ENTSO-E's Ten Year Network Development Plan 2014

LTND Stakeholder Group

Brussels, 01/07/2014

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Reliable Sustainable Connected

Content

1. TYNDP role in reaching the European targets
2. TYNDP in a nutshell
3. TYNDP continuously improving
4. TYNDP process
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7. Regional studies –main findings
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1. **TYNDP role in reaching the European targets**
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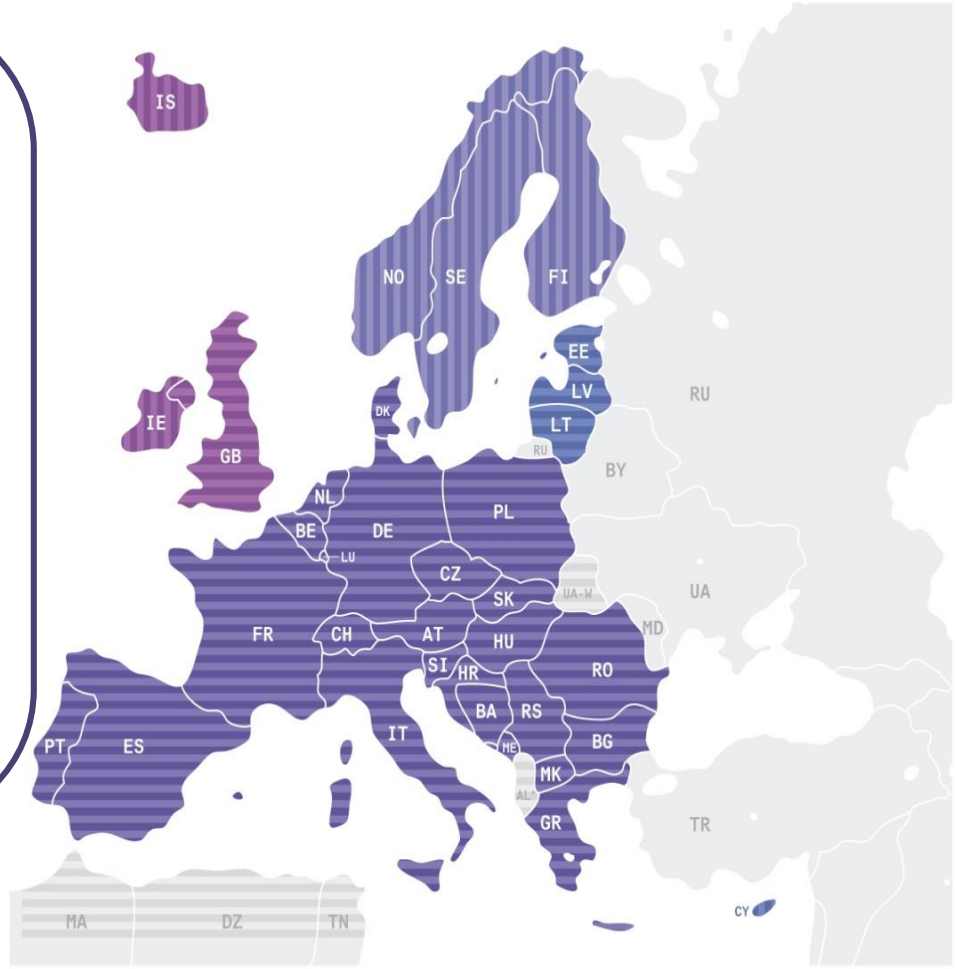
8. **Conclusions**

Energy Policy Goals Require significant increase in grid Capacity

Ensuring the development of a single European grid in line with **20-20-20 targets and upcoming 2030 targets**

Guaranteeing **security of supply**

Completing the **internal energy market**



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ENTSO-E is the expert in building the European grid

ENTSO-E: association of all the European TSOs*

TSOs: neutral role in the European energy market

ENTSO-E expertise: thousand of professionals all over Europe

TSOs: here to serve the society as a whole

Regulation (EU) 714/2009 – *"In order to ensure greater transparency regarding the entire electricity transmission network in the [Union], the ENTSO for Electricity should draw up, publish and regularly update a non-binding [Union]-wide ten-year network development plan"*

* Except Ukraine, Moldavian Republic and Russia

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TYNDP – the sole base for the PCI selection - Regulation (EU) 347/2013

