DSO ENTITY
DSOs FOR EUROPE

Ask Me Anything

Task Force Ten-Year Network Development Plan (TF TYNDP)

29.01.2024

Agenda

No.	Start time	Stop time	Timeframe	Topic	Speaker
1	10:00	10:05	00:05	Welcome	
2	10:05	10:20	00:15	Introduction to TF TYNDP - Mandate - Looking back on 2023 - Looking forward to 2024	Stephan Gross (DSO Entity)
3	10:20	10:40	00:20	Network Development Plan e-distribuzione	Enrico Ruggeri (e-distribuzione)
4	10:40	11:00	00:20	Capacity Maps in Austria	Christoph Schred (Wiener Netze)
5	11:00	11:30	00:10	Closing and AOB	

The Task Force

TF TYNDP Kick off in December 2022

Stephan Gross
Stephan.gross@eudsoentity.eu

Creation date: 6 December 2023

Experts: 19 experts from 11 countries

Scope and objective of activity:

1. Investigate the opportunity to collaborate with the ENTSOs on the TYNDP process
2. React to the public consultations on the TYNDP process

Introduction to the TYNDP workflow Regulation

- Trans-European Networks for Energy (TEN-E)
  - Projects of Common/Mutual Interest (PCI/PMI)
  - REGULATION (EU) 2022/869
  - FAQ PCI/PMI
- Regulation on the internal market for electricity
  - REGULATION (EU) 2019/943 on the internal market for electricity
- Further important regulation related to the internal market for electricity
  - Regulation (EU) 2019/941 on risk-preparedness in the electricity sector
  - REGULATION (EU) 2019/942 establishing a European Union Agency for the Cooperation of Energy Regulators
  - Directive (EU) 2019/944 on common rules for the internal market for electricity

The Trans-European Networks for Energy (TEN-E) is a policy that is focused on linking the energy infrastructure of EU countries. As part of the policy, eleven priority corridors and three priority thematic areas have been identified.

Establihes and mandetes tasks to ENTSO-E and DSO ENTITY

Our role in the TYNDP

- **TYNDP is an ENTSO-E and ENTSOG task**, see (EU) 2019/943 article 30 (general tasks) and article 48 (details on TYNDP)
  - (EU) 2019/943 article 48 includes ACER role in reviewing the national and Union-wide network development plans
- DSO Entity tasks are defined in (EU) 2019/943 article 52ff.
  - “promoting operation and planning of distribution networks in coordination with the operation and planning of transmission networks;”
  - “cooperate with the ENTSO for Electricity and adopt best practices on the coordinated operation and planning of transmission and distribution systems including issues such as exchange of data between operators and coordination of distributed energy resources;”

