HEDNO’s role in energy market

27ο Εθνικό Συνέδριο «Ενέργεια & Ανάπτυξη 2023»

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The energy market in Greece and Europe will revolve around the networks as the focal point for the foreseeable decade

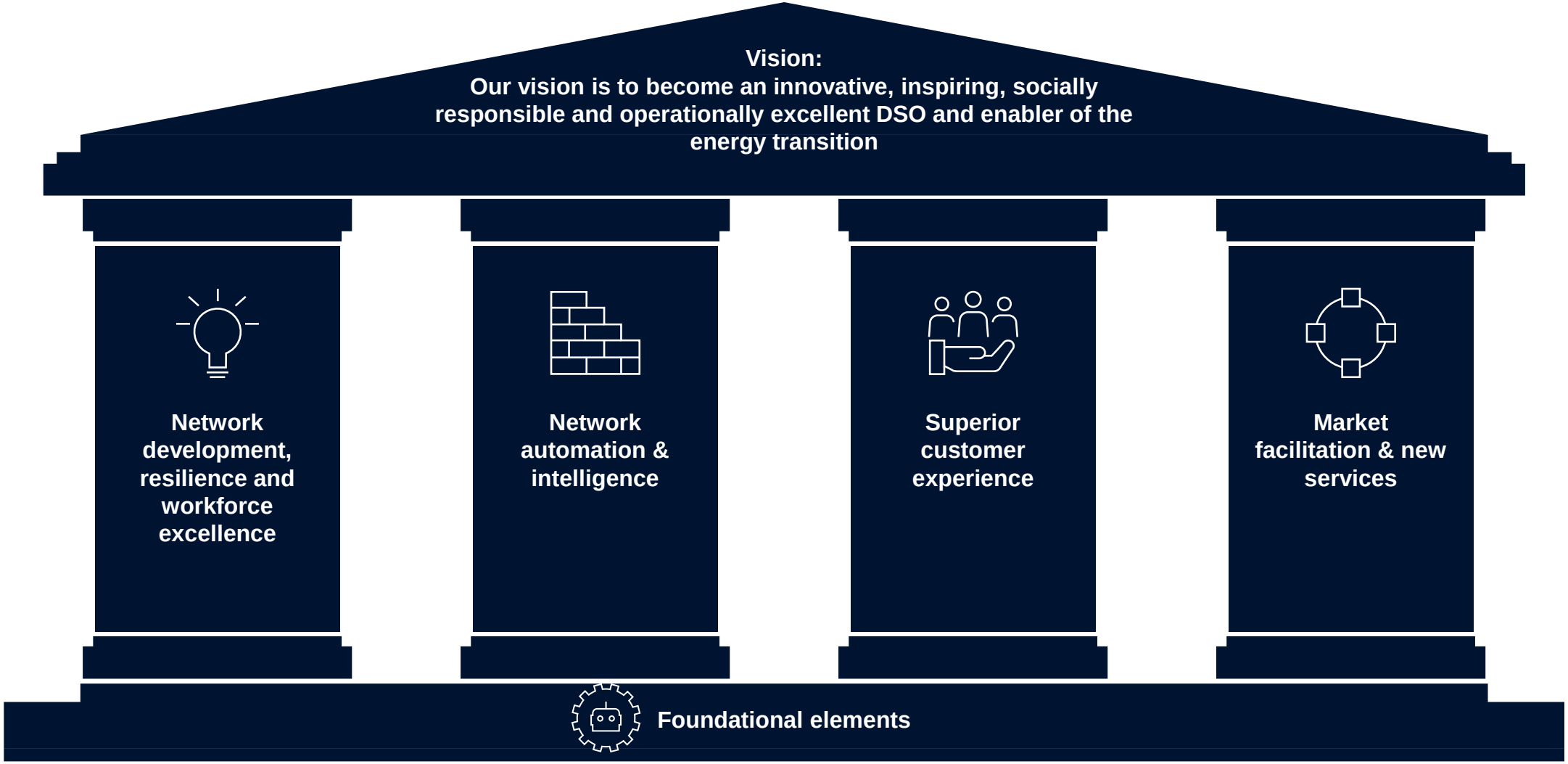
	2023	2030 Target
Gross Energy Consumption from RES	~22%	44%[1]
RES Installed Capacity	11.4 GW	~27 GW[2]
Lignite Production Units	~3 GW	0 GW *(up to 2028)*
GHG Emissions Reduction (compared to 1990)		57% ↓
Improvement of Energy Efficiency (compared to 1990)		43% ↓

