



# DIVERSITY IS ERRA'S RICHNESS

*A REGULATORY MAPPING*

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# «Message in the bottle» for our dear ERRRA members

Don't read the Mapping Report as a ranking of where your system stands — but as a way of seeing your own regulatory choices in the context of what all other ERRRA regulators have chosen, or are trying, to do, and why — and how.

*“The Report will raise questions. Some may be uncomfortable. That is a sign it is doing its job”*

# ERRA Regulatory Mapping

ERRA's 25th Anniversary called for something more than a celebration: it called for a “regulatory stocktaking”.

Purpose: to analyse, understand and learn from ERRA's members diversity, across key areas of energy regulation; and to inform the planning of future research priorities

Method: a structured grouping system applied to 38 member regulators across 13 areas of regulatory interest; grouping was based on bilateral interviews and data collection

# The Regulatory Context: Why Now?

## Transition

- Rapid VRE (Variable Renewable Energy) integration
- Electrification (EV, Data centres)
- Grid constraints and flexibility needs

## Role of Regulation

- Defines investment signals
- Ensures affordability vs cost-reflectivity
- Enables market functioning vs system security

## Regulatory Development Stage

- Fully liberalised markets vs single-buyer models
- Advanced vs limited digitalisation
- Different subsidy and tariff structure

# What We Did?

## COVERAGE

**38** member Regulators, from the regions: **Europe, Caucasus, Central Asia, Middle East, Africa, Southeast Europe**

## FRAMEWORK

**13** Regulatory areas assessed including: **Independence, Market Structure, Tariffs, Consumer Protection, Renewable, Innovation**

## METHODOLOGY

Methodology proceeded with following steps: **Pre-interview questionnaires, Bilateral interviews with regulators, Evidence-based validation, Final check with members.**

## GROUPING SYSTEM

**Grouping Scale: 0 – 4 per each Area,** which reflects level of development

# Regulatory Independence

**94 % of Regulators in Groups 3 - 4  
Strong Regulatory Independence**

\* *Groups 1–2 (6%): one member operates mainly in an advisory capacity with limited decision-making powers. One member has partial independent powers, primarily in network tariff matters.*

- High levels of institutional autonomy across members
- Strong governance structures:
  - Fixed mandates
  - Dismissal safeguards
  - Decision-making independence
- Independence reinforced by:
  - Transparency mechanisms
  - Accountability frameworks

