 TSOs from 34 countries**
- Founded on 19 Dec 2008 and fully operational since **July 2009**
- A trans-European network
  - **525** million citizens served
  - **828** GW generation
  - **305,000** Km of transmission lines
  - **3,400** TWh/year demand
  - **400** TWh/year exchanges
- Legal mandate, among which TYNDPs, based on Reg. (EC)714/2009



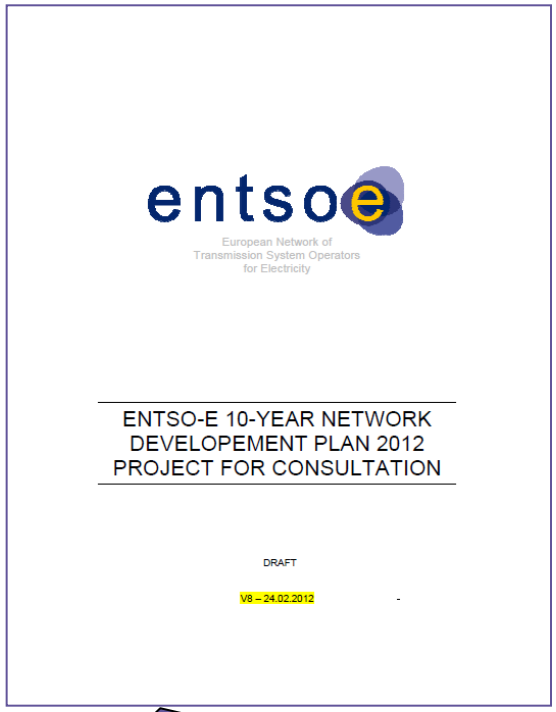
ENTSOE releases the TYNDP 2012 package

A vision for the future European extra high voltage grid

- A non-binding plan, updated every 2 years by ENTSO-E
- A modeling of integrated networks
- A generation adequacy outlook

A comprehensive and synthetic 8-document suite

- Ten-Year Network Development Plan report
- Scenario Outlook & Adequacy Report
- 6 Regional Investment Plans


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European Network of Transmission System Operators for Electricity

ENTSO-E 10-YEAR NETWORK DEVELOPEMENT PLAN 2012 PROJECT FOR CONSULTATION

DRAFT

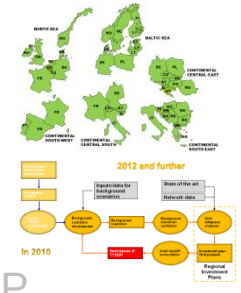
V8 – 24.02.2012

In consultation until 26th April

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Major improvements compared to the TYNDP 2010 report

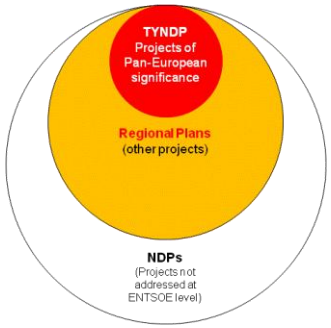
- An organisation framework to elaborate Plans
  - Identification of Europeans regions relevant for grid development
  - A looping elaboration process, constantly improving
  - A public procedure to identify 3rd Party projects
  - Consistent approaches for Regional Investment Plans and TYNDP



- Bottom-up & top-down scenario development
  - Consulted, complying with EC initiatives and Member States positions

- Methodology for project assessment
  - Explicit definition of projects of pan-European significance
  - Projects identification & standard assessment: Cost Benefit Analysis
  - Basis for future Project of Common Interest selection at Regional level

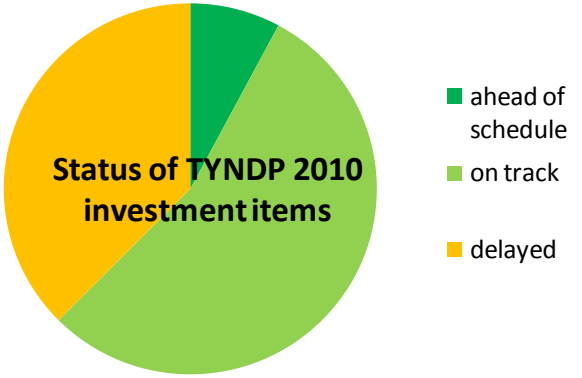




↳ **Many bilateral meetings, external workshops, consultations**
↳ **… with limited feedback**

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Evolution compared to TYNDP 2010



Social acceptance and permitting issues result in one third of TYNDP 2010 investment items to be delayed

