



## CASE STUDY

# Changing the Landscape of Utility Sub-metering with LoRaWAN<sup>®</sup>

A new approach is sometimes the best accelerant for business growth. H2O Degree, a leading provider of innovative utility management solutions for multi-dwelling properties, understands this philosophy. In fact, they've staked their growth on it.

MACHINE Q<sup>™</sup>

H2O Degree's industry value proposition, much like their solutions, could be described as elegant. On the surface, the company provides economical utility sub-metering infrastructure for multifamily properties. But, according to Don Millstein, President of H2O Degree, they're really providing property owners with a platform for business growth and profit optimization.

"Properties that have not been updated with sub-meters – that is, those with only master utility meters for water, electricity, and gas – are not capitalizing on what has become a simple opportunity for sustainable profitability," explains Millstein. "When tenants do not have ownership of, or even visibility into, their utility consumption, it's the property owners that lose." He adds, "Not to mention, the planet."

## Down the Drain

Millstein's observations are apt. Wasteful energy consumption has a significant impact on a property owner's bottom line as well as on our natural resources. The United States Environmental Protection Agency has reported that American households unknowingly waste 1 trillion gallons of water every year because of minor household leaks. That's 10,000 gallons of water wasted annually by the average American dwelling, simply due to leaky toilets, faucets, and other fixtures. And somebody's got to pay for it.



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— Don Millstein  
President of H2O Degree



### THE CHALLENGE

H2O Degree sought to diversify their offering of wireless sub-metering solutions by adopting LoRa® IoT technology.



### THE SOLUTION

H2O Degree partnered with MachineQ, a Comcast company, to develop a scalable, enterprise-ready IoT platform for property owners and managers.



### THE OUTCOME

H2O Degree launched a line of LoRa®-based sub-metering solutions within nine months, contributing to the company's explosive 263% growth since 2018.

American households unknowingly waste

**1 trillion**

GALLONS OF WATER EVERY YEAR BECAUSE OF MINOR HOUSEHOLD LEAKS.

**10,000**

GALLONS OF WATER ANNUALLY PER HOUSEHOLD, ON AVERAGE, SIMPLY DUE TO LEAKY TOILETS, FAUCETS, AND OTHER FIXTURES.

Multifamily property owners who haven't yet adopted sub-metering technology are left to assume the financial burden of all this wasted water, to say nothing of squandered electricity. They have two options. The first is to allow errant running water to erode their already slim margins. The second is to increase monthly rent to cover the costs. "Neither of those options is appealing to property owners over the long term," says Millstein. "While you can't afford to lose money to leaks or to high-consumption units, renters will only tolerate so much increase in their fixed monthly expenses. Incrementally raising utility fees will drive renters away."



Conservation is important. You can't make a lot of headway if you simply tell people to conserve. You have to give them the tools to conserve."

Conversely, properties that offer individualized metering are becoming increasingly attractive in the marketplace. Property owners are touting this option as a primary selling point to attract new tenants and to retain existing ones. "The average renter doesn't want to have to pay for another tenant's long morning showers or repetitive laundry cycles," says Millstein. "Especially if she tends to consume less." Property owners

see a clear marketing advantage in this. "If you're a property owner it's either, 'Come to my building; it's \$2,000 a month plus utilities,' or, 'Come to my building; it's \$2,500 including utilities.' People think, I can do better than \$500 on utilities. I'll take a shorter shower and save the money."

But when it comes to renters changing their daily habits, property owners have found that's easier said than done. Despite renters' increasing proactive interest in green housing options, there is no guarantee that they will use less water, electricity, or gas. And sometimes, they end up spending more on their own energy use than they would have spent had utilities been included in their rent.

"Conservation is important," says Millstein. "But you can't make a lot of headway if you simply tell people to conserve. You have to give them the tools to conserve."

## The Tools to Conserve

Companies like H2O Degree are helping property owners incorporate sub-metering technology, either in new construction or retrofitted properties, by building the tools that enable conservation and making them easy to adopt.

When the company was founded, in 2007, they brought to market a wireless sub-metering product suite built on Zigbee wireless technology. At the time, this was a safe investment as Zigbee was one of the prevailing automation and low-power networking technologies.

