eSIM in Smart Meters



Case Study

Company Snapshot

Name: **Iskraemeco** Industry: **Smart Metering** Founded: **1945**

One of the leading smart metering solution providers on a global scale. With a comprehensive smart metering portfolio Iskraemeco helps energy companies shape the future of energy generation and management.

www.iskraemeco.com

<u>eSIM</u> technology continues to build momentum thanks to a growing ecosystem. In this case study, we look at a new industrial application project from Iskraemeco. The Slovenian OEM is doing a proof-of-concept with its next-generation eSIM-enabled smart meters, which feature innovations from Sierra Wireless, Workz, Telemach Slovenia and Kigen.

By moving to eSIM, Iskraemeco is targeting two objectives: overcoming the <u>limitations of traditional SIMs</u> and keeping ahead of the competition by tapping into the connected meter market.

Opening a modular strategy

The smart meter market is growing fast, with meters going beyond their original use cases and forming the foundations of comprehensive interconnected systems spanning from smart grids to smart home applications. Within the EU, smart meter adoption is being driven by policy. In accordance with EU directives, utility companies had to ensure that 80% of consumers are equipped with intelligent metering systems by 2020. To support this target, various standards have been developed to ensure interoperability, safety and reliable connectivity. The Interoperable Device Interface Specification (IDIS) Companion Specification defines electric smart meter use cases and options for different communication technologies that are required for seamless data flows and smooth upgrades for new applications.

Iskraemeco released its first meter that complied with the IDIS Companion Specification in 2011. However, this and other specifications, as well as market requirements have evolved both rapidly and quite significantly. For example, IDIS Companion Specification Package 1 focused only on narrowband power line communication interfaces. Package 2 added Internet Protocol (IP) connectivity and then Package 3 introduced more diagnostics, enhanced security, updated meter reading functionality and extended functionality for end user engagement.



In 2014, to stay ahead of the market and specification changes, Iskraemeco launched its new strategy to expand into truly interoperable 'smart grid ready' smart meters. Their innovation team architected modular subsystems into their fourth-generation residential smart meter, which is compliant with IDIS Companion Specification Package 3. This next generation smart meter has a universal communication interface that facilitates effortless exchange of various communication modules. This offers greater flexibility for utility companies in terms of their future business models and the ever-evolving needs of the energy industry.

Flexibility with M2M Modules

Gregor Rodič, innovation manager for connectivity at Iskraemeco, is working to get ahead of all these changes. "Communication changes faster than metering," said Rodič in a recent interview. "Device makers globally face different power line communications (PLC), Ethernet and wireless <u>M2M</u> connectivity requirements. Modularity allows our team to match any modem with any meter, for any region."

Rodič says that demand for cellular M2M connectivity is on the rise. His team works with 2G, 3G, and 4G communication modules, and they are also evaluating LTE-M and NB-IoT. Their latest selection is an IoT module that offers 4G (LTE Cat-1) connectivity with 2G fallback (GPRS, EDGE). This module provides dual SIM single standby (DSSS) that enables seamless switching between two networks to avoid loss of connectivity. In the near future, Rodič expects improved signal penetration from cellular IoT for areas with limited coverage, such as basements.

Bootstrap and RSP

The current 4G modules work with a traditional SIM. However, using traditional SIMs introduces the issues that take the meter makers away from their primary function of providing safe and reliable metering solutions. For example:

- Meter-makers need to maintain complex engagements with connectivity providers (operators) in multiple regions and to avoid long-term lock-ins.
- SIM procurement, handling, testing and distribution adds significant overheads and cost.
- Problems with non-functional SIM profiles or signal coverage undermine device performance and customer experience.
- Testing meter's connectivity for a specific country isn't an option prior to shipment without international roaming.

For 'smart grid ready' smart meters, flexibility is key. That's why Iskraemeco is transitioning to an <u>eSIM</u> created and supplied by Workz. Each eSIM comes personalized with a global bootrstap, which enables both factory over-theair meter testing and out-of-the-box global connectivity. If a local network is preferred, the <u>Kigen remote SIM provisioning (RSP) service</u> can provision a local operator profile to the meter with no need for physical access to the device.

