



BLOCKCHAIN

Introduction to blockchain and its application to Renewable Energy



Introduction

- ▶ Alfred Glickman
- ▶ Software developer
- ▶ Excited by the possibilities of the Blockchain technology
- ▶ Renewable Energy Enthusiast

Introduction

- ▶ There has been much talk of blockchain over the past 12 months
- ▶ Blockchain has been making an appearance in green energy space
- ▶ People have been approached to invest money into crypto currency or tokens
- ▶ I would like to;
 - ▶ Present an overview of the main concepts and reasons for why this technology is being applied to green energy
 - ▶ Explain how these ventures operate and what are some of the things to watch out for

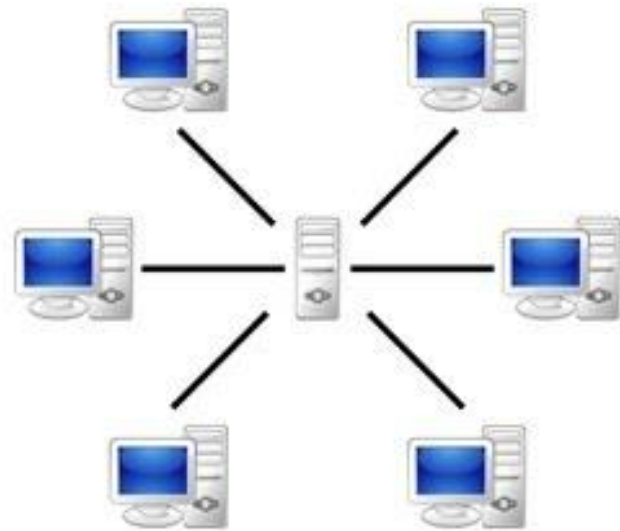
Trust

- ▶ Our society is based on trust.
- ▶ Who do we trust?
 - ▶ Our Family
 - ▶ Government Legislation
 - ▶ Big bands?
 - ▶ Tech Companies
 - ▶ Startups (Uber)?
- ▶ Advanced cryptography?

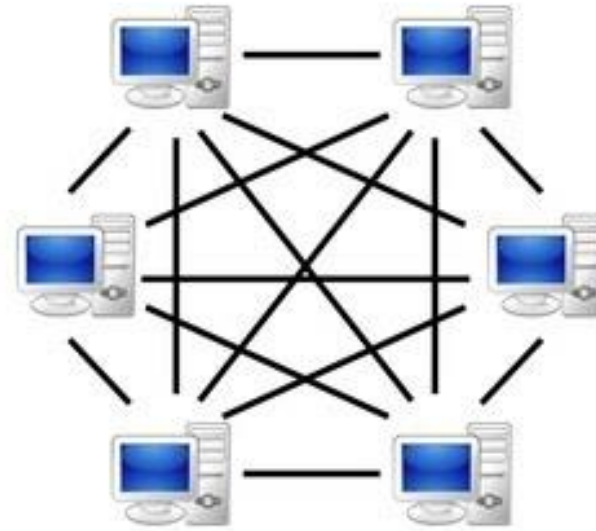


Decentralized model of trust

Making devices trust and operate without a central authority / regulation.



Server-based



P2P-network

The Protocol

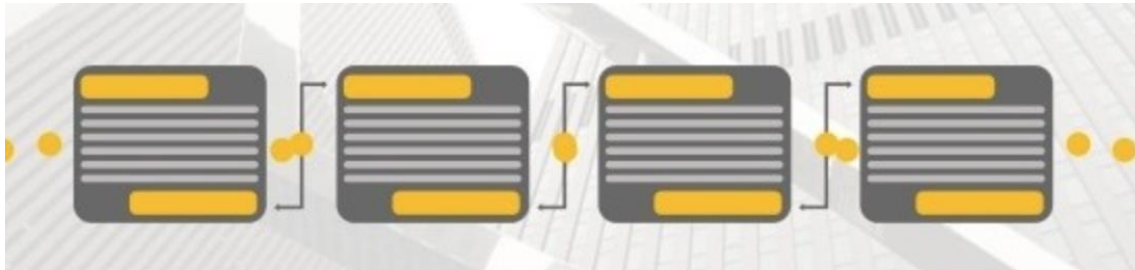
- ▶ All nodes play the same game with the same rules
- ▶ Nodes validate each other
- ▶ Invalid data is rejected





Immutability

- ▶ Central to trust, is the concept of immutability.
- ▶ Every record/block is has a unique signature that prevents tampering.
- ▶ Every new record contains the signature of the previous record.
- ▶ If any records are modified, the entire ledger/chain becomes invalid.
- ▶ (demo) <https://anders.com/blockchain/>
- ▶ Eth live stats: <https://ethstats.net/>



Consensus

- ▶ Majority (over 50%) of peers must agree before a new record is added.
- ▶ A copy of an entire chain (or at latest, the latest section of the chain) is stored by peers.
- ▶ This guarantees availability and resilience
- ▶ You can't destroy the data as long as even one copy remains.



