



The Next Evolution of IoT for The Web3 Ecosystem

IoT, Blockchain and DePIN workshop
SUSS, June 8 2023

Agenda

Part 1 14:00-15:00

物联网与区块链打造可信数据底座

Part 2 15:00-16:00

DePIN的模式介绍以及市场现状

Part 3 16:00-17:00

DePIN DeEnergy项目Arkreen分享



当物联网遇见区块链

打造可信数字底座上的商业模式探索

arkreen

掘金万亿级物联网市场 构建泛信任数字新世界

这个星球上的万物正以我们无法想象的速度飞速连接

我们即将迈入一个万物互联的世界，海量数据汇聚成奔腾不息的信息流改变着我们的日常生活



欧盟率先提出GDPR 将触发全球行业变革

2018年5月25日《通用数据保护条例》GDPR宣布正式生效。该条例面向所有收集、存储或处理欧盟境内任何居民的个人数据的任何组织及企业，无论该企业是否位于欧盟成员国内。不遵守GDPR的企业可能需要面临着2000万美元或4%营业额的罚款。



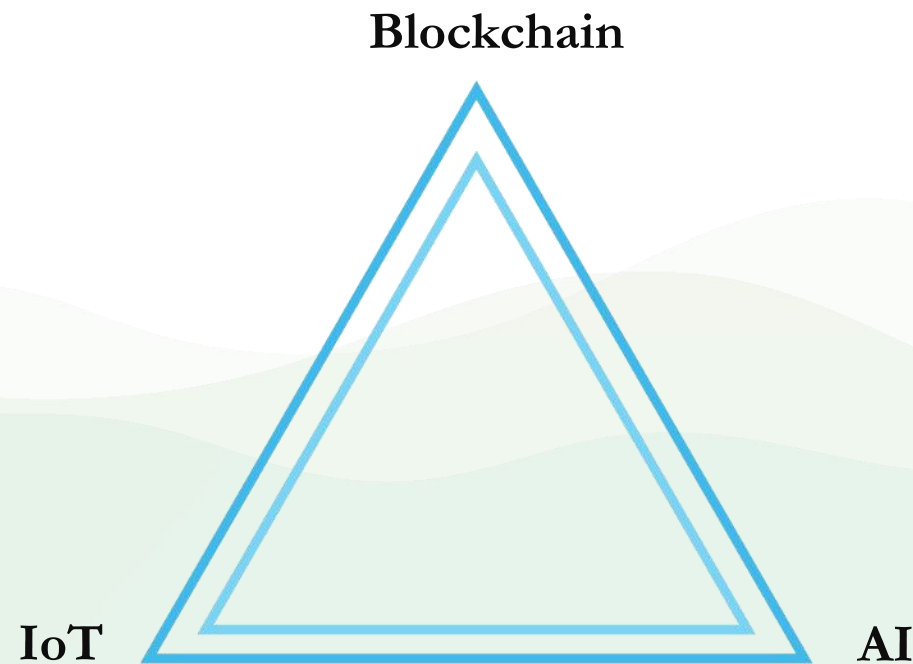
数据可信+隐私保护



未来十年的新技术源于已有技术的“组合进化”

组合是新技术的潜在来源，带来指数级增长

新技术并非无中生有的被“发明”，技术产生于其他技术的组合。由于新技术不断涌现，可能的组合机会成爆炸性的增长，有些技术成指数规模增长。



IoT

- 5G
- 无人驾驶
- 工业4.0
- 机器人

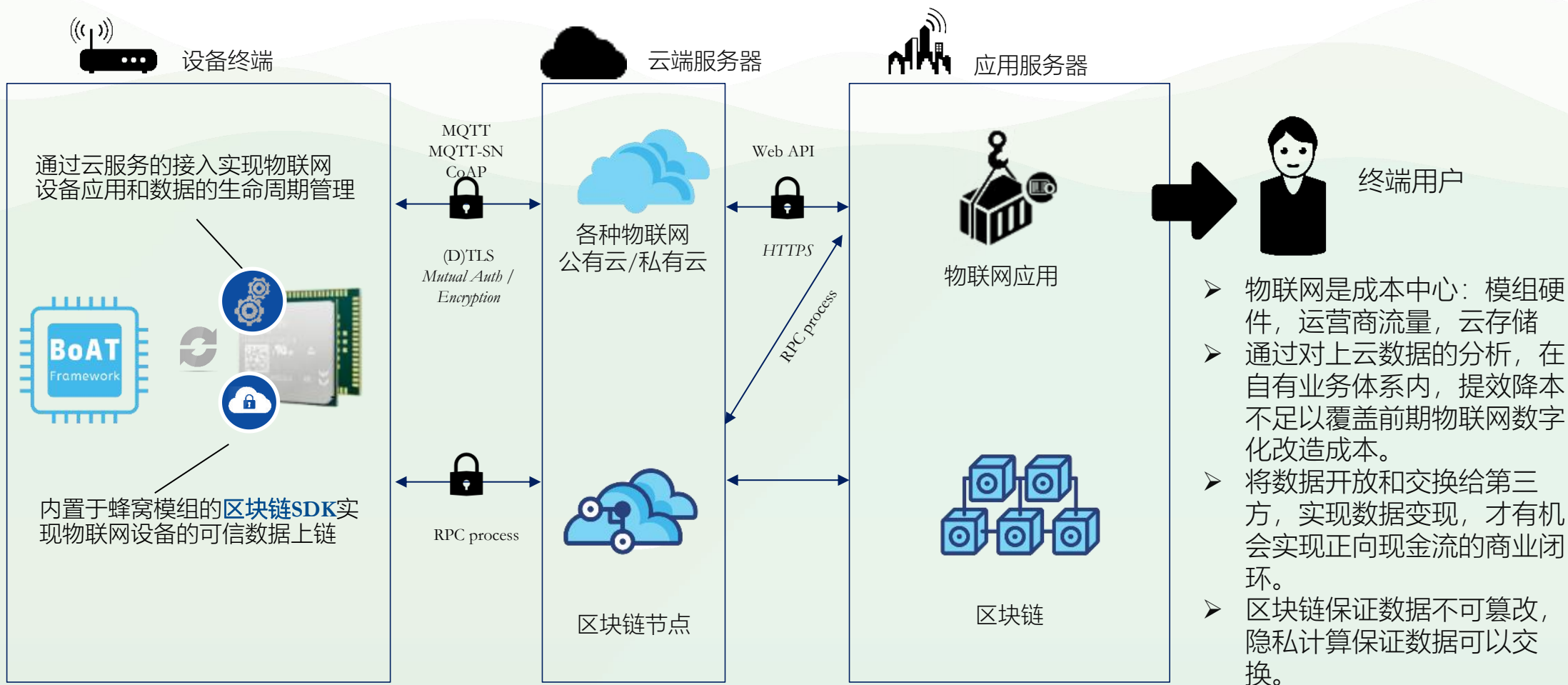
AI

- 机器学习
- 数据科学
- 大数据

Blockchain

- 分布式账本
- dAPP应用
- 通证

物联网数据上云的成本投入，通过区块链将数据开放交换形成收入，“上云+上链”实现数据价值的商业闭环



区块链和隐私计算对物联网 数据开放和交换至关重要

- 区块链技术保证数据不可篡改，实现信任的传递
- 隐私计算技术保证数据在隐私保护下的交换，实现数据重复变现和数据使用的合规性。



物联网数据在全生命周期内的信任机制

数据从物联网设备的源头可信的生成，安全的存储和使用，以及基于区块链与隐私计算的流动与交换，需要始终具备：

- 唯一性
- 不可篡改
- 隐私保护

这是围绕物联网数据整个生命周期的三大属性，也是支撑整个物联网数字经济的信任基础。

数据工厂

云端的可信认证和数据隐私保护

- > 大数据加密
- > 服务器保护
- > 联邦学习

数据市场

数据生命周期内的基于隐私计算的流动

- > 区块链
- > 密钥生命周期管理
- > 隐私计算
- > 安全多方计算

数据源头

设备的可信认证和数据隐私保护



物联网+区块链 -> 上云+上链

解决数据源头的信任问题

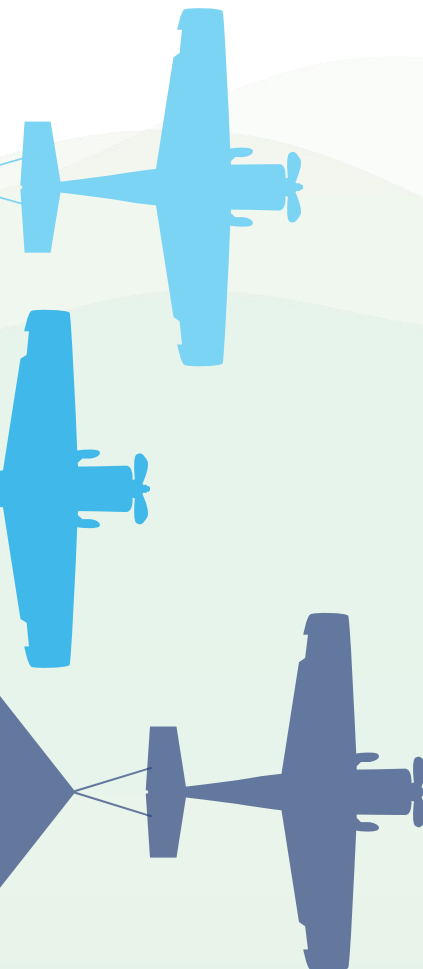


物联网设备可信数据上链 在源头保证数据可信

2025年，全球数据总量将达到175ZB，其中IoT设备数据将达到79.4ZB；同时IoT设备达到252亿台

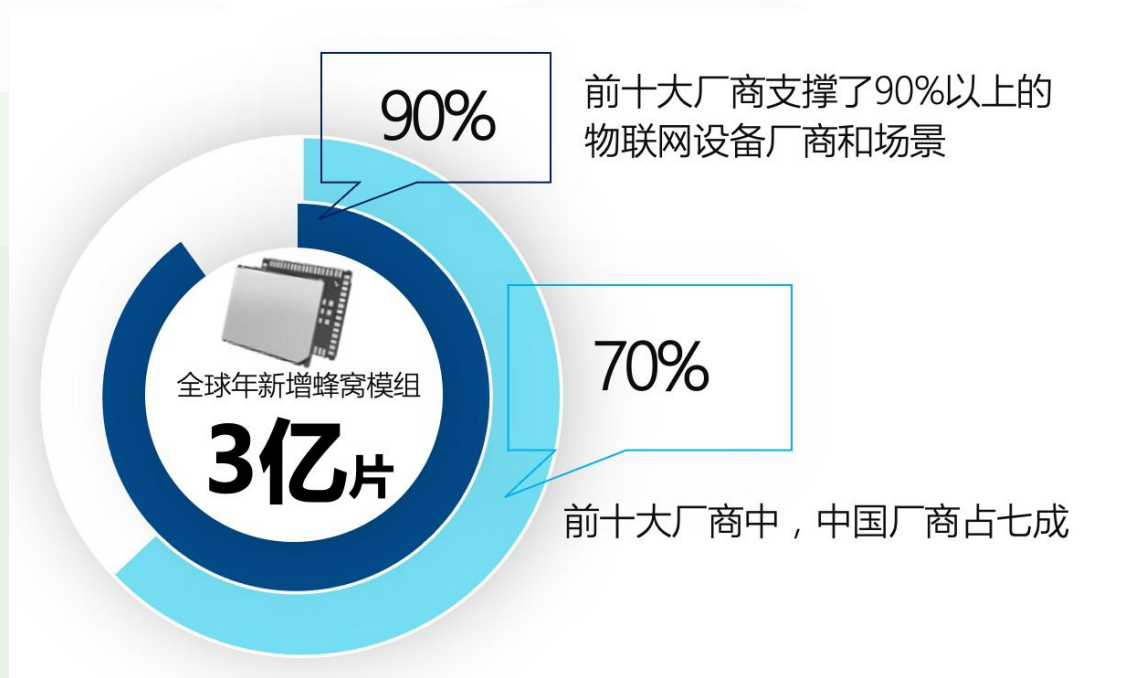
物联网设备是数据的源头，数据在某一场景下通过物联网设备采集产生

在设备侧对可信数据上链，在源头保证数据的可信

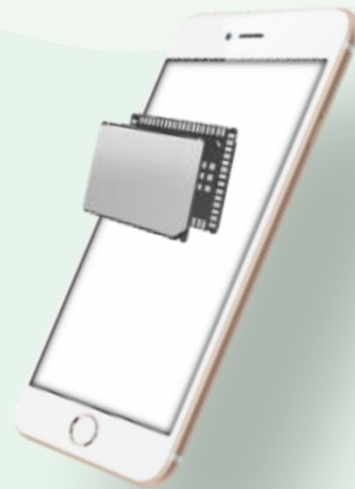


如何将区块链能力赋能到碎片化的物联网设备？

蜂窝模组全球产业链历时20年发展，头部效应明显

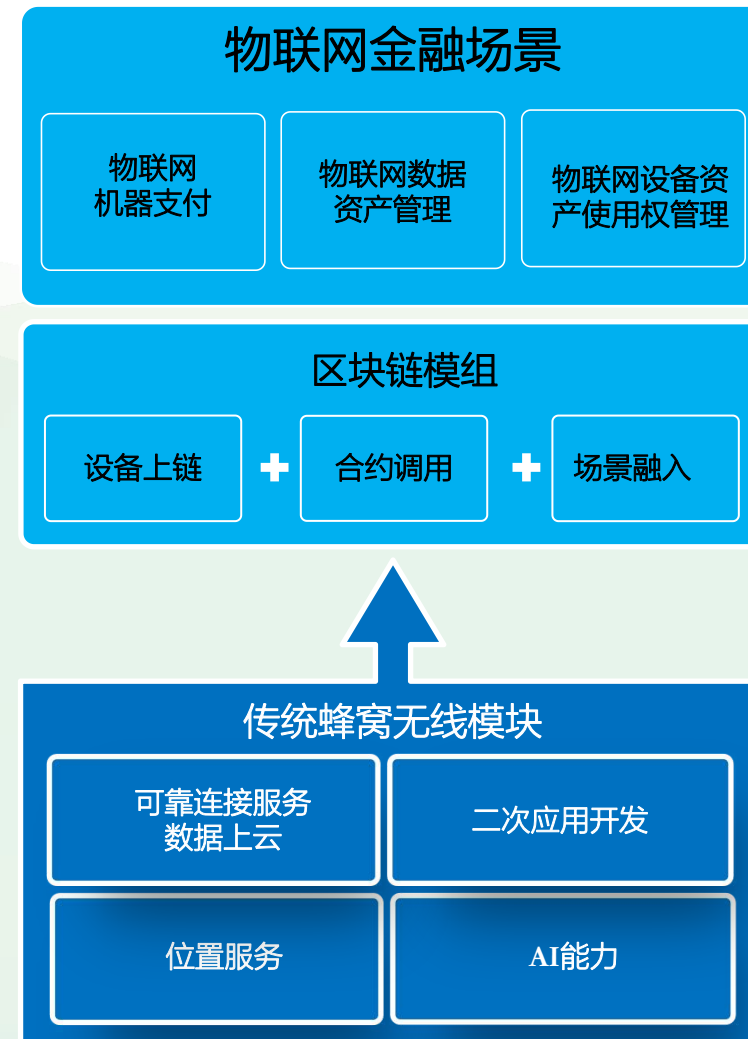
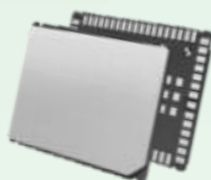


支持区块链能力的蜂窝物联网模组
物联网的可信区块链应用入口



物联网设备即智能机器人，
蜂窝模块之于物联网设备就如同手机之于人

什么是区块链模组?