21% of investment items are new ones in the TYNDP 2012 package

- regular turnover



Background scenarios matching EU 2020 goals

Peak load growing by about 8% by 2020

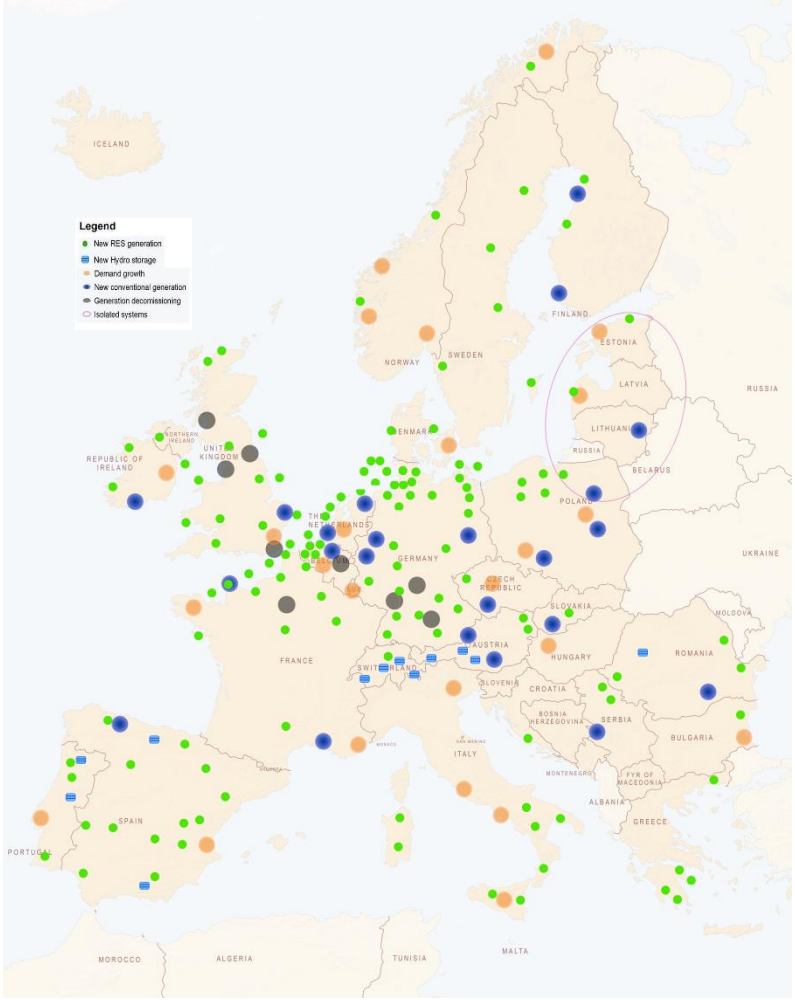
- energy efficiency, economic crisis…
- switch from fossil fuels to electricity, development of electric devices…

Renewable energies boom providing by 2020 as much as 38% of the electricity demand

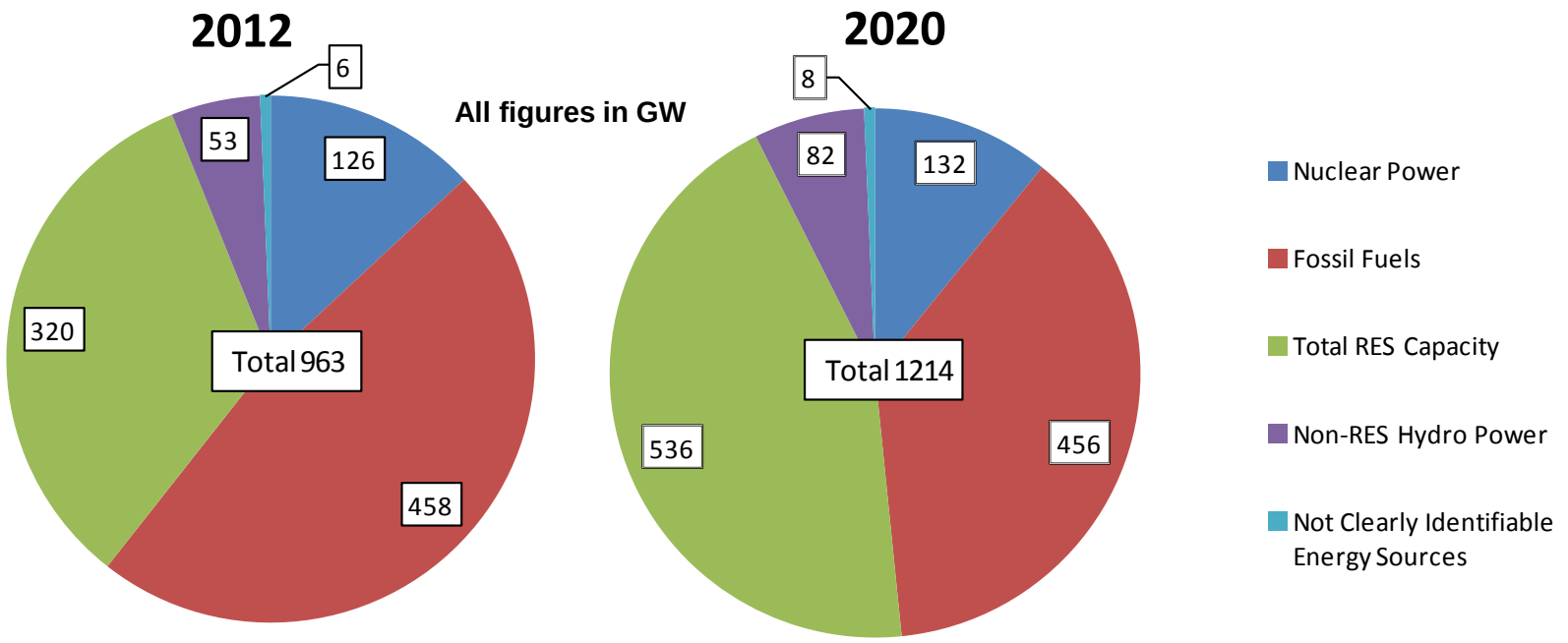
- mostly wind, photovoltaic

CO2 emissions of the power sector also sink from 26% to 57%

- Depending on the share of gas and coal-fired units in the mix



Evolution of Generation Mix till 2020 (EU2020 Scenario)



