



WHY UTILITIES ARE CHOOSING SMART LoRaWAN® CONNECTIVITY

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INTRODUCTION

With governments increasingly recognising the need to control energy consumption and reduce wastage and inefficient consumption of vital resources, the requirement to make utilities smart is not only desirable but also the law in many countries. Although the needs of electricity, gas and water utilities are different and highly specific, each utility type requires similar foundational technologies in terms of smart devices, connectivity and data processing capability.

Utilities of all types need to take a lead in deploying smart technologies to minimise wastage in ways that do not damage the customer experience and, instead, enhance customers' experience with their utility providers. It is possible that, ultimately, utility providers will be able to differentiate their offerings based on the performance and services their smart meters can support. This should be considered as an end goal of smart utility deployments.

OVERVIEW: THE SMART UTILITIES REVOLUTION

Utilities have been at the forefront of the smart revolution, with smart meters widely deployed in markets across the globe. However, many of these are still to be connected effectively and provide only limited benefits because of the fact that data is only valuable once it has been made possible for it to be aggregated, analysed and acted upon. Connectivity, therefore, has become the final frontier for enabling truly smart utilities. So-called smart meters can't

achieve their potential intelligence and value without being reliably, robustly and cost-effectively connected.

It's now better understood that connecting all the sensors, meters and controls that enable better management of utilities is complex, with many variables to take into account and, as the landscape becomes more sophisticated, and two-sided business models become more widespread, utilities recognise that easy-to-deploy, simple-to-manage, resilient, robust and cost-effective connectivity are an essential ingredient of their 'smart' plans.

This paper puts forward arguments for why LoRaWAN® can prevail as the optimal connectivity choice for enabling each smart utility sector due to their needs and the attributes of LoRaWAN technology. Traditional options such as hardwired connections, utilisation of existing cellular networks, RF Mesh or even satellite connectivity have certain flaws, whether due to the complexity of deployment or lack of interoperability, lack of sufficient coverage, particularly indoors, or because of the high installation and/or maintenance costs.



WATER

Water is increasingly being recognised as a resource that needs to be protected. The International Energy Agency claims that more than 34% of pumped water is lost as non-revenue water because of tampering, theft, meter errors and faulty distribution networks.

Similarly to the electricity industry, there are several different, clearly defined areas within electricity supply to be addressed. Primary smart water metering relates directly to a water utility's network and provides vital insight into how its distribution network is operating and enables individual customers to be billed. Smart sub-metering is focused on the reseller and building administration market, which is interested in dividing the individual end users' consumption of a building, as well as the monitoring of water and/or energy consumption per usage.

In addition to these two key differences, water utilities are looking for functionality beyond simple monitoring of information. Some want to achieve remote control of the water pipeline network not only to gain insight into pressure and flow but also to find leakages and control them. There are many examples of this being done successfully where water meters are used to uncover leakages.

There are strong opportunities for water utilities to make rapid advances, catch up and accelerate beyond the achievements made by electricity utilities in the journey to becoming smart. The situation is analogous to the telephony market in Africa. The African continent was well behind the rest of the world in terms of fixed line telephony density, but it took the opportunity to adopt the latest generation of wireless technology, thereby getting cheaper and ubiquitous connectivity very rapidly.

Water utilities can follow the same model by adopting LoRaWAN and jump ahead of the electricity industry which faces greater complexity, as detailed below.



ELECTRICITY

The International Energy Agency has reported that energy demand worldwide grew by 2.3% in 2018, its fastest pace in the past decade¹. Global electricity demand grew by 4% in 2018 to more than 23,000 TWh. The gap between the promise of energy for all and the lack of electricity access for 850 million people around the world is also placing pressure on electricity utilities which will exacerbate with the uptake of electric vehicles (EVs).² EV sales are set to reach 44 million vehicles per year by 2030³ and the demand of users recharging these will place significant additional management burdens on power grids to ensure brown-outs do not occur.

Of course, at the same time, electricity providers are moving away from burning fossil fuels to generate electricity and shifting to renewables such as wind and solar power. These present further challenges since generation capability is dependent on weather patterns and is therefore less predictable. In addition, consumers are increasingly becoming generators as well as users of electricity and therefore greater integration, data and insights are required into micro-generation and individual consumption habits.