The Process behind the Ten Year Network Development Plan at ENTSO-E

Process of European Projects of Common Interest led by the European Commission

Defining plausible futures, which we call **Scenarios**

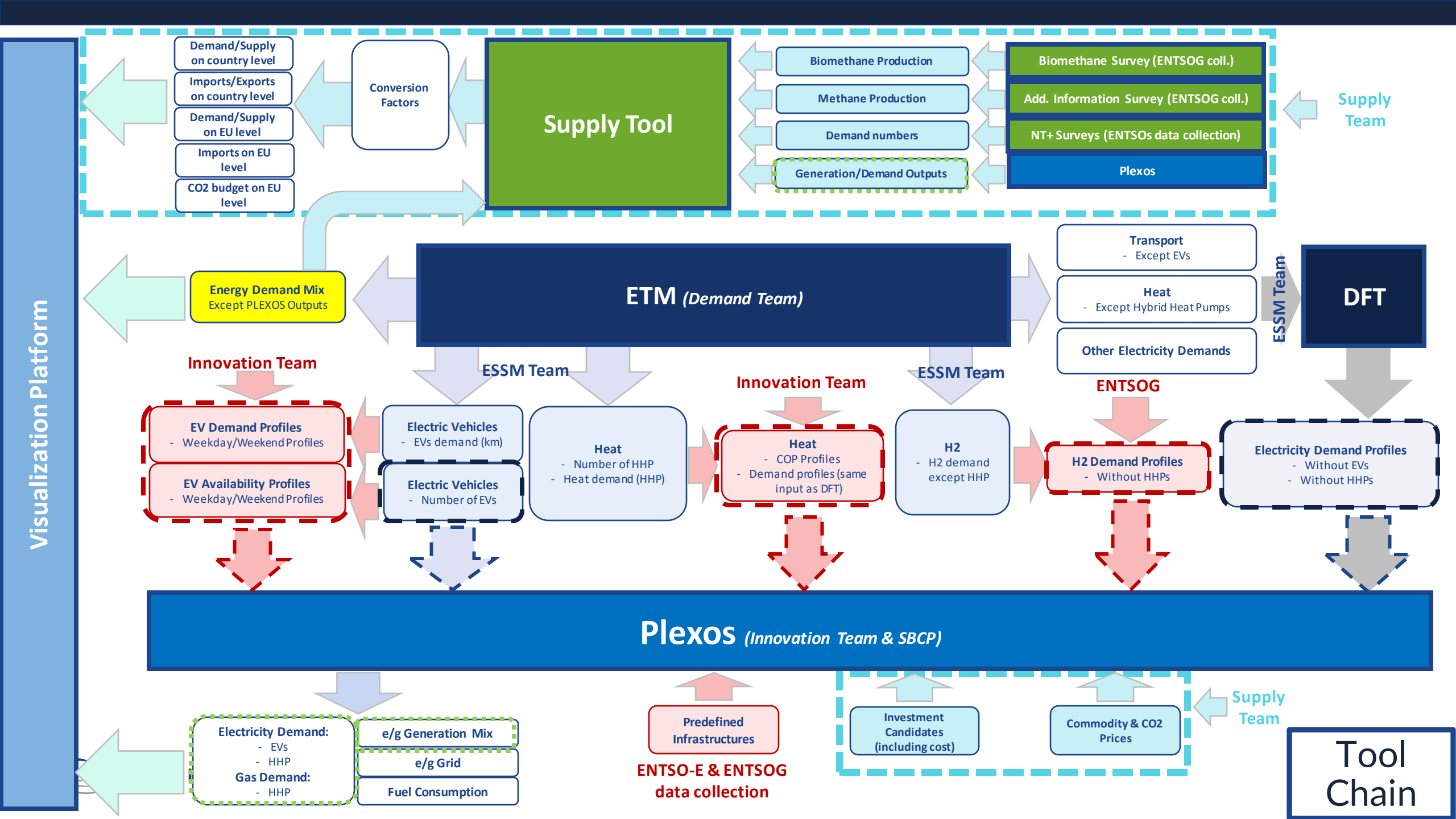
Project collection and identification

European Projects of Common Interest

Identification of the needs based on our scenarios

Cost benefits analysis of projects

Early in 2023, it was decided that our TF TYNDP will initially concentrate on the scenario step.


Visualization Platform
Demand/Supply on country level
Imports/Exports on country level
Demand/Supply on EU level
Imports on EU level
CO2 budget on EU level
Conversion Factors
Supply Tool
Biomethane Production
Methane Production
Demand numbers
Generation/Demand Outputs
Biomethane Survey (ENTSOG coll.)
Add. Information Survey (ENTSOG coll.)
NT+ Surveys (ENTSOs data collection)
Plexos
Supply Team
Energy Demand Mix