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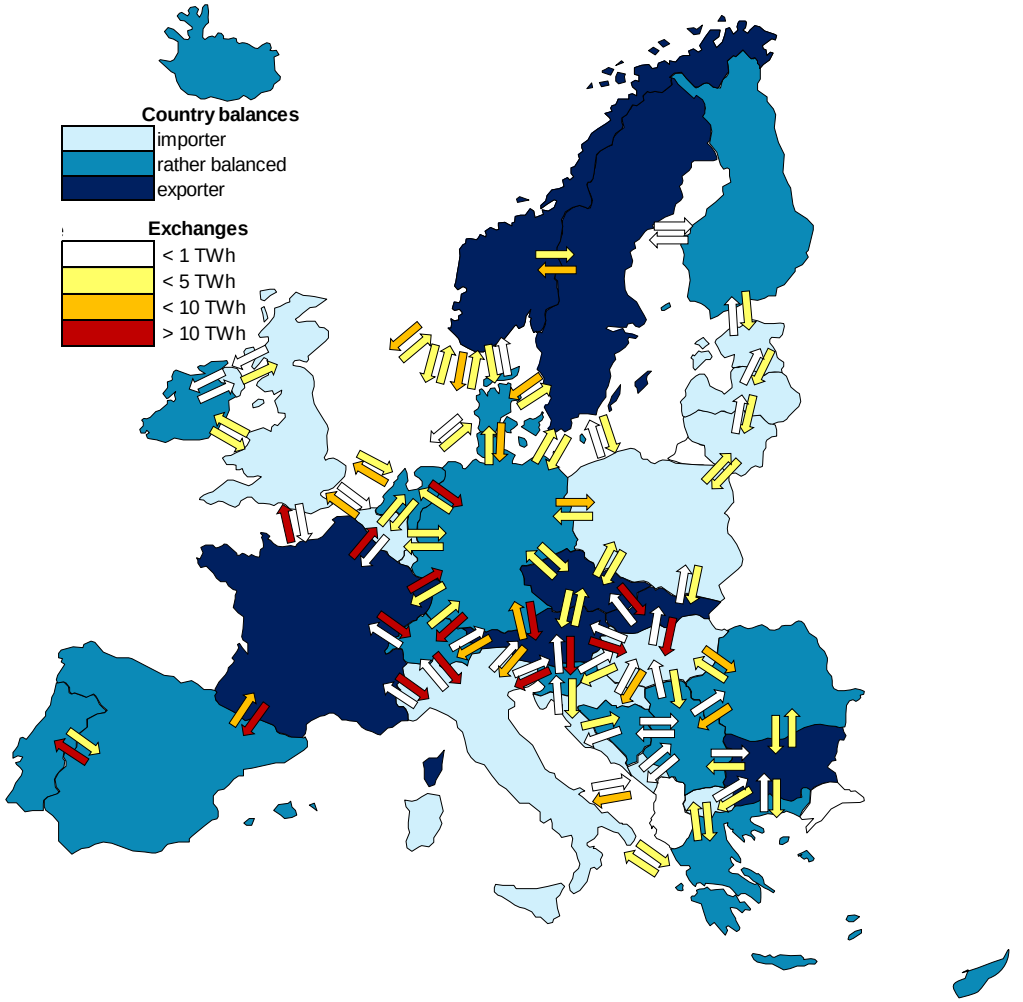
Thousands of possible situations and overall social economic welfare assessed via market studies

