WHAT, WHY, HOW - UNDERSTAND IN A NUTSHELL THE FINAL 2015 REGIONAL INVESTMENT PLANS, TYNDP 2016 SCENARIOS AND PROJECTS LIST
Overview TYNDP 2016 activities

Edwin Haesen, TYNDP 2016 Project Management Office
- Objectives
- Timeline for all deliverables
- Ongoing project assessments
TYNDP2016 objectives

- Explore and explain a vision of the future power system
- Highlight investment needs based on coordinated regional planning studies
- Assess cost/benefits of projects of pan-European relevance in a transparent and non-discriminatory manner
- Provide data, assumptions, methodologies
TYNDP2016 timeline

<table>
<thead>
<tr>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q3</td>
<td>Q1</td>
</tr>
<tr>
<td>Q4</td>
<td>Q2</td>
</tr>
<tr>
<td>Q1</td>
<td>Q3</td>
</tr>
<tr>
<td>Q2</td>
<td>Q4</td>
</tr>
</tbody>
</table>

- Scenario development
- Coordinated planning
- Project identification
- CBA assessments
- Public consultation

- Scenario Development Report
- Regional Investment Plans & draft list
- TYNDP2016 Project Candidates
- Final TYNDP2016
TYNDP2016 deliverables

- Storylines of possible futures
- Methodologies

Regional Investment Plans
- Planning studies
- Regional context

Project list
- Descriptions
- Technical characteristics
- Classification

Data sets
- Market (generation, demand)
- Grid models (TYNDP2014)

TYNDP2016 report
- Project CBA assessments
- System analyses
- Vision
Planning studies

- Scenarios and sensitivities
- Market-based target capacities
- Network studies
- Investment needs & Project candidates

Illustrative example for BS region
Planning studies

- Scenarios and sensitivities
- Market-based target capacities
- Network studies
- Investment needs & Project candidates

Market based target capacities (in a high-RES scenario)
Planning studies

- Scenarios and sensitivities
- Market-based target capacities
- Network studies
- Investment needs & Project candidates

Example of North Sea region
Planning studies

- Scenarios and sensitivities
- Market-based target capacities
- Network studies
- Investment needs & Project candidates

Note: map focuses on cross-border projects only
Scenario building – framing the uncertainty

- How will 2020 and 2030 look like?
- What parameters to consider (demand, technology, policies)?
- How to deal with inherent uncertainties?

The further you look, the more scenarios we need to ensure a robust study framework
Scenario building – methodology

- What do you need to build scenarios?
- How do you handle complexity?
- What do you get out of it?
Scenario building – Examples of outputs (1)

Installed capacities

Generation and country balances
Scenario building – Examples of outputs (II)

PV re-allocation from Vision 3 to Vision 4
Scenario building – Examples of outputs (III)

Demand across all scenarios

Wind/PV across all scenarios

- Annual demand (TWh)
  - Vision 4
  - Vision 3
  - Vision 2
  - Expected Progress

- Installed capacities (GW)
  - Wind
  - Solar

Legend:
- Vision 4
- Vision 3
- Vision 2
- Vision 1
- EP2020
- 2014
Regional Investment Plan
Baltic Sea 2015

Arne Pettersen, convener RGBS
Region Baltic Sea
- 3 synchronous areas
- 9 countries

General drivers in the region
1. Generation shift
2. FLEX needs for RES integration
3. Maintaining SOS
4. Market integration
Key drivers for grid development (Region Baltic Sea)

1. New interconnectors
2. North-South flows
3. Arctic consumptions
4. Baltic integration
5. Nuclear and thermal decommissioning
Projects to be assessed (RGBS), TYNDP 2016:

New project candidates - RGBS (based on Common Planning Studies, Regional plans 2015)

