



Contact info:

Valentina D'Amelio

Technical Partner – Energy transition and Senior Expert

vdamelio@nmi.nl

+31 6 256 41858



NMi Group @ a Glance

NMi safeguards confidence that innovative measuring systems remain fit for market, fit for purpose, and fit for the future.

As society, public institutions, private companies and individual citizens must have confidence in the systems that validate quality and functionality – now and in the future.

Measuring Tomorrow
Powered by NMi Group



State of the art of smart meters Rollout, Requirements and Communication Technologies in the EU.

Valentina D'Amelio
NMi Group
July 23, 2024

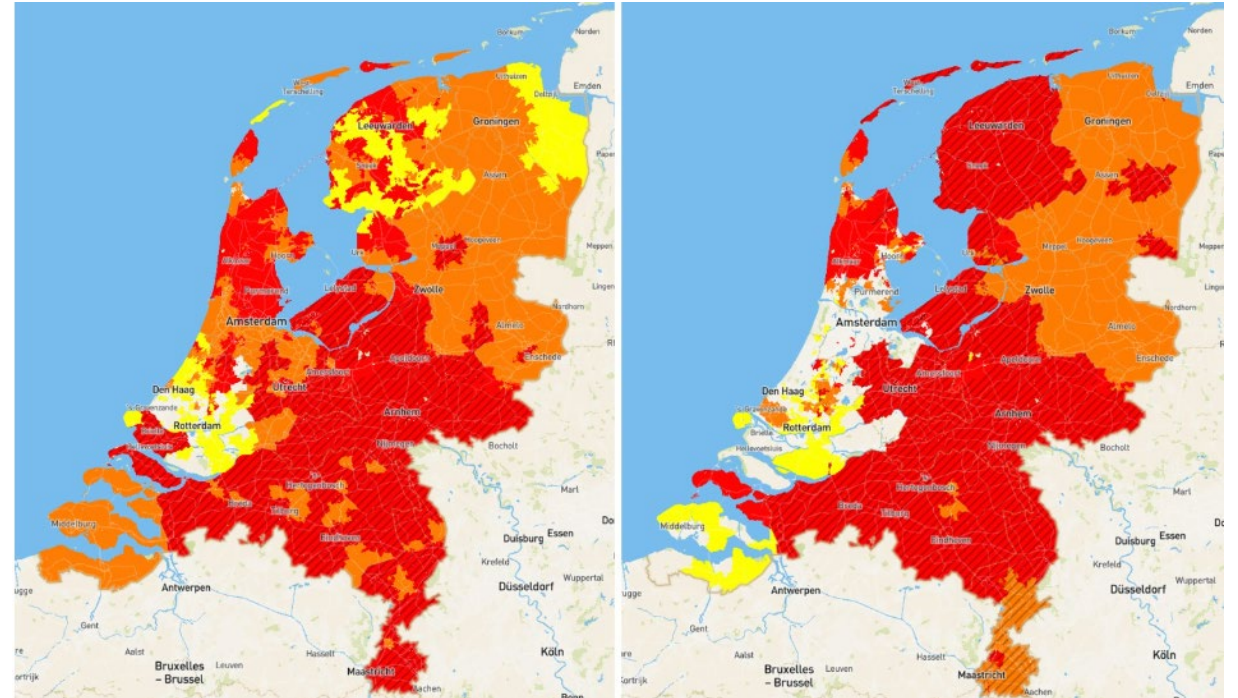
List of Contents

- Importance of AMI in EU
- EU Regulatory Framework
- Status Roll-out smart metering in EU
- Communication technologies in EU
- Smart meters Requirements in EU
- AMI trends in EU
- Conclusions



Importance AMI in Europe

- Renewable energy sources
- Smart meters
- Communication network
- Data management system
- Customer interface

