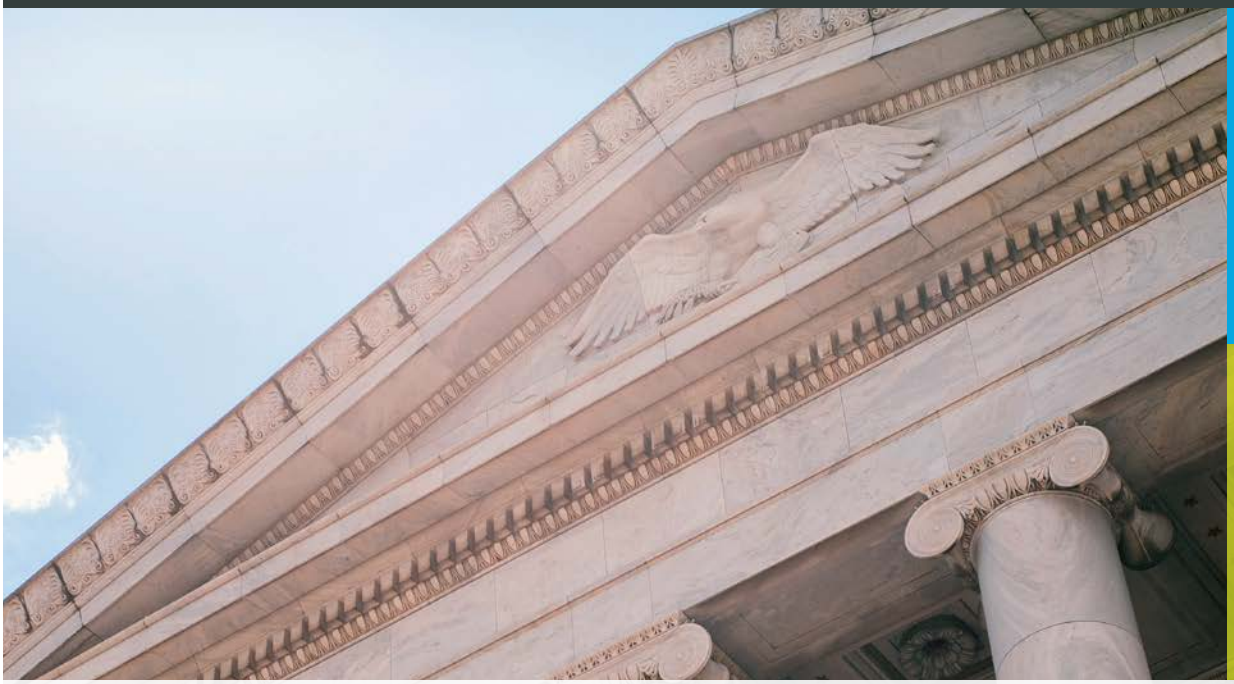

GOVERNMENT
guide to
BLOCKCHAIN

SIMBA

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WHAT IS BLOCKCHAIN?

Blockchain in its simplest form is digital information divided into blocks and linked together in a public or private peer-to-peer network. Let's look at this simplified example below. Each block represents a country. Contained inside each block are city names from that country.

Each block contains a set of unique characters, derived from the information contained inside that block, called a hash. The block of U.S.A. has cities Chicago, New York, and Houston. So for this example, the hash could be "CNYH".

Every successive block includes the previous block's hash, binding the blocks together. This hash makes the blocks tamper proof. If someone edits the first block to add Boston, the new hash becomes "CNYHB". The succeeding block of England has already stored the hash as "CNYH". This creates a mismatch, which in turn, breaks the chain and through consensus the update is rejected.

Internet apps, like Facebook, are currently centralized. All data and programs are housed on company-owned servers. When using a web service, your device requests need-to-know information. On a blockchain, the ownership of data is fully distributed. Data doesn't live on just one device or server, but is replicated on all the devices in the network.

The distributed nature of blockchain also greatly enhances security. Each device checks and validates the block for consistency across the entire network. The information is hosted locally on each individual device, making the system virtually incorruptible or immutable (once data is added it can't be changed or deleted). If someone does modify a block on their device the chain will be broken and the network will consider what the majority says as correct.