- 5% of generating costs saved by new interconnection



- Direct connection for 125 GW RES

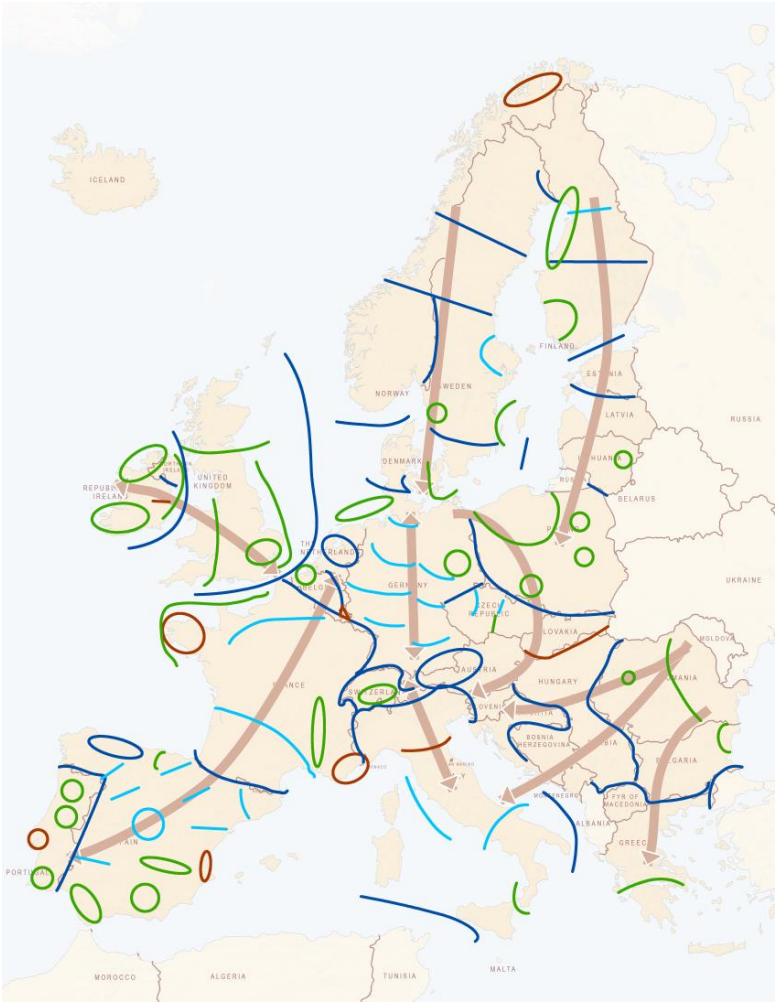
- - 170 Mt/y CO_2 emissions savings



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A detailed anticipation of upcoming congestions on grid

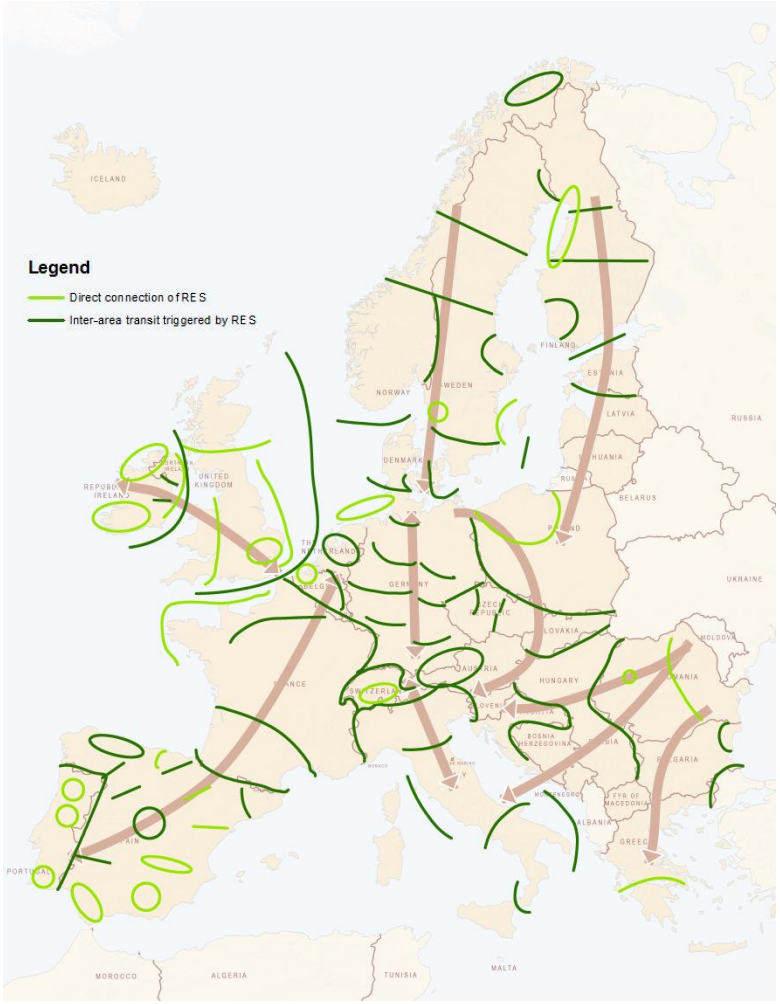
Larger, more volatile power flows, over longer distance across Europe