<table>
<thead>
<tr>
<th>Boundary</th>
<th>Project candidate name</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>Kriegers Flak CGS</td>
</tr>
<tr>
<td>62</td>
<td>Estonia-Latvia 3rd IC</td>
</tr>
<tr>
<td>96</td>
<td>Keminmaa-Pyhänselkä</td>
</tr>
<tr>
<td>111</td>
<td>3rd AC Finland-Sweden north</td>
</tr>
<tr>
<td>123</td>
<td>LitPol Link Stage 2</td>
</tr>
<tr>
<td>124</td>
<td>NordBalt phase 2</td>
</tr>
<tr>
<td>126</td>
<td>SE North-south reinforcements</td>
</tr>
<tr>
<td>170</td>
<td>Baltics synchro with CE</td>
</tr>
<tr>
<td>176</td>
<td>Hansa PowerBridge 1</td>
</tr>
<tr>
<td>179</td>
<td>DKE - DE</td>
</tr>
<tr>
<td>197</td>
<td>N-S Finland P1 stage 2</td>
</tr>
<tr>
<td>232</td>
<td>Kontek-3</td>
</tr>
<tr>
<td>234</td>
<td>DKE-PL-1</td>
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<tr>
<td>238</td>
<td>Kontiskan 2</td>
</tr>
<tr>
<td>239</td>
<td>Fenno-Skan 1 renewal</td>
</tr>
<tr>
<td>267</td>
<td>Hansa PowerBridge 2</td>
</tr>
</tbody>
</table>

Projects showing positive benefits, but not nominated:
- Norway-Denmark
- Sweden-Poland

This is based on the fact that Norway/Sweden already are realizing many interconnector projects. Further analysis/evaluations need to be done before adding project candidates on top of these.
LitPol Link Stage 2 (TYNDP-project 123)

<table>
<thead>
<tr>
<th>Short description</th>
<th>Stage 2 HVDC Poland-Lithuania. Capacity 500 MW.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEW [Meuro/year]</td>
<td>60-70 Meuro/year</td>
</tr>
<tr>
<td>RES [MW or MWh]</td>
<td>7000-8000 MWh</td>
</tr>
<tr>
<td>CO2 [Mton/year]</td>
<td>300-400 Mton (decrease)</td>
</tr>
</tbody>
</table>
Hansa PowerBridge 1  
(TYNDP-project 176)

Short description
New HVDC Sweden-Germany. Capacity 700 MW.

SEW [Meuro/year]
25-35 Meuro/year

RES [MW or MWh]
3500-4500 MWh

CO2 [Mton/year]
500-700 Mton (decrease)
Key drivers for regional grid development

1. Generation shift
   1. Thermal to RES
   2. Nuclear phase out (DE/BE)
   3. Shift of coal to gas

2. FLEX needs for RES integration

3. Maintaining SOS

4. Market integration

Resulting in needs to facilitate extra West-East and South-North power flows

Potential transfer capacity increases additionally to TYNDP14 interconnection capacity level resulting from market analysis on TYNDP 2014 high RES scenario
New project candidates - Region Group North Sea (based on Common Planning Studies, CPS)

Projects to be assessed, TYNDP 2016:

Projects showing positive benefits (CPS) but not nominated:

- Norway-Netherlands

This based on the fact that Norway has already built and is planning to build several interconnectors out of southern and western part of Norway in succession up until 2021. Prior to the assessment of a further increase in capacity out of southern Norway, further analysis/evaluations need to be done before adding project-candidates on top of these.
TYNDP 2016 - first assessment results for scenario EP2020 – 2 examples

Preliminary results

<table>
<thead>
<tr>
<th>NSN (TYNDP #110)</th>
<th>IFA2 (TYNDP #25)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short description</strong></td>
<td>A 1400MW HVDC subsea interconnector between Norway and Great Britain</td>
</tr>
<tr>
<td><strong>SEW</strong></td>
<td>155-220 Meuro/year</td>
</tr>
<tr>
<td><strong>RES</strong></td>
<td>70000-110000 MWh/year</td>
</tr>
<tr>
<td><strong>CO2</strong></td>
<td>1850-2550 Mton/year</td>
</tr>
</tbody>
</table>
Key findings in Common Planning Studies in CCE region

- New generation capacities with a big share from RES:
  - Increase of power flow volatility (higher surpluses, deeper imports)
  - Connection of traditional generation to ensure security of supply even though European market is not in favor of these capacities

- Projects for TYNDP2016 assessment in CCE RG
  - 25 midterm transmission projects

- 2 new transmission projects with expected cross-border impact evolved during the process (high RES scenario)
  - 3rd interconnection between DE and PL (Project no. 229 GerPol PowerBridge II) after finishing Project no 94 and Project no. 230 (GerPol Power Bridge I) involving PSTs installation resp. extension of PL internal transmission grid for the increase of capacity on western border
  - New interconnection between Hungary and Romania and internal reinforcements in RO
Regional Group CCE – Net Generation Capacity [%]

