Blockchain vs DAG for small energy community

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1. INTRODUCTION

Energy has become a socially worrying topic, due to the economic fluctuations and complicated legislation, in countries where clear legislation is often a very important brake on policies for the implementation of renewables. If we also take into account that climate change is one of the most worrying problems for many countries, and that in many cases it is very difficult for the public administration to involve private companies and individuals in mitigation and the implementation of measures. Often the legislation itself is not enough or comes into contradiction in certain aspects that prevent a greater degree of implementation.

2. DESCRIPTION

The proposed solution consists of a plurality of buildings (residential or services) of a population or an isolated interconnected nucleus forming a micro-network of the necessary infrastructure services. The infrastructures are shared in the micro-network and have an external connection where there would be a cloud of micro-networks connected from the backbone network. This includes energy: electrical and thermal, telecommunications and water. For this, a management service is available, based on communications and DLT (Distributed Ledger Technology). Where each building would have the capacity of hosting a node to validate the transactions, each building would have a unified control system, as an electronic switchboard, with a logical partition for each infrastructure service. So that the plant would have a flow meter, a router, an electrical and thermal meter, and distributed databases.

The management of both technologies, blockchain or DAG architecture, would be unassisted and automated, so that a central computer to the micro-network could process statistics or manage the maintenance of the micro-network buildings of buildings. The system would be capable of pricing imports and exports of water (i.e., rainwater, Domestic Hot Water…), import and export of electric power from the micro generation of the building and the micro network connected to the external electrical network or Smart Grid.

While the bandwidth of the telecommunications network would be distributed, and assignments could be made to recover at posteriori. So, when a building needs to be self-sufficient in the micro-grid, it will involve a purchase or a sell. While when there is self-supply in the building the surplus can be sold or sold. In these infrastructures the municipal administration needs to be involved, since part of the infrastructure would run through public domain paths, so the town councils should be part of the exchange network.

Although the two options may be valid in this solution, a comparison of both is presented. To make the case more concrete, IOTA (Tangle – DAG) is going to be the DLT technology selected. Blockchain technology is suitable for scenarios in which it is required to store some data in increasing order, without the possibility of modification or revision and whose trust is intended to be distributed instead of residing in a certifying entity.

The most important feature about IOTA is the data structure used, known as DAG, is distributed among all nodes in the network. As in blockchain there is a consensus about the correct DAG. This DLT technology is focused on Internet of Things.

Figure 1 – Tangle (DAG) vs Blockchain data structure

Table 1 – Blockchain vs DLT (IOTA)

	Blockchain	**DLT (IOTA)**
Transaction fees	Yes	No
Transaction speed	Slow	Fast
Miners	Miners	No miners
Micro-transactions	Too expensive	Ideal
Scalability	Not scalable	Scalable

To sum up the best system is IOTA since is cheaper, faster, and ideal than blockchain for micro-transactions and scalable on the opposite blockchain is too expensive for micro-transactions, slower and not scalable..