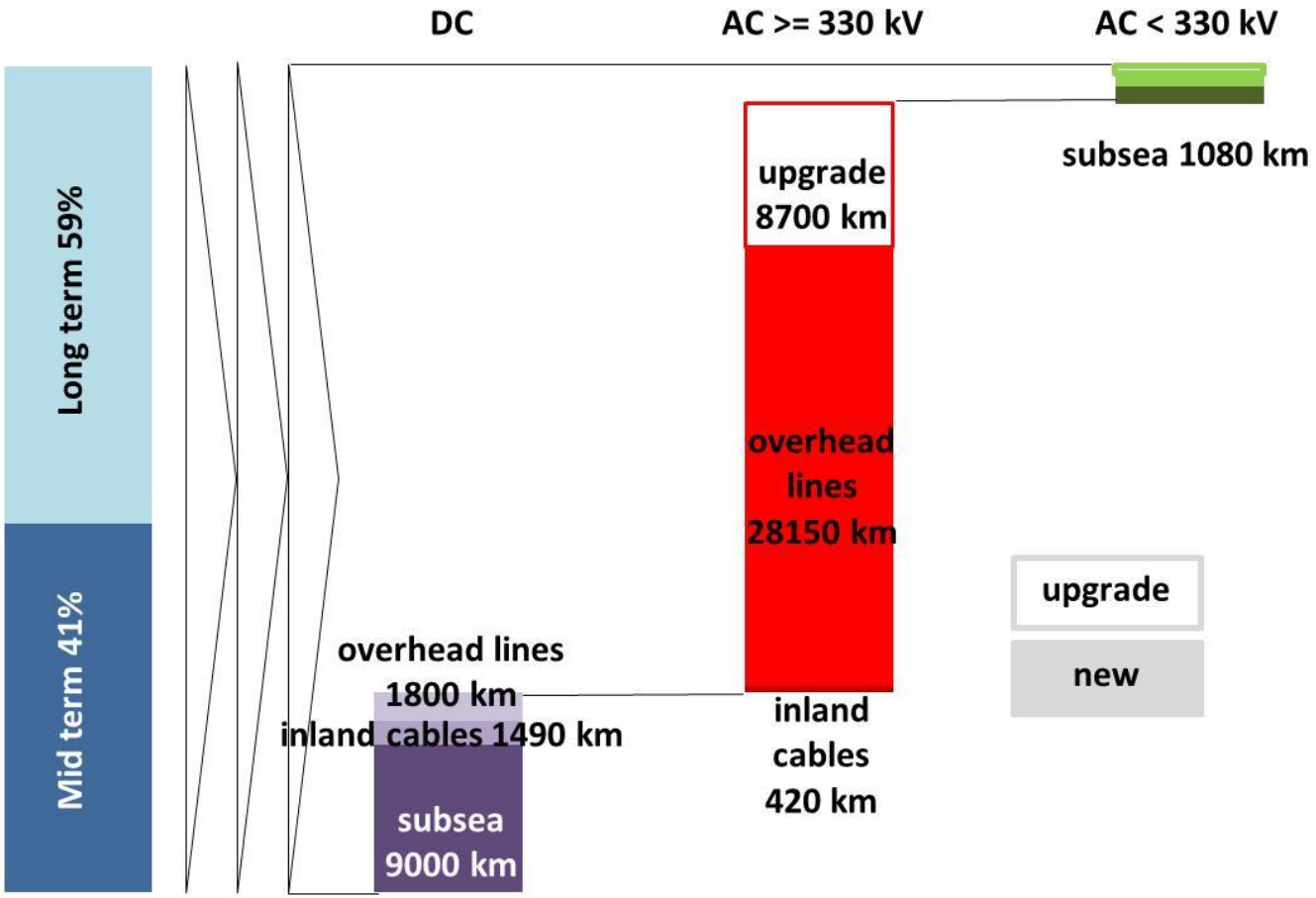
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Renewable generation triggers 80% of investments needs

