ESMAP
Energy Sector Management Assistance Program

MINISTERO DELL'AMBIENTE E DELLA SICUREZZA ENERGETICA

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# ESMAP Knowledge Exchange & Study Tour on Grid Digitalization and Cybersecurity in Italy

May 20 - 27

Italy

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# FIRESIDE CHAT

**Fanny Missfeldt-Ringius**
Manager Energy Access
ESMAP
World Bank Group

**Luciano Martini**
Director of the Generation Technologies and Materials Department

**Michele De Nigris**
Director of the Sustainable Development and Energy Sources Department at RSE

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# COUNTRY SPOTLIGHT

**Anders Pedersen**
Senior Energy Specialist
ESMAP
World Bank Group

**Doumbia Ladji Mory**
Head of Service, Chief of Cybersecurity Project, CI-Energies, Cote d'Ivoire

**Merab Kvirikashvili**
Director of Security and Monitoring Affairs, Georgian State Electrosystem

**Octavian Ciobirca**
Deputy General Director
Company Policy Director, Moldelectrica, Moldova

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# CÔTE D'IVOIRE

# TRAJECTOIRE NUMÉRIQUE
# & CYBER-RÉSILIENCE DU SECTEUR ÉLECTRIQUE

*Digitalisation & Cybersécurité*

Plan, réalisations, perspectives et enseignements clés

**Automatisme** | **Téléconduite** | **Smart Grids** | **Télécom** | **Cybersécurité**

*Mai 2026 | ESMAP Knowledge Exchange & Study Tour on Grid Digitalization and Cybersecurity*

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# Un Plan structurant à l'horizon 2040

*Vue d'ensemble — 5 volets, des ambitions chiffrées, des réalisations concrètes*

AMBITION 2040

**Rejoindre les standards internationaux du Smart Grid**

**30 → 75**

*Indice de maturité Smart Grid (SGI Singapour)*

| | |
|---|---|
| **Production - Transport** | 6 centres CNC/CCRT — 100% PS téléconduits |
| **Distribution** | 6 BCC modernisés — SIG centralisé à 100% |
| **Télécommunications** | Réseau privé numérique — Cœur FO mutualisé |
| **Smart Grids** | Smart metering finalisé 2030 — Poste smart |
| **Cybersécurité** | Certification ISO 27001 du Dispatching National visée en 2027 |

## INDICATEURS DE PERFORMANCE — TRAJECTOIRE SAIDI

**SAIDI HTB**

**7h → 0,1h**

*Réseau Transport — 2025 → 2040*

**SAIDI HTA Abidjan**

**15h → 0,7h**

*Distribution urbaine*

**SAIDI HTA Intérieur**

**63h → 6,5h**

*Distribution régionale*

**INVESTISSEMENT GLOBAL PDATSG** **480,5 M€** sur 2023-2040 — dont **49,1 M€** dédiés à la cybersécurité

# Approche de transformation cyber-résilience

*4 initiatives pilotées par le secteur électrique ivoirien*

*Un programme structuré autour d'un Système de Management de la Sécurité de l'Information (SMSI), pilotant simultanément la réduction de la dette technique, la mise en conformité ISO 27001 et l'industrialisation à l'échelle du secteur.*

## 01 RÉDUCTION DES RISQUES

*Court & moyen terme*

Plan de remédiation issu des audits 2024 : identités/privilèges (AD, IAM, PAM), micro-segmentation réseau, gestion des vulnérabilités, sécurité OT.

**OBJECTIF : Réduire la dette technique**

## 02 CERTIFICATION ISO 27001

*Périmètre Dispatching Yamoussoukro*

Gouvernance & PSSI, gestion des risques, ingénierie cyber industrielle, sécurité des opérations, SMSI, PCA/PRA. Cap fixé à 2027.

**OBJECTIF : Modèle de sécurité viable**

## 03 STANDARDISATION & MODERNISATION

*Sécurité by design*

Intégration cyber dans les projets de modernisation (CNA, postes, backbone, BCC). Périmètre : 71 postes, 164 HT, 1 169 RTU,  13 centrales (hydro, thermique et solaire).

**OBJECTIF : Industrialiser la cyber-résilience**

## 04 PLAN SECTORIEL RÉGLEMENTAIRE

*Échelle nationale & régionale*

Harmonisation du cadre cybersécurité avec le WAPP, gouvernance régionale, référentiel technique commun, articulation avec les acteurs IPP.

**OBJECTIF : Échelle sectorielle WAPP**

**PILOTAGE  CI-ENERGIES (PMO + AMOA technique cybersécurité)**

# Modèle de sécurité centralisé à Yamoussoukro

*Un Centre Cybersécurité Industriel mutualisé pour l'ensemble du patrimoine électrique*

## PRINCIPE DIRECTEUR

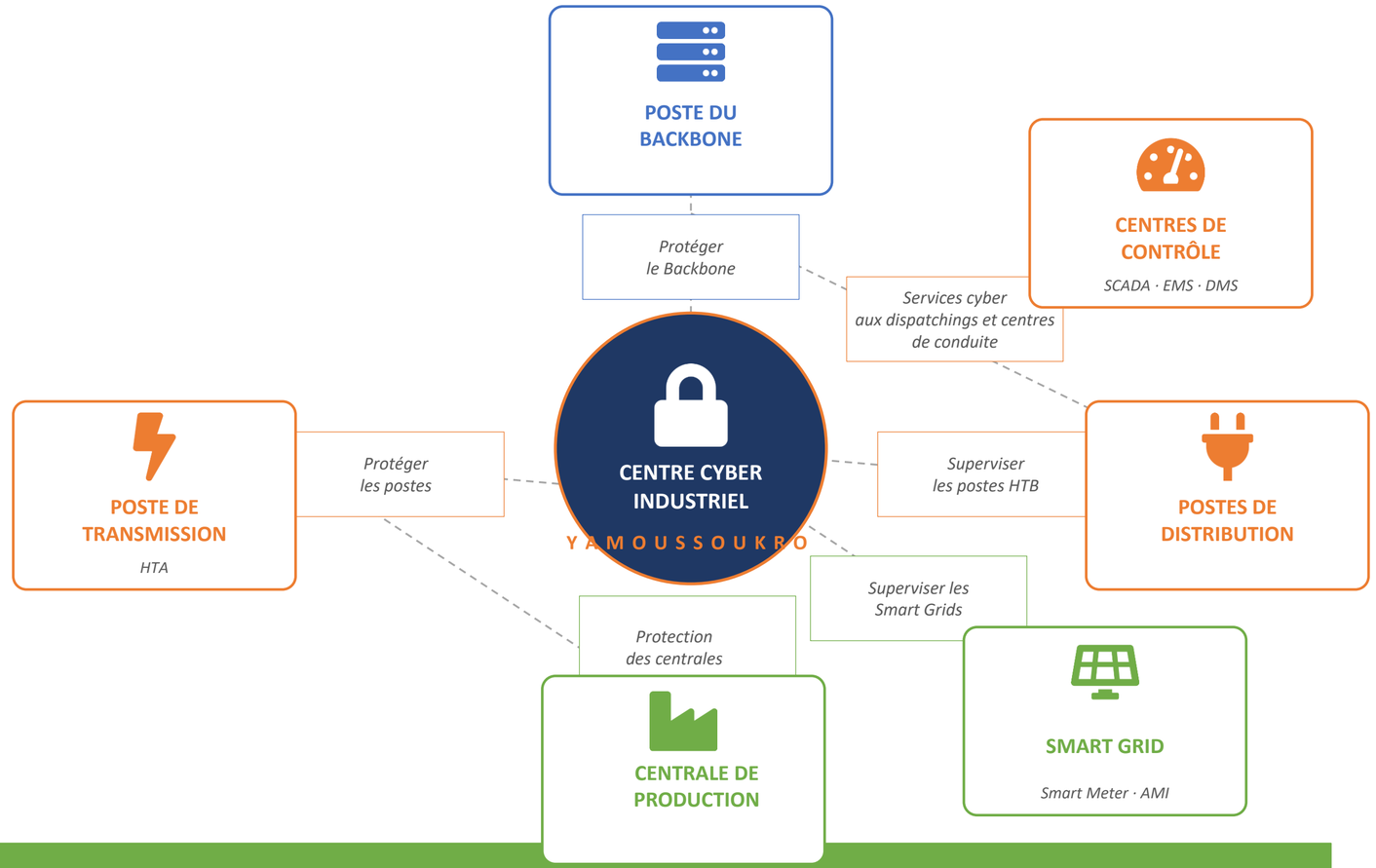
Centraliser et harmoniser la cybersécurité industrielle autour d'un nœud unique localisé au Dispatching National de Yamoussoukro.

