ENERGY REGULATORS
REGIONAL ASSOCIATION

Smart Meter Penetration in Select ERRA Member Countries

Results of the Joint Analysis by the ERRA Committees and Working Group

ERRA Renewable Energy Committee
January 19, 2022 | Online Meeting

Introduction

- Initiative for the smart metering project came from the ERRA Presidium in accordance with the Committee's Workplan;
- The ERRA Electricity Markets and Economic Regulation Committee, the Renewable Energy Committee and the Customer Working Group were included in the project with the aim to prepare a common paper;
- A small task force was created to prepare the questionnaire;
- The topics covered by the three groups are:

EMER Committee	RES Committee	Customer Working Group
- improving retail competition; - demand response; - implementing time of the day use of the tariffs; - impacts on end-used tariff formation; - decisions whether to go forward or to postpone the process; - general overview of main parameters of cost-benefit methodology; - functionality of smart meters.	- the benefit of smart meters for micro grids; - smart meters and the organization of energy communities; - smart meters for real time metering and billing of e-mobility-charging-stations.	- making more "traditional" consumers included, not just the active consumers; - how smart meters affect switching time; - allowing consumers to participate in many new options and services (aggregation, energy sharing, energy communities, flexibility services, etc.); - helping consumption management as the consumer has nearly or real time data on his/her consumption; - how smart meters help digitalization and consumer empowerment and education; - smart meters reduce personal contacts during a pandemic.

Content of the Questionnaire

- The Questionnaire was disseminated on 29th of July with deadline by 30th of August 2021.
- The questionnaire was targeting the smart meter deployment status together with related strategies & plans in different countries by addressing the following points:
  - Overview of the total available number, type and responsible entities for the metering points on the retail customers' side;
  - Cost-benefit Analyses' results and related data;
  - Roll-out plans and strategies;
  - Technical requirements and specifications;
  - Main drivers and challenges for deployment;
  - Services and business models that rely on the chosen roll-out strategy and functionalities of smart meters;
  - Additional legislation for the roll-out plan;
  - Time-of-use tariff deployments;
  - The deployment of smart meters in different sectors than electricity

Participating Countries

- 22 countries took part in the project and 19 replied to the questionnaire:

  - Albania
  - Algeria*
  - Armenia
  - Austria
  - Bhutan
  - Cameroon
  - Croatia
  - Czech Republic
  - Egypt*
  - Estonia
  - Georgia
  - Hungary
  - Latvia
  - Lithuania
  - Mongolia
  - North Macedonia
  - Poland
  - Serbia
  - Slovakia
  - Turkey
  - Ukraine
  - United Arab Emirates (Dubai)*

* Note: Algeria, Egypt and UAE (Dubai) did not fill the questionnaire as there is no smart metering regulation in place yet.

Definition and Objectives

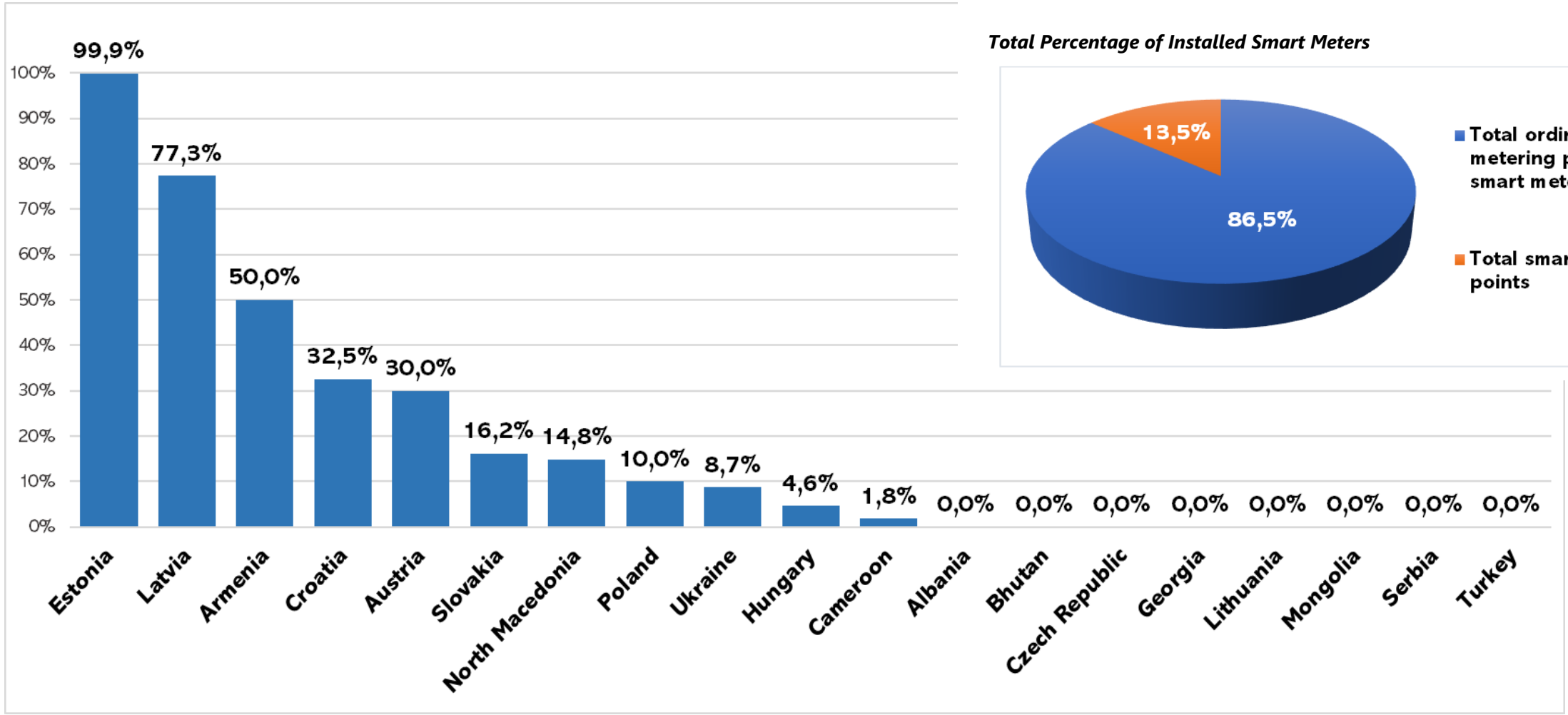
- Smart metering system is an electronic system that is capable of measuring electricity fed into the grid or electricity consumed from the grid, providing more information than a conventional meter, and that is capable of transmitting and receiving data for information, monitoring and control purposes, using a form of electronic communication. (Directive 2019/944).
- Smart metering systems aim to support retail markets to fully deliver benefits to consumers and the electricity system through enabling demand response, dynamic pricing competition, and other energy services to evolve.
- They have a key role promoting energy efficiency and empowering final customers, in particular about their interaction with consumer energy management systems and smart grids.

