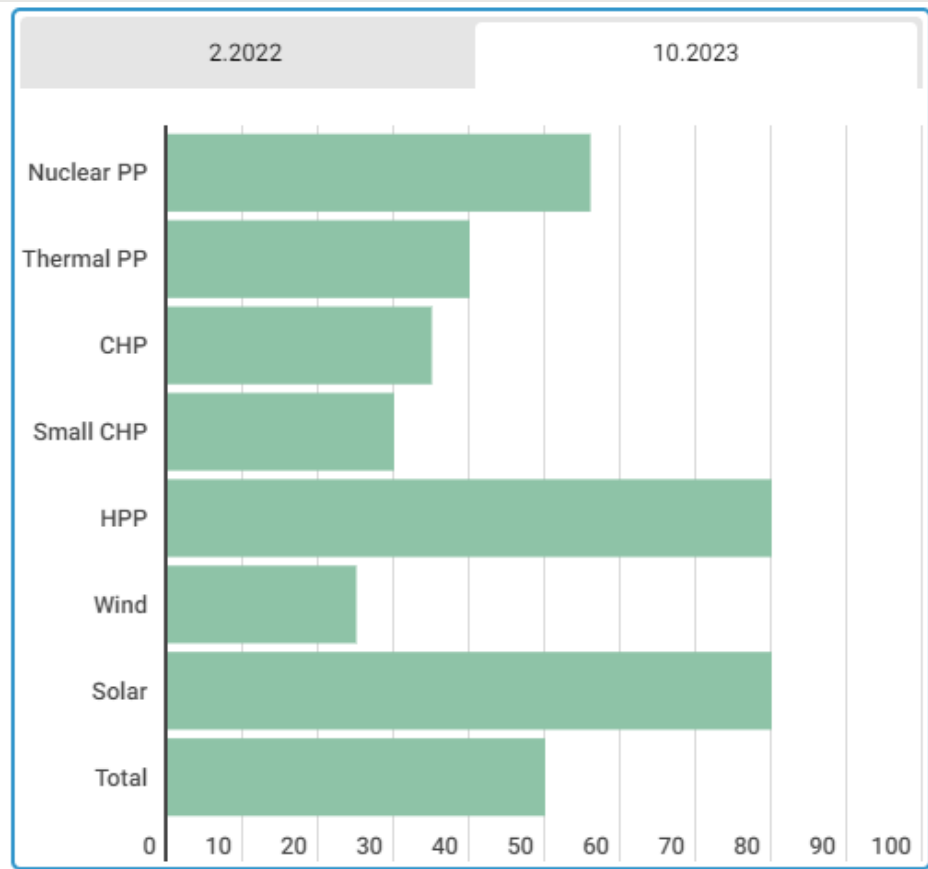


# BETWEEN WAR AND EU ACCESSION

HOW UKRAINE CAN COMBINE *ENERGY SECURITY* AND *GREEN RECOVERY*

# ENERGY SITUATION AND CURRENT NEEDS

# Damages for energy infrastructure



% from capacity available before 02.2022

**43% of TSO's** high-voltage network was damaged

**42 of 94 (45%)** key high-voltage transformers were damaged or destroyed



As of September 1, 2023, the damage to energy facilities amounted to **8.8 billion USD**; another **2.7 billion USD** was caused by the destruction of infrastructure, housing, and utilities.

