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The Role of Blockchain in Decentralized Energy Markets

Enabling Transparency and Efficiency

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Powerledger



About Powerledger

Powerledger was founded in 2016 developing world-first blockchain-based energy trading platform. **Today, our technology is available in fourteen countries, across five continents — enabling the trading of cleaner, cheaper electricity, and greater grid stability.**

We believe the grid is only as good as the market behind it. Hence, we create software solutions using **blockchain to spin up marketplaces** that respond to the variable character of renewables, and unlock the potential of distributed flexibility.

Powerledger



Key Regions

Europe, US, India, South East Asia, & Japan

14

Countries using the technologie

Forbes

5 Companies spearheading blockchain for renewable energy



FAST COMPANY





Time problem



Place problem

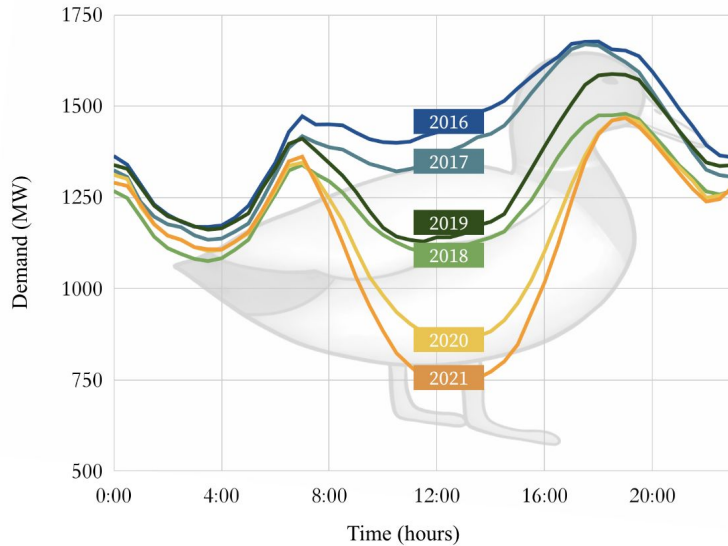
**Both need to be solved to get to
24/7 renewable energy**

The time and place problem



VRE generation cannot be programmed in time to match the electricity demand, limiting the potential of installed renewable capacity.

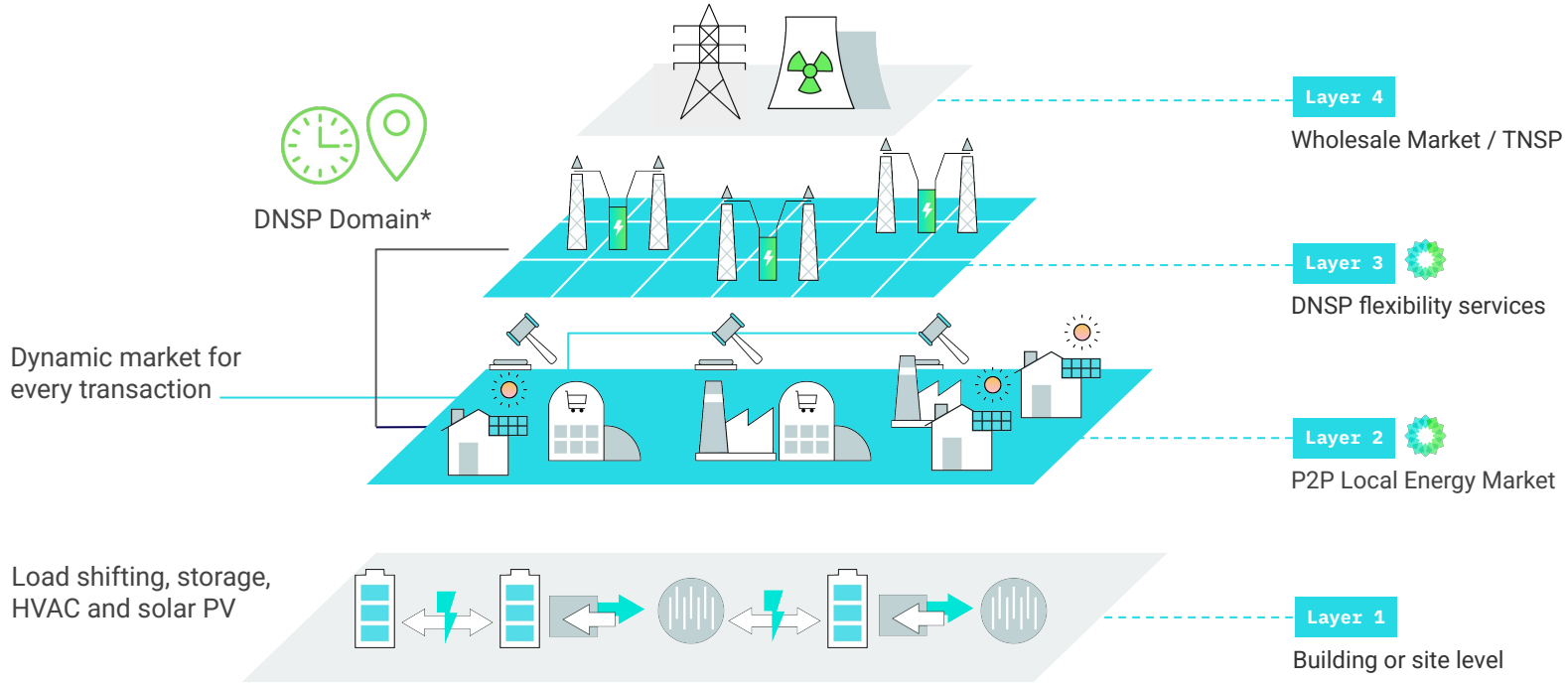
Spatial grid problems around the world, for example north and south Germany.