TYPES OF NETWORKS

CENTRALIZED

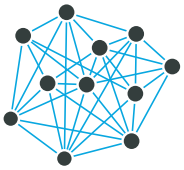
Most common type of network. Users connect to a central server, which is the agent for all interactions.

DECENTRALIZED

A network of computers configured to allow file sharing with everyone or with selected users.

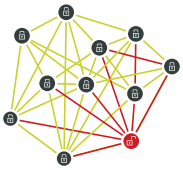
BLOCKCHAIN USER TYPES

Can be public or private and vary in size and structure



ANONYMOUS

Each user has a copy of the blockchain and participates in confirming transactions independentl.y



REGISTERED

Permission is required for users to have a copy of the blockchain and participate in confirming transactions.

HOW BLOCKCHAIN WORKS

When a transaction is requested on the system, it is broadcast to a peer-to-peer (P2P) network consisting of interconnected computers. Each computer in the P2P network is called a node. Each node checks and validates the transaction for consistency across the entire network.

Once validated, the transaction is put into a group with others to create a block of data to be added to the ledger. At regular internvals, these blocks are grouped, logged, and linked in a chain with other blocks – a blockchain. Once logged, this chain is permanent and can't be altered.

WHY GOVERNMENT SHOULD BE USING IT

Blockchain is a great example of enabling a public-private partnership that seeks to merge interest of the federal government and commercial innovation while increasing cohesion and efficiency. Blockchain is designed to be a principle-based regulation system that provides high safety standards, legal certainty, and a stable environment for transactions. It provides an immutable (unchanging), transparent record of the truth.

Blockchain and smart contracts have the potential to increase the speed and efficiency of government and public services. Governments are the custodians of citizens' vital information (Social Security numbers, tax information, votes, and identities). The security built into blockchain could add a new level of trust and transparency while addressing data protection and privacy concerns.

WHY IS IT SO IMPORTANT FOR GOVERNMENT?

- Blockchain allows for the transparency and security government requires.
- Having no single point of control also means no single point of failure. Important for industries such as energy and banking.
- Blockchain saves time and costs while reducing risks

USE CASES

FINANCE AND BANKING

SUPPLY CHAIN AND DOD

INSURANCE / HEALTHCARE

WASTE MANAGEMENT

ENERGY USAGE

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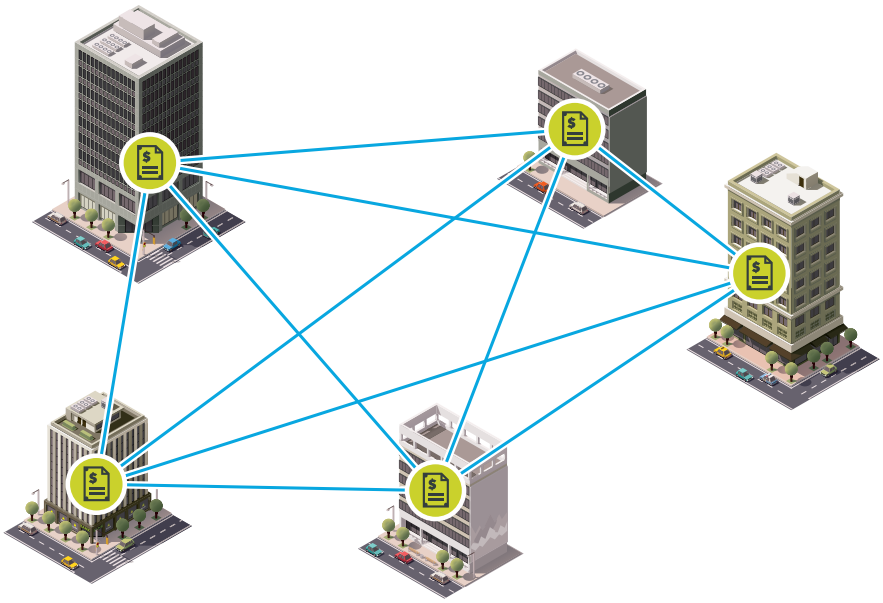
USE CASE

FINANCE AND BANKING

Suppose a number of banks want to keep a private, distributed ledger available to only the participating banks. This would provide the ability to record transactions from each bank in a way that is visible to the participants, but not the public. However, to do this as a private blockchain (to avoid having to use an expensive proof of work algorithm), each bank takes turns signing the blocks under a distributed consensus algorithm such as Byzantine Paxos.