Transparency on all TYNDP projects

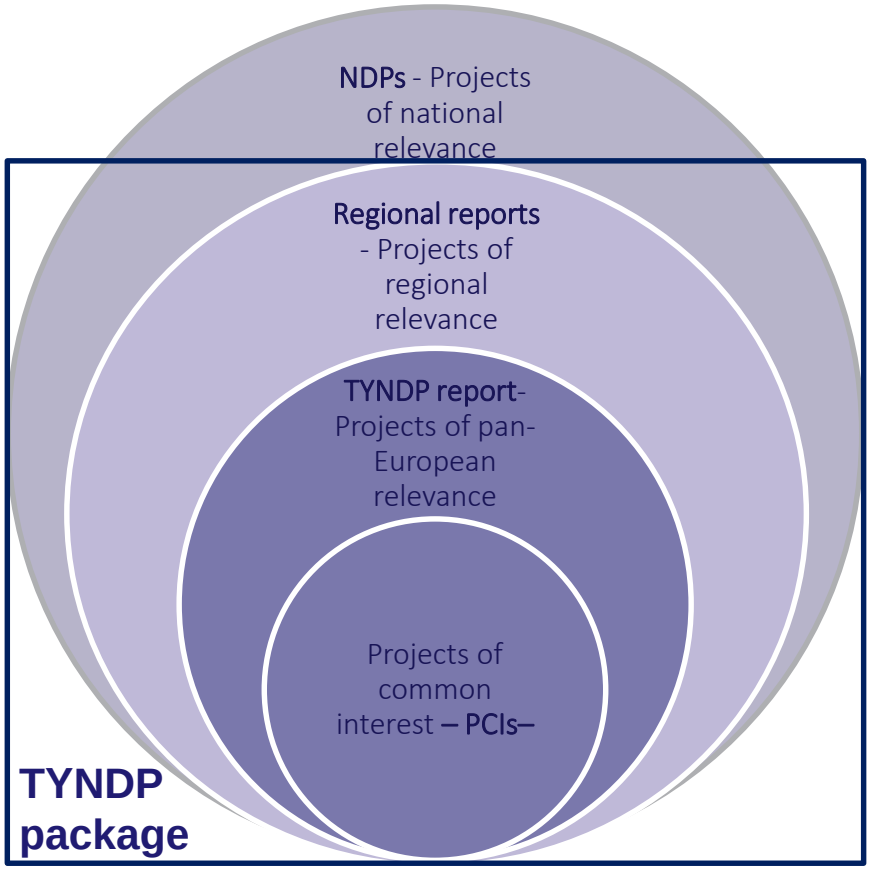
Harmonized EU energy system-wide CBA

Demonstrate overall costs and benefits from a Pan-European system perspective

Support in the selection of the PCIs

TYNDP CBA results- support for the PCI Selection process

Support to the Cross border cost allocation if requested



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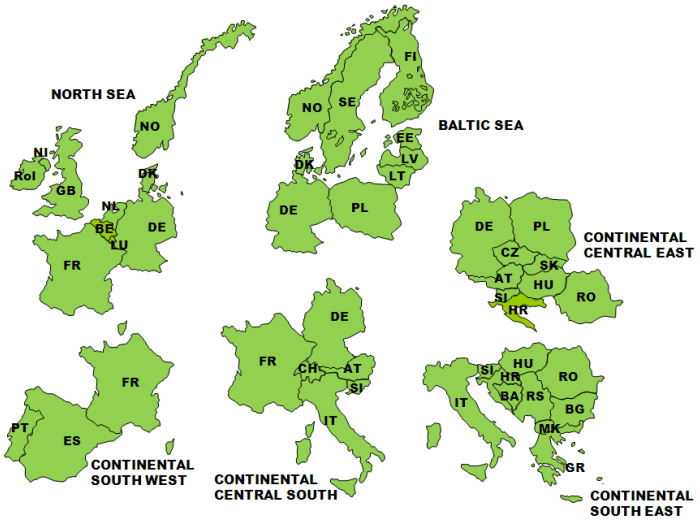
The TYNDP 2014 package delivers…

…a vision for the development European extra high voltage grid

- Non-binding
- Updated every 2 years
- Based on common market and network studies
- Generation adequacy outlook

…a comprehensive document suite that includes

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



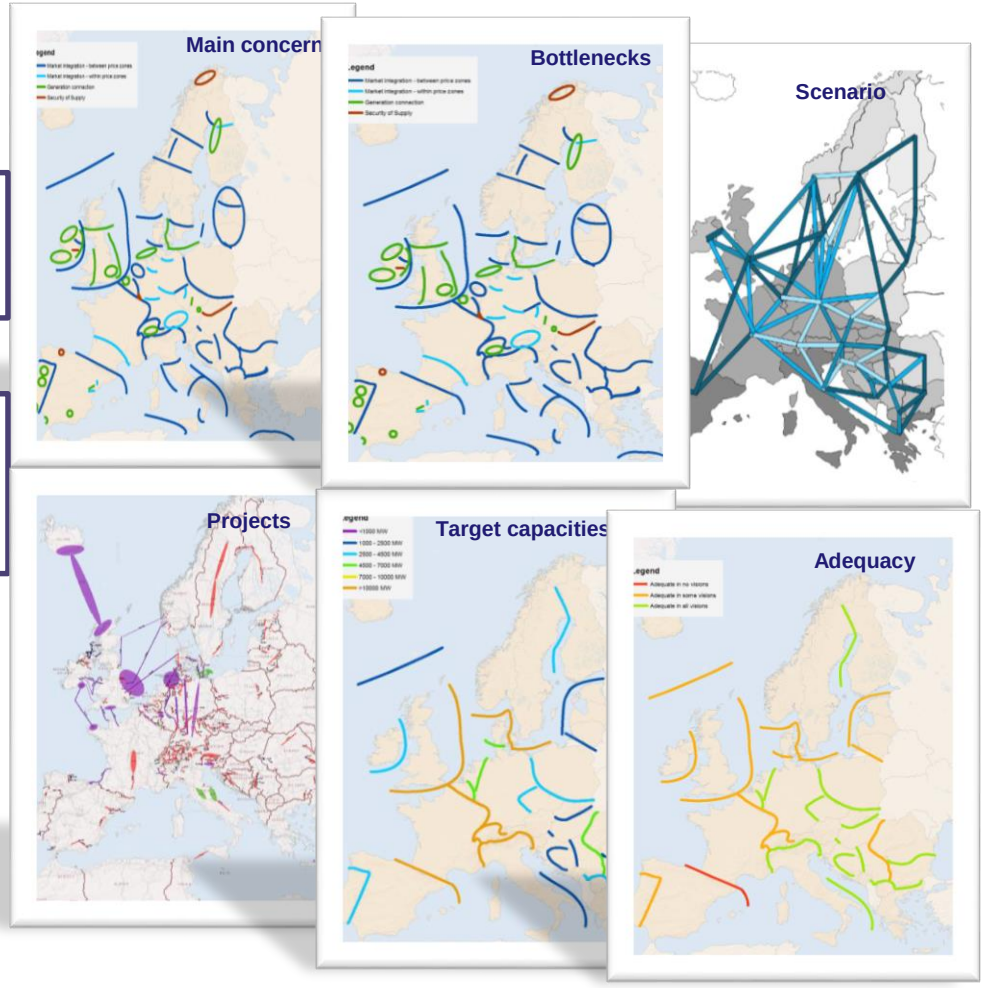
Ten-year Network development plan overview

Transparency

TSO cooperation platform

Inform EU policy and investment decisions

Stakeholder involvement



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The TYNDP 2014 capitalizes upon and improves past work

TYNDP 2010

- ENTSO-E proactively publishes the pilot TYNDP
- Bottom-up approach
- 2020 scenarios
- No 3rd party projects incorporated
- ENTSO-E significant effort to create and run the TYNDP process with all its 41 members

TYNDP 2012

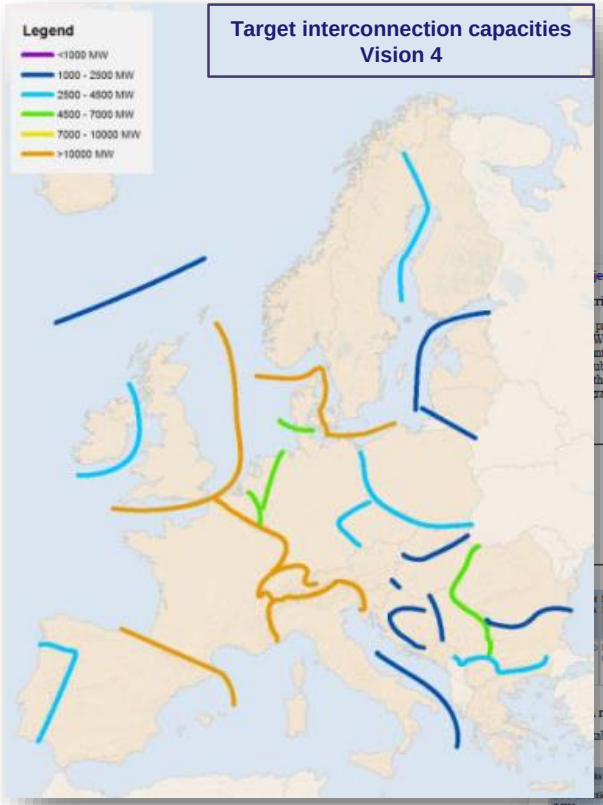
- First official TYNDP package
- Bottom-up and top down approach
- 2020 scenarios
- First call for the inclusion of the 3rd party projects (transmission)
- First assessment of the projects using the CBA methodology
- Supports the discussions on the new energy infrastructure legislation

