

## Press information

# Blockchain pilot reveals potential of decentralised home storage systems for tomorrow's energy infrastructure

- **TenneT and sonnen complete a blockchain project that is unique in the world**
- **The pilot project shows how decentralized home storage systems can be networked using blockchain technology to stabilise the power grid**
- **Blockchain technology via open-source-based solution from IBM will be developed further**

*Bayreuth, Wildpoldsried, 8 May 2019.* Decentralised home storage batteries that are networked via a blockchain and integrated in the energy supply system can stabilise the power grid. The pilot project launched by transmission system operator TenneT and storage specialist sonnen in 2017 has now demonstrated this.

"We've shown for the first time how it's technically feasible to utilise blockchain technology so households can stabilise the power grid via their home storage systems. Because the results of our pilot project are so promising we intend to examine other blockchain projects more in-depth," announces Manon van Beek, CEO of TenneT. She envisages tremendous potential in the use of battery storage systems to render the electricity grid more flexible, as Germany may have decentralised PV battery storage systems with a total output of up to 10,000 megawatts by 2030 (Grid Development Plan 2030/version 2019). This would be more than the output of all pumped storage power plants currently installed in Germany. If such small decentralised flexible units are to be able to stabilise the electricity system, van Beek believes, the regulatory framework must be developed further and the right incentives established for such flexibility solutions.

"The project has enabled us to demonstrate how the networked storage systems of our sonnenCommunity can cope with not only primary balancing power but also redispatch. As a virtual battery can be formed in this way at almost any point in the electricity grid, thereby making it independent of location, this technology is the key to a new energy system requiring the utmost flexibility. In the power grid of the future with an ever greater share of renewable energies, networks comprising home storage systems will assume many more of the grid services that conventional power stations are predominantly used for at present," states Jean-Baptiste Cornefert, Managing Director of sonnen eServices.

In the pilot project, TenneT used a virtual power station comprising home storage systems specially provided by sonnen for this. The blockchain solution networked in this way was developed by IBM. Tests served to ascertain the extent to which emergency measures such as curtailing wind farms can be reduced in the event of bottlenecks in the power grid. The intelligent charge management of the battery storage systems adapted itself individually to the respective situation in the TenneT grid, the storage batteries either taking in or giving out excess electricity in a matter of seconds, as and when required.

In practical terms, sonnen continually communicated to TenneT how much capacity the home storage systems can provide together for redispatch at specific times. If TenneT accepted one of these automatically generated offers, the sonnen batteries were charged with surplus energy in a region where, for instance, there was too much wind energy. To main equilibrium, other sonnen batteries simultaneously discharged the same amount of energy in a region where it was actually required. This process was documented in a blockchain in real time. To this end, the measured values of all sonnen batteries were transmitted to IBM's Hyperledger blockchain. This means every kilowatt hour provided – whether stored or discharged – was saved uniquely. Each kilowatt hour received a cryptographic signature for this, which is unique and transparent and which can be used for settlement.

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The pilot project now completed revealed how blockchain technology has the potential to become a key technology when it comes to the efficient provision of grid-stabilising measures from storage batteries and other decentralised storage systems such as electric car batteries. Amongst other things, this relies on the blockchain technology being able to establish a manipulation-proof environment (private blockchain), in which transactions involving millions of individual systems are automated so they can be performed with low transaction costs. The innovative technology thus enables a decentralised data exchange that is just as fast as it is secure, while ensuring that the flexible application of individual units is coordinated with the distribution system operators. As the use of a large number of small decentralised storage systems for stabilising the power grid is only possible with coordination across grid operators, TenneT will collaborate closely with distribution system operators in the advanced development of its blockchain pilots.

The blockchain solution developed by IBM is based on Hyperledger Fabric, a blockchain framework application, and one of the Hyperledger projects hosted by The Linux Foundation. The solution ensures an especially high level of transparency and makes it possible for transactions between market participants to be verified. This is supposed to significantly simplify the participation of providers of decentralised distributed flexibilities in servicing the transmission system operator. The blockchain technology enables streamlined processing that meets TenneT's requirements for security and accuracy of the data as well as the requirements of discretion through access rights.

The pilot project is just one in a series of innovative projects in which TenneT is researching the development of new flexibility options and more intensive use of data. The aim of these projects is to get the power grid into shape for the challenges posed by the energy transition: With the grid expansion stipulated by law establishing the basis for energy policies aimed at fulfilling the development targets behind the energy transition by 2030, new technologies enabling the power grid to be utilised to a greater extent, such as storage and digitalisation, are also necessary if a share of 65 or 80 percent renewable energy is to be integrated.

#### **About TenneT**

TenneT is one of the leading transmission system operators in Europe. With approximately 23,000 km of high-voltage and extra-high voltage lines in the Netherlands and Germany, we offer reliable and safe power supply to 41 million end users. We employ around 4,500 employees and are one of the largest investors in national and international power grids both onshore and offshore. We are particularly focused on promoting and implementing the energy transition and integrating the energy markets of northwest Europe.

#### **Taking power further**

#### **About sonnen**

The sonnen Group is one of the world's leading manufacturers of intelligent power storage solutions and a pioneer in the development of technologies for clean, decentralised and networked energy systems. As one of the fastest growing technology companies in Germany and Europe, sonnen has already received numerous international awards. With its virtual battery comprising digitally networked home storage systems, sonnen offers new and highly innovative energy services for grid operators and customers. sonnen is represented along with its products in numerous countries while maintaining a number of sites in Germany, Italy, the UK, Australia and the USA. Since March 2019, sonnen has been a hundred percent subsidiary of Shell, belonging to the business unit Shell New Energies.

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