区块链模组类型与典型应用

智能模组



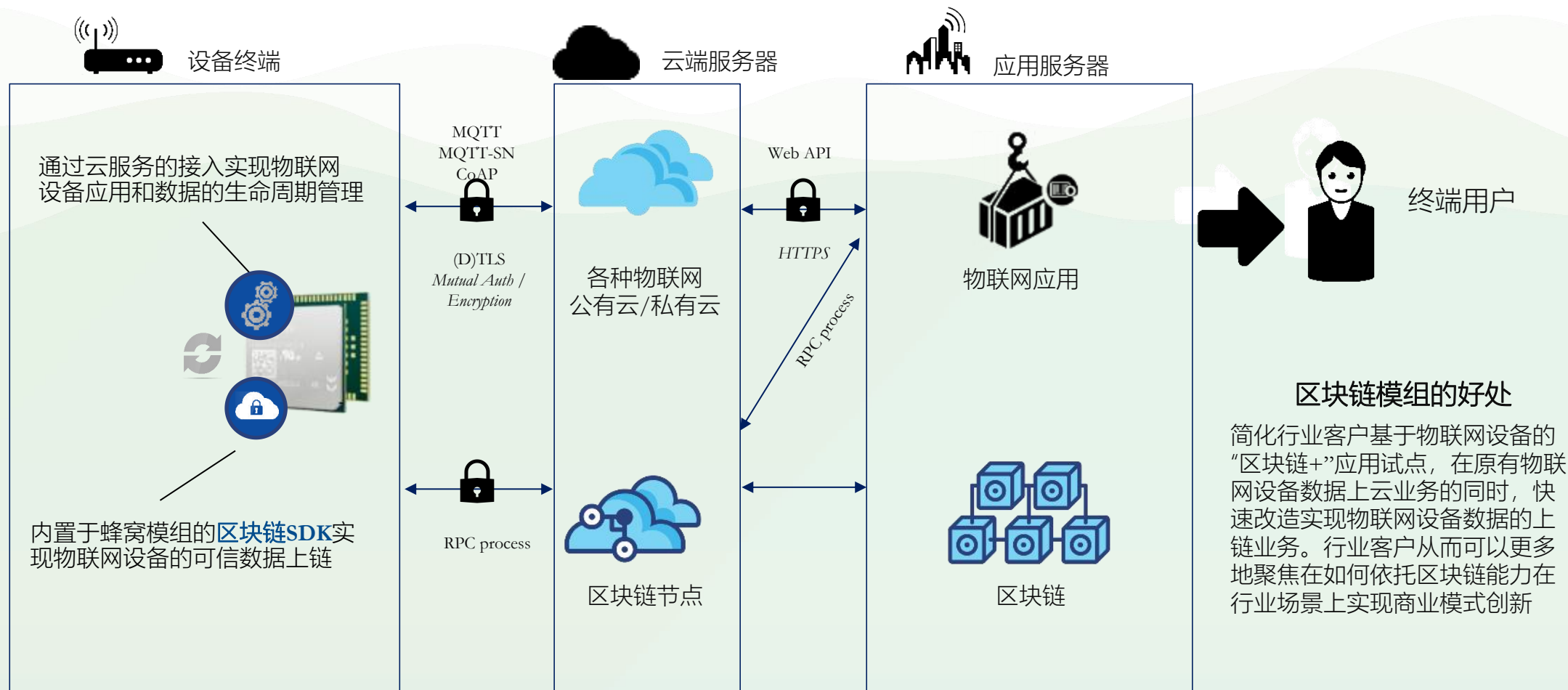
标准模组



瘦模组



从物联网到物链网，区块链模组赋能安全上云可信上链 让“区块链+”物联网行业应用升级变简单

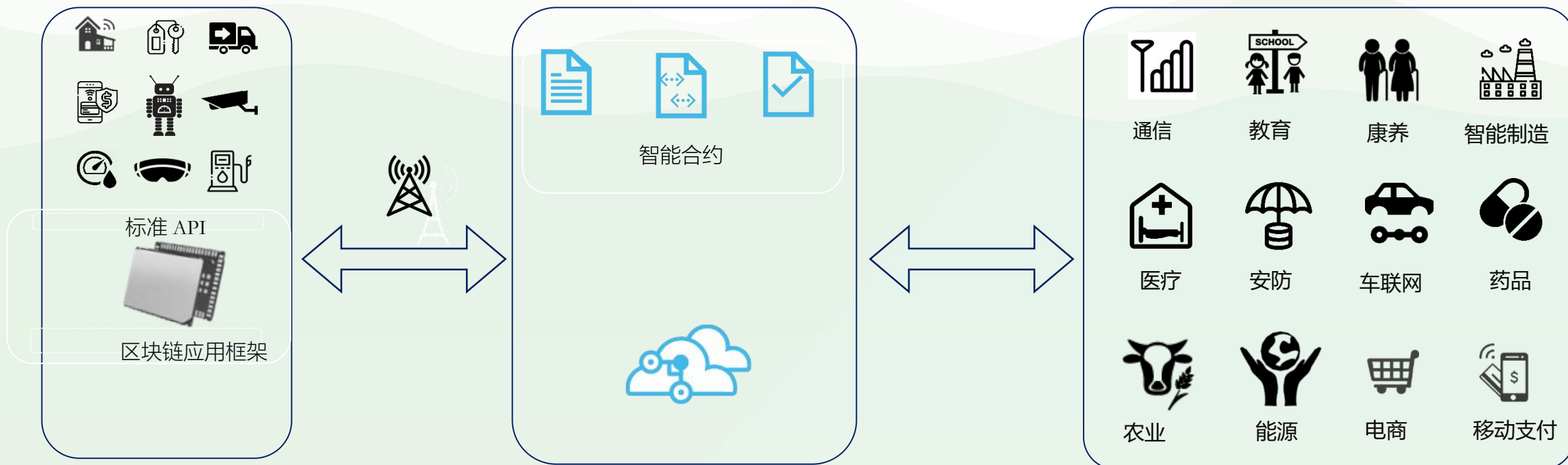


面向物联网+区块链技术融合的数据上链端到端能力

集成了区块链模组的
智能物联网终端

区块链网络

物联网行业应用





基于物联网+区块链的肉牛融资

中国肉牛市场 规模化程度低

中国牛只出栏大于1000头占比 4%



美国牛只出栏大于1000头占比 84%



中国进口牛肉2019年同比增长 65%

传统肉牛质押融资 存在普遍风险

- 牛只重复抵押
- 抵押资产变现难
- 生产与销售缺乏规划
- 肉牛品种单一
- 饲料和防疫监管难

实施乡村振兴战略，是党中央对“三农”工作作出的重大决策部署。2018年以来，恒丰银行把服务乡村振兴作为全行的一项重点工作，倾听“三农”声音，深入田间地头，借助金融科技，探索出了乡村振兴的“恒丰模式”。

“好牛快贷”是恒丰银行与龙头企业、科技公司、养殖户合作的架子牛育肥养殖新模式。

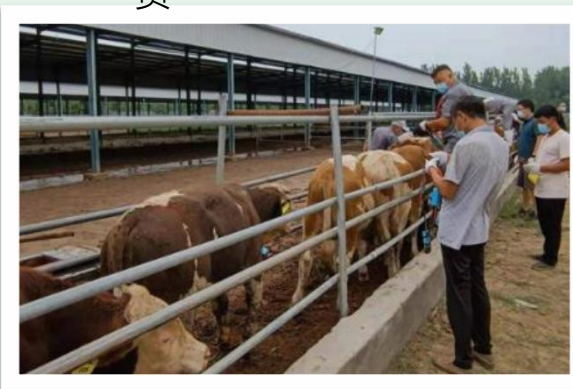
200万 RMB

首笔“好牛快贷”



1亿 RMB

菏泽试点总体规模



山东菏泽入选农业农村部、财政部“2021年农业优势特色产业集群建设名单”



山东菏泽曹县商都恒昌有限公司养殖基地

物联网+区块链 二手车残值管理

不可篡改的车辆全生命周期画像

精准二手车残值估计将提升保值率

- 2018年，全国二手车累积交易1382.19万辆，累计交易金额8603.57亿元。
- 国内纯电动车型保值率仅为33%。车商、消费者和零售商都不太愿意参与到二手车流通。
- 二手车交易市场75%的成交价格在8万以下，无法承担过高残值估计成本。

数据来源：中国汽车流通协会(CADA)



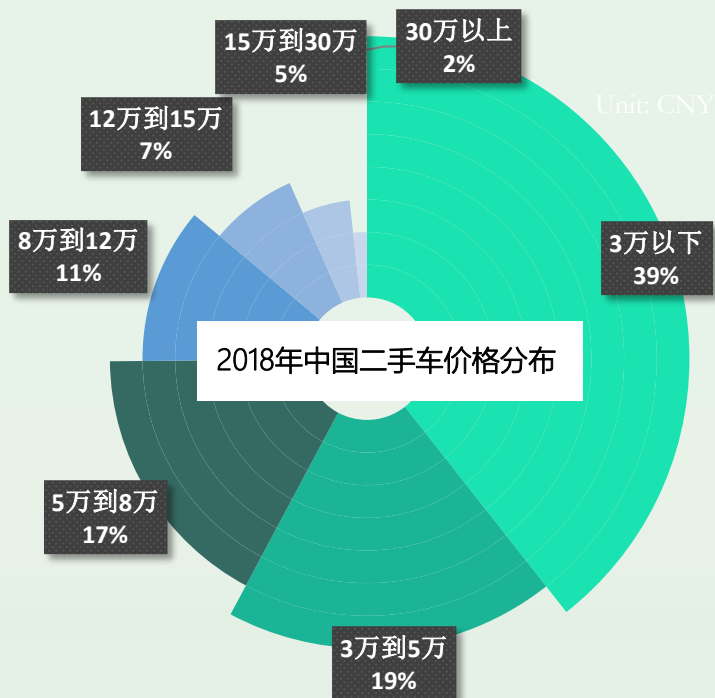
实现二手车各环节数据的上链记录与可信追溯

- 建立连接车辆、4S店、二手车事业部的车辆生命周期数据共享平台。
- 形成车辆出厂数据、行驶数据，以及车辆销售数据的实时记录网络，为车辆的数据分析和行业应用提供不可篡改的数据来源。



建立行业指数、实现二手车数据资产化

- 形成二手车估值、折价模型，构建二手车行业指数基线。
- 围绕保险公司、金融机构等其他参与方节点，实现二手车链上数据交易服务

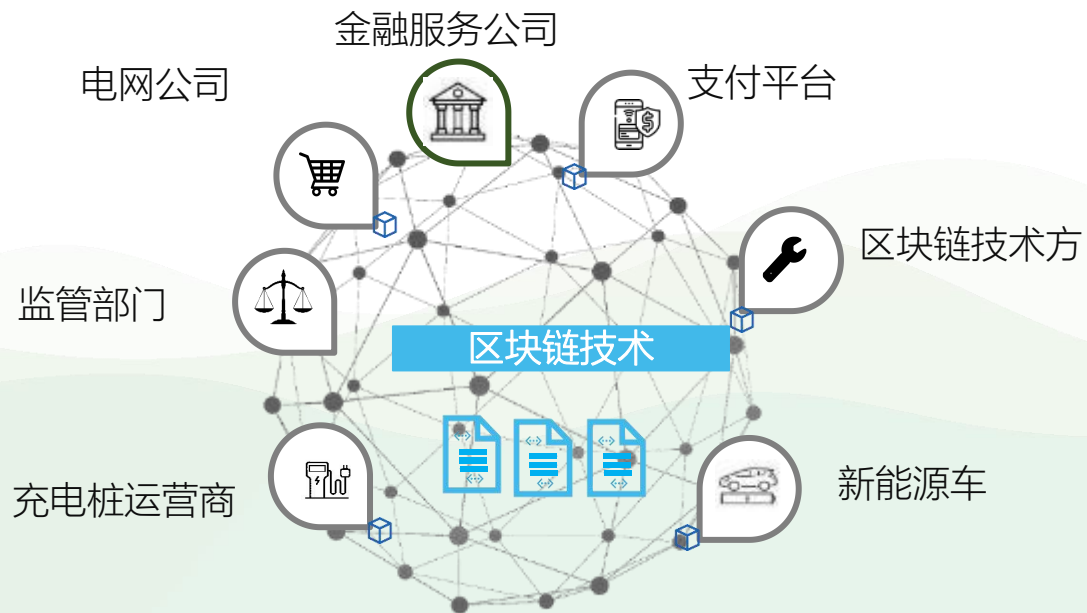


基于物联网+区块链的充电桩运营生命周期管理

通过可信的生命周期管理：

- 更准确的充电桩位置、用电量和使用率状态等可靠的数据有助于实现从“车多桩少”到“一车多桩”的转变
- 利用二次营销和客户粘性让充电桩运营公司和金融产品获益
- 完成融资、充电桩所有者和二次营销团队之间的汽车生命周期循环

帮助生态合作伙伴，面向百亿级市场共建智能充电桩平台，实现基于可信数据的统一运营管理和项目收益的公平分配



好处：

- ① 基于区块链技术的平台记录了所有相关方的充电交易的防篡改历史
- ② 提供值得信赖的充电桩设备证书-以帮助交易安全可信
- ③ 为所有交易方节省时间
- ④ 让各方共同创造和分享透明可靠的充电桩市场所带来的互惠互利

基于物联网+区块链的“电池银行”

电池资产全周期管理

受到疫情和新国标政策红利刺激，两轮电动车行业过去两年迎来了全面爆发。一方面，电动车2020年同比增长29.7%，未来十年，每年保持新增4000万辆。另一方面，锂电池引发的换电模式成功撬动了全新的千亿级“电池银行”市场。

区块链+物联网的“电池银行”方案优点:

- ① 基于BoAT区块链应用框架的智能换电柜可以实时上报换电柜位置、时间、设备ID、电池充放电状态等
- ② 换电柜数据上链，保证充电交易记录防篡改、可追溯。当出现电池故障时，快速锁定，避免造成人员伤亡财产损失。站点配置远程防盗监控，实时保障电池资产安全。
- ③ 透过联盟链，实现电池资产数字化，形成有效的风控报告和市场预测报告，加强投资人信心。

新国标催生“电池银行”千亿级市场:

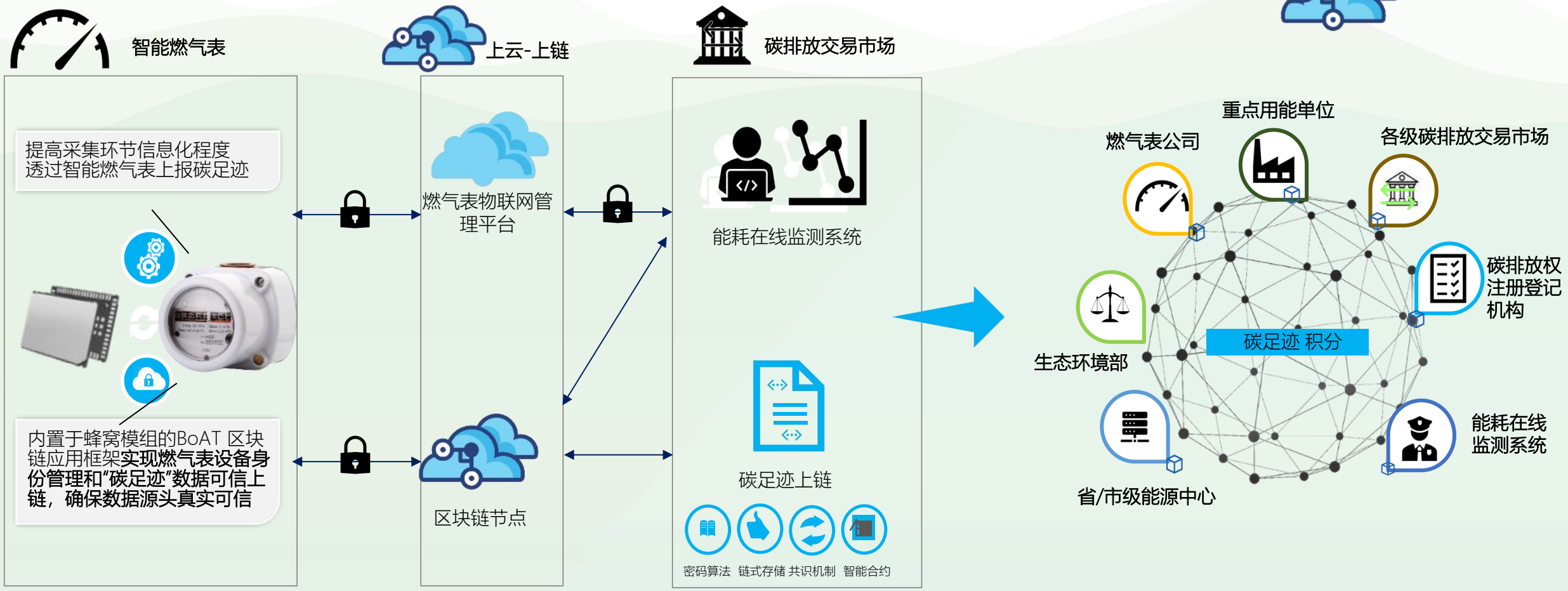
即时配送骑手一般车速在40-60km/h，新政下限速25km/h，必须用换电取代充电，节约等待时间。

- “新国标”对整车55KG的限制让锂电池替代“铅酸电池”，电池单价提高8倍，换电模式下“电池”变成高单价高频流转资产。
- 频发的电瓶车爆炸事件，让政府要求避免人车同屋充电、杜绝私自拉线充电的行为。