Benefits for Consumers, DSOs and Suppliers

Customers	DSOs	Suppliers
Cost optimization through new pricing models	Increasing the efficiency of network operations	Accurate forecasting of future energy consumption this reduces the balancing energy risk and achieves nondiscriminatory equality of all suppliers
Elimination of the estimated consumption in billing	Improvements in network planning and network control	Possibility to offer new energy tariff models to customers and thus act in an innovative and more customer friendly way
No more uncertainty in billing, even if the consumption pattern changes	Possibility of automatic power limitation	Offering suitable energy tariffs (peak load / base load), consumption peaks can be shifted and thus economic advantages generated
Possibility to remote meter readings at any time	Failure management with identification of customer installations affected by failures, and targeted efficient fault elimination	Potential to improve the offers and thus increase the competitiveness
Automation of processes, e.g., in the course of supplier switching procedure	Possibility of monitoring and evaluating the voltage quality characteristics (current) recorded by the system	
Change and increases in service quality	Support of the integration of decentralized power plants	
Enhanced possibility to support RES integration	Individual load profile measurement	
Participation in the electricity market	Shifting of consumption peaks and equalization of the network load through tariff incentives for customers	
Power quality	Knowledge of the actual amount of energy delivered, e.g., for the exact determination of network losses	
Integration of e-mobility		

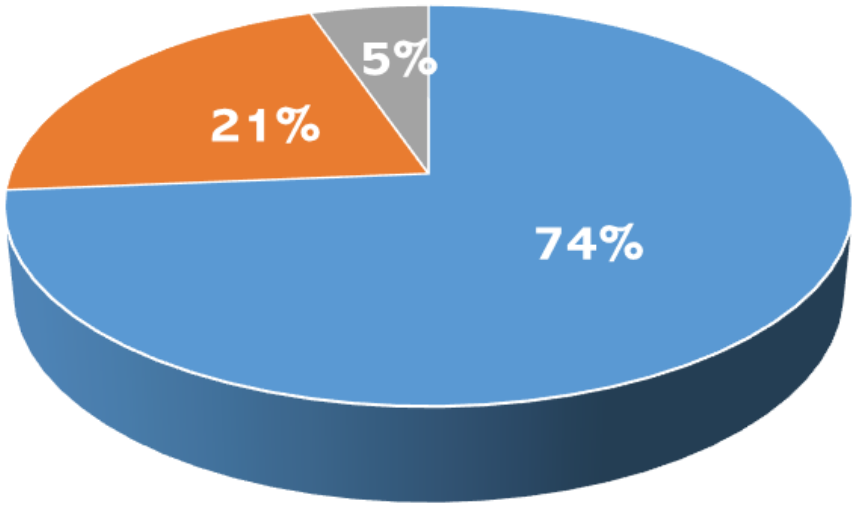
Source: „Clean Energy for all Europeans. The role of regulators and active consumers."
Energy Community Regulatory School, Sabina Eichberger, E-Control, 6th November 2020

Share of Smart Meters from Total Number of Metering Points



Total Percentage of Installed Smart Meters

Entity Responsible for Metering of Retail Consumers



- **DSO: Albania, Austria, Cameroon, Czech Republic, Estonia, Georgia, Hungary, Lithuania, North Macedonia, Poland, Serbia, Slovakia, Turkey, Ukraine**
- **DSO & TSO: Bhutan*, Croatia, Latvia, Mongolia***

  Note: In Bhutan and Mongolia there is no unbundling, therefore it is the same company
- **DSO & Supplier (Sales Company): Armenia**

Cost Benefit Analysis (1/2)

- Out of 19 members, only 4 members reported that Cost Benefit Analysis (CBA) was prepared (Croatia, Czech Republic, Georgia and Poland) which represents 33%.
- Three of the members reported positive result of the CBA and one member (Czech Republic) negative.

