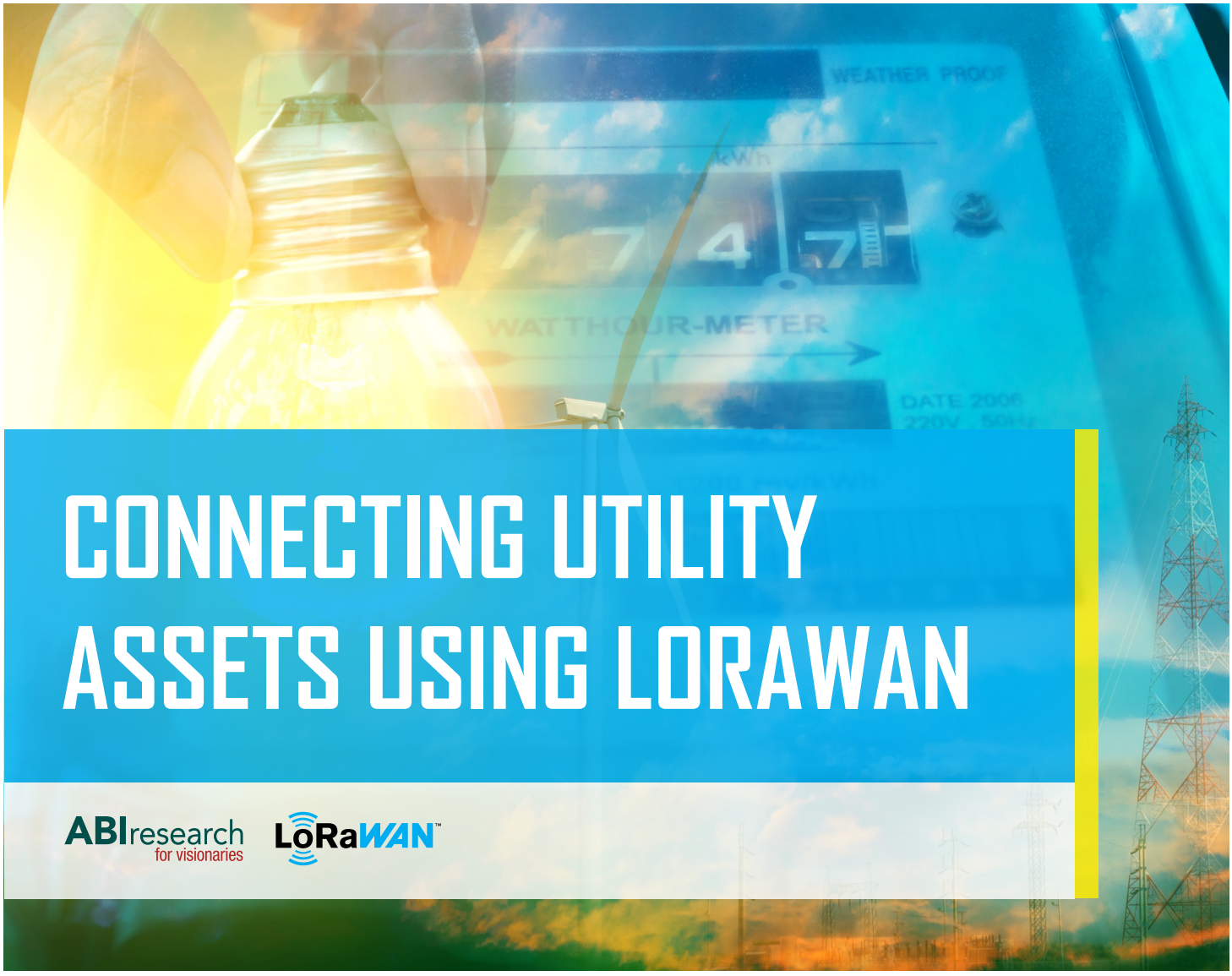


CONNECTING UTILITY ASSETS USING LORAWAN

ABIresearch for visionaries

LoRaWAN™

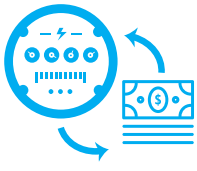
Introduction

Utilities are at the forefront of employing Internet of Things (IoT) technologies on their journey toward digital transformation. The technology leading this charge is smart meters. For utilities, smart meters are foundational toward building tomorrow's smart grid, ultimately enabling new operational efficiencies, new service opportunities, and new revenue streams.