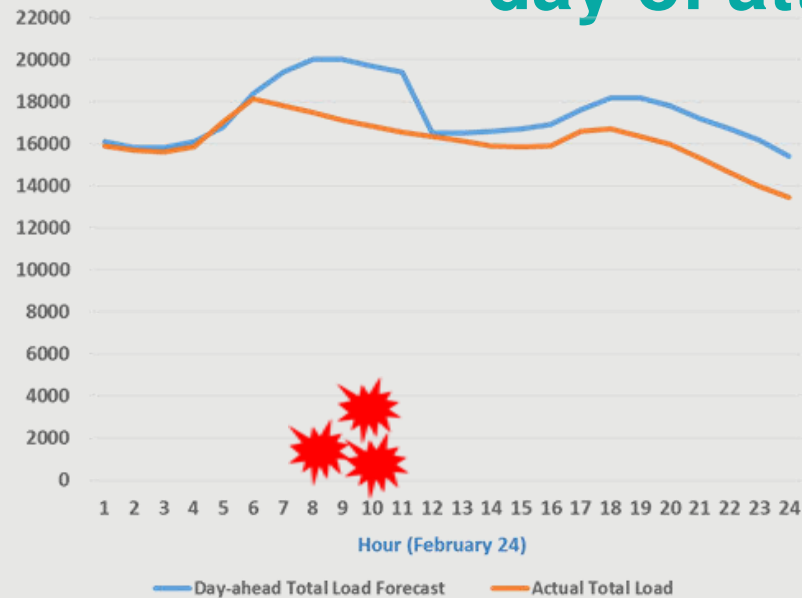
Of the nearly **37 GW** of available capacity, more than **19 GW have been destroyed**, damaged or captured since February 2022.

# RESULTS OF MARCH 22 & 29 ATTACKS

- **Thermal generation**
  - Burshtynska, Ladyzhynska TPPs destroyed (DTEK)
  - Prydniprovska and Dobrotvirska damaged (DTEK)
  - Trypilska, Zmiivska TPP destroyed (Centrenergo)
- **Hydro generation**
  - Dnipro HPP (ca. 1.6 GWt lost)
  - Kanivska and Dnistrovska hydropower facilities attacked
- **Gas**
  - on-ground infrastructure of gas storages attacked (incl. the largest one, Bilche-Volytsko-Ugerske facility)
- **Municipal energy in Kharkiv and Odesa**
  - Kharkiv: cogeneration facility and all main transformer substations were destroyed
- **Ukraine Energy Support Fund**
  - Funds are running out

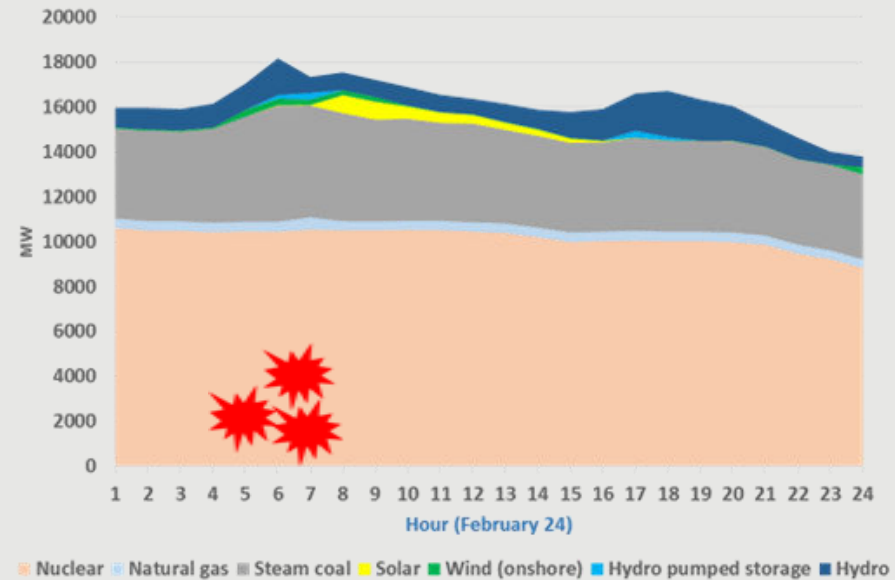
# Immediate reaction: 24.02.2022

## day of attack



Forecasted and actual load curve, MW (Feb 24)