Country	Overall result of the CBA	Which parameters have the highest impact on total costs (1 = highest impact, 5 = lowest impact)				
		Smart Meter Hardware	Communi-cation	Operational Costs	Installation Costs	Others
Croatia	positive	2	5	1	5	-
Czech Republic	negative	2	1	4	5	5
Georgia	positive	1	2	3	4	5
Poland	positive	1	2	4	3	5

- Cost for Smart Meter hardware and communication costs have high impact on the total cost, and installation and operational costs medium to lower impact, as reported.

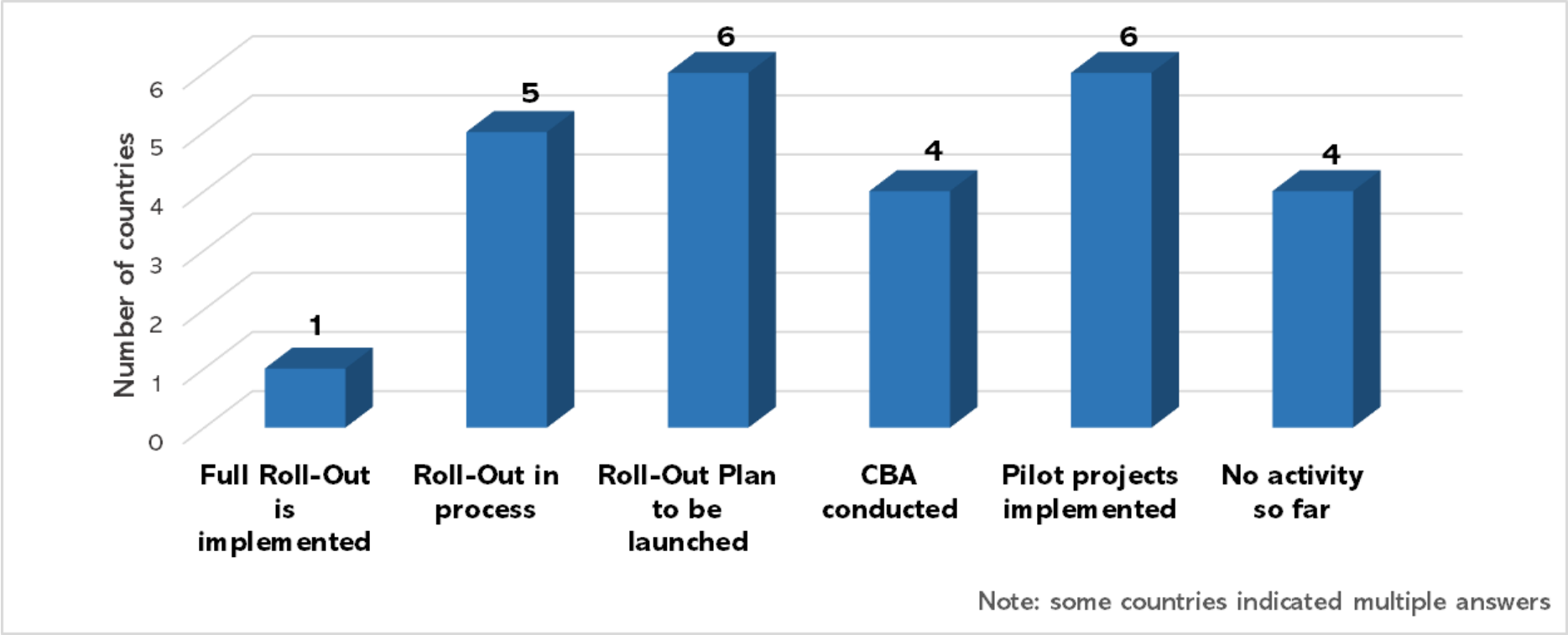
Cost Benefit Analysis (2/2)

	Croatia	Czech Republic	Georgia	Poland
Standard guideline to calculate the CBA	Joint Research Centre Scientific and Technical Research, Luxemburg 2012	No	EC Guidelines for Cost Benefit Analysis of Smart Metering Deployment	No
Did you consider energy efficiency gains?	Yes	Yes	Yes	Yes
What was the % of annual energy efficiency gains that were assumed?	Decrease of the electricity consumption by 2%	Negative result	3%	2.5%
Did you consider environmental impact?	Yes	No	Yes	Yes
What does environmental impact include?	CO2, NOX, SO2, "Particles", emissions from cars	N/A	CO2 emissions	N/A
What was the assumed Unit-Price for a Smart Meter in the model	64-167 EUR	40-80 EUR	90 EUR	79 EUR
What is the ratio of CAPEX in the total analysis?	37%	N/A	85%	88%
What is the ratio of OPEX in the total analysis?	63%	N/A	15%	12%
What was the main assumption for the OPEX in the analysis?	Installation and operation partly outsourced to service providers.	Installation and operation partly outsourced to service providers.	Installation and operation of Smart Meters completely done by DSOs.	No specific assumption for the OPEX.

