



ANALYST REPORT

***How IoT is
enabling
transformation
in the
electricity
sector***

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Over the coming decade the electricity sector must face increasing demand, increasing regulation, and fundamental changes in the way that electricity grids work on a day-to-day basis. New fluctuating energy sources must be integrated into existing grids, and many of today's customers may take on a second role as suppliers, writes Jim Morrish, a founding partner at Transforma Insights.

The deployment of new technology is critical to enabling the changes that must happen, and a wide variety of technology-based solutions are being deployed in the electricity industry right now. These range from smart-metering applications through to remote asset monitoring and control solutions and solutions to better enable a remote workforce. According to research undertaken by Inmarsat, investment in IoT solutions overall is expected to be significant for electricity utilities, and with cost reduction and increased efficiency come related benefits in sustainability ►



Jim Morrish
Transforma Insights



But there are challenges, including in the domains of connectivity, security and available skillsets. Service providers to the electricity sector can help to alleviate many of these problems for their potential clients by delivering robust, sophisticated, and secure applications that can be easily integrated into electricity utility operations. Any service provider seeking to deliver solutions to electricity utilities will need to invest to ensure the delivery of high-quality solutions, and it is likely that working closely with ecosystem partners will significantly ease the development of such solutions.

Introduction

The electricity industry worldwide is facing a period of unprecedented change. In recent decades distribution grids and other infrastructure have become increasingly smarter, but today's environment is characterised by a number of disruptive changes. These range from increased demand overall and the rapid adoption of evehicles, through to an expected increased incidence of harsh weather events associated with global warming.

The fundamental dynamics of electricity distribution are changing too. Historically, electricity supply has been dimensioned to match demand but with a shift in the mix of energy generation towards renewable sources (particularly solar and wind) the associated unpredictability of electricity supply is ushering in a need to manage demand to match supply. This is a complete reversal of traditional grid dynamics. Associated with this development is the advent of microgrids that optimise the generation and consumption of electricity within a campus or similar context. Such microgrids will only draw power from an external grid when they are experiencing a net deficit within the local network. These grids may also seek to supply power back to an external grid in circumstances where local generation exceeds local demand. This reverse-supply dynamic can extend down into consumer markets, with households with photovoltaics installed seeking to supply excess power back to the grid.

These developments set the stage for a period of rapid change in terms of the technology that the electricity ►



industry will need to deploy to maintain the stability of supply and distribution systems. And with the rapid adoption of new technologies come new security challenges, the associated risks of which are magnified by the critical infrastructure nature of electricity supply. As with many industries, the need for security often conflicts with ambitions to develop sophisticated, agile and flexible technology-based solutions.

The coming decade will be characterised by a significant transformation in how the world's power grids work on a day-to-day basis, taking place against a backdrop of increasing regulation covering aspects ranging from grid stability to heightened safety expectations.

How technology can help

Looking at some specific applications in the electricity industry can help us to develop a picture of what the future might look like. As William Gibson noted, "the future is already here - it's just not very evenly distributed". The following is a far from complete list of some of the applications that will change electricity industry operations in coming years:

- Smart metering to provide accurate consumption information, and potentially to manage local storage and consumption – in the case of demand response – and enable reverse-supply.
- Monitoring distribution substations, transformers, and feeders to ensure that any faults can be quickly identified and resolved, or pro-actively managed.
- Remote monitoring and control of network assets, ranging from reclosers – that automatically interrupt power in the case of a supply problem – to voltage regulators.
- Drone inspection for transmission and distribution assets, potentially incorporating artificial intelligence to identify any abnormalities.
- Remote monitoring for a range of renewable energy generation assets, including wind turbines and photovoltaics – either at grid level, or at campus or even consumer level.
- Deploying connected inductive sensors throughout a grid to monitor the efficiency of grid operations, and ►



potentially combining this information with smart metering information and using artificial intelligence to identify and combat energy fraud.

- Fleet management solutions for maintenance field forces, including job allocation systems, safety monitoring solutions, and solutions that enable remote workers to access second- and third-line support – possibly using augmented reality and shared video images.