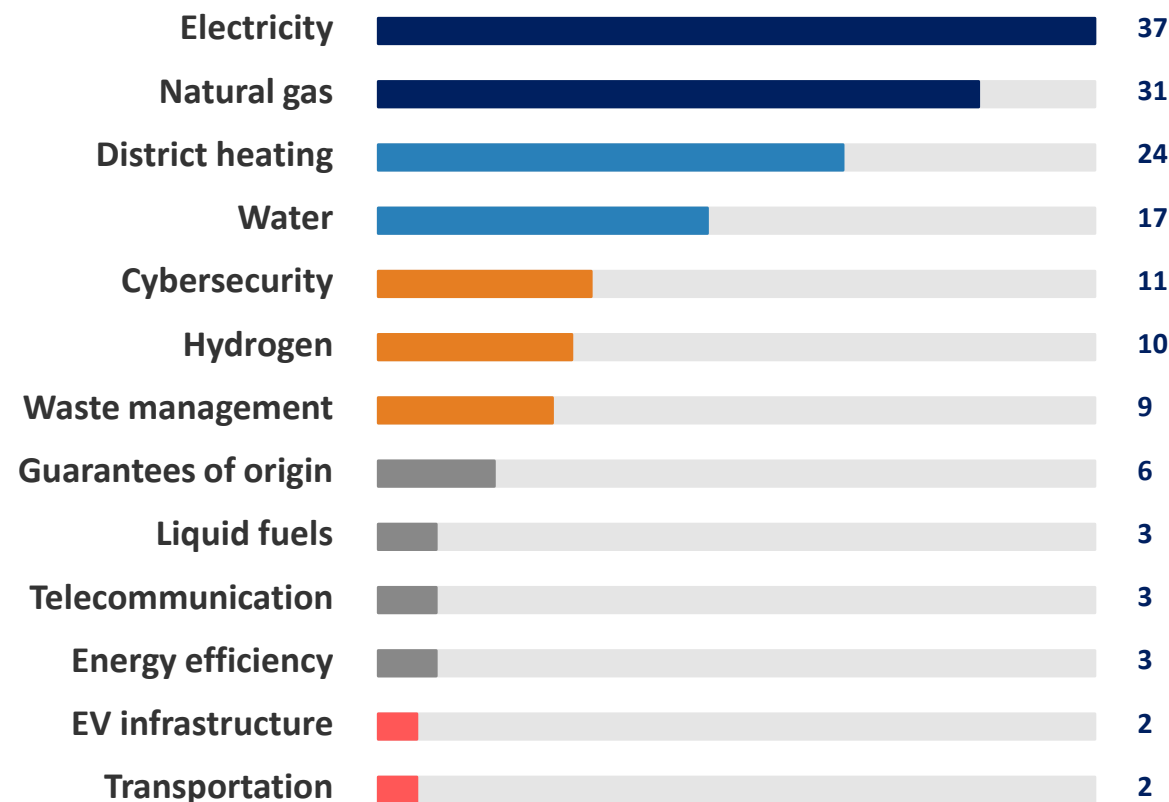


# Multisectoral Jurisdiction

<b>37</b> Members regulate electricity - near universal	<b>14</b> Members regulate more than 2 sectors (Group 4)	<b>0.18%</b> R2 scope vs independence - virtually zero
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<b>Group 0</b>	<b>Only one sector (only gas or only electricity)</b> BA, PK, CM, UZ, NG, EG	<b>6</b>
<b>Group 1</b>	<b>Only electricity and gas, no other sectors under regulation</b> FR, TH, AT, AL, DZ, SA	<b>6</b>
<b>Group 2</b>	<b>Different public services, all belonging to the energy sector: electricity, gas, district heating and/or liquid fuels</b> PL, CZ, TR, KG, MD, MZ, MN, XK,	<b>8</b>
<b>Group 3</b>	<b>Different public services belonging to two different sectors: for instance, energy and water or energy and telecom</b> GE, AE(Dubai), BG, UA	<b>4</b>
<b>Group 4</b>	<b>Different public services belonging to more than two different sectors: for instance, energy and water and waste management; or energy and telecom and water</b> GR, AZ, LT, MK, HU, AM, EE, KZ, BS, SK, OM, LV, HR, RO,	<b>14</b>

Sectors regulated across ERRA membership (number of members)



Diversity of regulatory scope is a feature of ERRA's membership - from single-sector specialists to comprehensive multi-utility authorities. No model is superior: each reflects national priorities, administrative capacity, and sectoral maturity.

# Customer Protection

**81,5 % of Regulators in Groups 3 -4  
Full consumer protection**

\*Groups 0–2 (18.5%): one member has no formal consumer protection function assigned to the regulator. Six members have foundational instruments in place — quality standards and complaint handling — but lack regulator-led vulnerable customer protection or binding ADR.



- Widespread mechanisms:
  - Vulnerable customer protection
  - Complaint handling frameworks
  - Dispute resolution
- Different models:
  - Price regulation
  - Subsidies
  - Social Tariffs

# Household Price Regimes

## Fully regulated pricing

- Vertically integrated market structure
- Absence of retail competition
- Affordability and control dominate over competition



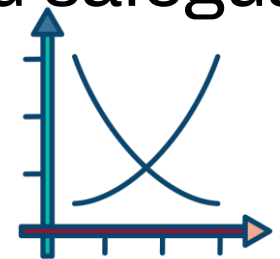
## Hybrid Pricing System

- Market mechanisms coexist with regulated elements
- Household prices may remain shaped by subsidies or cross-subsidies
- This is dominant transitional model