## PÉRIMÈTRE COUVERT

- 12 centres de conduite (Dispatching, CCRT,et BCC) + 13 centrales
- 71 postes sources, 164 HT, 1 169 RTU supervisés
- Backbone télécom, transport, distribution
- Environnements Smart Grid & AMI

## MISSIONS DU CENTRE

- Gouvernance & stratégie cyber sectorielle
- SOC industriel — surveillance 24/7
- Threat Intelligence
- Coordination inter-équipes & cyber drills




## GAIN ÉCONOMIQUE

**8 M€ → 2 M€**

*Coût cybersécurité par dispatching — optimisé grâce à la mutualisation, sans perte de niveau de protection. Effet d'échelle préservé sur l'ensemble du secteur.*

# Perspectives & enseignements clés

*Projets cybersécurité 2026+ et leçons tirées du programme*

## PERSPECTIVES — 4 PROJETS IDENTIFIÉS

| | | |
|---|---|---|
| 1 | **Centre de Supervision Cybersécurité Industriel de Yamoussoukro**<br>SOC + SIEM + équipe 24/7 — dispatching, postes, télécom, Smart Grid. | 13 M€ |
| 2 | **Architecture sécurité & continuité d'activité**<br>Réplication multi-sites, entrepôt de données centralisé, PCA/PRA. | 15,8 M€ |
| 3 | **Cadre réglementaire cyber national & régional**<br>Harmonisation WAPP : classification, exigences, gouvernance régionale. | 1 M€ |
| 4 | **Cyber Range & Centre de Formation Régional**<br>Simulateur SCADA, IEC 60870/61850, exercices crise inter-pays. | 3 M€ |

## ENSEIGNEMENTS CLÉS

✓ **MUTUALISATION = LEVIER ÉCONOMIQUE**

*Hub centralisé à Yamoussoukro : coût cyber optimisé*

✓ **ISO 27001 REPOSE SUR DES FONDATIONS**

*PSSI, gouvernance, sécurité by design : prérequis incontournables.*

✓ **WAPP, ACCÉLÉRATEUR RÉGIONAL**

*Une attaque se propage entre opérateurs interconnectés : cadre harmonisé indispensable.*

✓ **L'OT EXIGE UNE CULTURE PROPRE**

*Protocoles IEC 61850, temps réel, Cyber Range pour former des équipes mixtes.*

**BUDGET PERSPECTIVES CYBER 2026+ 32,8 M€ |**

# Georgian State Electrosystem

Merab Kvirikashvili
Member of the Board of Directors
Director of Security and Monitoring Affairs
Georgian State Electrosytem
18 May 2026

# Country Profile - Georgia

## COUNTRY OVERVIEW

- EU candidate country since 2024
- Energy Community Contracting Party since 2017
- Population: 3.8 million

## ECONOMIC INDICATORS

- GDP (2024): USD 34.2 billion
- Foreign Direct Investment (FDI): ~USD 1.57 billion

## INVESTMENT & TAX ENVIRONMENT

- 3 basic laws on investment protection and promotion
- Several Free Industrial Zones with tax incentives
- Ease of company registration and doing business
- Profit tax: 15%
- Reinvested profit tax: 0%
- Income tax: 20%
- VAT: 18%

## ENERGY & REGULATORY FRAMEWORK

- Energy legislation aligned with the European Energy Acquis
- (currently compliant with the 3rd Energy Package)
- Ongoing transposition of the EU Clean Energy Package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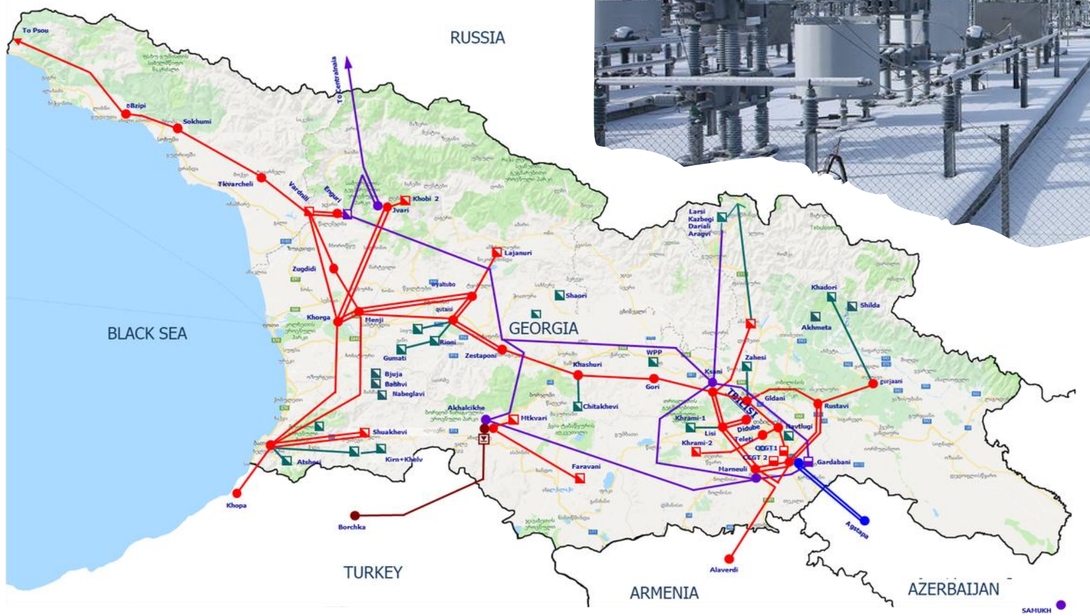
# About The Company & Grid Infrastructure

## WHO WE ARE

- Company Profile: GSE ensures nationwide electricity transmission and dispatch for authorized users and distribution companies, powered by ~1,700 professionals.
- ENTSO-E Cooperation: Bilateral agreement with the European Network of Transmission System Operators to drive long-term grid integration.
- CIGRE-Georgia (since 2018): Empowering Georgian engineers to solve the energy sector's most urgent challenges alongside globa research committees and international experts.