Although electricity utilities have been earlier adopters of smart metering, the generation, transportation and distribution of electricity have quite different requirements and are often addressed and owned by different companies. So, even if these are well interconnected, there are separate motivations and drivers within the electricity sector that smart electricity initiatives need to take into account.

An electricity production company needs accurate data every 15 or 30 minutes from end-user customers in order to determine the required amount of electricity to generate to fulfil market demands and to balance the electricity grid. The goal of this demand-side management is to encourage the consumer to use less energy during peak hours, or to move the time of energy use to off-peak times such as nighttime and weekends. Electricity companies look for intentional modifications to consumption patterns of electricity of end user customers that are intended to alter the timing, level of instantaneous demand, or the total electricity consumption. However, these data come from prosumers that are often managed by different distribution companies so the entire electricity industry is challenged to interconnect and integrate data from all end users involved in order to get an accurate picture of consumption and demand.



GAS

Gas consumption is also becoming more tightly controlled as companies look to more environmentally friendly alternatives. This is reflected in the continued focus on renewable energy since the United Nations⁴ announced that major changes would be needed across the world to limit the effects of climate change. Consistent with this, it has recommended a 45% cut in carbon emissions by 2030.

The gas industry, in contrast to electricity, remains relatively straightforward. No consumers generate gas, for example, and gas itself can be more easily stored to be available when demand occurs. However, gas has some similarities

to the primary water metering industry. Providers need to calculate consumption and ensure their distribution network has no leaks and meters are ideal sources of data to support this. The relative simplicity of gas supply means gas utilities are less interested in tele-reading of gas meters and there are tight regulations relating to all equipment that gas providers must comply with. This presents some limitations to the adoption of new technologies that are yet to be addressed so it is likely that gas utilities will follow along later when it comes to becoming fully smart.

HOW UTILITIES WILL BECOME TRULY SMART

Utilities in general are traditional industries that have a heritage of building infrastructure and monetising by charging based on consumption. The business model is capital intensive but relatively simple and has relied on predictable consumption patterns. However, for the reasons outlined in the introduction, new models are coming into play for each utility type and these are increasingly heavily regulated industries as governments enforce environmental policies.

To help the EU countries better reach its 20% energy efficiency target by 2020, the European Commission has established a set of binding measures under the Energy Efficiency Directive (EED) with the obligation to provide easy and free access to real-time data and historical energy consumption. This coincides with the plan to connect 200 million smart meters for electricity and 45 million for gas. This will have a direct impact on smart metering and will improve efficiency, with obligation schemes set for energy companies to achieve energy savings of 1.5% of annual sales to final consumers.⁵

Put simply, utilities need to know more about the consumption habits of their users and develop better abilities to predict consumption patterns so they can smooth out inconsistencies between generation capability and user demand. For example, it's obvious that solar power reaches peak generation in the middle of day but EV owners recharge their vehicles at night. Something therefore needs to be done to shift peak solar power generation to support overnight vehicle charging.

To gain these insights, utilities need to collect data from their customers. However, aside from those that have environmental consciences or already generate power at their homes, there is little incentive for customers to connect to their utility providers. The ability to consume electricity at a cheaper rate at off-peak times is nothing new, but needs to be made more prevalent and marketed to customers more effectively.

In essence, though, utilities need to be able to collect data at the point of use and communicate that to computing functions for analysis to distil it down into actionable information that can result in more efficient consumption, reduced bills for consumers and optimised availability of resources to match demand profiles.

Connectivity, however, remains the key to making use of consumption data in real-time. Historical data is too passive and reactive to enable utilities to respond to peaks and troughs in user demand, although it is currently utilised to provide a foundation for establishing trends and patterns that allow broad-brush planning to occur.