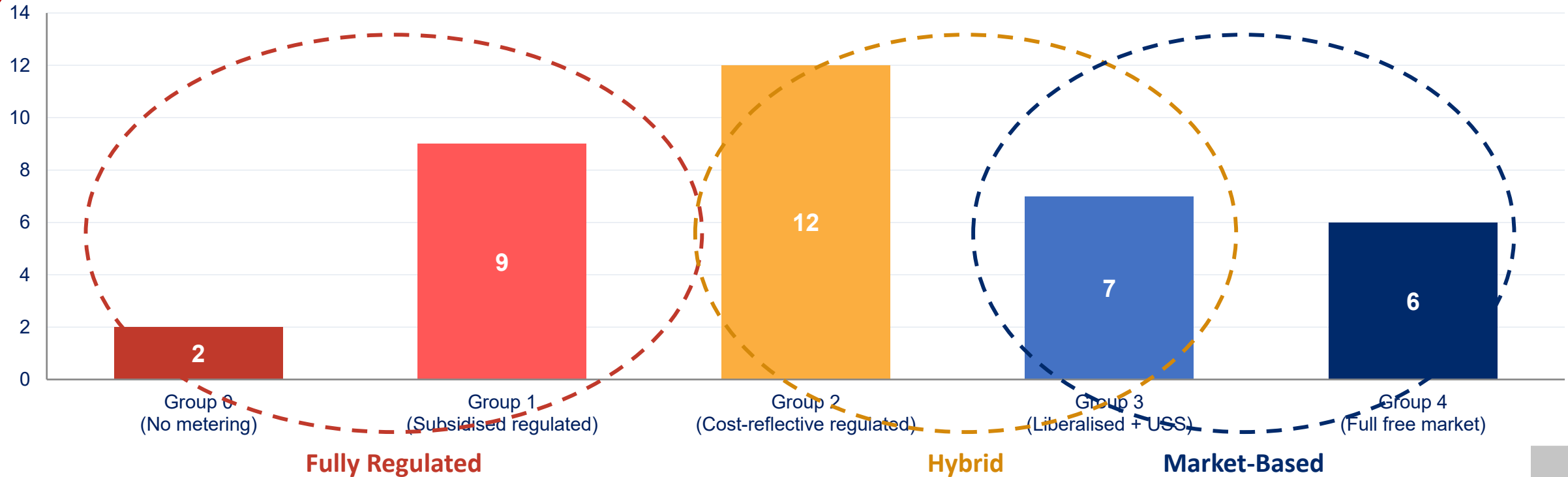


## Market Based Pricing

- Suppliers set prices
- Households switching is possible
- Protection shifts from price control to targeted safeguards



# Household Price Regimes



**Key pattern:** Hybrid pricing is the dominant model — most members sit in Groups 2–3 where market signals and policy intervention coexist. Groups 0–1 reflect administered pricing in vertically integrated systems. Group 4 members have active retail competition with protection shifting to targeted safeguards.

# Market Architecture

## UNBUNDLING

- Separation of network and commercial activities
- Ensures non-discriminatory access
- Foundation for market-based operation

## Wholesale Market

- Competitive trading of electricity
- DAM/IDM / Balancing Markets
- Shift from bilateral to organised markets

## Regional Integration

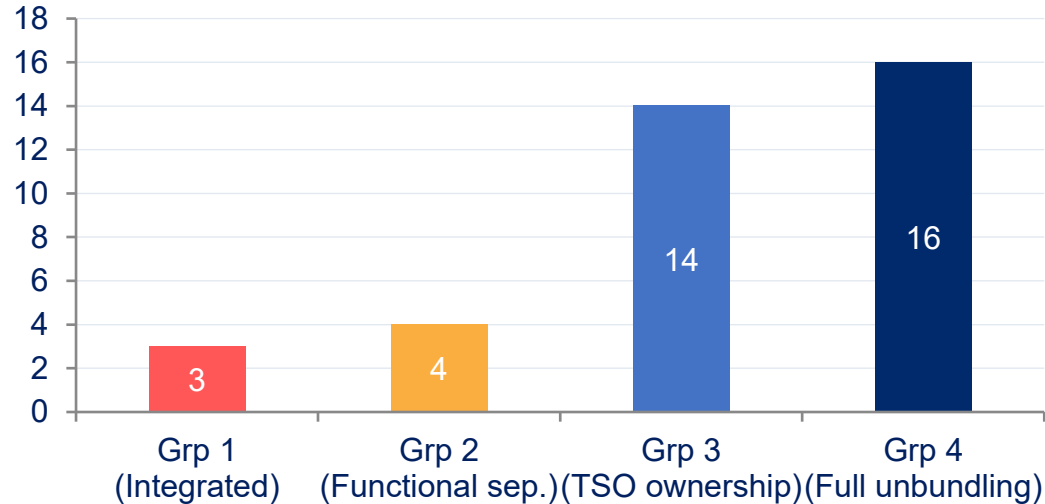
- Cross-border trade
- Market Coupling
- Coordinated ATC allocation
- Participation in regional platforms