Distribution Network – Relevant requirements described in NECP:

- **Network enhancement** through capacity expansion to relieve system congestion and achieve prompt and efficient RES connection
- **Energy storage solutions** advancement
- **Operational optimization** of the Hellenic Electricity Distribution Network (HEDN) and Non-Interconnected Island (NII) System
- **Grid digitization** to facilitate a new market structure with sophisticated consumer choices (e.g. smart meters, central control systems)
- Required **infrastructure development for electrification**
- **Energy efficiency** requirement for the DSO

Source: 1) NECP National Energy Climate Plan (Plan- Proposal, April 2023), 2) DAPEEP 07/2023,

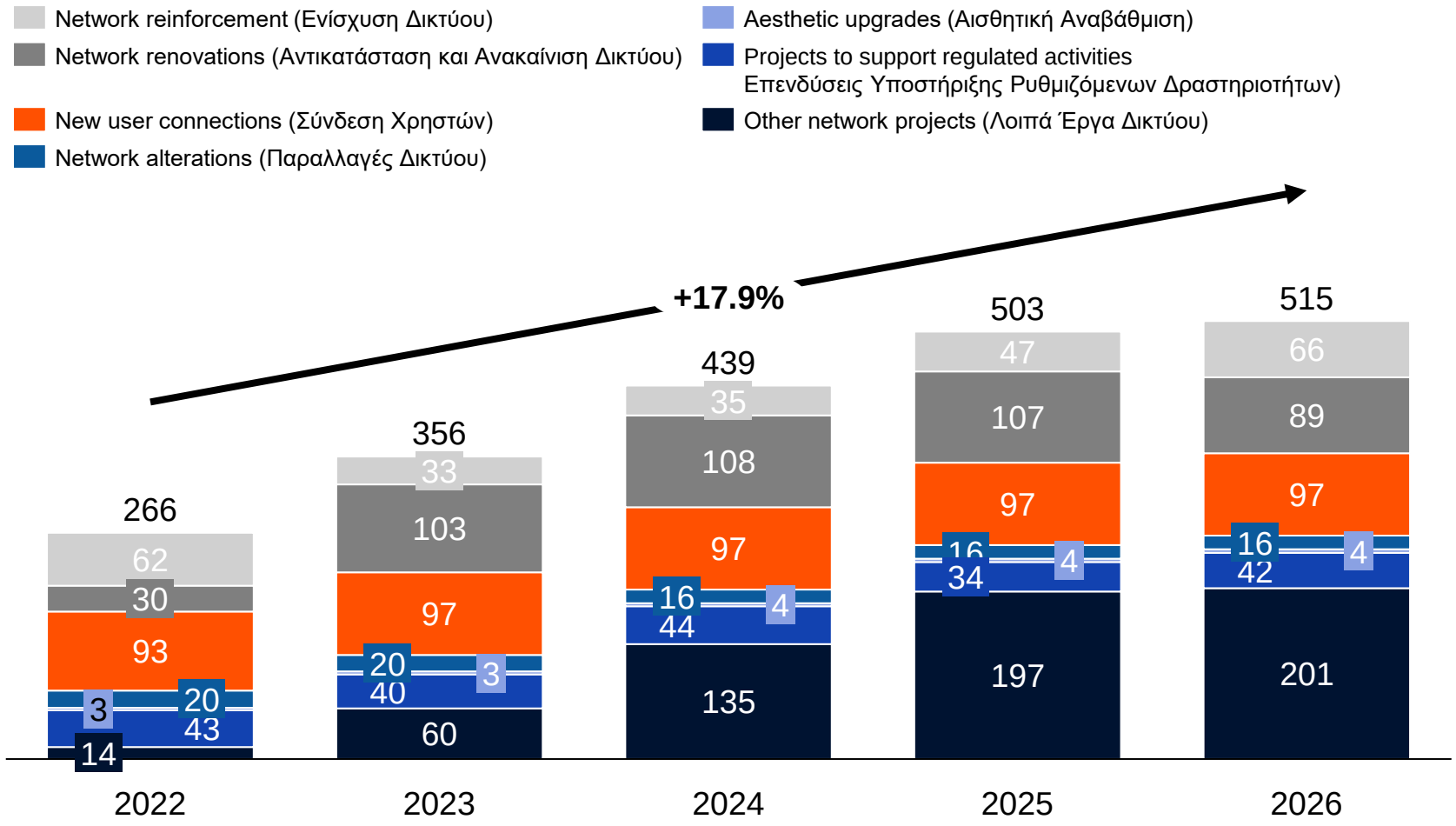
HEDNO has designed initiatives to enable these trends via its holistic transformation…