## REGIONAL INTERCONNECTIONS

- Cross-Border Exchange: Actively drives bilateral electri exchange and strategic alliances to secure regional transmission stability.
- Direct Interconnections: Russia • Turkey • Armenia • Azerbaijan

## EXISTING TRANSMISSION GRID

500 kV OHL – 949 km
400 kV OHL – 32 km
330 kV OHL – 37 km
220 kV OHL – 1919 km
500/220 kV AT – 3960 MVA
330/220 kV AT – 800 MVA
220/110 kV AT – 6634 MVA
500 kV React. – 1150 MVAR
500/400 kV HVDC – 875 MVA/700 MW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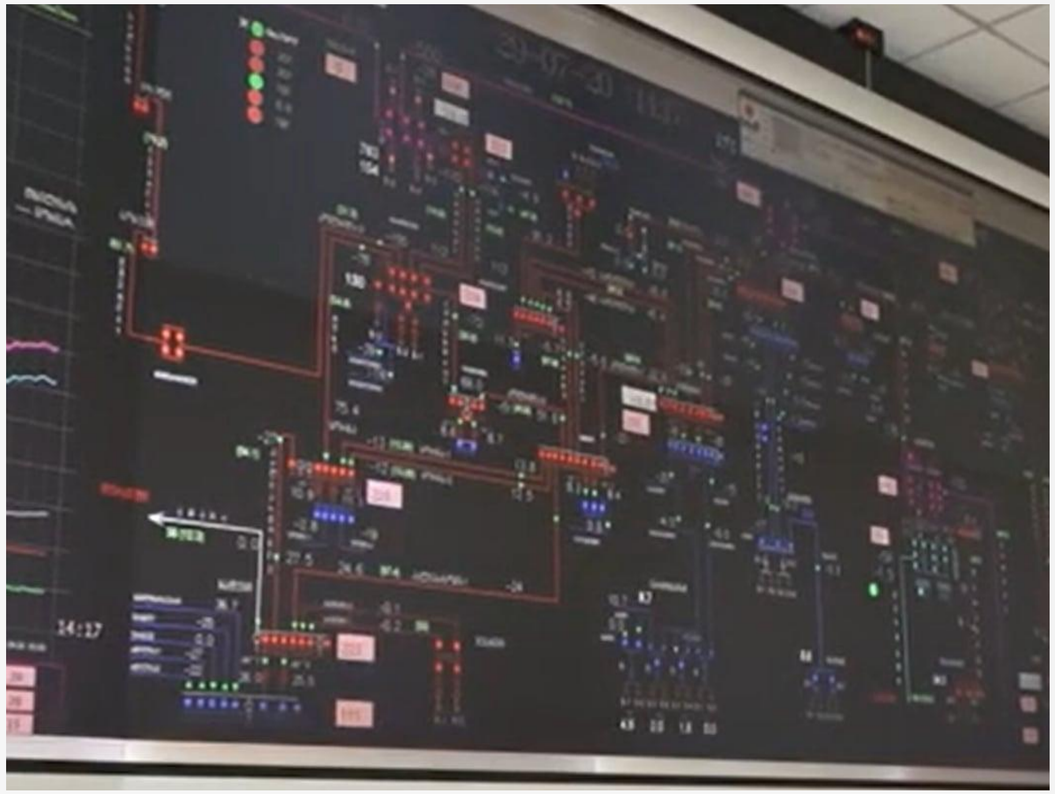
# Technological Modernization & Advanced Grid Management

- SCADA/EMS System: Equipped with AGC (Automatic Generation Control), OTS (Operator Training Simulator), and TNA (Technical Network Analysis) applications.
- OPGW Fiber-Optic Network: 2,000 km long proprietary OPGW backbone.
- Telephony Systems: Physical and virtual ATS (PBX) telephone network.
- Data Management: Unified Event Data Collection system.
- Digital Substations: 24 digital substations, including a 700 MW HWDC converter.
- Remedial Action System (RAS): For grid protection.
- Wide Area Monitoring System (WAMS): For real-time control.
- Work and Asset Monitoring (WAM): System for monitoring works and assets.
- Battery Energy Storage System (BESS): For grid stabilization and reserves.





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# Information Security

## Cybersecurity Measures

SCADA/ICS protection against APT threats, IT/OT network segmentation, SOC monitoring, and Zero Trust architecture implementation.

## Data Protection

Telemetry encryption, multi-factor authentication, comprehensive logging, and rapid incident response protocols.

## Security Awareness

Regular cybersecurity training programs, phishing simulations, and insider threat prevention initiatives for all staff.

## ISO 27001 Certification

Preparation for ISO 27001 certification with risk management framework and audit readiness procedures.

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# Physical Security and Safety

- **Perimeter Protection**

Multi-layered defense with fences, barriers, anti-ram systems, armed guards, and rapid response teams.