Larger, more volatile power flows, over longer distance across Europe

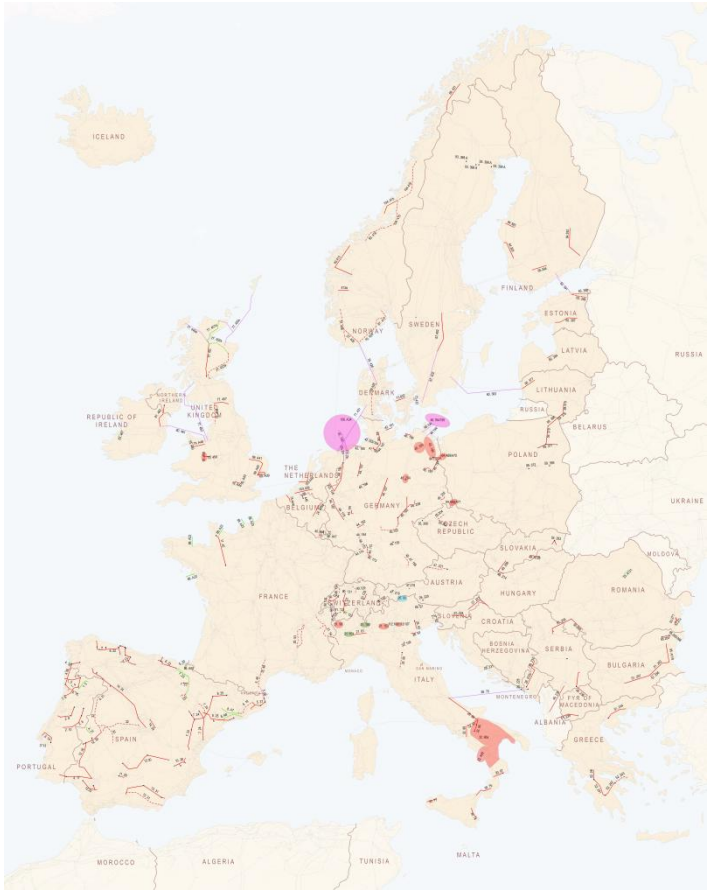


More than 50000 km of grid corridors to build or refurbish

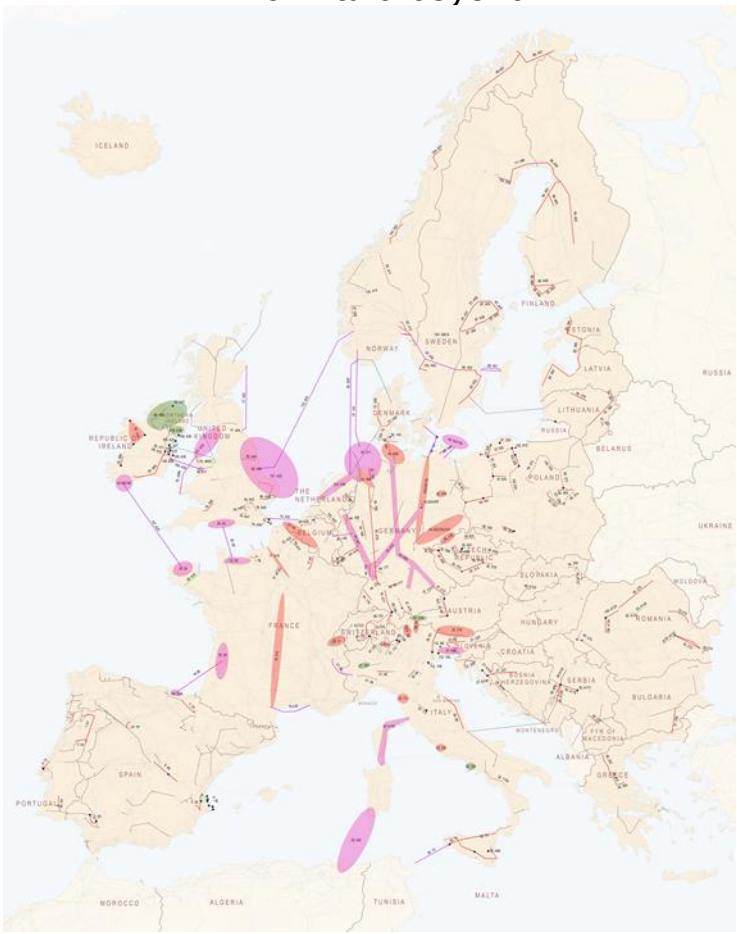


Investment is required all over Europe

By end 2016

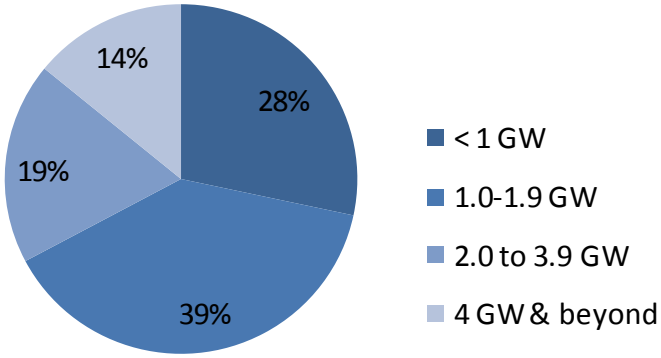


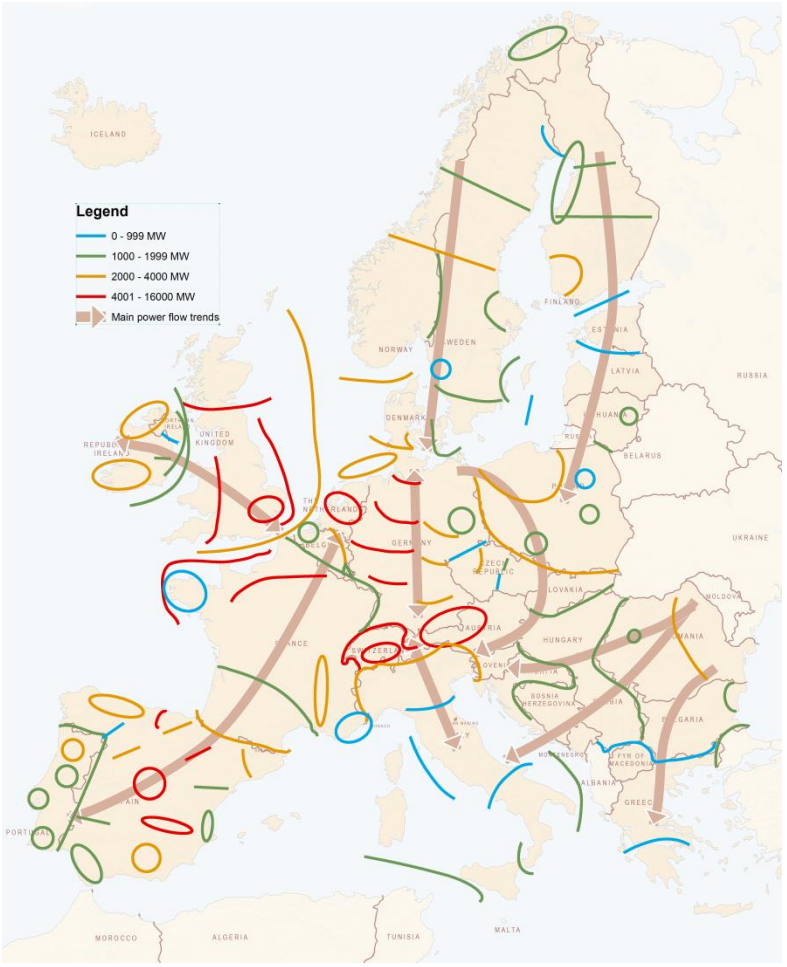
2017 and beyond



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Appropriately adapted grid transfer capability development

