A DATA ENABLED **ENERGY TRANSITION**

The energy transition is characterised by distributed energy resources, new load profiles, the rise of prosumers, the uptake of electric vehicles and addition of storage in the pursuit of a decarbonised energy sector.

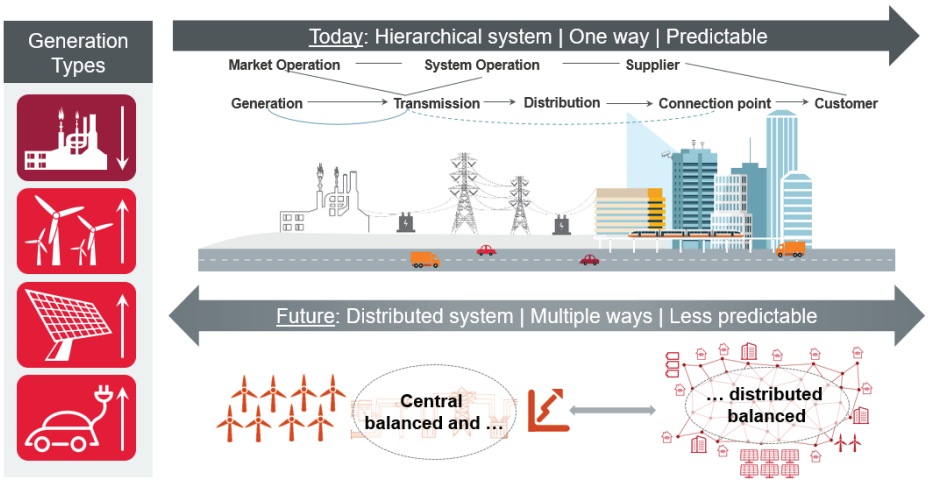
However, the energy transition is not just about energy technologies. It's a transformation that is cultural and organisational. Importantly, it's a transformation that is about data – access, quality and equality. In many ways, data is critical to the transformation as it is the basis upon which utilities will solve the foundational challenges of the transition.

There is no getting around the fact that someone has to manage the infrastructure and preservation of energy access across the grid. With the introduction of additional distributed energy resources, or alternative technologies such as electric vehicles or storage, the ultimate responsibility in terms of reliability, provision of energy and balancing of supply and demand remains the responsibility of the network operator. The complexity of that environment, however, has changed. The distribution operators now have to directly and dynamically interoperate with a new disruptive paradigm of low capacity but high volume of energy and power correctional resources that are geographically dispersed. This requires a much more complex coordination between the system operators and the distribution operators in order to combine balancing and congestion management requirements when for example the opportunity to leverage flexibility of loads occur.

The IT solutions that were initially developed to support the one-way flow of power were developed with exactly that flow structure in mind. However, challenges now involve the integration of the various generation options across all segments of the grid. Balancing now includes optimising distributed generation assets across the grid and balancing that supply, managing the injection of power across consumption points.

Demand for new IT systems supporting the future grid

While an element of that change is being seen already, we are still in the early stages of that transition. What has become clear is that the IT solutions which so effectively helped manage the more traditional energy sector are no longer completely suitable and will soon reach a point where they cannot meet business needs nor allow for a faster go to market of new business abilities as the energy ecosystem shaped by specific market structures evolves



Network service providers are at a point where, when they introduce a new service, they are struggling to realise the benefits they were hoping to realise – and one of the key reasons for this is due to a lack of easy access to quality relevant data. This reality is being seen around the world.

This kind of data – data from an ADMS, GIS or EAM which will enable new functions to support grid transformation – has to be quality operational data. And therein lies the challenge. Data historically has been siloed and held in separate operational and IT systems with limited integration of the data. Furthermore, data on the energy resources that customers are connecting to the network is still quite limited for the needs of an intelligent grid that meets the requirement of the new energy system. "Something as obvious as being able to have a good view of the status of the network – i.e. the history of the assets that make up the network, or the operational status of some of the equipment on that network – is spread out across multiple different systems," explains Simon Boyer, vice President, Utility Solutions, CGI's US operations. "For instance, you have a GIS system that provides information about the spatial network connectivity; you have an ADMS/DMS system that provides an operational view of the same grid; and then you have an enterprise asset management system that has additional information on the assets and/or their work history. This is because different elements of the chain are looking at it from different perspectives – based on their function and role across the network – but the ideal is to enable a facility to bring all of these systems together effectively, so you have a clear, detailed view of the network. This is a challenge we're helping utilities address with our OpenGrid 360 suite, because without these insights, they're not able to move quickly enough to adjust to the changes and demands in the market."

Agility is key to success

As these kinds of developments pick up pace along with the energy transition, utilities need to deploy new capabilities in an agile way in order to be successful in the future. CGI OpenGrid360 is positioned to assist in moving quicker in terms of deploying these new systems and capabilities, providing an integration platform on which utilities can deploy these new solutions.

This could include support for flexible connection and more advanced outage prediction and strategies. ➞

OpenGrid 360 offers a platform to integrate the increasing amount of new data from both internal and external sources, access the quality of the data and allow the organisation to operate in a more agile way. The data from traditional systems, such as DMS, will stay in these systems and will not be duplicated.

Quality data

The issue of data quality is one that often raises its head when it comes to combining disparate data sources. How is it possible to ensure that the quality of the data is sufficient to deliver suitable insights?