Smart Utilities - Key Trends

Common and global goals for all utilities	Identified gap or key driver	Key trend	Approach to close the gap	How LoRaWAN can help
Improve global efficiency, become more environmentally friendly and safer	Water: Protect water 34% of produced water is lost (NRW)	Smart water network	Migrate from manual meter reading to AMI to enable smart metering analytics Add IoT sensors for water flow monitoring and water leak detection	Coverage: 148 networks in 162 countries Matured ecosystem: large availability of smart meters and IoT sensors with LoRaWAN certification
	Gas: Safer gas distribution Energy Efficiency Directive	Smart gas network	Adopt AMI for smart gas metering Add IoT sensors for remote monitoring of gas pressure and gas leak detection	Interoperability with standards: LoRaWAN is an open protocol that supports M-Bus and DLMS among major metering standards
	Electricity: Growth of energy demand Addition of EV and Renewable Energy Energy Efficiency Directive	Smart grid Demand Side Management	Open smart meters to support new Energy Management Systems with IoT sensors for energy monitoring and demand side management	Flexible network models: LoRaWAN networks can be public, private or hybrid and have roaming Expand business with IoT applications for Smart Cities and communities

LoRaWAN PROVIDES THE PERFECT FIT FOR UTILITIES

There are many ways in which smart utilities can enable devices such as meters to be connected and these range from satellite and cellular connectivity to newer low power radio offerings, such as LoRaWAN. Low power wide area networks (LPWAN) in general are prevailing over mobile reading solutions and being selected by utilities because LoRaWAN specifically combines extremely long range (measured in miles) with deep underground and indoor penetration, plus battery lifetimes of up to two decades.

For water utility metering applications, which have relatively low data payloads and seldom require low latency or high quality of service, it's clear that LoRaWAN offers the range, battery life, coverage capability, deployment ease and cost efficiency the water industry requires.

There are currently 148 LoRaWAN networks in 162 countries with a large ecosystem of developers, suppliers and providers. This has the potential to provide utilities and their customers with a greater choice of applications and a greater number of device makers are likely to incorporate more widely deployed technologies into their device designs. LoRaWAN Certification ensures compliance with the LoRaWAN specification for correct network behavior and gives access to a broad eco-system of more reliable device makers and sensors.

There are substantial opportunities thanks to the capacity and coverage of LoRaWAN for utilities of all types to work jointly with smart city initiatives on private LoRa® networks deployed locally. For example, city street lighting, garbage collection and parking services could all utilise a LoRaWAN network that can be shared with utilities, thereby creating cost and operational efficiency for the utility and the smart city.

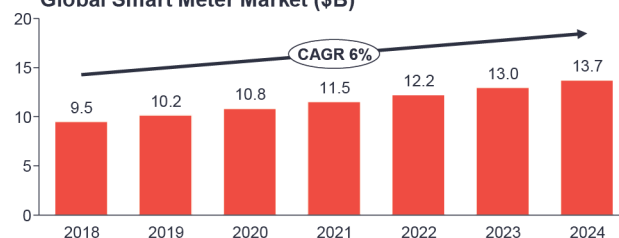
Utility devices are deployed in the field for long periods of time – electricity or water meters have a typical lifespan of 20 years or more – so security must be future-proof. LoRaWAN security therefore has been designed to incorporate the use of standard, proven and trusted algorithms, and end-to-end security involving principles such as mutual authentication, integrity protection and confidentiality.



MARKET PENETRATION

A report by IoT Analytics says the global smart metering market is expected to grow at a 6% CAGR from \$9.5B in 2018 to \$13.7B in 2024. The utilities sector is estimated to remain the largest vertical for LPWAN during the whole forecast period, representing 38% of the installed base in 2019 to 30% in 2025. The growth in the sector is mostly driven by the fast adoption of LPWAN in smart metering projects, particularly gas and water.

Global Smart Meter Market (\$B)



Source: IoT Analytics

Electricity metering has the largest share of the global smart meter market. In 2024, electricity metering will represent 64% of the global market value. Water metering will be the fastest growing in the forecast period, at a CAGR of 8%.

APAC is the leading region, followed by Europe and North America. With 59% of the global market shipments in 2018 (\$3.9B in value) APAC holds the largest share of the smart meter market and is expected to maintain the lead through 2024 when its market value is expected to reach \$5.8B (60% of total shipments), at a 7% CAGR. Europe and North America follow, with \$2.8B and \$2.4B respectively in 2018, and are expected to grow to \$4.2 B and \$3.1B in 2024. Global smart meter penetration reached 14% in 2019.

