

Will blockchain lead to a smarter energy grid?

An interconnected energy system of the future requires decentralised, democratic and resilient electricity trading. Ever more companies are wishing for blockchain technology to become a core feature of the European electricity market

[Blockchain technology](#) enables secure trading without a centralised intermediary like an exchange. This makes it attractive not only for [cryptocurrency](#), where it was applied first to bypass banks, but also for **large decentralised energy systems with a high share of renewable energy**. In other words, it's attractive for the European energy market of the future based on "[prosumers](#)"; consumers who produce electricity using own generators.

Experts assert that several important trends exist in the European electricity market that make blockchain a desirable choice. **Firstly, there is a shift from a [futures market](#)** - where consumers buy electricity for future use, in a bid to mitigate the risk of price increase - **to a spot market** - where electricity is bought to be delivered the next day at the latest.

The shift happens as a reaction to sinking electricity prices, driven by low-cost renewable energy: end users aren't afraid of price rises and want to benefit from increasingly cheaper electricity. **Since blockchain processes transactions nearly in real time, it can become a blueprint for spot electricity trading.**

Next, transaction volumes on the power market are decreasing. The share of the so-called "15-minute contracts" - containing as little as 0.1 MW of electricity to be delivered during particular 15 minutes on the day or the next – is rising. Such **small transactions are better suited to the intermittent power generation from renewables**. In these conditions blockchain performs better than traditional energy exchanges. Its transaction costs are lower with the absence of payment to traders and various service providers.

At the same time, **integrating energy systems of European countries means a novel approach to electricity trading** to enable transnational commerce at lowest cost, without local intermediaries. And the cryptocurrency market has proven that blockchain is able to create global trading networks.

Another important tendency is the development of [residential renewable generation](#) with small installed capacity, which is a challenge to integrate into the traditional wholesale electricity market. The latter was created to operate with a

finite number of bulk power producers, whereas blockchain can handle a vast number of participants.

Christoph Burger, a senior lecturer at the international business school [ESMT Berlin](#), stresses that **“the major trends in energy transformation are decentralisation and digitalisation.** And blockchain is an ambassador of both.”

In this context, the latest achievements in blockchain [enable smart contracts](#) that can become a basis of the automated energy trading of the future. Basically, these are programs executed automatically under certain conditions. It means that a smart meter can be programmed to buy energy when it costs X euros, and a renewable generator can be set to sell electricity on the grid for Y euros. When X=Y, the smart contract is executed, and the electricity is sold from the renewable generator to the consumer.

“Smart contracts are certainly a major feature of the modern blockchain. They have the potential to facilitate trading in the future, be it wholesale trade or retail markets and peer-to-peer transactions,” opined Dr. Ole Langniß, CEO of blockchain start-up [OLI Systems](#).

So far, electricity trading with blockchain [is being tested](#) on micro-grids. The above mentioned start-up is partner in a prominent blockchain pilot project in Europe together with a range of partners. The project aims to test the blockchain technology, including smart contracts, creating a self-sufficient community of producers and consumers.

“Currently we have the first residential customers connected, and industrial customers are expected to follow soon. Generally, they’re either “first movers” or employees of the participating utility. I think their main motivation is to be involved in a cutting-edge project, to try out now what can boost renewable energy use in the future,” explained Dr. Thomas Brenner, chief technology officer of OLI Systems.

International utilities like E.ON, Enel and Vattenfall [have also expressed](#) their interest in the technology.

“Large utilities can be very interested in using blockchain applications. Not in a disruptive sense, but rather as a software tool that either makes existing processes in their business easier and cheaper (for example, smart contracts can automatically disconnect debtors) or lets them offer new products and services (i.e. shared use of storage batteries),” said Thomas Brenner.

However, a number of problems still need to be solved. “Scalability of the transactions is a key challenge,” said Christof Burger. In other words, **blockchain can process [a limited number of transactions per second](#)**, and this number is way below the capabilities needed in an interconnected smart energy system. To deal with this, energy blockchains are trying alternative approaches to validate new blocks.

Issues related to data access and protection must also be resolved. To operate fully and autonomously, the system needs to collect and share grid data via connected devices. This requires both robust data protection and compliance with the new [General data protection regulation](#) (GDPR).

Many [regulatory obstacles](#) are to be overcome. Currently, blockchain is not reflected in European energy laws, and the new technology must meet the existing regulatory requirements. At the same time, market players are seeing their roles change significantly with blockchain. Electricity suppliers who buy energy from producers to sell it to final consumers are getting pushed to the side as producers and consumers start trading directly. And the role of grid operators is also changing to accommodate the new market landscape.

Blockchain is still in its early days, and the variety of possible future scenarios is huge. It can become the key to a sustainable energy system or remain in a niche of peer-to-peer transactions in microgrids.

By Alina Fedosova