- Among the four ERRA Member countries, 3 consider the environmental impact but not all of them use a standard guideline for making CBA. The results on CAPEX and OPEX ratios also vary.
- There is a great variation for the Assumed Unit-Price (EUR) for a Smart Meter in the model between different countries.

Roll-out Plans & Strategies

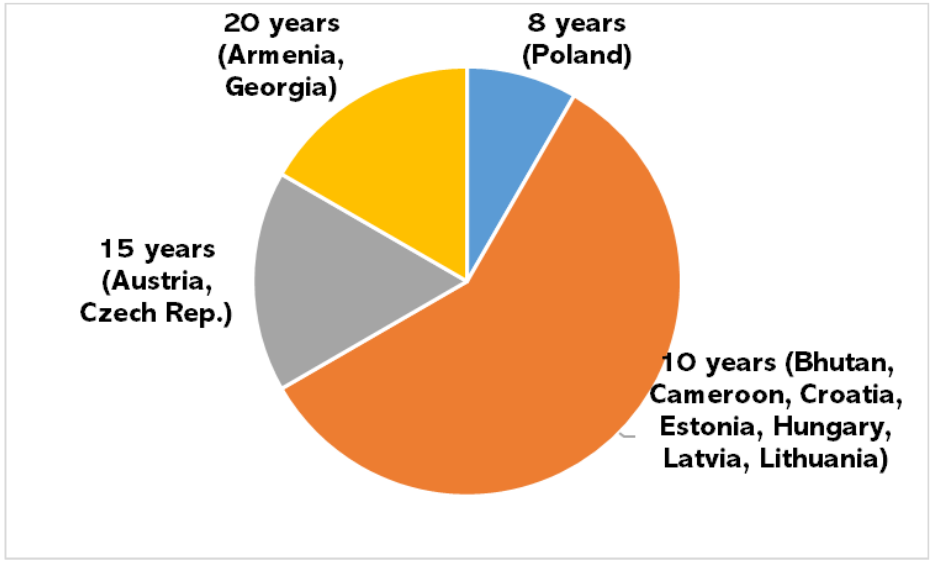
- Only 5 countries declare their status as in the roll-out process and 1 country has reached the full roll-out. On the other hand, there are countries that considered themselves in the initial stage of roll-out (pilot projects, CBA conducted, roll-out to be launched).



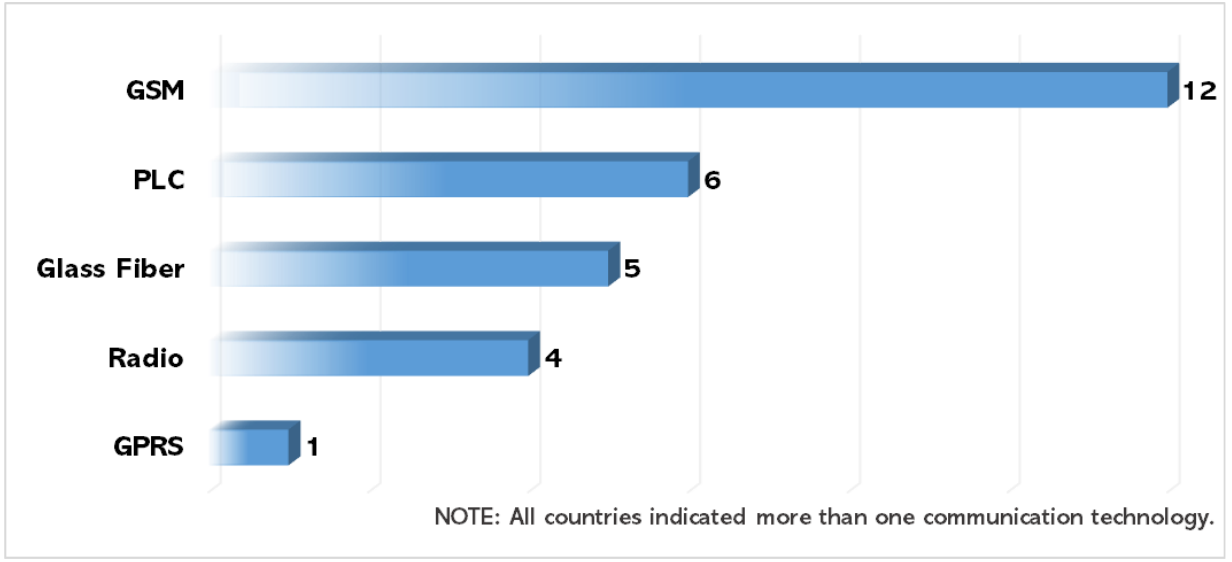
Technical Requirements and Specifications

- Some of the technical requirements and specification of the SM include display on the meter, remote switchable, third-party access via interfaces, measuring voltage quality, measuring load, specific interval for measurements and remote updates possible, etc.
- 12 countries reported on the technical requirements and specifications of SM questions,
- Most of the countries set minimum technical requirements for the SM except 3 countries.