Source: HEDNO Business Plan

…and its aspirational investment plan for the next 5 years translates these initiatives into investments

National development plan, EUR m

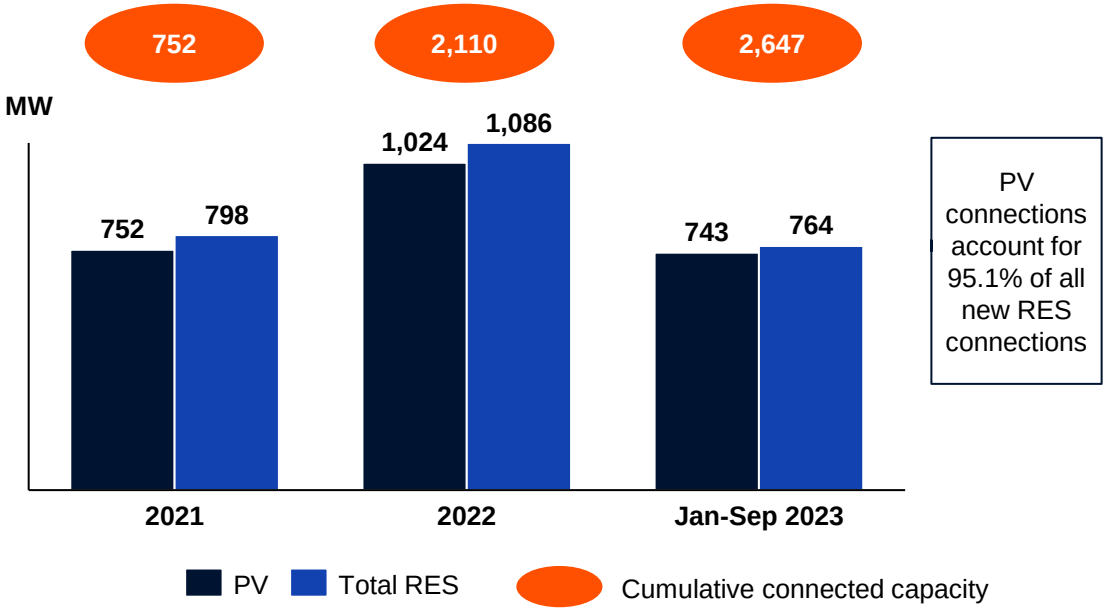


- HEDNO's Investment Plan aims to **incorporate the necessary investments in order for HEDNO to succeed in its role**
- It estimates a **total of EUR 1.8 billion** investments in the period **2023-2026**, while a total of **EUR 4.1 billion** are anticipated to be invested **by 2030**.
- A significant amount is allocated to **energy transition projects, such as network enhancement and digitization, initiating from smart meter roll-out**

Source: National Development Plan 2022-2026

To facilitate the increasing integration of RES, c. 33% of investments are allocated towards reinforcing and upgrading the network infrastructure

New RES Connections to the Grid, MW



From 2021 to 2023, the distribution grid witnessed an addition of **2.2GW** of new RES, showcasing progress towards achieving the **NECP's objectives**

The connection of new RES on the grid has facilitated:

- **Avoidance** of carbon capture emissions
- **Acceleration** of RES penetration
- **Enhancement** of just transition initiatives

- High concentration of RES plants has led to regional grid saturation, as the ability to absorb electricity from RES plants is exceeded
- Network reinforcement and renovation is required to handle additional capacity and maximize balance between current grid and new connections

Network Reinforcement & Renovations, 2022-2026

50 EUR 112.3	19 EUR 31.6	**HV/LV Substations and Distribution Centers**
1 EUR 8.4	1 EUR 0.2	**HV Network**
15 EUR 27.9	8 EUR 6.0	**MV Subsea Cables**
1 EUR 88.2	3[1] EUR 399.6	**Repetitive Projects**
2 EUR 5.8	-	**Overhead HV Grid**
-	1 EUR 0.5	**MV Substations**