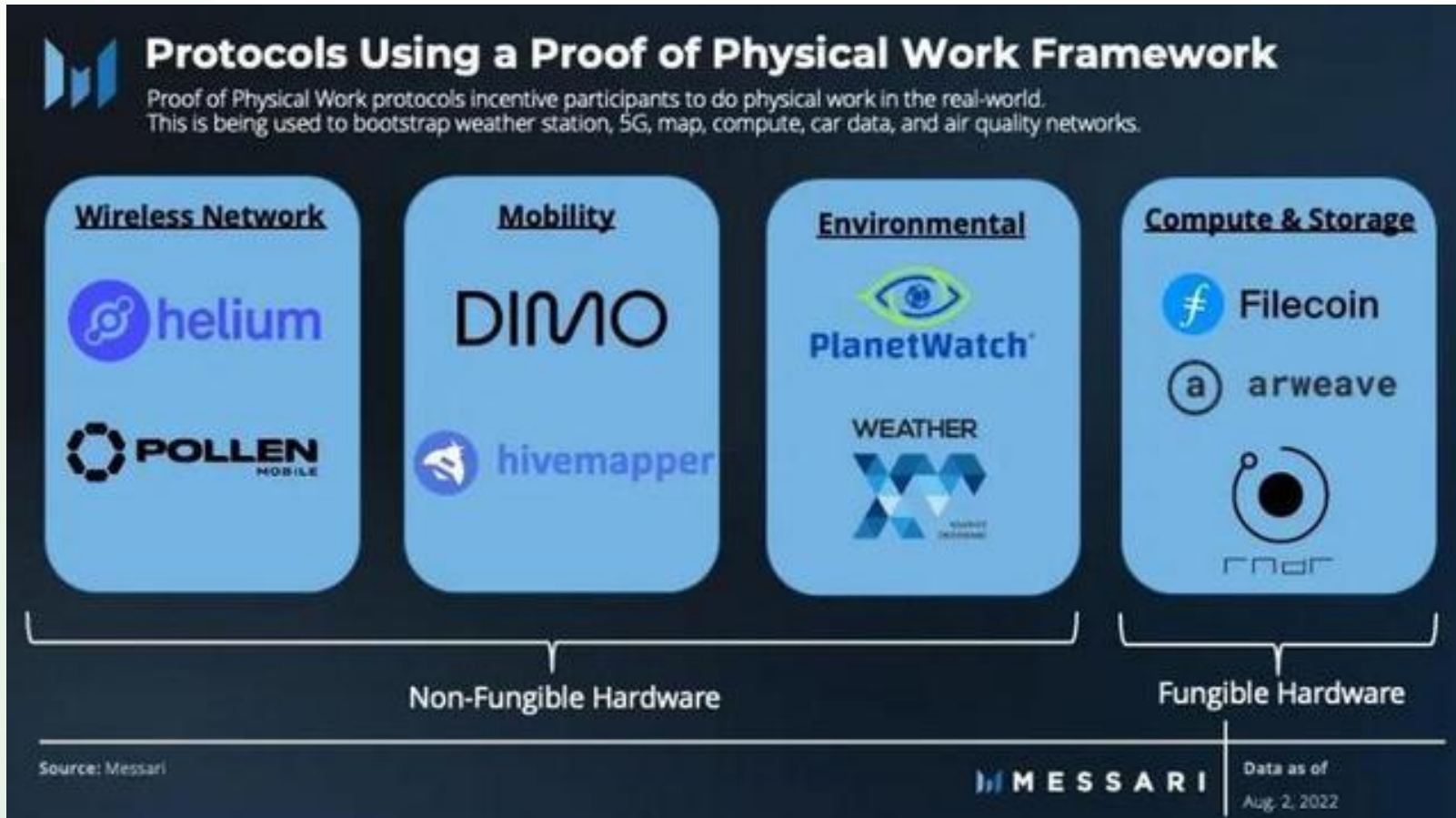
可信智能燃气表：“碳足迹”上链

从数据源头实现基于区块链+物联网的可信碳交易应用



PoPW-Proof of Physical Work

激励参与者在现实世界中完成可验证的工作



- 许多协议正在利用物理工作证明框架来激励供应方参与构建硬件网络。其中包括无线、移动、环境、计算和存储网络。
- 在激励和协调人类活动方面非常强大，使其对开发现实世界的去中心化基础设施和硬件网络非常有用。
- 使用物理工作证明框架，协议可以激励参与者构建其网络，以使用户发现其吸引力。

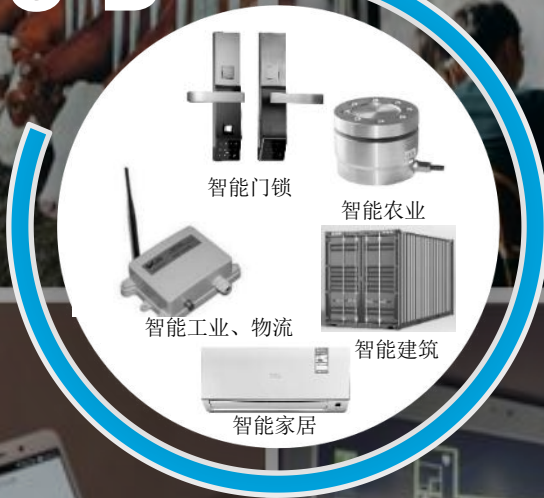
通过区块链模组精准触达海量物联网场景，帮助传统行业实现可信的“万物互联”

区块链模组是物联网+区块链融合创新的重要抓手，从源头确保物联网数据可信，积极配合数字基建的下一代基础设施。

To G



To B



To C



可信物联网数据赋能平台

面向物联网+区块链生态的端到端开放能力平台

“物联网+区块链”的融合创新带来数据价值的开放



设备上链



合约调用



场景融入



区块链数据存证服务



密码算法 链式存储 共识机制 智能合约



4G/5G 蜂窝无线网络

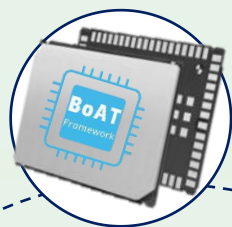


未来行动计划

更多伙伴 | 更多场景

数据资源化、数据资产化、数据资本化

数据的价值在隐私保护下得到充分的挖掘，通过区块链实现数据价值的开放与交换，物联网的商业闭环才能得到真正实现，从而实现产业数字化转型的全面提速



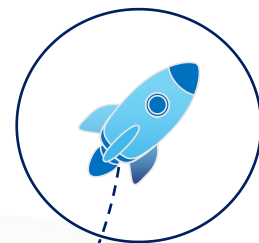
更多的模组品牌支持



更多的行业客户接入



更多的应用场景尝试



更多的商业模式探索

Analysis of Decentralized Physical Infrastructure Networks (DePINs) and its Potential Applications



Part One: DePIN Concepts

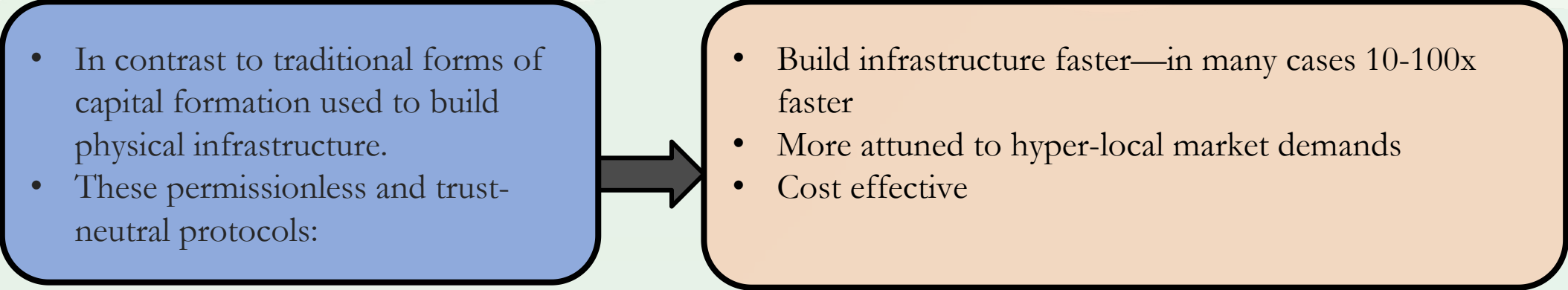


What is DePIN?

- DePIN refers to **infrastructure projects using tokenization to coordinate and incentivize their bootstrapping phase**. Individuals build up the supply of the infrastructure in a decentralized manner and get rewarded with token incentives.
- The **key idea** is to **flip the traditional model on its head**. The traditional way is for corporations in telecommunications or energy to invest a lot of time and money into building and maintaining infrastructure. Web3 companies try to outsource this build-up and maintenance process to a token-incentivized army of volunteers and monetize later once the coverage rate is high enough.
- This is the **same liquidity incentive principle used in other web3 sectors**, such as DeFi (yield farming), play-to-earn, or move-to-earn.

What is DePIN?

- DePIN is the new name for blockchain networks that use tokens to incentivise communities to build physical infrastructure networks/dApps.
- DePIN facilitates the scalability of infrastructure faster due to decentralized deployment and the larger pool of contributors.
- Is a protocols that incentivizes contributors to do a verifiable work that builds a real-world infrastructure.
- Using crypto-economic games to build a people-friendly communication network.
- DePINs incentivize supply-side participants to build the network by leveraging crypto-economic protocols.

- 
- In contrast to traditional forms of capital formation used to build physical infrastructure.
 - These permissionless and trust-neutral protocols:

- Build infrastructure faster—in many cases 10-100x faster
- More attuned to hyper-local market demands
- Cost effective

Why DePIN economic flywheel of offering users a reward to complete a verifiable physical activity in the real-world?

What Belongs to DePIN?

- Cloud/storage networks: File storage, relational database, CDN and VPN networks.
- Wireless networks: 5G, LoRaWAN (Internet of Things).
- Sensor networks: Interconnected devices embedded with sensors that collect real-time data from the physical world, such as maps.
- Energy networks: Aggregate distributed energy sources to create a more resilient and efficient energy grid.

What Are the Benefits of DePIN?

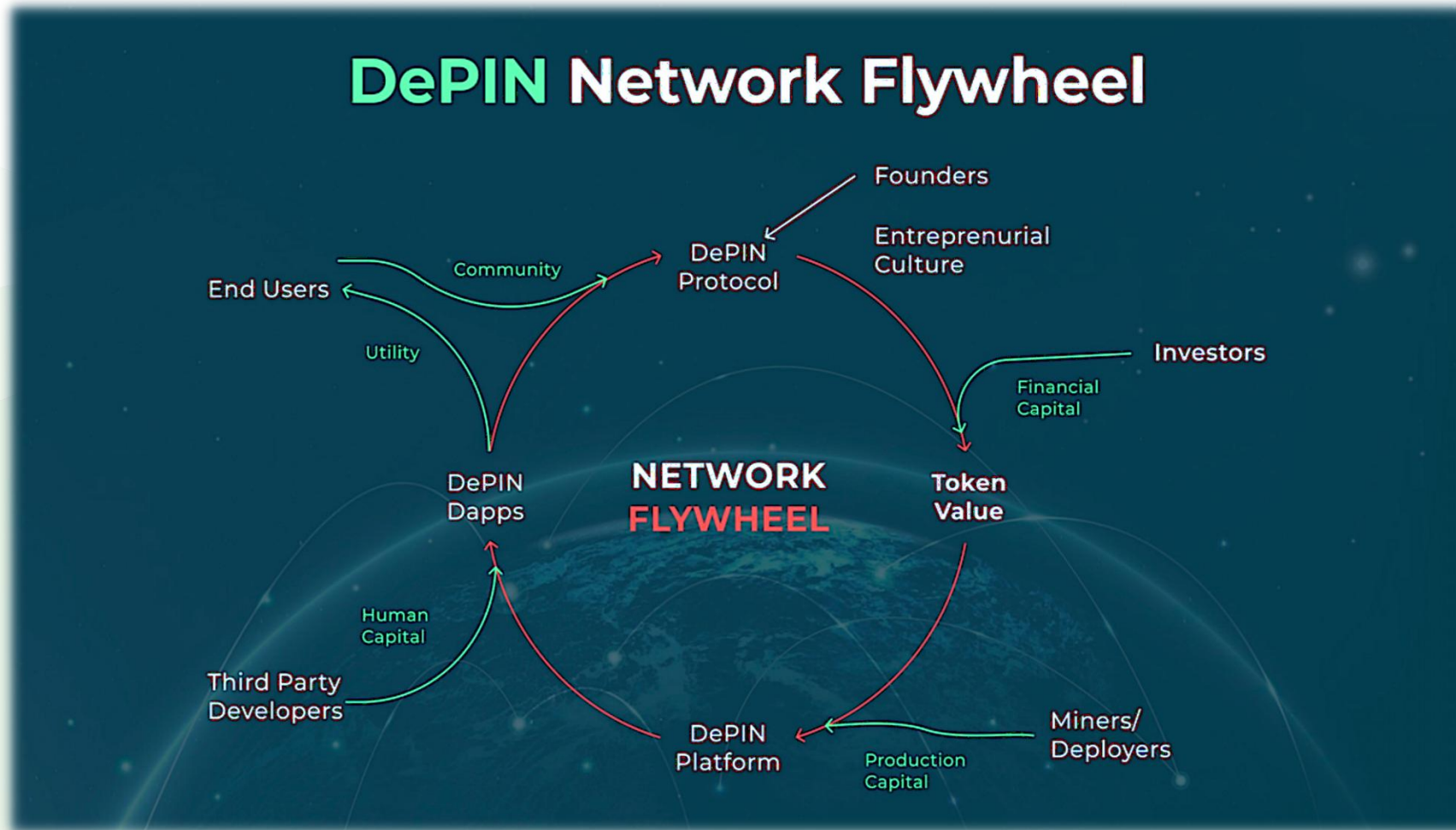
- DePIN's declared goal is to create a more equitable and efficient process to bootstrap infrastructure networks compared to legacy companies' top-down, capital-intensive approach.
- You can build infrastructure 10-100x faster.
- It is better synced to hyper-local market needs.
- It can be far more cost-effective.
- It can be scaled across jurisdictions in a permissionless way.
- The network is credibly neutral and collectively owned.
- Blockchains support frictionless micropayments and integration with DeFi.

What Is the Flywheel of DePIN?

Web3 enthusiasts point out that tokenization allows globally distributed individuals to collectively bootstrap a network in a permissionless and trustless manner. Ideally, the costs of building the network are borne by and distributed among the supply-side participants, usually retail, who get paid token incentives to bootstrap the network.

Once the network has built an infrastructure base, it attracts users. These users pay to use the network and boost further supply-side growth. In the best-case scenario, this kicks off the virtuous cycle of more demand fueling more supply, which is incentivized by token rewards that grow in value, thanks to growing demand.

What is DePIN Network Flywheel?



DePIN network flywheel. Source: IoTeX

What Are the Trends and Challenges of DePIN?

Trends

- Most people access the internet from a mobile device these days. Crypto is the one big exception, simply because much of it hasn't developed a good mobile interface. But to succeed, crypto will have to go mobile eventually. Technological trends like AI tools and more capable smartphones point towards more mobile traffic, not less.
- Moreover, with the possibility to produce and consume content in a decentralized way increasing (again, AI), the demand thereof will also increase. And with it the demand to access and store it, which concerns wireless and storage providers.

Challenges

- DePIN faces several challenges, explaining why the sector hasn't taken off yet. For instance, as we will still explore further, the incentive models are highly dilutive and often sound better than they are in reality. The time horizon to build applications and demand is significantly longer than for mere consumer apps. The market is big, but companies compete against web2 giants like Amazon, Microsoft and Google.
- In other words, disrupting legacy competition will take a lot more effort and professionalism than in purely retail-facing sectors of web3 like gaming.

Web3 Physical Infrastructure needs a name!

Messari 
 @MessariCrypto

Web3 physical infrastructure needs a name!


Often referred to as Proof of Physical Work (PoPW), Token Incentivized Physical Networks (TIPIN), EdgeFi, or Decentralized Physical Infrastructure Networks (DePIN), crypto has yet to reach a consensus.

Vote below, or add a suggestion 

PoPW	28.7%
TIPIN	22.8%
EdgeFi	16.9%
DePIN	31.6%


136 votes - Final results

5:59 PM · Nov 5, 2022

Hans  @hansaFL · Nov 5, 2022

DePIN is technically not correct. Many of these projects have a centralized (Oracle) component with a crypto backend handling the financial aspects

1 1

Sami Kassab  @Old_Samster · Nov 5, 2022

Technically, yeah. But you could say this for every crypto sector including DeFi.

2

Major Components of DePIN

Supply side



Network



Demand side

The *service providers (suppliers)*, who contribute to the scale of the network by conducting some useful work, and the *service consumers*.

The Networks are decentralized, secure, and transparent infrastructures that manage the entire activities of the participants who join the network and contribute towards the connection of both supply and demand services.

The demand side, who pay for the services and optimally utilize the services provided by the network to build applications or services.

How DePIN works?

- Physical infrastructure network
- Off-chain compute infrastructure
- Blockchain architecture
- Token Incentives

What is DePIN Token Economic Mechanisms?