Estimated Lifetime of a Smart Meter



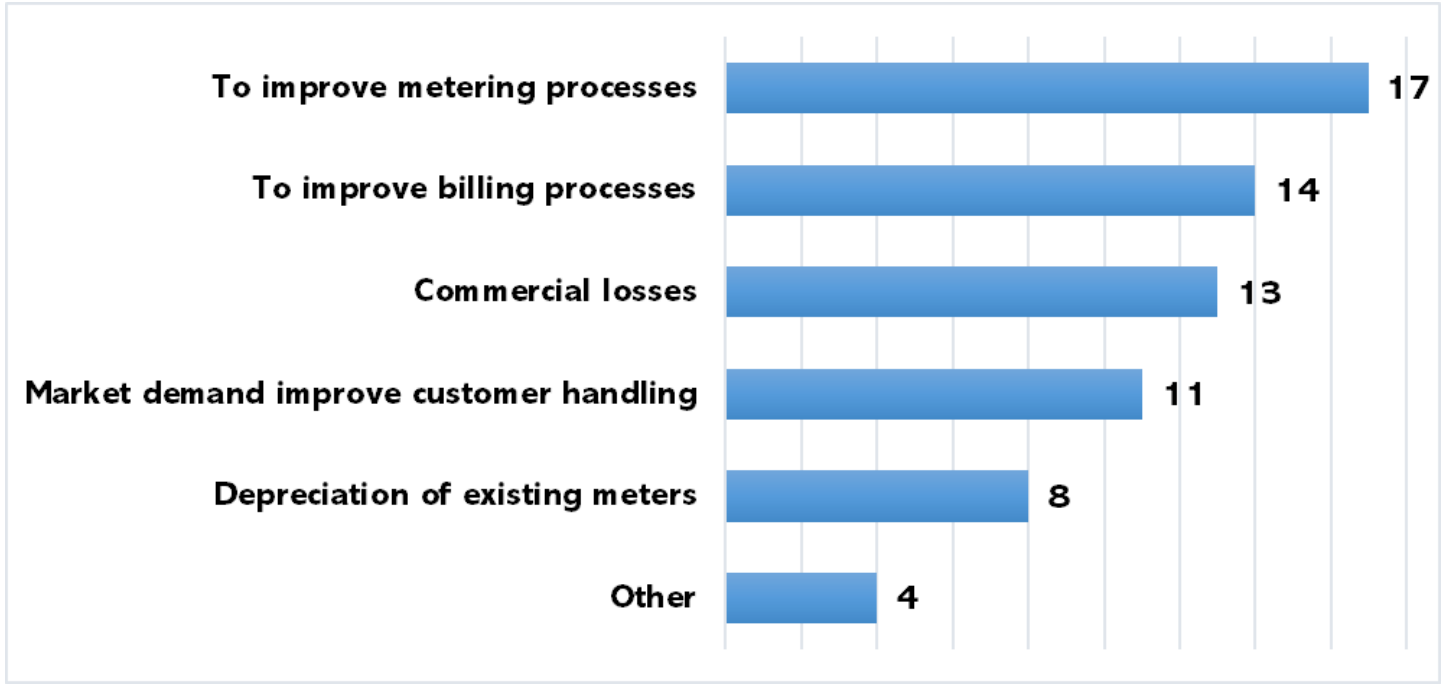
Communication Technologies Used in Smart Meters



Main Drivers of Smart Metering Deployment

- Usually there are multiple drivers that foster smart meter roll-out but the improvement of metering process is listed as the most frequent one. As 'Other', the ERRA regulators indicated inter alia: Increasing the interoperability of different brands of meters and other components as well as standardization in smart meter systems used and exclusion of the human factor.

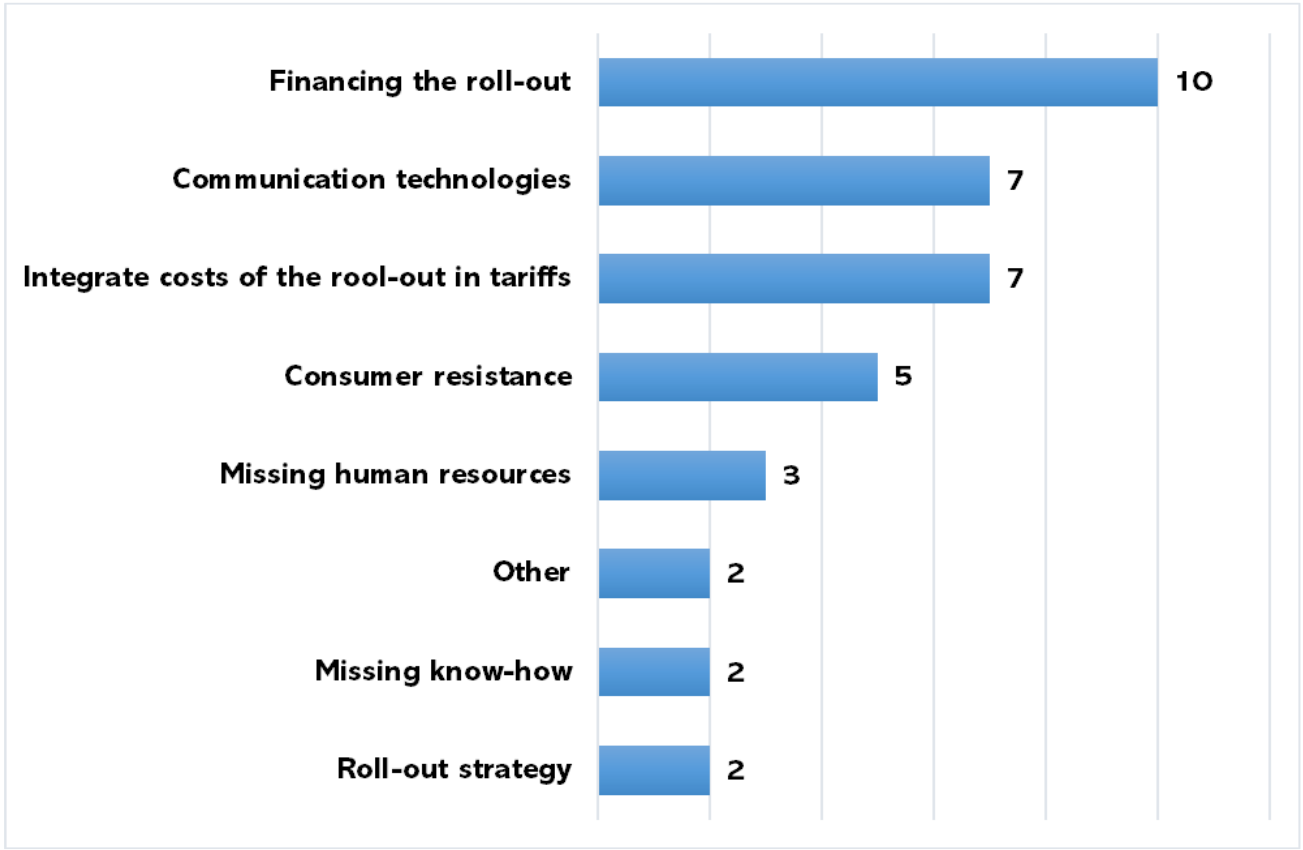
The Main Drivers of the Smart Metering Deployment