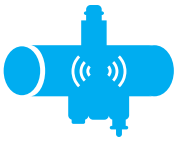
According to a recent report by ABI Research, in 2018 there will be an installed base of 617 million smart meters and by 2023 this install base will double to reach 1.34 Billion meters. Smart electricity meters are just the first wave of technology that is driving the utility market's transformation; a second wave—through the deployment of smart water and gas meters—is just beginning.

IoT Market Opportunities for Energy and Water Utilities

Utilities are transitioning from distribution network operators to distribution system operators who can employ digital technologies. The benefit is a more dynamic, adaptive, and interconnected utility distribution network, facilitating new use cases and benefits.



- **Meter-to-Cash Services:** Meter-to-cash services are defined by data acquisition and delivery activities that are facilitated with smart metering and meter data management systems. The benefit is lower billing costs by eliminating manual meter readings and reading errors. These services can also significantly improve customer relationships and create opportunities for greater engagement with customers by putting them in greater control of their usage and costs.



- **Remote Valve Control:** Bidirectional, low-latency communications on flow control points address several market needs. They include government-mandated restrictions on water, as most recently seen in South Africa; regulations on utility use when using prepayment services; and gas meter safety valve control.
- **Eliminate Electricity Theft and Water Losses:** A digital metering network deters theft and reduces water leakage loss by effectively lowering nonrevenue water loss due to better accuracy, with electronic meters synchronized with pressure and flow measurements. In some emerging economies, such as Brazil, Mexico, India, and Indonesia, nontechnical losses can account for up to 25% of the power distribution loss. Worldwide water loss (typically through leakages in the distribution network) can represent at least 20% or more than 1.3 million cubic meters of clean water. Compounding this loss is the energy used for pumping water that is never consumed!
- **Outage Management:** Unplanned network outages can be reduced and the response to outages can be hastened through monitoring and analytics technologies on meters and within the grid.
- **Integration of Renewable or Distributed Energy Resource Systems and Storage:** Digital networks with bidirectional communications and metering technologies ease integration and use of distributed or decentralized energy sources, such as solar photovoltaic (PV) systems, fuel cells, and wind turbines.
- **Demand Response Programs:** These programs incentivize customers toward more energy-conservative usage patterns, giving utilities another tool for managing the use of the utility's infrastructure. The end result is reduced Capital Expenditure (CAPEX) and Operating Expenditure (OPEX) costs, ultimately reducing customer utility bills.

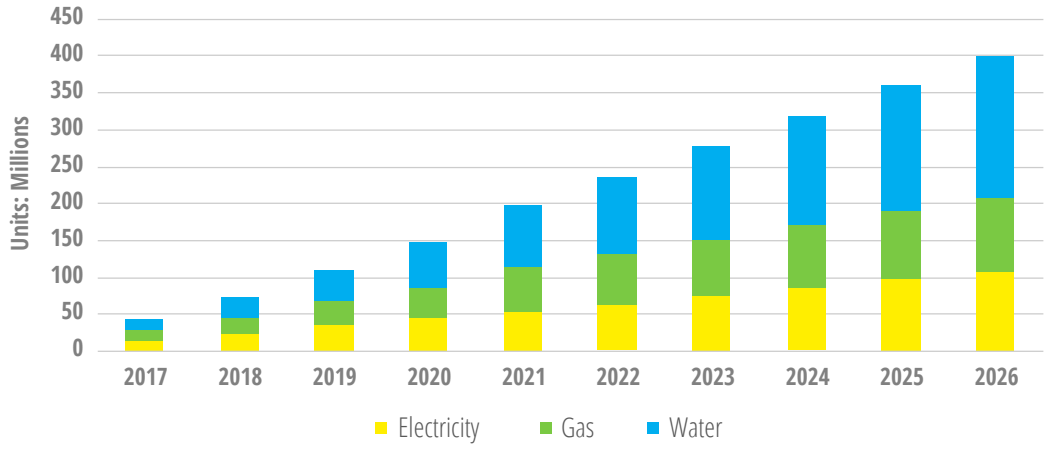
LPWAN TECHNOLOGIES EMPOWERING UTILITY MARKET TRANSFORMATION

Smart electricity networks have been around for nearly a decade but have been created through the use of a variety of wired and wireless technologies. In North America, energy utilities have deployed sub-GHz Radio Frequency (RF) mesh networks, whereas in Europe and Asia-Pacific, Power-Line Communications (PLCs) have had a dominant connectivity share. By the end of 2018, PLC-enabled smart electricity meters will account for nearly 50% of all worldwide smart meter connections, mesh networks will have 27% share, cellular connections and non-cellular LPWA network connections will account for 11% and 12% share respectively.