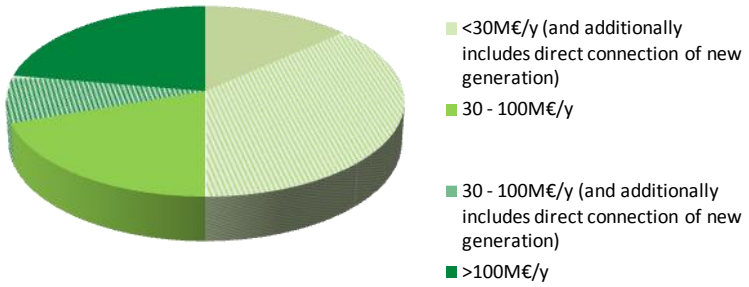




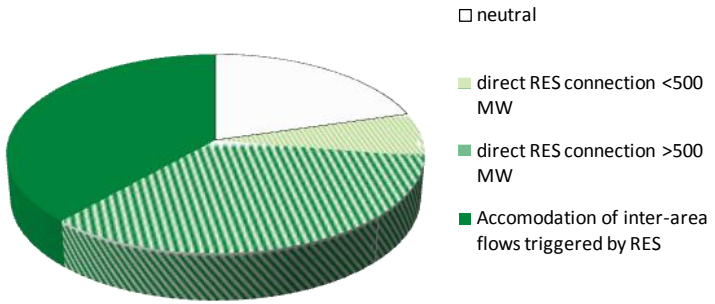
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A direct support to the European Energy policy goals

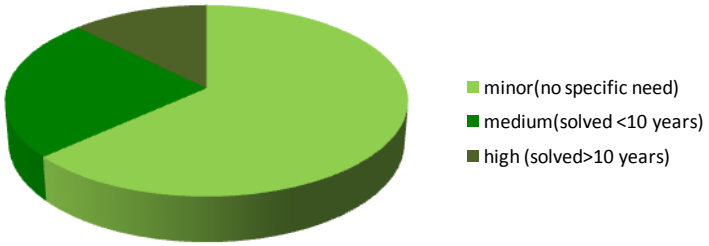
Social and economic welfare



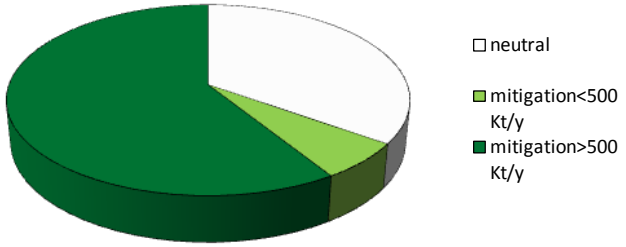
RES integration



Security of Supply



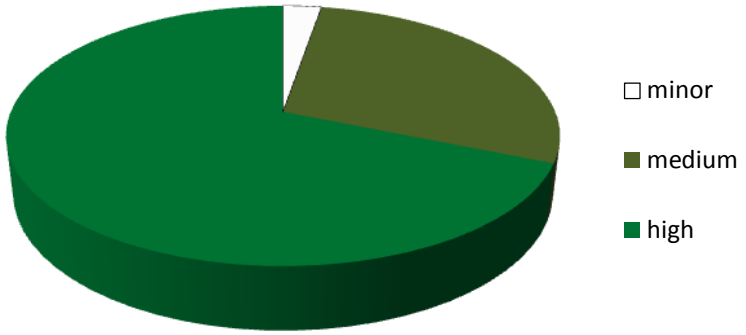
CO2 mitigation



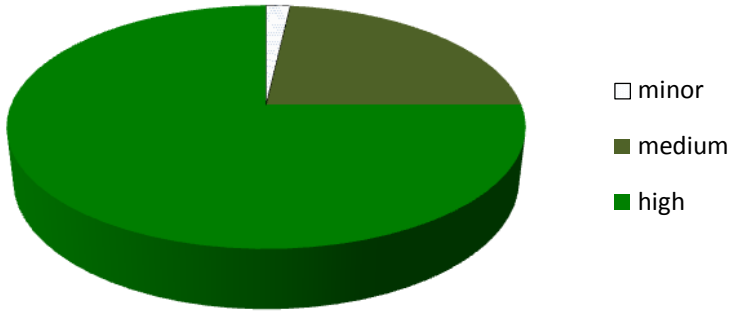
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Projects with high technical performances