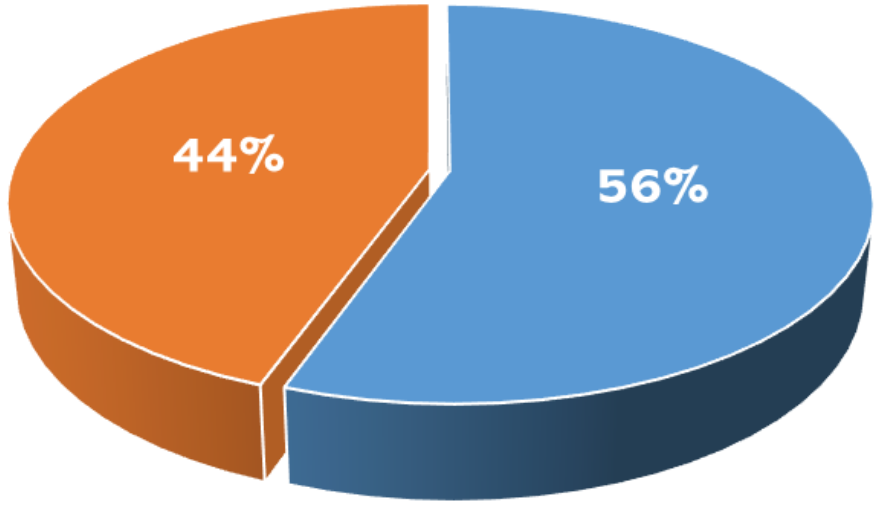
Main Challenges of Smart Metering Deployment

- On the challenges' side, for many ERRA member countries, financing the roll-out stands out as the biggest issue for the process 'Others' included availability of products meeting the required specification and Covid-19.