TYNDP 2014

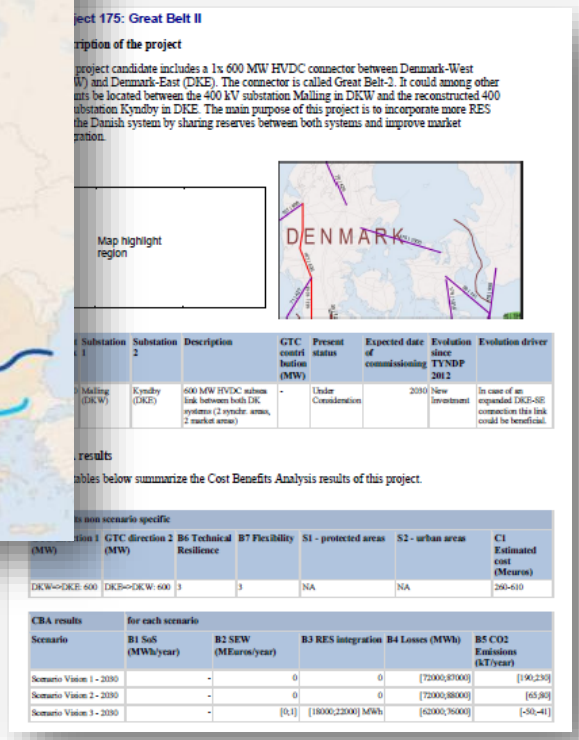
- Second official TYNDP package
- Bottom-up and top down approach
- **2030 scenarios**
- Second & Third call + new procedure for inclusion of **3rd party projects (transmission & storage)**
- **Improved CBA methodology**
- Sole base 2015 PCI list
- Intermediate update of the TYNDP 2012 table of projects
- **Creation of the Long-Term Development Stakeholder Group**

TYNDP 2014 improvements and achievements

1. **Exploration up to 2030**
2. **New clustering rules for projects of pan-European significance**
3. **Full quantification of projects assessment according to the CBA (assessment of all PCIs)**
4. **Target interconnection capacities**



Target interconnection capacities Vision 4

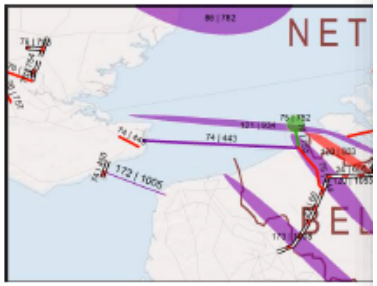


TYNDP 2014 Example of presentation of project

Project 74: Thames Estuary Cluster (NEMO)

Description of the project

This group of investments includes the 1 GW NEMO interconnector between Great Brit and Belgium and a number of onshore UK reinforcements to facilitate this and other potential interconnector connections within the Thames Estuary region.



Investment index	Substation 1	Substation 2	Description	GTC contribution (MW)	Present status	Expected date of commissioning	Evolution since TYNDP 2012	Ev
443	Richborough (GB)	Zeebrugge (BE)	Nemo Project: New DC sea link including 135km of 400kV (voltage level is subject to outcome of detailed engineering) DC subsea cable with 1000MW capacity	1000	Design & Permitting	2018	Investment on time	Inv wit cor pla lea cor op
449	Richborough (GB)	Canterbury (GB)	New 400kV double circuit and new 400kV substation in Richborough connecting the new Belgium interconnector providing greater market coupling between the UK and the European mainland.	1000	Planning	2018	Investment on time	Pro pla
450	Sellindge (GB)	Dungeness (GB)	Reconductoring the existing circuit which runs from Sellindge - Dungeness with a higher rated conductor. This will facilitate the connection of more interconnectors on the South coast and prevent thermal overloading of this area.	400	Design & Permitting	2015	Investment on time	Pro pla

The tables below summarize the Cost Benefits Analysis results of this project.

CBA results non scenario specific						
GTC direction 1 (MW)	GTC direction 2 (MW)	B6 Technical Resilience	B7 Flexibility	S1 - protected areas	S2 - urban areas	C1 Estimated cost (Meuros)
BE=>GB: 1000	GB=>BE: 1000	2	5	Negligible or less than 15km	Negligible or less than 15km	500-830

CBA results	for each scenario				
Scenario	B1 SoS (MWh/year)	B2 SEW (MEuros/year)	B3 RES integration	B4 Losses (MWh)	B5 CO2 Emissions (kT/year)
Scenario Vision 1 - 2030	-	[32;74]	[220000;270000] MWh	[410000;420000]	[180;220]
Scenario Vision 2 - 2030	-	[20;30]	[50000;61000] MWh	[370000;460000]	[160;190]
Scenario Vision 3 - 2030	-	[200;280]	[1800000;2200000] MWh	[190000;230000]	[-1300;-1400]
Scenario Vision 4 - 2030	-	[240;280]	[1100000;1400000] MWh	[190000;230000]	[-1700;-1400]

Additional comments

Comment on the security of supply: A new interconnector contributes to the security of supply of Belgium as a whole, due to the diversification offered to market players to import energy from countries where excess generation could be available. Giving the changing production mix with ongoing nuclear phase out and decommissioning of old power plants, this benefit materializes itself as soon as the project is realized.

Comment on the RES integration: avoided spillage concerns RES in UK and Belgium mainly.

Comment on the flexibility indicator: the project appears useful in all visions, depends on a key-investment and interconnects two synchronous areas.

