

## S650 Smart Grid Terminal provides a unique solution for street lighting and smart grid development

**Landis+Gyr and Dutch network operator Stedin have cooperated on a smart solution that increases the energy efficiency and reliability of public street lighting. The solution also provides tools for improving the reliability of the energy supply as well as the managing of the addition of renewable energy generation to the network.**

Dutch network companies are required to offer a “switched network” for municipalities to serve street light applications. Traditionally, street lighting has been controlled centrally but there is now a need to replace the existing systems with new, more cost-efficient technologies. Furthermore, over 40% of the street light connections are currently not measured, meaning a meter has to be installed.

### The background to Stedin and Landis+Gyr’s project

Also Landis+Gyr’s long-term customer Stedin was facing the need to update their street lighting technology. Furthermore, there was also a clear need for Stedin to improve their operations and energy efficiency – to take steps towards creating a smarter grid and realizing the vision of a “self-healing grid”.

Landis+Gyr and Stedin agreed to implement a street lighting solution that provides real measurement of consumption and enables the optimized switching and dimming of the street lights. The solution could be used also for distribution transformer monitoring, which would improve and cost optimize operations and maintenance of the network and provide efficient tools to monitor energy and power.

### Pilot in Houten

It all began in the municipality of Houten that had their tariff and street light application controlled by a centralized system that was not optimal and was in need of development. The S650 Smart Grid Terminal was used as a complete solution for their street lights. The technology could be utilized also for distribution transformer monitoring.

Stedin and Landis+Gyr initiated a smart grid pilot project that facilitates the tracking, monitoring and managing of activities in the street lights as well as at power stations. This resulted in the entire replacement of the previous control system with a modern, decentralized infrastructure.

### Simultaneous operation – parallel costs

After the pilot, Stedin decided to install S650 Smart Grid Terminals in every distribution transformer station to serve the two applications: streetlight control and transformer monitoring. A combined solution would also be cost efficient because all the required equipment could be installed during a single visit of the assembly personnel to the transformer. The solution includes dedicated S650 Smart Grid Terminals for both applications which eases the

maintenance. However, a shared communications channel can be used, which reduces the total costs.

### Smart Streetlight with S650

The S650 Smart Grid Terminal for street lights enables Stedin to provide improved service and decreased energy consumption for Houten. First, the CO<sub>2</sub> emissions caused by public street lighting are being reduced due to smarter use. The S650 provides accurate, reliable information on the energy consumption of the street lights, improves awareness and allows the benchmarking.

### About Stedin

Stedin distributes electricity to more than 2.0 million customers, producing 22,471 GWh of electricity per year over a 45,000 km network. As a company, Stedin is responsive to clients who wish to contribute positively to the environment and society. Hence, Stedin seeks innovative solutions that focus on creating smart networks which are able to increase sustainability and improve the existing grid. Thus, in 2013, Stedin will spend 500€ million on the construction, renovation and replacement of networks.



Stedin uses Landis+Gyr S650 Smart Grid Terminal both for streetlight application as well as for transformer monitoring

In addition, the capability to control the street lights according to the need for lighting is a major factor in reducing the overall amount of energy consumed. The devices' output relays mean the S650 can dim, brighten or switch the lights off as necessary. Furthermore, local inputs and remote commands can be programmed in and the S650 is equipped with an on-board astronomic clock, allowing for accurate sunset and sunrise trigger signals for the switching of street lights. Moreover, the reconfiguration can be done remotely and managed on the transformer area level, improving the flexibility of the use of the street lighting.

In addition to energy savings, the S650 solution also supports in optimizing operation and maintenance costs. This comes in the form of an SMS alarm, which is sent when a threshold value for consumption is recognized – and this happens e.g. when a street lamp fails.

S650 Smart Grid Terminal serves the various stakeholders that need access to the data and controls of the street light solution. A utility needs the information for billing, but there may be a service company responsible for maintenance, while the municipality may want to change the time the lights come on. The advanced functionality of the S650 allows the defining of various user groups, so that they can have different levels of access. In brief, all the defined users have access but security can be programmed into the solution.

### Serving the smart grid initiative

S650 Smart Grid Terminal supports Stedin in its grid management because

the solution can be used for distribution transformer monitoring. Thus, the utility gains a better understanding of the status of the distribution network, based on measurements of power flow and quality. Consequently, the S650 is able to provide accurate information on energy, voltage and current. The alarm functionality is a significant asset for the operator, and it can also be connected to external equipment in the transformer. Thus, alarms can be defined for measures other than those related to energy, such as identifying unauthorized access to the transformer station or excessive temperatures within transformers.

The transformer monitoring functionality further supports the utility in minimizing the effects of failure in the network and reducing downtime – active alarms can provide immediate information on disturbances and make it easier to find them as well. In fact, the S650 could serve as the first step towards a self-healing network, where, in the event of a power outage, the part of the network where the fault has occurred is automatically isolated by means of ICT technology, leaving the unaffected part of the network to continue to be operational or be reconnected quickly, reducing downtime from hours to minutes.

### Integrating renewable energy generation

The actual measurement of loads in the distribution transformer also supports the optimizing of the integration of renewable energy into the network. It is only through measurement that the utility can gain knowledge about the decentralized generation that can and will be brought into the distribution network from renewable sources.

The S650 can measure energy, voltage and current for consumed and produced energy both bi-directionally and per phase. S650 can also be connected to external devices and it can provide remote control functionality for inverters, stepping transformers and various loads, meaning it can also be used to control future renewable energy production in terms of demand and generation management, storing and voltage regulation.

### Further benefits with smart metering

Transformer monitoring will also provide reference measurements for residential smart metering. The full benefit of this functionality can only be achieved when households are covered by smart meters.

The energy consumption data provided by the S650's transformer measurements can thus be compared with the consumer's consumption measurements, providing information on possible losses, unauthorized energy usage or any other unmetered consumption.

### Blueprint for a rollout

Landis+Gyr and Stedin have realized the project by working closely together and reviewing the process thoroughly after each phase. Positive results were already evident from the first phase, prior to the pilot project. "With benefits immediately visible during the first installation phase, we took the decision to proceed with the installation of the S650 solution," stated Henk Fidder, Expert Asset Manager at Stedin, at the launch of the pilot project at the end of 2012. Based on the experience in Houten, the existing centralized system in the province of Utrecht will be replaced and a combined rollout with smart street lighting, a smart grid solution and smart metering is planned for the Hoeksche Waard island in 2014.

Rolling out a combined smart grid infrastructure for street lighting decreases costs and secures the assets for the future. The achievements of the project are the minimization of the outage in the output voltage, the provision of up-to-date knowledge about the transformer stations, pro-active maintenance as well as net planning for future grids that use solar panels and have electric vehicle charging. All of that aids the creation of a sustainable energy supply for completely different energy network structures and management. It also prepares the networks for the energy supply of the future.

### Our contribution:

- + Smart solution to serve street lightning and transformer monitoring
- + 150 S650 Smart Grid Terminals to 75 transformers
- + Extensive testing under laboratory conditions before installation phase
- + In 2014, the technology will be implemented in Hoekse Waard Island, covering 200 transformers and 40,000 consumers for smart metering.

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