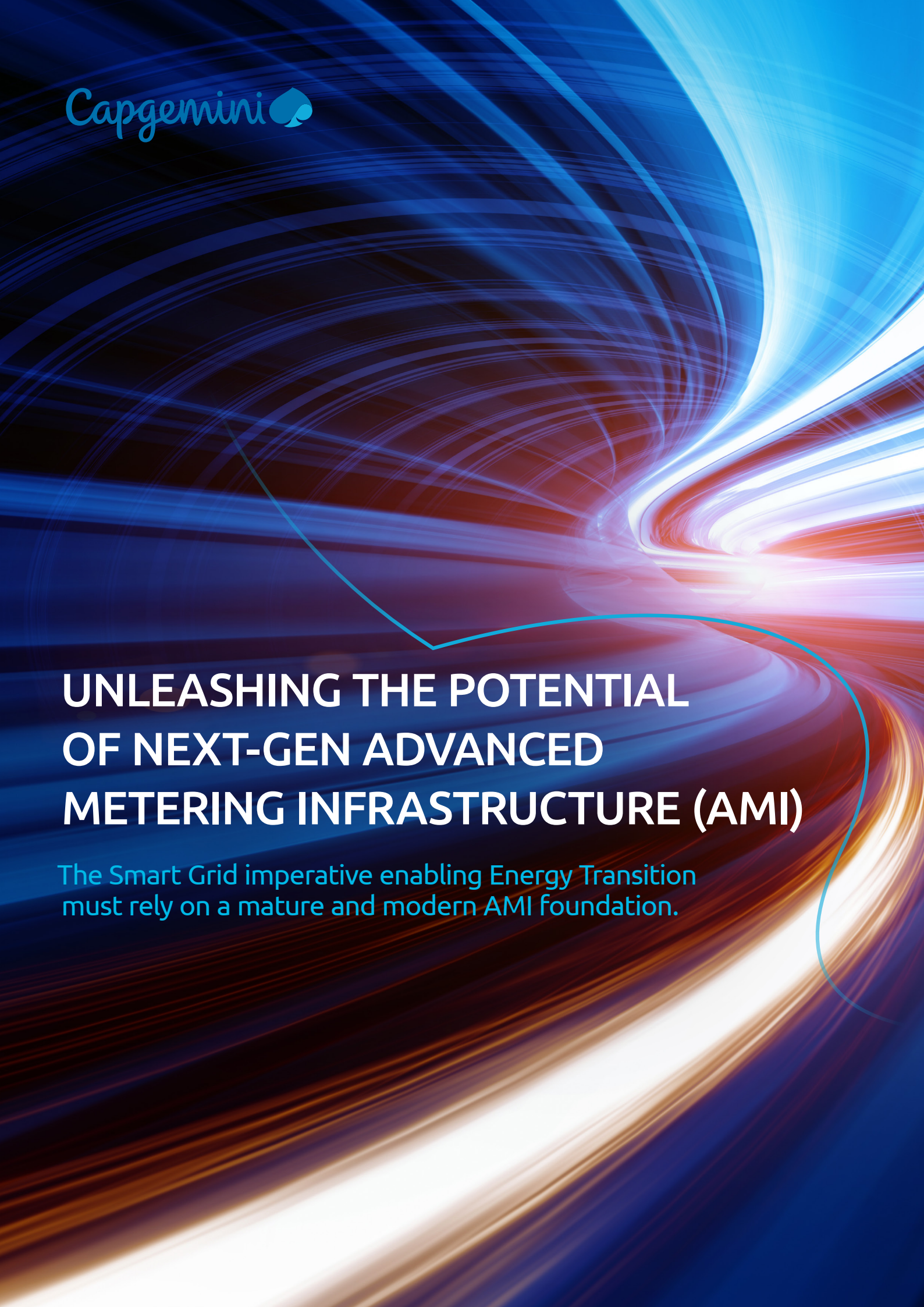