***Different systems combine these elements in different ways — forming distinct market archetypes***

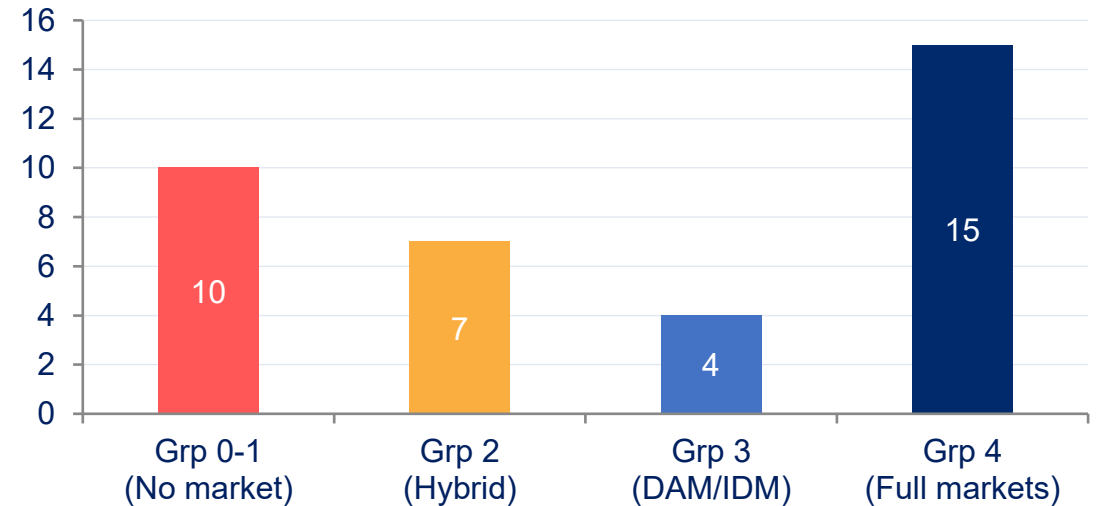


# Unbundling & Wholesale Markets

Area F: TSO/DSO Unbundling (N=37)

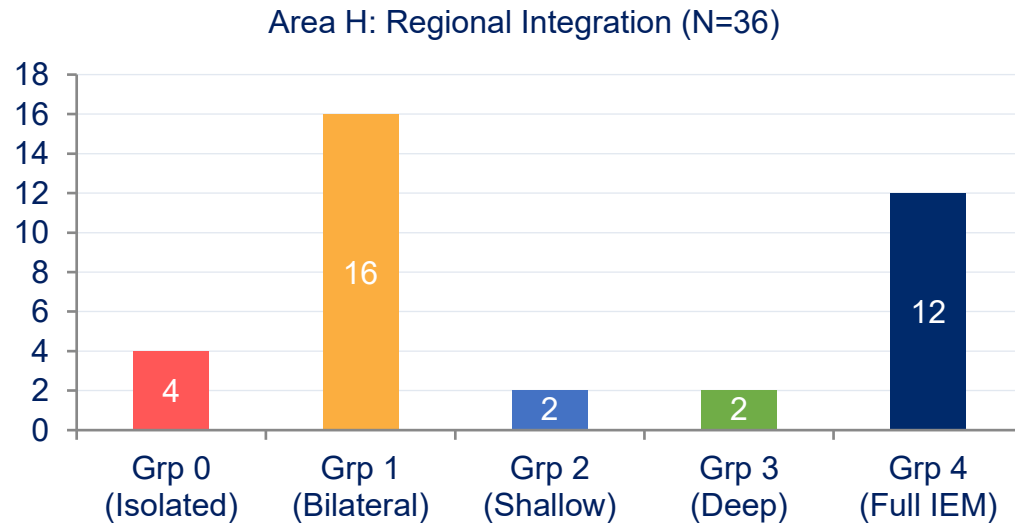


Area G: Wholesale Markets (N=36)



**Critical sequence:** Unbundling is necessary but not sufficient for market development. Every Group 4 wholesale market member has at least Group 3 unbundling — but not every Group 3/4 unbundling member has progressed to competitive markets.

