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Reliable Sustainable Connected



31 mai 2010

TYNDP

Le plan de développement du réseau à 10 ans d'ENTSO-E

10-year Network Development Plan

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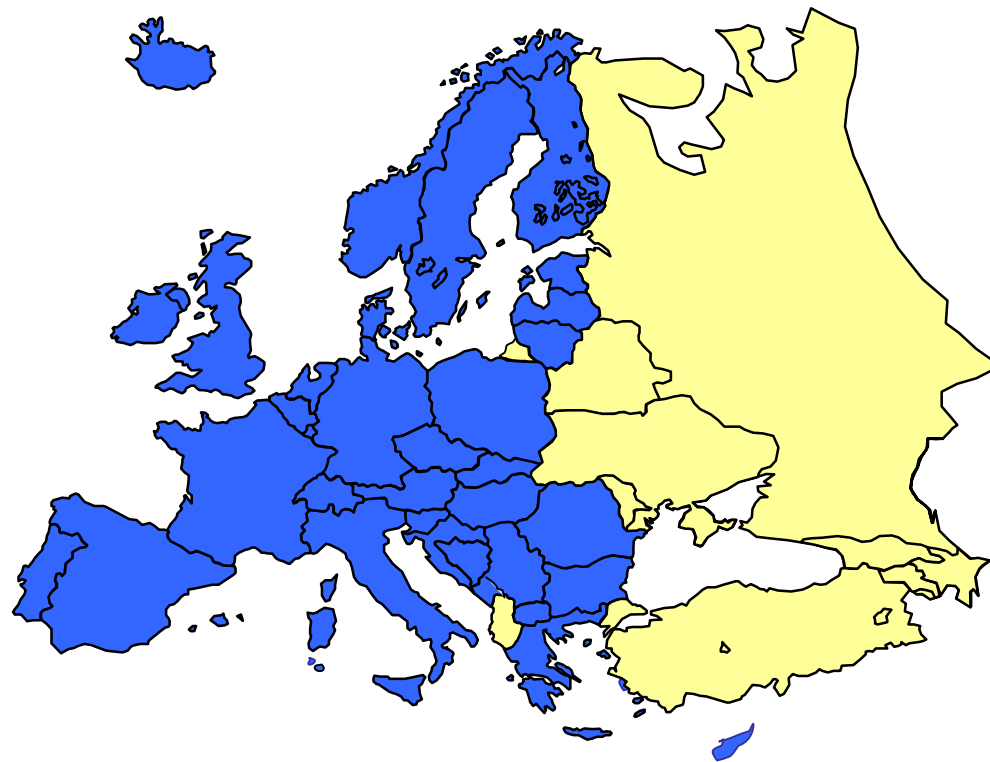
Plan

- Les enjeux
 - Les attentes (Législation, parties prenantes)
 - Propositions d'ENTSO-E
- Le premier “TYNDP”
- La dynamique du TYNDP
 - Réalisation, Implication des parties prenantes
- La suite



ENTSO-E: a pan-European TSO platform, founded 19 Dec. 2008 and fully operational since 1 July 2009

- Represents 42 TSOs from 34 countries
 - **525** million citizens served
 - **828** GW generation
 - **305,000** km of transmission lines managed by the TSOs
 - **3,400** TWh/year demand:
 - **400** TWh/year exchanges:
- ENTSO-E operational before EC 714/2009 in force
 - because a fully developed IEM and the integration of RES demand urgent TSO action





Les enjeux

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The 10yNDP in Regulation

- A non-binding plan, updated every 2 years
 - Regulators to check consistency with National DP
- A vision for the future European HV grid
 - “Derived from reasonable needs of system users”
 - A generation adequacy outlook (5/15 years)
 - A modelling of integrated networks
 - Assessment of most probable power flow patterns, investment gaps and investment projects
 - A review of barriers to increase capacities

What does the 3rd package tell about TYNDP?

Non binding
Every 2 years

← **Regulators check consistency** →

Binding
Every year

EU-TYNDP

- gen. adequacy.outlook
 - 5 yr
 - up to 15yr (→ 2025!)
- Incl modeling of integrated networks
- Scenario development
- Assessment of resilience
- Based on reasonable needs of system users
- Identify investments gaps
- Review barriers to increase cross border capacities arising from approval procedures

← **Build on nat. gen. adequacy outlooks and invest. plans** →

← **Take into account** →

Nat. TYNDPs

- Existing and forecast supply demand
- Efficient measures to guarantee adequacy & SoS
- Indicate main transmission infrastructure to be built
- Based on reasonable assumptions about evolution of generation supply consumption and exchanges

Non binding
Every 2 years

Regional Investment Plans

← **Take into account** →

← **Take into account** →



Strong stakeholders' expectations: the European TYNDP shall...

- “Present a clear development framework”
 - “Show what transmission capacity is needed & when”
 - “Develop numerous background scenarios”
 - “Derive power flows patterns from market studies”
 - “10yNDP all encompassing”
 - “Open the eyes of decision makers”
 - “Show that political decisions have their cost”
 - “Detail the methodology”
 - “Specify the criteria”
 - “Involve stakeholders in the process”
 - ...
- All applications for new grid connection
 - Cost effective
 - Confidentiality
 - Merchant lines
 - ...