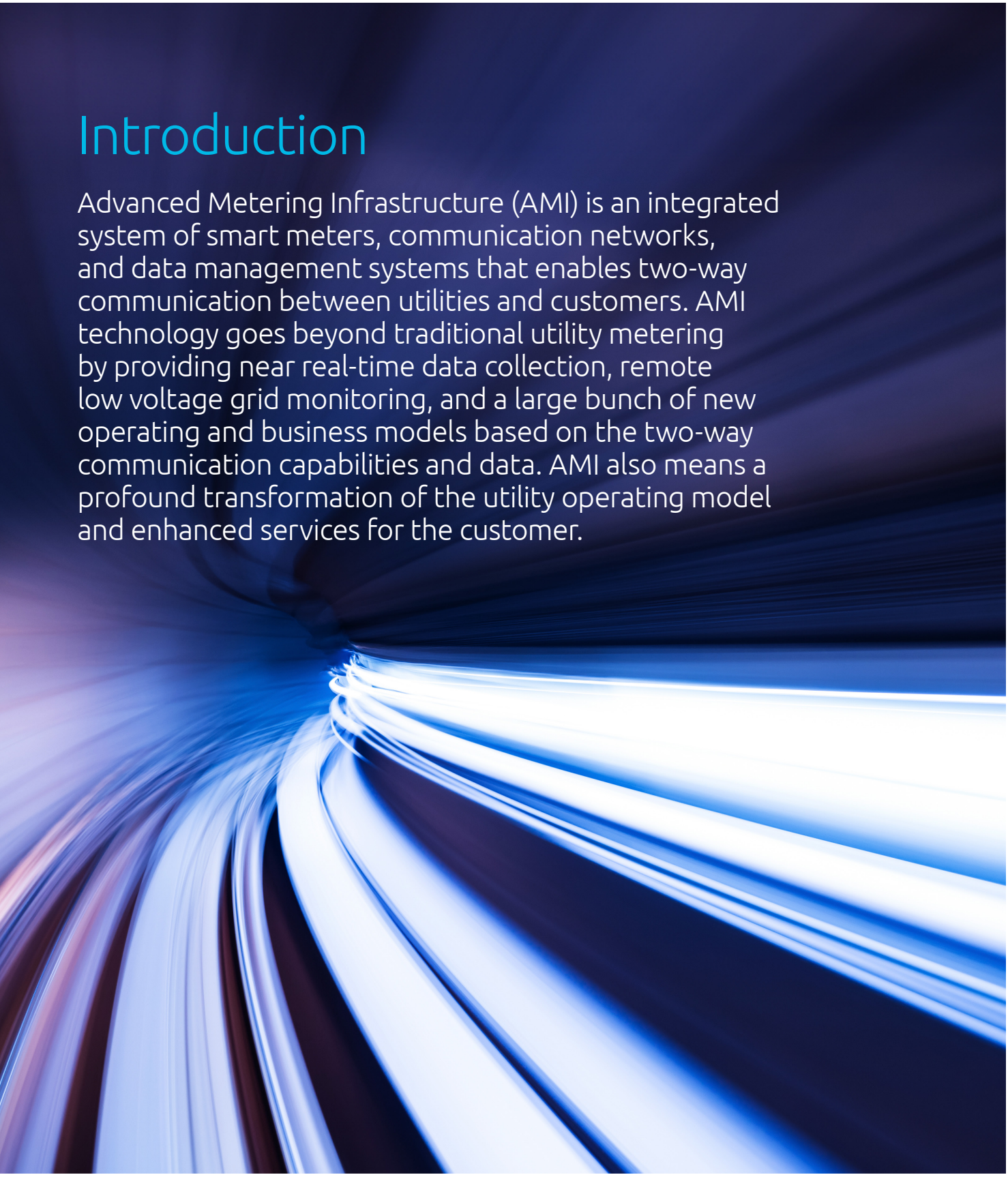