This is a diverse range of applications, but any list can only ever be indicative of the innumerable niche and optimised applications that will be deployed in the electricity sector in coming years. A survey of electricity utilities undertaken by Inmarsat found that in five years' time the average respondent expected to have achieved a 30% saving in their organisation's costs by deploying IoT solutions. The same respondents are likely to benefit from additional related benefits including in terms of overall efficiency and carbon reduction. Any IoT solutions that reduce the need for field engineers to visit remote sites are likely to be particularly impactful, and may have associated health and safety benefits. The same survey suggested that electricity utilities would spend 9.9% of their IT budgets on IoT

projects in the next three years, a figure matched only by spend on cloud computing. Other big spend areas included related topics such as next generation security, big data analytics, machine learning, and robotics.

Emerging challenges and opportunities

Given the often-remote nature of electrical grid assets many of these applications are reliant on the internet of things (IoT), and so connectivity in remote locations. As mentioned above security is also critical and clearly any organisation planning to deploy an IoT solution must have access to the relevant skillsets. But Inmarsat's research in the electrical utilities sector identified deficits in each of these areas. Specifically:

- 58% of respondents struggled to deploy IoT because of unreliable or inconsistent connectivity in the areas they wish to introduce it. 75% of organisations encountered connectivity problems in the trial or proof of concept phase of IoT.
- Only 24% of respondents thought that they had robust cyber defences. ►



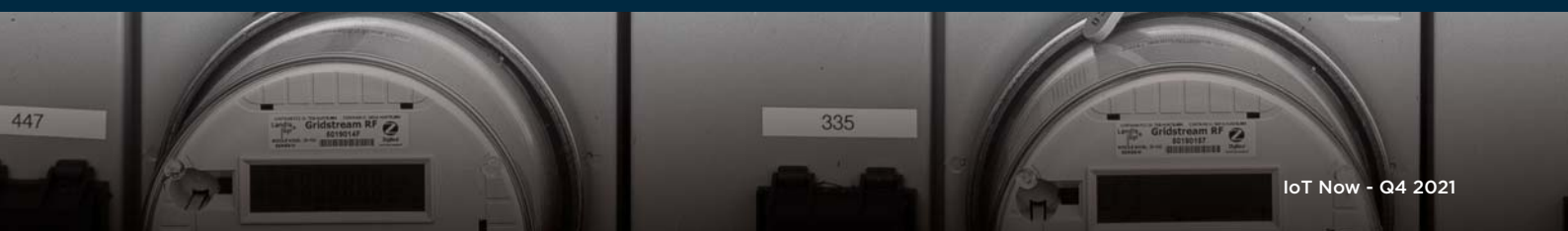
- The majority of respondents said that they would benefit from additional skills to fulfil IoT projects.

In part these concerns are simply a reflection of the realities in the electricity sector: assets are often deployed in remote locations, and electricity utilities are a critical industry that must be particularly sensitive to security concerns. Also, many of the assets deployed in electricity distribution grids are relatively old technology, increasing the challenges associated with integrating them into sophisticated IoT solutions.

To a great extent, many of these challenges for electricity utilities are also opportunities for technology service providers to the electricity industry to focus on delivering robust, sophisticated, and secure applications that can be easily integrated into electricity utility operations. A key aspect of such easy integration is the range of connectivity options catered for and the ease of deploying connectivity in all of the locations that a solution might potentially need to serve. Satellite communications can clearly play a role in connecting these devices, particularly in remote locations.

But IoT solutions are often complex, and their development and deployment can draw on multiple domains of competence ranging from sensor technology to artificial intelligence and including edge computing and application enablement. For their part, electricity utilities may not want to be exposed to the complexities of application development, and as noted above they may not have the necessary skill sets. This puts the onus on suppliers to the industry to work together to overcome development challenges to deliver comprehensive and well-integrated solutions which are also reliable and intuitive to use. Overall, 'better' IoT solutions can be expected to secure more rapid adoption and also to require relatively lower levels of ongoing support resource. Such a collaborative approach can have additional benefits for service providers, including potential exposure to new sales opportunities through partner companies and also opportunities to co-create solutions to target any identified opportunities.

Where satellite communications are included as part of a solution then new aspects of complexity can be introduced, including the need for applications to be





Inmarsat ELERA is the global network for the Internet of Things (IoT) and secure narrowband connectivity.

Designed for mobility and trusted to connect over a million assets globally, ELERA enables the next wave of world-changing technologies that will underpin our connected society and help build a sustainable future.