“Though Zigbee was still a younger technology back in 2007, it was appealing to us for a number of reasons,” explains H2O Degree co-founder and CTO, Rick Whiffen. “The mesh topology was favorable for equipping multi-family residences with sub-meters. We could accommodate large properties with a 2.4 GHz radio because no individual device had to transmit all the way back to a hub; the meters and repeaters just had to be within 150 feet of each other. Security has been a top priority from day one, and we could build a secure network on Zigbee.”

Today, the company still produces Zigbee-based sub-metering installations and has enjoyed a lot of success since their humble beginnings. To date, H2O Degree has sold more than 100,000 wireless meters and control devices to a wide range of facilities, from apartments to student and military housing to hotels and light commercial properties.

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eliminating them altogether is a  
game-changer.

Some of the company’s more recent projects – a strategic mix of high- and mid-rise properties – now boast water savings in the millions of gallons and reductions in electric usage by as much as 25%.

“Every property sees a different return on investment, and a different time to ROI,” says Millstein. “Many property managers are enjoying a return on investment within one to two years.”

## A New Approach

Despite H2O Degree’s success with Zigbee, a lot can change in a decade and a half, and it pays to be cognizant of advancing technologies.

“Zigbee has been a successful technology for us,” says Whiffen. “But when we were introduced to LoRa, we saw an opportunity to offer something new to the sub-metering market.”

LoRa®, an abbreviation of “long-range”, refers to a radio frequency (RF) modulation technique that has gained significant traction worldwide, especially for Internet of

Things (IoT) applications such as utility sub-metering. LoRa® bears some important distinctions from Zigbee, making the technologies in some ways competitive, in others complementary.

First, there’s the RF band. Whereas Zigbee operates in the 2.4 GHz band within the RF spectrum, LoRa® runs in the sub-gigahertz space. There a few advantages to operating a sub-GHz network. It can be less crowded than 2.4 GHz, which carries a number of consumer protocols such as Zigbee, Bluetooth®, and Wi-Fi®. Also, the lower operating frequency results in longer signal transmission range.

“This,” Whiffen says, “is where we really saw direct benefit to our customers and to our customers’ customers.”

As the range of wireless transmission increases, the number of repeaters needed to maintain communication with a central point, or gateway, decreases. Every repeater is a physical device that has an associated purchase price in addition to the cost of physical installation, labor, and maintenance. Reducing those costs is a win; eliminating them altogether is a game-changer for property managers and owners.



We knew we needed more than meters and a few LoRa gateways; we needed an end-to-end infrastructure for secure, wireless data transmission. And we needed it to work – no hassles, no surprises out in the field.”

A forty-story building, for instance, might have 200 apartments. To provide 2.4 GHz coverage to the entire facility could require thirty or forty signal repeaters. “Each repeater is a pain point for somebody,” Millstein explains. “It’s the cost of buying one, it’s the cost of installing an outlet, or it’s the time-cost of maintaining a piece of equipment. If we can eliminate those repeaters, we can save customers the costs of hardware, installation, and engineering time to figure out where the repeaters should be located.”

That longer-range, unlicensed data transmission could bear such immediate and significant cost reductions and operational efficiencies was not lost on Millstein and Whiffen. In 2017, H2O Degree decided to invest in LoRa® – or, more specifically, LoRaWAN®, the standardized wide-area network protocol built on LoRa® RF modulation. Shortly thereafter, the company introduced a range of LoRaWAN®-based metrology solutions.

“Adopting LoRa wasn’t so much a departure from Zigbee as it was an expansion of our company’s capabilities,” says Millstein. “The savings to our customers is the huge benefit, hands down. But another advantage is that LoRaWAN is an open protocol, so we can connect with lots of different devices and extend the footprint of our networks.”

## “Where’s the surprise at?”

The benefits of LoRaWAN® technology in utility sub-metering solutions are easy to recognize. Effectively adopting the technology and making it profitable can be a hazier proposition.

# Tenants at Luma Apartments in San Diego are consuming only



**48**

GALLONS OF WATER A DAY



**32%**

BETTER THAN THE PROPERTY'S  
TARGET CONSUMPTION  
OF 70 GALLONS PER DAY,  
PER APARTMENT.