Capgemini
UNLEASHING THE POTENTIAL OF NEXT-GEN ADVANCED METERING INFRASTRUCTURE (AMI)
The Smart Grid imperative enabling Energy Transition must rely on a mature and modern AMI foundation.

Introduction

Advanced Metering Infrastructure (AMI) is an integrated system of smart meters, communication networks, and data management systems that enables two-way communication between utilities and customers. AMI technology goes beyond traditional utility metering by providing near real-time data collection, remote low voltage grid monitoring, and a large bunch of new operating and business models based on the two-way communication capabilities and data. AMI also means a profound transformation of the utility operating model and enhanced services for the customer.



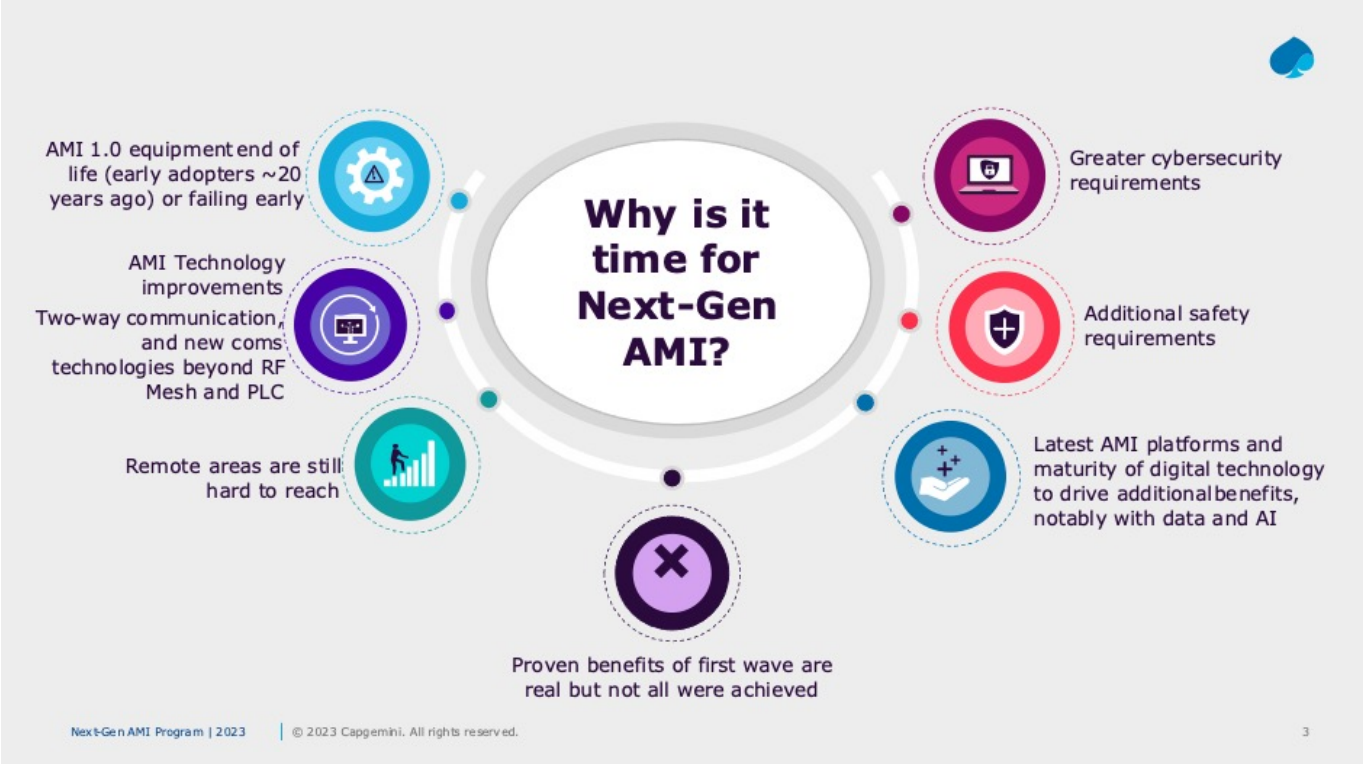
Why there is a need for Next Generation AMI?

Some utilities have implemented their AMI 1.0 fifteen to twenty years ago with one-way communication for metering data collection, which mainly benefits the utilities. In this scenario, the customer receives – only - a monthly bill based on real consumption, not estimated consumption. Even if it was progress, one-way communication technology doesn't deliver the full expected value of AMI.

AMI addresses escalating cyber threats, safeguarding the integrity and confidentiality of data transmitted between beyond the meter customer devices, smart meters and utility servers.

Next-Gen AMI is also pivotal to managing the transition to decentralized energy resources or load demand, such as distributed generation and storage (solar rooftops, self-consumption models, home batteries) and heat pumps or EV charging infrastructures. Bidirectional communication for optimal energy flow between consumers and the grid opens

