PARTICLE QUBE

How Qube Became an Early Mover In Continuous Emissions Monitoring with Particle

Case Study

particle.io

Executive Summary

Problem

Qube was designing IoT devices that needed to be deployed in remote environments and required very little maintenance. They needed a platform that offered low power, was affordable, and that could scale across the world. Qube wanted to avoid including costlier hardware (e.g., larger batteries and solar panels), negotiating with cellular providers around the world, and developing their own back-end infrastructure to support and maintain a fleet of remote devices.

Solution

Qube found that Particle's integrated platform would handle the hardware, software, and connectivity technology requirements for them, so they could focus on their value proposition: reliable, accurate, and continuous emissions monitoring technology.

Results

Qube used Particle to scale from prototype to production quickly, and as a result, deployed devices on oil and gas infrastructure across the U.S. and Canada. Particle's integrated platform, reliable cloud connectivity, easy Over-the-Air updates, and low data costs helped Qube be an early mover in a growing industry.

The Company: Qube

Qube provides an emissions monitoring solution to oil and gas companies that combines Internet of Things devices and proprietary AI technology to continuously monitor greenhouse gas emissions.

Qube's solution accomplishes this by allowing customers to deploy their devices around a facility to measure ambient air quality, wind speed, and wind direction to determine where gas leaks are coming from, the quantity and type of those leaks, and manage repairs quickly and efficiently whenever required.

By developing a continuous emissions monitoring solution, Qube allows oil and gas companies to comply with stricter regulations around emissions, particularly methane. It gives them a way to overcome the deficiencies of intermittent emissions monitoring, which leads to incomplete data and an unclear picture of leak location and quantity.

"Particle has been a pretty pivotal part of our growth story here at Qube. We started with a couple of devices and prototypes, and now we're deploying them at scale across a number of different markets...They've allowed us to deliver on our value proposition of low-cost continuous monitoring."

Eric Wen
COO at Qube

Problem

Wifi-Based IoT Hardware Makes Scaling Impossible for Qube

Qube's customers, largely in the oil and gas industry, need a way to implement continuous emissions monitoring and mitigation processes across their entire infrastructure.

They need to be able to prove the impact of their efforts to reduce emissions to both investors and regulators to avoid steep fines, lawsuits, and reputational damage. Most existing emissions monitoring solutions, however, use intermittent monitoring techniques that don't accurately measure emissions or make mitigation easy.

To solve this, Qube began building a solution that combined IoT devices with their proprietary AI that could detect emission types and quantities, factor in wind speed and direction, and accurately locate the origin of the leak.

However, Qube's expertise was in building their emissions detection algorithms, not in building IoT solutions. At the beginning of its product development cycle, the Qube team was evaluating multiple alternative IoT hardware solutions in terms of microcontrollers, modems, and boards that they could build on top of.

They found hardware to use, but quickly realized it wouldn't scale easily because it forced Qube to manage firmware and software themselves. Many of the solutions were also limited because they relied on WiFi connectivity. This wouldn't work in the remote locations Qube's devices would eventually be deployed to.

"One of the key lessons we learned was that you need something that can scale from a hardware, firmware, and fleet management standpoint," said Eric Wen, COO of Qube. "The solutions we were using made scalability very difficult."

That was when Qube found Particle.

Solution

Particle Gives Qube Hardware, Software, and Connectivity in One Package

Qube compared Particle to other IoT hardware solutions and found that Particle's tight integration of hardware, fleet management, and global connectivity gave them everything they needed to quickly go from prototype to product.

"If we just had hardware, we would have had to write all of the fleet management and software ourselves. We would have had to devote additional resources to that, on top of supporting it all long-term," Eric said.

Eric and his team felt that Particle could provide better support for an IoT infrastructure long-term while simplifying the development process.

Regarding Particle's hardware, Eric noted that "it's really low power and low cost. The hardware has a simple, elegant design, and we knew they could keep us supplied."

But the seamless integration of the hardware and software was the true difference-maker for Qube.

"You get all the microcontroller capabilities, but you also get the modem to send data in and out," Eric said. "There's also a lot of fleet management capabilities included, so if you have 1,000 or even 10,000's of Particle devices, you can manage them effectively no matter where they are. Even with all this, the cost is still very competitive."

Results

Qube Scales Quickly and Becomes an Early Mover in a Growing Market

From the start of the partnership, Particle's platform has made it possible for Qube to validate its product, scale quickly, and start serving customers across Canada and the U.S.

So what has that meant for Qube's business?

Going from Prototype to Scale Within Months

Particle's integrated platform saved Qube months of development time by allowing them to focus on what they do best instead of reinventing the core IoT functions themselves. They got to market faster and have established themselves as a first mover in the growing continuous emissions monitoring space.