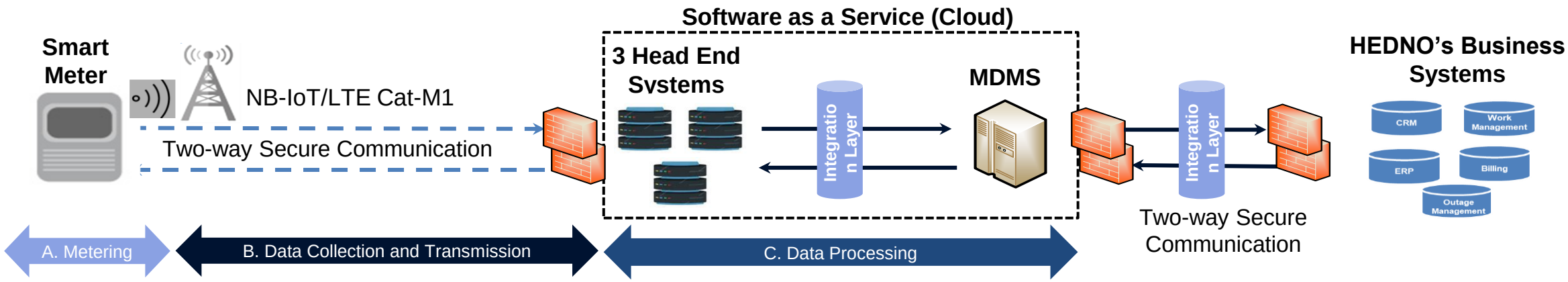
#. of Reinforcement Projects / total budget 2022-2026 (EUR m)

# of Renovation Projects / total budget 2022-2026 (EUR m)

1) Including RRF B "Overhead network upgrading in forest areas" and RRF C "Network upgrades aiming at enhancing resilience and protecting the environment"

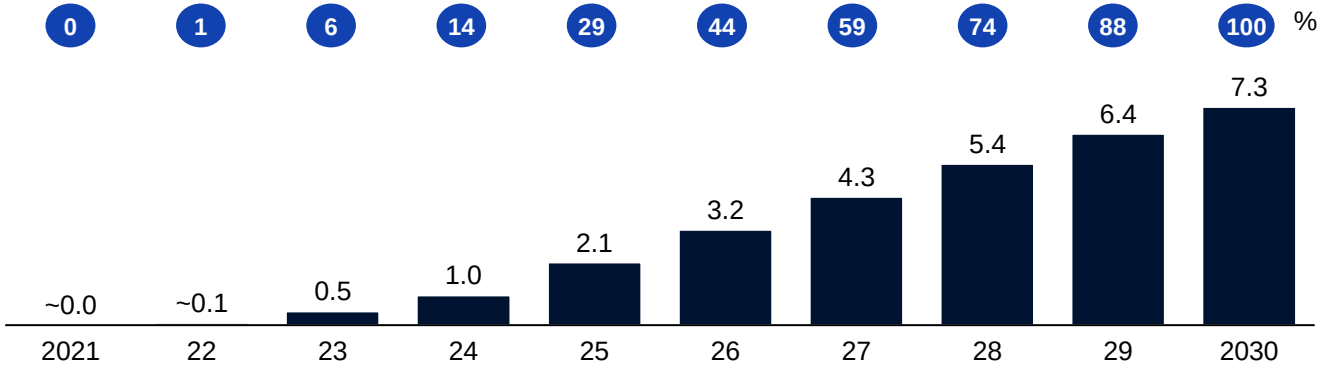
Smart Meters aim to establish an integrated meter management system, facilitating HEDNO's digital and operational transformation

Smart Meter Infrastructure



HEDNO's country-wide **smart metering roll-out** over a 10 year period …

Progressive smart meter deployment
Mil smart meters, 2021 -2030



… offers various benefits in line with **2030 goals**

- Improvement of **consumer awareness** and behavior, leading to el**ectricity consumption reduction**
- **Peak-load shifting**
- Reduction of the **non-technical losses** (mainly energy thefts)
- **Reduction of operating expenses** related to the on-site metering of consumers
- Reduction of **network equipment thefts** and the **associated replacement costs**

Island electrification would be unattainable without the valuable contribution of HEDNO,

Greek Islands Electrification

The development of the electricity distribution network across the Greek island complexes is undergoing development for the interconnection of the following islands:

1 **Cyclades**	• Paros – Antiparos (2023) • Ios – Sikinos (2026) • Serifos – Sifnos (2031) • Serifos – Kythnos (2031)	• Naxos – Donoussa (2031) • Naxos – Amorgos (2031) • Santorini – Anafi (2031)
2 **Dodecanese**	• Oinousses – Panagia (2023) • Kos – Guali (2027) • Karpathos – Kassos (2028) • Kalmnos – Leros (2029)	• Leipsoi – Patmos (2033) • Leipsoi – Leros (2033) • Rhodes – Symi (2034) • Leipsoi – Arkioi (2034)
3 **North Aegean Islands**	• Skiathos – Skopelos (2023) • Samos – Fournoi (2027)	• Ikaria – Samos (2031) • Samos – Agathonisi (2035)

- HEDNO alongside IPTO contributes to the **energy transition of the Greek islands** through the completion of the **interconnection between islands** with those already connected to the mainland grid by IPTO
- Cyclades network enhancement is supported by RRF “**Interconnection of Cyclades** ” sub-program funds

HEDNO aims to maximize benefits from such investments, via network digitization and network operation alignment with net-zero needs

Network Digitalization Strategic Projects

1 Control Centers' Modernization

Modernization of the CCDN of Attica, NII and Division of Macedonia-Thrace Region, Division of Central Greece, Division of Peloponnese - Epirus Region, through the **supply and installation of SCADA – DMS System**, **Remote Terminal Units (RTUs**) at the HV/MV Substations and the **reorganization** of its units

2 Upgrading of remote control equipment

Supply and installation of **modern remotely controlled elements (Load Switches, Terminal Units, Automatic Re-closers, Fault Indication devices)** at overhead MV Grids and MV/LV Substations, which will be connected with the Regional Control Centers of Distribution Networks

3 Installation of a Geographic Information System

Mapping of the Network positions using geographic coordinates, digitalization of electric designs and data of MV/LV Networks

4 Development of a Unified Information Management System

Development of an **integrated Information Management System** (IMS) for the **management of operational and Information systems of HEDNO** (GIS, new customer service information system, SCADA-DMS, etc)

Initiatives for HEDNO's alignment with EU practices

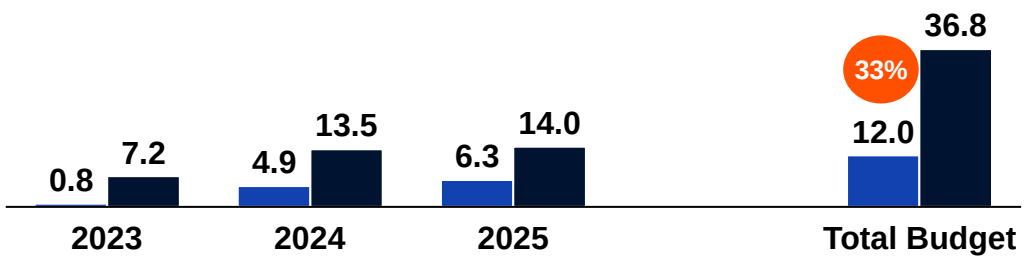
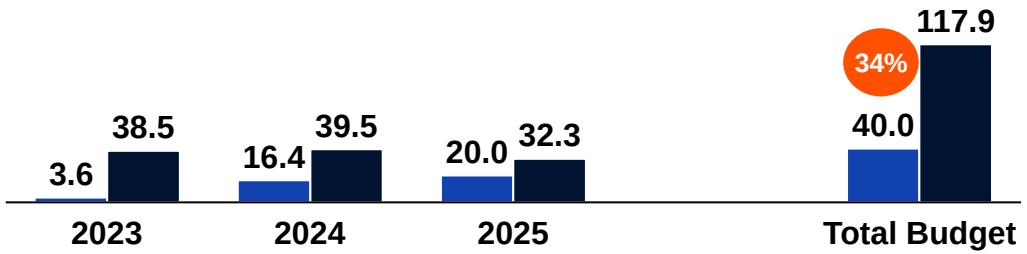
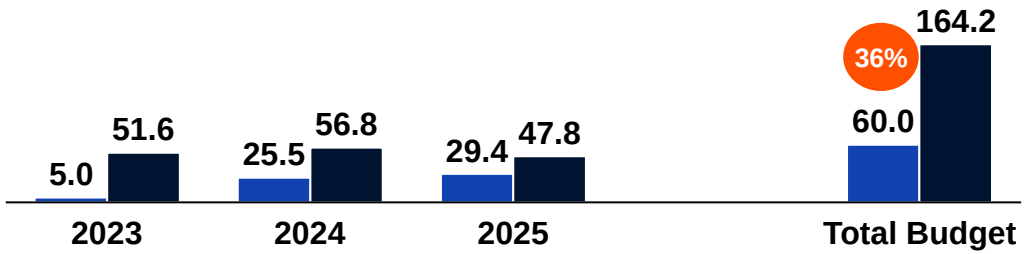
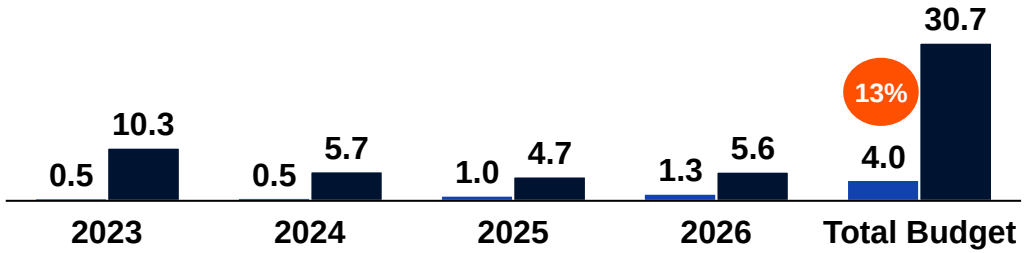
A Revision of HEDNO's Network Code