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SIMs can be <u>remotely provisioned</u> to any suitable network, which not only simplifies the logistics but also provides an insurance against connectivity contract lock-ins. When coverage is patchy, networks can be switched quickly and easily to ensure continuity of service. Utilities are freed from sourcing and managing SIMs and connectivity as OEMs, and in this case Iskraemeco, can manage this.

Deploying a smart meter involves the following steps:

- Iskraemeco manufacture the smart meter and embed it with an eSIM that contains the global connectivity profile.
- The smart meter is deployed anywhere in the world and, thanks to the global connectivity bootstrap profile, it can attach to almost any available network to provide out-of-the-box connectivity.
- Iskraemeco decide which profile will be downloaded and enabled on the meter, based on criteria such as the location.

- Kigen RSP server delivers the selected profile to the smart meter and requests profile enablement.
- The smart meter connects to the desired network with the newly activated profile.

Helping Improve Grid Intelligence

Iskraemeco aggregates data flowing from their smart meters. Small and medium utilities typically adopt Iskraemeco meter management software while larger utilities usually have their own software, integrating the Iskraemeco data stream.

The next leap is even bigger. Always-on connectivity and secure cloud infrastructure open new possibilities, with uninterrupted data enabling better insights and cloud processing – automated decision-making in relation to the grid's reliability and efficiency. This gives utility companies more visibility, more control and more opportunities for innovation.

However, as the number and variety of smart grid-connected assets is expanding, even cloud computing cannot process the huge amount of data that result from these devices without encountering problems with network latency and bandwidth. Fog and edge processing can help to manage and extract more value from the data in the age of the growing complexity of grid management. "Meters will have more edge computing capability in the future," says Rodič. Smart meters will process the data where the data is collected ('at edge'), decide what to send to the central system and even empower local corrective action, therefore reducing the pressure on the cloud infrastructure and enabling more grid flexibility.

When asked to compare the security of an eSIM with that of a traditional SIM, Rodič says: "It's the same, beyond any doubt." In this smart meter proof-of-concept, there are multiple layers of strong security. First, only meters with a correct profile can get on a cellular network. Second is the VPN and secure data communications. eSIM as an embedded form factor also offers more physical security as it can't be easily accessed.



What's Ahead for eSIM-enabled Meters?

The use of traditional SIMs brings another solvable issue. In harsh field conditions contacts can corrode over time and SIM cards may then operate intermittently or fail. That's why future M2M modules will move to industrial-grade eSIM form factor (MFF2) for reliability. eSIMs can survive extreme temperatures, humidity, corrosion and vibrations, and because they are more difficult to remove, their physical security is also better than that of traditional SIMs.

Iskraemeco is about to enter a trial of eSIM-enabled meters with utility companies. They are currently adding more MNOs supporting the RSP M2M solution to offer wider connectivity coverage and choices. The Kigen support team have helped to prepare operational profiles for Telemach Slovenia, and proof-of-concept deployments into the Telemach territory using RSP have been very successful. A choice of MNOs in regional deployments solves lock-in concerns for their utility customers and also alleviates concerns about varying signal quality between MNOs in some areas.

Next, Iskraemeco will integrate meter management software with the Kigen RSP server's API. Creating a unified workflow for companies is a big step towards easier adoption. Moving that software onto a cloud infrastructure improves scalability. With this, Iskraemeco can help utility companies expand value by serving the increasing demand for real-time analytics that are needed for advanced asset optimization and delivering smart grid resilience.

Reduce the total cost of ownership, get better insights and gain competitive edge.

Innovation Across the eSIM Ecosystem

Kigen sees developing the eSIM ecosystem as a top priority. In this proof-of-concept, several Kigen innovations have been key:

- Kigen Professional services team and tools supported Iskraemeco's product delivery.
- Vorkz eSIM cards run Kigen OS SIM software.
- Iskraemeco uses the Kigen M2M RSP solution.

eSIM technology is ready for smart metering and many other IoT use cases. Utilities and other enterprises can take advantage of this technology and the broad cellular IoT coverage to reduce the total cost of ownership of managing IoT, get better insights and – ultimately - gain competitive edge. This clear market opportunity presents an attractive opportunity for OEMs to capitalize on, while simplifying the way they manage smart device supply chain.

For more insight into how eSIM can help you, visit <u>www.kigen.com</u>



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