"Particle has been a pretty pivotal part of our growth story here at Qube. We started with a couple of devices and prototypes, and now we're deploying them at scale across a number of different markets," Eric said. "They've allowed us to deliver the value proposition of low-cost continuous monitoring to our customers."

A Reliable Solution for Qube's Customers

Particle's global cellular connectivity solutions ensure that Qube's devices reach maximum coverage. Particle's EtherSIM solution, which is a globally available, self-optimizing cellular connectivity built into the devices, made connectivity simple even in remote locations.

This is crucial since Qube and its customers rely on a continuous stream of data to detect and mitigate emissions.

"We rely on Particle's devices to get continuous data, which is streamed to our servers on a minute-by-minute or second-by-second basis. We then use that continuous data in our machine learning algorithms to infer what is actually happening in terms of leak quantity, leak size, and leak type," Eric said.

As Qube collects more data, they're able to improve their models over time, resulting in more efficient detection of emissions.

Qube's Axon product, built on Particle.

Results

Qube Scales Quickly and Becomes an Early Mover in a Growing Market

Innovation Enabled by Easy Over-the-Air Updates

Particle's industry-leading OTA updates enable Qube to push updates to all its devices without sending someone out to a remote location to do it manually. The ease of deploying OTA updates allows Qube to innovate faster and continue to build its competitive edge in a growing market for continuous emissions monitoring.

With Particle's fleet management console, Qube can update thousands of devices simultaneously with a single click, rather than updating each device individually.

"Before, our customers had to send a technician out to each device, have them plug a USB into it, and update the firmware manually. Now, as long as there's a connection, we can update an entire fleet with a single click," Eric said.

"Not only can we get data off the devices, but we can also actually input and change parameters on the devices via OTA updates," he added. "For example, if there are calibration coefficients where we need to adjust their power management issues, based on the time of year, latitude, and sun exposure, we're able to monitor and adjust for those things in real-time at scale."

Support, maintenance, and reprogrammability aren't the only benefits of Particle's OTA updates.

"It's just very efficient to be able to upload, change, and test new software quickly using the Over-the-Air updates," Eric said.

Passing on Cost Savings to the Customer

Particle's OTA updates also help Qube maintain its margins, as the cost of upgrading the entire fleet is lower than what it would be without Particle.

"Particle brings us huge cost savings too. It's effectively like a phone plan where we're sending just bytes of data over 5G or LTE networks, so the data charges are low," Eric said. "That helps us maintain our margins, and also transfer those cost savings to the customers."

That's critical, as part of the value proposition of continuous emissions monitoring is that it should bring lower costs than traditional intermittent monitoring solutions like flyover methods or infrared detection.

Fulfilling Qube's Mission

Qube's innovative solution is in pursuit of a singular goal: Ensuring every source of emissions in the world is tracked.

As Qube continues to innovate in the emissions detection and mitigation industry, Particle continues to ship improved features that ensure the IoT side of Qube's product will always be sufficient to solve the emissions problem.

"Methane is not a Canada or U.S. problem, or an oil and gas problem. It's a global problem. And we want to put our devices on every potential emission source out there. We firmly believe that Particle is going to be with us for that next step of our journey," he added.

Work with Particle

Particle has helped market leaders and innovative new companies alike bring IoT projects to life for over a decade. What makes our platform different?

Secure and reliable

End-to-end encryption from hardware to connectivity to cloud, with SOC II and GDPR certifications, public/private key authentication, open event logging framework, encryption at REST, encrypted API messages, and firewall protection.

Scalable

We've helped connect and launch hundreds of thousands of devices, with a fully managed cloud infrastructure processing billions of messages a month and zero planned downtime.

Upgradable

Wirelessly reprogram your fleet of vehicles in the field with our over-the-air (OTA) software updates without any hardware or software scalability issues, and add product features, improve bugs, and avoid vehicle disruption with the push of a button.

Open

Use our APIs and open, referenceable system architecture to access and share vehicle data to multiple different stakeholders of your choosing or integrate seamlessly into existing software architecture without any security hassles.

Global Connectivity

Our IoT-specific SIM card is built into our hardware and is powered by over 350 carriers around the world that automatically connect to the best networks across 2G, 3G, and LTE technologies, designed to make IoT cellular management simple and unified.

All-in-one

A pre-configured network and applications so devices remain online

Secure by Default

End-to-end encryption, limited attack vectors, a firewall-protected cloud, and more

Scalable Infrastructure

Sensor hardware are cloud platform that works the same from your first prototype to your millionth unit

Domain Experts

Developer community, support, & engineering services ready to assist

Data Autonomy

Put your data where you want - integrate with AWS, Azure or anything with a REST API

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About Particle

We love helping game-changing emissions monitoring companies build better connected products, get to market faster, and win in competitive markets.

Speak to an expert today

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