According to Boyer, one of the ways in which both challenges around uncertainty of quality and a lack of sufficient data are dealt with is through the implementation of an integrated network model. Data from the various sources is continuously checked against this model and analytics and an algorithm are then run to identify data mistakes.

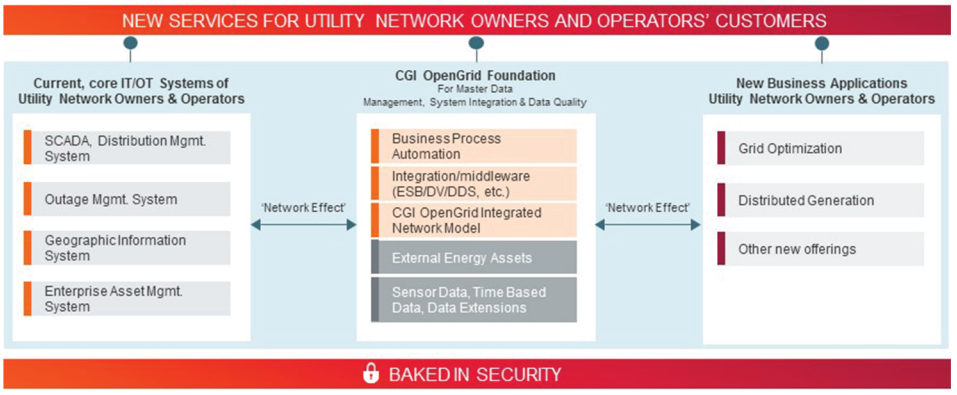
This creates a 'heat map' of the data quality. For instance, it may identify assets within your GIS which you don't have in your core IT or OT system, or you have assets in the IT systems which aren't showing up from an operational point of view. It is also possible to identify data inconsistencies specifically where there is duplicate data, but the duplications don't match up.

Rules and algorithms are then applied to identify the accurate information, making it possible to automate a lot of the data cleansing in this way. The key component here is layering the data together over the underlying electric network – this is vital to identifying inconsistencies and is something that cannot be done with unstructured data or a traditional relational database view of the world.

Access to the data and the ability to model/analyse this, enables utilities to gain a deeper understanding of consumer usage profiles across different endpoints. The additional view of the assets on the network allows decisions regarding the addition or implementation of storage in the light of distributed energy resources to be taken.

Co-developed with clients

"This strategy and new way of integrating enterprise data is an important innovation, because operators have been trying to solve this issue for quite some time. The key difference in this approach is that is it based on a single reference data model created out of all the other data models in the core systems," explains Ana Domingues, global utilities industry lead, CGI. "We had the privilege of working on several innovation projects as part of the Low Carbon Fund initiative in the UK and worked on these with large grid operators. Through the work done across the different innovation projects, we ended up with a fully developed solution. These grid operators are now rolling out the platform into the production environment."



Value-adding in the wider ecosystem

Early adopters of advanced distribution management systems and other grid modernisation solutions have learned to their detriment that not having access to quality data means that they cannot retrieve high quality insights good enough for high levels of automation. This solution allows for some of these initial concerns and months and months of cleaning up data to be put aside.

How end users and other market parties benefit from having access to this increased granularity of reliable data and what kind of services or applications could actually be added to the network to deliver value to the ecosystem can be difficult to envision.

"There is huge value to be gained in the ecosystem," says Domingues. "If we think about the challenges around integrating more and more distributed energy resources – renewables, heat pumps or electrical vehicles – there will be a need for grid operators to have multiple new business abilities. For example, they will need to move from deterministic to probabilistic network planning to ensure maximum connection of DERs into the grid safely and reliably and that the grid doesn't become a bottleneck for the different market players to explore distributed energy resources and help with decarbonisation. In Europe, the grid operators are being asked to be market makers so that they drive more innovation in the market by making more data available, along with more market functions or market facilitation to the ecosystem."

Access to detailed information means distribution system operators will be able to offer flexible connections, i.e management of flexible energy contracts, and actively manage the network. All of these new business abilities will be required to enable a balanced transition to a new energy system

The future is already here

Boyer says: "These may not necessarily all be realised today – that might be a few years out – but they all are predicated on your having a platform for this level of data integration. Some of the value we envisage includes: Whoever is managing the system in the future will have to balance that system. To balance the system and make effective use of energy, they will need to facilitate all of these transactions. Then, as suppliers start offering flexible connections they will need to involve the distribution system operator in that process, because they're the ones that are going to be more and more involved in balancing the grid. Finally, for end-consumers there are cost benefits and energy efficiency benefits. Everybody wants to feel that the decarbonised energy that they're producing or storing is getting leveraged effectively and contributing to meet climate change targets. A reality today is that a lot of it isn't, because the system is not yet capable of balancing and really using the power that exists at the endpoints and distribution grid effectively. Every market will figure out how to incentivise network operators to provide these new services, be it through regulation or rates. Ultimately, everybody benefits from it. We're not going to be able to really transition and integrate distributed energy resources without doing this." **SEI**

About the interviewees

Ana Domingues, Global Utilities Industry Lead. Domingues is responsible for the portfolio strategy and growth of CGI's global utilities business.

Simon Boyer, vice president, Utility Solutions, CGI. In his current role Boyer is responsible for managing a portfolio of Utility solutions including mobile workforce management, outage management, work and asset management and energy efficiency.

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