Expected Progress 2020
• Total Capacity = 358 GW
• Total RES cap. % = 52%

Vision 1 2030
• Total Capacity = 376 GW
• Total RES cap. % = 62%

Vision 4 2030
• Total Capacity = 424 GW
• Total RES cap. % = 67%

Others non-renewable
Others renewable
Wind (on & off)
Solar
Hydro
Nuclear
Hard Coal
Lignite
Gas
Oil
Regional Group CCE – Annual Generation Dispatch [%]

**Expected Progress 2020**
- Generation = 1114 TWh
- Demand = 998 TWh
- Total RES % = 34%

**Vision 1 2030**
- Generation = 1121 TWh
- Demand = 1046 TWh
- Total RES % = 40%

**Vision 4 2030**
- Generation = 1048 TWh
- Demand = 1048 TWh
- Total RES % = 54%

[Diagrams showing generation types: Others non-renewable, Others renewable, Wind (on & off), Solar, Hydro, Nuclear, Hard Coal, Lignite, Gas, Oil]
First results 2020 – Project 94 GerPol Improvements

**Preliminary results**

3.15 Cluster Germany — Poland between Vierraden and Krajnik (currently known as “GerPol Improvements,”)

<table>
<thead>
<tr>
<th>Project 94 GerPol Improvements</th>
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<tbody>
<tr>
<td><strong>Short description</strong></td>
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<td></td>
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<tr>
<td><strong>Investments included in the project</strong></td>
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<tr>
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<tr>
<td></td>
</tr>
<tr>
<td><strong>SEW [Meuro/year]</strong></td>
</tr>
<tr>
<td><strong>RES [GWh/year]</strong></td>
</tr>
<tr>
<td><strong>CO2 [Mton/year]</strong></td>
</tr>
</tbody>
</table>

**Assessment results are still provisional**
First results 2020 – Project 48 New SK-HU intercon. – phase 1

Preliminary results

3.16 Cluster Hungary - Slovakia between Gönyű and Gabčikovo
3.17 PCI Hungary - Slovakia interconnection between Sajóivánka (HU) and Rimavská Sobota (SK)

Assessment results are still provisional

<table>
<thead>
<tr>
<th>Project 48 New SK-HU Interconnector</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short description</strong></td>
</tr>
<tr>
<td>This project will increase the transfer capacity between Slovak and Hungarian transmission systems, improve security and reliability of operation both transmission systems and support North - South RES power flows in CCE region</td>
</tr>
<tr>
<td><strong>Investments included in the project</strong></td>
</tr>
<tr>
<td>Main investments of this project are double circuit AC OHL 400 kV from new Gabčikovo (Slovakia) substation to Gönyű (Hungary) substation, with one circuit connected to the Veľký Štúr (Slovakia) substation and double circuit AC OHL (preliminary armed only with one circuit on Hungarian side) 400 kV from Rimavská Sobota (Slovakia) substation to Sajóivánka (Hungary) substation</td>
</tr>
<tr>
<td><strong>SEW [Meuro/year]</strong></td>
</tr>
<tr>
<td>5 ÷ 10</td>
</tr>
<tr>
<td><strong>RES [GWh/year]</strong></td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td><strong>CO2 [Mton/year]</strong></td>
</tr>
<tr>
<td>-100 ÷ -200</td>
</tr>
</tbody>
</table>
Regional Investment Plan
Continental South West 2015

Claire Fourment, convener RG CSW
Main drivers for grid development in RG CSW region

Internal Energy Market (IEM):

- Insufficient cross border capacity between the Iberian Peninsula and mainland Europe, despite commissioning of the new HVDC in eastern part of the FR-ES border
  - Current cross border congestion ~ 70-80% of the time with significant price difference (~17 €/MWh in 2014)
  - 10% interconnection ratio by 2020 established by the EC as a prerequisite for IEM
  - 15% interconnection ratio by 2030 “while taking into account costs aspects and the potential of commercial exchanges”
  - Madrid Declaration (04/03/15) signed by the three Governments and the EC

Sustainability: RES generation integration

Security of Supply (SoS) issues in the region have low European impact
Regional Group CSW – Net Generation Capacity [%]

**Expected Progress 2020**
- Total Capacity = 258 GW
- Total RES cap. = 47%

**Vision 1 2030**
- Total Capacity = 279 GW
- Total RES cap. = 55%

**Vision 4 2030**
- Total Capacity = 359 GW
- Total RES cap. = 67%
Regional Group CSW – Annual Generation [%]

**Expected Progress 2020**
- Generation = 900 TWh
- Demand = 821 TWh (*)
- Total RES % = 29%
- Exchanges = 68 TWh (export)