- **CCTV & AI Monitoring**

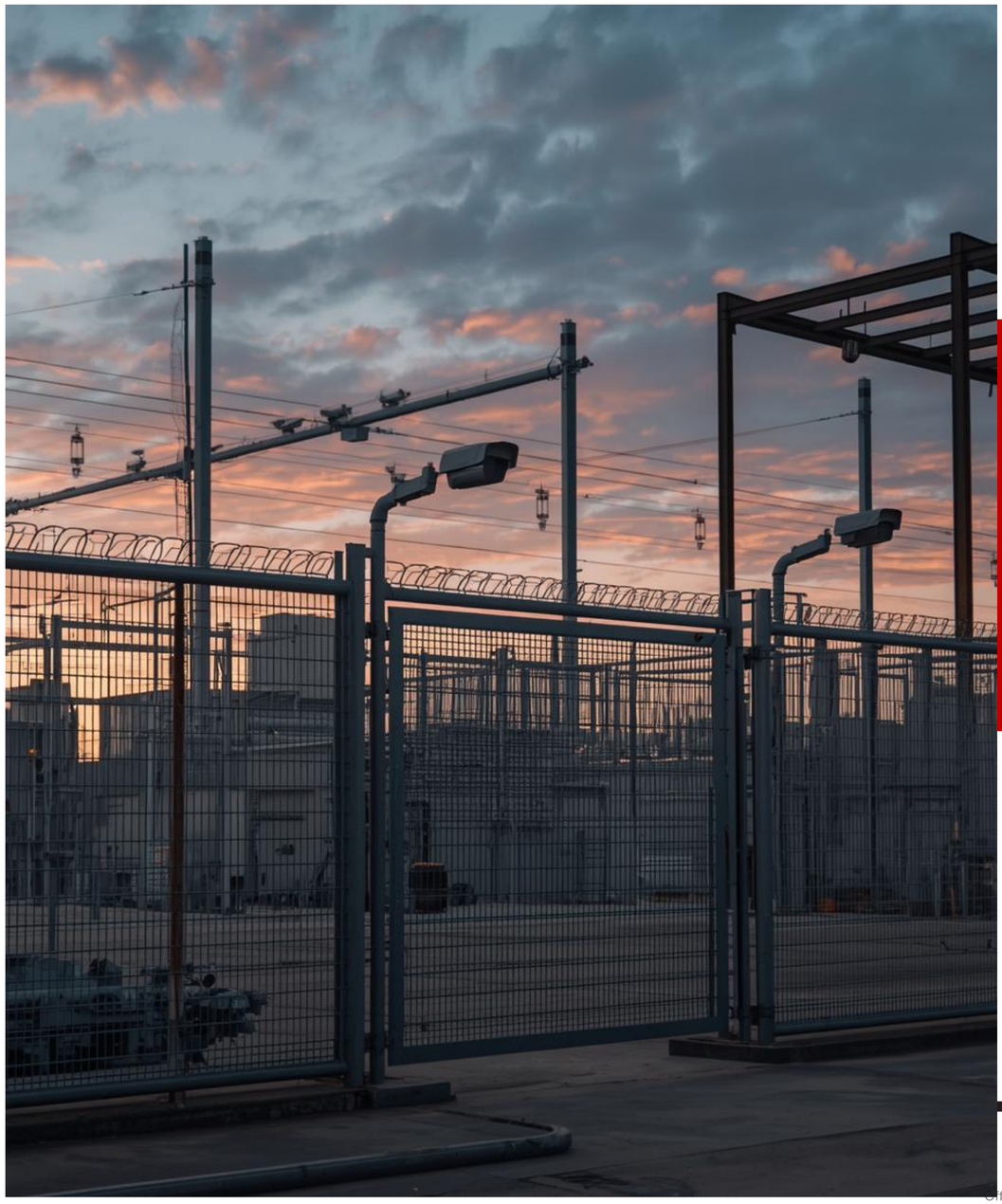
Advanced surveillance with AI detection, thermal imaging, intrusion analytics, and drone defense.

- **Access Control Systems**

Badge and biometric authentication, zone-based permissions, and multi-factor verification protocols.

- **Employee Safety**

PPE requirements, occupational safety standards, emergency procedures, and regular safety training.





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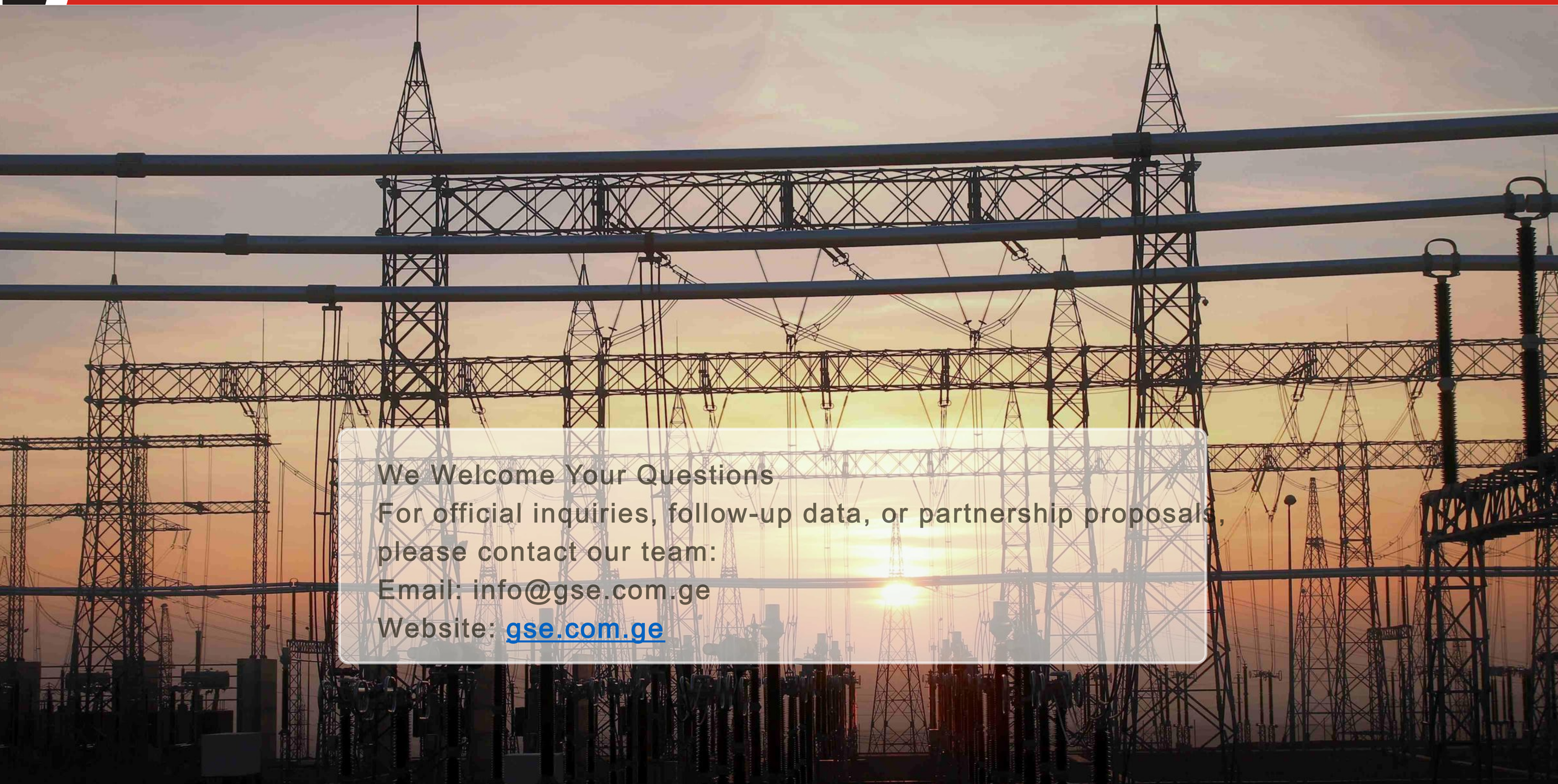
# Thank you for your attention



We Welcome Your Questions

For official inquiries, follow-up data, or partnership proposals, please contact our team:

Email: info@gse.com.ge

Website: gse.com.ge

# The Development of the Electricity Sector in the Republic of Moldova

Overview of the sector (Legal Framework, Grid Digitalization, and Cybersecurity)

MOLDELECTRICA

Ministry of Energy
of the Republic of Moldova

May 2026

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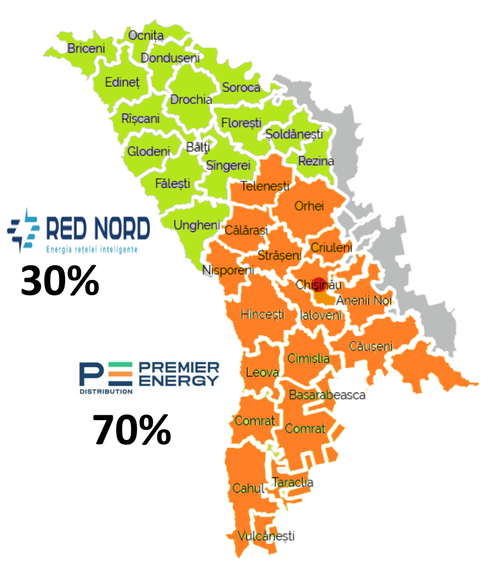
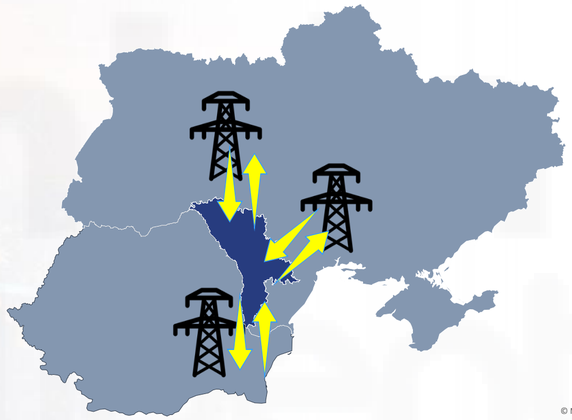
# I. GENERAL CONTEXT

## The electricity sector

MINISTRY OF ENERGY
OF THE REPUBLIC OF MOLDOVA



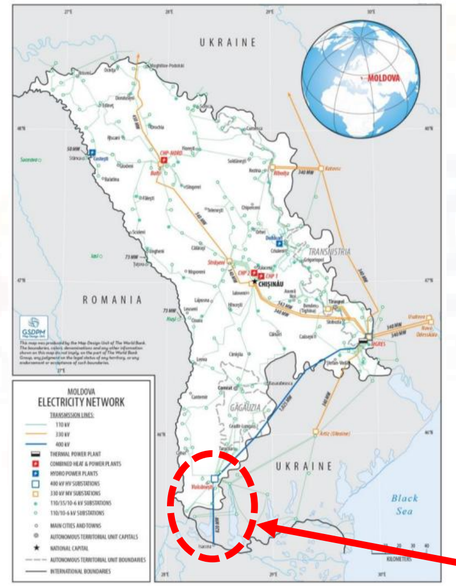

The area of activity of **distribution system operators**



Electricity flows between neighbouring countries

MOLDELECTRICA

**Transmission system operator**




**Isaccea (RO) – Vulcanesti (MD)**

Map of electricity transmission networks

## Market participants 2026

### Wholesale Market

- **JSC "Energocom" (**central supplier of electricity)
- **Suppliers**
- **Traders**
- **JSC "Termoelectrica"** (Producer)
- **JSC "CET-Nord"** (Producer)
- **Other producers** (more than **300** RES producers)

### Retail Electricity Market

- **LLC "Premier Energy"** (PSO* supplier)
- **JSC "FEE-Nord"** (PSO* supplier)
- **77 license holders** for the supply of electricity at unregulated prices
- **18** electricity **trading licenses**

*Public Service Obligation (PSO)

### Service Providers

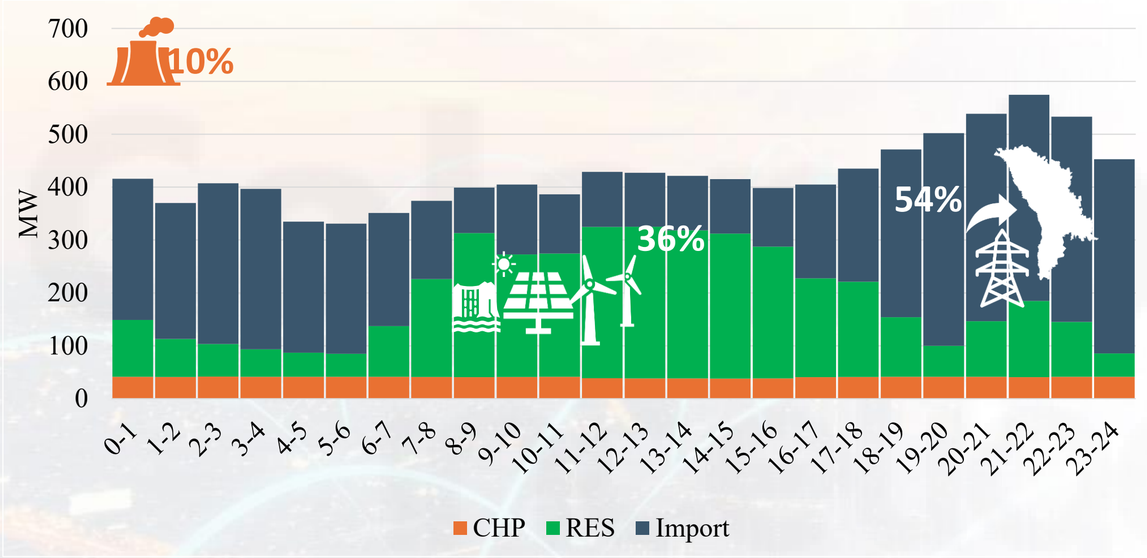
- **LLC "Operatorul Pieței de Energie M" (market operator)**
- **SE "Moldelectrica" (TSO*)**
- **JSC "Premier Energy Distribution" (DSO*)**
- **JSC "RED-Nord" (DSO*)**

*Transmission System Operator (TSO)
*Distribution System Operator (DSO)