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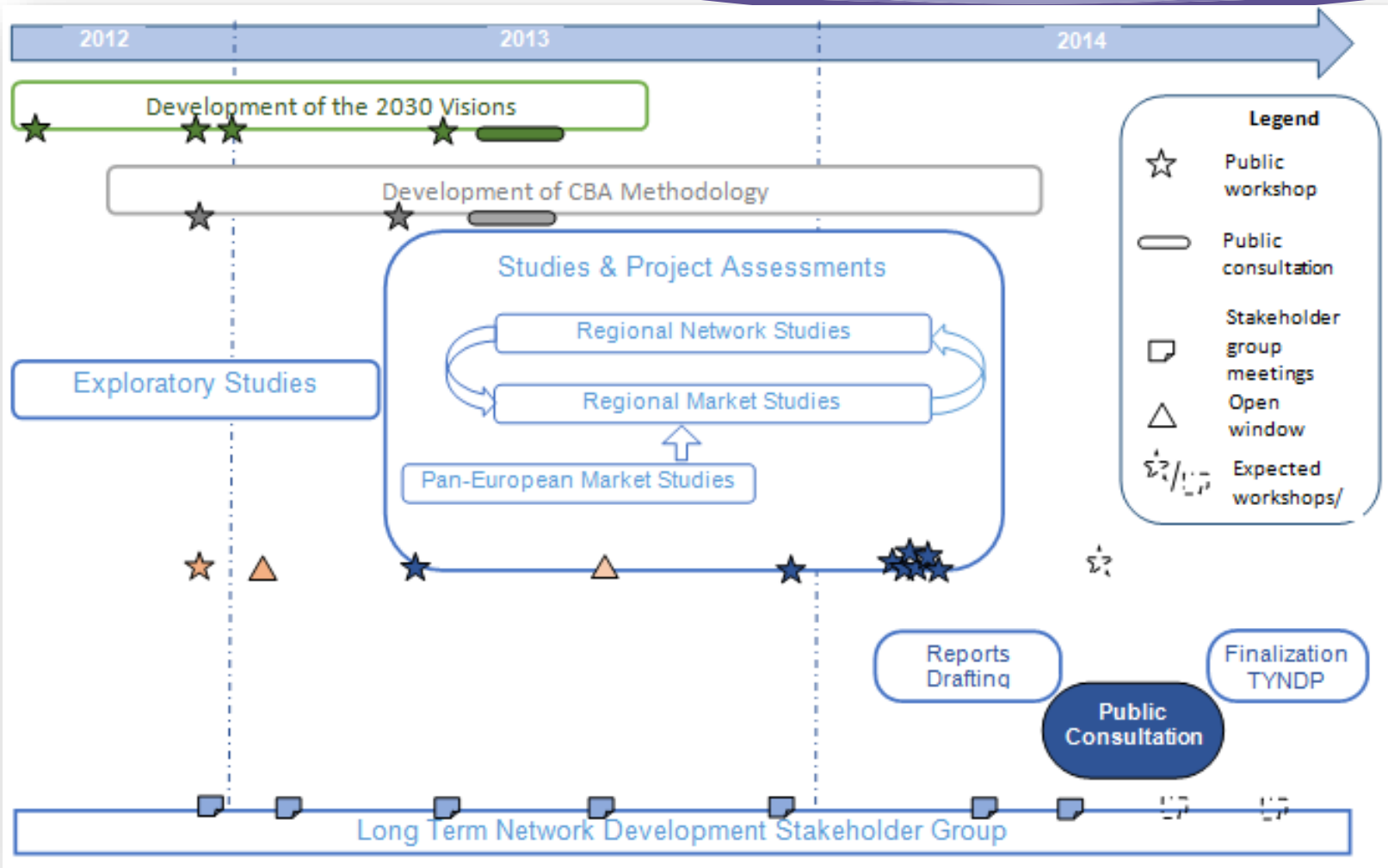
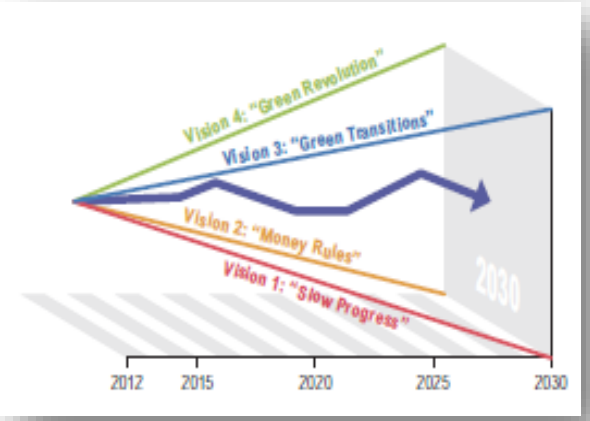
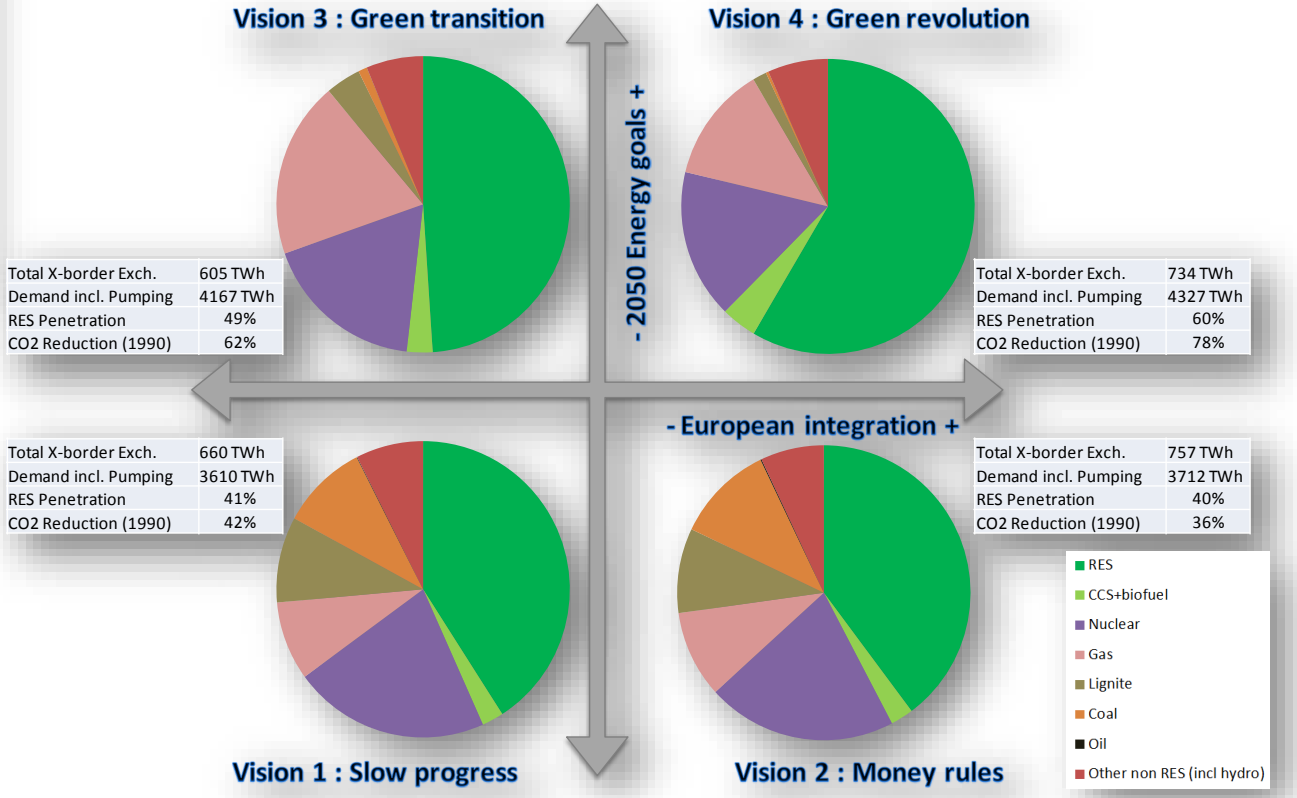
The TYNDP 2014 is the outcome of a 2-year process



Framing uncertainties by 2030 - 4 “Visions”





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2030: a milestone for the energy transition on the road to 2050

14%
35%
40%
50%
60%
% RES

-7%
2005

-20%

-39%
-42%

1
2

EU sets targets of 40% carbon cut and 27% share of renewables by 2030 – live

Rolling coverage and reaction on Europe announcing a new 2030 greenhouse gas emissions target

-62%

3

-78%

4

CO2 reduction (% - compared to 1990)