Token rewards incentivizes supply-side contributors to deploy infrastructure

As network utility increases, the token price increases based on the protocol's value capture mechanism

DePIN Economic Model

Network fees derived from the demand-side usage attract more supply-side contributors

Network's supply-side grows, attracting end-users, product builders and developers

Five Key Benefits of Crypto-economic Protocols using DePIN

DePIN unveils the potentials for the crypto economics as follows:

- Rapid Scale
- Credible Neutrality
- Collective Ownership
- Frictionless Payments
- Integration with DeFi rails

DePIN model also help to accelerate the web3 adoption

- Web3 technologies and communities have matured to the point where they're controlling trillions of dollars in digital assets

It's time to plug them into the physical world, by exploring some potential use cases.

Summary

- DePIN is the new name for blockchain networks that use tokens to incentivise communities to build physical infrastructure networks/dApps.
- Web3 has enabled new ways of coordinating human activities on a global scale.
- Crypto-economic protocols create incentive structures to encourage users to build a decentralized global infrastructure network with total ownership of the data back to users.
- These incentive structures can facilitate far-reaching coordination to accomplish specific goals.
- Anyone in the world can permissionlessly contribute to a set of shared objectives.
- Step-function improvement in capital formation
- **The majority of crypto-innovation projects focus on coordinating digital communities and economies.**
- Capital formation and human coordination extend beyond the digital world and in to physical.
- The deployment and management of physical infrastructure, such as **telecom networks, cloud services, mobility networks and power grids**, have been dominated by large corporations due to their enormous capital requirements and logistical challenges.

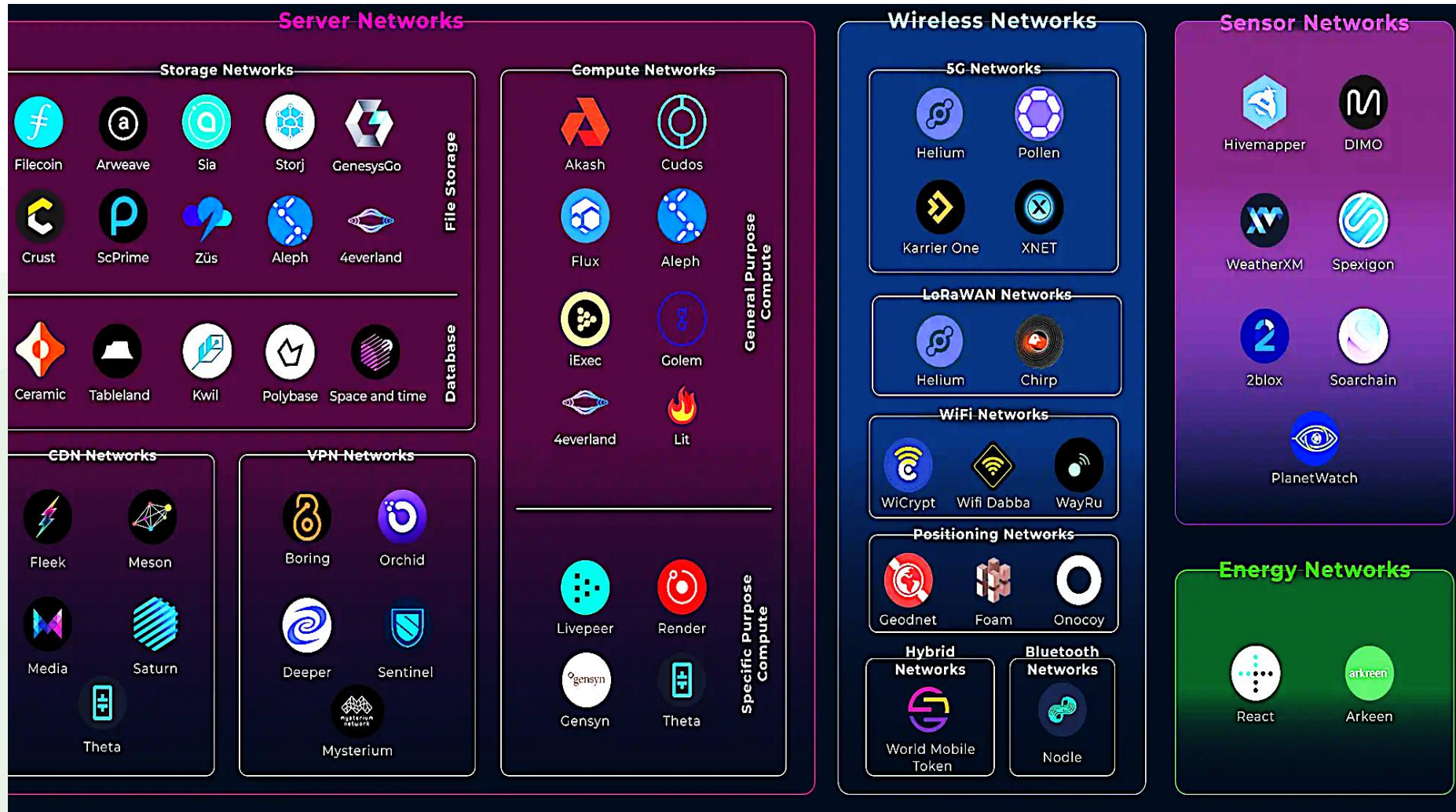
What if crypto protocols could incentivize the construction of real-world infrastructure?

- This is what exactly **Decentralized Physical Infrastructure (DePIN)** protocols strive to achieve.

Part Two: Potential Use Cases of DePIN



DePIN Map by Sector



Source: Messari

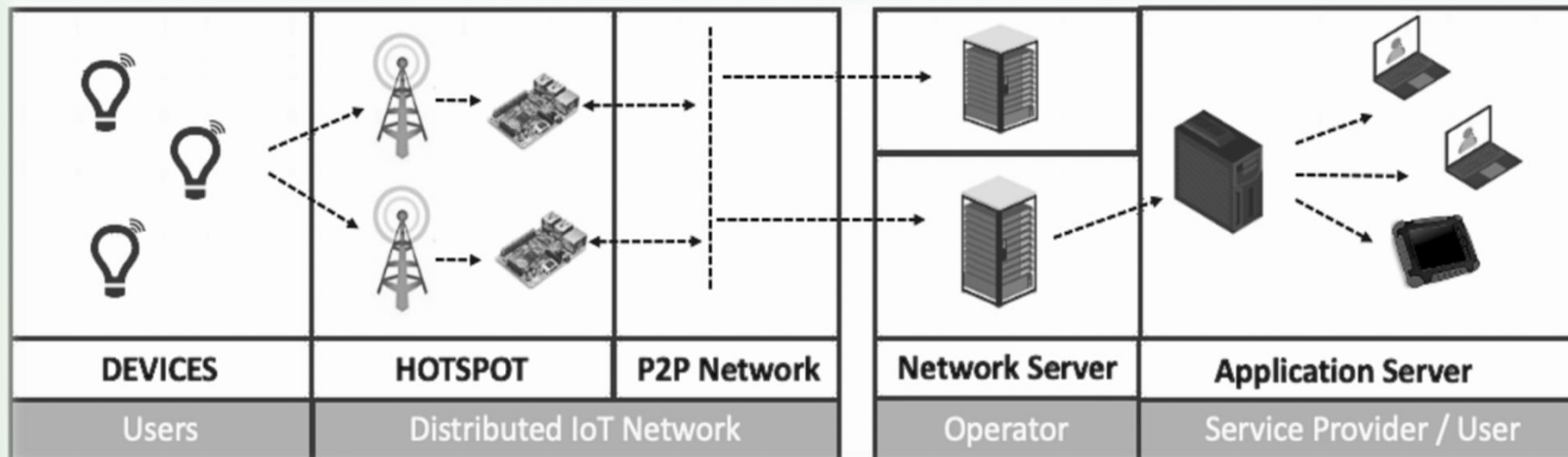
Next, will look into the potential use cases of the DePINs

What is Helium Network?

- Helium incentivizes people to build and manage physical telecommunications networks – eg, micro-cell towers.
- The Helium network is built by “hosts” that mine the Helium protocol’s native token,
- Participants can get HNT, in exchange for creating coverage and transmitting data over the network.
- Currently Helium available worldwide with coverage of over 700,000 hotspots (Hotspot, hardware hotspots in the Helium network).
- Permissionless cryptoeconomic protocols provide network-level reliability through redundancy, even if individual network nodes are less reliable.

What is Helium Network?

- Helium network is composed by hotspots.
- Miners are connected altogether over the a p2p network.
- They are maintaining the Blockchain
- The devices communication passes through these different layers and are routed up to their specific network server.
- The distributed network supports multiple networks servers.
- Application servers works on helium network as on any other network server. Nothing specific, the data itself is not inside the blockchain.

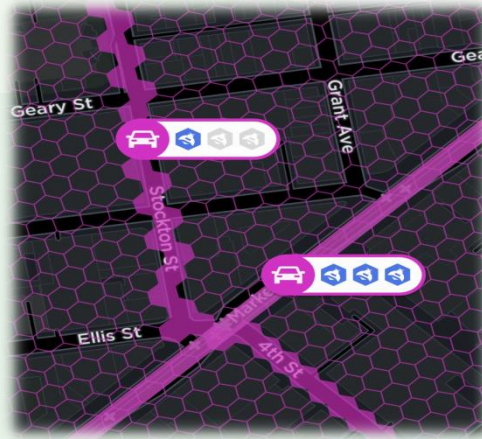


HiveMapper Network

- Hivemapper is a decentralized map built by participants using dash cams.
- The protocol rewards supply-side participants (map miners) for driving or using dashcams to move around and contribute to the network map.



Get the dashcam



Map while driving

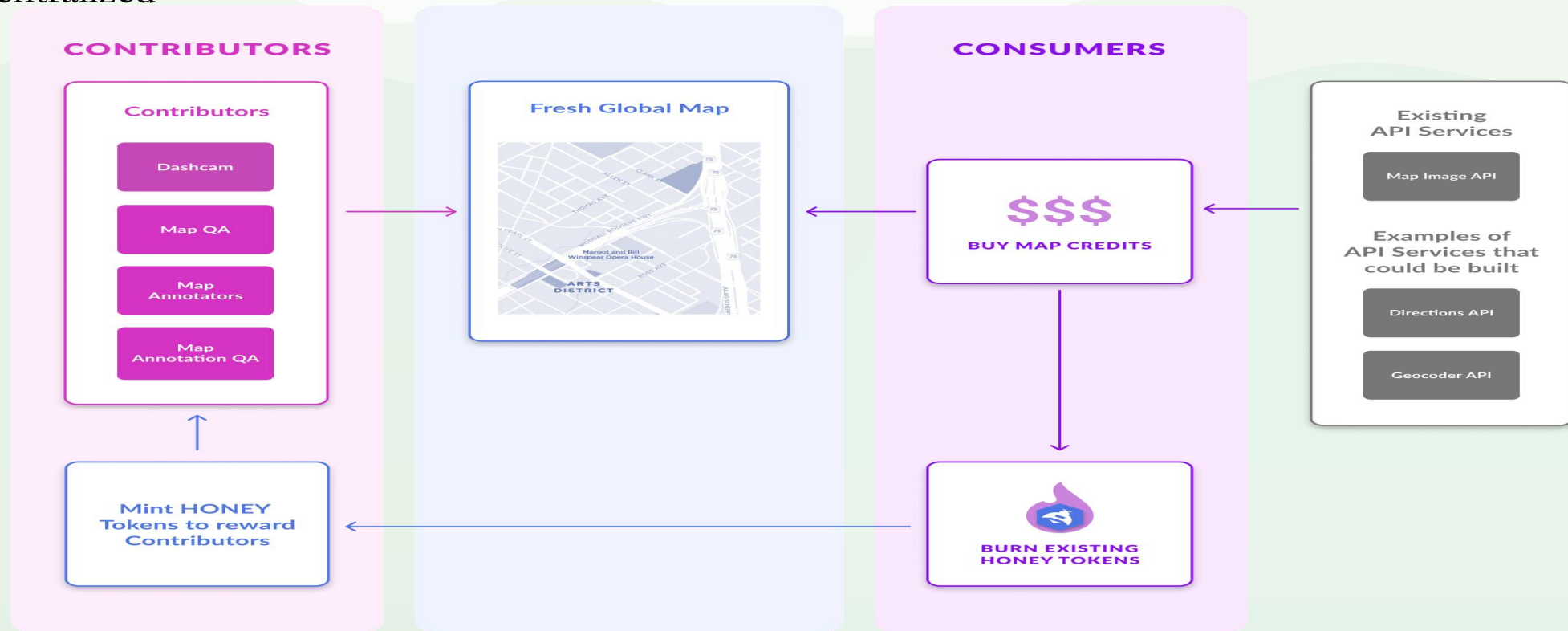


Earn HONEY tokens

Major components of HiveMapper Network

Hivemapper is designed from the ground up to be:

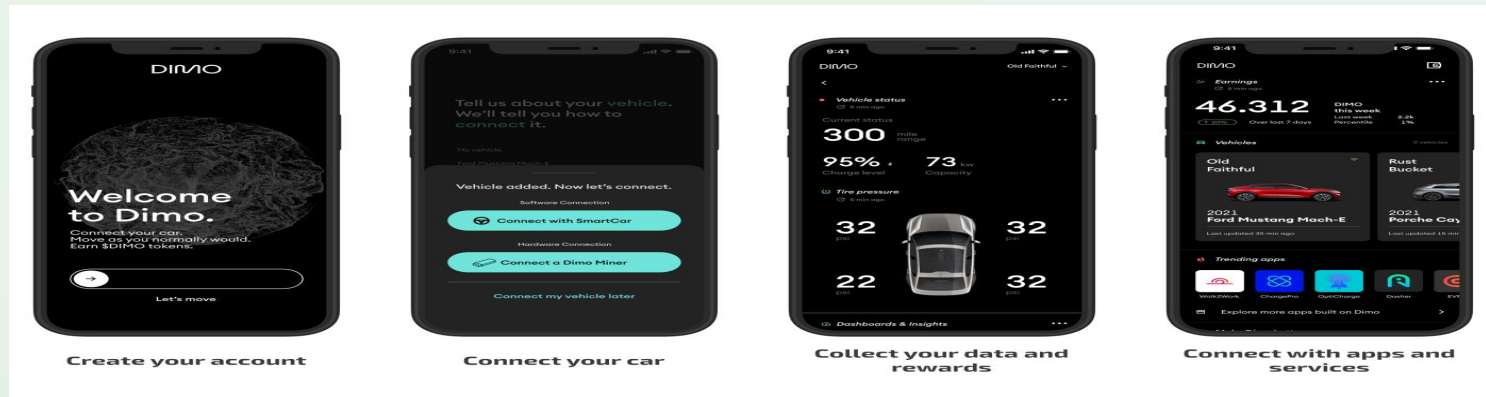
- Permissionless
- Rewards-based
- Decentralized





What is DIMO Network?