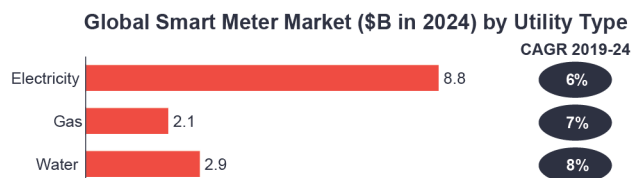
The residential metering market dominates over commercial and industrial metering. Residential metering is estimated to account for about 80% of the total market value during the forecast period. Commercial and industrial metering are



SECURITY

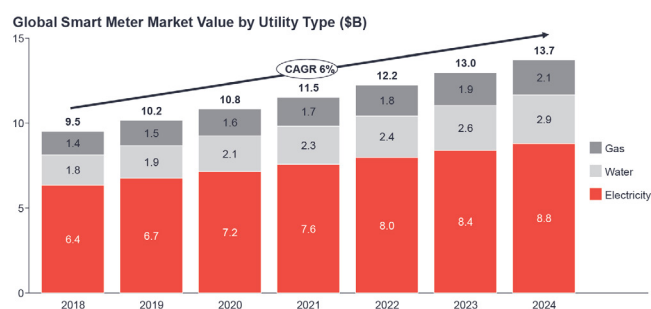
Utilities provide services that are vital for sustaining life, so security for connectivity should also be a priority. Meters need to be secure both to protect user information and the utility from fraudulent activity but also, and perhaps more importantly, so they do not provide a point of security weakness at which cybercriminals can enter the utility's own network. LoRaWAN security has been developed to fit the technology's design criteria of low power consumption, low implementation complexity and high scalability along with separate secured keys for the network operator on one hand and the end user application on the other.

expected to contribute to 15.5% and 4.5% respectively of the market value in the same period.



Source: IoT Analytics

In terms of volume, considering all wireless and wired technologies, licensed and unlicensed, IoT Analytics reports that the smart electricity market has the lion's share with a volume of 151 million new units to be shipped in 2024. Water meter shipments were over 16 million in 2018 and are expected to grow at a CAGR of 10 to reach just under 29 million in 2024. Similarly, Gas meter shipments were over 14 million in 2018 and are expected to grow 8 per year to reach 23 million by 2024.



Source: IoT Analytics

LPWAN HAS A GENUINE ADVANTAGE IN MINIMIZING THE BOOMING COST OF METERING DATA

This illustrates that global smart metering creates an immense volume of data. It is clear that management of these data will be complex and involve enormous data management and analytics capabilities.

None of this will be free. Cloud computing resources and the network capacity to link meters to management systems will come at a significant cost, so utilities need to carefully balance the value generated with the expenses incurred. For many, more intelligent meters – genuinely smart meters – will be needed that can understand useful data and send only that for processing. This adds cost to the device, but removes it from the computing cost and also limits the volume of data that needs to be communicated and therefore can also reduce network costs.

New trends in water and gas are demanding more frequent data, such as an hourly or every-10-minute consumption index, with devices maintaining long battery lives. With the use of beaconing for synchronization or timestamping on gateways for every message received by a network, the new system can better recognize some consumption patterns and help detect possible leaks or abnormal situations in water and gas networks, creating a better operational efficiency for utilities.

Demand for firmware updates over the air (FOTA)⁶ is also now supported with recommendations available.

LoRaWAN can handle all these new requirements and do so cost effectively for the long term.

EXPANDING LoRaWAN THROUGH STANDARDIZATION

In its quest to promote and drive the success of the LoRaWAN protocol as the leading open global standard for secure, carrier-grade IoT LPWAN connectivity for utilities, the LoRa Alliance has forged strategic partnerships with organizations that share a mutual benefit in standardizing this technology.

Driving a Common Standard with DLMS User Association

DLMS (Device Language Message Specification) is a ISO/IEC-recognized standard for smart electricity metering. DLMS is specified by the DLMS User Association which is an international and non-profit organization driving utilities and meter manufacturers to develop and support a common standard for data exchanges with a long history for smart metering.