There are a few interesting considerations when using a private blockchain with few participants, such as the ability to overcome its immutability. If there was some major disaster or exception situation, the banks could coordinate to roll back the blockchain and write a different transaction. Additionally, the transactions would not be anonymous because a banking ID would be needed to join.



SMART CONTRACTS

HOW IT ALL WORKS

1

PRE-PROGRAMMED CONTRACT

The agreement rules and conditions are established by all parties and then coded.

2

CHAIN OF EVENTS

If the events specified by the conditions happen, then the code automatically executes.

3

EXECUTION AND VALUE TRANSFER

Once in process, the terms of the contract will automatically transfer the value to the correct parties.

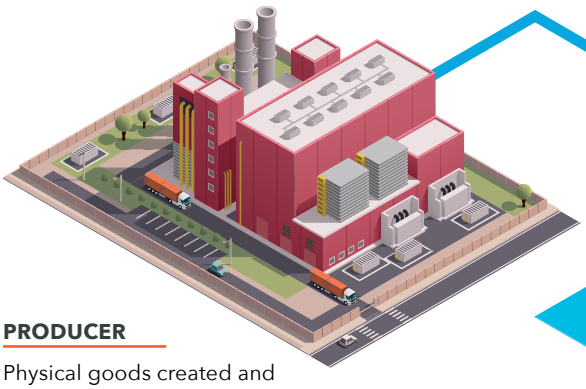
4

SETTLEMENT

The transfer of value to counterparties are recorded to the blockchain.

USE CASE

SUPPLY CHAIN AND DOD



PRODUCER

Physical goods created and added to the blockchain.

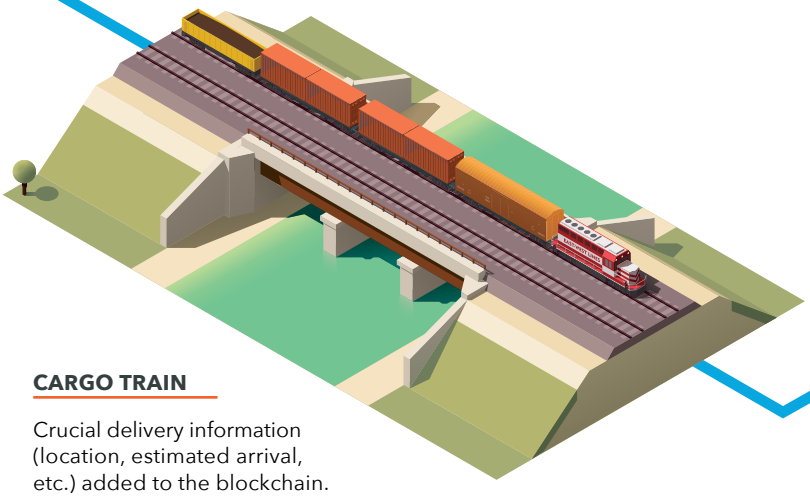
Proof of ownership added.

SHIPPING TERMINAL

The movement of goods to the terminal tracked with blockchain.

SHIP

Quantity and types of goods added to ship recorded to the blockchain.