- DIMO is a user-owned data-driven network that exists to improve the way we move throughout the world.
- By putting users in control of their data and enabling developers to build on a stable, open platform.
- DIMO is making the future of mobility brighter, for everyone.
- DIMO is a user-owned IoT platform that allows users to maximize the value of their connected devices, starting with cars.
- Inspired by [Helium](#), [Streamr](#), [IPFS](#), [Ethereum](#)
- It allows users to create verified data streams from devices they own and share them with applications privately and without exploitative middlemen

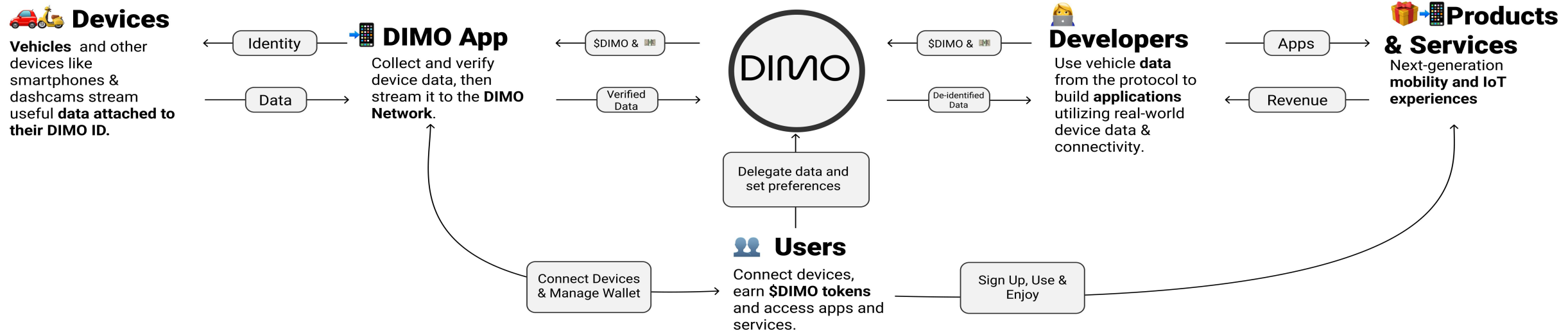


Create an account, Connect your car, Share your mobility data, earn rewards

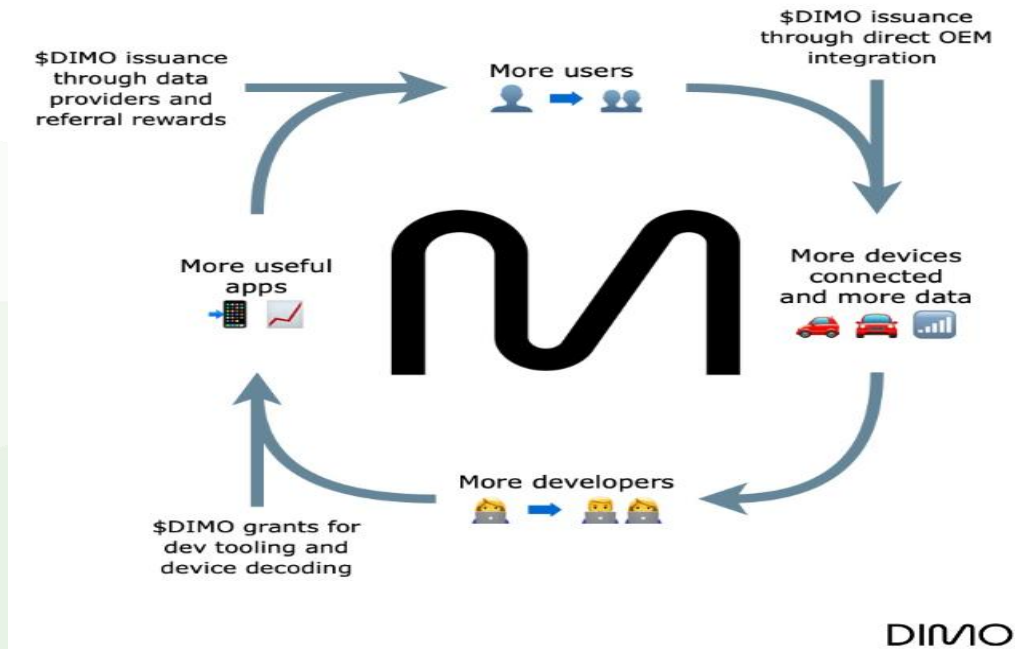
How does the DIMO Network work?

- DIMO is built in the open with open source components.
- Unlock levels of transparency, privacy, composability, and reliability in IoT networks
- Increasing user and developer trust in connected devices and services.

How DIMO Works



How DIMO Network scales?

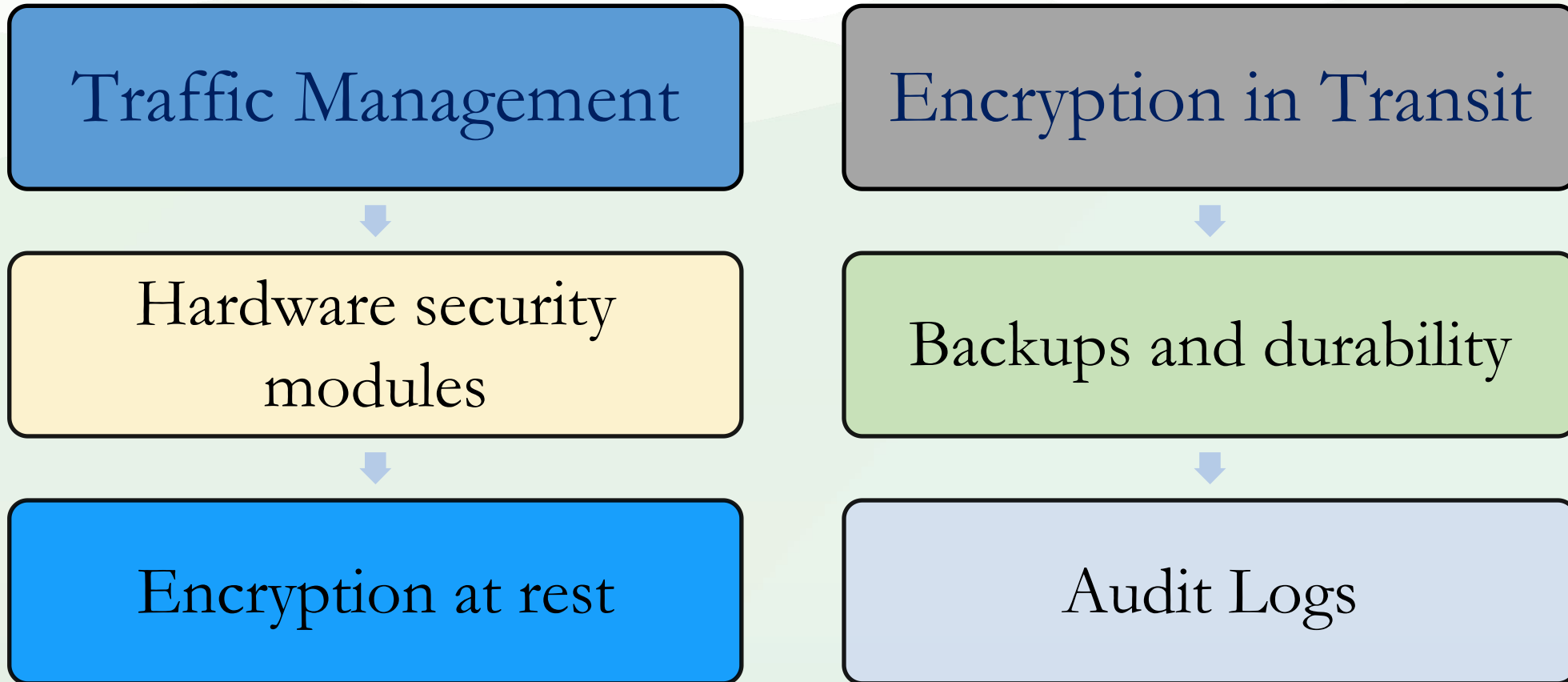


Phase	Functionality Established
Phase 1 👤 User Acquisition (2021-2022)	Direct relationship between device owners & DIMO Platform for <i>Read Only</i> use-cases
Phase 2 🏠 Mobility Platform (2022-2025)	Developer platform for <i>read & write</i> applications in insurance, energy, and automated mobility—driving \$DIMO utility and user growth
Phase 3 🌐 Trusted IoT Mesh (2025-2030)	Use \$DIMO token & existing transaction volume to seed demand for applications outside of mobility

- Build vehicle supply, measuring contributions via \$DIMO token issuance to data providers.
- Incentivize OEMs to make it easy for users to share data from their devices with developers.
- It also makes device data more accessible to developers to can create new user experiences using the open market economy.

How DIMO Secures User & Device Data?

- Provide end-to-end encrypted communications channels to access the data
- All data access is scoped by roles and depend on strong user authentication to identify requesters.

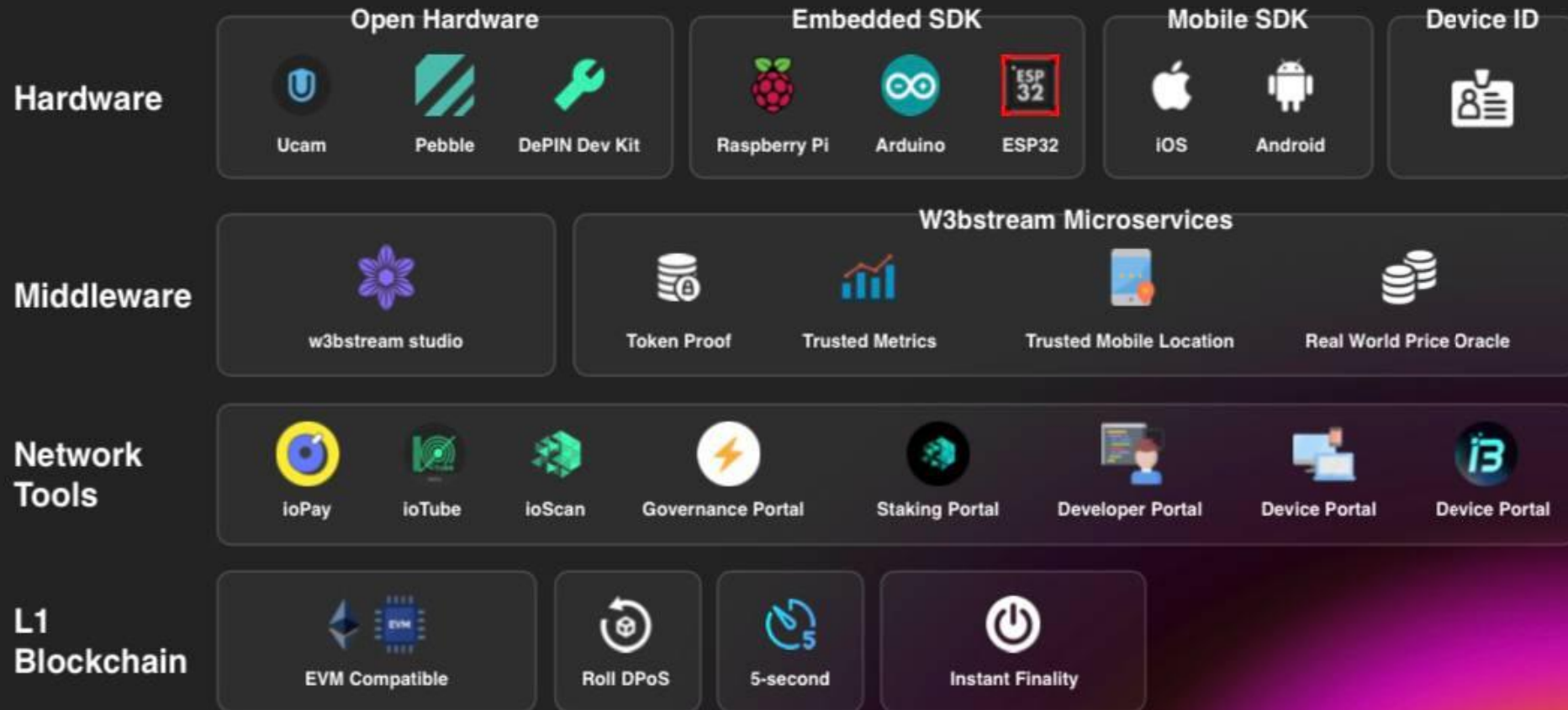


Part Three: DePIN Enabler Projects as-a-service



IoTeX as DePIN Innovation Enabler

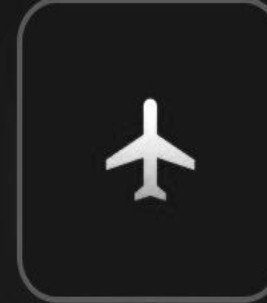
IoTeX platform connecting physical infra networks to Web3



Peaq as an enabler for building DePIN applications

Build any dApp or DePIN for connected machines, anywhere and everywhere.

Machines exist in all four domains: land, sea, sky and space. peaq provides everything you need to build dApps and DePINs (Decentralized Physical Infrastructure Networks) for vehicles, robots and devices in all domains. Explore use cases, submit ideas for new ones, get funding, and start building on the peaq network.



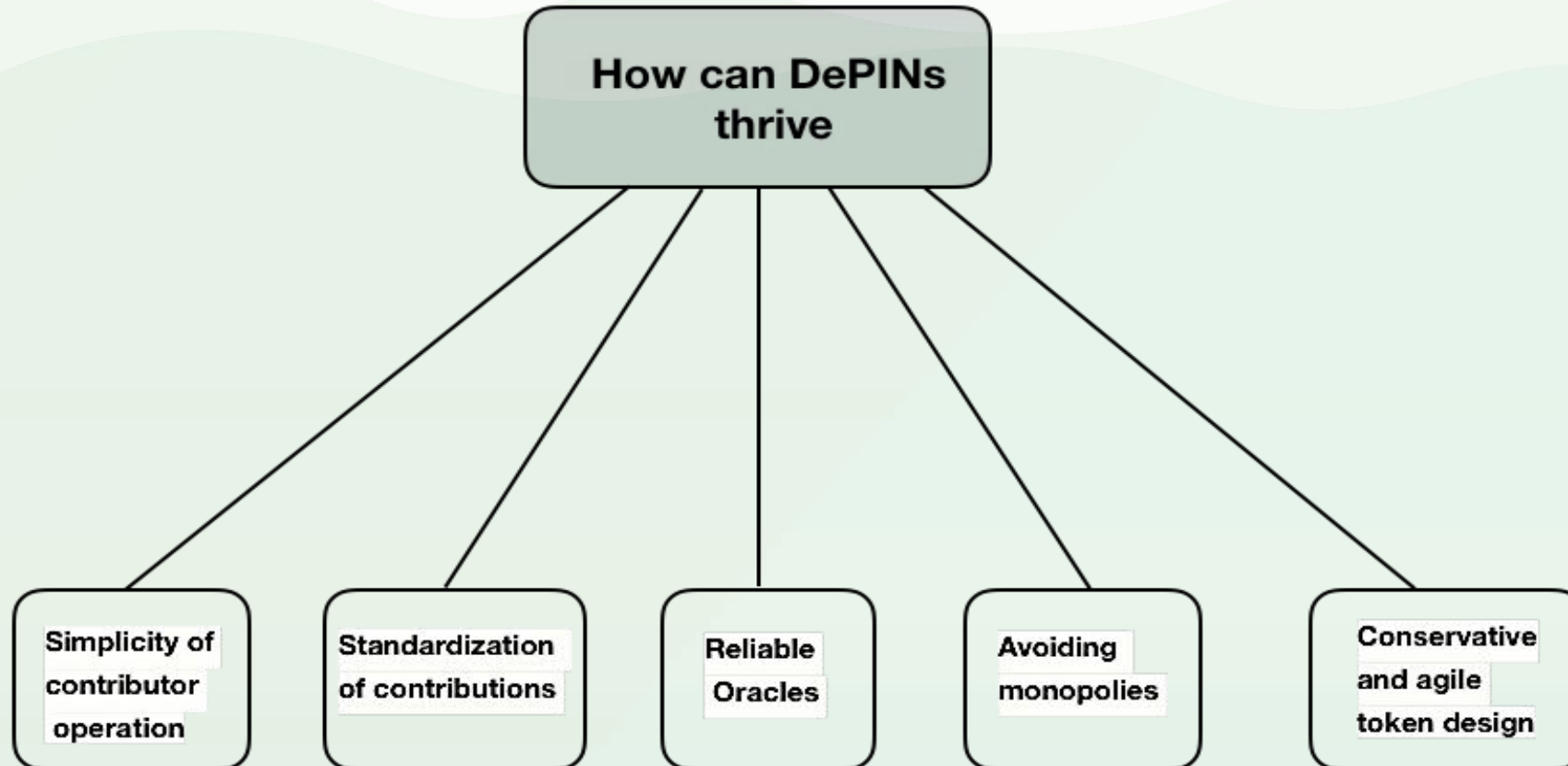
Part Four: Future Prospect of DePIN



How can DePINs thrive?