In 2019, the LoRa Alliance and the DLMS User Association announced an active liaison to combine the benefits of IoT applications with a vast ecosystem of wireless sensors and the interoperability provided by an international standard recognized by utilities (read the joint whitepaper⁷)

In June 2020, they presented together in a webinar how to use DLMS over LoRaWAN⁸ with a case study of smart electricity metering. In October 2020, the DLMS User Association officially released the new DLMS profile over LoRaWAN, making DLMS the first Internet-based application protocol standard to be supported over LoRaWAN.

This is made possible with mandatory use of the adaptation layer standardized by the IETF (RC8724).

There is a fast ecosystem adopting DLMS over LoRaWAN among many entities in the value chain, such as energy and gas utilities, network operators, smart meter manufacturers, software providers for the adaptation layer and system integrators.

In addition, LoRaWAN developers can now create new LoRaWAN smart devices that can support DLMS for new applications, such as:

- Smart metering for electricity, gas or water
- Data exchange with private electricity vehicle charging stations
- Energy health and usage monitoring services to support demand side management and energy monitoring

Open Standard Solutions with Smart Water Networks Forum (SWAN)

The benefits that IoT and LoRaWAN connectivity can bring to the water metering market are significant. LoRaWAN's ability to communicate over long distances and through barriers (concrete, underground) at low cost per connection make it ideal for metering applications.

Key applications for utilities include access to real-time data, which enables leak identification, conservation of natural resources and saves end-users money; and that utilities can monitor water quality to ensure consumer safety, provide proper water distribution, plan for water availability through peak periods, and conduct correct billing Management.

Since July 2020, the Smart Water Networks Forum (SWAN) and the LoRa Alliance® are partnering to advance "smart," data-driven solutions in water networks, and drive adoption of the LoRaWAN open standard in the water metering sector. As smart water metering is the leading use case for LoRa, this liaison aims to enable a larger adoption of open standards for intelligent water management applications such as smart water metering, intelligent asset management, waste water network monitoring, water quality monitoring and flood and stormwater management.

USE CASES

EUROPE



Zenner & Stromnetz Hamburg, Germany

Based on previous success, German water and heat meter provider Zenner continues to partner with utility Stromnetz Hamburg to roll out LoRaWAN-powered, sub-water metering and smoke detection projects for several commercial and residential properties. In addition, 34 mountain village schools were equipped with multi-metering technology in partnership with HAMBURG WASSER and gas net Hamburg GmbH. A LoRaWAN network was implemented for this purpose in nearly the entire southwest of Hamburg. Together with other companies in the Free and Hanseatic City of Hamburg implementing a wide variety of similar projects, an area-wide LoRaWAN network for the whole of Hamburg is expected to be realized by the end of 2020.



Unidata, Italy

Unidata, a leading telecom currently focused on the study and development of LoRa wireless transmission technology and the related LoRaWAN network standard, has rolled out a LoRaWAN network with water utility provider Gestione Acqua. The deployment of nearly 3,000 Itron smart water meters, with a battery life of 10 years, has provided hourly consumption data sent twice a day to Unidata's connectivity platform, UniOrchestra (PaaS), which is also able to indicate water leaks. The successful, cost-effective deployment has greatly increased efficiency and ROI for the utility company.



FACSA, Spain

FACSA, which manages water control and tracking in more than 70 cities to serve more than four million citizens in the region of Castellon de la Plana in Spain, has connected different water meters to the IoTsens cloud platform via LoRaWAN and through a LoRaWAN server operated by IoTsens. The implementation began with a proof of concept

involving 600 smart water meters and led to the second step of the current full deployment of which consists of 20,000 water meters connected to the IP67 outdoor LoRa Gateway from MultiTech. The IoTsens solution consists of an integral method of tele-reading meters that collects the data remotely and automatically in near-real time. In addition, the system is able to work with seven different brands of meter using a single communication platform in order to achieve a fast and efficient management of its supply network.