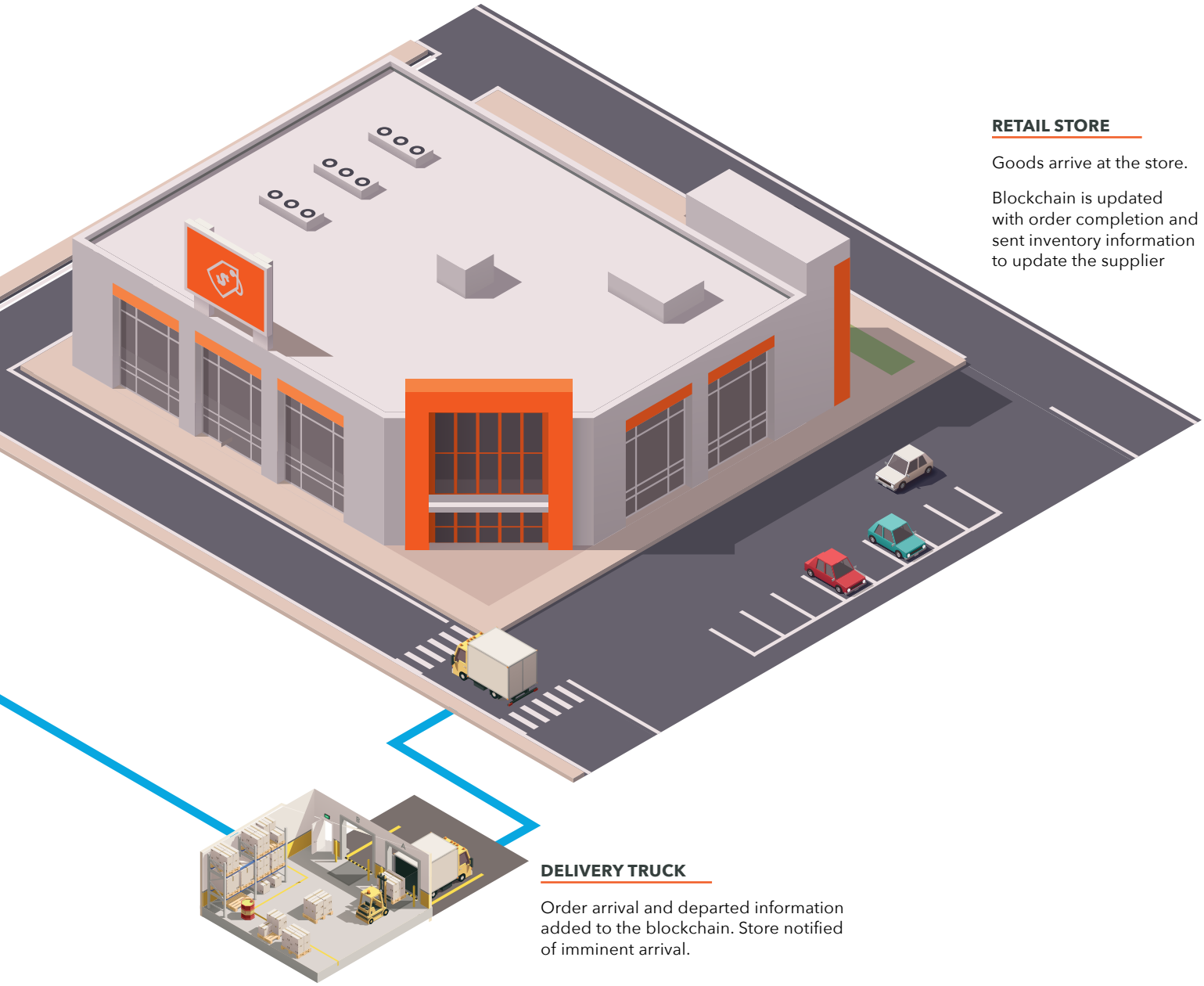
CARGO TRAIN

Crucial delivery information (location, estimated arrival, etc.) added to the blockchain.

Recording the transfer of physical goods from a **producer**, to a **shipping terminal**, to a **ship**, to a **cargo train**, to a **delivery truck,** and to a **store** is an appealing application of blockchain technology. A blockchain could play a crucial role in trust and transparency with end customers.

The blockchain could also be used to monitor supplier actions. Suppliers can record the product produced (such as X number of widgets on a certain date) in a way that other viewers of the blockchain can verify.

With a blockchain, it is possible for warehouses to manage logistics efficiently by avoiding overstocking.



RETAIL STORE

Goods arrive at the store.

Blockchain is updated with order completion and sent inventory information to update the supplier

