



# Application of enterprise blockchain solution for energy trading

Solution Brief

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## Executive Summary

### The purpose

The document describes current challenges and limitations for energy trading market and provides solution how actors of secondary market can use digitization (tokenization) process to improve existing operations' model, allow trading among participants themselves (P2P trade), exclude intermediaries and related restrictions and increase market liquidity. The document is intended for large energy producers, distributors, resellers, corporate energy buyers.

### Mission statement about the concept

Energy is one of the leading areas where blockchain implementation is inevitable. In addition to using blockchain to account for the electricity wastes as well as to identify and improve the smart counters operation, its another global area of application is energy trading.

To sell the produced energy to end users, traditional energy trading solutions involve centralized utilities—most often through local intermediaries. In this regard, there are a number of restrictions problems which are mostly associated with the fact that energy is being traded in a centralized way. Some of them are as follows:

- Energy pricing is being established by a centralized authority;
- Trading is usually conducted through a few large direct buyers, resulting in an extremely high entry barrier for traders;
- Energy is being resold by intermediaries, resulting in higher price for end consumers;
- Low liquidity: resale or reduction of the amount of energy purchased is a rather complicated process that implies parties changing their agreements (which involves corresponding costs);
- Difficulties while selling household generated energy (large infrastructure and high capital costs required).

The speed of the solar panels development and the pace of their introduction into everyday life results parties who were previously just consumers to be electricity suppliers. By installing solar panels on their house, the owner produces energy and consumes it. If the amount of energy produced exceeds the amount consumed, the house owner can sell this energy to other consumers.

In such conditions, it is important to build a platform which not only presumes the purchase of energy from large producers, but which also allows for the trading among the participants themselves (P2P trade), excluding any intermediaries and related restrictions. When building such a platform, it is necessary to solve a number of tasks related to ensuring efficiency and flexibility of management in the field of energy trading.

The TOKEND blockchain software platform ([www.tokenend.io](http://www.tokenend.io)) can solve these challenges, mitigate threats and increase energy trading efficiency:

- Company receives a white-label infrastructure solution (with user wallets, modules for user management, payment gateways, administrative interface, and an internal exchange) that it fully customizes and creates new opportunities and revenues for energy trading;
- Ability to create a secondary market. The price of energy on the secondary market is regulated directly by the supply and demand, and not by one centralized party;
- Compared to traditional solutions, tokenized energy are much easier to receive for a customer;
- The record of each transaction is easily traced;
- Effectiveness—and liquidity—of energy trading reaches a new level, which was unattainable before: energy is being traded instantly and peer-to-peer, resulting in the decrease of energy losses;
- High level of transparency for the platform customers.

## Benefits of the TOKEND blockchain platform for energy trading:

### For the platform owner:

- Extension of the partner energy ecosystem;
- Simple reporting as well as control of energy costs by system participants;
- Getting a broad picture of how much electricity has been produced and wasted;
- Saving time and costs on launching a new business campaign;
- Technological basis for expanding business through exclusive services with multi-channel partners and personalized offers;

### End-Customer (Account owner):

- Transparent energy price formation;
- An ability of not only being a consumer but a supplier: sell the produced, unconsumed energy for a fair market price;
- Energy is being sold by micro contracts—time and amount are specified and are easily changeable.



## Proof of value of blockchain in energy trading

- Eliminates the central point of failure;
- Enables simple and fast partner cooperation;
- Introduces real-time data settlement and reconciliation;
- Enables a frictionless system;
- Real-time, transparent audit;
- Immutability of the system state while being distributed among the few parties.

## Blockchain advantages

- Single source of truth for all participants which is provided without intermediaries;
- Reduced transaction costs, which are a result of disintermediation;
- Shared data enables near-real-time updates across the network for all parties.

# Expanding energy trading with Blockchain

## Concept overview

A decentralized solution for energy trading using blockchain technology implies the distribution of TOKEND nodes among organizations being energy providers, which are physically connected to end users. In addition to energy consumers (e.g., electrical appliances), users can have both energy storage (batteries) and energy producers (generators) in the form of, for example, solar panels.

In order to receive the energy from the supplier, a user pre-arranges the corresponding contract and transfers the necessary amount to the supplier's bank account. In response, an energy provider issues the appropriate amount of tokenized energy assets, which essentially are obligations to supply energy. Further in the text, we will apply to them as ENRG . Each ENRG is tied to a certain amount of energy (for example, 1 kw) that a user can receive from a supplier. Note that the ENRG token is fungible since there may be a large number of issuers (energy suppliers).