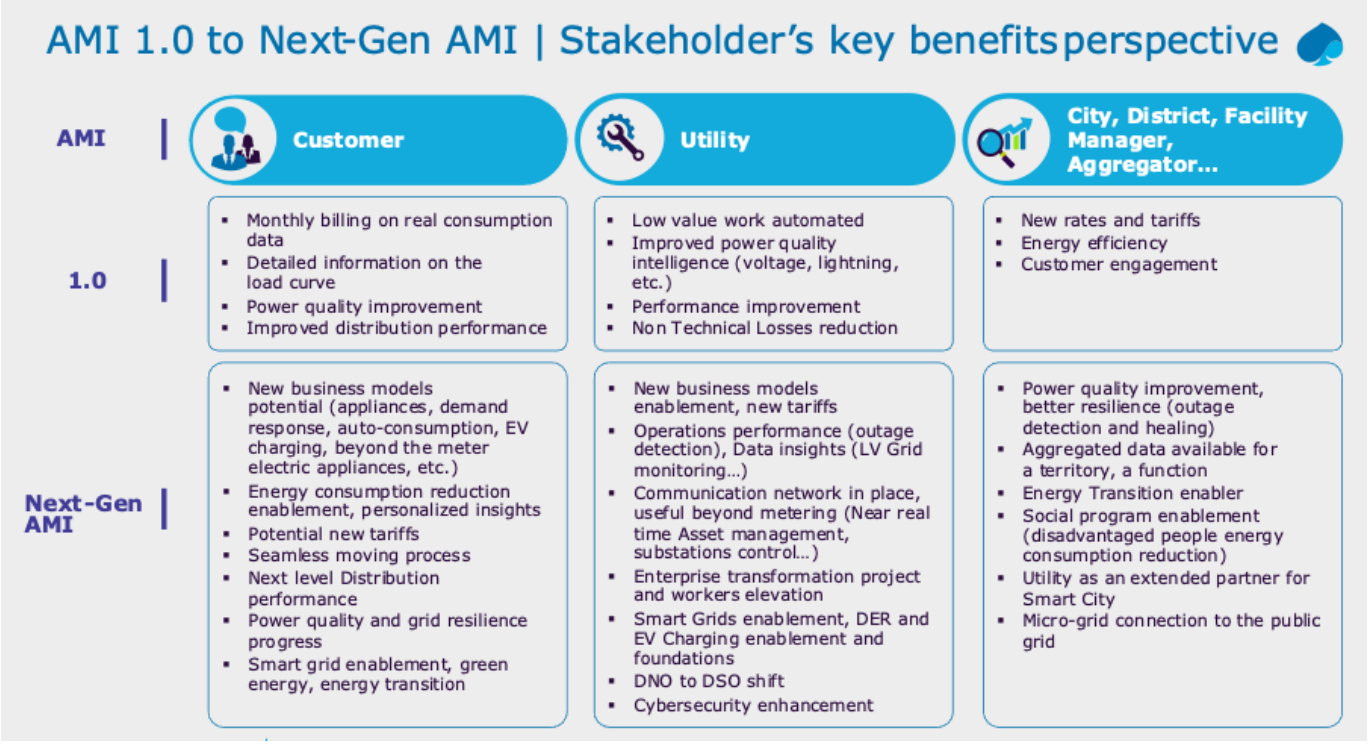
Diagram 1



The imperative for Next-Gen (AMI) stems from the continual evolution of technology and the escalating demands on utilities to augment efficiency, reliability, and sustainability in energy resource management. Next-Gen AMI incorporates cutting-edge technologies, spanning sensors, communication protocols, data analytics, and next level cybersecurity, ensuring utilities benefit from improved capabilities and heightened security features. Its ability to provide highly precise and granular data on the electric system enables utilities to glean deeper insights, identify inefficiencies and swiftly locate outages, monitor the low-voltage grid health and implement targeted strategies for optimizing the grid. With an unwavering focus on cybersecurity, Next-Gen a vast range of new services and models. Advanced analytics and Artificial Intelligence capabilities embedded in Next-Gen AMI extract valuable insights from the vast data generated by smart meters, enabling predictive analytics for Low Voltage issue identification and improved grid reliability.

With Next-Gen AMI, utilities get far more from the metering system (improved efficiency notably on the LV Grid), but customer and electric systems stakeholders get the main benefits, as shown in the table below.

Advancing from AMI 1.0 to Next-Gen AMI: Stakeholder Benefits Perspective



Next-Gen AMI project challenges

The journey towards Next-Gen AMI is not without obstacles. The most important are below:

- The companies moving from an old or amortized AMI 1.0 to Next-Gen AMI must deal with regulators and customers potential lack of understanding of the limited AMI 1.0 benefits and need to make a compelling demonstration for a Next-Gen AMI implementation.
- There are more possible choices on communication technologies and good reasons to mix Point to Point (4G/5G) for isolated meters on top of PLC / RF Mesh / NBIoT.
- When it comes to communication technologies, companies choosing PLC, notably in Europe, have to consider the coming intelligence and communication capabilities of Smart Substations. The Data Communication Unit (DCU) of future smart secondary substations could include the data concentration function of the AMI. This is not valid for RF Mesh communication (the communication feature typical in North America).
- Data brings a lot of value to Next-Gen AMI. New services to clients, efficiency elevation for the grid. With two consequences: A/ Data foundation and related skills must be available for the Next-Gen AMI project, from the beginning. B/ Data use cases must also be embedded and considered as the projects' core components.
- An AMI project, especially those that are Next-Gen, represent a fantastic opportunity to transform the way the company operates. Business transformation is a key dimension of the project.