Source: ENTSO-E

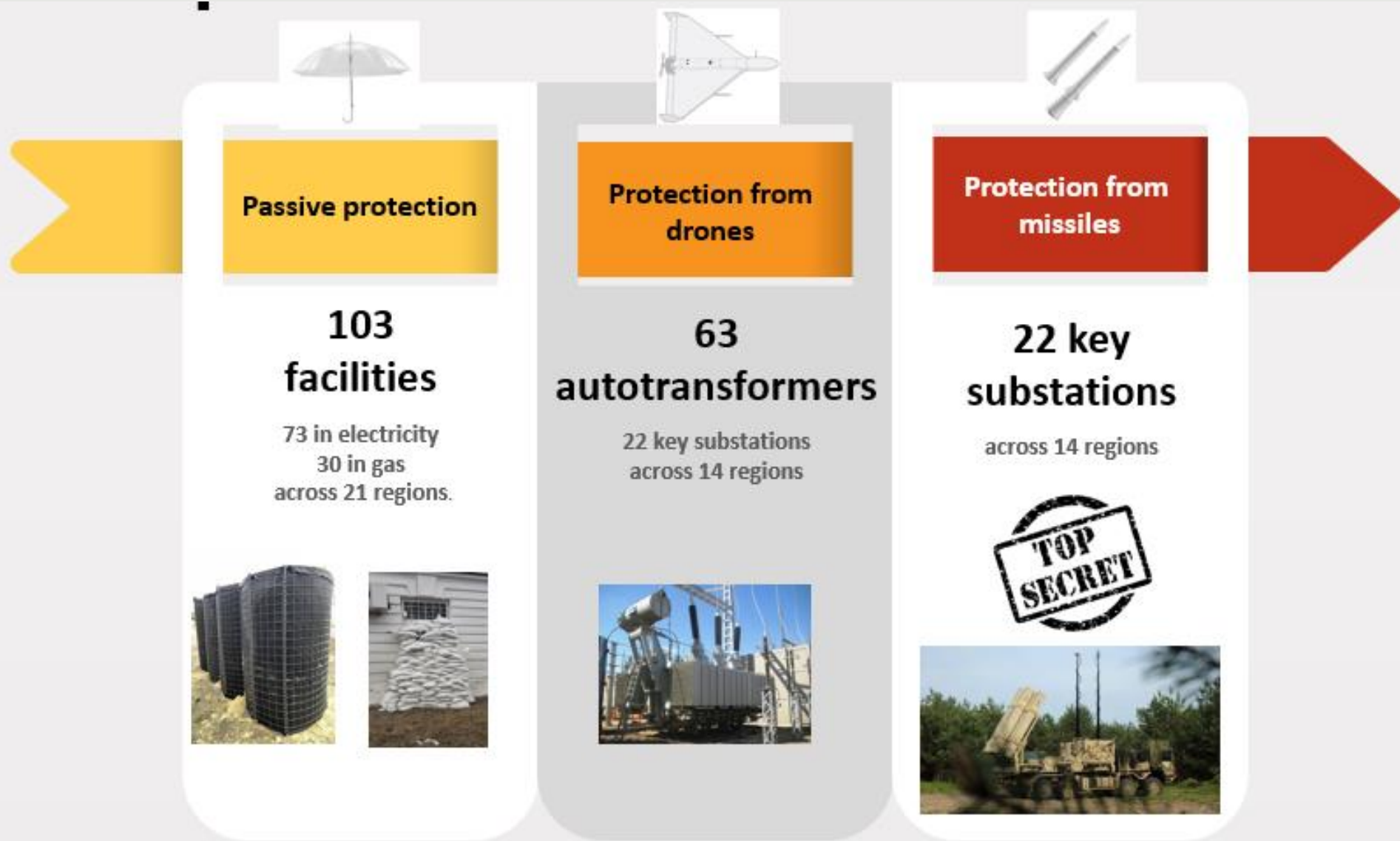


Hourly electricity mix (Feb 24)