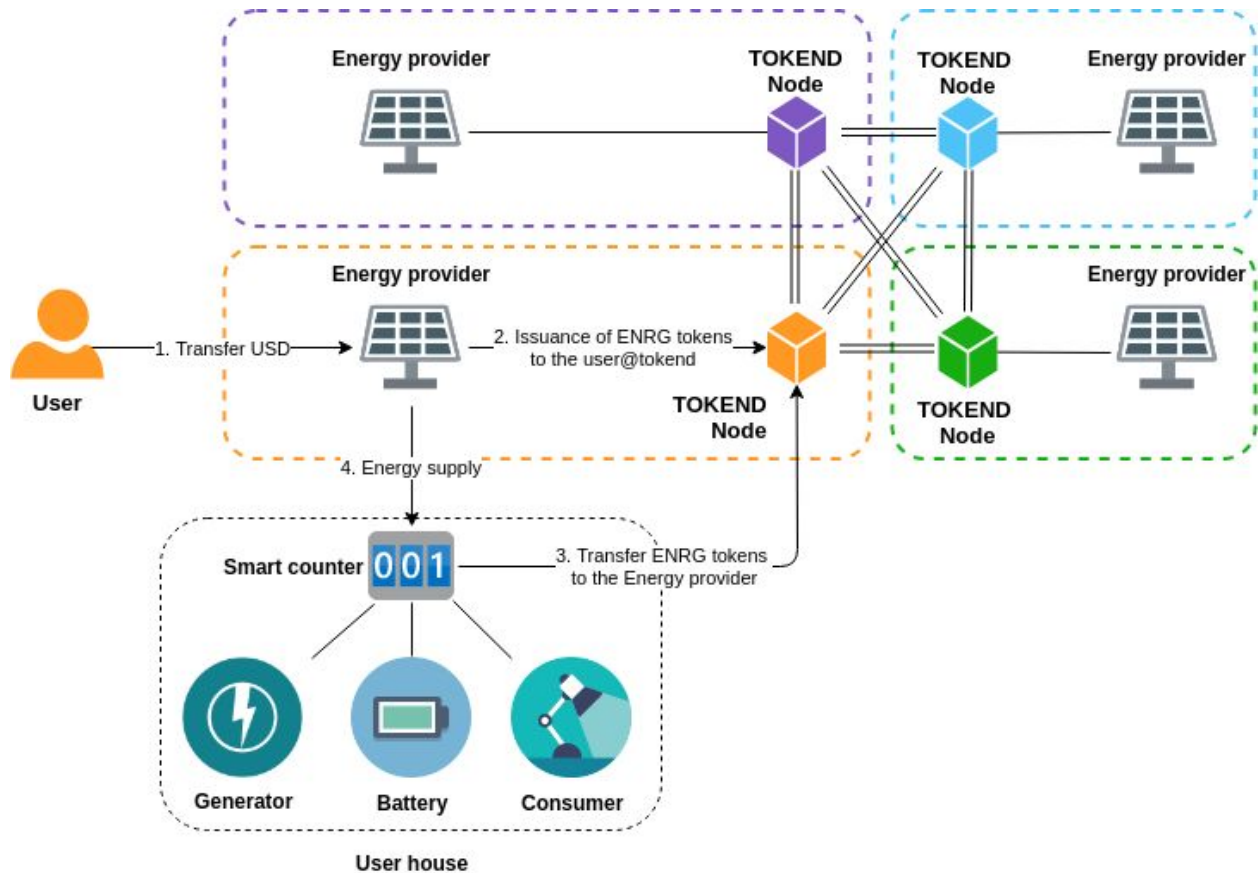
In case a user needs to receive energy, he/she transfers a certain amount of tokens on the energy provider's balance. Once the transfer is complete, the energy provider supplies required amount of energy. Noteworthy, in this case the interaction can be organized in such a way that a user will send micropayments (several tokens) every short time interval, resulting in the following benefits:

- Cheating the consumer (e.g., deny to supply the requested amount of energy) doesn't make sense since each contract deals with small amounts and can be terminated at any time;
- The supplier can provide energy both after receiving the transfer and in advance. In both cases, the contract can be instantly terminated if a user refuses to make transfers (while the loss of funds will be minimal).