# Regional Market Integration

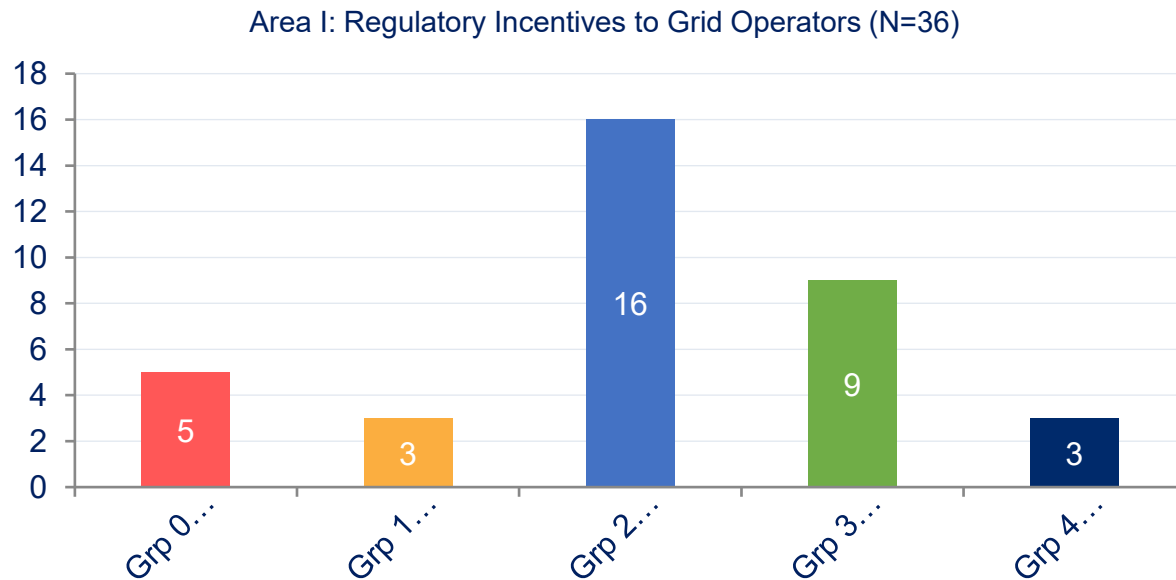


## Notable Cases:

- 12 EU members at Group 4 — fully integrated into SDAC/SIDC
- Baltic states (LT, LV, EE): completed synchronisation with Continental Europe in 2025
- Nigeria (Group 3): anchor of the West Africa Power Pool (WAPP)
- Advanced regional integration remains almost exclusively a European phenomenon within ERRA

*The institutional conditions that enabled EU market coupling — synchronised grid, supranational authority, mandatory network codes — do not currently exist in other ERRA regions. This is structural, not a failure.*

# Incentive Regulation for Grid Operators



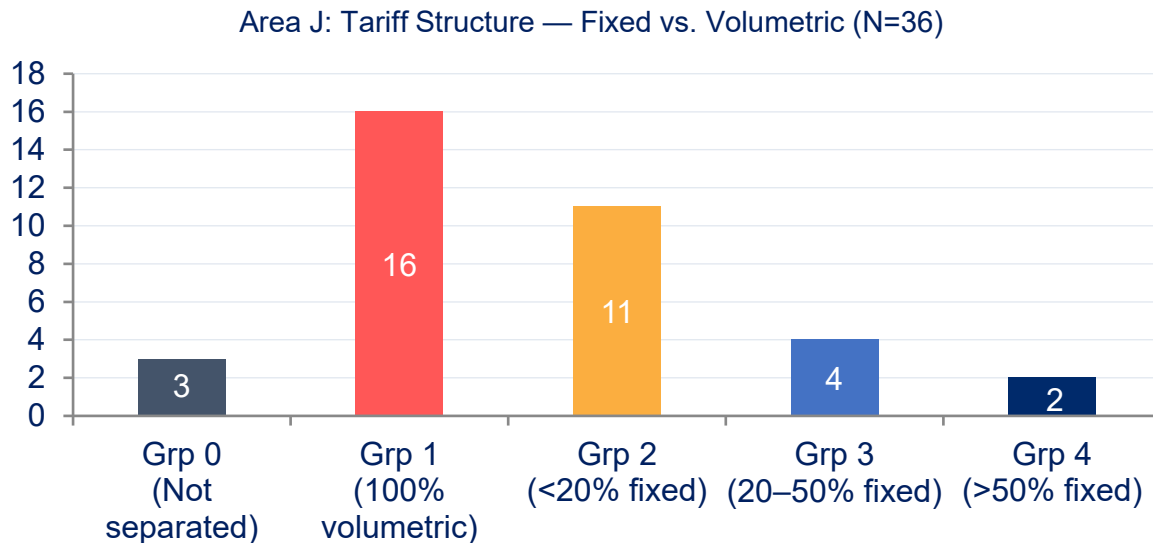
## Notable Cases:

- 80% of members use price-cap + SAIDI/SAIFI — broadly diffused across all contexts
- Opex→Capex boundary is the key current reform frontier
- Only 3 members at Totex level: France (TURPE7), Austria (E-Control), Latvia (SPRK)
- SAIDI/SAIFI are universally the reference quality indicators

*Opex efficiency + Quality of service regulation (Grp 2) is the most common mode of incentive for grid operators.*

*New performance indicators and Capex efficiency (Grp 3). Totex (Grp 4) is still a frontier among ERRA Members.*

# Electricity Network Tariff Structure

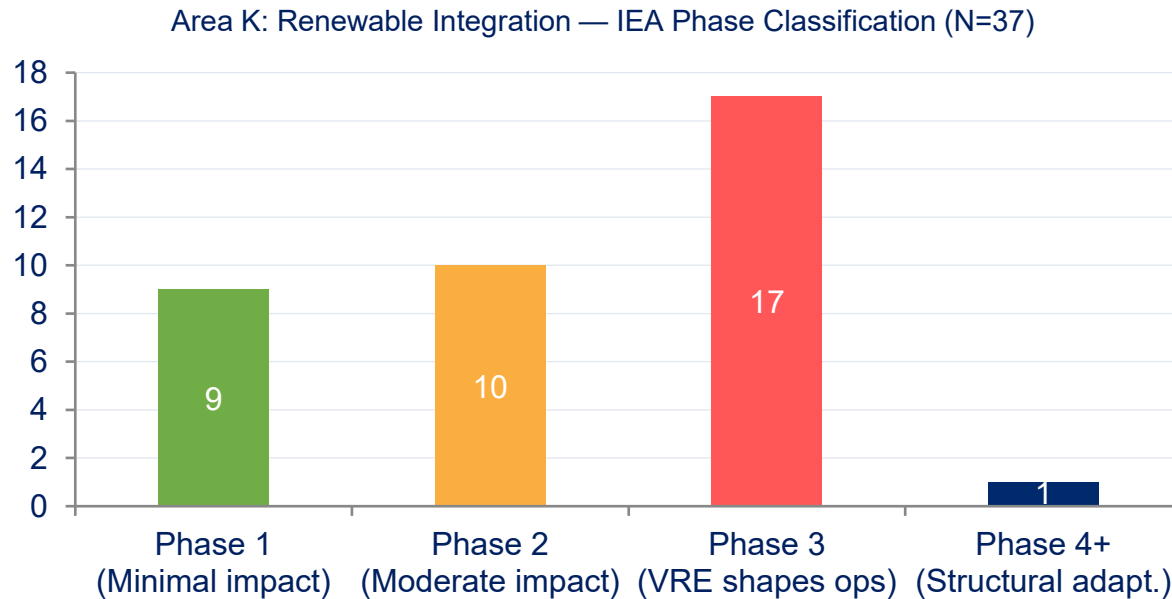


## Notable Cases:

- Network costs are primarily fixed — recovering them through volumetric charges is structurally misaligned
- Every additional prosumer or efficiency measure compresses volumetric revenue without reducing fixed network costs
- Greece (RAAEY): ~90% capacity-based, only 10% volumetric — the most advanced in ERRA
- Latvia (SPRK): also predominantly capacity-based
- Block tariffs create institutional inertia against cost-reflective reform

*Shift from 100% volumetric to capacity-based tariffs is economically justified regardless of renewable penetration level — network costs are fixed by nature.*