Except PLEXOS Outputs
ETM (Demand Team)
Transport
- Except EVs
Heat
- Except Hybrid Heat Pumps
Other Electricity Demands
ESSM Team
DFT
Innovation Team
ESSM Team
Innovation Team
ESSM Team
ENTSOG
EV Demand Profiles
- Weekday/Weekend Profiles
EV Availability Profiles
- Weekday/Weekend Profiles
Electric Vehicles
- EVs demand (km)
Electric Vehicles
- Number of EVs
Heat
- Number of HHP
- Heat demand (HHP)
Heat
- COP Profiles
- Demand profiles (same input as DFT)
H2
- H2 demand except HHP
H2 Demand Profiles
- Without HHPs
Electricity Demand Profiles
- Without EVs
- Without HHPs
Plexos (Innovation Team & SBCP)
Electricity Demand:
- EVs
- HHP
Gas Demand:
- HHP
e/g Generation Mix
e/g Grid
Fuel Consumption
Predefined Infrastructures
ENTSO-E & ENTSOG data collection
Investment Candidates (including cost)
Commodity & CO2 Prices
Supply Team
Tool Chain

Looking back on 2023 (TF TYNDP) :

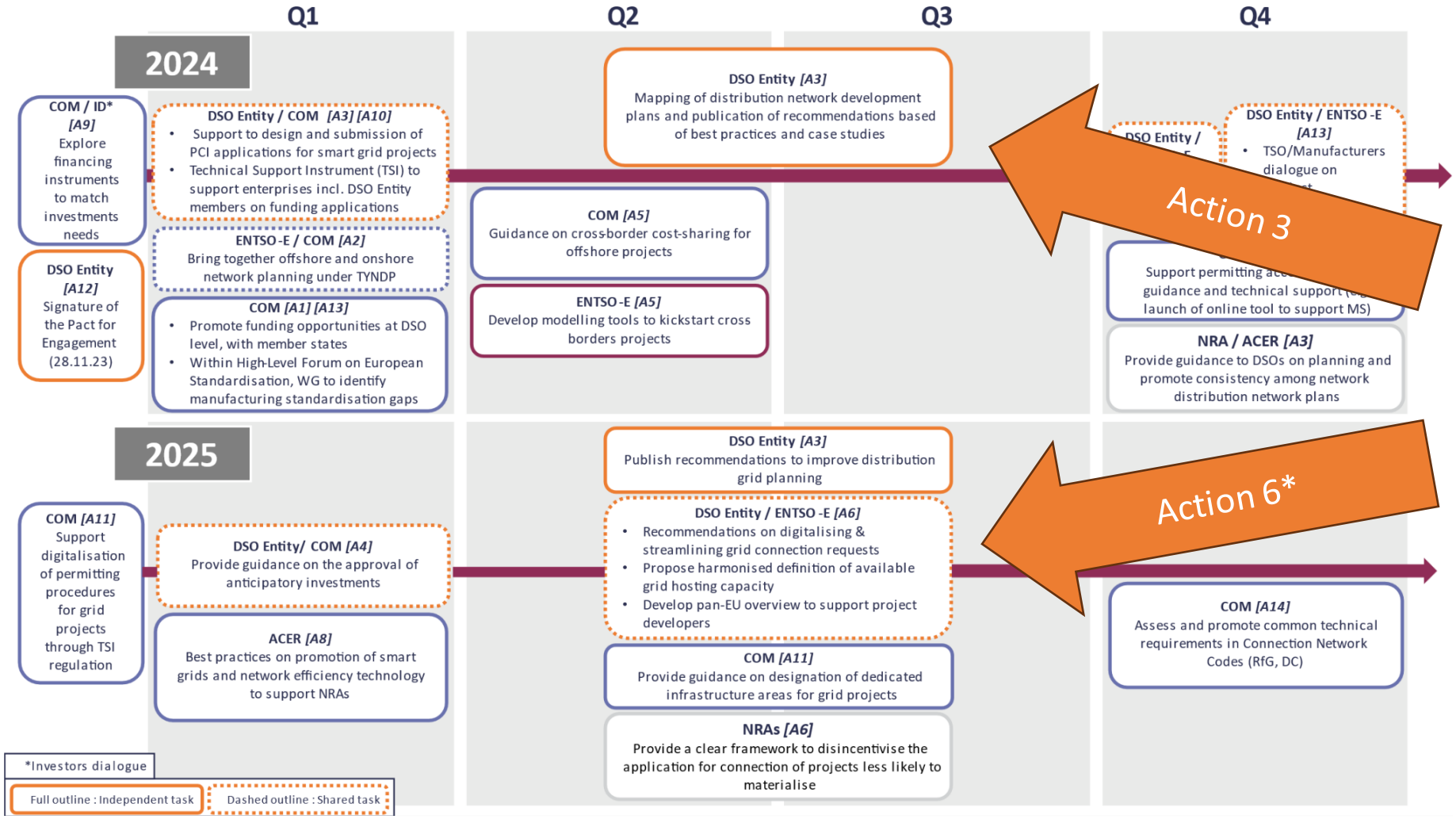
Highlights of 2023:

- DSO Entity and ENTSO-E met multiple times in 2023 to investigate the opportunity to **collaborate on the TYNDP process**.
- TF TYNDP provided **feedback on** the **public consultation** on the TYNDP 2024 scenarios input parameter.
- The TF TYNDP invited **Rickard Venetjoki (E.ON)** to inform the TF about the status of the **TEN-E and the related Smart Grid PCI projects**.
- **Alejandro Falkner Falgueras** joined the **TYNDP Scenarios External Technical Advisory Group** representing DSO Entity and TF TYNDP.
- **Andreas Schlesier (SWM)** volunteered for an exchange with the **European Heating Industry (EHI) to** discuss the impact of heat pumps on the power grid.

Outcome of 2023:

- **TF TYNDP concluded** that an active extended participation of DSOs in the TYNDP process requires specific attention so as to find best ways to **add value** for all involved parties.
- TF TYNDP **discusses** the option of shifting its focus to also include the topic of **distributed network development planning (DNDP).** In October/November, different members of the TF presented their DNDP including their encountered issues in drafting it.

PCI Energy Days and the Grid Action Plan in November 2023



* Grid hosting capacity potentially together with EG Distributed Flexibility

Looking towards 2024 (TF TYNDP) :

Outlook for 2024:

- The TF TYNDP **proposes to realign** its objective and focus to include the topic of **distributed network development plans (DNDP)** and network planning in general for 2024. The TF will draft a **Model DNDP** in 2024 after a deep investigation of the current state in DNDP development.
- TF TYNDP is going to prepare a **reaction to** points 6-7 from the Energie Infrastructure Forum (**Copenhagen Forum**) conclusions 2023.
- TF TYNDP will work on action 3 and 6 coming from the **Grid Action Plan.**
- By investigating how **DNDP are prepared in different organizations** and member states, TF TYNDP expects to **generate results that will be beneficial for the ENTSOs' TYNDP process.**

Generated with DALL·E 3

Timeline for TF TYNDP

Timeline until Copenhagen Forum (likely first week in June):

1. Clarify and formulate work including work Breakdown Structure: **Jan 2024**
2. Launch project and structure report for Copenhagen: **Feb 2024**
3. Draft report: **March and April (Consider eastern)**
4. Review report and approval: **May**

Full day workshop on 01.02.2024

Generated with DALL·E 3

Call for experts opening soon.

Generated with DALL·E 3

Q&A

Network Development Plan e-distribuzione

September 2023

e-distribuzione

Network Development Plan 2023–2025

Energy transition: priorities and strategic drivers

QUALITY of SERVICE:
Smart Grid implementation using diffuse sensors, advanced automation, advanced predictive maintenance algorithms.

CLIMATE CHANGING AND GRID RESILIENCY
The Resilience plan aim to reduce the risks related to extreme events due to climate change

INTEGRATION OF DISTRIBUTED GENERATION:
Renewal of the HV/MV/LV infrastructure to increase Hosting Capacity

DEVELOPMENT PLAN 2023 – 2025
The Development Plan describes the principal infrastructure interventions. The document is divided in 5 chapters plus the Addendum dedicated to PNRR and the Resilience plan

CLIENT ACTIVE PARTICIPATION:
Development of a digital ecosystem using Open Meters to improve customers participation in the energy market

ELETTRIFICATION OF CONSUMPTIONS:
Support for e-mobility. LV infrastructure renewal and development. New services implementation for energy efficiency support

Network Development Plan 2023

Addition required by ARERA – Del n. 296/23

e-distribuzione

1. Charging Infrastructure connection scenario for electric mobility	➢ CHAPTER 2 - «Charging infrastructure for e-mobility development»	NEW
2. Electric System flexibility	➢ CHAPTER 4 - «Grid Flexibility: e-d pilots projects»	NEW
3. Planned interventions for 5 years	➢ CHAPTER 4 - «HV interventions and MV and LV interventions»; ➢ ANNEX 1,2,6.	NEW
4. Methodology to define interventions on the Grid	➢ CHAPTER 4 - «Grid analysis/demands and methodologies»	NEW
5. Cost estimation Methodology	➢ CHAPTER 4 - «Cost estimation Methodology»	NEW
6. Detail on (economic/temporal) replanning of interventions	➢ Estimated operating cost (related to the last 25 years) ➢ Expected date ➢ Justification of external delays or voluntary postponements	NEW