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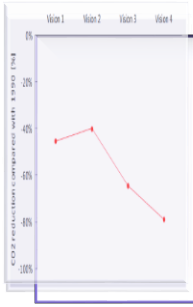
The Ten-year Network development plan 2014: Main findings

€150 billions for projects of pan-E significance by 2030

- 2 to -5 €/MWh for bulk power prices by 2030

46000 km of new or refurbished grid investments by 2030: +1%/year

An optimised land use: the crossed urbanised (resp. protected) areas account for less than 4% (resp. 8%) of the total TYNDP projects' routes



Contribution with 20% of the CO2 emissions mitigation for the European power sector by 2030

Integration of RES up to 40-60% of total consumption in 2030

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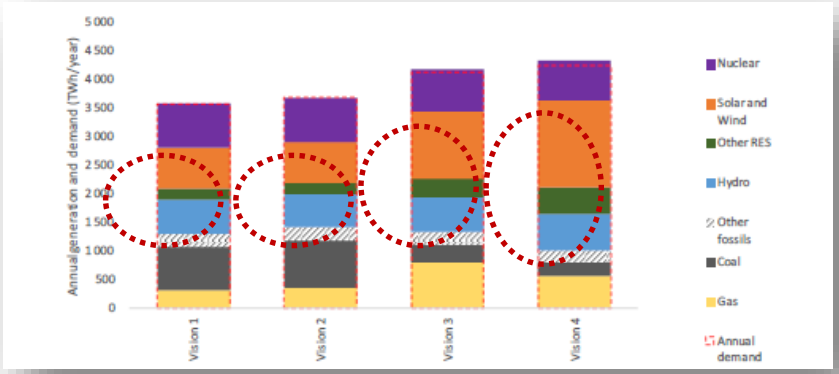
RES development: the major driver for grid development

Total installed capacity from now to 2030:

- +30% (Vision 1)
- +90% (Vision 4)

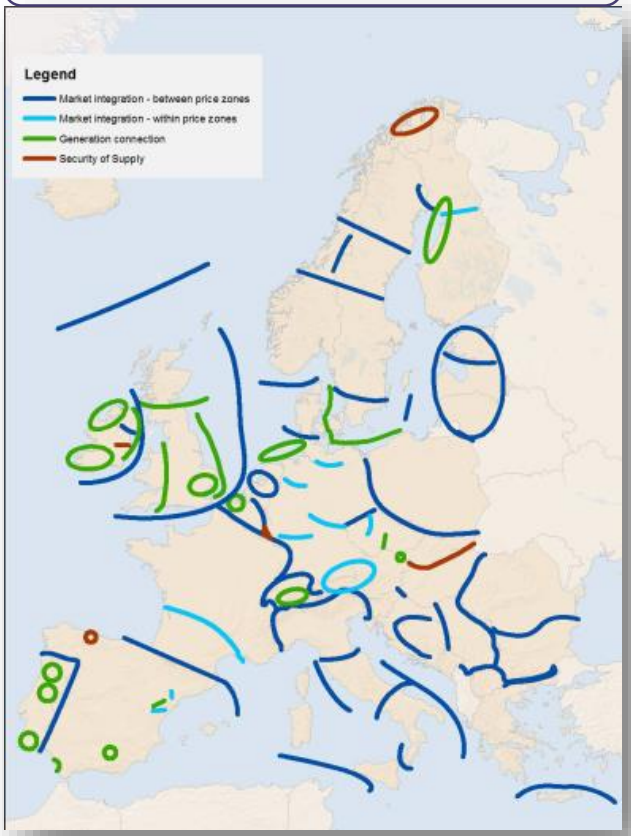
RES covers % of the demand in 2030:

- 40% (Vision 1)
- 60% (Vision 4)

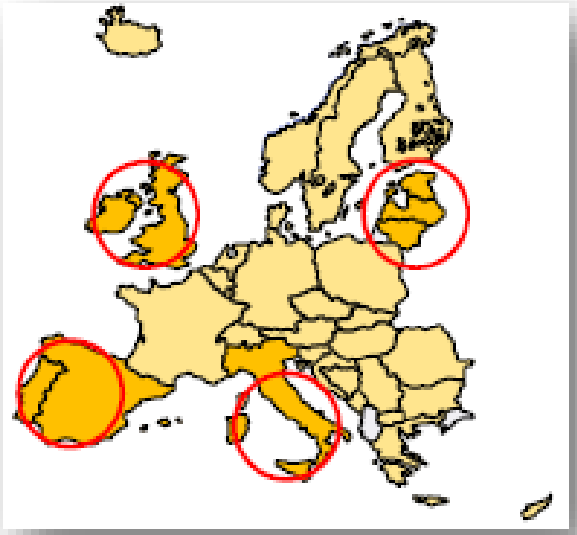


Larger, more volatile over longer distances power flows

About 100 investment needs



4 electric peninsulas



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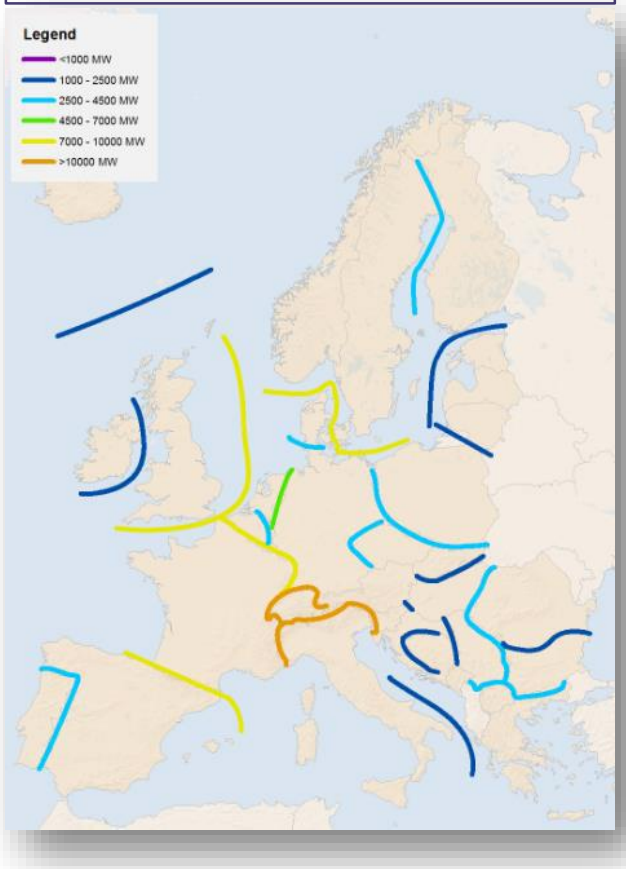
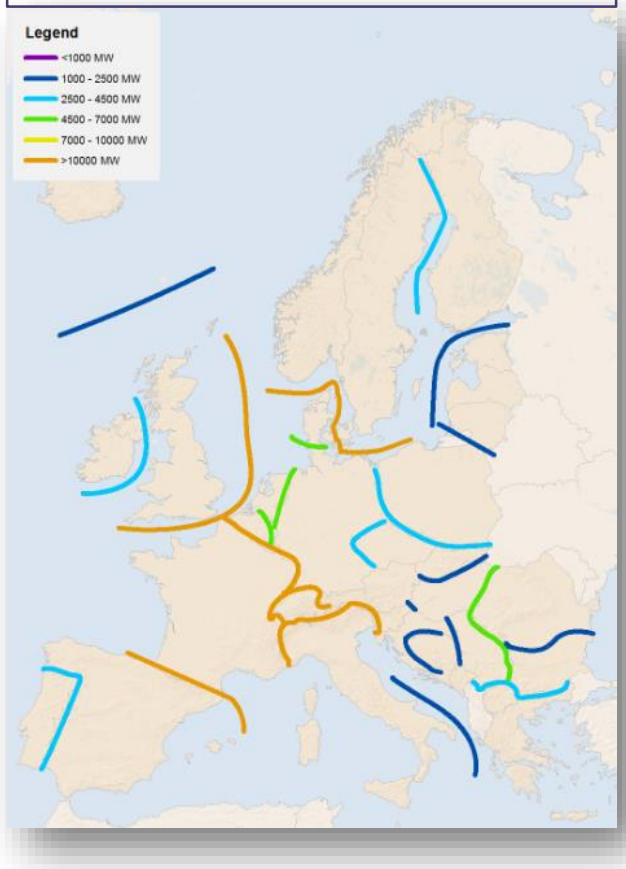
Interconnection capacity must on average double by 2030