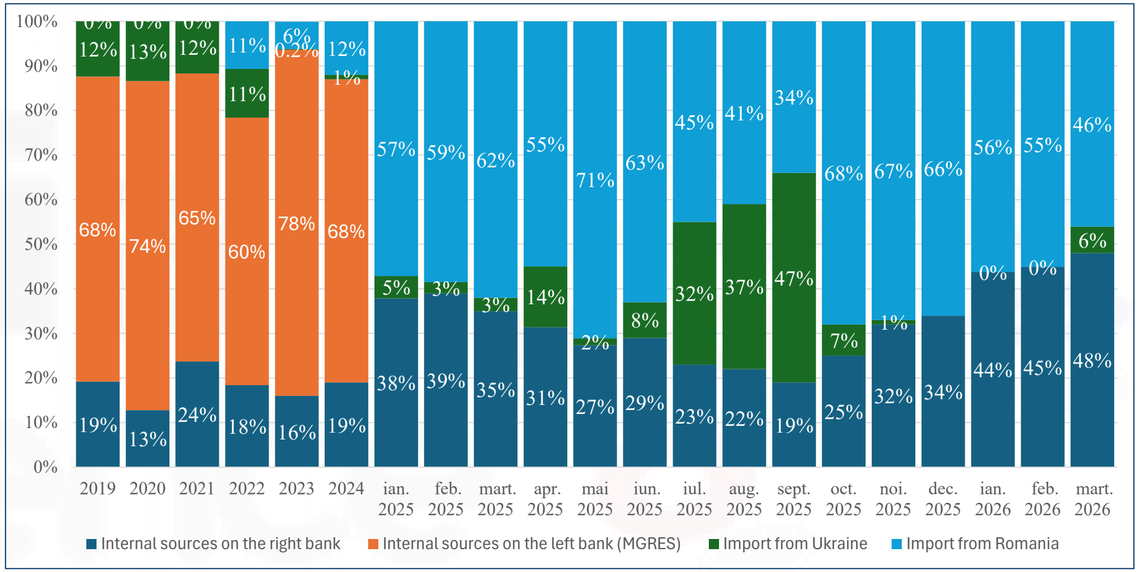
# I. GENERAL CONTEXT

## Electricity supply

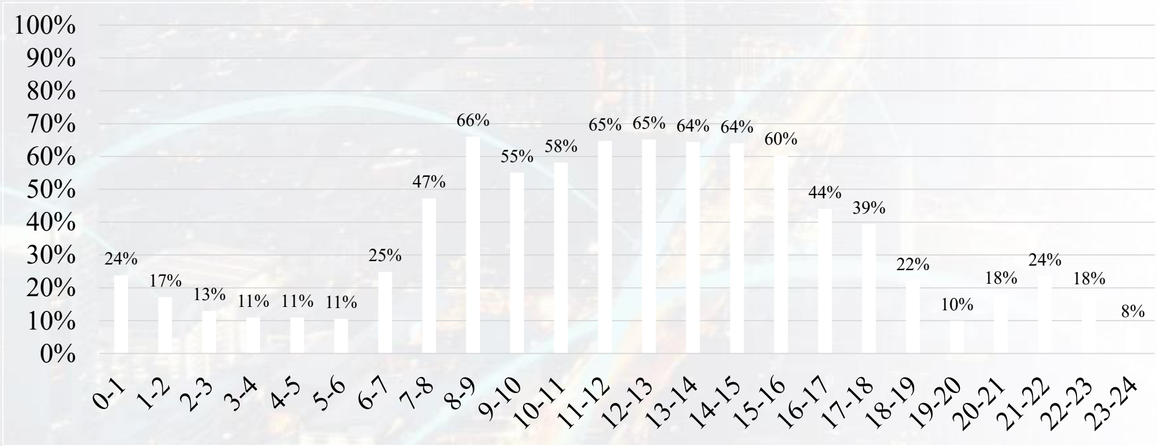
MINISTRY OF ENERGY
OF THE REPUBLIC OF MOLDOVA



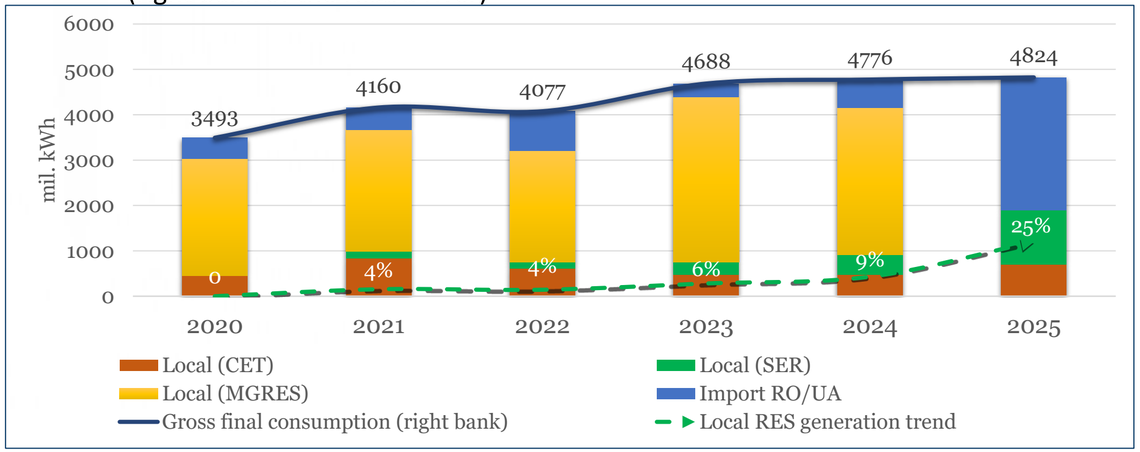

Coverage of **daily electricity consumption**, May 17, 2026
(right bank of the Nistru river)




Electricity consumption coverage between 2019- May 2025
(right bank of the Nistru river)




**Share of renewable electricity** in final consumption, June 16, 2025
(Sunday, right bank of the Nistru river)




Electricity Supply Mix and RES Generation Trend (2020–2025)

# II. Electricity market
# Electricity Integration Package

MINISTRY OF ENERGY
OF THE REPUBLIC OF MOLDOVA

**EU Regulation 2015/1222** establishing a guideline on capacity allocation and congestion management (CACM)

**EU Regulation 2017/2196** establishing a network code on the state of emergency and restoration of the electricity system (ER NC)