Network Development Plan 2023

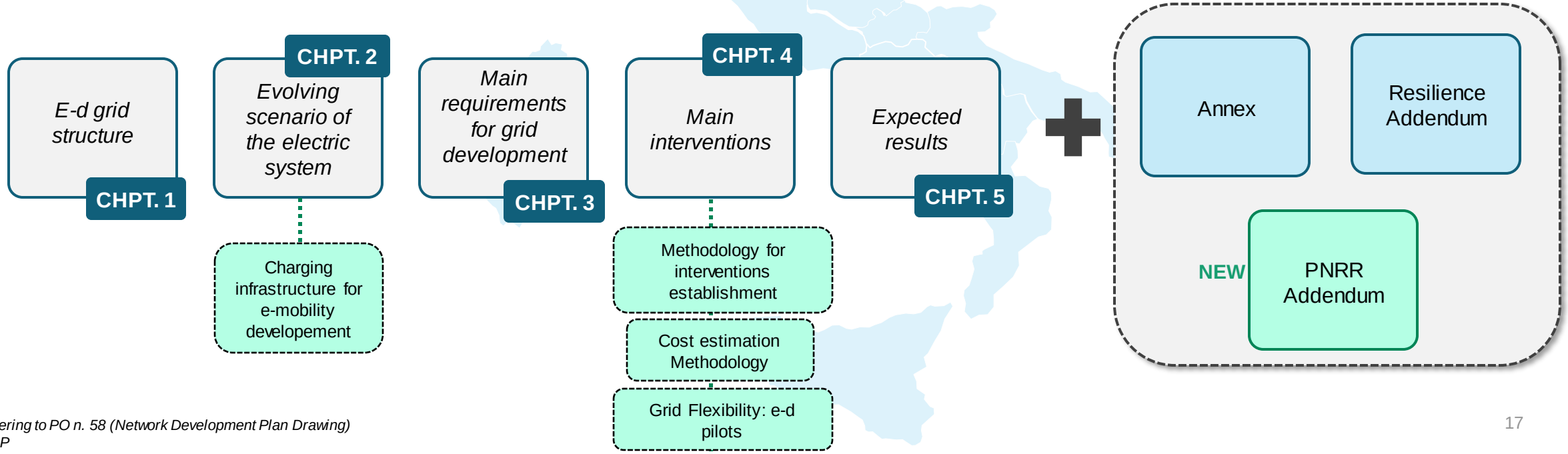
Documents structure and main topics

***Descriptive section*:** growth forecast, analysis and description of the planned interventions by type

***Main projects 2023*:** list of planned interventions/investment projects

***Resilience Plan 2023-2024*:** criteria of intervention and purposes, interventions description, overall benefits

PNRR* Addendum *2023*: criteria of intervention and purposes, interventions description, overall benefits



Referering to PO n. 58 (Network Development Plan Drawing)
**NRRP*

Network Development Plan 2023

Document contents

e-distribuzione

	PARAGRAPH	DESCRIPTION
CHAPTER 1 E-Distribuzione's Netwok Structure	Grid's Structure	• Description of E-Distribuzione's network assets and key investments categorized by purpose and equipment type
CHAPTER 2: Electrical system evolution scenarios	Electric Power and Energy Demand Forecasts	• General macroeconomic scenario analysis • Trends in electric power demand • Terna's energy demand growth forecasts
	Development of Distributed Generation	• Analysis of the electric power system's state in terms of generation and renewable energy evolution • Analysis of active, in-progress, and planned connections
	Development of Electric Vehicle Charging Infrastructure	• Analysis of public MV and LV charging infrastructure connection requests • Forecast of the expected number of connections and power capacity

Referering to PO n. 58 (Network Development Plan Drawing)

Network Development Plan 2023

Document contents

e-distribuzione

CHAPTER 3: Main infrastructure development needs

PARAGRAPH	DESCRIPTION
Grid's adaptation to the continuous load increasing (new connections and demand increasing)	• Measures for meeting energy demand and connecting end-users/producers (new primary substations, new MV lines, MV network enhancement, line refurbishments, etc.)
Quality of Service	• ARERA Regulation set by Delibera No. 566/2019 • Improvement measures and planned interventions aimed at reducing the number and duration of interruptions (system refurbishment, reducing the average length of medium-voltage lines, trenching, remote monitoring, etc.)
Adaptation to prescriptions and technical standards	• Measures to ensure the maintenance of safety conditions, after changes in regulations, including the potential introduction of innovative technologies • Activities aimed at adapting existing systems to environmental regulations (e.g., noise emissions, electromagnetic fields, etc.)
Development projects in support of infrastructure	• Network development creating shared value • Investments in innovation to enhance performance in terms of efficiency and QoS • Initiatives aimed at sustainability by adopting solutions to reduce environmental impact and enhance the local area

Referering to PO n. 58 (Network Development Plan Drawing)

Network Development Plan 2023

Document contents

e-distribuzione

CHAPTER 4: Main Interventions

PARAGRAPH	DESCRIPTION
Network Analysis/Requirements and Methodologies	• Analysis of the existing network and forecasts for the development of the future network based on: QoS, network losses, load, and resilience
Interventions on the HT (High-Voltage) Network	• Load adjustment interventions (enhancement/expansion of existing Primary Substations, etc.) • QoS interventions (construction of new Primary Substations, etc.) • List of Primary Substations planned to enable the connection of customers/producers with a formalized connection request to the RTN (National Transmission Grid).
Interventions on the Medium-Voltage (MV) and Low-Voltage (LV) Networks	• Load adjustment interventions (enhancements to existing line segments, creation of new outgoing lines from existing Primary Substations, etc.) • QoS interventions (upgrade of network components, construction of new MV/LV lines, MV network automation, etc.) • Technical solutions for the connection of customers/producers
Technological Innovation Projects	• Project "DSO 4.0 – Digital Network" • Project E-Grid • Project for the installation of a new 2G meter • Remote control of Primary Substations • Initiatives for the development of Smart Grids and Smart Cities • Other technological innovation projects