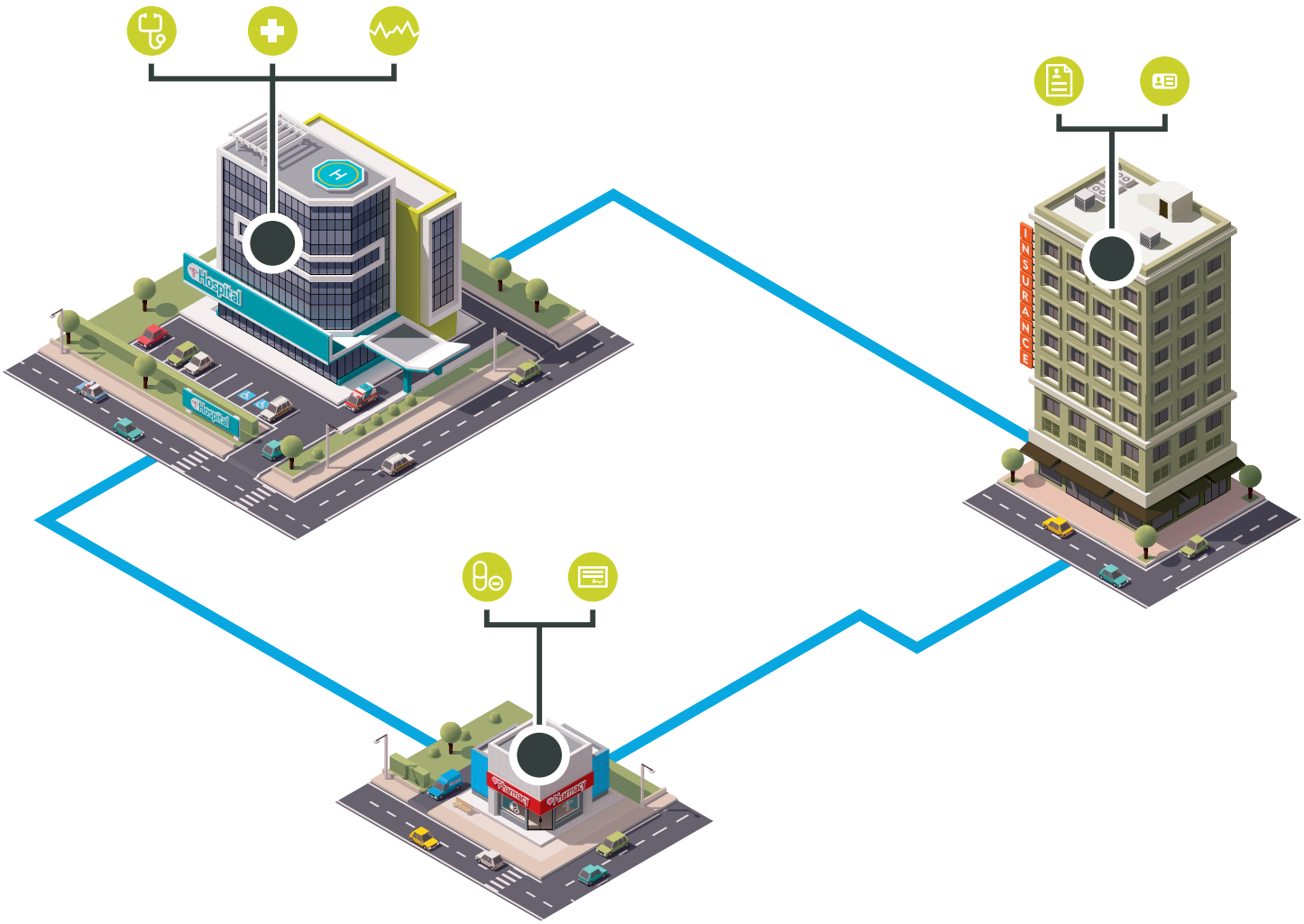
DELIVERY TRUCK

Order arrival and departed information added to the blockchain. Store notified of imminent arrival.

USE CASE

INSURANCE / HEALTHCARE

Whenever someone visits a care provider, a myriad of transactions take place behind the scenes. Administrative transactions from **nurses**, **doctors**, **staff**, **medical providers**, **insurance companies**, and **pharmacies** could all be written to a blockchain. Transactions (such as checking benefits, eligibility, coverage, and the available medicine supply) could be read from the blockchain while providing HIPAA compliance.

