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Blockchain Mobility Week: Mobility and the Energy Transition

June 2021

Speakers

Walter Kok

CEO

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Director | E-Mobility

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Agenda

1. Intro: Acting our way into new thinking
2. Enterprise adoption of blockchain through decentralized service-level agreements (DSLAs)
3. Decentralized Identifiers (DIDs): the secure, scalable, and GDPR compliant bridge between mobility and energy
4. Mobility and energy use cases: Challenges and Opportunities
5. Q&A

Accelerating grid decarbonization by bringing open source decentralized technologies to the new energy system

Mission

Our mission is to develop and deploy a **decentralized digital operating system** for the energy sector in support of a low-carbon energy future

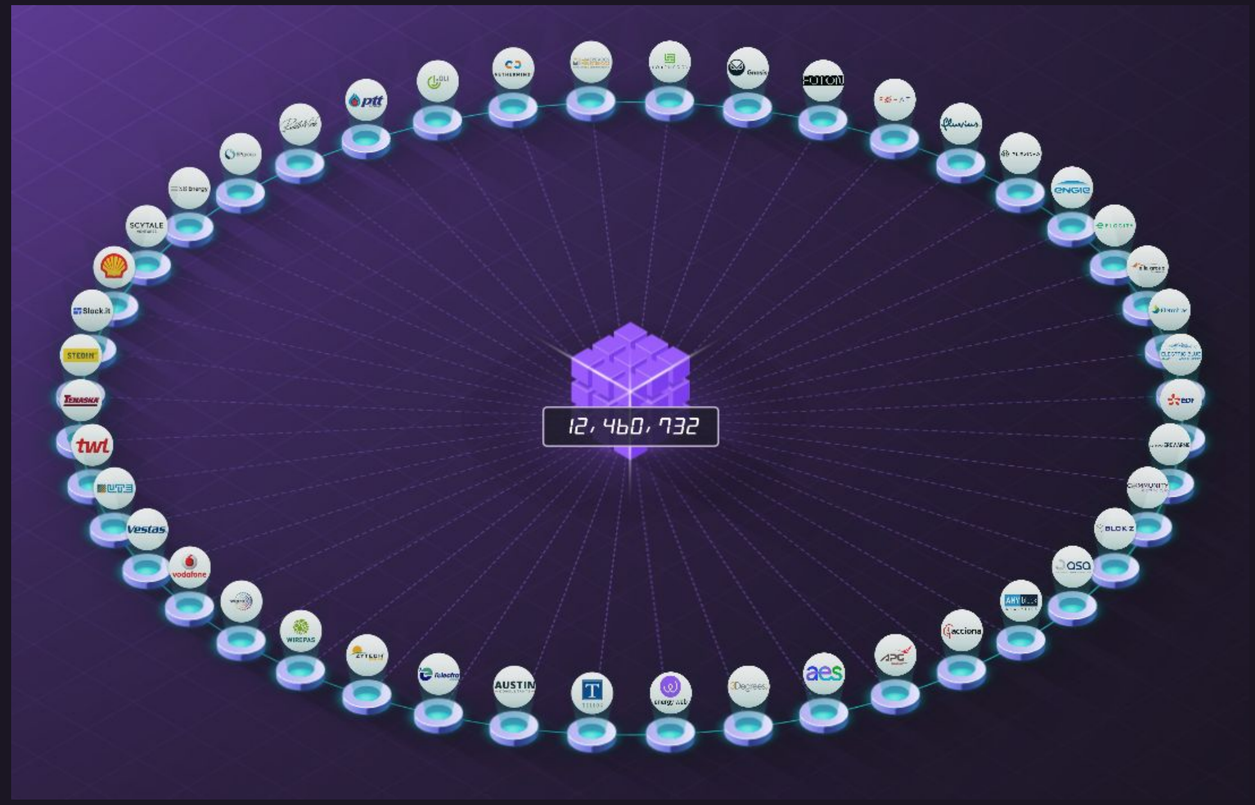
Who we are

A non-profit foundation with energy, IT, and blockchain specialists dedicated to transforming the way we use energy with offices in The Netherlands, Germany, Switzerland, and the U.S.
Established in 2017, founded and spun out of Rocky Mountain Institute

Through 2019, we worked with the ecosystem to launch the Energy Web Chain, the world's first public chain focused on the energy transition

The Energy Web Chain:

- Public chain run by global energy community of 45+ validators
- Developer friendly (ETH EVM, PoA)
- Scalable, energy efficient, green
- Ultra low cost due to PoA consensus



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Do not think your way into new acting but act your way into new thinking