Target interconnection capacities – Vision 1 –



Target interconnection capacities – Vision 4 –



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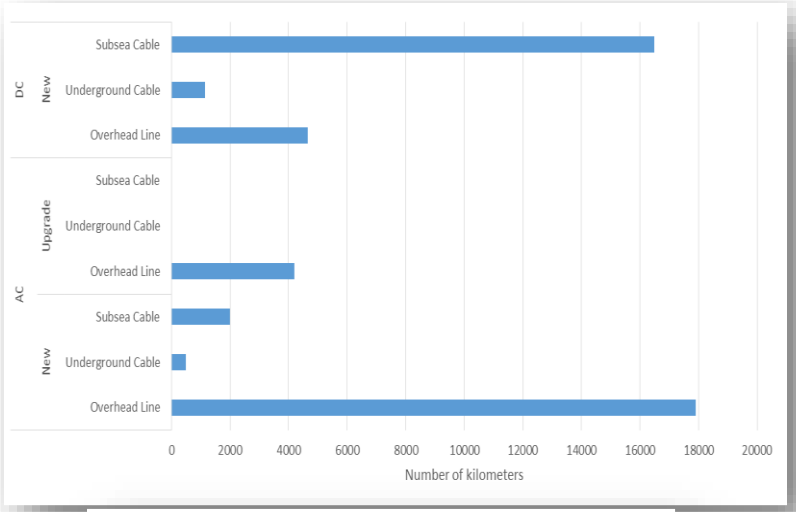
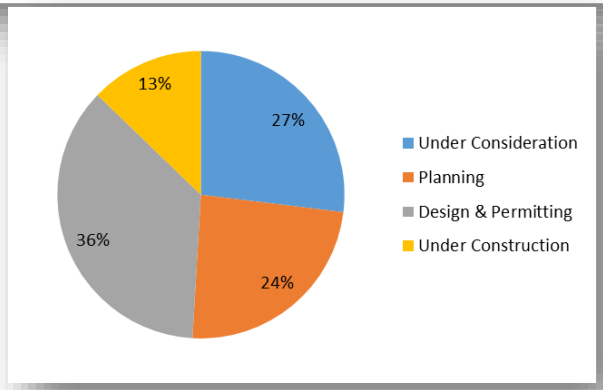
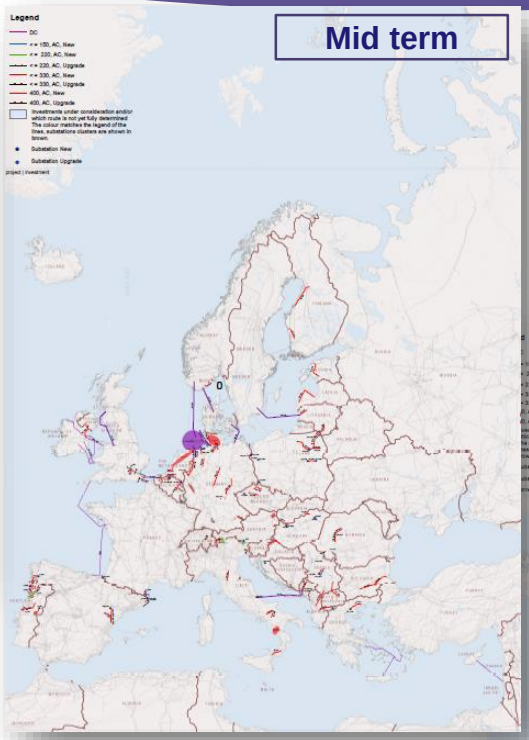
46000 km of lines to be built or upgraded by 2030







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€150 billion by 2030, with a positive net impact on social welfare

- 2 to -5 €/MWh for bulk power prices by 2030

€150 billions for projects of pan-European significance by 2030

AT	1.9	**IE**	2.0
BA	0.1	**IS**	0.0[1]
BE	2.0-4.0	**IT**	5.9
BG	0.3	**LT**	0.7
CH	1.6	**LU**	0.2
CY	0.0	**LV**	0.4
CZ	1.5	**ME**	0.1
DE	34.8-54.2	**MK**	0.1
DK	3.7	**NI**	0.5
EE	0.2	**NL**	3.3
ES	4.3	**NO**	7.9
FI	0.8	**PL**	1.9
FR	8.4	**PT**	0.7
GB	15.9-16.2	**RO**	0.5
GR	2.6	**RS**	0.4
HR	0.2	**SE**	3.6
HU	0.1	**SI**	0.6
		SK	0.3
Total		**110-150**	

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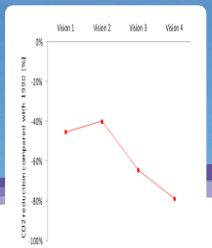
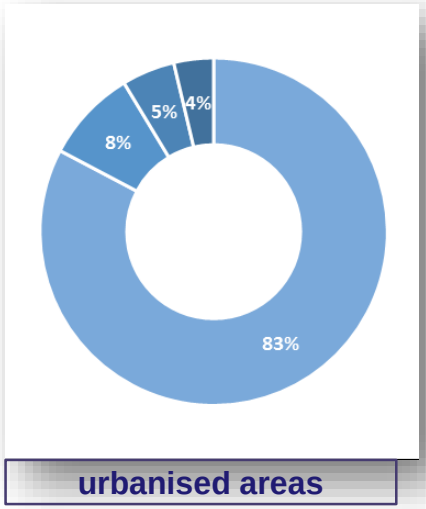