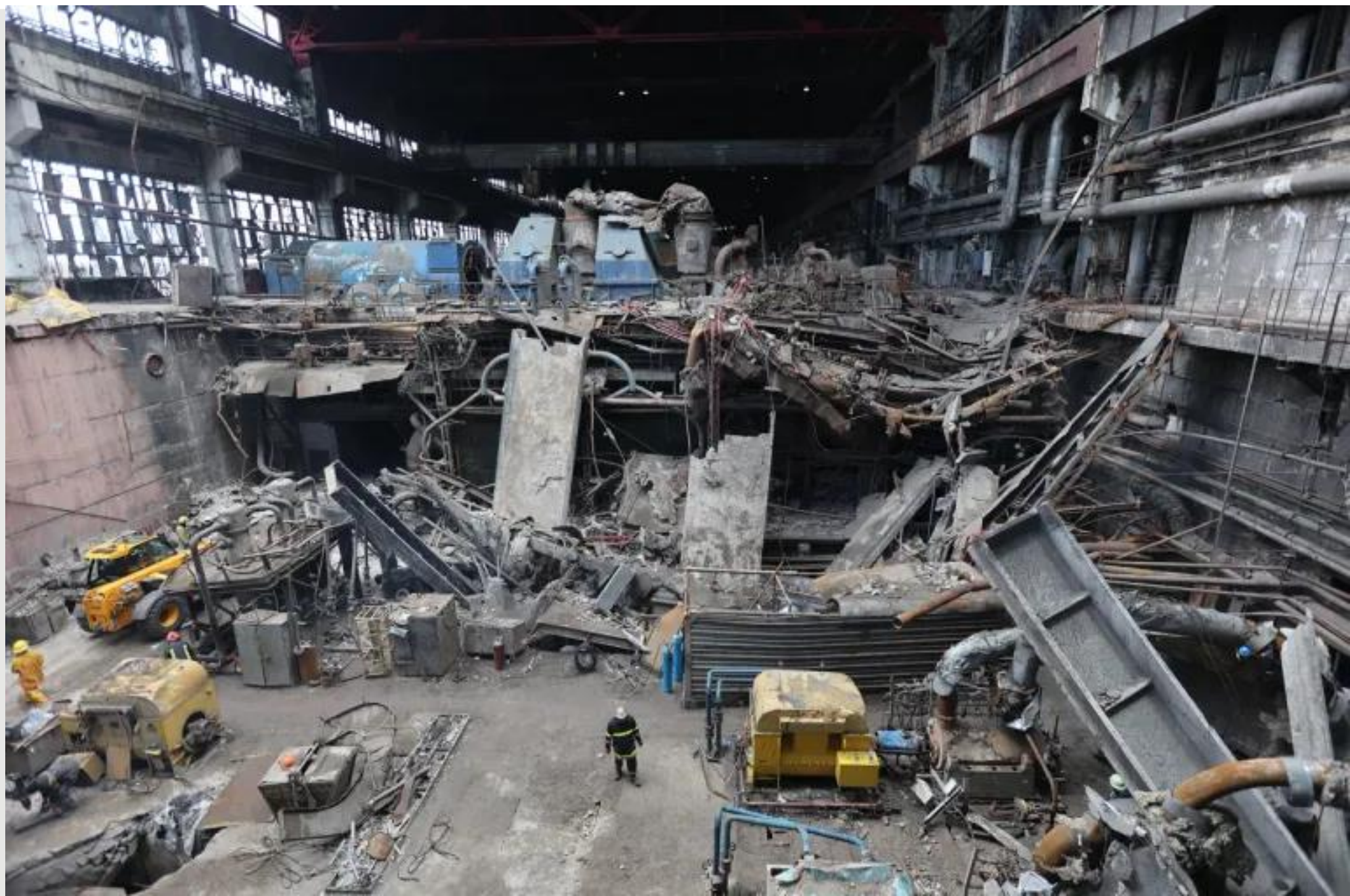
### TSO reaction:

- Renewables were curtailed entirely to ensure the power system was manageable and stable. Later, the TSO curtailed up to 50% of RES's potential daily production.
- TSO has limited the NPPs generation from 11,800 MW on Feb. 23 to 8,200 MW on Feb. 25 due to a decline of consumption by 30%-35%
- To ensure flexibility and resilience, the coal-fired and gas-fired TPPs were used for balancing. Additionally, HPPs were used for system balancing.