Companies face a number of questions in situations like this. Can we make the new technology platform as cost-effective as it needs to be to remain viable? Do we need to onboard new manufacturing processes or equipment? Will we have access to a consistent, stable supply of hardware components and gateways? Is there an established code base or are we starting from scratch?

“That’s the whole thing about a new technology,” laughs Millstein. “It’s, Where’s the surprise at?”

While getting acquainted with LoRaWAN®, Whiffen and his engineers encountered their share of design challenges, just as they had ten years earlier with Zigbee. “In 2007 we were getting to know Zigbee and had a learning curve to traverse. Fast-forward ten years, we’re getting to know LoRaWAN, and now we’re on a new learning curve,” he says. “It’s just part of staying current.”

H2O Degree was able to address some of those challenges internally. Migrating to an all-new antenna design, for instance, or learning how to optimize battery life in sub-GHz applications.

Other challenges, such as designing for LoRaWAN® security compatibility, were a bit heftier. For H2O Degree – and any company migrating to a new technology platform – that’s where having a viable technology partner makes all the difference.

## The Right Partner

Though Millstein and Whiffen were still getting accustomed to specific technical nuances associated with LoRaWAN®, they recognized that their success in adopting the technology would depend not so much on individual nuts and bolts, but on the availability of a viable, holistic IoT platform. “We couldn’t bring a partial solution to our customers and expect them to get excited,” says Millstein. “We knew we needed more than meters and a few LoRa gateways; we needed an end-to-end infrastructure for secure, wireless data transmission. And we needed it to work – no hassles, no surprises out in the field.”

“That’s where we’ve come to rely on MachineQ,” says Whiffen.

MachineQ, a Comcast company, has built the defining low-power IoT platform for enterprises. The company’s core tenets collectively amount to making it easy for enterprises of all sizes

to deploy, manage, and scale their own IoT networks. After all, companies cannot make data-driven operational improvements if they don't have access to good, reliable data.

“What MachineQ provided, and what we couldn't find with other potential partners, was a full-stack IoT network solution, with everything from the sensors to the gateways to the network server and application interfaces. Having all of that come from one vendor, and having it all work seamlessly, that was the win we were looking for. And we found it.”

Leveraging MachineQ's IoT infrastructure, H2O Degree was able to develop, pilot, and launch a fully integrated, long-range wireless sub-metering solution in just nine months. Which is not to say that there were no surprises, it's just that the surprises were easily addressed between the companies' engineers.

According to Whiffen, one significant challenge to overcome was designing for MachineQ's stringent network security.

“LoRaWAN's native security features are fairly robust,” he explains. “So, if a vendor comes along with a vanilla LoRaWAN system, it will offer decent security right out of the box.”

At the enterprise level, however, decent is not always enough.

“Something that impressed us about MachineQ,” Millstein recalls, “was the extended layer of security they've built into their LoRa platform. They basically went above and beyond the standard AES encryption to ensure that our customers'

data would remain totally protected at every point in the transmission chain. That is extremely important to us and it's important to our customers.”

Prior to adopting MachineQ's infrastructure, H2O Degree had built a functioning prototype based on standard security features. Migrating to MachineQ's more secure LoRaWAN® platform presented an opportunity to strengthen their own product security.

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“The engineers at MachineQ worked closely with our design team to develop a custom, proprietary software solution, saving us weeks if not months of additional R & D. That's the advantage of choosing the right company to partner with. Their expertise complements ours, and ultimately we ended up with a better, more secure LoRaWAN product.”

## Growth of H2O Degree



**263%**

GROWTH SINCE 2018.



**75%**

GROWTH IN 2019 ON TOP OF 50% GROWTH THE YEAR BEFORE.

“Ideally, a partnership works both ways,” says Steve Salata, General Manager at MachineQ. “We bring IoT networking expertise and simplification to the table, and H2O Degree’s leadership in utility sub-metering provides us with tremendous insight into the realities of the end application. We help them stand up a reliable, low-power IoT network, and they help us improve upon that solution as experts in the business case.”