The pan-European infrastructure - positive environmental impact

Integration of RES up to 40-60% of total consumption

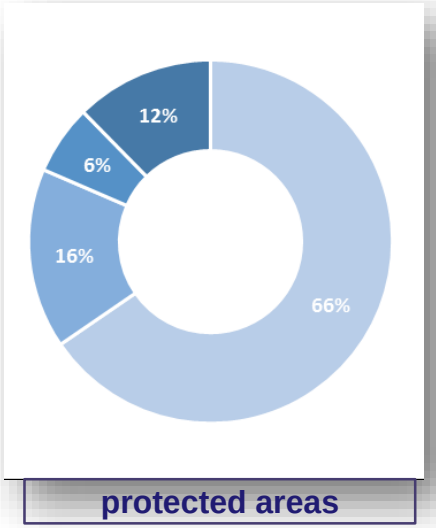
Less than 4% of routes affect urbanised areas

Less than 8% of routes affect protected areas



urbanised areas

- Negligible or less than 15km
- 15-50km
- 50-100km
- more than 100km



protected areas

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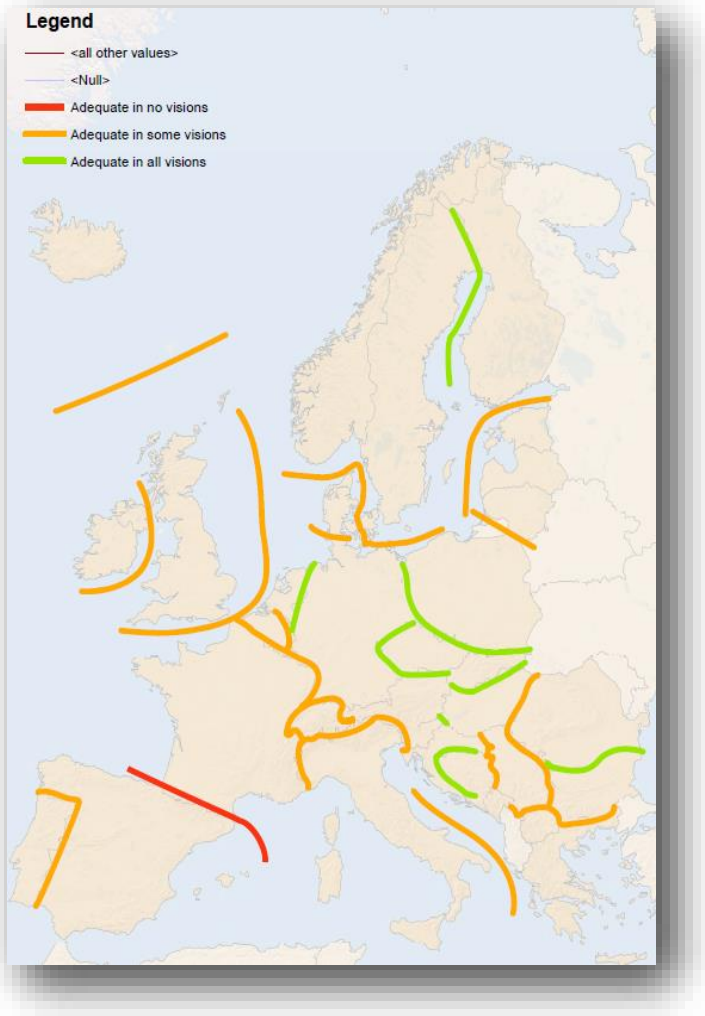
The pan-EU projects are well adapted and robust

Integration of iberian peninsula is still the main concern

Solution concepts must still become tangible projects to meet highest RES development goals (Vision 4)



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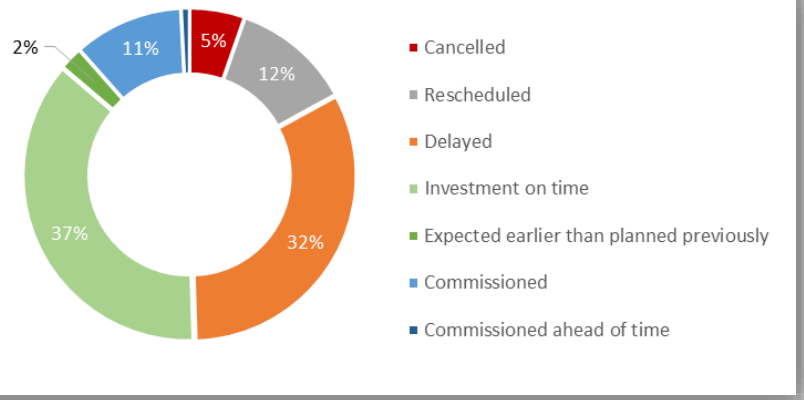
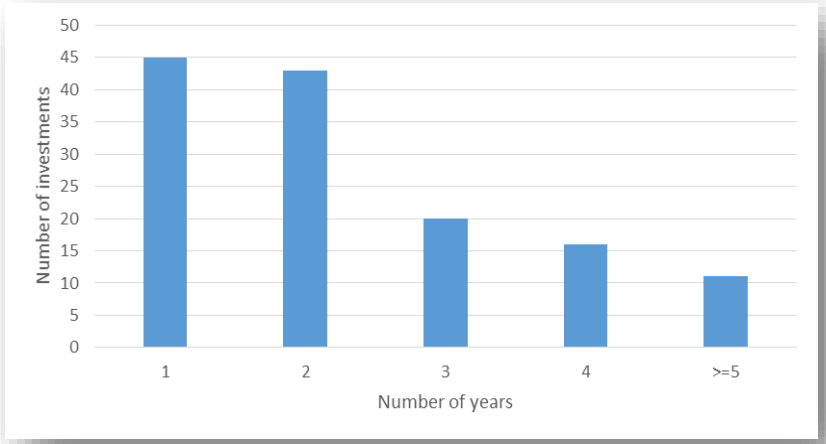
One third of TYNDP 2012 investments delayed





Follows the same trend as indentified in the TYNDP 2012.

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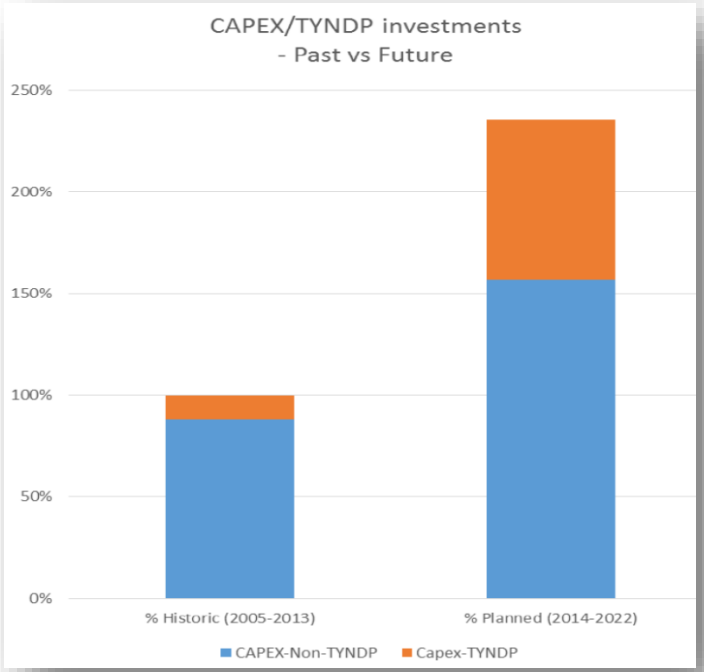
Energy transition needs grid, grid needs everyone's support