The platform allows a user to purchase excess energy (energy produced minus energy consumed) from other users. In this case, the buyer can either determine the required price for the energy themselves or automatically select the offer which is most advantageous at the moment.



## Energy supply



**Figure 1.** Energy supply flow

1. User sends a payment to the energy provider (integration of the TOKEND platform with external payment systems is a default feature, and it is supported via PSIM, Payment System Integration Module).
2. Using the TOKEND Node, the energy provider issues an appropriate number of ENRG tokens to the user's balance. These tokens can be further used to obtain energy from the supplier.
3. Smart counter processes the energy consumption data (from the generator, battery and electrical appliances). Based on the data received, it calculates the needed amount of energy to consume. Next, it sends the transfer of an appropriate amount of tokens to the energy supplier's balance.
4. When receiving a transfer, the supplier provides a user with the appropriate amount of energy. As noted earlier, such an interaction could be performed through



micropayments, which occur in short periods of time. In this case, the agreement between a user and supplier may be terminated at any time.

### Secondary market for P2P energy trading

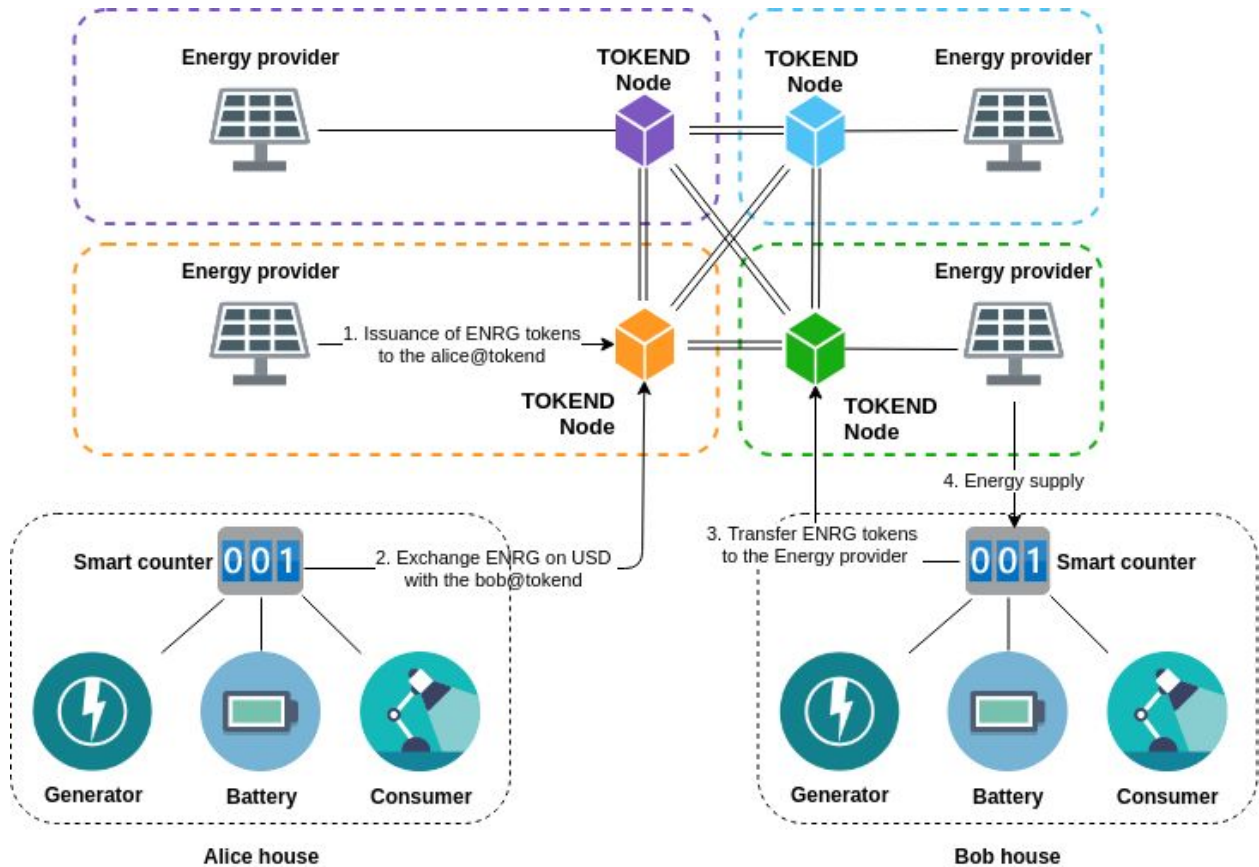


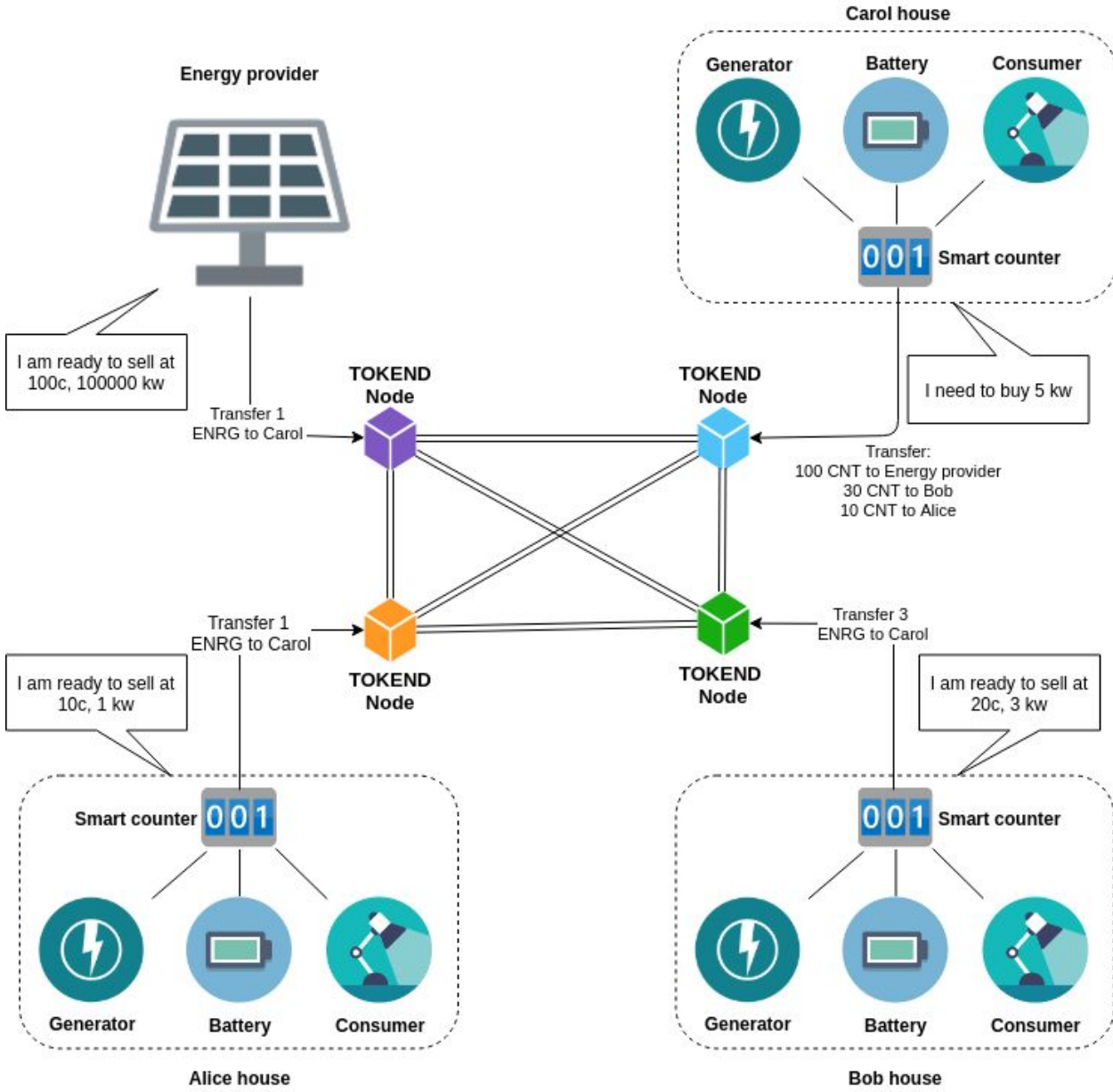
Figure 2. Secondary market functioning

1. Using the TOKEND Node, the supplier releases the appropriate amount of tokens to Alice's balance.
2. Alice can send / sell / exchange received tokens to Bob. In our example, she exchanges ENRG tokens for USD tokens within the platform. Note that USD tokens must be previously issued by the bank (or other payment system), and Bob has to have them on his account.
3. After receiving the transfer, Bob can transfer the received tokens to his electricity supplier.
4. When receiving tokens, the energy provider sends Bob the necessary amount of energy.