Goals for 10yNDP

- A **common reference** ...
 - Summing up the most accurate information regarding the European HV grid development concerns
 - An in-depth consultation with all European stakeholders and support for a monitoring process
- ... meeting eventually all expectations
 - EU objectives (SoS, RES integration, IEM...)
 - Regulation compliant, and
 - Updated and *improved* every 2 years
- A basis for all stakeholders for their projects



Le premier rapport

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The 1st issue of TYNDP – a pilot project

- Based on existing material
 - Stakeholders statements in 2009
 - Review of TSOs practices, projects, ...
 - Definition of scenarios despite 2020 survey still ongoing
- A **first** attempt for the content organisation
- But a first **comprehensive** report
 - Highlighting scenario description, investments overview, technologies & barriers ... and leads for improvements
- = a **Pilot Project**, basis for further debates



Main body content

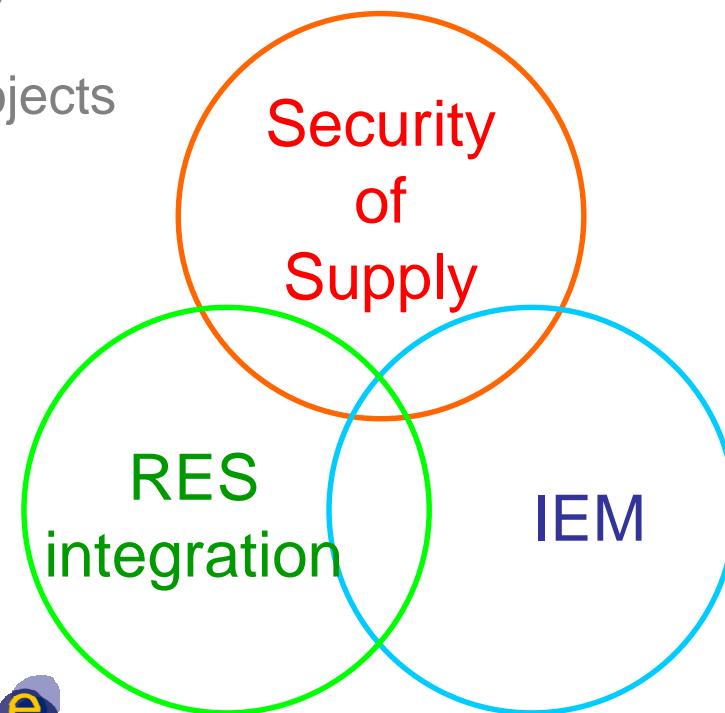
- Challenges for grid development
- **Background scenarios**
 - Generation Adequacy, market analysis
- **Grid investment needs**
 - Transmission adequacy
- Planned **transmission projects**
 - Illustration of economic analyses & criteria, resilience
- Techno: State of the art & perspectives
- Conclusion, **toward next releases**
- Appendices

Scope of the TYNDP

- Projects *of European significance*
i.e. *which address at least one of the 3 pillars of the EU Energy policy*

- Not only cross-border projects

- 1 project usually addresses several pillars at once





Challenges for grid development

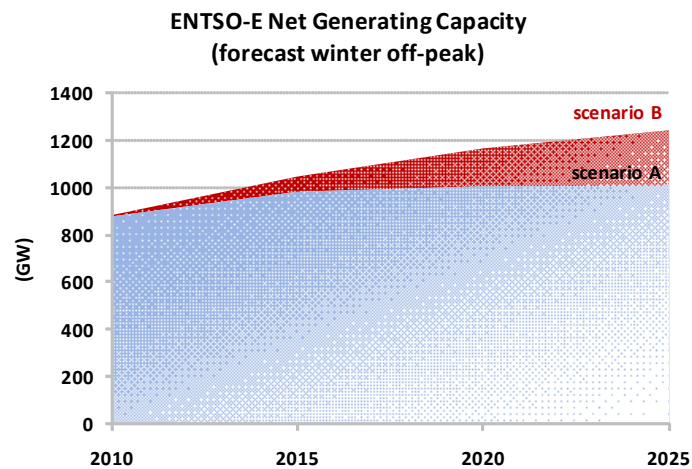
- TSOs directly address SoS, RES, IEM
- While complying with increased legal and regulatory obligations
- Though TSOs play a key role, coordinated efforts from all stakeholders are required
- Uncertainty

Pilot TYNDP delivers

Two scenarios for load and generation evolution (2025) built on available information

**25.5% RES in electricity production (2020)
800-1400 MtCO₂ emissions (2020)**

| | 2010-2015 | 2015-2016 | 2016-2020 | 2020-2025 |
|--|-----------|-----------|-----------|-----------|
| Annual Average Consumption Growth | 1.26% | 1.44% | 1.70% | 1.68% |