# Winterization 2023/2024: national level













# IMMEDIATE NEEDS (BEFORE WINTER 2024/25)

- **Quick to install flexible capacities**
  - Gas turbine generators (with transformers and compressors)
  - Gas piston generators, turbogenerators
- **In-kind contributions / Energy Support Fund**

# DEFENCE EQUIPMENT



# CHANGE OF APPROACH IS NEEDED

- **Comprehensive support with project-based financing**
  - engineering costs
  - rebuild machine rooms
  - replacement of equipment (instead of repairs)
  - other needs to rebuild
- **Backup equipment for replacement and components for operational repairs:**
  - **Power cables (from 0.4 kV to 110+ kV)**
    - Needs not covered start from 100 km of cable
    - Most needs are for 6-35 kV grids (over 500 km of cable)
  - **Power transformers**
    - Most urgent: medium voltage grids of 6-40 kV (over 1,000 units)
  - **Transformer oil (over 1,000 tons)**
  - **Items for the restoration of power grids**
    - grid fittings, couplings, traverses, etc.
  - **Stop-systems**
    - repair of gas networks without interrupting supply to consumers

# OTHER NEEDS

- **Vehicles to reach the damaged sections**
  - over 2,000 units of pickups and light trucks requested, incl. about 130 critically needed;
- **Electric tools**
  - welding systems, drills, angle grinders, chainsaws, etc.
  - All possible items for the restoration of power grids: grid fittings, couplings, traverses, etc. (exact volumes are hard to estimate, as the recovery process is executed permanently).
  - Stop-systems that allow for the repair of gas networks without interrupting supply to consumers.



# NATIONAL ENERGY AND CLIMATE PLAN

# ROLE OF NECP IN UKRAINE'S INTEGRATION TO THE EU

- ❑ NECPs were introduced by the Regulation (EU) 2018/1999, agreed as part of the Clean Energy for all Europeans package adopted in 2019
- ❑ Ukraine's obligation under the Energy Community Treaty and the EU-Ukraine Association Agreement
- ❑ NECP is a conditionality for the implementation of the Ukraine Facility financial support program of the European Commission.
- ❑ NECP is a subject to review and recommendations from the Energy Community Secretariat
- ❑ NECP's role:
  - Medium-term planning
  - Coordination of public policies
  - Identification of investment needs and gaps in existing policies
  - Strengthening of international cooperation

# UA NECP SOME BASIC TARGETS

## Dimension

### Decarbonization

Reduction of GHG emissions by 65% compared to the level of 1990

Reduction of methane emissions by 30% compared to the level of 2020

27% share of RES in gross final energy consumption

Share of alternative sources (RES and secondary) in heat production 30% (2025), 40% (2035)

### Energy Efficiency

Primary energy consumption <72.224 Mtoe (est.)

Final energy consumption <42.168 Mtoe (est.)