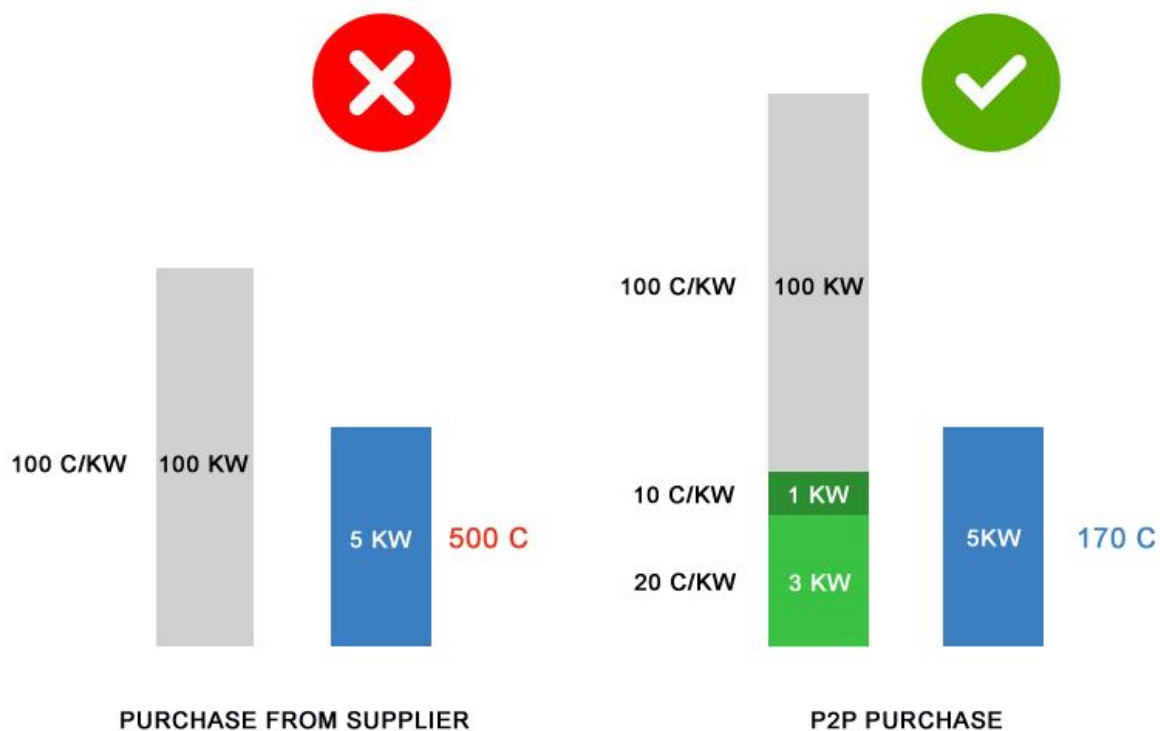
### Energy trading

The TOKEND platform supports p2p energy trading between end users. In addition, each network participant can determine the price for which he/she is ready to sell the generated or unused electricity as well as the price for which he/she is ready to buy it.



**Figure 3.** Energy trading flow

As indicated in Figure 3, Carol needs to buy 5 kw of energy. She can do it directly from the supplier at a price of 100c per kw. However, at the same time, Alice and Bob also want to sell energy at a much lower price (10 and 20c per kw). Therefore, they place appropriate orders on the platform. Carol is ready to buy energy from them, which she does in the future (and she only has to buy one missing kw from the energy provider). As a result, she consumes 5 kw of energy at 170c instead of 500c (Figure 4).



**Figure 4.** Energy trading options

## Summary

TOKEND is a blockchain-based ecosystem which allows expanding currently energy trading with the necessary set of features all implemented in a universal client digital wallet. Seamless integration with payment services and gateways ensure better user experience, which will increase the revenue from the clients as well as the efficiency of churn management.

## Learn More

<https://tokend.io/>

<https://tokend.io/downloads/>

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## About TOKEND

TOKEND is a white label blockchain software platform that consolidates best practices of tokenization solutions. It allows you to issue, transfer and exchange your assets with a high level of privacy, security, and auditability while following regulations of your jurisdiction. TOKEND is designed for enterprises who are willing to take advantage of tokenization or experiment with the blockchain technology without the need for maintaining the expensive team of blockchain experts and within the shortest time to market.