ELERA is a springboard for innovation. It is accelerating pioneering use cases for commercial and government customers and is inspiring new possibilities on land, at sea and in the air. In short ELERA is:

- An L-band network with unique resilience in all conditions with complete global redundancy, ultra-high security and market-leading, 99.9% availability
- Offers seamless coverage with global consistency and simple deployment in the field
- The only global Geo-synchronous Earth Orbit (GEO) operator, with more usable spectrum in every region than any global provider, ensuring the delivery of mission-critical data
- Proven network, in operation for decades with a strong roadmap of improvements into the 2030's.

Inmarsat's Application and Solution Provider Programme (ASP) is the marketplace for IoT solutions that work anywhere. Constantly expanding, we are working with new solution providers across agriculture, electrical utilities, mining, oil and gas and transport and logistics. Benefits associated with the ASP programme include:

- Reliable global connectivity will enable anyone to scale products and services across commercial land markets
- Gain access to expert sales and marketing support from Inmarsat and our distribution partners
- Get technical support to help get the most out of our satellite connectivity
- Access to loan hardware and development kits including modems
- The potential to create flexible and affordable data plans tailored to solution needs
- Open relationships with our developer portal
- Access and promotion to our global partner channel
- Use of the Inmarsat ASP brand in your marketing materials

Learn about the solutions our ASP partners offer, or join our programme here:

www.inmarsat.com/ASP-Programme

tolerant of latencies – generally of up to one second. Satellite-connected IoT applications should also be developed with a view to optimising bandwidth usage. Given these requirements, any service provider that intends to deliver satellite enabled IoT services can particularly benefit from access to specialist knowledge and information in the satellite domain. They may also potentially significantly benefit from engagement in an ecosystem that includes companies that are expert in different aspects of enabling satellite solutions.

Overall, the disruption that electricity utilities are currently facing can be a source of significant commercial opportunity for service providers. While the complexities of IoT deployment can at first seem formidable, cooperation between different parties with a range of different capabilities can help. Building better IoT solutions can be expected to secure more rapid adoption, and improved outcomes for service providers and the utilities sector. ■

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Inmarsat's Application and Solution Provider Programme supports AnsuR's growth plans

AnsuR Technologies, is an award-winning software company, founded in Norway in 2005 to help the United Nations with image transfer in disaster response. Since then, the company has branched out from its original focus on creating ground-breaking visual communication solutions for emergency situations to develop solutions for a variety of government and enterprise customers. Joining Inmarsat's Application and Solution Provider Programme has opened a significant global market opportunity for AnsuR, in providing software solutions for any commercial or industrial use case where visual information is required to back up traditional IoT sensors

To date, **AnsuR** has focused much of its commercial research and development work in remote inspection for the utilities sector, offering safe and cost-effective ways to perform on-site inspections. AnsuR's innovative tools enable utilities firms to send high-precision photographs, video clips or real-time streaming from remote or hard-to-access sites via bandwidth-constricted connectivity.

Ground-breaking livestreaming software

"We are all about enabling the efficient transfer of data to save our customers money and increase operational efficiency," says Paul Gudonis, the chief executive officer at AnsuR. "Alongside Inmarsat's BGAN M2M service, we provide data communication tools for real-world situations where visual data is needed, ensuring full-precision photo and video content is communicated using considerably less bandwidth than traditional methods. By facilitating remote inspections in hazardous environments, we can not only help keep people safe, but also deliver substantial sustainability value too."

In any situation where an IoT sensor sends an alarm, AnsuR's proprietary software sends the visual information needed by engineers or maintenance teams, helping them to understand the exact situation on the ground.

ASP Programme accelerates growth

Right now, AnsuR is on a journey, rapidly transitioning from a traditional R&D organisation to a company that is far more commercially focused. To support its ambitious growth plans, AnsuR formalised its longstanding relationship with **Inmarsat** by joining the company's Application and Solution Provider (ASP) Programme. Being an ASP member gives AnsuR access to

Inmarsat's reliable, secure and cost-effective connectivity through the industry leading ELERA narrowband network. It also offers access to an invaluable network of trusted technical and commercial partners, and the opportunity to collaborate closely with other innovative IoT solutions developers. Working closely with Inmarsat and other ASP partners means AnsuR can accelerate the development and commercialisation of its bespoke software solutions: helping customers in utilities and in other sectors, such as mining or critical infrastructure, manage assets that are beyond the easy reach of both people and terrestrial network coverage.