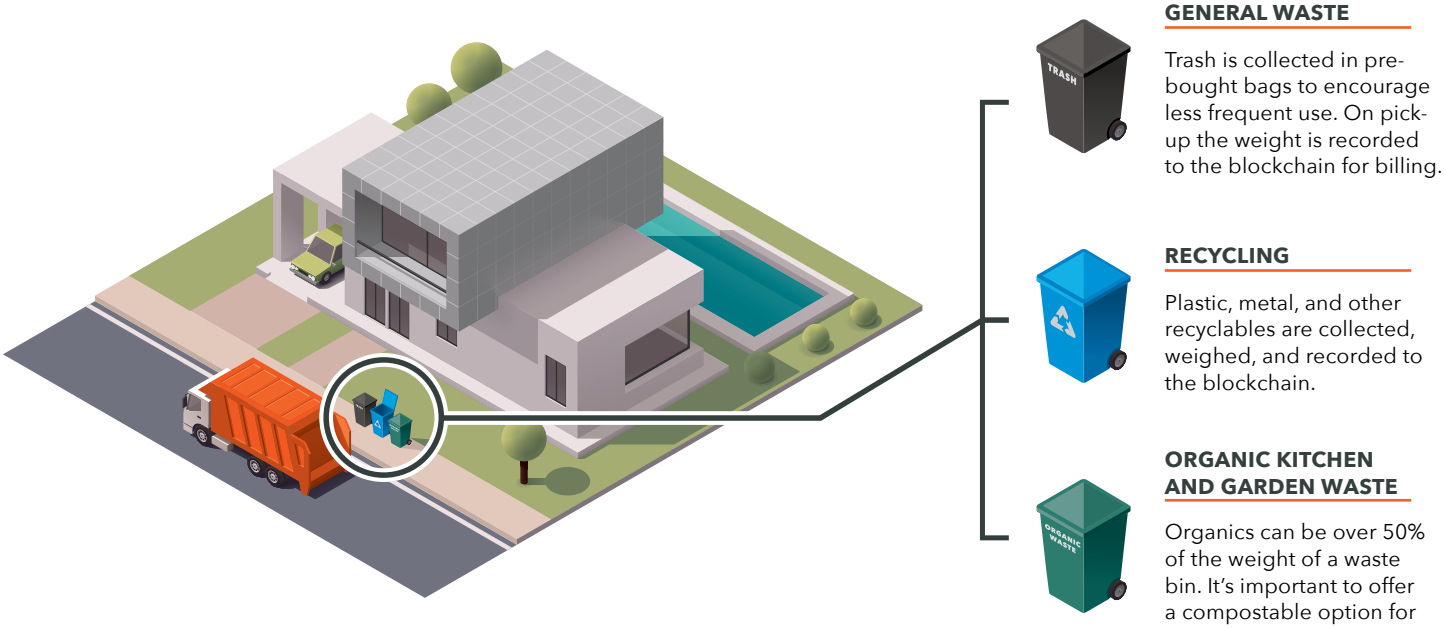


USE CASE

WASTE MANAGEMENT

Each house is given one black garbage bin for general waste, a blue for recycling, and a green for organic kitchen and garden waste. Trash and recycling are collected in pre-bought garbage bags which have unique identifying tokens. Organic kitchen and garden waste is collected for future composting.

Blue bags are for recycling plastic bottles, containers, metal, packaging, and cartons. Black bags are for none-recyclable and none-compostable waste. The cost of collection is the cost of the token on the pre-bought bags.



GENERAL WASTE

Trash is collected in pre-bought bags to encourage less frequent use. On pick-up the weight is recorded to the blockchain for billing.