# Renewable Energy Integration



## Notable Cases:

- VRE (solar + wind)  $\neq$  Total RES: hydro-rich systems show high RES but low integration challenge
- 17 members at Phase 3 — the most dynamic and operationally challenging position
- Austria is the only Phase 4+ member in ERRA
- Largest VRE growth 2019–2024: Greece (+24.6%), Lithuania (+21.6%), Hungary (+15.8%)

## Groups 1 - 2

Establish balancing framework and grid connection rules before VRE rises further

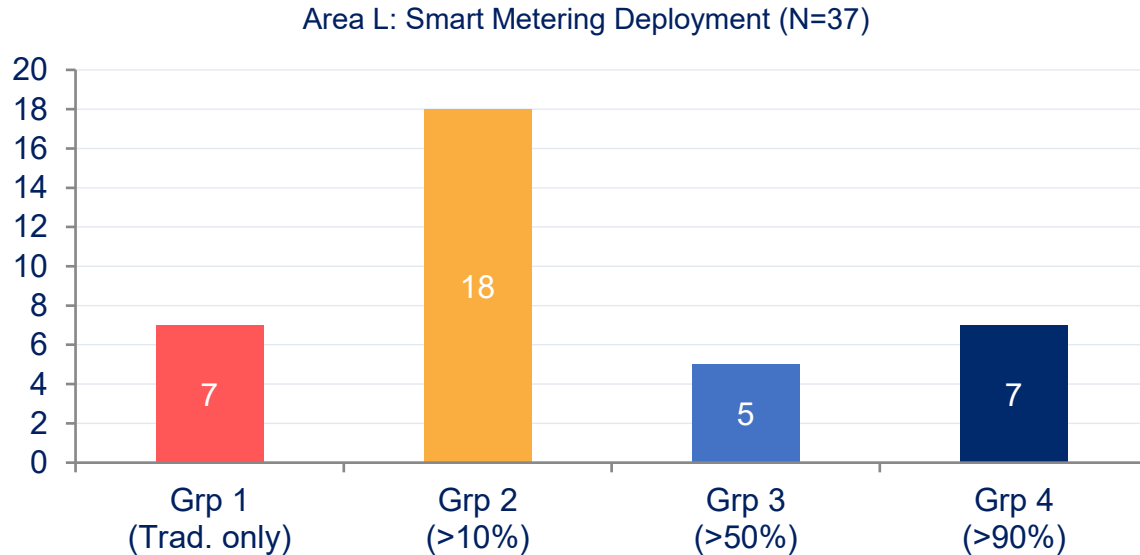
## Group 3

Formalise flexibility procurement: reserves, demand response, adequacy methodology

## Group 4

System stability, market design adaptation, V2G and storage integration

# Smart Metering & Digitalisation



## Group 4 Members (>90%):

France · Austria · Estonia · Latvia

Uzbekistan · Saudi Arabia · UAE/Dubai

## Key Insight:

- Near-universal smart metering is achievable across very different institutional contexts
- The gap between Group 4 and Group 1–2 is a regulatory design gap, not a technology gap
- Without smart metering, demand-side flexibility cannot be activated at scale

## Groups 0 - 1

Address universal metering coverage first; define functional specs before procurement