John Brzozowski, Head of Engineering at MachineQ, has been an enthusiastic champion of H2O Degree’s expansion to LoRa® technology from the beginning. “Early in our initial conversations, it was clear that Don and Rick had a huge opportunity to bring something exciting and quite new to the sub-metering market. Sub-metering has profound benefits, both with respect to conservation of energy and natural resources – which is always front-of-mind at MachineQ – and as a sustainable growth opportunity for technology providers. Offering a streamlined sub-metering solution with no repeaters and minimal hardware investment will help H2O Degree differentiate themselves from the competition. That’s what we love to see.”

## So, About That New Approach...

By all counts, H2O Degree’s decision to invest in LoRa® through partnership with MachineQ has proven prudent if not a little foreknowing.

“We see a lot of benefits with MachineQ’s LoRa IoT platform,” says Millstein.

Most of those benefits are related to the new markets it presents to H2O Degree and the new sales motions it enables, in addition to improving the company’s P&L overall.

Prior to adopting LoRaWAN®, H2O Degree sold mostly to wholesale plumbing distributors whose end customers were the property owners. This approach tasks the plumber with installing the physical network devices, running wires, and placing the repeaters. Because low-voltage electrical is not within the scope of the trade, an electrician would often be brought in to handle the complex network installation. The result? Additional cost, project delays, and other complications.

Now, having successfully introduced a LoRaWAN® solution, H2O Degree has an entirely new story to share with customers.

“We have new audiences and all-new interest in our solutions,” explains Millstein. “We’ve been very successful with our Zigbee products but as the market matures, those products are becoming less differentiated. With our LoRaWAN solution, the proposition becomes cutting-edge IoT performance with no repeaters, one maybe two gateways, on an extensible platform designed for interoperability. ‘And, did we mention your battery life now goes up to ten years?’ This opens up a whole new customer base in meter-reading companies, integrators, and contactors.”



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Head of Engineering, MachineQ

A notable fringe benefit is also the ease of installation. While plumbing contractors may not be comfortable installing a host of network devices, with MachineQ’s platform they simply plug in the gateway and call it a day. The reduced hardware burden presents long-term benefits to the facility manager as well. “Less hardware onsite is a good thing,” says Whiffen. “It’s less maintenance for the property manager, who needs his or her staff to focus on property maintenance and turning over units for new renters.”

## Champions of Conservation

Building on their success with Zigbee, H2O Degree’s LoRaWAN® systems are producing admirable results in the field. At one of their new-construction properties, Luma Apartments in San Diego, tenants opting to pay their own utility bills are consuming an average of just 48 gallons of water per day. If this seems impressive, it is. In fact, it’s fully 32% better than the property owner’s target average daily consumption

of 70 gallons, and at least a 62% improvement over similar-sized buildings that don't sub-meter. This is great news for the State of California, which mandates utility sub-metering for new construction in its Senate Bill SB-7 as part of a broader statewide initiative on responsible water use.

2,712 miles away, in Yardley, Pennsylvania, stands The Edge at Yardley, a 200-unit garden-style apartment property situated on more than 30 acres with multiple two- and three-story buildings. "Our LoRaWAN retrofit covers the entire property with a single MachineQ gateway and eliminates an entire repeater network," says Millstein.

The company expects to see ROI in less than 18 months at this property.

## The Bottom Line

LoRaWAN®-based utility sub-metering has been a game-changer for H2O Degree and their customers. The company has grown by 263% over the last two years; a wowing 75% on top of 50% the year before. The adoption of LoRa® has certainly played a part in that growth, according to Millstein.



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"MachineQ enables us to be more aggressive in the market, expand and diversify our opportunity funnel, achieve stronger profits, and scale very quickly," he says. "The MachineQ platform has increased our sales and decreased production costs, driving profitability while enabling us to reduce prices for our customers. We can close deals faster and at a more competitive price-point. And economy of scale dictates that as we continue to grow, our hard costs will diminish predictably, further increasing our gross margin."

## LEARN MORE

To learn more about MachineQ's platform for enterprise-grade IoT, or to schedule a conversation with a sales engineer, please visit [MachineQ.com](https://www.machineq.com).