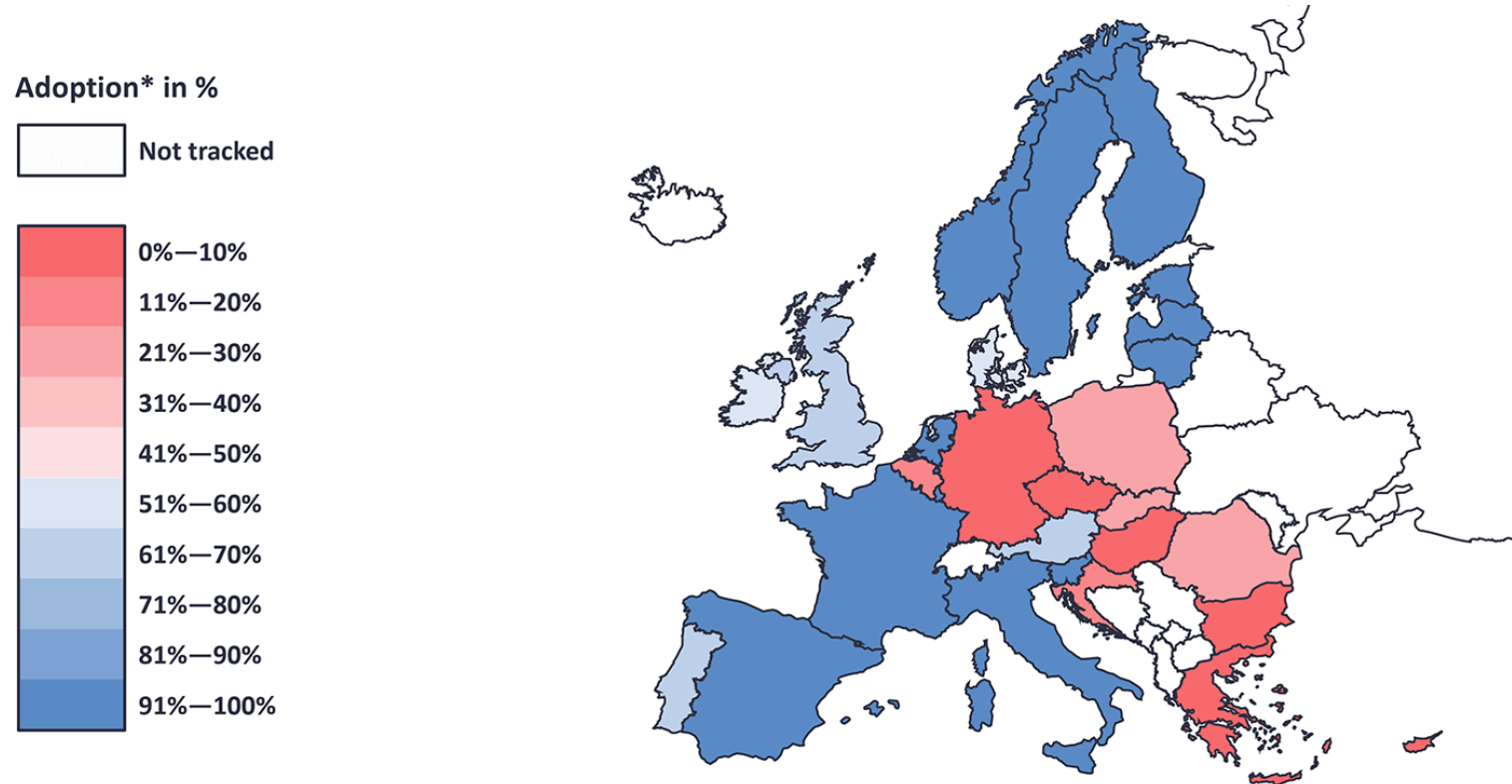


Regulatory Framework for rollout:

- Third Energy Package
- Energy Efficiency Directive (EED)
(2012/27/EU)
- Clean Energy for All Europeans Package
- Renewable Energy Directive (RED II)
(2018/2001/EU)
- Electricity Market Directive (EU) 2019/944
- General Data Protection Regulation (GDPR)
(EU) 2016/679



Role-out of smart meters in EU



* =Smart meter adoption (as of Q4 2023) = The share of smart (AMI) electricity meters installed as a share of the total number of metering points that includes residential, commercial, and industrial segments. Si
Source: IoT Analytics Research 2024 – Global Smart Meter Market Tracker 2020-2030. We welcome the republishing of images but ask for source citation with a link to the original post or company website.

Member State Initiatives



- Italy, Sweden and Finland have achieved nearly 100% smart meter deployment before the other EU countries.

Communication technologies in EU

Communication technologies	Description	Advantages	Examples	Usage
Power Line Communication (PLC)	Utilizes existing electrical power lines for data transmission.	Cost-effective as it leverages existing infrastructure; reliable in urban areas.	G3-PLC, PRIME (PowerLine Intelligent Metering Evolution).	Widely adopted in countries like Spain, France, and Italy.
Radio Frequency (RF) Communication	Uses wireless communication via radio waves.	Suitable for areas without existing infrastructure; flexible and scalable.	2.4 GHz and sub-GHz frequencies, Zigbee, Wireless M-Bus.	Common in countries with diverse geographical challenges, such as the UK and Germany.
Cellular Communication	Uses cellular networks (e.g., 2G, 3G, 4G, and increasingly 5G) for data transmission.	Wide coverage and reliability; suitable for remote and rural areas.	GSM, GPRS, LTE, NB-IoT (Narrowband Internet of Things).	Increasingly popular in various EU countries for its robust connectivity, especially in less densely populated regions.
Fixed Network Communication	Uses dedicated wired communication networks such as fiber optics or dedicated Ethernet connections.	High data transmission rates and low latency; highly secure.	Fiber-optic networks, Ethernet.	Primarily in highly urbanized or industrial areas where infrastructure investments are justified.
Hybrid Solutions	Combines multiple communication technologies to optimize coverage and reliability.	Provides flexibility and resilience; leverages the strengths of different technologies	Combining PLC and RF, or RF and cellular technologies.	Increasingly common as utilities seek to ensure robust and comprehensive coverage.