- TSO – PoC Complete Q1 2020
- Goal: Streamline prequalification, registration, and activation processes to integrate 1M+ decentralized flexibility assets into wholesale markets

- TSO – PoC Complete 2018
- Goal: Reduce operational costs of performing settlement for decentralized flexibility assets to enable more market participation

- TSO – Pilot 2020
- Goal: Improve efficiency, security, and accuracy of DER standing data to create shared state among market participants

- DSO – PoC Complete Q3 2020
- Goal: Create a distribution-level market where decentralized assets can provide services to asset owners and the grid

- OEM – Pilot underway; MVP 2020
- Goal: Automate the process for establishing digital identity for renewable generation assets

- DSO + OEM – Multiple Pilots Ongoing
- Goal: Create certificates for battery storage assets that provide flexibility services that reduce renewable curtailment

Our Ecosystem

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The two big questions of public, open enterprise blockchain

Can decentralized solutions actually deliver enterprise-grade services with high availability and guaranteed levels of service?

Yes!
Utility Layer

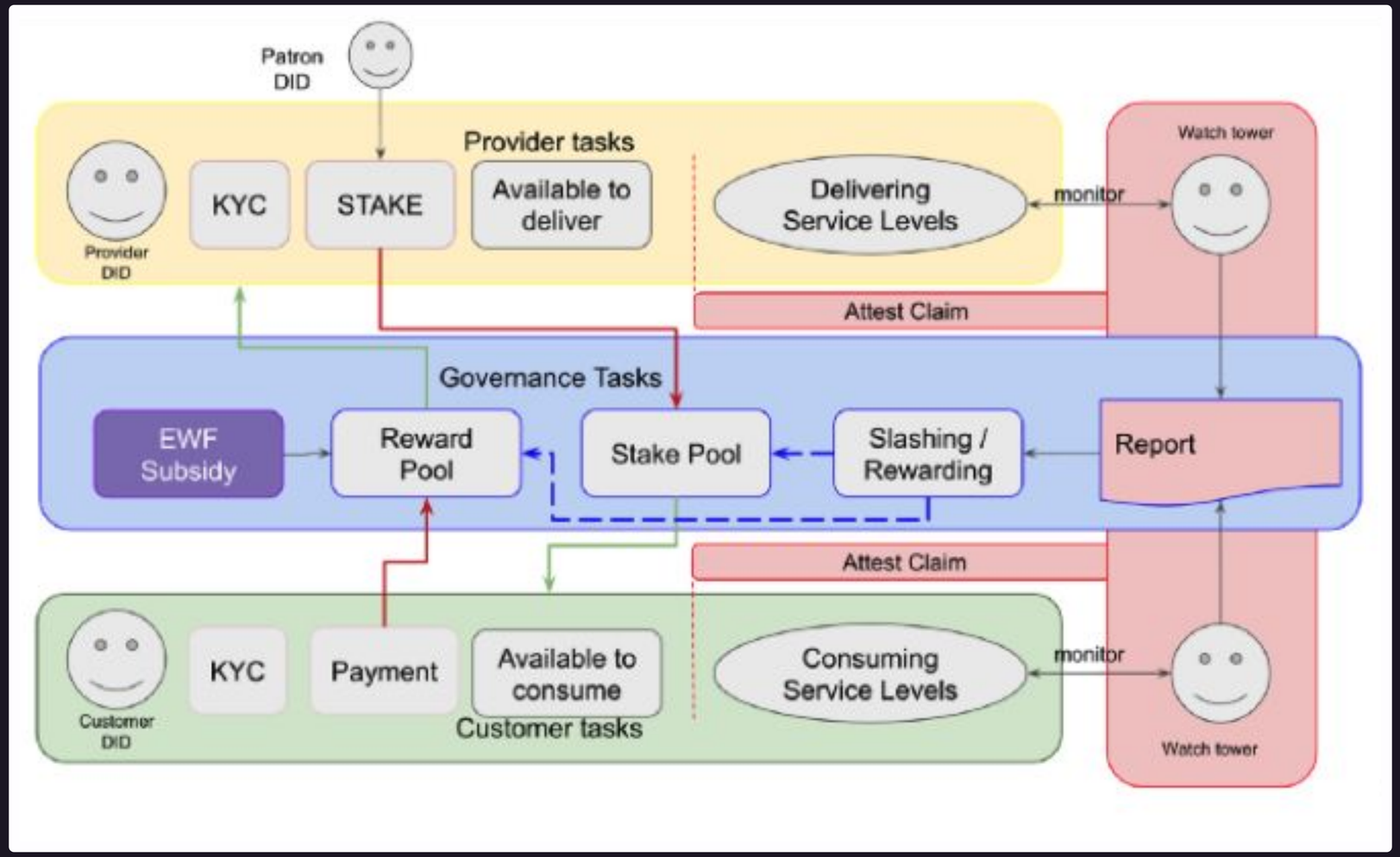
Off-chain services and technology to compliment the Blockchain:
DIDs, secure messaging, GDPR compliant data storage

Could SLAs that don't rely on single vendors or require bilateral contracts be the secret to bridging from limited pilots and proofs of concept to full-blown commercial deployments?

