As an increasing proportion of our energy is generated from renewable sources, grid automation grows in importance. It provides the insight and controllability needed to ensure that high-quality power is reliably delivered wherever it’s needed, as generation sources become increasingly distributed, intermittent and volatile.

Achieving the levels of control and performance needed requires a more intelligent, efficient and reliable grid. This is now possible thanks to significant advances in technology in recent years in areas such as sensing, data processing, control and communications (especially wireless). ABB’s portfolio of protection, control and communication systems is constantly updated to incorporate the latest developments for substation and power grid automation. ABB’s approach to product development and innovation ensures that customers can update existing systems with new technologies as and when they’re needed to improve the safety and reliability of existing installations today.

Built on the international standard for substation automation, IEC 61850 9-2, ABB’s solutions bring significant advantages in terms of interoperability and ease of configuration, as well as addressing the security requirements of multi-access substation automation systems. These solutions include the SAM600, the latest stand-alone merging unit, and SDM600, a system data management software solution, along with the Relion 670 series 2.0 IED, the newest member of the ABB’s family of protection and control devices, and the RTU520, which joins the RTU500 family of network monitoring and control devices. They represent another step toward fully digital substations and underline ABB’s position at the forefront of substation automation and communication technologies.
Modern utilities run two vital networks – one delivering services to customers, the other monitoring and managing the first network. ABB’s software manages and monitors that network; presenting operators with real-time geographical representation of the power distribution network and reducing outage time with efficient fault location and automatic restoration. ABB also tracks protection relay software versions, collates disturbance reports, and helps secure the network against cyber-attacks.

ABB has been heavily involved in IEC 61850 since its inception, having deployed the first commercial IEC 61850-9-2 installation in 2011 at the Loganlea substation, for *Powerlink Queensland*. That project was part of an upgrade of an existing station, an upgrade that saw it move into an IEC 61850 future, adopting digital standards for effective future-proofing. ABB created a retrofit solution based on specifications from Powerlink that can be applied to another five of their substations when ready for refitting.

The use of ABB’s IEC 61850-9-2 compliant merging units and IEDs, not to mention non-conventional instrument transformers (NCIT), makes the deployment a landmark in the evolution of substation design. The Fiber Optic Current Sensor (FOCS) is one of a range of NCITs that can support digitalization. Measurement is digitized right at the source and transmitted as a digital signal, via the process bus, to the protection and control IEDs, as well as the revenue meters. Such an optical current transformer takes up a lot less space than its analog equivalent. It can even be integrated into a *disconnecting circuit breaker* to combine the functions of circuit breaker, current transformer and disconnector in one device – halving the size of a new substation.

In the medium voltage range, ABB’s *UniGear Digital* switchgear supports the creation of a reliable and efficient electrical network using well-proven components: current and voltage sensors, protection and control relays, and IEC 61850 digital communication.

As substations become increasingly digital they also become smaller and more reliable. Life-cycle costs come down. Ease of maintenance and life extension also increases. They also offer increased safety and are more efficient. Not every substation needs to be catapulted into a full-scale digital world – this depends on the substation size and type, and whether it is a new station or a retrofit of the secondary system. Different approaches and solutions are required. ABB’s extensive IEC 61850 experience and portfolio of NCITs, merging units, protection and control IEDs as well as station automation solutions ease utilities into the digital world. Flexible solutions allow utilities to set their own pace on their way toward the digital substation.