**Vision 1 2030**
- Generation = 921 TWh
- Demand = 818 TWh
- Total RES % = 35%
- Exchanges = 97 TWh (export)

**Vision 4 2030**
- Generation = 990 TWh
- Demand = 937 TWh
- Total RES % = 57%
- Exchanges = 38 TWh (export)

(*) w/o pumped storage
**EP 2020 – Installed Generation Capacities**

**EP 2020 – Generation & Demand**
ES-PT capacity: Mid and Long Term:
Up to 3.5 GW PT→ES
Up to 4.2 GW ES→PT

FR-ES capacity:
Mid Term: up to 5 GW
Long Term: up to 8 GW
FR-ES project in the Biscay Gulf

2000 MW HVDC subsea link in the western part of the Spanish-French border, bringing the ES-FR interconnection capacity up to 5 GW. It aims at improving the integration of the European market and avoiding RES spillage, especially in the Iberian Peninsula. The project complies with the Madrid Declaration and increases the Spanish interconnection ratio.

2*1000 MW HVDC subsea and underground link between Gatica (Basque country, Spain) and Cubnezais (Aquitaine, France) with converter stations at both ends
Total length ~370 km

<table>
<thead>
<tr>
<th>SEW</th>
<th>200 ± 30 M€/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>RES</td>
<td>45 ± 45 GWh/year</td>
</tr>
<tr>
<td>CO2</td>
<td>2.4 ± 0.5 Mton/year (increase due to coal/gas substitution in this scenario)</td>
</tr>
</tbody>
</table>
Interconnection Portugal-Spain

This project will allow to increase the interconnection capacity between Portugal and Spain up to 3200 MW (complying with the governmental agreements) in order to establish a complete operational Iberian Electricity Market (MIBEL). This project will also allow Portugal to reach the objective of at least 10% for the interconnection ratio, and improve the Spanish ratio.

The project includes a new 400 kV interconnection route between Minho (PT) and Galicia (ES), besides some 400 kV internal reinforcements required.

Investments included in the project:
400 kV OHL Beariz–Fonte Fria–Ponte de Lima–Vila Nova de Famalicão–Recarei/Vermoim
Substations: Vila Nova de Famalicão (PT), Ponte de Lima (PT), Fonte Fria (SP), Beariz (SP)
Total length of the project: ~222 km
Expected date of commissioning: 2018 (the section Vila Nova de Famalicão–Recarei/Vermoim and the Vila Nova de Famalicão substation are expected to be commissioned until the end of 2015)

<table>
<thead>
<tr>
<th>SEW</th>
<th>6 ± 5 M€/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>RES</td>
<td>n.s.</td>
</tr>
<tr>
<td>CO2</td>
<td>0,25 ± 0,06 Mton/year</td>
</tr>
</tbody>
</table>

(Increase of CO₂ emissions: CCGT are replaced by Coal)
CCS Region – Main messages

Outstanding characteristics of the region

- large development of variable RES especially at the corners of the CCS region,
- storage potentials (especially hydro-pumping in the Alps)
- at present slightly exporting electricity to the rest of Europe (less structural in the long term time horizon)
- intense interaction between CCS countries and neighbours (highly meshed system)

Main drivers for power system evolution in the Region

- massive RES integration ➔ stronger and flexible transmission system
- integration of storage plants ➔ facilitate the efficient use of RES
- thermal and nuclear phase-out ➔ adequacy and security needs
- wide area power flows ➔ load / generation divergence (time and location) requires investments in transmission grid
TYNDP 2016 scenarios
CCS Region – Net Generation Capacity [%]

**Expected Progress 2020**
- Total Capacity = 524 GW
- Total RES cap. % = 54%  

**Vision 1 2030**
- Total Capacity = 535 GW
- Total RES cap. % = 60%

**Vision 4 2030**
- Total Capacity = 631 MW
- Total RES cap. % = 70%
TYNDP 2016 scenarios
CCS Region – Annual Generation [%]