Yes!
DSLA

A decentralized SLA forms the basis of a new type of service-level agreement (SLA) for enterprises and vendors alike

We are building the solution as we speak...



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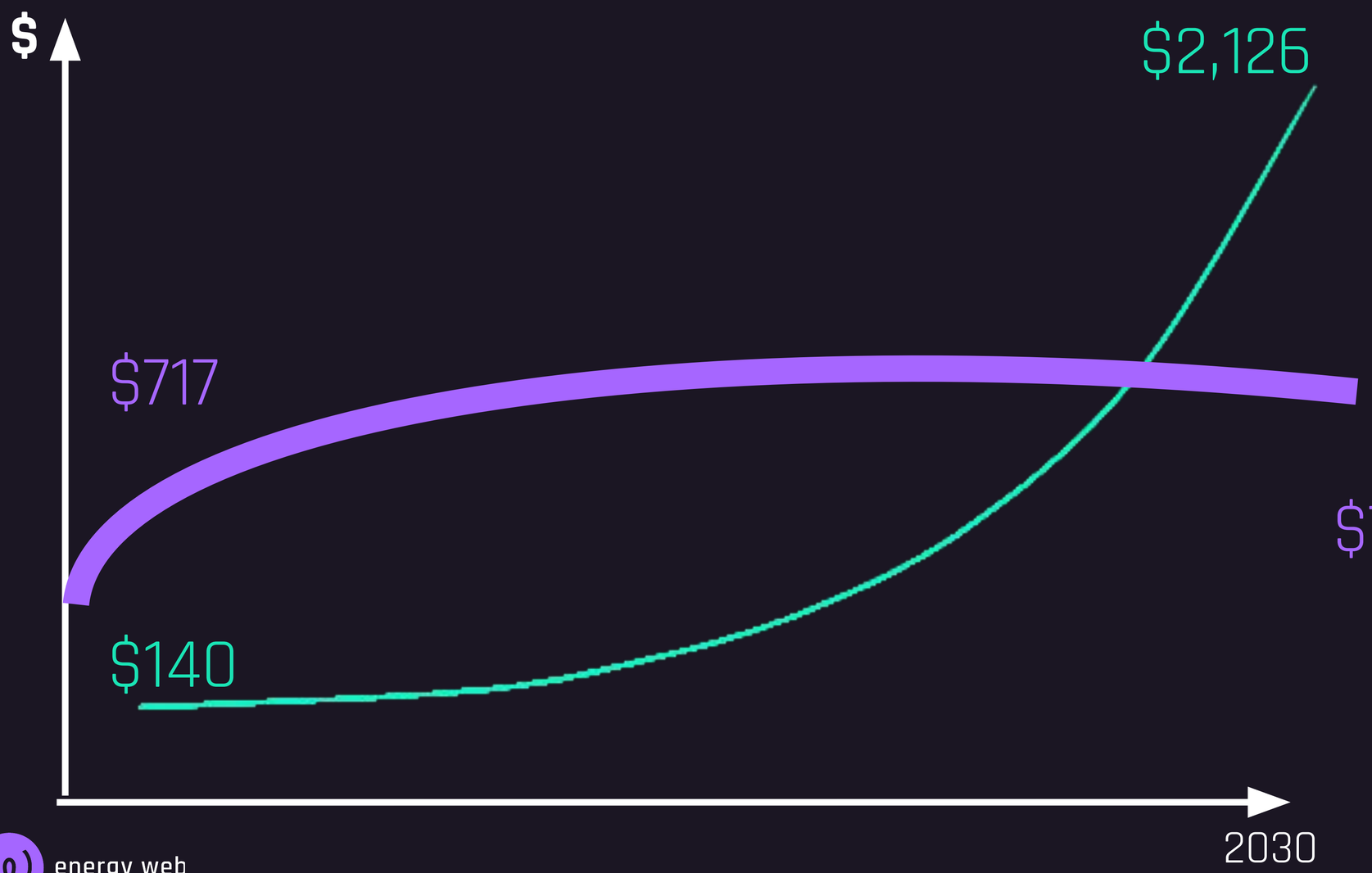
Customer spending on RE & DER is on-track to eclipse utility investment