Veolia, France

Nova Veolia and its subsidiary Birdz, a pioneer in the remote metering of energy consumption for Smart Cities, are working with Orange Business Services to help digitize Veolia's water-related services in France. Their goal is to read more than 70% of their meters remotely by 2027 in a deal which will see more than three million water meters connected to public LoRaWAN networks covering more than 30,000 municipalities and 95% of the population of metropolitan France.

ASIA



SenRa, India

SenRa, an LPWAN provider for IoT/M2M applications providing customers with high quality, commercial grade managed network services, has recently installed a smart water meter through a select central Indian city. At 41 sites, existing water meters were replaced or new meters were installed with LoRaWAN-enabled Smart AMI Ultrasonic Water Meters, providing end-to-end automated mechanisms including wireless communication, secure data transfer, and real-time analytics. This increased the efficiency of water distribution throughout the city at various locations, water availability planning during high consumption periods, billing management, and in resolving installation issues quickly.

Korea, Electric Co (KEPCO), South Korea

Electricity utility KEPCO has deployed an "Electric Power Monitoring System", comprising 300 gateways and 8K sensors in the cities of Daegu and Daejeon. The company selected LoRaWAN for its long range capabilities, simplicity of deployment and ability to meet government-approved network security standards. Areas of monitoring include: electric pole (Insulator, Gradient, Transformer, Switchgear); ground switch monitoring; ground transformer; cable loss; ground switch current; and environment monitoring. KEPCO plans a nationwide deployment based on the ROI obtained from its city deployments.



K-Water with SK Telecom, South Korea

SK Telecom, South Korea's largest MNO providing LoRaWAN connectivity, has partnered with K-Water, a government-affiliated company responsible for nationwide water supply. SK Telecom will deploy 200K smart water meters for AMI and additional LoRaWAN gateways by 2021.

City governments, South Korea

Over 17 city governments in South Korea are deploying private LoRaWAN networks to enable applications such as water AMI services, social welfare, street lighting, fine dust monitoring, smart parkings and children tracking. About 50 gateways have been installed and expansion to reach 50 cities by 2022 is expected. Water AMI is a major use case with a total potential volume of 6M smart water meters.

Korea City Gas Association, South Korea

Korea City Gas Association installed 30K meter readers for gas AMI in six main cities in a first pilot to be completed by Q2 2021. Based on results, a total of 300K units will be deployed by 2022. The total available market volume is 17Mpcs with 36 gas companies.

Osaki Electric, Japan

Osaki Electric, a veteran Smart Meter supplier in Japan, recognized the cost benefit to utilize LoRaWAN for sub-meters in shopping malls and buildings where overall electric usage needs to be shared between multiple clients. Osaki Electric develops its own LoRaWAN-based sub-metering system that will be more cost effective thanks to savings in both hardware and installation costs.

Hangzhou Water Meter Co. Ltd (HWM), China

HWM, a water meter manufacturer in China focusing on smart water utility equipment design, research, and manufacture, has incorporated LoRa devices and the LoRaWAN protocol into its smart water metering solutions enabling public utility companies to improve efficiency and reduce management costs. By the end of 2019, HWM's LoRa-based water metering solution had been deployed in 72 residential districts in Hangzhou. It is expected to deploy 80 gateway devices and tens of thousands of intelligent water meter terminals. Currently, hundreds of thousands of LoRa-based water metering solutions by HWM have been deployed in Zhejiang, Anhui, Hunan, Sichuan, and other regions of China to help water supply customers transform to intelligent public utilities management.

Suntront, China

Suntront Technology, a leading smart meter solution company for heat, gas, water, and energy, has incorporated LoRaWAN devices and wireless radio frequency technology into its smart gas and water meters for more advanced coverage and analytics. Suntront's smart gas and water metering solutions utilize LoRa Technology to remotely measure and adjust the levels of flow through piping by accessing a LoRaWAN network and transmitting data via third-party applications. A simple user management software service connects to Suntront solutions and provides the utility manager all necessary functions, including the ability to view usage trends and to monitor each meter remotely. Utility managers then use the data to program the LoRa-enabled devices to automatically shut off or change valves when certain thresholds are met. The solution also automates the management process to limit human error.