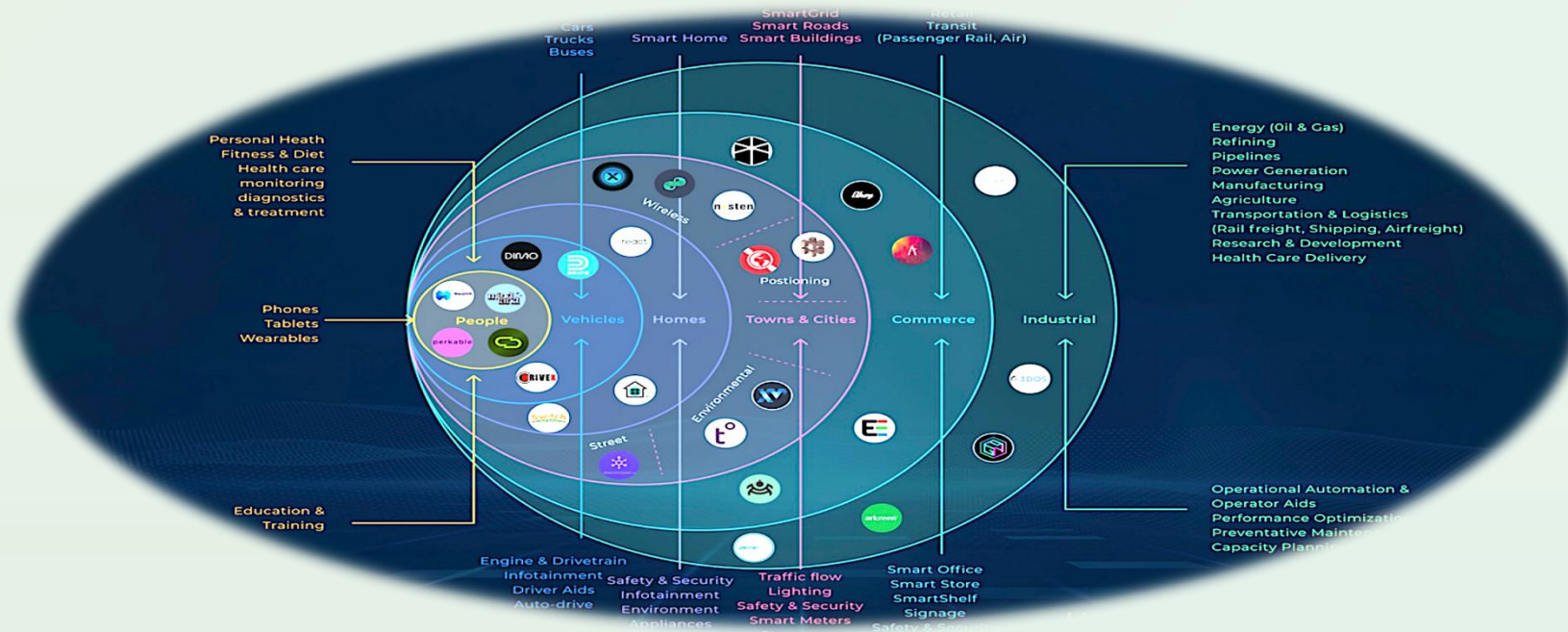
- Can DePINs achieve results that are comparable to centralized systems in terms of quality, or whether the same model used in DeFi for coordinating the members using DAOs can also be used to coordinate and incentivize participants in the real world to build massive physical infrastructure in a satisfying manner?

Five essential qualities that DePINs must possess in order to thrive



Why DePINs are the future?

- There are over 40 billion smart devices and machines, and trillions of sensors deployed worldwide, the future of DePIN is bright.
- The demand for decentralized infrastructure continues to grow due to massive adoption from the supply side/ contributors.
- The individuals and companies will look to DePIN to build their networks
- DePIN offer a new way of building and operating real-world infra that is more equitable, efficient and aligned with the interests of network participants.
- DePIN ecosystem evolves and new use cases are emerging
- DePINs play an increasingly important role in developing our physical world.





Introduction of Arkreen Network

A DePIN project to build distributed renewable energy resource data network

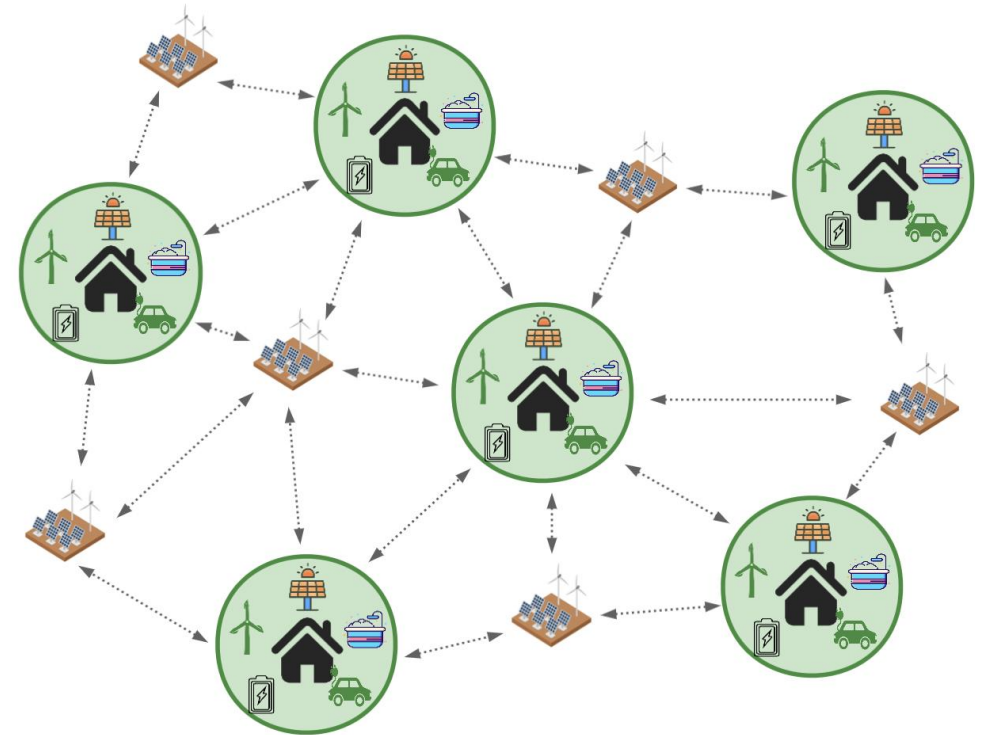


Arkreen Network-Why



Why

Arkreen Network is an **Web3-powered** infrastructure for globally-distributed renewable energy resources connection and monetization to enable carbon-reduction applications.



Grid Tomorrow: Decentralized Bi-directional Network

Why

Arkreen Network is an

Web3-powered infrastructure for

globally-**distributed renewable energy resources** connection and
monetization to enable

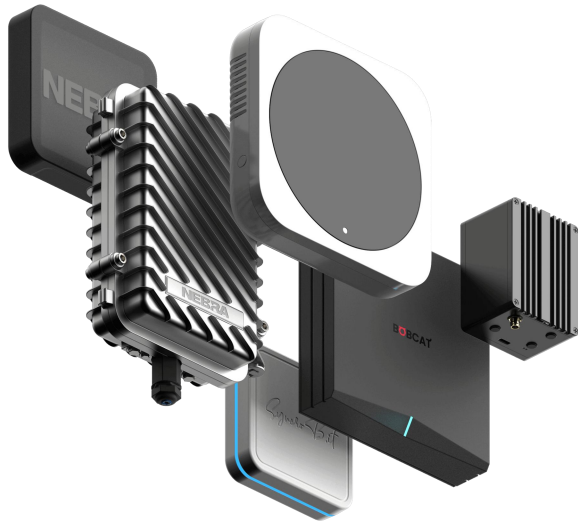
carbon-reduction applications.

Why Web3?

Web3-enabled global physical infrastructure is emerging!



Helium, initiated in 2017, is the biggest global IoT network and shows the textbook of Proof of Physical Work.

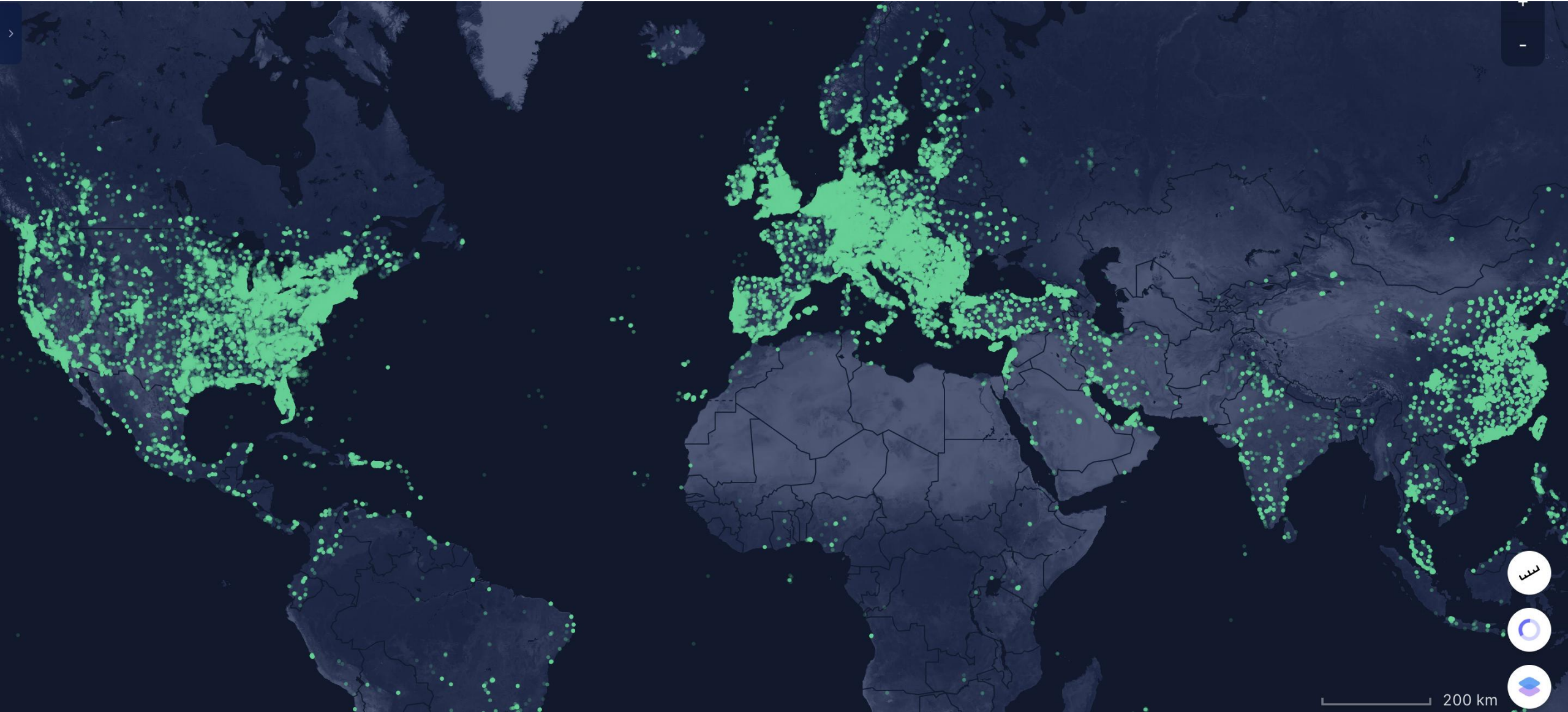


Helium Hotspot, which is Helium network miner, has been deployed globally for almost **1 Million** over **182 countries** and **73k+ cities** within **3 years, 30 employees, \$0 cost**.

This dream has failed Alibaba, Sigfox, ZTE for huge cost and global coordination. Web1 and Web2 method do not answer global physical infrastructure.

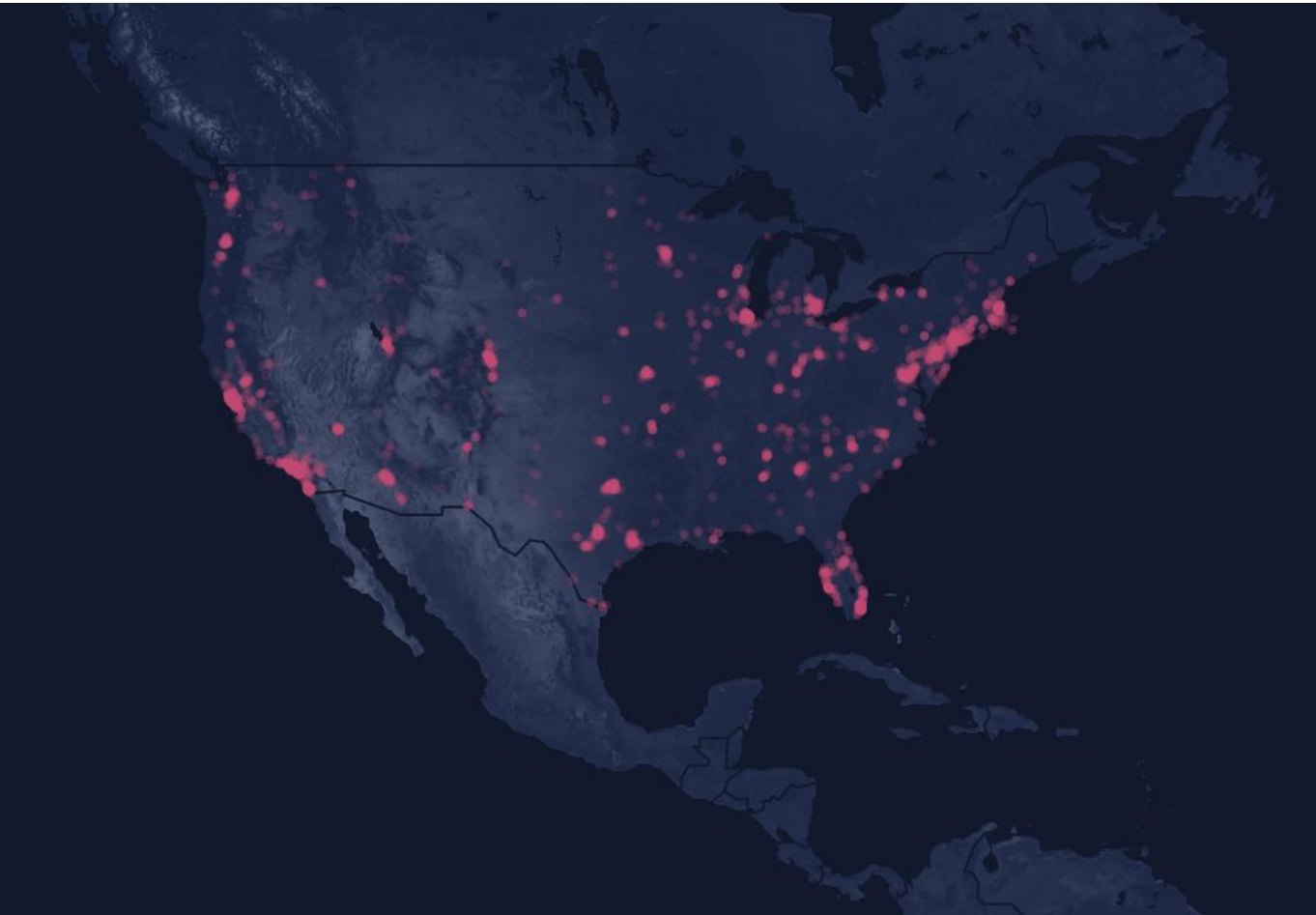
Why Web3?

IoT coverage map.



Why Web3?

5G coverage map.



Nova Labs Inks Agreement With **T-Mobile** to Cover 5G Dead Spots in Helium Network

21st Sep.



Why Web3?

Web3 enabled global physical infrastructure definitely will be the “DeFi Summer” of the next bull market.



Helium, initiated in 2017, is the global LoRaWAN/5G/IoT network and shows the textbook of Proof of Physical Work.



Hivemapper, founded in 2022, is building the global dashcam mapping system under the rule of Proof of Physical Work.



DIMO, founded in 2022, is building the global vehicle data monetization system under the rule of Proof of Physical Work.

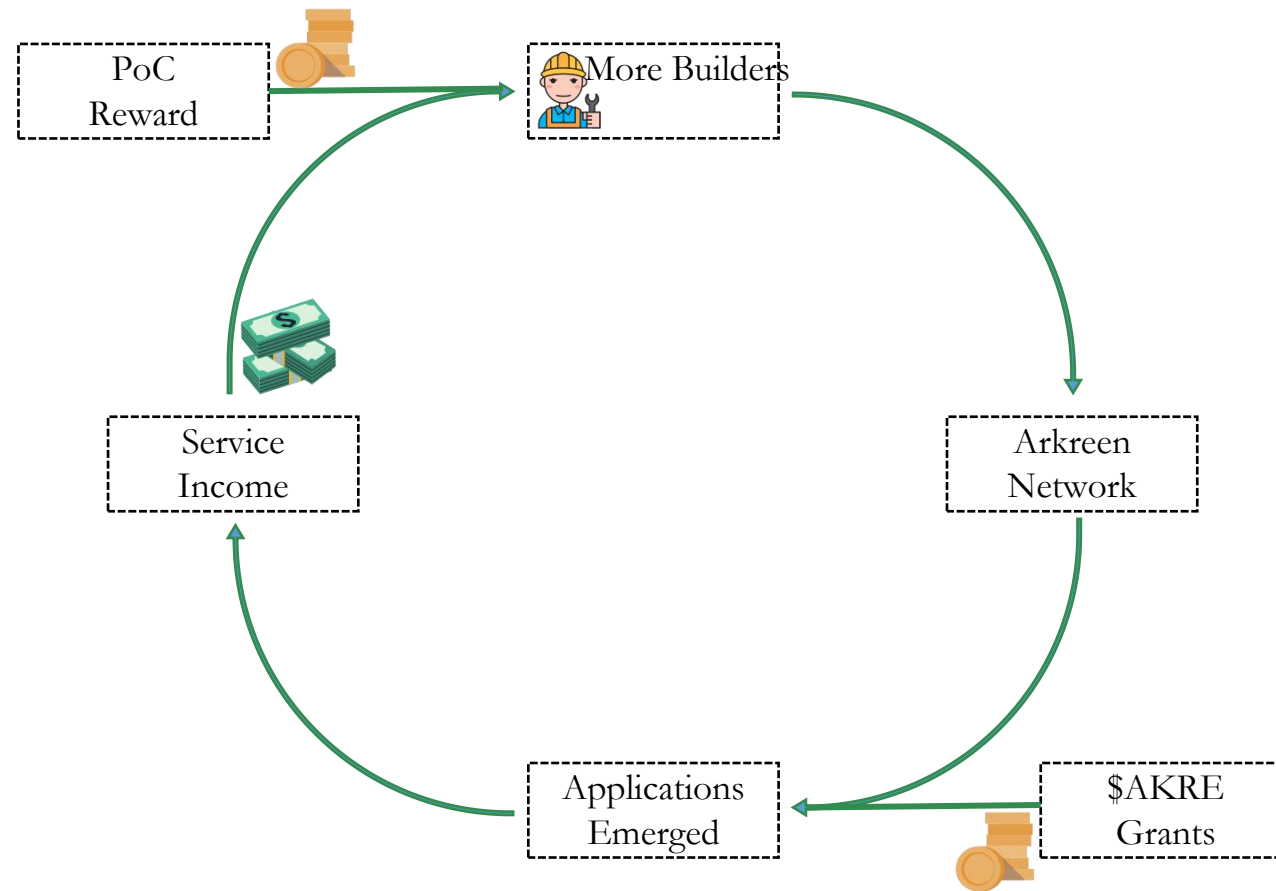


Pollen, founded in 2022, is building the global mobile 5G network under the rule of Proof of Physical Work.