RECYCLING

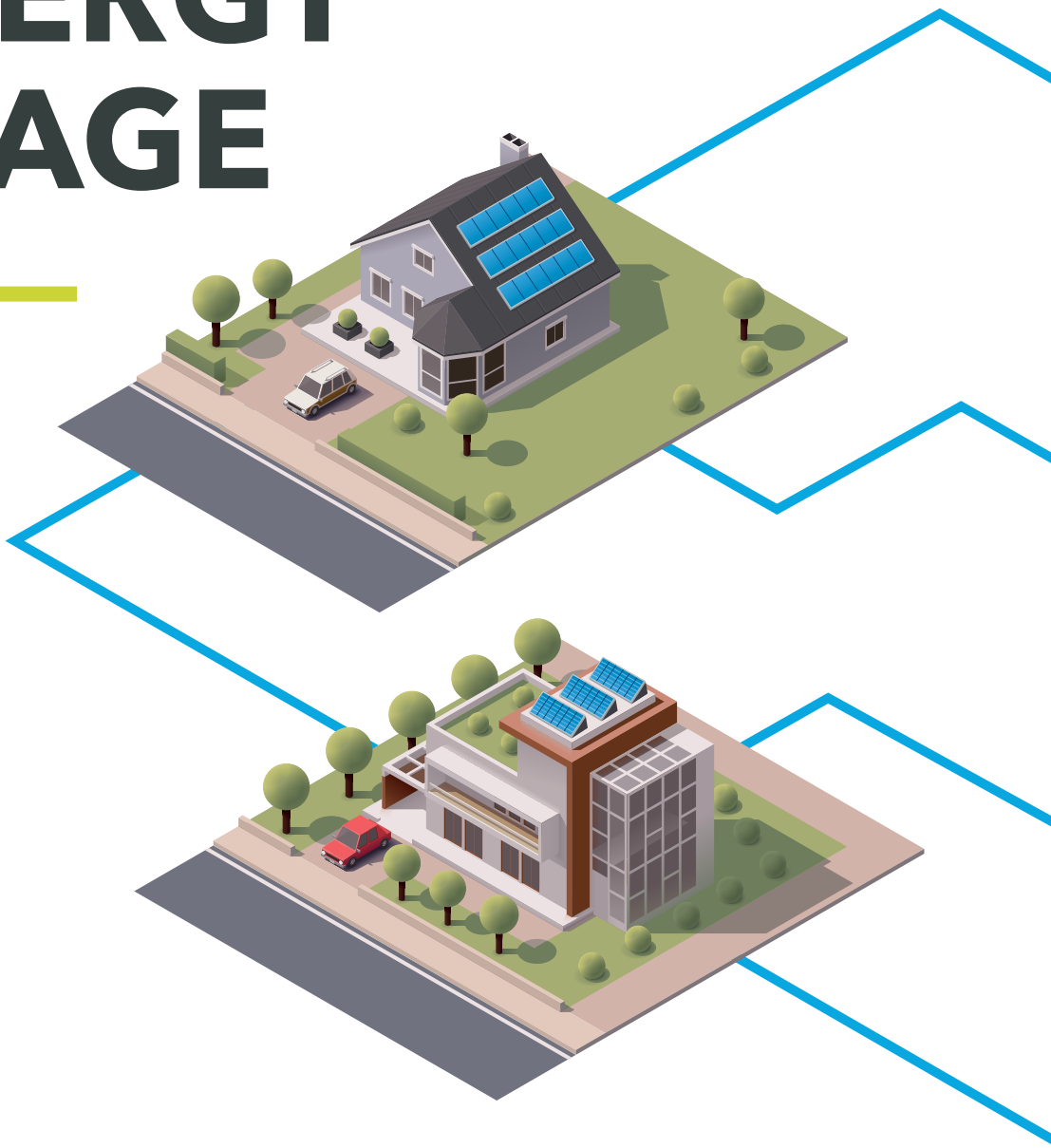
Plastic, metal, and other recyclables are collected, weighed, and recorded to the blockchain.

ORGANIC KITCHEN AND GARDEN WASTE

Organics can be over 50% of the weight of a waste bin. It's important to offer a compostable option for waste managment