**Lowan, China**

Lowan Information, a leading LPWAN solution provider and LoRaWAN-powered IoT network operator helped the city of Hangzhou digitally transform their grid and energy management systems. Lowan provides cities with flexible and reliable smart-grid solutions to maximize energy efficiency. The company deploys LoRa technology with its long range, low power platform to improve power management across the country. As a result, utility companies save money and time, avoid utility energy losses and serious safety risks. LoRa-based IoT solutions help

identify when current is drawn, monitor electricity usage remotely, instead of manual personal visits and readings, and decrease human reading errors, reducing billing costs overall which free utilities to focus on creating business value by improving services and improving the quality of life for citizens.

Transpower and KotahiNet, New Zealand

When Transpower, the owner and operator of the National Grid, the high voltage transmission network in New Zealand wanted an automated way to continuously measure cable distance in real-time, KotahiNet iteratively designed, produced, and tested a LoRaWAN device capable of operating in the harsh electromagnetic environment using a distance ranging laser, transmitting data over KotahiNet's public LoRaWAN network, and visually displaying the results online. Two final prototype devices are now in operation, providing cable distance and temperature data in real-time. These data can be compared to predictive models; provide a better understanding of risk exposure as well as mitigation strategies; and reduce operational costs. The next steps are being considered for further devices and measurement.

**NNNCo, Australia**

In Australia, NNNCo, a public LoRaWAN operator, has started deployment of a network for connecting 170,000 water meters in the Gold Coast region, illustrating how cities are seeing the benefits of a technology that is ready to use for IoT.

NORTH AMERICA**Vision Metering, USA**

Vision Metering, a leading developer of Internet of Things (IoT) utility metering solutions, has incorporated LoRa devices and the LoRaWAN protocol into its line of advanced metering infrastructure (AMI)-based smart electric meters and meter interface units for water and gas meters. Vision's LoRa-based applications enable the upgrade of legacy metering solutions, requiring traditional walk-by or drive-by reading methods, to fixed, long range AMI, for hourly or daily data transfer over LoRaWAN networks for efficient utility management and billing.



Neptune, North America

Neptune, a technology company that provides measurement tools, networks, software, and services to water utilities across North America, partnered with Senet, a leading global provider of cloud-based software and services platforms, to provide utility companies with a wireless Network-as-a-Service (NaaS) infrastructure. Combining Neptune's technology and metering units with Senet's highly scalable and reliable LoRaWAN removes the burden of having to install and maintain network infrastructure, so that utilities can get back to the business of water. The IoT network serves as the foundation for smart cities, allowing municipalities to achieve higher levels of integration among technology-driven city services and solutions across multiple operations and service sectors.

CONCLUSION

The utility sector is facing pressure from authorities to reduce greenhouse gas emissions, protect natural resources and optimize global energy consumption. Meanwhile, there is a continuous increase in demand and more and more densifying distribution networks in urban areas as the world population keeps increasing and megacities become the norm. With localized and limited resources, utility organisations need to invest more for enabling a better efficiency in distribution operations. Also, with even broader use of internet-based applications, utilities must adapt and engage in a digital transition to provide clear and regular consumption information. Policies also exist which can penalize utilities that do not have a plan for increased efficiency, such as water utilities for reducing non-revenue water, or gas utilities for decarbonating and

securing potential gas leaks with detectors. Improving global efficiency, becoming more environmentally friendly and safer are key goals for utilities.

To scale with long-term interoperability and benefit from the great disruption of the Internet of Things, utilities are demanding open-standard connectivity technologies allowing the choice between several network models (public/private/hybrid). Utilities also need cost-effective, robust, reliable, perennial, secure, easy-to-install wireless technology to support their businesses' digital transformation, along with those of their partners and customers in the long term.

LPWANs in general, but LoRaWAN in particular, meet and exceed the needs of utilities as they transform for the new digital age of environmentally responsible utility supply. In fact, LoRaWAN is the leading connectivity technology within the LPWAN market and already widely adopted in a large ecosystem supported by the LoRa Alliance, along with a vibrant developer ecosystem, securing its position for serving utilities in the long term. In addition, LoRaWAN has the flexibility and simplicity to adapt easily and thereby ensure utilities have the connectivity they need for their businesses — whatever the future holds.

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