And an appreciation of the fulfillment of EU2020 targets

With generation adequacy maintained on both scenarios by 2020

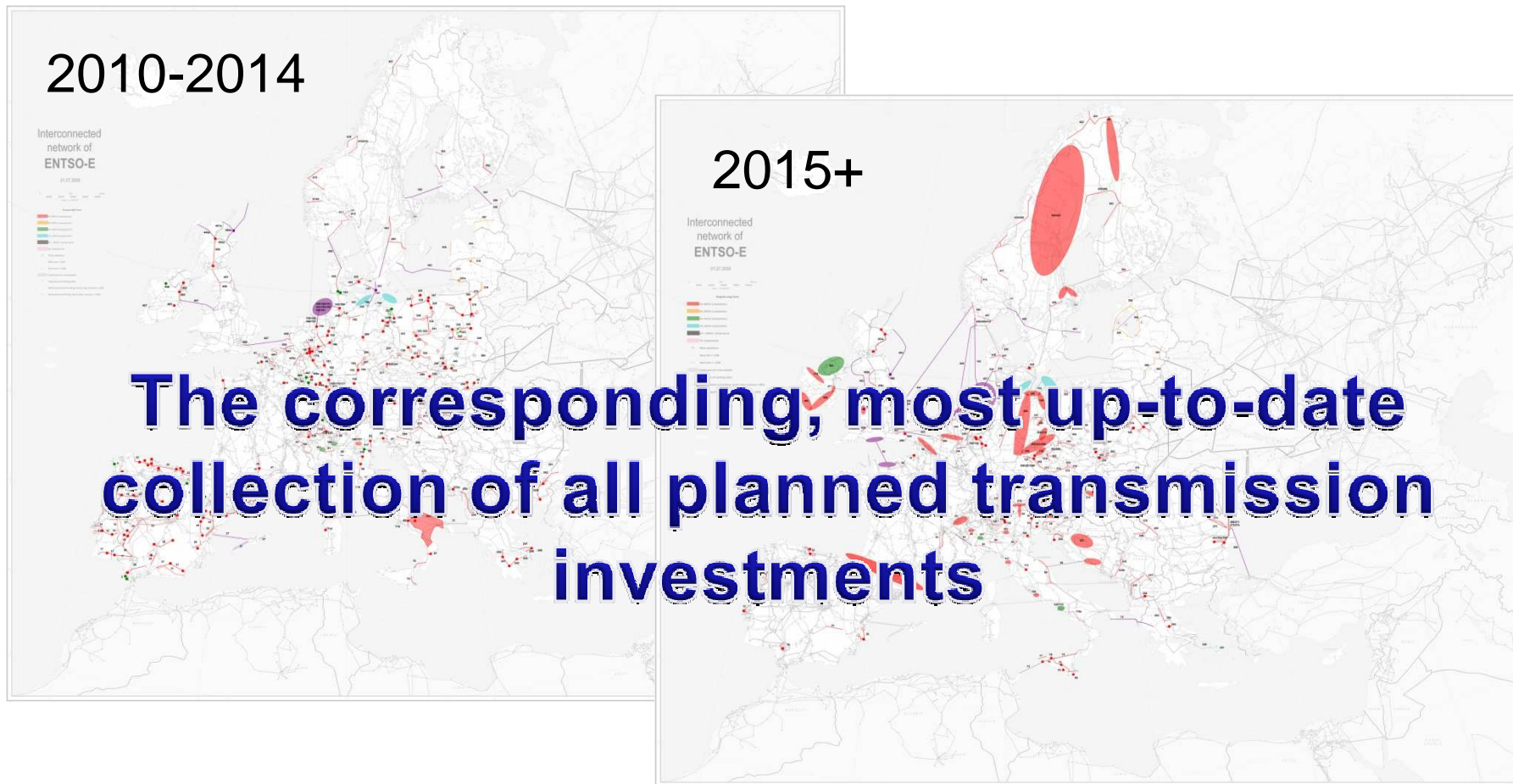
Pilot TYNDP delivers



The identification of all investment needs of pan-European significance for the next 10 years

June 17, 2010

Pilot TYNDP delivers

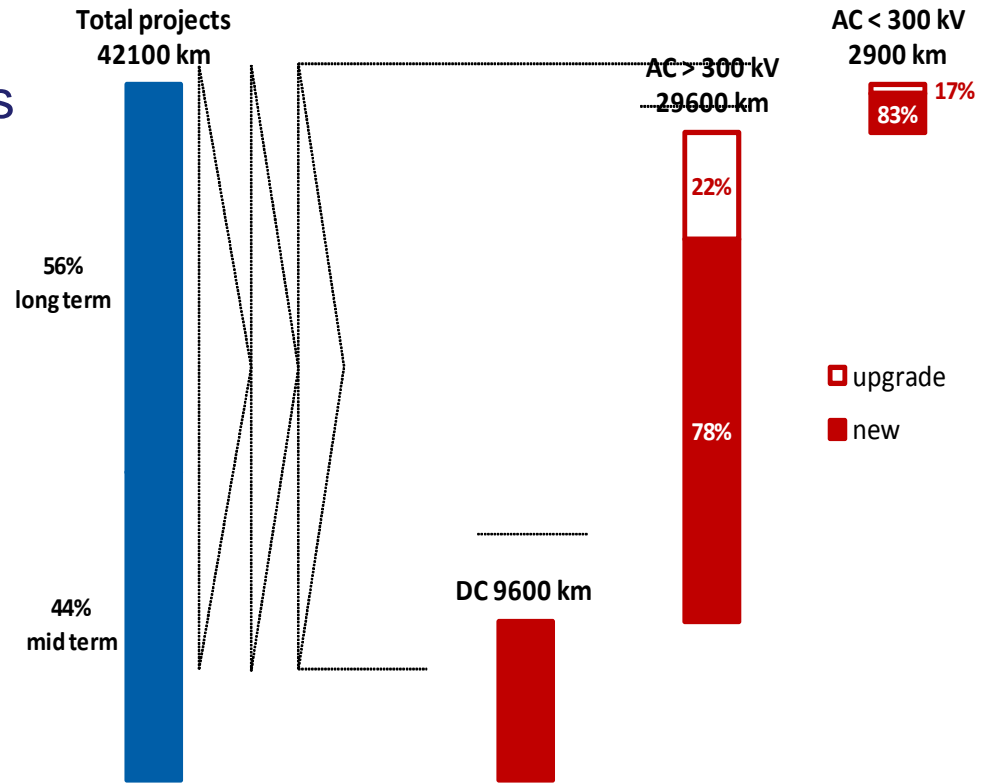


June 17, 2010

Pilot TYNDP delivers

Transmission investment projects that answer the three pillars of EU energy policy:

- Security of Supply
- Integration of RES
- The completion of the IEM



~14% of existing transmission line km

Pilot TYNDP delivers

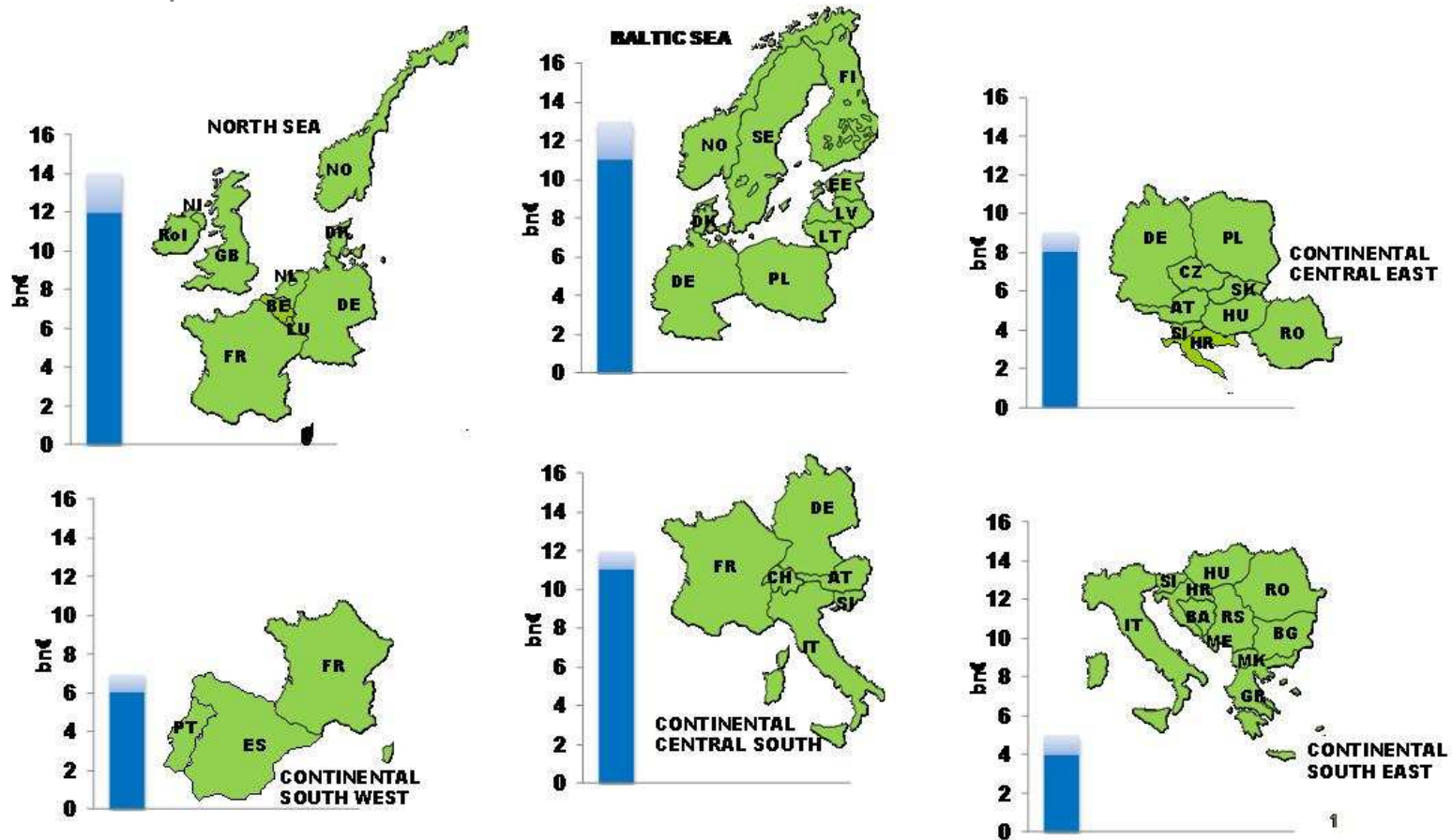
... a comprehensive list of projects

| REF on map | RGs | Substation 1 | Substation 2 | Project characteristics | Investment need alleviated | Expected benefits | Progress status | Expected time of commissioning | TENE | Comments |
|------------|-----|---|---------------------------|---|---|---|--------------------|--------------------------------|------|--|
| 1 | CSW | Frades B (PT) | Pedralva 1&2 (PT) | Creation of a new 400-kV station in Frades B connected to Pedralva by means of two new 400 kV, 40-km. The realisation of this two connections can take advantage of some already existing 150 kV single lines, which will be reconstructed as double circuit lines 400+150 kV line and partially sharing towers with those 400 kV circuits. | Needed to receive new hydro power plants that are in construction or permitting. | This project will provide higher RES integration and annual grid losses reduction | design&permitting | 2015 | 0 | Partially by reconstruction to 400+150 kV of 150 kV single lines already existent. New 400 kV Frades B substation will be created. |
| 2 | CSW | Pedralva (PT) | Alfena (PT) | New 50-km double circuit Pedralva (PT) - Alfena (PT) 400 kV OHL (only one circuit installed in a first step) | The project is needed for better integrating new renewable energy (wind & hydro) and securing the supply to Porto area | Expected benefits regard RES integration, increase of NTC and improved security of supply | planned | 2016 | 0 | 0 |
| 3 | CSW | Pedralva (PT) | Vila Fria (PT) | New 55-km double circuit Pedralva - Vila Fria 400-kV OHL (one circuit installed), with needed extension of existing Vila Fria substation to include 400-kV facilities. | The project is needed to increase the NTC with Spain, improve the capacity of the grid to receive new renewable energy (wind & hydro) in Northern Portugal and secures the supply to Vila Fria. | Expected benefits regard increased NTC, RES integration and improved security of supply | design&permitting | 2013 | 0 | There is the need to expand Vila Fria substation with 400 kV. |
| 4 | CSW | Frades B - Ribeira de Pena - Feira (PT) | | New 180-km double-circuit 400-kV OHL Frades B (PT) -Ribeira de Pena (PT) - Feira (PT) (one circuit operated at 220-kV between R. Pena and Feira) with a new 400/60 kV substation in Rib. Pena. In a first step, only the 130-km section Rib. de Pena (PT) - Feira (PT) will be constructed and operated at 220-kV as Vila Pouca Aguiar (PT) - Carrapatelo (PT) - Estameis (PT) (see project 6). In a second step, one circuit of this line will be operated at 400-kV. | The project is needed to receive new hydro and wind power plants that are in construction or permitting in Northern Portugal. | The project is expected to help RES integration and provide annual grid losses reduction | planned | 2015 | 0 | New 400 kV Ribeira de Pena substation will be created. On a first phase (2013) double ckt 400+220 kV Vila Pouca de Aguiar-(Rib. Pena)- Carrapatelo-Estameis will be constructed and operated only at 220 kV (project 6). After 2015, that double ckt will operate with one ckt at 220 kV and the other at 400 kV from Rib. Pena to near Feira. |
| 5 | CSW | Macedo de Cavaleiros (PT) | Vila Pouca de Aguiar (PT) | New 75-km double circuit 400+220 kV OHL (only 220 kV circuit installed in the first step) Macedo de Cavaleiros (PT) -Valpaços (PT) - Vila Pouca de Aguiar (PT). | Limitations on RES reception and need to improve the supply of local load | The project is expected to help RES integration (mainly wind) and improve the security of supply. In addition, an increase of ES-PT NTC is expected, due to reinforced exchange capacity on Douro border. | permitting | 2010 | 0 | Improve load feed and receive new renewable energy (mainly wind). Also contributes to reinforce interchange capacity on Douro border. |
| 6 | CSW | V. P. Aguiar - Carrapatelo - Estarreja (PT) | | New 400+220 kV double circuit OHL (initially only used at 220 kV) Vila Pouca Aguiar - (Rib. Pena) - Carrapatelo - Estarreja . Total length of line: 2x(90+49)km | Limitations on RES reception and reinforce to load supply | RES integration (mainly wind) and improve security of supply | design&permitting | 2012-2013 | 0 | Improve reception of new renewable energy (mainly wind) and also load feed. |
| 7 | CSW | Armamar - Bodiosa - Paraimo (PT) | | This 120-km double-circuit OHL has been constructed according to 400-kV standards but is currently operated at 220 kV as Valdigem (PT) - Bodiosa (PT) -Paraimo (PT). The project consists in operating one circuit at 400-kV while creating a new 400/220 kV substation in Armamar and upgrading the existing Bodiosa substation from 220/60 kV to 400/60 kV. Total length of line :120 km | Insufficient capability of existing network to accommodate interior to littoral flows | The project is expected to help RES integration, increase the NTC and improve the security of supply | under construction | 2010 | 0 | Implies new 400/220 kV Amamar substation and changing of Bodiosa substation from 220/60 kV to 400/60 kV, to which it was prepared since the beginning. |