Main Challenges for Smart Metering Deployment



Existence of Services that Rely on the Roll-Out Plan

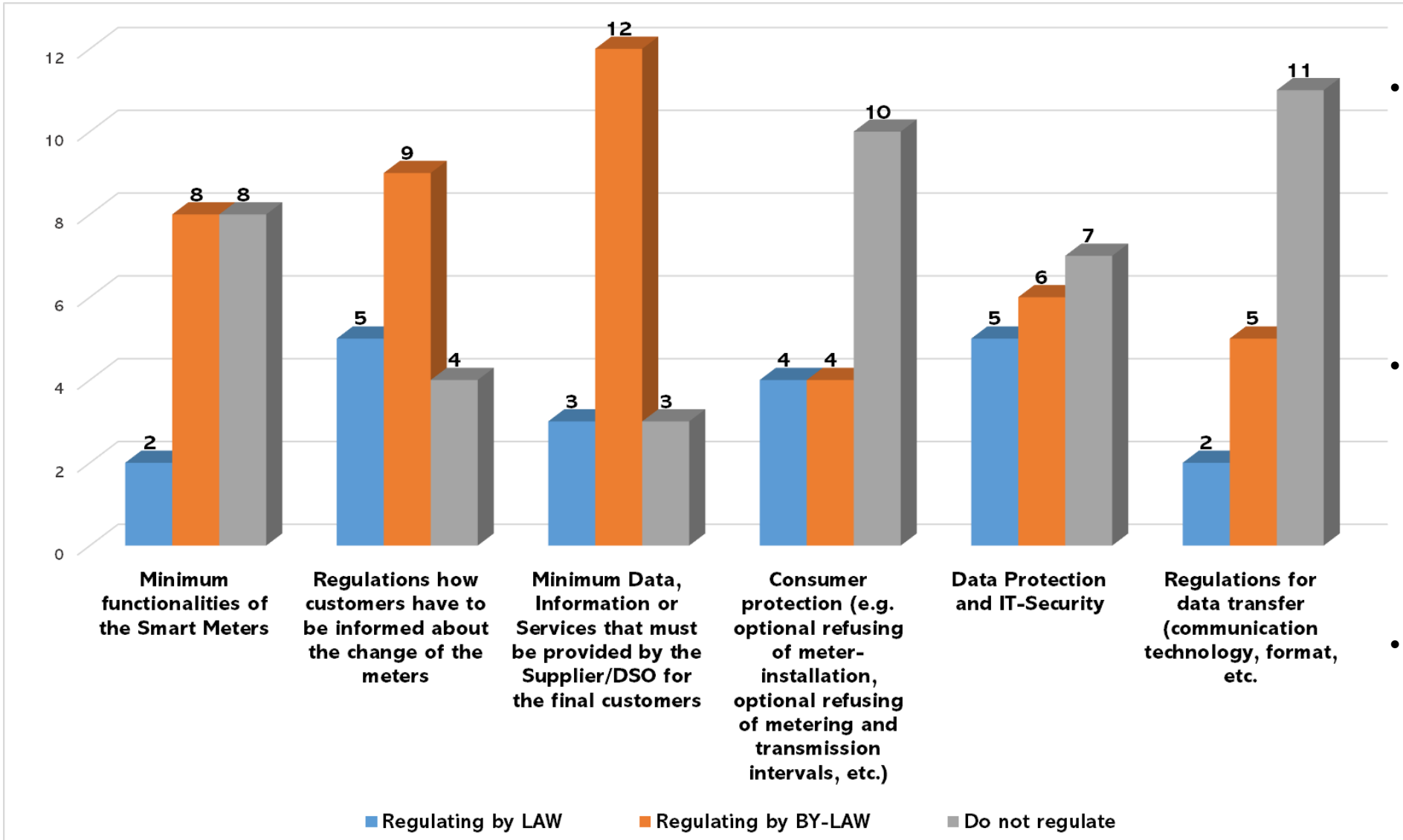


- **Countries that have services relying on roll-out (10): Armenia, Austria, Cameroon, Croatia, Estonia, Hungary, Latvia, Lithuania, Mongolia, Ukraine**
- **Countries that don't have any services relying on roll-out (8): Albania, Bhutan, Czech Republic, Georgia, North Macedonia, Serbia, Slovakia, Turkey**

Note: Poland indicated N/A

- 56% of the countries have already services that rely on Roll-out of smart meters.
- The deployment of smart meters (even if the roll-out is not fully implemented) affects a lot of services and business models such as: Energy communities, Microgrids, Flexible tariffs, Peer-to-peer-trading and Public E-Mobility-Charging-stations.

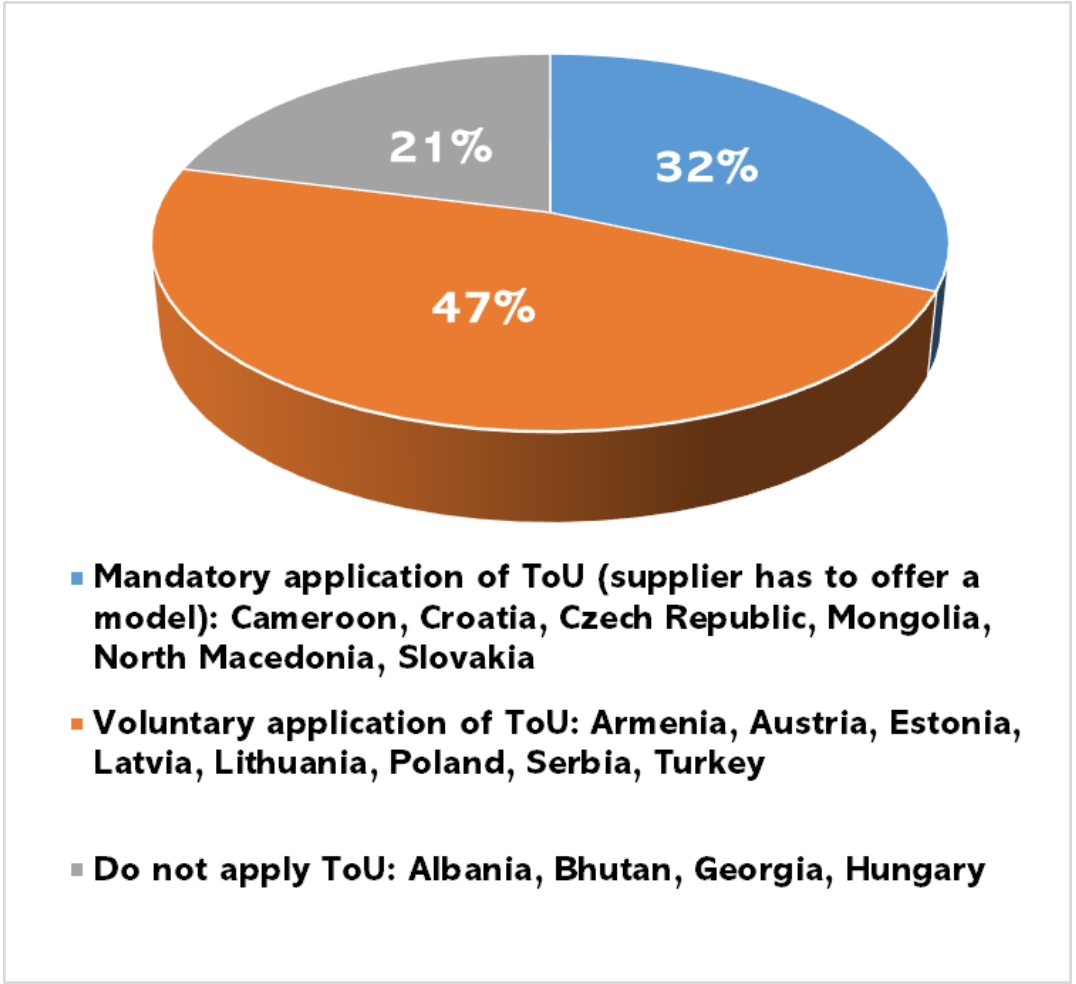
Additional Legislation for the Roll-Out Plan