Duck curve showing trend in solar energy production from 2016 to 2021 in South Australia



Two additional market layers in the new energy paradigm



* These solutions address time and place needs for 24/7 renewable energy

Decentralised Energy Markets

Enables energy end-users to trade energy between each other across the grid or within embedded networks/microgrids.

Customer benefits

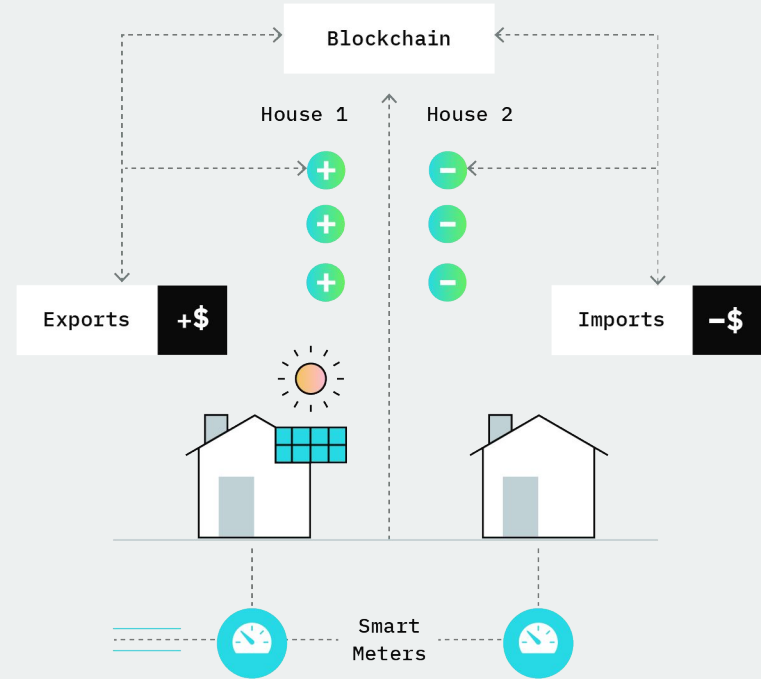
- Access to verified renewable electricity
- Improved visibility over energy consumption
- Potential revenue stream for building managers
- Alternative revenue streams for asset owners

Energy provider benefits

- Ability to save energy costs with detailed usage data insights
- Improves sustainability of development
- Extra incentive to install solar on new developments

Features

- Real-time settlement
- Detailed billing and usage data
- Automatically converts electricity credits to fiat currency
- Transactions viewable on the blockchain



Blockchain for energy trading



1. Decentralised and transparent record-keeping visible for all participants ensuring trust.
2. Instant and automated execution and auditing through smart contracts.
3. Eliminating single point of failure of traditional systems due to decentralised nature
4. Scalable systems that work at any level of operation with high-throughput as a result of Gen3 blockchain
5. Removes the need for centralised authority verifying transactions as transactions are verified by the distributed network.
6. No risk of fraud, as transactions are recorded tamper-proof in the ledger.





1. High Throughput & Scalability

- Handles thousands of transactions per second (TPS)—critical for real-time energy markets where millions of microtransactions occur (e.g., EV charging, P2P trades).
- Solana achieves ~65,000 TPS (compared to Ethereum's ~30 TPS), preventing congestion and delays.

2. Ultra-Low Transaction Costs

- Fractions of a cent per transaction—makes energy trading viable at micro-scale (e.g., fractions of kWh-based transactions). Avoids gas fee spikes ensuring cost predictability.

3. Near-Instant Finality

- Sub-second transaction speeds mean energy trades settle in real time—essential for grid balancing, dynamic pricing, and automated energy procurement.

4. Energy Efficiency

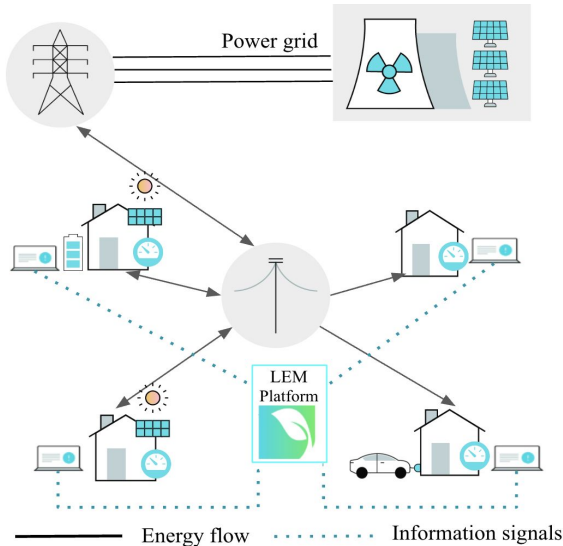
- Uses Proof-of-Stake (PoS) or other low-energy consensus models, unlike Bitcoin's energy-intensive Proof-of-Work (PoW).

Applications of blockchain-enabled platforms in energy markets



Blockchain enables Tracking, Tracing and Trading of energy.

Blockchain-enabled marketplaces bring resilience and flexibility to electricity grids and promotes sustainability.



Applications include



Peer to Peer and grid-flexibility solutions: P2P energy trading for any end-user, choosing energy mix, behind the meter and in front of the meter options, localised and cross-grid options, and options to provide flexibility services to the grid.



Trading environmental commodities: Blockchain based platforms to trade env. attribute certificates (like renewable energy certificate or carbon credits) in a transparent marketplace connected to a registry or directly through a blockchain ledger.



Transparency, tracking and tracing solutions: Recording transactions in the blockchain to provide full traceability using a trustless system. Use cases include renewable energy verification for EV Charging or PPA procurement.

Thank you



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