Permit granting	• Procedures are lengthy and cause often commissioning delays
Public acceptance	• Energy transition requires grid, grid requires everyone's support
ENTSO-E welcomes Regulation 347/2013	• positive on permitting process • Speed-up procedure • one stop shop at national level • defined time lines

Regulatory framework & investment incentives - key to timely grid development

1. **EU legislative framework shall stimulate investment**
   - thereby fostering timely delivery of European Energy policy goals

2. **Stable and sufficiently investor friendly regulatory frameworks are needed**
   - to provide access to capital to finance the expansion of the grids



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Improving the Regulatory framework & investment incentives

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Key findings in CSW Region

RES integration supports an Energy transition

- *Increase of RES generation from a total of 90 GW in 2013 to around 150 – 320 GW by 2030, depending on the Vision (Vision 1 – Vision 4).*
- *It is expected new Wind and Solar power plants within all the CSW region, and also new Hydro generation, this mainly in Portugal and Spain. The level of increase depends on the Vision.*
- *Reduction of Nuclear generation from 71 GW in 2013 to 63 - 47 GW by 2030, depending on the Vision (Vision 1 – Vision 4).*

IEM full implementation asks for adequate Cross-Border capacities

- *Insufficient cross-border capacity between the Iberian Peninsula and the rest of the European Continent (the Iberian Peninsula can be considered almost an electrical island).*
- *Studies show that the cross-border capacity between the Iberian Peninsula and the rest of the European Continent needs to be increased in all visions. For the particular case of Visions 3 and 4 this increase should be to values greater than 10 GW.*
- *CSW project portfolio included in TYNDP 2014 only allows an NTC increase between the Iberian Peninsula and the rest of the Europe from 1 GW today to 6 GW in 2030.*

Energy transition requires the grid and the grid requires everyone's support

- *In the set of projects included in TYNDP 2012, a significant number has experienced delays, especially in short and mid-term projects.*
- *For the achievement of climate and energy objectives, it is of utmost importance smooth the permitting processes and gain political support at all levels.*
- *A stable regulatory framework is essential to ensure that grid reinforcements can be completed in time.*

RG CSW has identified 27 projects of pan-European relevance in the region. The proposed investment plan includes 14000 km of lines and estimates €17 billion of investment.

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Main messages – Baltic Sea Region

- The bulk power flows in the studies are mainly directed from the North to South of the region towards Central Europe. However, depending on assumptions behind the visions and sensitivity cases, significant flows from East to West and from West to East are observed.
- One of the main drivers in the Baltic Sea region is an expected Nordic surplus, largely due to the hydro generation in Norway and Sweden, but also due to increases in nuclear capacity, additional wind power and biomass generation.
- The Nordic surplus and integration of RES all over Europe makes interconnections from the Nordic area to Continental Europe highly beneficial, especially in visions with a high share of renewables.
- An important driver is the integration of energy peninsulas into the common European Electricity market. In addition, the results of the analysis show that further grid-interconnection of the Baltic States with the Continental and Nordic system is needed. In addition, Baltic synchronisation with Continental Europe has been analysed.
- In total the Regional Investment Plan assesses an investment portfolio of about 55-75 billion Euros for the countries within the Baltic Sea Region. Germany is having the largest investment portfolio.
- If energy and climate objectives have to be achieved, it is of the outmost importance to smooth the authorisation processes - delays in commissioning cause additional costs to the European society. With Baltic Sea regional analyses, loss caused by delays can reach 150-600 M€ annually if ca 30% of investments in the region are delayed.

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Main conclusion

TYNDP 2014 confirms the main findings of TYNDP 2012

TYNDP 2014 supports the implementation of the EIP regulation

Energy transition requires grid, grid requires support from everyone

TYNDP 2014 - Next steps

10 July – 20 September – public consultation

4 September – Public workshop – TYNDP 2014 package

October 2014 – review of TYNDP 2014 according to the public consultation outcomes

End of October 2014 – submission of TYNDP 2014 package to ACER

End of 2014 – publication of TYNDP 2014 package | ACER opinion

TYNDP 2014: Appendix

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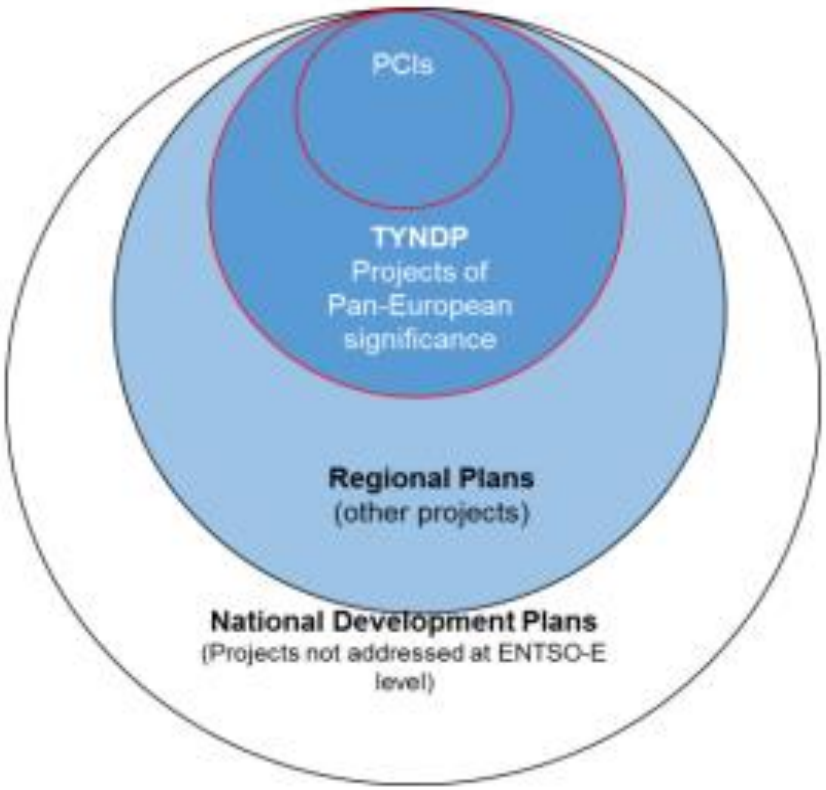
What cover the projects of Pan-European significance?



Definition of Projects of Pan-European Significance

- Meeting the EU energy targets: RES, SoS, IEM
- Voltage & capacity thresholds

From TSOs & 3rd parties

- Non-discriminatory procedure

Basis for further selection of Projects of Common interest

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