Referering to PO n. 58 (Network Development Plan Drawing)

Network Development Plan 2023

Document contents

e-distribuzione

CHAPTER 4: Main Interventions

PARAGRAPH	DESCRIPTION
Infrastructure Support Development Projects	• Presentation of the strategic development projects that are increasing process effectiveness and network management efficiency in E-Distribuzione (e.g., Grid Blue Sky, Special Vehicles, etc.)
Measurement Activities	• Replacement of smart meters for customer management activities (including power increase requests) • Mass replacement with second-generation (2G) smart meters • Installation of meters in Secondary Substations for measuring and balancing transiting energy
Network Flexibility: E-D's Pilot Projects	• Focus on E-D's pilot projects, particularly the EDGE project, aimed at developing efficient and integrated electricity markets for the energy transition
Cost Estimation Methods	• Identification of the methodology for estimating average unit costs for CAPEX and OPEX in the HV-MV-LV segments for the main types of interventions • Phases of cost estimation progress: Multi-year Plan, Annual Budget, Annual Budget Revisions • Indication of the variables that determine potential deviations in average unit costs

Referering to PO n. 58 (Network Development Plan Drawing)

Network Development Plan 2023

Document contents

CHAPTER 5: Expected Results

PARAGRAPH	DESCRIPTION
Prevention of network overload phenomena	• Qualitative description of expected results (overload thresholds; limitation of voltage drops on lines and utilization of equipment)
Improvement of QoS	• Qualitative description of expected results (reduction in the number and duration of interruptions; reduction of quality performance gap between different territorial areas of the Country)
Energy efficiency and reduction of distribution losses	• Qualitative description of expected results related to the type of intervention (load adjustment, voltage drop containment; rationalization and network adaptation interventions)

Referering to PO n. 58 (Network Development Plan Drawing)

Network Development Plan 2023

Annex in details

ANNEX	DESCRIPTION

Annex 1 *"HV GRID "*	• Projects with lifetime amounts ≥ 500 k€ and spending start year before 2026 (Purpose: Budget, Quality and Load Adjustment; for HT works, also Technological Adaptation).
	• Detailed list:
	  • Project Description
	  • Planned amount per plan year and lifetime
	  • Budget Purpose: CA, QS, E0, UP, UH, and TA (the latter purpose only for HT works and energy storage systems)

Annex 2 *"MV GRID "*	
Annex 3 *"TECHNOLOGICAL INNOVATION"*	Detailed list with names • Project description • Start / end year • Lifetime cost
Annex 4 *"INFRASTRUCTURE INVESTMENTS"*	
Annex 5 *"ADJUSTMENT OF HV PLANTS"*	List and description of Enel Distribuzione's HV plant upgrades requested by Terna
Annex 6 *"HV AND MV* PROJECT REPORTS*"*	List of HV and MV interventions from the previous Development Plan with actual economic valuation and indication of completion

Referering to PO n. 58 (Network Development Plan Drawing)

Network Development Plan 2023

Addendum

ADDENDUM	DESCRIPTION
Addendum *RESILIENCE PLAN*	• Regulatory Framework • Major extreme weather events and critical analysis • Description of risk factors (ice sleeve, wind/ tree fall above cables, heatwaves) • Interventions summary for 2023-2024, prepared in accordance with ARERA resolutions • Cost and benefit assessment for the system

Addendum
PNRR
	• Regulatory Framework
	• Smart Grid Reinforcement:
	  ◦ Investments criteria and purposes
	  ◦ Summary of Interventions by type (for Electrification and Hosting Capacity)
	  ◦ Overall benefits
	• Interventions to Increase the Resilience of the Grid
	  ◦ Investments criteria and Purposes
	  ◦ Summary of interventions by type (for ice sleeve, tree fall above cables and for heatwaves)
	  ◦ Overall benefits

Referering to PO n. 58 (Network Development Plan Drawing)

Q&A


WIENER NETZE

AVAILABLE CAPACITIES – GENERAL

- Method is regulated

  https://www.ris.bka.gv.at/Dokumente/BgblAuth/BGBLA_2022_II_350/BGBLA_2022_II_350.html

- Consistent implementation by Austrian DSO's

- Substation Capacity-Map must be published

  https://www.ebutilities.at/verfuegbare-netzanschlusskapazitaeten

  https://www.wienernetze.at/o/document/wienernetze/uw_kapazitaeten

STEP 1: LIMITATION TROUGH THE 380/220/110KV GRID

- In order not to underestimate the capacities at substation level, the limitations of the 110 kV grid as well as the transmission grid are generally not taken into account
- An exception to this rule are limitations, which can be assigned to specific substations

STEP 2: DETERMINING THE PERMISSIBLE LOAD ON THE TRANSFORMERS

- Nominal currents of the HV/MV transformers, depending on the operating voltage, if it deviates from the rated voltage by more than 10%
- If other equipment than the transformer (e.g. current transformers, busbars) has a capacity-limiting effect, this shall be considered
- The installed transformer capacity in a substation is the sum of all transformer units
  - If two voltage levels are present, they are evaluated separately

