Planning the energy transition – The European perspective

ENTSO-E’s Ten-Year Network Development Plan (TYNDP)
What is the role of ENTSO-E?

ENTSO-E fosters the cooperation among those who keep the lights on in Europe

- 39 Member TSOs in 35 countries serving 500 million citizens + 2 Observer Member
- ENTSO-E platform for cooperation on operations, markets, system development and innovation
- ENTSO-E is the common voice of TSOs in Europe
ENTSO-E’s planning tool: The Ten-Year Network Development plan (TYNDP)

1. SCENARIOS
2. NEEDS
3. COLLECTION
4. COST BENEFIT
5. SELECTION

Defining up to three most plausible futures, which we call Scenarios

Identification of the needs based on our scenarios

Infrastructure projects collection and identification (transmission and storage)

Cost-benefits analysis of projects

European Projects of common Interest Process (ran by the European Commission)
TYNDP 2022 assessed 141 transmission projects, including 85 cross-border projects.

6 offshore hybrid projects (generation + transmission).

23 storage projects, including 15 Hydro Pumped Storage, 6 Compressed air and 2 electrochemical storage projects.
Three key messages from TYNDP

1. **Opportunities** for improving the power system exist **all over Europe**

2. **Addressing system needs** reduces Europe’s **dependence** on gas-based power generation

3. **Coordinated planning will be needed** across sectors
Opportunities for increased cross-border transmission, storage and peaking capacity exist all over Europe

Needs for cross-border electricity transmission, storage and peaking capacity in Europe in 2040

CROSS-BORDER CAPACITY INCREASES NEEDS IN MW (ADDITIONAL TO THE STARTING GRID 2025)

- < 500 MW
- 500 → 2,000 MW
- 2,000 → 4,000 MW
- > 4,000 MW

STORAGE NEEDS IN MW (ADDITIONAL TO BATTERY CAPACITIES IN NT2030 AND TO 2040 CAPACITIES FOR OTHER STORAGE TECHNOLOGIES)

- < 1,000 MW
- 1,000 → 5,000 MW
- 5,000 → 10,000 MW
- > 10,000 MW

CO₂-FREE PEAKING UNIT NEEDS PER COUNTRY IN MW
How addressing system needs benefits Europe

What would happen in 2040 if...

We stopped investing in the power system in 2025?

- EU Energy bill rising to 132 Billion euro per year
- System instability and risk of blackout
- 78 TWh of renewable energy curtailed each year
- Dependence on gas with 366 TWh of gas-based power generation per year
- Grid not sufficient → Leads to no decarbonisation

What would happen in 2040 if...

We addressed system needs?

- Investing 6 Billion euro per year cuts generation costs by 9 Billion each year
- Ensuring stability and security of electricity supply in Europe, with 1.6 TWh of avoided energy-not-served
- Avoiding the curtailment of 42 TWh of renewable energy each year
- Gas-based power generation is reduced by 75TWh per year
- Grid welcoming the expected development of renewables → CO2 emissions cut by 31Mton per year
Coordinated planning will be needed across sectors

Non-infrastructure solutions

- Demand side response
- Regulation
- Smart Grids
- Storage
- Smart Sector Integration
- Market design
- Operational measures

Electricity infrastructure solutions

- Transmission lines
- Energy Storage
- Peak units
- Hybrid solutions
Our values define who we are, what we stand for and how we behave. We all play a part in bringing them to life.

**EXCELLENCE**
We deliver to the highest standards. We provide an environment in which people can develop to their full potential.

**TRUST**
We trust each other, we are transparent and we empower people. We respect diversity.

**INTEGRITY**
We act in the interest of ENTSO-E.

**TEAM**
We care about people. We work transversal and we support each other. We celebrate success.

**FUTURE THINKING**
We are a learning organisation. We explore new paths and solutions.

We are ENTSO-E