**Expected Progress 2020**
- Generation = 1591 TWh
- Demand = 1501 TWh *
- Total RES % = 37%
- Exchanges = + 67 TWh

**Vision 1 2030**
- Generation = 1580 TWh
- Demand = 1506 TWh *
- Total RES % = 42%
- Exchanges = - 38 TWh

**Vision 4 2030**
- Generation = 1608 TWh
- Demand = 1558 TWh *
- Total RES % = 60%
- Exchanges = +35 TWh

* Without pumping
TYNDP 2016 – EP 2020 scenario
CCS Region – Generation & Demand (National detail)

**EP 2020 – Installed Generation Capacities**

**EP 2020 – Generation & Demand**

- **Installed capacities (GW):**
  - AT, CH, DE, FR, IT, SI

- **Annual generation and demand (GWh/year):**
  - AT, CH, DE, FR, IT, SI

- **Sources:**
  - Wind
  - Solar
  - Other RES
  - Other non RES
  - Oil
  - Nuclear
  - Lignite CCS
  - Lignite
  - Hydro
  - Hard coal CCS
  - Hard Coal
  - Gas CCS
  - Gas
  - Annual demand
## CCS Region – list of mid-term projects to assess in the EP2020

<table>
<thead>
<tr>
<th>TYNDP 2016 Project Index</th>
<th>Project candidate name</th>
<th>Border/Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Italy-France</td>
<td>FR - IT</td>
</tr>
<tr>
<td>22</td>
<td>Lake Geneva West</td>
<td>CH - IT</td>
</tr>
<tr>
<td>28</td>
<td>Italy-Montenegro</td>
<td>IT - ME</td>
</tr>
<tr>
<td>29</td>
<td>Italy-Tunisia</td>
<td>IT - TU</td>
</tr>
<tr>
<td>31</td>
<td>Italy-Switzerland</td>
<td>CH - IT</td>
</tr>
<tr>
<td>33</td>
<td>Central Northern Italy</td>
<td>IT Center – IT North</td>
</tr>
<tr>
<td>47</td>
<td>AT - DE</td>
<td>AT - DE</td>
</tr>
<tr>
<td>127</td>
<td>Central Southern Italy</td>
<td>IT Center – IT South</td>
</tr>
<tr>
<td>150</td>
<td>Italy-Slovenia</td>
<td>IT - SI</td>
</tr>
<tr>
<td>174</td>
<td>Greenconnector</td>
<td>CH - IT</td>
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<tr>
<td>210</td>
<td>Wurmlach (AT) - Somplago (IT)</td>
<td>AT-IT</td>
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<tr>
<td>250</td>
<td>Castasegna (CH) - Mese (IT)</td>
<td>CH-IT</td>
</tr>
<tr>
<td>264</td>
<td>Swiss Roof I</td>
<td>CH-DE / CH-AT</td>
</tr>
<tr>
<td>266</td>
<td>Swiss Ellipse I</td>
<td>Internal CH</td>
</tr>
</tbody>
</table>
## Project 28 – Interconnection Italy - Montenegro

### Short description
The project, having a significant cross border impact, makes possible to increase the use of existing and future interconnections all along the corridor between Italy and Continental East Europe through the Balkans; it helps to use most efficient generation capacity; enables possible mutual support of Italian and Balkan power systems; contributes to RES integration in the European interconnected system by improving cross border exchanges.

### Investments included in the project
The Italy-Montenegro interconnection project includes a new HVDC subsea cable between Villanova (Italy) and Lastva (Montenegro) and the DC converter stations.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEW [Meuro/year]</td>
<td>119 ÷ 161</td>
</tr>
<tr>
<td>RES [GWh/year]</td>
<td>37 ÷ 56</td>
</tr>
<tr>
<td>CO2 [Mton/year]</td>
<td>1,6 ÷ 2,2</td>
</tr>
</tbody>
</table>

* Estimated Investment cost of project 28 reported in TYNDP 2014
Regional Investment Plan
Continental South East 2015

Yannis Kabouris – Convener of RG CSE
Regional Group CSE

- Sparse Network
- Predominant N->S and E->W power flow directions

- Market integration: Increase of cross-border and internal transfer capacities in order to assist market integration in the Region.
- Massive RES penetration: The anticipated large RES penetration (mainly wind, PV and hydro) in the Region in order to achieve EU and National targets requires extensive grid developments.
- Evacuation of future conventional generation mostly in the West part of the Region.
**Regional Group CSE – Net Generation Capacity [%]**