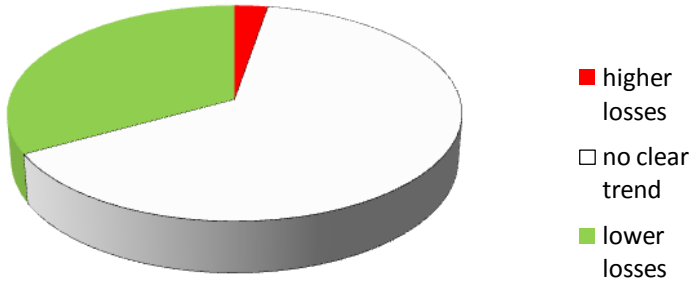
Technical resilience



Flexibility



Losses variation



Additional investment reduces overall losses… ceteris paribus

About €100 billion in the coming 10 years

- €100 billion investment on grids…
- ≈ 1.5-2 €/MWh in Europe over the 10-year period,
- ≈ 2% of the bulk power prices,
- ≈ less than 1% of the total end-users' electricity bill

	billion €		billion €
Austria	1.1	Ireland	3.9
Belgium	1.9	Latvia	0.4
Bosnia-Herzegovina	0.0	Lithuania	0.7
Bulgaria	0.2	Luxembourg	0.3
Croatia	0.2	Montenegro	0.4
Czech Republic	1.7	Netherlands	3.3
Cyprus	0.0	Norway	6.5
Denmark	1.4	Poland	2.9
Estonia	0.3	Portugal	1.5
Finland	0.8	Romania	0.7
France	8.8	Serbia	0.2
FYROM	0.1	Slovakia	0.3
Germany	30.1	Slovenia	0.3
Greece	0.3	Spain	4.8
Hungary	0.1	Sweden	2.0
Iceland	0.0	Switzerland	1.7
Italy	7.1	United Kingdom	19.0

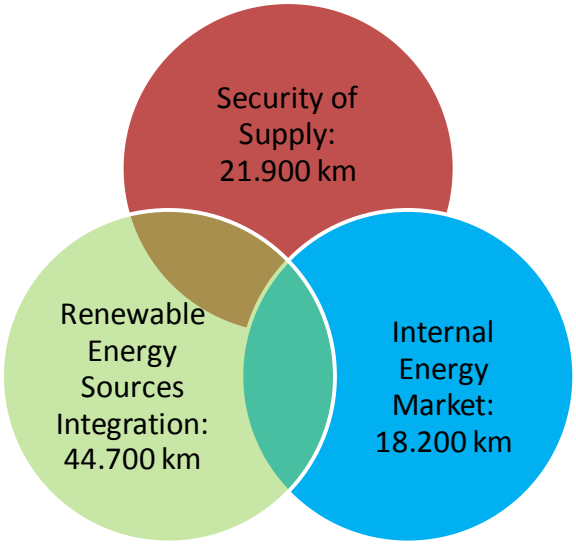
Total ENTSOE perimeter	104

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A relatively limited network growth answering major challenges

- Grid length development is only +1.3%/yr despite a major upcoming shift in generation mix
  - 1/3 of the present generation capacity to be build in the coming decade (i.e. +3%/yr)
  - Peak load growth +1.7%/yr

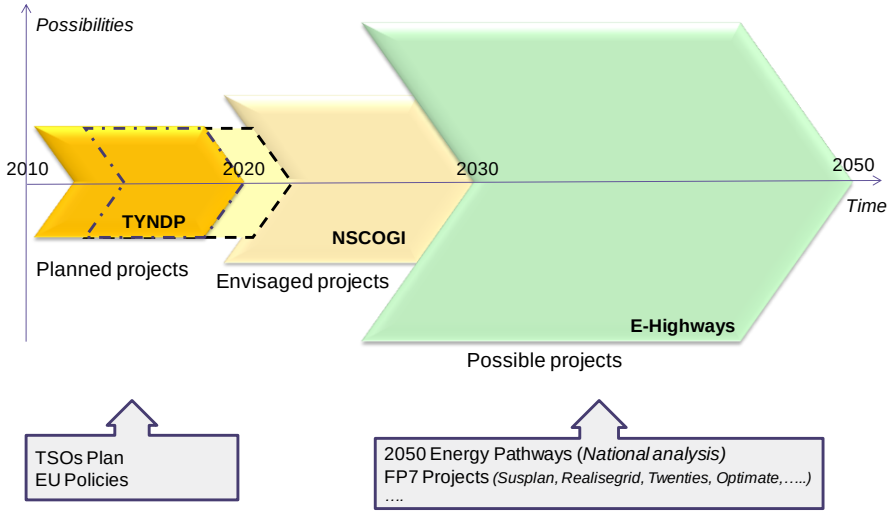
- A strong support to EU energy policies with efficient resources commitment



Reliable, adaptable and robust investments

- An anticipation of thousands of diverse situations
- An analysis of most frequent situations, and extreme ones
  - Peak hours winter/summer
  - High, unbalanced renewable generation across Europe
- Use of novel and unconventional technologies ⇔ Smartgrids
  - Several world premieres
  - ENTSO-E R&D program
- First step toward

  Electricity Highways 2050



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A 10-year plan to meet EU 202020 goals

> 100 projects, 51 500 km, approx. €104 bn of investments

- Notwithstanding non pan-European significance projects

+1.3% per year grid length development despite a major upcoming shift in generation mix to accommodate wider, stronger, more volatile power flows

- One third of the present generation capacity to be built in the coming decade (i.e. +3% per year)

A solid basis for the Project of Common Interest selection

Social acceptance is still the major challenge!

- One third of TYNDP 2010 investment projects are delayed because of longer than expected authorization procedures