Why Web3?

Web3 Infra is a disruptive solution to bootstrap network by 10x cheaper, 10x easier, 10x faster than **Web1** method.

Web3 is also 10x economic value than **Web2** method due to it's an economy not a company.



The Earlier, The Bigger

Why Web3?

			
Buildup:	Top-down	Bottom-up	Bottom-up
Beneficiary:	Shareholder	Shareholder	Stakeholder

Web1-enabled physical infrastructure causes huge investment and monopoly.

Web2 enables global physical infrastructure and reduces investment with monopoly globally too.

Web3 enables **global physical infrastructure** without **huge cost and monopoly**.

Why Energy?

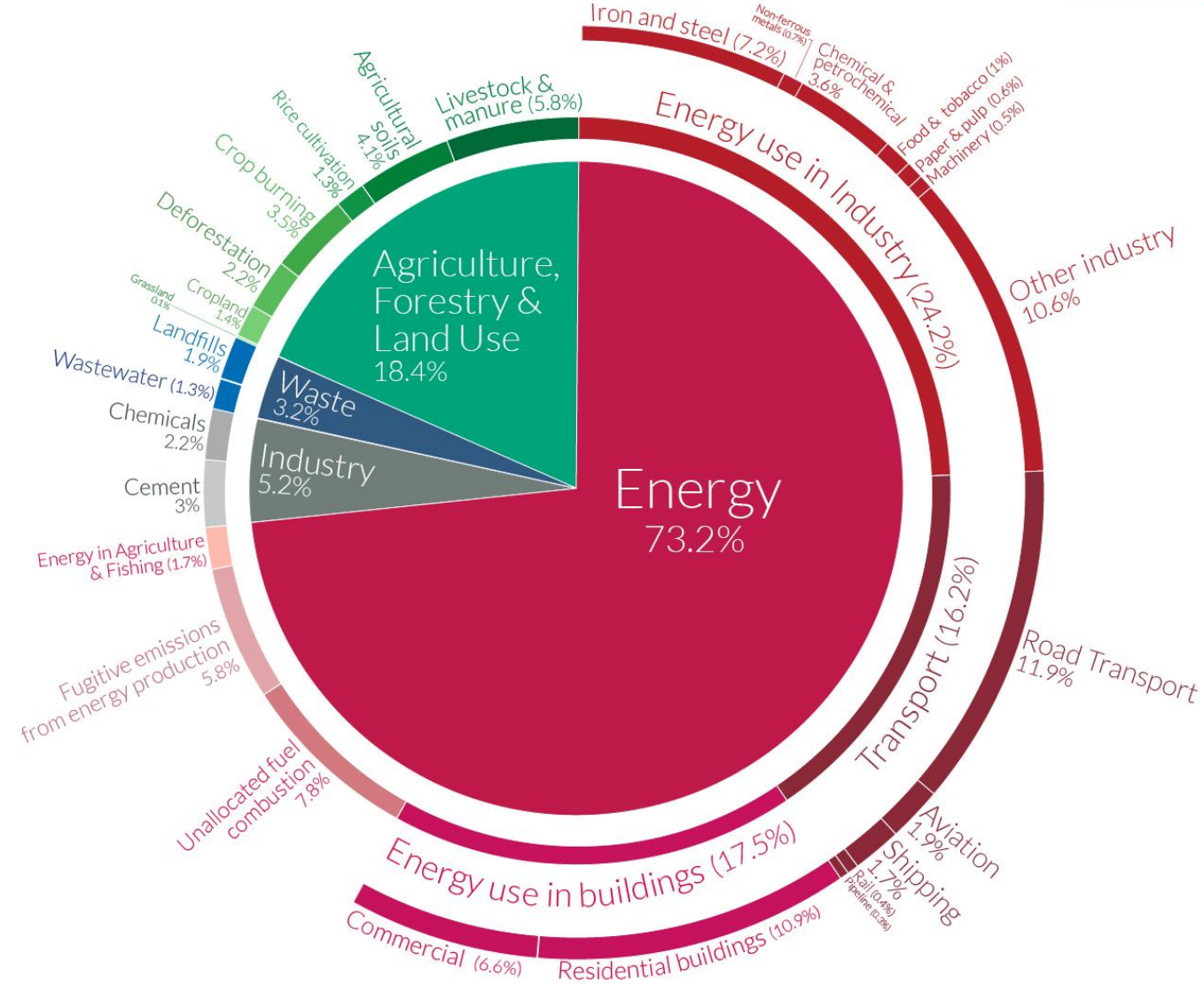
Energy sector accounts for 75% of global greenhouse gas emission.

We are facing the **mega-transition** of energy sector with trillions dollars opportunity.

Global greenhouse gas emissions by sector

Our World in Data

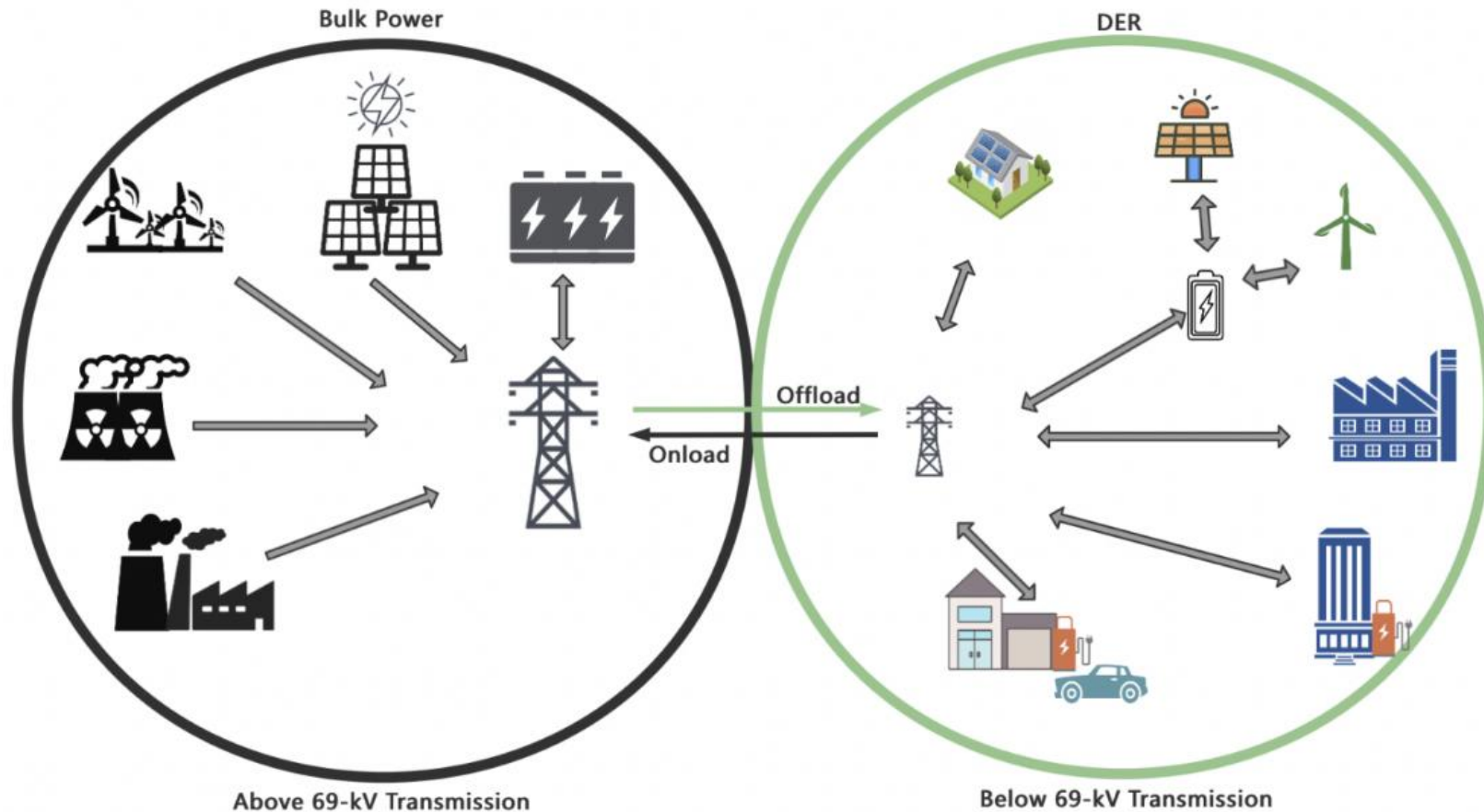
This is shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes CO₂eq.



Why Distributed?

Distributed energy resources is essential to uphold more centralized renewable energy on the grid.

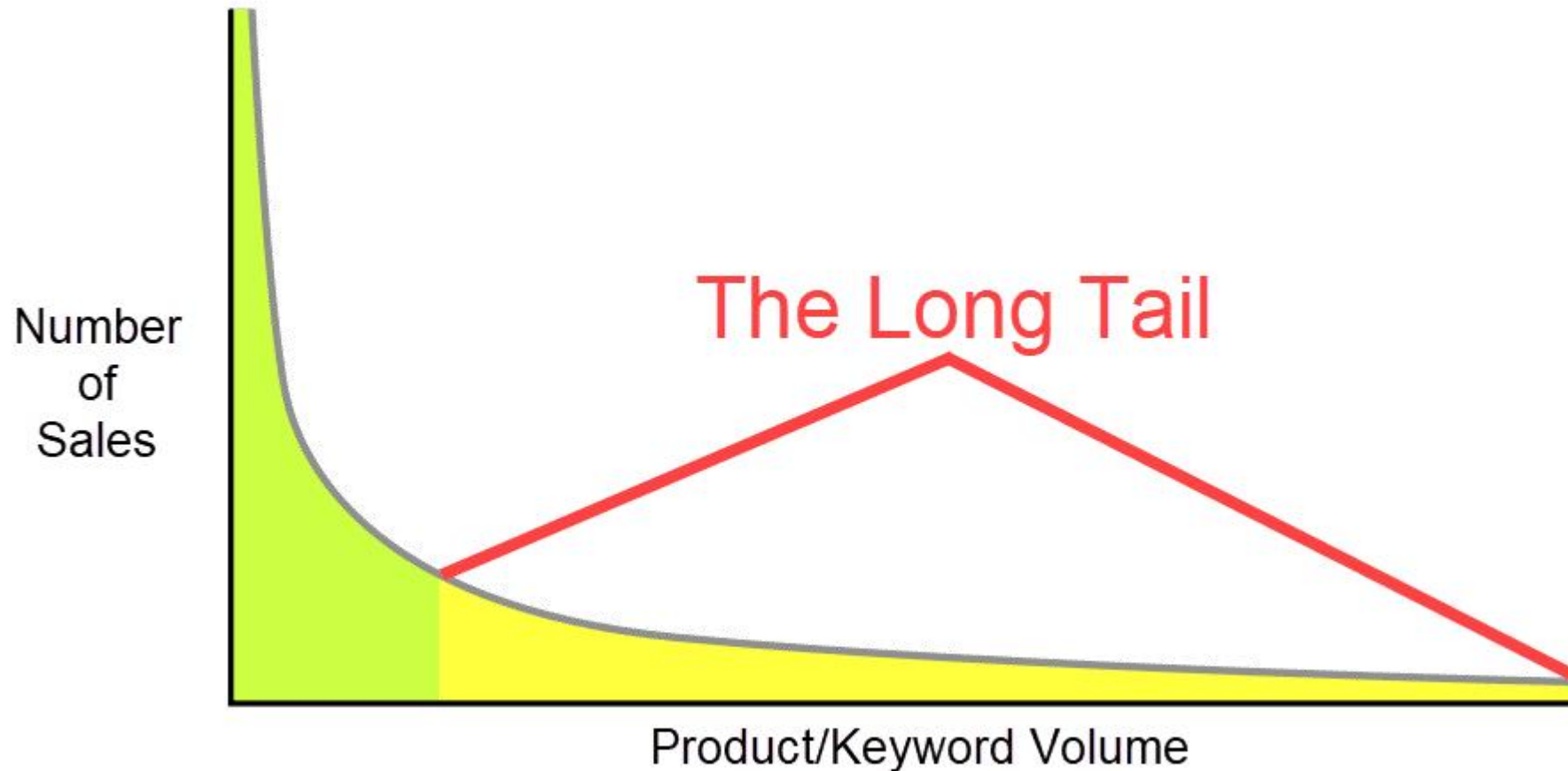
The challenge is connecting globally fragmented equipment is **impossible** for traditional organization.



Why Distributed?

Distributed energy resources is the unserved longtail market lacks connection.

Arkreen offers an omni-adaptable hardware to **cost-efficiently** connect equipment globally.



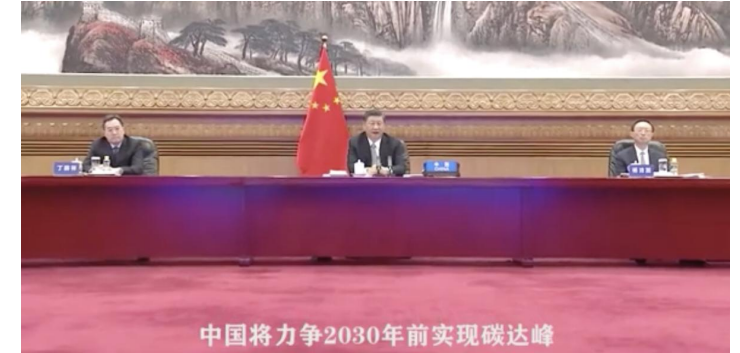
Why Carbon Reduction?



The legislation earmarks \$369 billion for U.S. energy security and fighting climate change.



COP26 reached The Glasgow Climate Pact



China strives to achieve carbon emission peak before 2030

Climate change and carbon neutrality is a **global consensus**. This is the few macro certainty among the US, EU and China. It is a fully educated market waiting for **solution**.

Arkreen is universal, inclusive, regenerative for the whole world. It is Web3-powered, but for Web-all.

Why

Arkreen Network is an

Web3-powered infrastructure for

globally-**distributed renewable energy resources** connection and
monetization to enable

carbon-reduction applications.

Arkreen Network-What



What is Arkreen?