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Pilot TYNDP delivers

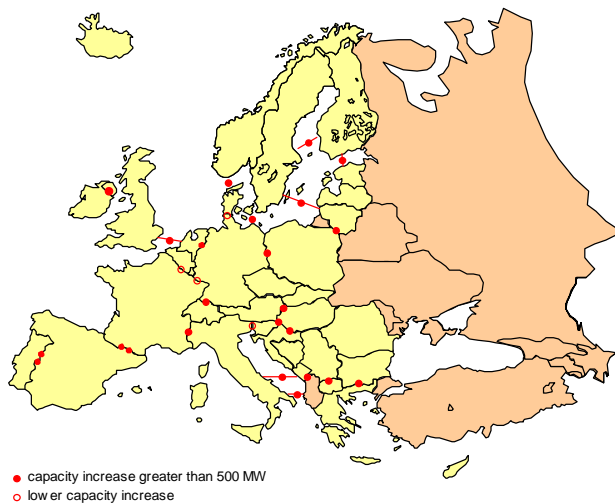
... and an impressive investment effort



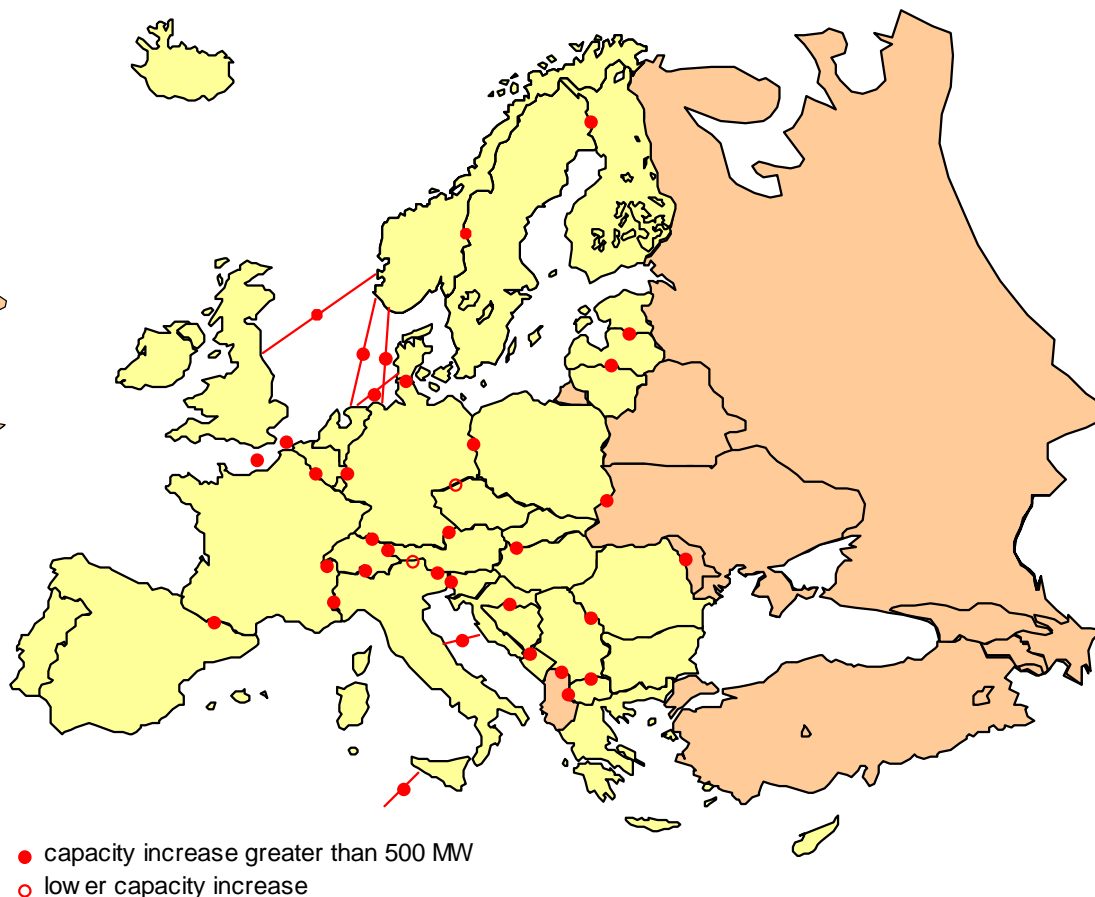
Pilot TYNDP delivers

Major transmission capacity increase in Europe in 2015 and beyond
(longer term)