HEDNO's Network Code is currently under revision, in order to incorporate new European and national legislative provisions in its operation (e.g. e-mobility, storage, prosumers etc.), in order **to enable electricity ecosystem to develop and draw a roadmap for HEDNO's own transformation towards a net-zero electricity market and network**

B Participation in EU-DSO and other European fora

HEDNO is actively participating in EU-DSO, with its employees participating in technical and managing committees, **ensuring gradual alignment of HEDNO's operations with front edge European practices** and contributing in legislation drafting and EU DSOs cooperation

RRF will cover ~33% of capital expenditures for various projects, lowering the cost that customers must bear

Project	Grant & CapEx Evolution (EUR m)	Description
1 **RRF A:** Installed capacity increase in HV/MV substations for new RES connection		• Involves the replacement or construction of new HV/MV power transformers in expandable existing substations to increase the installed capacity **by 800 MVA** • Aims to **alleviate grid congestion**, which limits further expansion of RES plants in high-potential locations
2 **RRF B:** Overhead network upgrading in forest areas		• Includes the replacement of bare conductors in the overhead electricity distribution network, the installation of insulating covers and the undergrounding/relocation of the electricity distribution network passing through forest areas • The project shall **improve the resilience and reliability of the network**, while also **protecting the environment**
3 **RRF C:** Network upgrades aiming at enhancing resilience and protecting the environment		• **Upgrade of aerial networks** via structural renovations, network route adjustments, and/or undergrounding • The action aims to enhance network resilience, addressing the increased cost of repairing damages caused by severe weather events, which often involve damages in neighboring networks and require fast restoration
4 **Interconnection of Cyclades**		• Construction of **4 new substations** on the islands of Thira, Milos, Folegandros and Serifos • Key pillar in the **decarbonization of Cyclades**, completing IPTO's work

To achieve these targets HEDNO will face many challenges

Macroeconomic

Current **macro-economic conditions** (e.g., war in Ukraine, energy crisis, potential economic crisis) generate high **volatility in power demand and price**, increase **uncertainty about the future development of the energy infrastructure** (e.g., mix of lignite in the energy mix) and about **consumer behavior**

Challenges

Network Development Plan in constant alignment with needs of an electricity market in transition

Operational

HEDNO will face significant **operational challenges** in order to make sure that it creates the necessary infrastructure to **enable the energy transition in the most cost-effective way for the consumers.**

Flexible operating model to correspond to customer needs, maintaining necessary standards for Network Users

Regulatory

The **regulatory framework will need to evolve** in tandem with the energy transition for the country to successfully deliver on its goals. This would imply elements such as **taking into account required investments** or allowing the **evolution of the tariff** and the introduction of **demand side products**

Enhance and diversify regulatory framework, in response to market roles amplification

Thank you for your attention

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22 November 2022