- Countries may have additional legislation for the roll-out plan – the rules may be regulated by law or by secondary legislation (by-law).
- One of the main points that is regulated by secondary legislation is the minimum data and information, which should be provided by supplier/ DSO to the final consumer.
- There are a lot of points that are regulated by law such as data protection and IT security and how should the regulator inform the customer about meter change.
- Most of the countries do not have regulation for data transfers.

Time-of-Use Tariff (ToU) Deployments

- Most of the countries apply time-of-use tariff in different sectors (Households, SMEs and Industry) which can be either voluntary or mandatory.

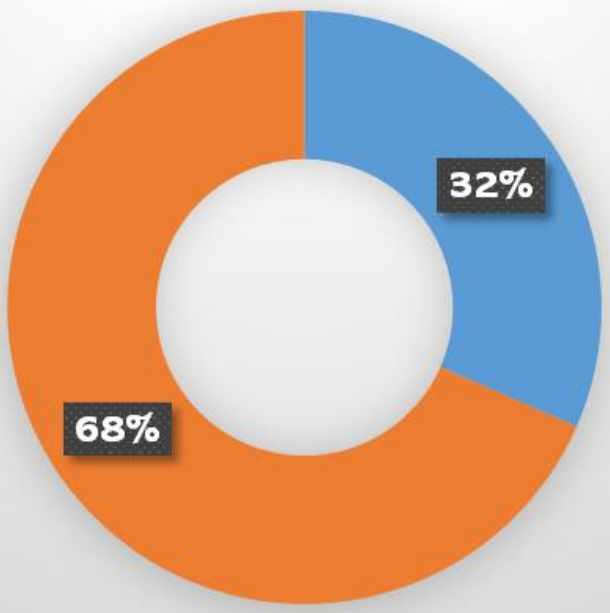


Deployment of Smart Meters in Different Sectors than Electricity

- Most of the countries (13 out of 19) do not deploy smart meters in other sectors than electricity. There are however efforts elsewhere to introduce smart metering systems in other areas of the energy business, which include Natural Gas, Heating and Water Sectors – these are observed in 6 ERRA Member countries.

Using smart meters only in the electricity sector:

1) Albania
2) Armenia
3) Bhutan
4) Cameroon
5) Croatia
6) Czech Republic
7) Georgia
8) Mongolia
9) North Macedonia
10) Serbia
11) Slovakia
12) Turkey
13) Ukraine

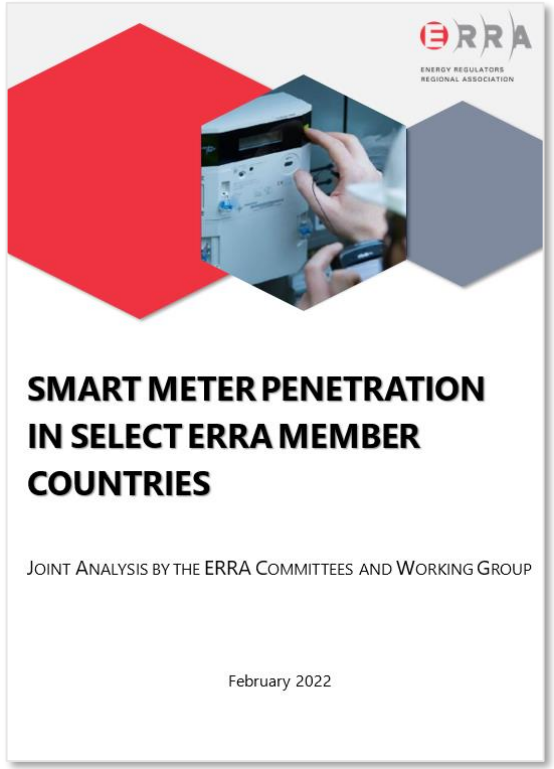


Deployment of smart meters in other sectors:

1) Austria (Heating)
2) Estonia (Natural Gas, Heating, Water)
3) Hungary (Natural Gas)
4) Latvia (Natural Gas, Heating, Water)
5) Lithuania (Natural Gas, Heating, Water)
6) Poland (Natural Gas)

Next Steps

- The prepared joint analysis on „Smart Meter Penetration in Select ERRA Member Countries" will be extended with an executive summary and recommendations by an invited consulting company.
- Expected publication in February 2022.



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