Major transmission capacity increase in Europe in the next 5 years
(mid-term)



Ajouté suite au retour
des parties prenantes
après consultation





Resilience of the plan

- Reliability ensured through complex studies
- Economic soundness ensured for every investment
 - social welfare
- Wise use of new technology for long lasting solutions
- All projects required for the long-run picture
 - Offshore grid, supergrid



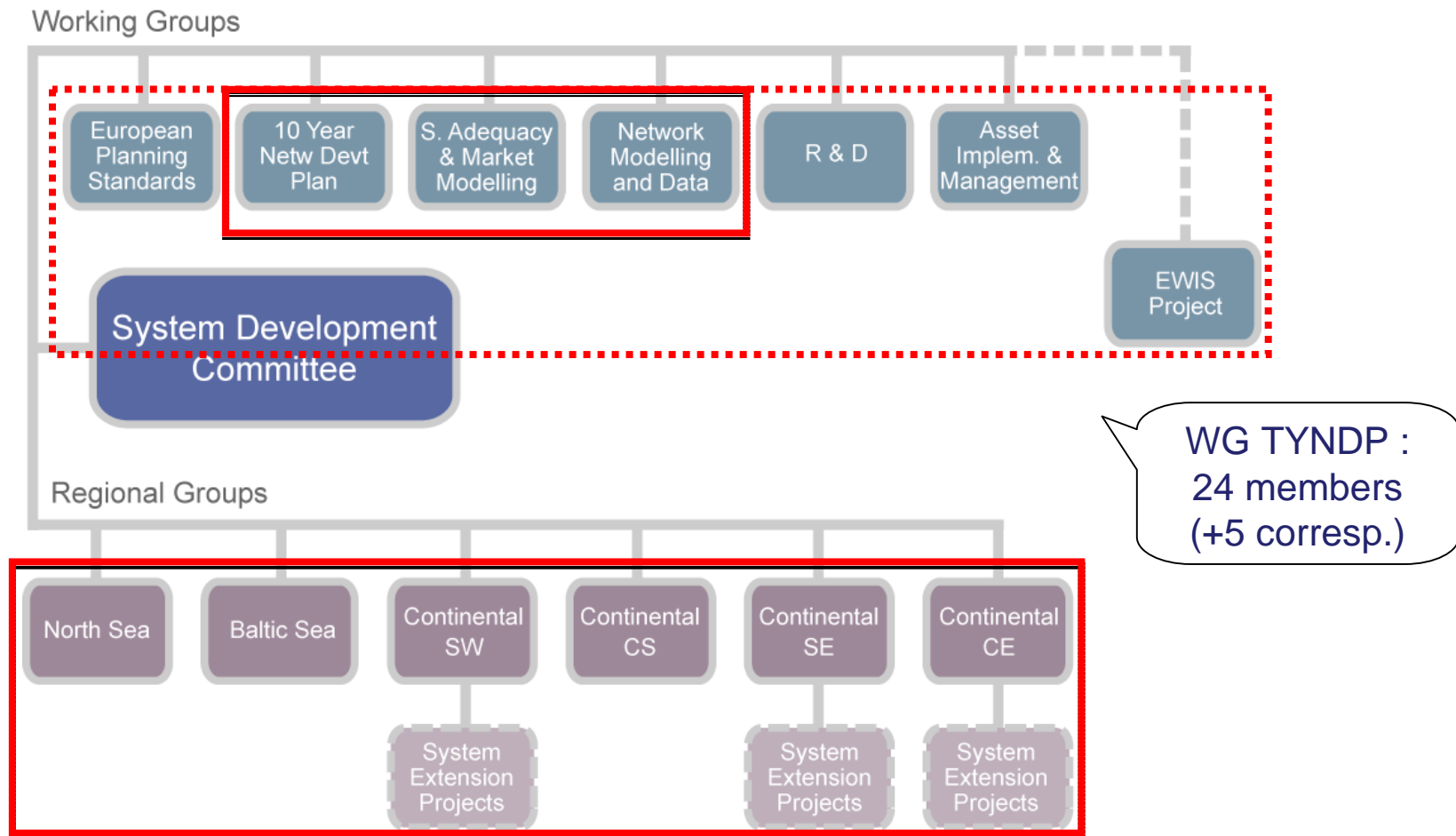
La dynamique

TYNDP

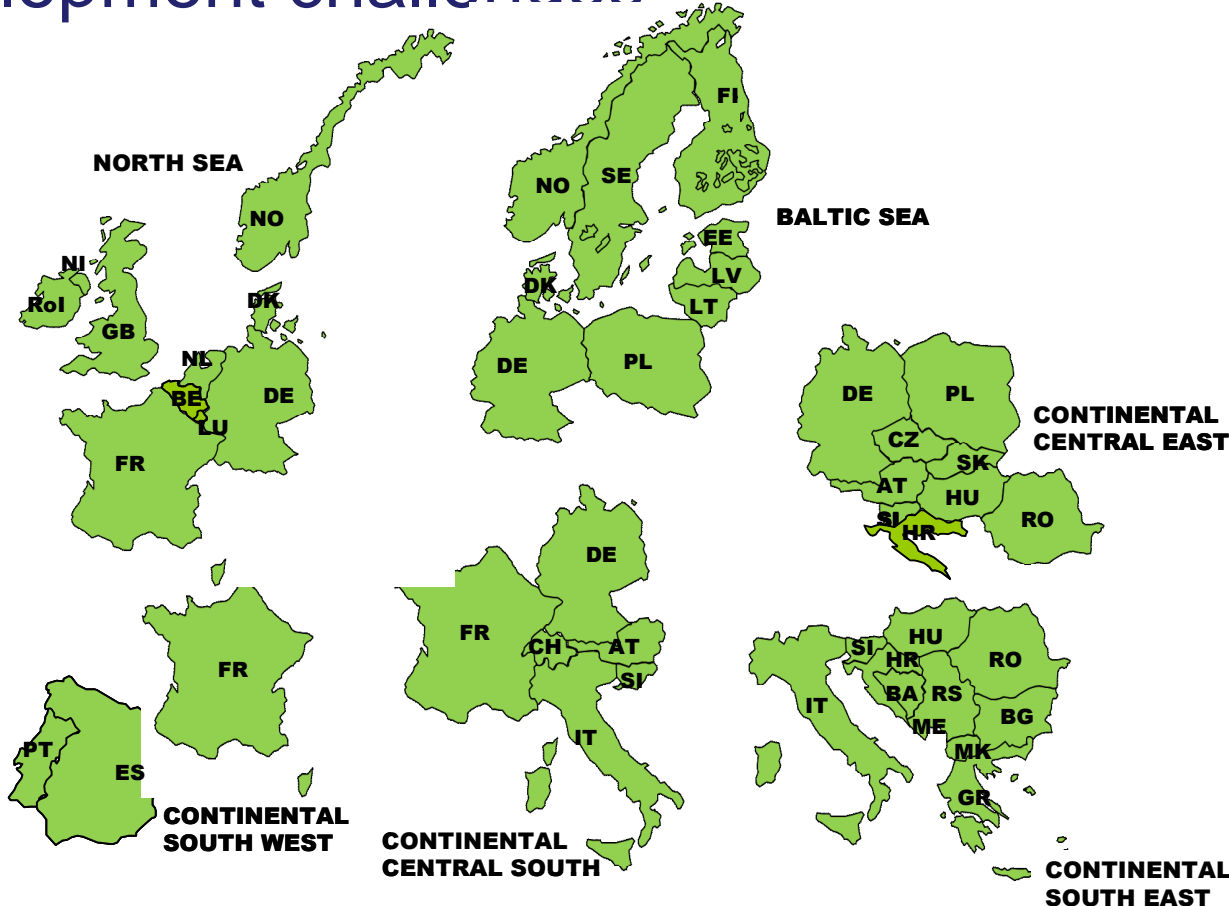
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ENTSO-E dedicated working structure



Regional Groups designed to address grid development challenges



Implication des parties prenantes

- Upstream consultation process

- Sondage des principales parties prenantes
- Peu de demandes spécifiques

EC, ERGEG,
Eurelectric,
Greenpeace,
EFET, etc.

- 6 semaines de consultation

Workshop 19
Mars > 100
participants

- Les retours de la consultation

- Questions avec réponses déjà dans le rapport... ✓
- Les procédures d'autorisation au premier plan ✓
- Mais exigence de réponses simples et vite
 - La complexité n'est pas une excuse



Stakeholders' feedback

- Public consultation 1st March – 10th April
 - More than 100 attendees at workshop, 21 written answers
- Acknowledgements
- Shared sense of urgency
- Synthetic picture of congestion
 - Project clustering, improved transfer capability
- Achievement of EU 2020 targets
- Integration of transmission projects
 - Also from non-ENTSO-E members