Vision:

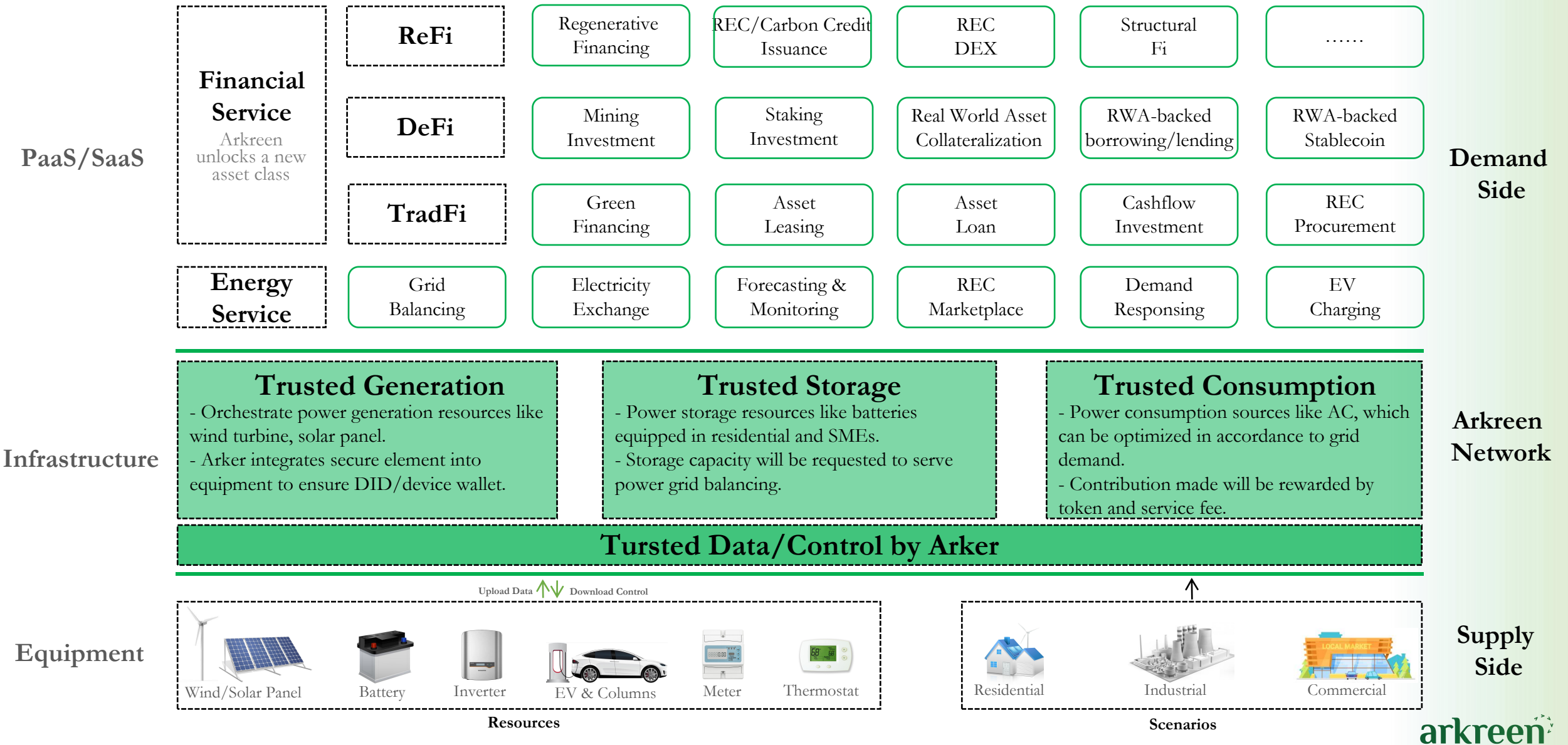
Arkreen Network is a **Web3 - enabled** data network for globally distributed renewable energy resources connection and monetization to boost a carbon neutral earth.

Mission:

Enabled by **Web3** (economics) and **IoT/Blockchain** (tech), arkreen is building a network to **economically** collect **trustless** distributed renewable energy generation data and convert the data into Renewable Energy Certificate (REC) for sale to anyone wants to claim itself carbon neutral.



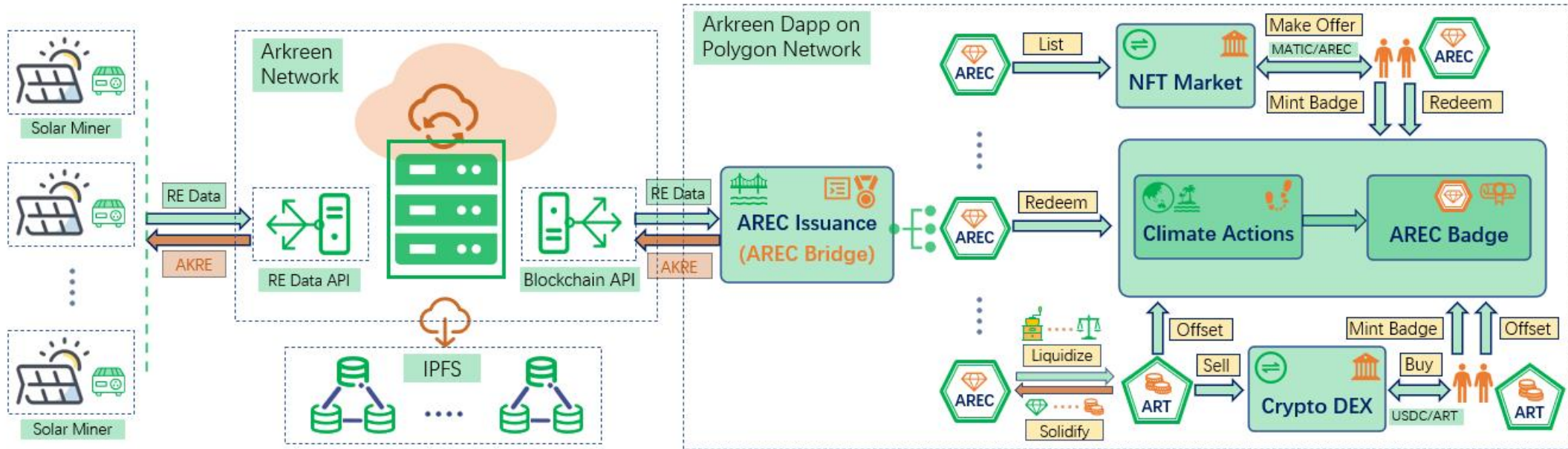
Arkreen unlocks a new green asset



Arkreen Network Overview

For RE Generators: generate renewable energy, mint Arkreen REC (AREC), sell AREC for cryptos / liquidize AREC to ART, swap ART for desired cryptos

- 1 Buy Arkreen miner(s), connect with solar panel, generate RE
- 2 Mint Arkreen REC NFT based on generated RE
- 3 Sell AREC for cryptos / Liquidize AREC to ART
- 4 SELL ART for other cryptos on DEX



For Climate Actors: buy ART/AREC, offset ART / redeem AREC, mint a climate Badge.

- 4 Mint a climate Badge based on climate action(s)
- 3 Offset ART / Redeem AREC to commit a climate action
- 2 Buy ART in Arkreen DEX / Buy AREC in NFT open market
- 1 Start with various cryptos on Polygon Network

Supply side: DePIN model

- Bottom-up via community co-build renewable energy resource digital infra network
- Token incentive to accelerate the bootstrap
- Connect global long-tail 1mio renewable energy equipment

Demand side: ReFi model

- Develop the green data accumulated on Arkreen Network to REC
- Tokenized REC via AREC bridge protocol to increase liquidity with more DeFi applications
- Become the standard of digital REC tokenization and carbon neutrality in Web3 community

Bootstrap Arkreen in a bottom-up way

Arkreen Network leverages IoT+Blockchain connectivity for easy access and first-focuses on solar PV for mass adoption. It offers embedded and integrated IoT connection options for scalability.

And with reference and respect to Helium, token incentivised global coordination method is deeply applied to bootstrap Arkreen in a bottom-up way.

With these, a distributed renewable energy resources infrastructure can be built up.



Integrated IoT Module Inverter

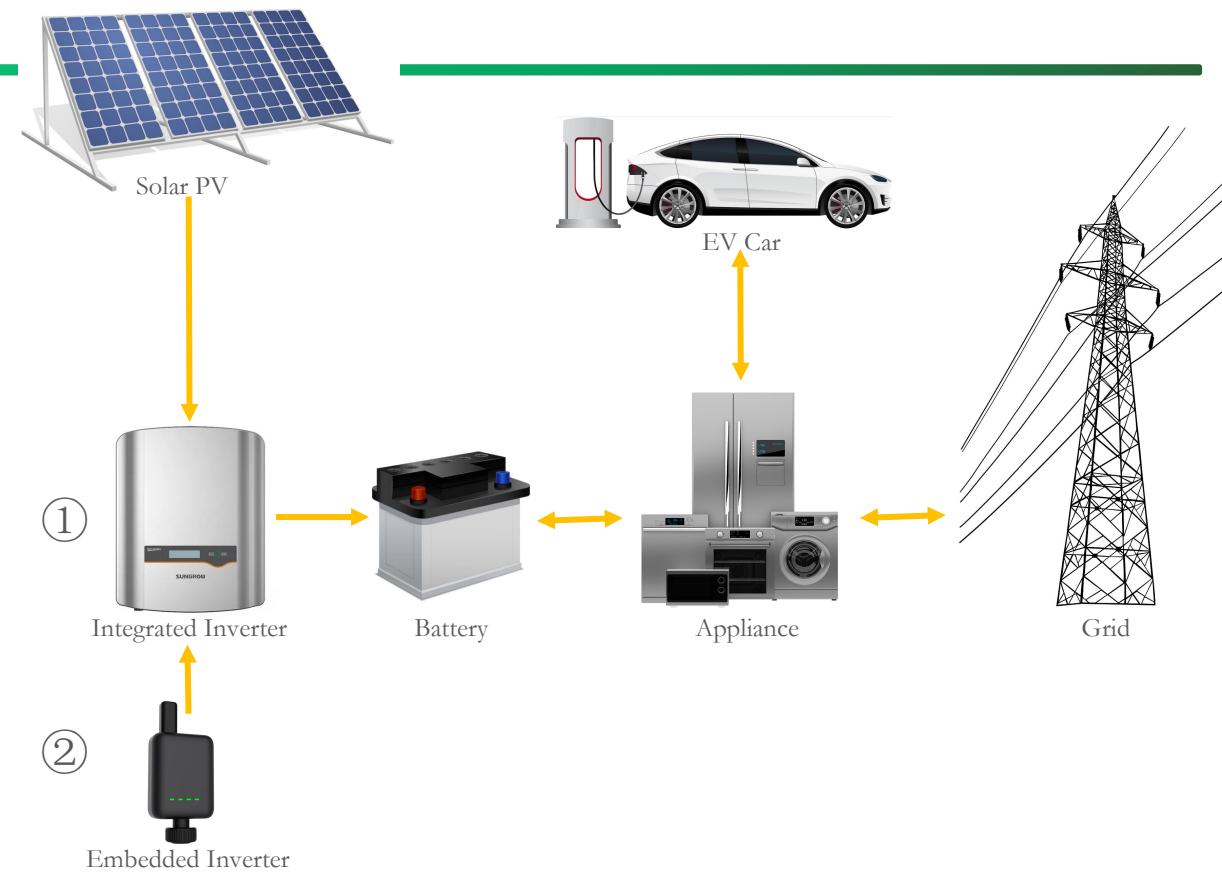


Embedded IoT Module Connector

Arkreen starts with Solar PV

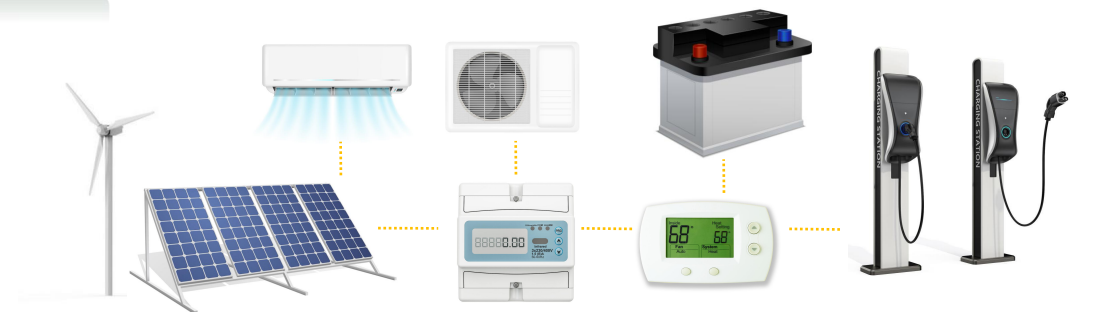
For inverters with Arkreen guardian modules integrated, which will be massively produced, users can monetize their renewable energy data by click APP.

For existing inverters, users can plug Arkreen connector into their inverters for data validation. Due to chipset level security and edge devices integration, the data is trustless and transparent in real time.

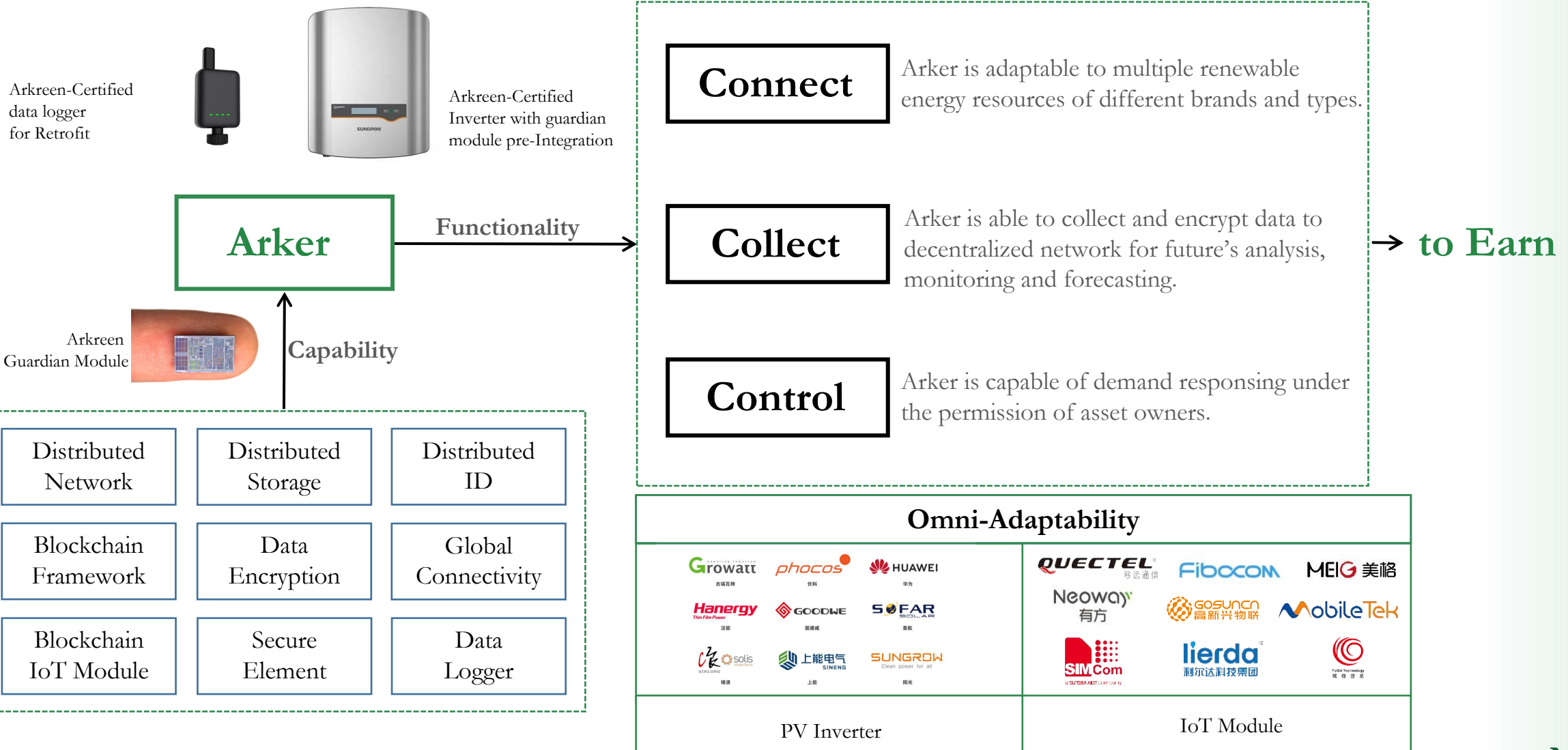


Future, All Connected

Arkreen starts with the most populous PV. In the future, Arkreen will deploy IoT chipset module in battery, smart meter and charging column to aggregate multiple renewable energy resources.



Arker Miner is a connector



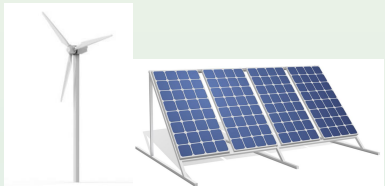
Arkreen Proof Model

Capacity of power generation, storage and consumption registered on Arkreen will serve energy services. Capacity owners will receive **service income** and **\$AKRE reward**. This turns renewable equipment into money-printer.

Proof of Capacity

Generation

- Generation Capacity includes distributed wind turbine, solar panel in residential and SMEs.
- The kWh generated will be collected via Arker and recorded on chain to secure immutability and accurate \$AKRE reward.



Storage

- Storage Capacity refers to rechargeable battery in residential and SMEs.
- The kWh charged from/discharged to the grid will be one of key incomes/rewards for battery owners.



Consumption

- Consumption Capacity refers to AC controller, smart meter etc. for demand response.
- The kWh reduction contributed by collective power consumption response will release grid pressure and will be rewarded.



Our Vision

Arkreen Network is a Web3-powered infrastructure for globally-distributed renewable energy resources, allowing the connection and monetization of carbon-reduction applications.

arkreen