Prevent Spam

- ▶ Spam is a concern. Without any measures in place, every participant can spam and overwhelm the network flooding everyone with data.
- ▶ Proof of Work
 - ▶ Guess a number right to complete the hash
 - ▶ Get rewarded with crypto currency
 - ▶ Write the next block
- ▶ More competition leads to greater difficulty
 - ▶ One bitcoin transaction now uses as much energy as your house in a week



Staking

- ▶ Proof of Stake - Pay your way in
 - ▶ Virtual Mining
 - ▶ Proof of burn
- ▶ Tokens are usually pre-generated early
- ▶ Those with tokens can spend them to write new data

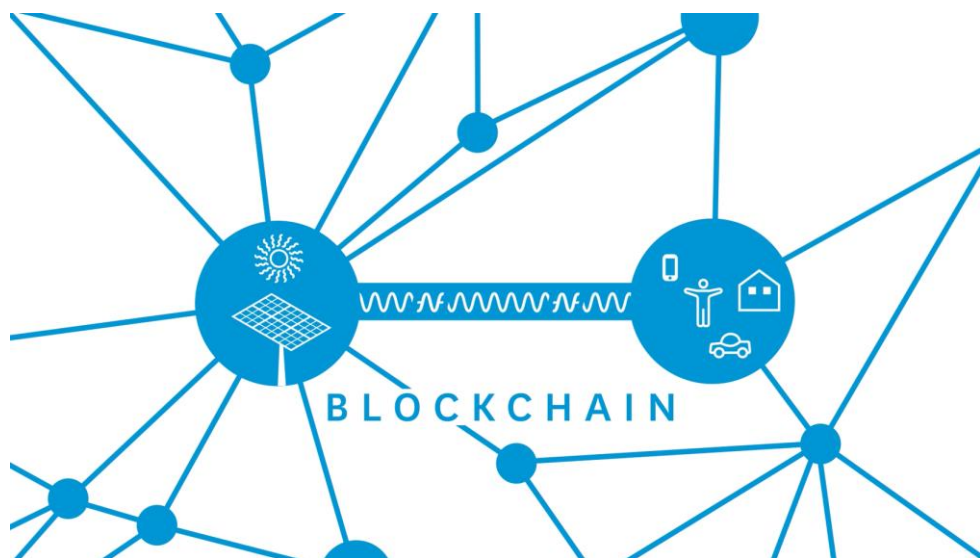


PROOF OF STAKE



Benefits

- ▶ **Disintermediation** - remove the middle men / resellers and etc from existing processes
- ▶ **Transparency** - improve transparency and aid in auditing.
- ▶ **Equal / power contribution** - each peer in a system can be responsible for building, maintenance, improvement and hosting of data and interfaces.



Smart Contracts

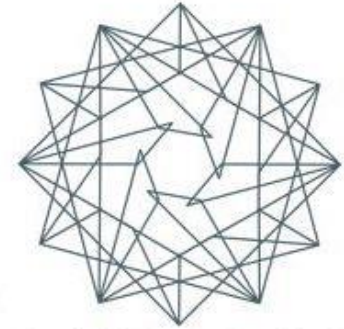
- ▶ Rules and processes stored in a blockchain
- ▶ Can be used to enshrine rules:
 - ▶ Token distribution
 - ▶ Processes operation
 - ▶ Organisational structure
 - ▶ Many more...
- ▶ Entities can make claims on a smart contract
 - ▶ Eg: I have generated a certain amount of electricity and now I am entitled to a certain amount of tokens.



Perfect for the renewable energy space

- ▶ Australia's energy generation and supply system is complex and expensive.
- ▶ Feed in tariffs are falling while energy prices for consumers are on the rise.
- ▶ There are many middlemen; resellers, government and etc contributing to 20% of the cost
- ▶ Homes are disconnecting from the grid making it less relevant and more expensive.
- ▶ Many homes aren't able to generate their own electricity and in certain times, even self sufficient homes need to buy energy externally.
- ▶ Seems like the perfect storm for building a peer to peer trust system.

POWER



LEDGER




Initial Coin Offerings

- ▶ Many ventures in the blockchain space have found a perfect alternative to traditional capital raising - ICO - Initial Coin Offerings
- ▶ Pregenerated Tokens/Coins are sold for money to initial investors. These tokens will be forever stored in the blockchain.
- ▶ Those who want to join and be able to participate **after** the ICO will need to buy those pregenerated tokens from initial investors.
- ▶ Expectation that the system will lead to mass adoption means that entities who invested early (at the ICO) will be able to sell their tokens for a massive profit.
- ▶ ICOs rules and tech is often outlined in a document called the **whitepaper**



Dangers of ICOs and Blockchain schemes

- ▶ The extent of the problem and the promise of wide adoption had attracted many individuals to this space who are eager to get rich quick.
 - ▶ There is a lack of understanding of the technology, its limitations leading to some very tall tales and false promises.
 - ▶ Government legislation is still catching up to provide consumer protection.
 - ▶ There is a real lack of knowledge and tools for keeping peoples virtual assets like crypto currency safe.
 - ▶ Your crypto currency exchange isn't a bank!
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▶ Your Questions?



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