Cumulative amount of end-use energy savings over 2021-2030 at 16.405 Mtoe

Energy savings in public buildings no less than 24.9 GWh/year

### Energy Security

Diversification - no more than 30% from a single supplier

Reducing the share of a single supplier of nuclear fuel to 60%

Increasing the flexibility of the national energy system

Reducing the level of import dependency in TPES to 33%

### Internal Energy Market

The level of interconnectivity with ENTSO-E at 10%

25% RES in electricity generation

Market pricing with the mechanisms of supporting vulnerable consumers

Sufficient volumes of own gas production

### Research, Innovation and Competitiveness

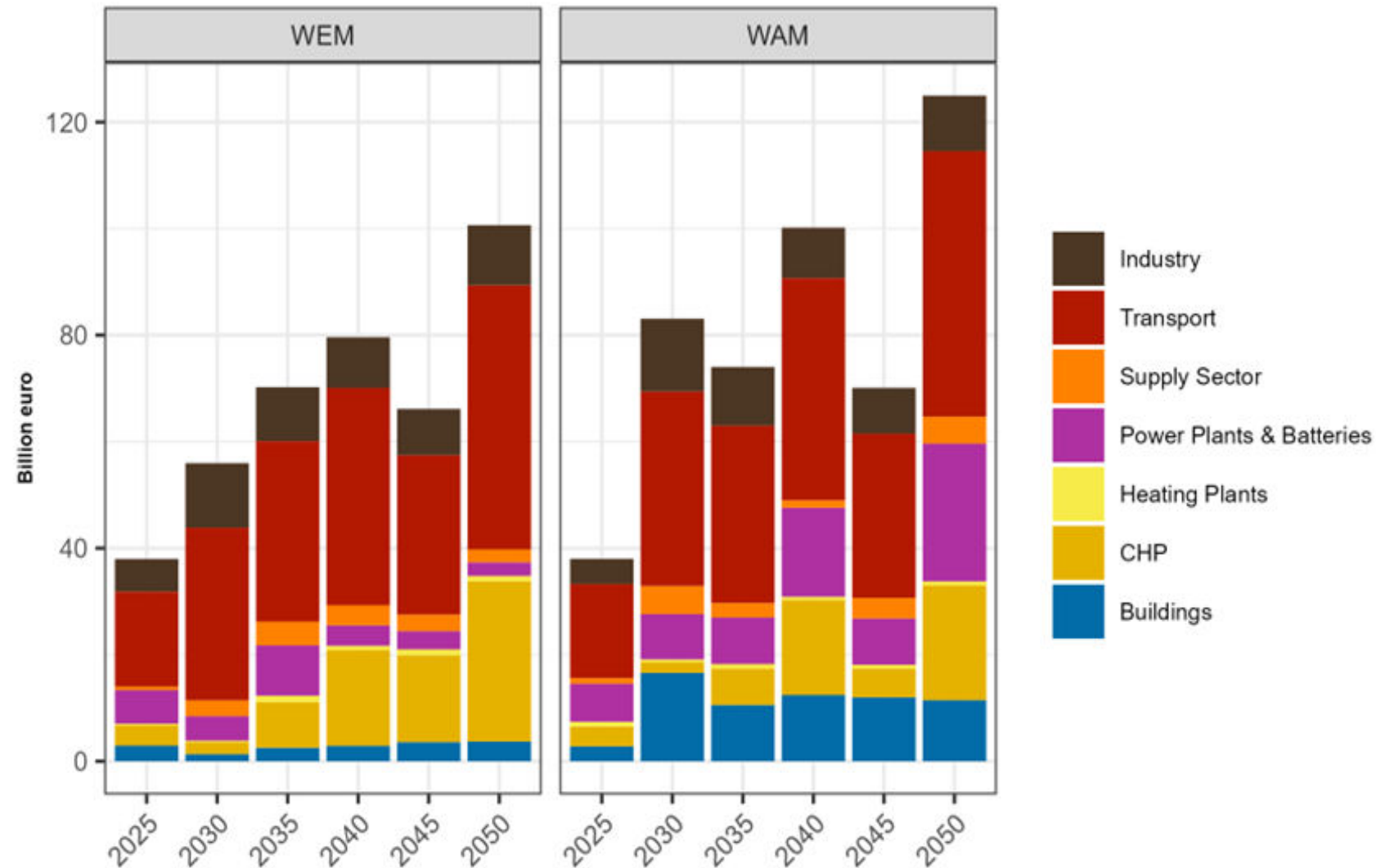
Financing innovations and research in the sector of clean technologies

Increase of competitiveness (resource-efficient tech.)

Implementation of clean energy solutions and low-carbon technologies

Promotion of biomethane  
Reduction of energy poverty to the EU level (7.9%)

# MODELLING (*PRELIMINARY RESULTS*): INVESTMENT NEEDS



Note: Each bar shows a sum of investment for a five-year period. For example, investments in 2030 include 2028,2029,2030,2031,3032

- ❑ Total investment needs are high in both scenarios, but comparable
- ❑ In both scenarios, the largest needs are for renewal of vehicles fleet (without households). Investments in electricity and heat generation are also significant.
- ❑ Due to higher rates of building retrofitting, investment needs for cogeneration in the WAM scenario will be lower than in the WEM.



THANK YOU  
FOR YOUR QUESTIONS

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