"Being able to work with Inmarsat's top-tier distribution partners is a huge bonus," Gudonis explains. "The ASP Programme enables us to build on our great network within the value-added reseller community, establishing new connections and meeting new partners. Working collaboratively using our collective capabilities we really get around a particular customer challenge. There is an in-built lead-generation element to ASP that all partners benefit from, which goes both ways: we get leads from other partners and they get leads from us."

Scale, replicate and expand

Through the ASP Programme AnsuR, as a small software company, has access to resources and knowledge to help it scale up, replicate and expand its solutions into new sectors and markets. For AnsuR, this is the real benefit of the ASP Programme: combining its expertise in image transfer and video streaming software with the strength of a globally recognised and trusted IoT connectivity brand, alongside the technical and commercial support network provided via the network. ►

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"A good example is a new project for a major hydropower company operating in northern extremes," Gudonis explains. "This is a proof-of-concept we are working closely with Inmarsat and a partner on, for a typical utilities company operating in arduous environments where there is basically no infrastructure. When an alarm is triggered by one of the customer's IoT sensors, which might be monitoring for changes in specific conditions for example, checking for valves that haven't closed, the company would previously have sent an engineer to that station. However, if it's a false alarm – let's say a moose wandered by and knocked a sensor – from an operational perspective you've taken an engineer out on to the ground unnecessarily. With high-definition visual communication at play, they can now check IoT devices remotely, from anywhere in the world, to assess the situation."

"AnsuR has the capability in terms of the engineers and the expertise in designing these types of solutions," adds Gudonis. "But where we benefit from ASP is the ability to properly market and attract more customers and then scale that business. We can now scale and replicate solutions throughout the ASP partner network, using the strength of Inmarsat's salespeople, solutions engineers, marketing team, its product knowledge and understanding of other geographies."

"It's not only the scale and the reach but, most importantly, the experience of the people we are able to connect with," he explains. "That has allowed us to take that hydropower use case and, with the experience of the teams at Inmarsat, look at other areas where that solution can be deployed. We are now looking to take that same solution, with no extra development work, into other areas like shipping and logistics, mining, fixed infrastructure, maritime and government use cases."

Inmarsat's ASP Programme provides access to the resources, knowhow and commercial networks needed by highly-specialist solutions providers such as AnsuR, offering them an umbrella for collaboration, and enabling them to effectively scale their solutions much faster, easier, and far more cost-efficiently than was previously possible.

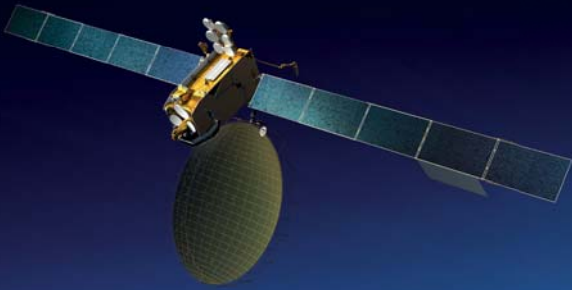
"The opportunity for us to be a part of the ASP Programme really meant that we could collaborate and co-create end-to-end solutions with partners. With Inmarsat leading the way, providing technical support and operational experience, Inmarsat is the glue that binds all the pieces together. It's allowing us to achieve that global reach at a pace that previously was not possible," says Charlie Clark, the director of Sales and Marketing at AnsuR. ■



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**Do you have a connectivity or distribution issue you need to solve to grow your business?
Learn more about Inmarsat's Application and Solution Provider Programme.
<https://www.inmarsat.com/en/solutions-services/enterprise/solutions/asp-programme.html>**



APPLICATION AND SOLUTION
PROVIDER PROGRAMME

JOIN INMARSAT'S ASP PROGRAMME FOR SOLUTION PROVIDERS AND GROW YOUR BUSINESS

- **Overcome** unreliable connectivity with ultra-reliable satellite connectivity.
- **Expand** to new markets, geographies and develop new solutions.
- **Access** technical, marketing, commercial, and regulatory support.

Ask about our free developer kit!

Inmarsat works with application and solution providers across the globe to incorporate satellite connectivity into their solutions and to help them grow and scale.

Find out more:

inmarsat.com/ASP-programme