USE CASE

ENERGY USAGE

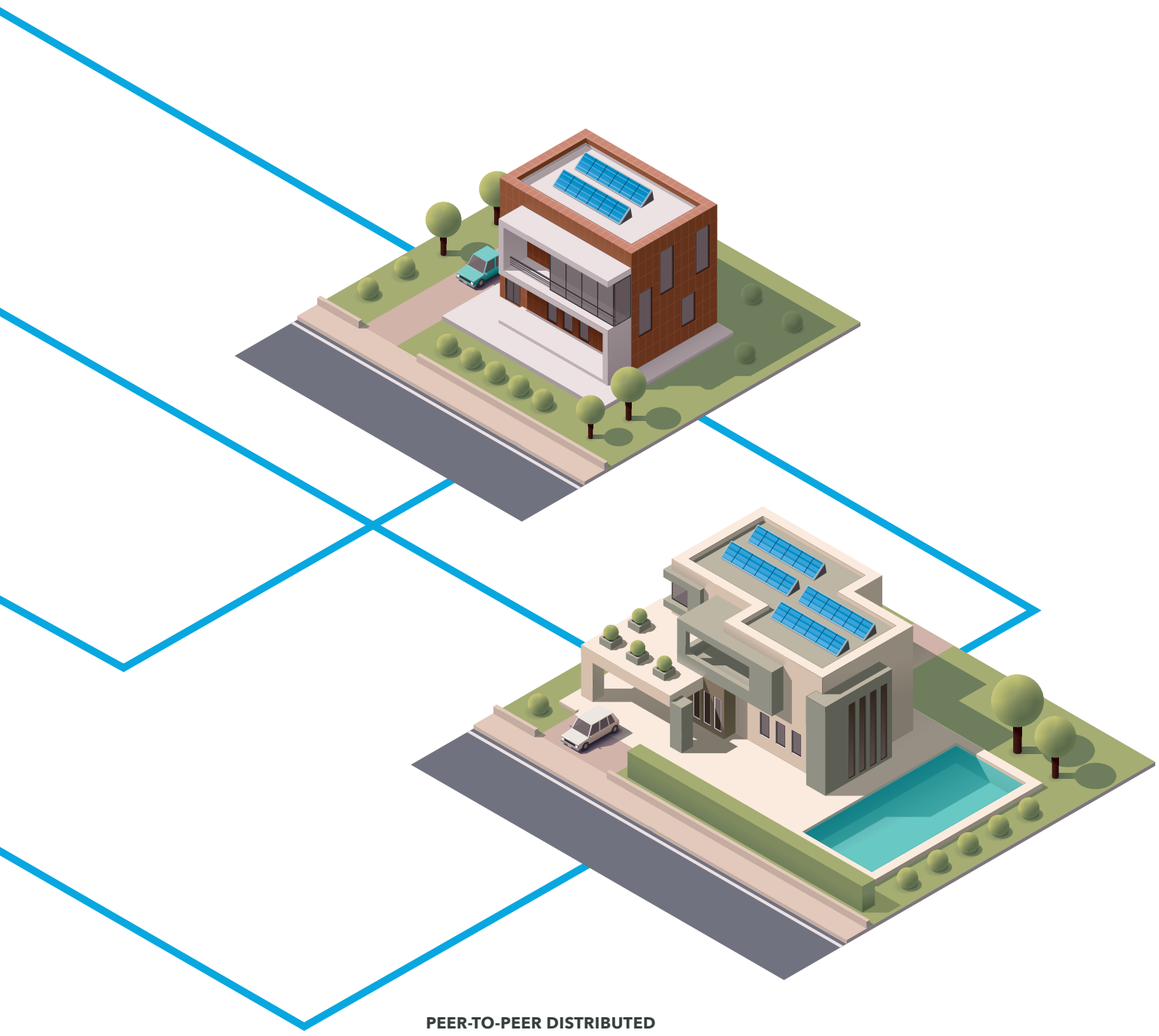


An individual sells or buys the power to a grid, but not to another individual directly. With the dispatching of the grid, the energy can be sold to the person or business in need. Blockchain provides the information necessary to enable usage forecasting. It allows two things with the meters:

1. Recording reading of meters every second or minute for **analysis** use
2. Recoding readings of meters every hour for **transaction** records.

Since the power is transferred to the grid continuously, the amount of energy (kWh) is accounted each hour and the reading is saved to blockchain ledger. Each individual can be viewed as a peer in the recording system.

Load shifting is also a consideration to reduce the grid load in the recording system. The readings of meters are saved in blockchain ledgers. But the "out" reading (sell amount) from solar or wind could be transferred to credits/points to redeem free electricity or cash. A transfer ratio from energy amount (kWh) to rewards (credits/points) could be set dynamically to encourage a prosumer to save energy at a specific time or to sell more power at peak load time to earn more credits/points.



PEER-TO-PEER DISTRIBUTED TRANSACTION NETWORK

Meters, connected through blockchain, record readings every second and can quickly and easily transfer energy to any user needing extra power.

DAPPS

Get started developing your distributed applications (DApps) at SIMBAChain.com.

We can help springboard your development with SIMBA web app and mobile app templates that utilize the power of the SIMBA API.

A DApp has its backend code (smart contract) running on a decentralized peer-to-peer network. The apps frontend (webapp) can be hosted on decentralized storage.

DAPP = FRONTEND + CONTRACTS

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