

Blockchain in energy systems: From centralized to decentralized

Nature Energy, 7: 495–502, 2022

The increasingly distributed energy system poses a serious challenge to traditional centralized management schemes. Blockchain is a promising technique for enabling trusted collaboration without a trusted central authority. Still, blockchains are limited to being

applied in the energy system as they are not specialized for mathematical optimization. To fill this gap, Chen et al. propose a blockchain consensus mechanism (proof of solution, PoSo) tailored to support mathematical optimization problems in energy systems, which replaces the meaningless mathematical puzzle in proof of work (PoW) with a meaningful optimization problem. The inspiration comes from the fact that both the solutions to the puzzle and to an optimization problem are hard to find but easy to verify.

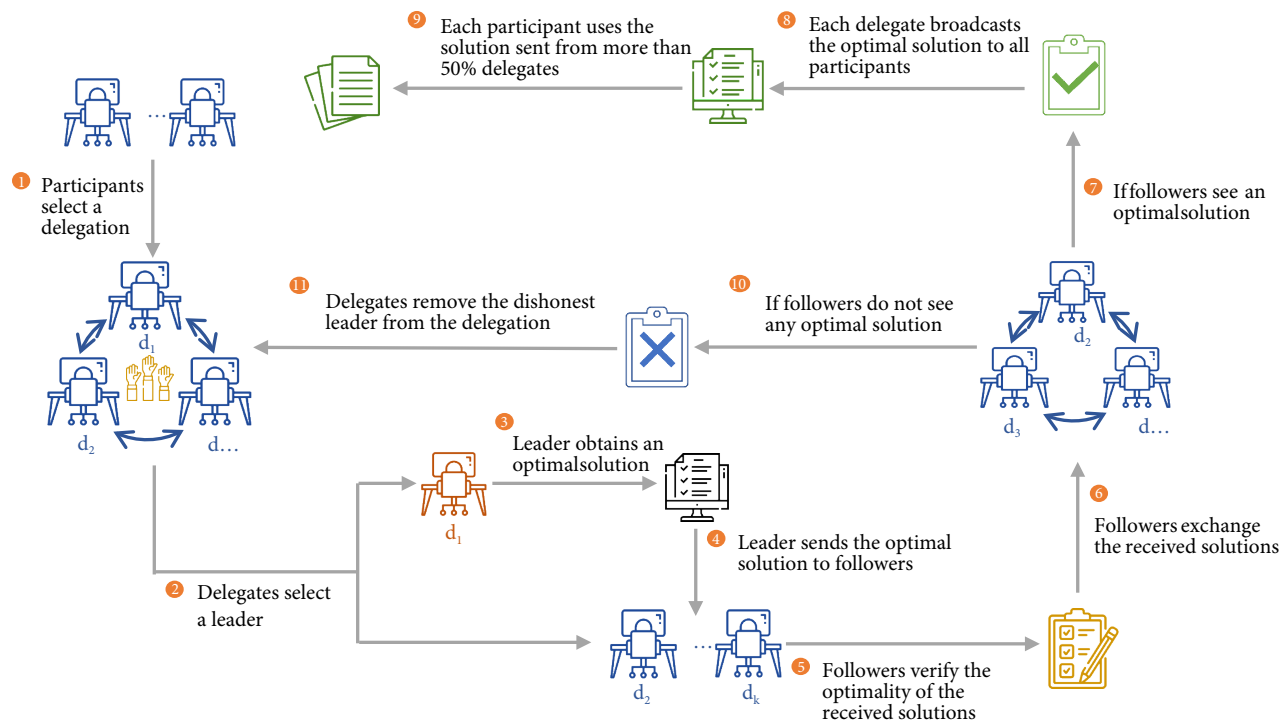


Fig. 1 PoSo flowchart (reprinted with permission from *Nature Energy*, 7: 495–502, 2022. © The Author(s), under exclusive licence to Springer Nature Limited 2022).

Mathematical optimization plays a significant role in control, dispatch and trading in a power energy system. Two case studies were presented to verify the robustness and necessity of PoSo by using PoSo to dispatch and trading for two integrated energy systems. The results illustrated that PoSo could handle the issues of dishonest parties and deliver the correct dispatch and trading results. Besides, PoSo outperforms existing blockchains in terms of computational workload and efficiency.

Sijie Chen¹ and **Ershun Du²**

¹Key Laboratory of Control of Power Transmission and Conversion, Ministry of Education, Shanghai Jiao Tong University, Shanghai 200240, China;

²Low Carbon Energy Laboratory, Tsinghua University, Beijing 100084, China

✉ e-mail: sijie.chen@sjtu.edu.cn

<https://doi.org/10.23919/IEEN.2022.0030>