STEP 3: DETERMINE THE ACTUAL LOAD ON THE TRANSFORMERS

- The basis for determining the transformer load are the recorded actual measured values
- The normal switching state is considered
  - ➢ Exclusion of times with special switching states based on the logged switching actions
- The 99,5% quantile value is used (not the maximum value)
- Annual update (calendar year)

STEP 4: DETERMINE THE BOOKED CAPACITIES

- The available (free) capacities are reduced by the booked capacities
  - booked capacities = plants with valid grid access contract
  - use of a simultaneity factor of 0,88

- Update every 3 months

STEP 5: CONSIDERATION OF THE (N-1) RULE

- Substations for public supply: Failure of the largest transformer must be controllable
- Substations for Wind/PV only: Max. capacity is the full transformer power
- Temporary operational shutdowns are not additionally considered

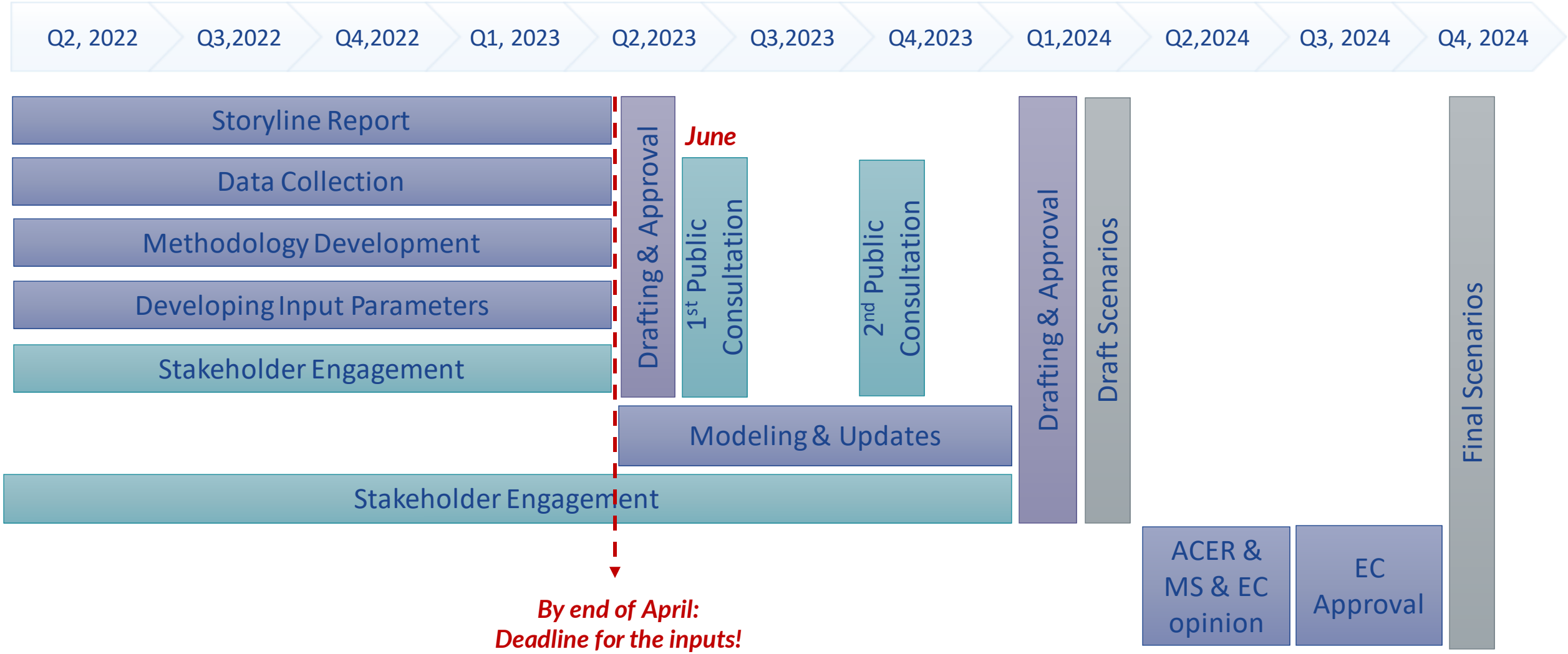
Q&A

DSO ENTITY
DSOs FOR EUROPE

Generated with DALL·E 3

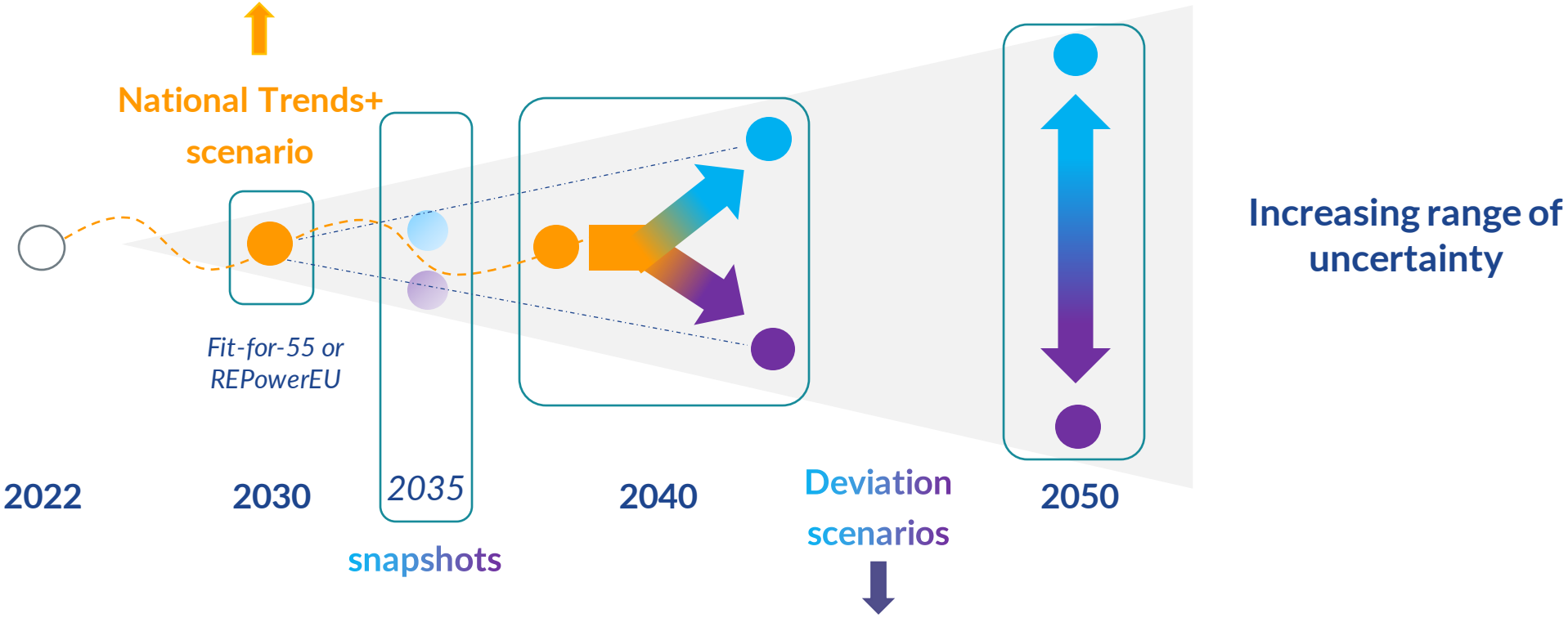
Thank you!

TYNDP 2024 Scenarios Timeline



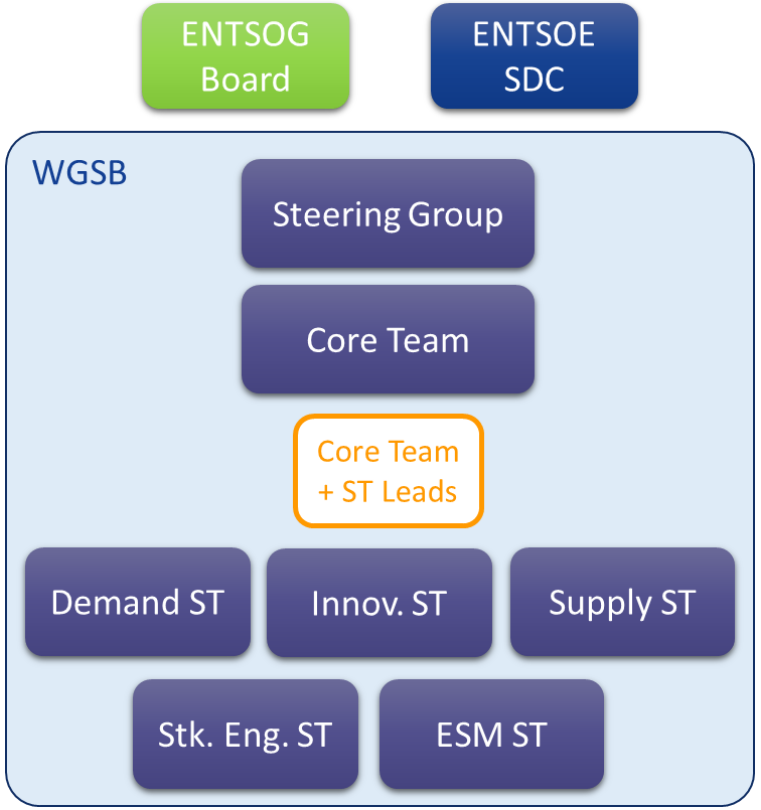
TYNDP 2024 Scenarios Strategy

The aggregation of national approaches that reaches EU targets



Deviation from National Trends + scenario to capture uncertainties and reach EU targets