Unveiling the transformative value of Next-Gen AMI

The value proposition of Next-Gen AMI is extensive, heralding transformative outcomes for utilities and their diverse clients and stakeholders. One pivotal facet is the elevated customer value-proposition, where innovative business models offer end-users dynamic engagement through initiatives like demand response programs, auto-consumption strategies, and electric vehicle (EV) charging solutions. This fosters seamless processes, energy consumption reduction incentives, and the exploration of avant-garde tariff structures.

Next-Gen AMI lays the groundwork for smart grid foundations, offering utilities the capability to integrate distributed energy resources (DER), deploy electric vehicle (EV) charging infrastructure, accompanying heat pump deployment and enabling intelligence at the edge (Smart Secondary Substations). With asset management and grid operation modernization, network instrumentation (smart substations) are the 3 pillars of the long Smart Grid journey, on top of Smart Metering.

From the utility perspective, the transition to Next-Gen AMI translates to operational efficiency gains, directly derived from the business transformation dimension of such a project. The mandatory incorporation of data insights and analytics facilitates enterprise-wide transformation and development of new models, marking a seamless transition from Distribution Network Operator (DNO) to Distribution System Operator (DSO).

Moreover, Next-Gen AMI lays the groundwork for smart grid foundations, offering utilities the capability to integrate distributed energy resources (DER), deploy electric vehicle (EV) charging infrastructure, accompanying heat pump deployment and enabling intelligence at the edge (Smart Secondary Substations). With asset management and grid operation modernization, network instrumentation (smart substations) are the 3 pillars of the long Smart Grid journey, on top of Smart Metering.

Capgemini AMI value proposition: experience reduces risks

Capgemini has been at the forefront of delivering comprehensive Advanced Metering Infrastructure (AMI) projects and services for more than 20 years now. We have contributed to more than 170M meter deployment projects. All projects have met their business objectives and have been delivered on time, at or below budget. Our experience reduces risks.

Capgemini provide services all along the metering project value chain:

- **Project planning**
  - Business/regulatory rate business case
  - Strategy and planning
- **Project design**
  - AMI selection (system and vendor evaluations)
  - Deployment plan
  - Systems architecture
  - Systems integration
  - Cybersecurity
- **Build**
  - POC / experimentation
  - Systems integration
  - Rollout
  - Transformation, business process re-engineering, new business models
  - Change management and operational training
  - Physical and cyber security assessment
- **Run**
  - Smart metering network operations
  - Analytics

With a commitment to excellence, Capgemini's AMI services redefine utility metering by enhancing operational efficiency, improving power quality, providing value added innovative services to clients and stakeholders, and enabling utilities to embark on a transformative journey towards a sustainable and technologically advanced future.

Empowering AMI Initiatives through Advanced Energy Services Platforms

Capgemini introduces the Next-Gen Energy Services Platform (Next-Gen ESP), a comprehensive end-to-end solution tailored to meet the sophisticated requirements of Next-Gen Advanced Metering Infrastructure (AMI). Serving as a proven and integrated platform, Next-Gen ESP efficiently oversees the complete smart metering lifecycle—from program planning and meter rollout to material traceability, asset management, and meter operations. Drawing on the wealth of insights gained from deploying millions of smart meters globally and leveraging 20+ years of implementation experience, Next-Gen ESP stands as a robust solution. Key modules within the platform, such as Work Order Management (WOM), Meter Operations (AMM), and Meter Data Management (MDM), ensure a seamless and efficient execution of AMI programs, reflecting Capgemini's commitment to delivering cutting-edge solutions for the energy and utilities sector. DER control and EV charging infrastructure management have been added to the original stack of solutions.

Ecosystems management

Capgemini takes pride in having the leading metrology and MDM vendors as our strategic partners. We also closely collaborate with logisticians and electrical installers.

Rene Kerkmeester
Global Vice President
Energy Transition & Utilities Smart Grids

Bragadesh Damodaran
Vice President
Energy Transition &
Utilities Industry Platform

Divyesh Arora
Manager
Energy Transition &
Utilities Industry Platform

Philippe Vié
Senior advisor
Capgemini Energy
Transition & Utilities

About Capgemini

Capgemini is a global leader in partnering with companies to transform and manage their business by harnessing the power of technology. The Group is guided every day by its purpose of unleashing human energy through technology for an inclusive and sustainable future. It is a responsible and diverse organization of nearly 350,000 team members in more than 50 countries. With its strong 55-year heritage and deep industry expertise, Capgemini is trusted by its clients to address the entire breadth of their business needs, from strategy and design to operations, fueled by the fast evolving and innovative world of cloud, data, AI, connectivity, software, digital engineering, and platforms. The Group reported in 2022 global revenues of €22 billion.

Get the Future You Want | www.capgemini.com