## Group 2 - 3

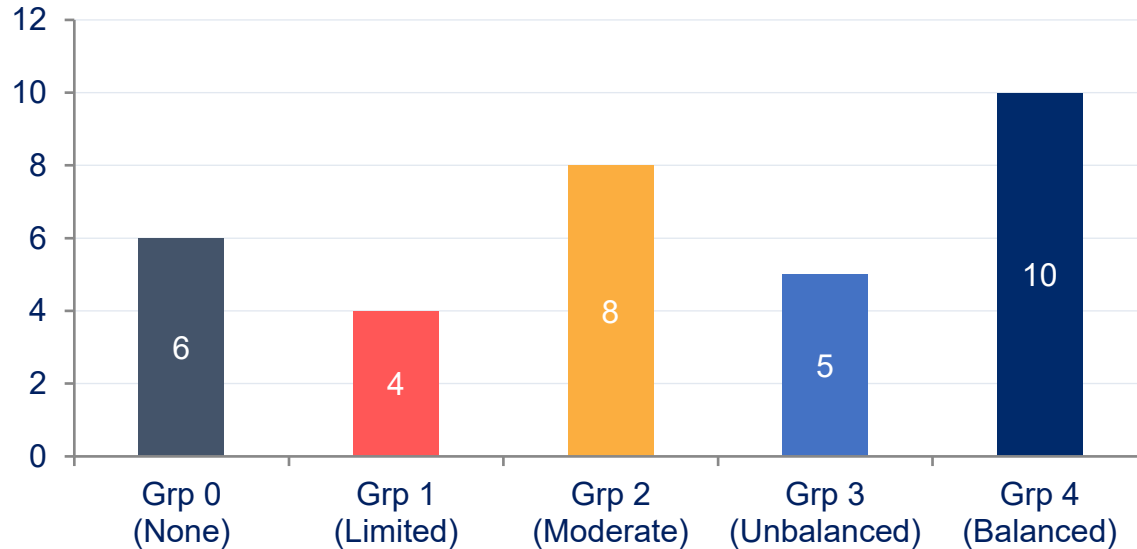
Shift focus to rollout execution; define data access framework for third parties

## Group 4

Activate data for flexibility markets; address cybersecurity and third-party access

# Electro-mobility Development

Area M: Electro-mobility — Last 3 Years (N=33)



## Key Insight:

- DSOs prohibited from owning charging assets (Lithuania: 47 competing operators)
- DSOs responsible for connection only — not commercial operation (Georgia, Romania)
- DSO boundary still undefined — the most common situation

**Key regulatory challenge:** *EV registration is growing faster than charging infrastructure in several Group 3 members (Poland, Azerbaijan, Hungary, Kazakhstan, Romania). This imbalance risks becoming self-reinforcing — insufficient charging suppresses adoption, slow adoption reduces investment case.*

# Cross – Cutting Patterns

01

## Convergence at Foundation

~80–94% in top groups for Independence, Unbundling & Consumer Protection — institutional foundations broadly in place

03

## Governance Dimensions Are Independent

Independence  $\neq$  Scope ( $R^2=0.18\%$ ).  
Consumer protection  $\neq$  Market liberalisation.  
Each requires separate logic

05

## Energy Transition as New Frontier

Network tariff structure, smart metering activation, and EV frameworks are the most consequential upcoming reform agendas

02

## European vs. Non-European Divide

EU/European members dominate Groups 3–4 in market areas. Middle East, Africa, Central Asia face structurally different contexts — not developmental lag

04

## Reform Sequencing Matters

Unbundling → Wholesale Markets → Regional Integration is empirically validated. Structural separation necessary but not sufficient

06

## Diversity as Institutional Strength

The grouping system maps, not ranks. Different configurations = legitimate responses. Peer-learning works precisely because of this breadth

# Some Implications for ERRA Members

## INDEPENDENCE

- Prioritise leadership appointment protections: fixed terms, non dismissal, no other charges compatible
- Invest in participatory processes: consultation, hearings, strategic plans — these give autonomy social legitimacy

## CONSUMER & MARKETS

- Make ADR mandatory + enforceable; treat retail liberalisation and subsidy removal as distinct tracks
- Consider metering, tariff reform and social protection in parallel (esp. if consumption block tariff is active)

## NETWORK REGULATION

- Groups 0–1: SAIDI/SAIFI monitoring first; Groups 2: extend to capex benchmarking/efficiency incentive
- Groups 3: consider Totex + non-wire alternatives; tariff reform requires companion social measures

## ENERGY TRANSITION

- Establish balancing and grid connection frameworks before VRE reaches Phase 3 levels
- Resolve DSO role in EV charging before it becomes commercially significant; mandate functional specs for smart meters before procurement

# Country boxes : a tool for learning

In the Mapping Report there are 22 «Country Boxes»

Each **country case** is shaped by legal framework, market structure, and local political economy — and nonetheless each with something **to learn from**

See Summary Table of Country Boxes in Annex A1

A  
R  
E  
A  
S

REGIONS



***FIND THE BOX WITH  
THE COUNTRY CASE  
THAT YOU'RE MORE  
INTERESTED IN***





Thank you for your kind attention

and especially many thanks to  
all ERRA people deeply involved in this large  
project all around the ERRA world

*The potential for complete or partial publication will be addressed in the forthcoming period.*

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