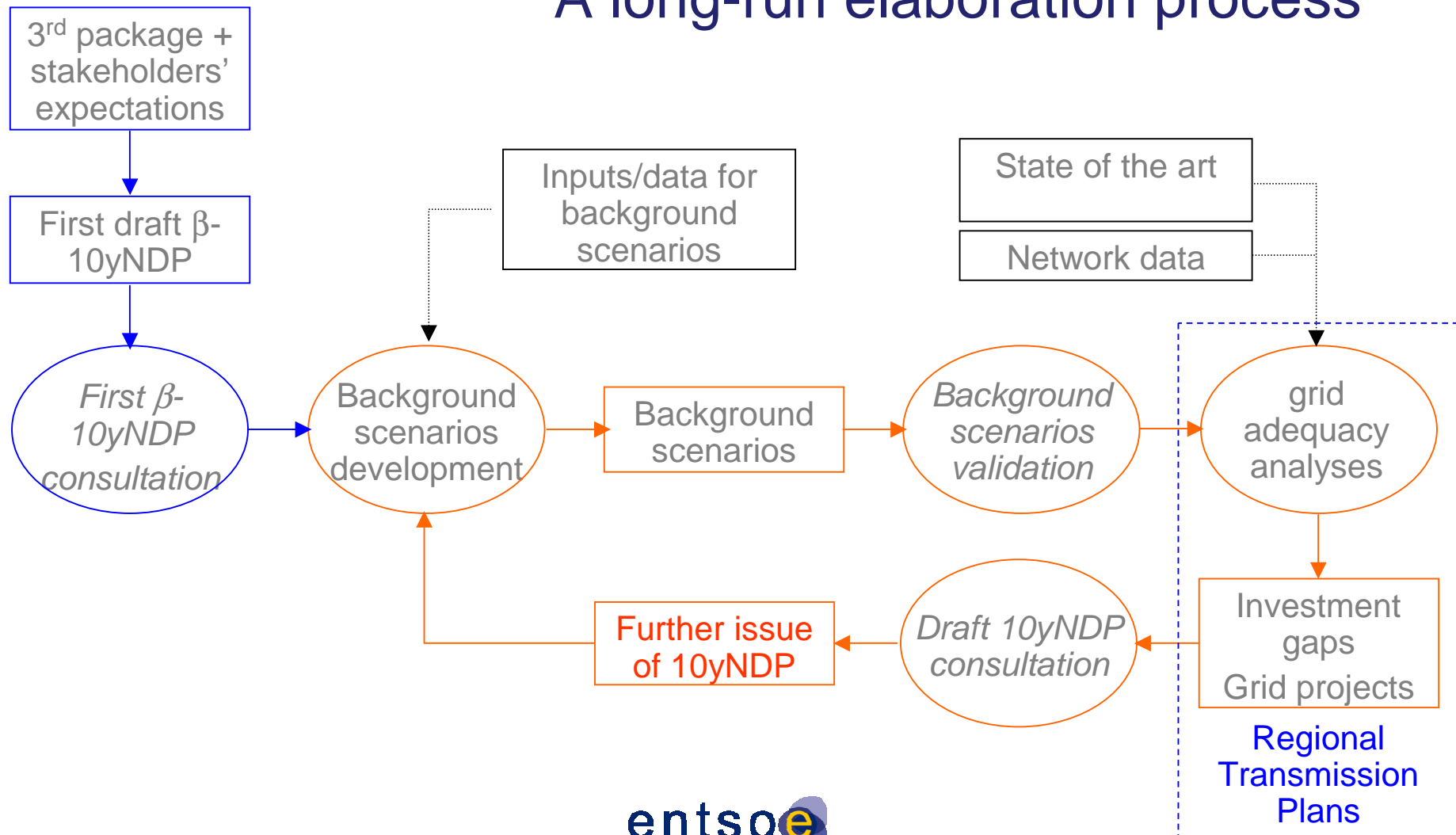
La suite

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A long-run elaboration process

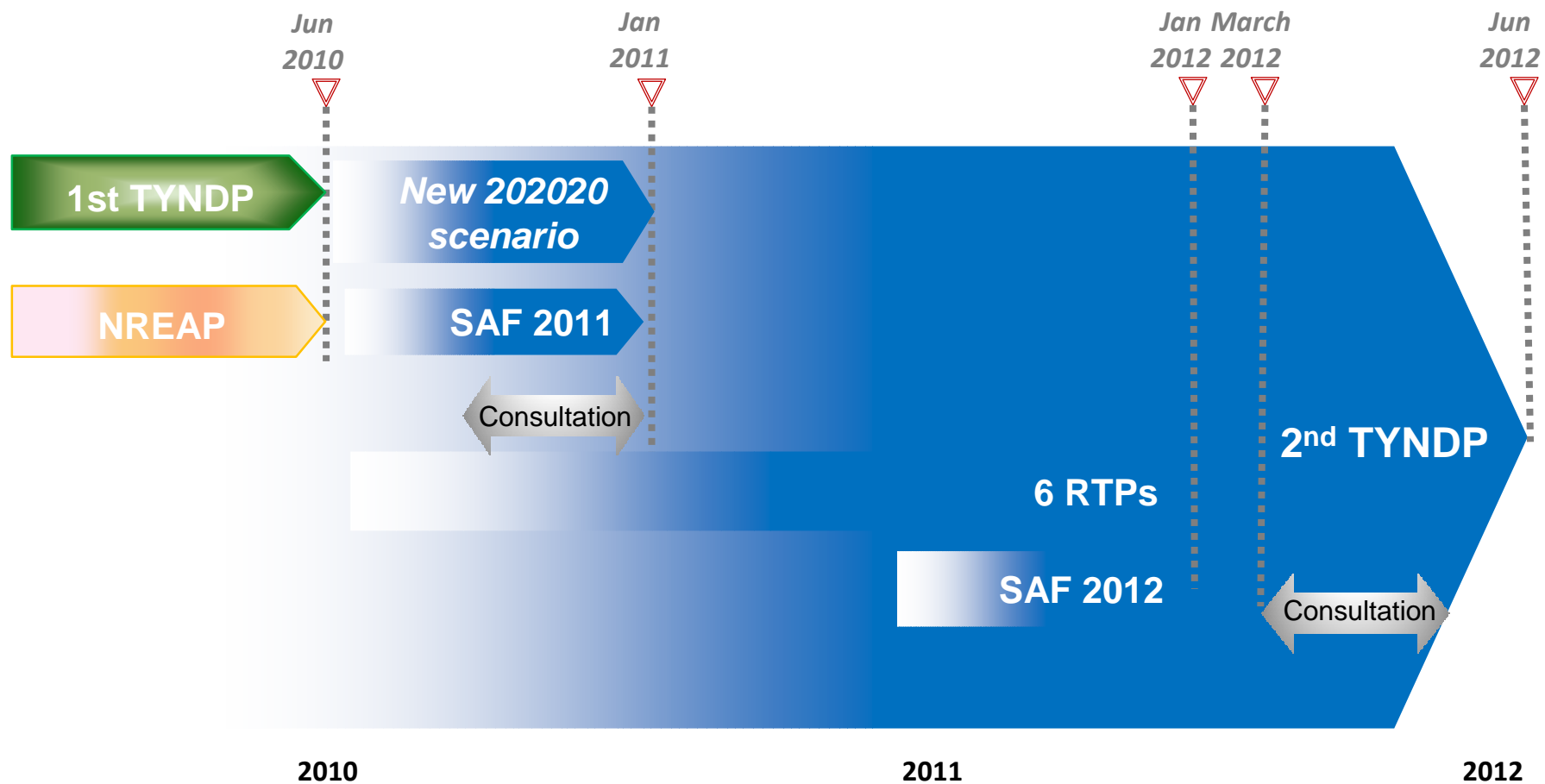




Towards the 2nd issue

- Guidelines for Regional Groups' inputs
 - TYNDP n°1 built on common TSOs studies but of different kinds
 - Pan-European base case models
- Top-down scenario(s): EU “202020” targets
 - As soon as NREAPs available (Jun/10)
 - Scenarios development must involve stakeholders
- A **full 2-year process** starting Jul/10

2nd TYNDP schedule





En guise de conclusion

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Conclusion

Pointage de
tous les risques
et
responsabilités

- Le TYNDP
 - Transparent, complet, amélioré à chaque édition
- ENTSO-E doit produire et produit
 - Pression et nécessité à répondre aux besoins externes
- Les processus des GRT s'adaptent pour répondre exigences européennes



Thank you for your attention!



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