**Expected Progress 2020**
- Total Capacity = 98 GW
- Total RES cap. % = 30%

**Vision 1 2030**
- Total Capacity = 116 GW
- Total RES cap. % = 26%

**Vision 4 2030**
- Total Capacity = 131 GW
- Total RES cap. % = 50%
Regional Group CSE – Annual Generation [%]

**Vision 1 2030**
- Generation = 372 TWh
- Demand = 341 TWh
- Total RES % = 22%

**Vision 4 2030**
- Generation = 342 TWh
- Demand = 344 TWh
- Total RES % = 45%

**Expected Progress 2020**
- Generation = 321 TWh
- Demand = 308 TWh
- Total RES % = 23%
EP 2020 – Installed Generation Capacities

EP 2020 – Generation & Demand
First results 2020 - case 1

Preliminary results

[CSE 1, HR-BA borders]

<table>
<thead>
<tr>
<th>Short description</th>
<th>The project aims to support market and RES integration in the area – South and Mid HR and North and Mid BA.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investments included in the project</td>
<td>The project includes a new 400kV HR-BA interconnector as well as internal 400kV projects in HR.</td>
</tr>
<tr>
<td>SEW [Meuro/year]</td>
<td>25-30</td>
</tr>
<tr>
<td>RES [MW]</td>
<td>830</td>
</tr>
<tr>
<td>CO2 [Mton/year]</td>
<td>0.4-0.5</td>
</tr>
</tbody>
</table>
First results 2020 - case 2

Preliminary results

<table>
<thead>
<tr>
<th>[Mid Continental East corridor, RO-RS borders ]</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short description</strong></td>
<td>The project aims to increase transfer capacity along the E-&gt;W corridor of the area.</td>
</tr>
<tr>
<td><strong>Investments included in the project</strong></td>
<td>The project includes a new 400kV double circuit RO-RS interconnector as well as 400kV reinforcements of the network along the Western border in RO.</td>
</tr>
<tr>
<td><strong>SEW [Meuro/year]</strong></td>
<td>45-55</td>
</tr>
<tr>
<td><strong>RES [MWh]</strong></td>
<td>2000-3000</td>
</tr>
<tr>
<td><strong>CO2 [Mton/year]</strong></td>
<td>0,8-0,9</td>
</tr>
</tbody>
</table>
Next steps
TYNDP 2016

Felix Maire, TYNDP 2016 Project Management Office
Most projects influence each other

How do we ensure an objective and transparent assessment?

- Impact is based on taking a project out of the reference; or adding it on top of the reference
- A reference grid for each time horizon, which includes all mature projects
- Impact is measured by several indicators
- Full approach documented in Cost Benefit Analysis Methodology, developed by ENTSO-E in past years, reviewed and approved by ACER and EC.
Assessment of individual projects

**Indicators**
- Multi-criteria approach
- Some criteria scenario-specific
- Coordinated ENTSO-E study
- Specific tailoring for storage projects
- Based on scenario/project data available on ENTSO-E website

**Approach**
- Put one IN at a Time (PINT)
- Take One Out at a Time (TOOT)
Assessment of individual projects

- Reflect maturity of projects
- Assess at two time horizons

→ Classify projects & define reference capacities

Mid-term project
- Planned
- Commissioning <= 2022

Long-term project
- Planned
- Commissioning <= 2030

Future project
- Others

Boundary capacity
- Today
- 2020
- 2030

Reference capacity
- Expected/planned development of the grid
- Parameter for market modelling tools
- Confirmed by network studies
- Possibly different values in either direction
Going beyond standardized CBAs

- **Storage tailoring**
  - Flexibility
  - Peak generation deferral

- **Capacity analyses**
  - View on relation between capacity and welfare
  - Explain impact of sequence of commissioning
  - Analyze areas with low interconnection rate

- **System analyses**
  - Impact of high-RES scenario
  - Technology review
## Approach for coming months

**Coordinated planning**

<table>
<thead>
<tr>
<th>2015</th>
<th>2016</th>
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</thead>
<tbody>
<tr>
<td>Q3</td>
<td>Q4</td>
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<td>Q1</td>
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<td>Q3</td>
<td>Q4</td>
</tr>
</tbody>
</table>

**Scenario development**

- **2015**: Q3-Q4
- **2016**: Q1-Q2

**CBA studies**

- 2020 assessments
- 2030 V1/V4 market studies
- 2030 V2/V3 market studies
- Network modelling
- Consultation draft TYNDP2016
- Finalization

**Final TYNDP2016**
TYNDP website

Thank you for your attention

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