Governance



Collaboration ENTSO-E & ENTSOG

- Joint development of scenarios since 2018

WGSB Steering Group

- Points out main directions
- Provide guidance on critical decision

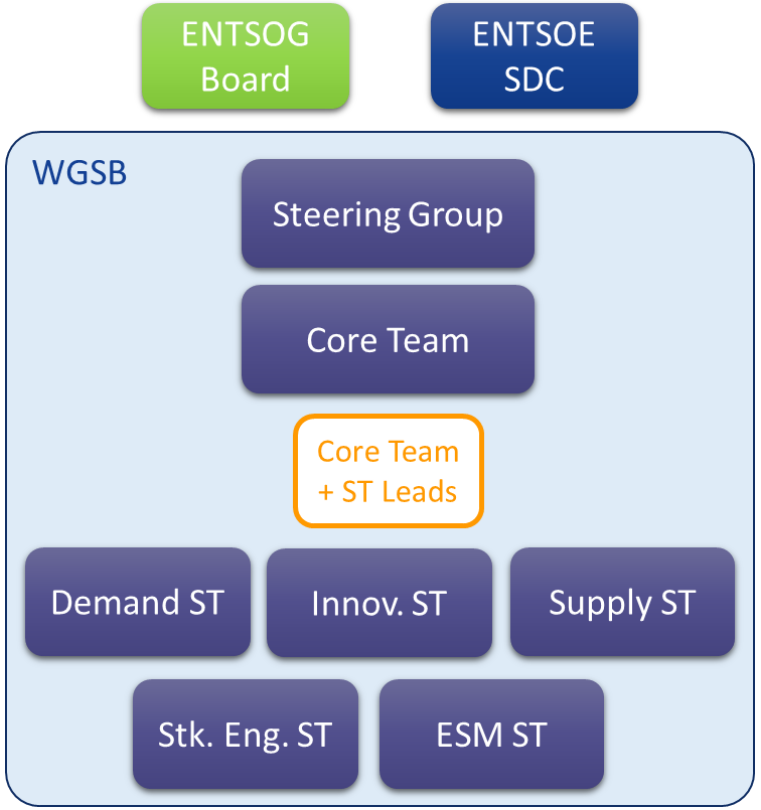
WGSB

- The WGSB consist experts from members of ENTSO-E & ENTSOG
- The group's task is to draft the reports and prepare deliverables
- The group divided into 5 sub-teams to perform tasks in parallel
- The WGSB meets every two weeks: update from each sub-teams, make the decisions and first level of approvals

Core Team

- The general management of WGSB
- Consist of PMO and Convenors
- The Core Team meets every week and meets with sub-team leads every two weeks.

Governance



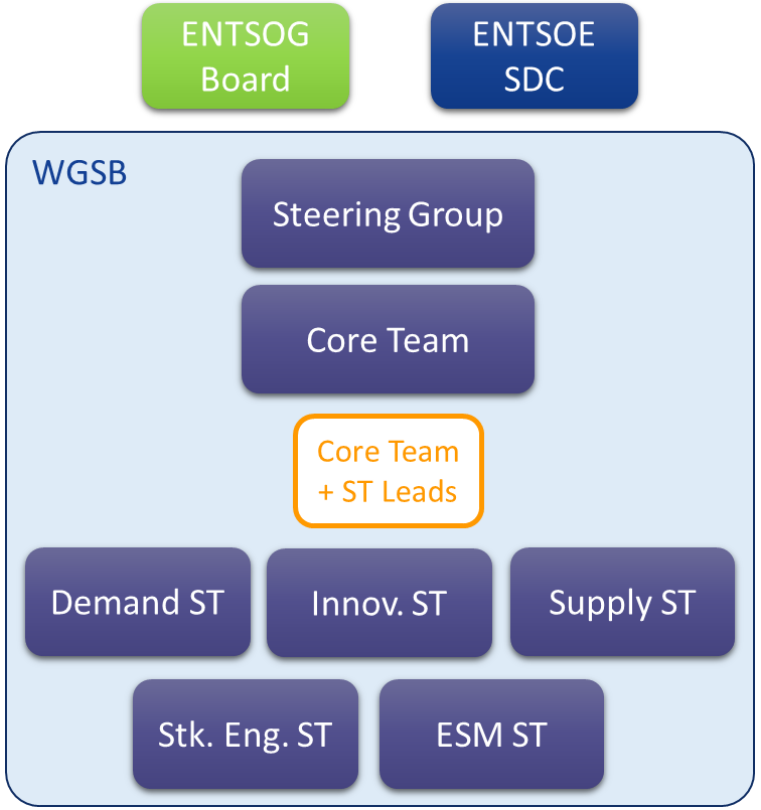
Demand Sub-Team

- Defining ranges/trajectories for key end-user technologies (space-heating, mobility…)
- Defining end-consumer energy behavior (share of prosumer, V2G…)
- Engaging with sectorial association/experts (boiler/HP manufacturers, industry…)
- Building the default demand scenarios (by country, sector, technology and carrier) to be submitted to TSOs for review and later to Stakeholder consultation

Supply Sub-Team

- Developing trajectories by supply source (wind, solar, batteries, nuclear, biomethane, imports…)
- Developing cost data for technologies proposed as investment candidates in the investment loop
- Supplying the commodity and CO2 prices

Governance



Innovation Sub-Team

- Developing & improving modelling approaches
- Some identified topics for 2024:
  - Enhanced hydrogen-to-power modelling
  - Explicit heat modelling
  - EV modelling
  - Offshore energy hub modelling

ESSM Sub-Team

- Developing and maintaining the energy demand tool
- Developing interfaces between energy demand tool and other tools

Stakeholder Engagement Sub-Team

- Developing the Stakeholder Engagement Plan
- Interaction with stakeholders and institutions
- Organising consultations & webinars

Supply Sub-Team – Collaboration Areas

The Supply team has identified the following subjects as possible for common investigation / knowledge share:

1. The distribution costs
2. Inputs on the DSO connected batteries
    I. Rooftop PV & battery ratio
        a. *Current capacity and trajectories*
        b. *Detail of the batteries and the cost*
3. District heating
    I. Supply of primary energy sources to produce

Current status and plans / projections for 2030 & 2040 & 2050 time horizons (*EU-level or country specific insights*)

Demand Sub-Team – Collaboration Areas

The Demand team has identified the following subjects as possible for common investigation / knowledge share:

1. Sensibility of electricity consumption to temperature
    I. Benchmark for DFT
2. Data on thermal storage & heat recovery
    I. Profiling on heating demand - similar to batteries <-> electricity demand
    II. Efficiency on heating demand (possibly linked to District Heating)
3. Demand elasticity / 'implicit DSR'
    I. Change in consumer behavior due to short term price changes

Benchmark for improving the Demand Forecasting Tool, the datasets will not affect 2024 cycle.

Innovation Sub-Team – Collaboration Areas

The Innovation team has identified the following subjects as possible for common investigation / knowledge share:

1. EV availability profiles
2. EV driving profiles
3. Average capacity of a hybrid heat pump and COP curve
4. Feedback on the EV modeling assumptions

Current status and plans / projections for 2030 & 2040 & 2050 time horizons (*EU-level or country specific insights*)