**5 codes/ guidelines approved by ANRE on November 5, 2025**

**EU Regulation 2016/1719** establishing a guideline on forward capacity allocation (FCA)

**EU Regulation 2017/1485** establishing a guideline on the operation of the electricity transmission system (SO GL)

**EU Regulation 2017/2195** establishing an EB GL (electricity balancing guideline)

**Transposed in the secondary framework (ANRE Decisions)**

**Directive 944/2019**
Electricity Directive

**EU Regulation 2019/943** Electricity Regulation

**The new Electricity Law entered into force on August 19, 2025. (Law No. 164/2025)**

**EU Regulation** 2019/942 ACER Regulation

**Part of EU Regulation 2015/1222** establishing a guideline on capacity allocation and congestion management (CACM)

**To be transposed by the New Electricity Law**

**EU Regulation 2019/941** on risk preparedness in the electricity sector

**GD no. 820/2024** was approved on December 11, 2024

**The transposition of the Electricity Integration Package by the Republic of Moldova has been completed in 2025.**

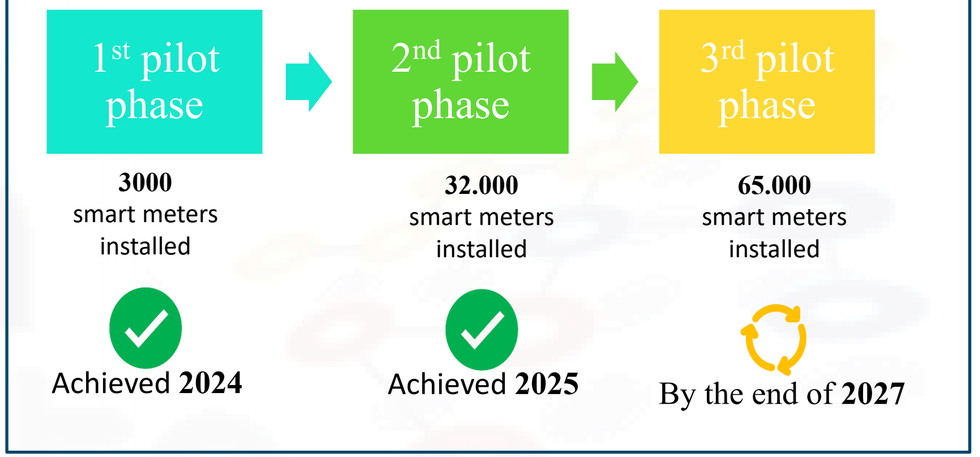
- The Ministry of Energy submitted the set of documents to the Energy Community Secretariat to initiate the transposition verification process**, a crucial step necessary for the future coupling of electricity markets**.
- The **official verification process began on March 5, 2026**, and the **maximum verification period is 8 months.**

# II. Digitalization of the Electricity Sector Pilot Program (Smart Meters)

MINISTRY OF ENERGY
OF THE REPUBLIC OF MOLDOVA

## The program is led by the Ministry of Energy, implemented by UNDP, funded by the Government of Italy

- In 2024, **3,000 smart meters were installed** to test the technology and gain initial operational experience.
- In 2025, the project expanded with **approximately 32,000 additional** fully parameterized meters, reaching a total of **35,000 units.**
- By 2027, the installation of an additional **65,000 smart meters is planned**, bringing the total to approximately **100,000 units**, representing around **7% of the total electricity consumers in the Republic of Moldova.**
- Currently, the pilot project provides a digital solution that enables automatic remote data collection from meters at 15-minute and hourly intervals.
- In 2026, the pilot project aims to provide a **universal Head-End System (HES)** and **a Meter Data Management System (MDMS)** to both distribution system operators, enabling multi-technology integration with the existing infrastructure to ensure the long-term scalability and sustainability of the pilot project. **On 4 December 2025, the tender for the procurement of these platforms was launched.**
- In parallel, stakeholders in the energy sector benefit from **institutional and technical assistance on regulatory matters.** This includes amendments to regulations on grid connection, commercial metering of electricity, and the quality of transmission and distribution services, as well as the development of the new comparison tool provided for in the Electricity Law and the establishment of principles and requirements for the cost-benefit analysis (CBA) of smart metering systems by the end of 2025.



*Sourse: UNDP Moldova*

# II. Digitalization of the Electricity Sector
## Continued digitization and cybersecurity

MINISTRY OF ENERGY
OF THE REPUBLIC OF MOLDOVA

In 2025, the Government approved the **Program for the Digital Transformation of the Energy Sector** of the Republic of Moldova for 2026–2030.

**The Program** serves as the sectoral implementation instrument for **General Objective No. 3** of the *Digital Transformation Strategy of the Republic of Moldova for 2023–2030*, approved by Government Decision No. 650/2023, aimed at **"Creating an innovative and resilient digital economy"**, while also contributing to several strategic objectives of the *National Development Strategy "Moldova Europeană 2030"*:

- **General Objective 1** – by developing opportunities for innovation and entrepreneurship in the field of digital energy;
- **General Objective 3** – by strengthening digital skills and competencies required in the energy sector;
- **General Objective 7** – by integrating technologies and data into energy sector governance;
- **General Objective 9** – by enhancing the security of critical energy infrastructure;
- **General Objective 10** – by supporting the transition to a green economy through digitalization.

Commission Delegated Regulation (EU) 2024/1366 of 11 March 2024 supplementing Regulation (EU) 2019/943 of the European Parliament and of the Council **by establishing a network code on sector-specific rules for cybersecurity aspects of cross-border electricity flows**

The regulation is scheduled to be transposed into secondary legislation, in accordance with the established timetable, **by the end of 2026**

# II. Digitalization of the Electricity Sector Resilience activities/Trainings

MINISTRY OF ENERGY
OF THE REPUBLIC OF MOLDOVA

A comprehensive cyber and information security training campaign has been launched by the Ministry for employees in the energy sector.

CRDFGLOBAL

Workshop on Best Practices in Cyber Security and Cyber Hygiene for Public Officials and Energy Enterprises

December 20 – 21, 2023

**12 entities**

TABLETOP EXERCISE CORE '24 MOLDOVA

Exercise Coherent Resilience 2024 Moldova (CORE 23-M), Hybrid risks to Moldova's Critical Energy Infrastructure and Energy Supply

March 12 – 14, 2024

**32 entities**

**100 participants**

INL Idaho National Laboratory

Workshop focusing on security for critical energy infrastructure

March 27 – 29, 2024

**13 entities**

U.S. DEPARTMENT OF ENERGY

The Critical Infrastructure Cybersecurity Summit (CICS)

July 8 – 11, 2024

**16 entities**

# II. Digitalization of the Electricity Sector
## Cybersecurity audit

MINISTRY OF ENERGY
OF THE REPUBLIC OF MOLDOVA

During the period October 2024 – June 2025, **seven enterprises benefited from cybersecurity audits**, with the support of UNDP and the Government of Denmark, in partnership with the Ministry of Energy. The audits were carried out by two specialized companies from Romania.

The audit process included:

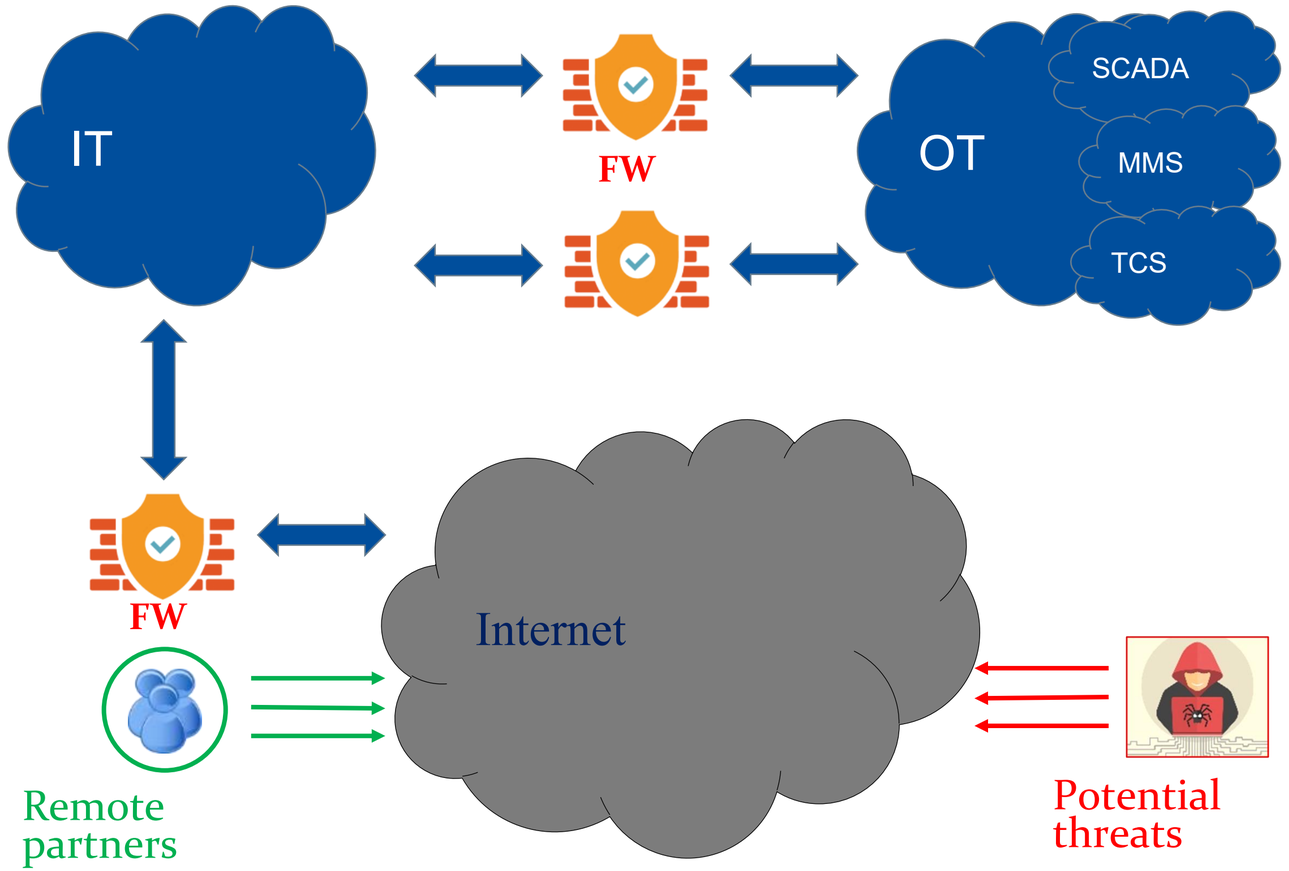
- analysis of IT infrastructure and identification of vulnerabilities;
- verification of compliance with relevant legislation and standards;
- assessment of internal policies and procedures;
- interviews with staff to evaluate the level of awareness regarding cyber risks.

**Each enterprise received an individual report containing specific recommendations and an action plan aimed at strengthening cyber resilience**.

# III. SE Moldelectrica case

## Recent state:

- Isolation of IT from OT;
- Encryption of high-priority network traffic
- Logging information activity within the OT infrastructure
- Ensuring 100% duplication of OT information system server equipment

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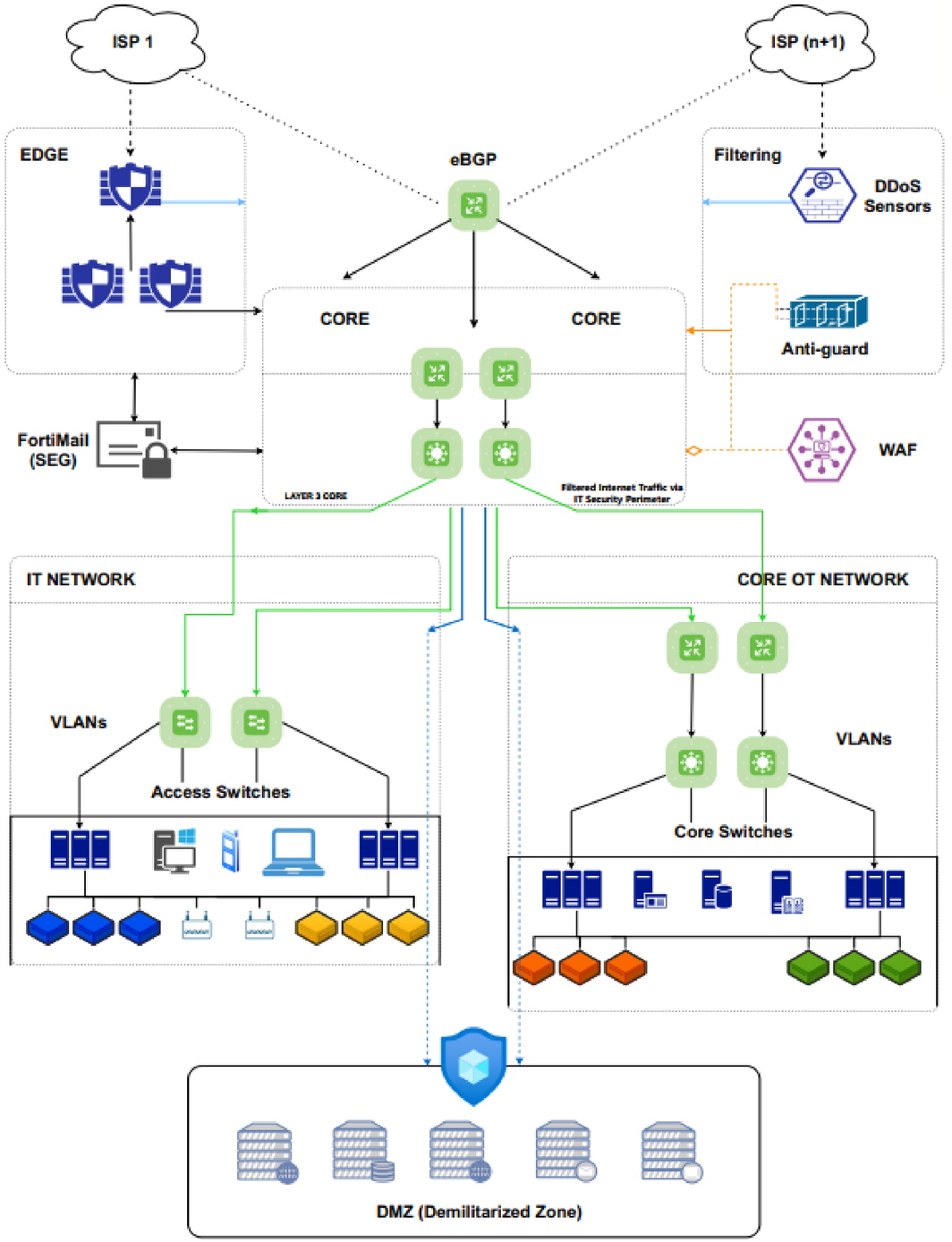
# Current implementation:

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MINISTRY OF ENERGY
OF THE REPUBLIC OF MOLDOVA

# Thank you for your attention!

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