However, cellular and noncellular LPWA technologies will begin to grow in share because of their benefits toward serving water and gas utility smart meters. According to ABI Research, by 2026 nearly 20% of smart meters deployed by energy and water utilities worldwide will be connected using noncellular LPWA networks.

Non-Cellular LPWA Connections By Smart Meter Type

(Source: ABI Research)



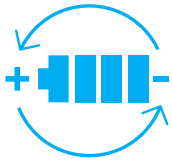
LoRaWAN's Key Value Proposition for Utilities

In a majority of the use cases mentioned above, the communication network requires small payloads of data in the tens of kilobits and low monthly data throughputs. In addition, most applications for metering on the utility network have a greater tolerance for latency. Only specific use cases—like breakers for electricity, prepayment systems, or valve control—can justify a need for low latency. As a leading LPWA technology, the LoRaWAN™ protocol offers some of the best capabilities for addressing current and future smart utility distribution and automation system requirements.

- **Low Network Total Cost of Ownership (TCO):** Traditionally, cash-rich energy utilities have deployed their own private communication networks to monitor the grid; however, they have more recently started to open up to public networks that are managed professionally by network operators. In comparison to other competing network technologies, such as IEEE 802.15.4–based mesh networks, PLCs, and other licensed LPWA network solutions, LoRaWAN has the lowest cost for network infrastructure deployment and maintenance. In addition, the high link budget and long range of LoRaWAN simplifies network deployment and requires less network infrastructure equipment while enabling good redundancy and ease for scaling densification.

- **Flexibility in Network Deployment Models:** Utilities have the choice to either use their own private LoRaWAN networks or leverage existing public LoRaWAN networks that are deployed by a referenced LoRa Alliance network operator. According to the LoRa Alliance, there are over 96 LoRaWAN operators globally.

- **Fast-Growing Open Ecosystem of Original Equipment Manufacturers (OEMs):** The LoRaWAN communication protocol is being adopted by a growing ecosystem of smart meter OEMs, such as Aiut, Arad, Axioma, Baylan, Diehl, Honeywell ELSTER, Itron, Kaifa Metering, Hanbit Solutions, Holley Meters, LIERDA, Maddalena, Mueller, Neptune Technology Group, Sagemcom, Sunray, Zenner, and ZTE. With the growing ecosystem of LoRaWAN communication service providers and OEMs, utilities have the flexibility to integrate devices from multiple vendors and benefit from interoperability at the network level with end devices certified for LoRaWAN protocol.



- **Battery Life Optimization:** LoRaWAN applications for water and gas meters claim to be optimized for a battery life of 15-plus years when communicating once per day. While higher data transmission frequency or bigger payloads may be required and would obviously reduce battery life, LoRaWAN offers one of the best options for mitigating battery life issues through addition of more gateways and picocells. Network densification allows increasing total data transmissions by decreasing the time on air, consequently reducing battery consumption.

- **Security:** Electricity, gas, and water distribution networks are categorized as critical national infrastructure and hence require the highest level of security in adhering to a framework decided by regional regulators. The LoRaWAN specification uses 128-bit Advanced Encryption Standard (AES) algorithms to provide end-to-end encryption for both public and private deployments using two keys: one for the utilities, for protection of payload content; another for operators, for network authentication security.

Summary

The digital transformation of energy and water utilities is providing these utilities with an extensive choice in new technologies. As public authorities are demanding greater efficiency, and as dense urbanization provides the rationale for cities to combine smart metering with other city applications, utilities are choosing LPWA network technologies more and more. LoRaWAN offers a strong value proposition to the utilities with the flexibility to deploy and/or leverage private and public networks in a cost-efficient manner, along with interoperability at the network and device levels. With the backing of the fast-growing LoRa Alliance ecosystem of solution providers, utilities should strongly consider LoRaWAN as the connectivity technology that will help achieve their goals of smarter distribution networks.

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