Country-Specific Examples

- Spain: Predominantly uses PLC technology, specifically PRIME, for smart meter communication.
- France: Employs G3-PLC for its Linky smart meter program.
- Italy: Utilizes a mix of PLC and RF communication technologies.
- UK: Uses RF mesh networks and cellular communication for the Smart Metering Implementation Programme (SMIP).
- Germany: Adopts Wireless M-Bus and other RF technologies for its smart metering infrastructure.



DLMS/COSEM



- Standardized Communication Protocol
 - Interoperability
 - Flexible Communication
- Data Model and Information Exchange
 - Structured Data Model and efficient data exchange
- Security and Privacy



Role of smart metering

■ Functionalities

- ❑ Remote Reading and Data Collection
- ❑ Real-Time Monitoring
- ❑ Time-of-Use (TOU) Pricing
- ❑ Demand Response Programs
- ❑ Enhanced Customer Engagement
- ❑ Support for Renewable Energy Integration
- ❑ Data Privacy and Security
- ❑ Power Quality



Requirements for kWh meters

- MID directive 2014/32/EU
 - Harmonized standards:
 - EN 62052-11 A11: 2022
 - EN 50470-3: 2022
 - EN 50470-4: 2023
 - IEC 62052-31: 2015 safety standards → FDIS 2024

Software requirements – Welmec 7.2

Guide

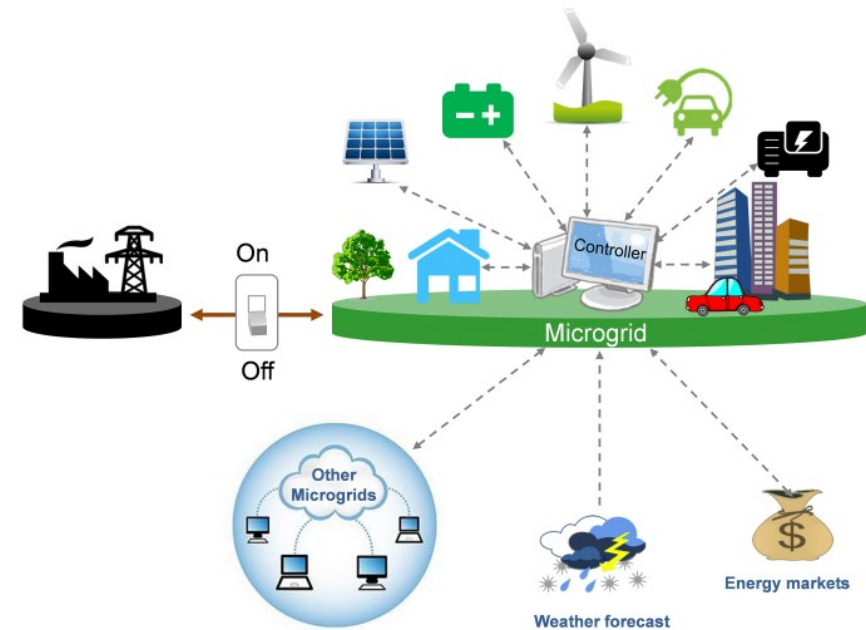


Applicable to all measuring instruments covered by the MID, such as electricity meters, water meters, gas meters, heat meters, weighing instruments, and more.

- Ensures Compliance to MID requirements
- Promotes the development of reliable and secure software, ensuring the integrity of measurement results
- Contributes to the harmonization of legal metrology practices across Europe, promoting consistency and interoperability.
- Ensures that measuring instruments provide accurate and trustworthy measurements, protecting consumers and ensuring fair trade.

AMI trend topics in EU

- DC systems and EVCS for fast charging
- Microgrids AC and DC
- Grid balancing via stability contributors
- Cyber Security
- Sustainability and Circularity



Copyright Berkeley Lab

Future Prospects of AMI in Europe

- **Technological Advancements:** Integration with IoT and AI for smarter grid management.
- **Regulatory Support:** Continued support from EU policies for smart grid innovations.
- **Sustainability Goals:** Contribution to achieving the EU's climate and energy targets.

Conclusions

- AMI are essential in Europe to improve the energy usage efficiency, Enhances grid reliability and resilience and Empowers consumers with real-time data and control over their energy consumption.
- Deployment is not ready but there is a rapid growth of AMI across EU.
- Stakeholders shall be continue investing in and supporting AMI initiatives.

Today's Presenter



Valentina D 'Amelio

NMi Sr. Expert & Technical Partner
Energy transition

- vdamelio@nmi.nl
- +31 6 256 41858
- nmi@nmi.nl