USD billions



Customers

Utilities

$752

EV & EVSE

Storage Smart AC

Renewables

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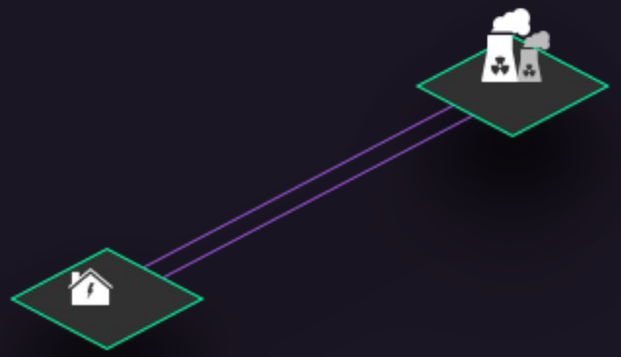
The challenge: grid operators generally unequipped to procure services from DERs. We solve this problem via digital, decentralized infrastructure



20th Century Model: centralized, top-down registration and operation of a small number of thermal assets

Energy Web Model: decentralized, flexible, bottom-up coordination of a large number of customer, OEM, aggregator, and grid operator-controlled low-carbon assets

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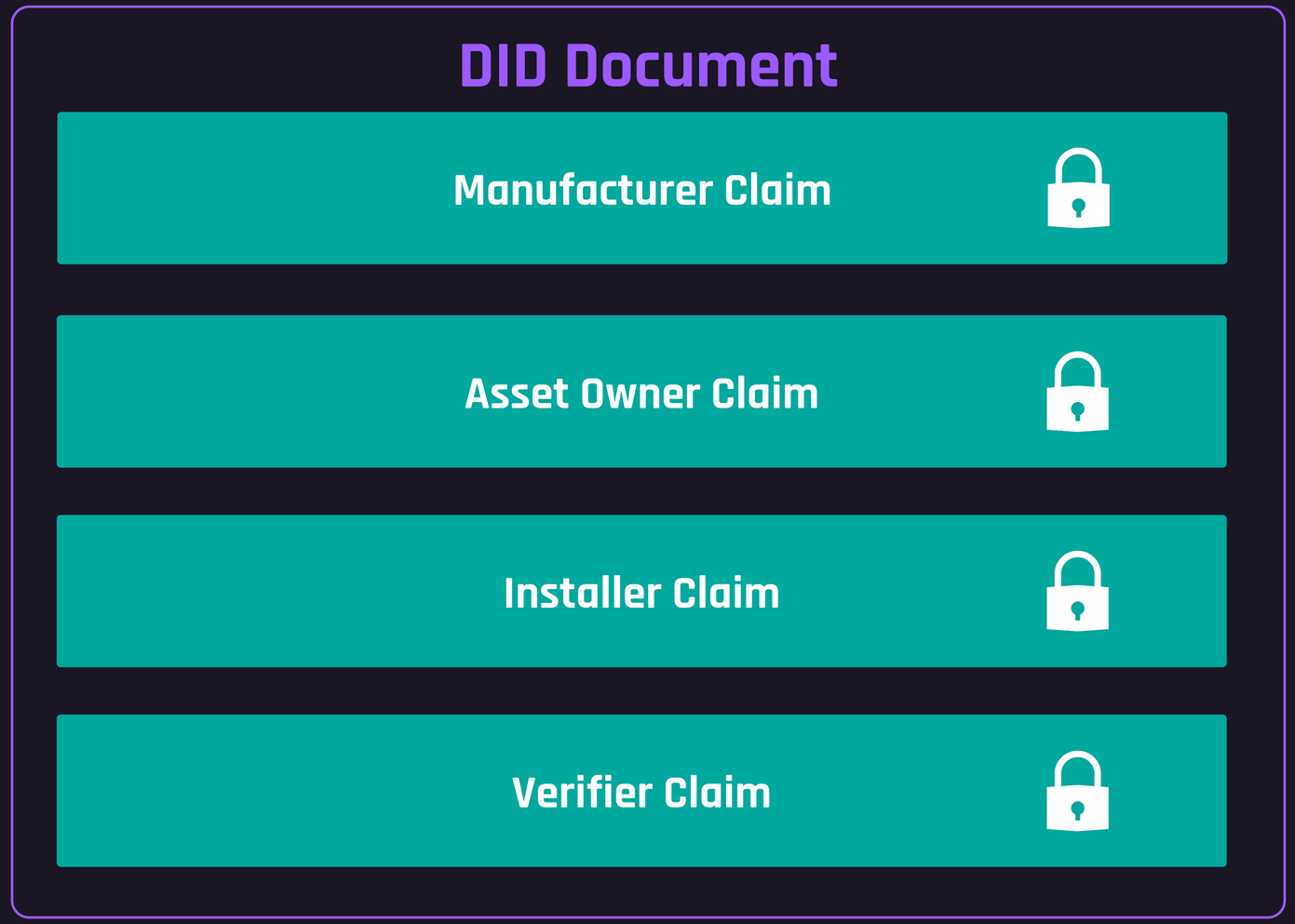
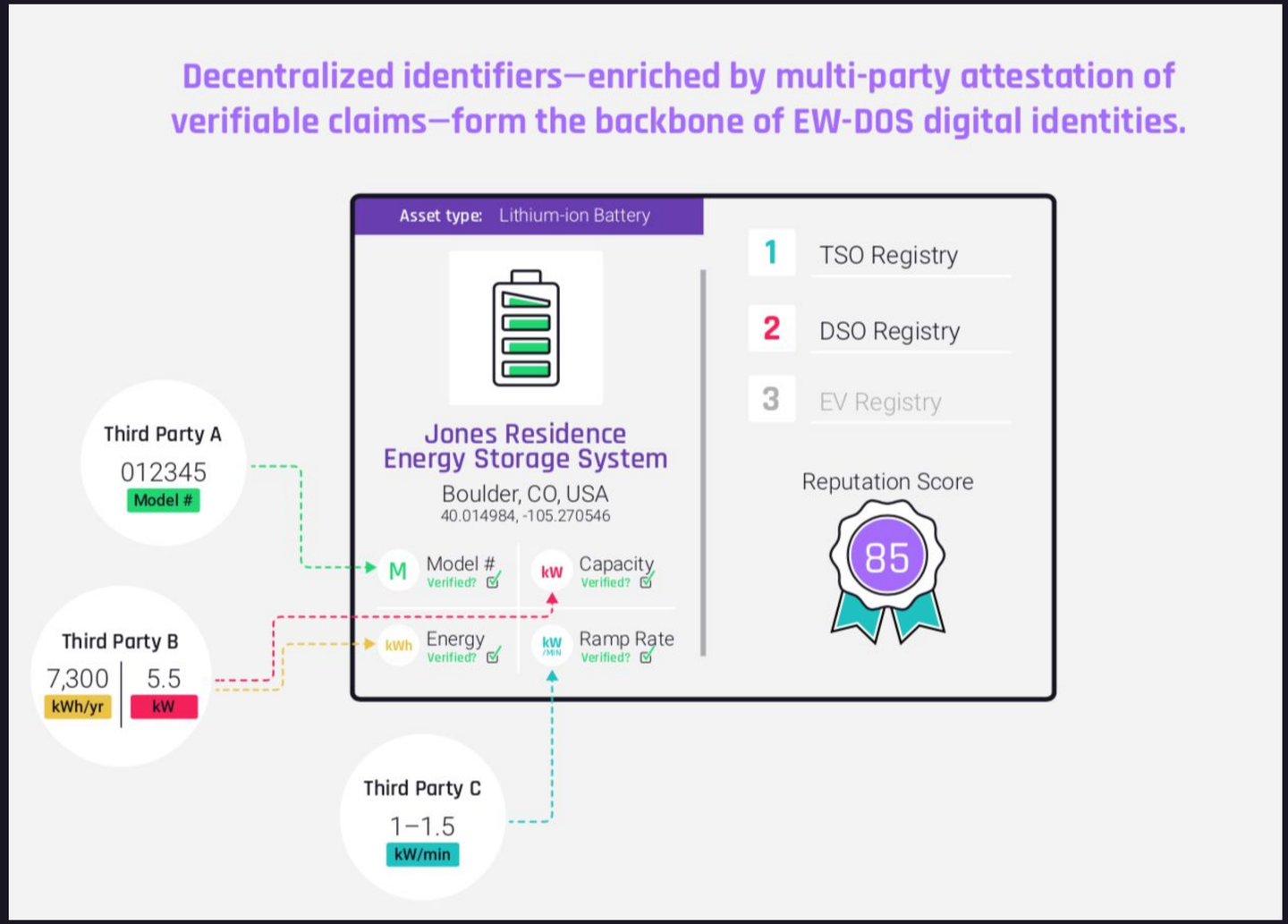
DIDs and Verifiable Claims

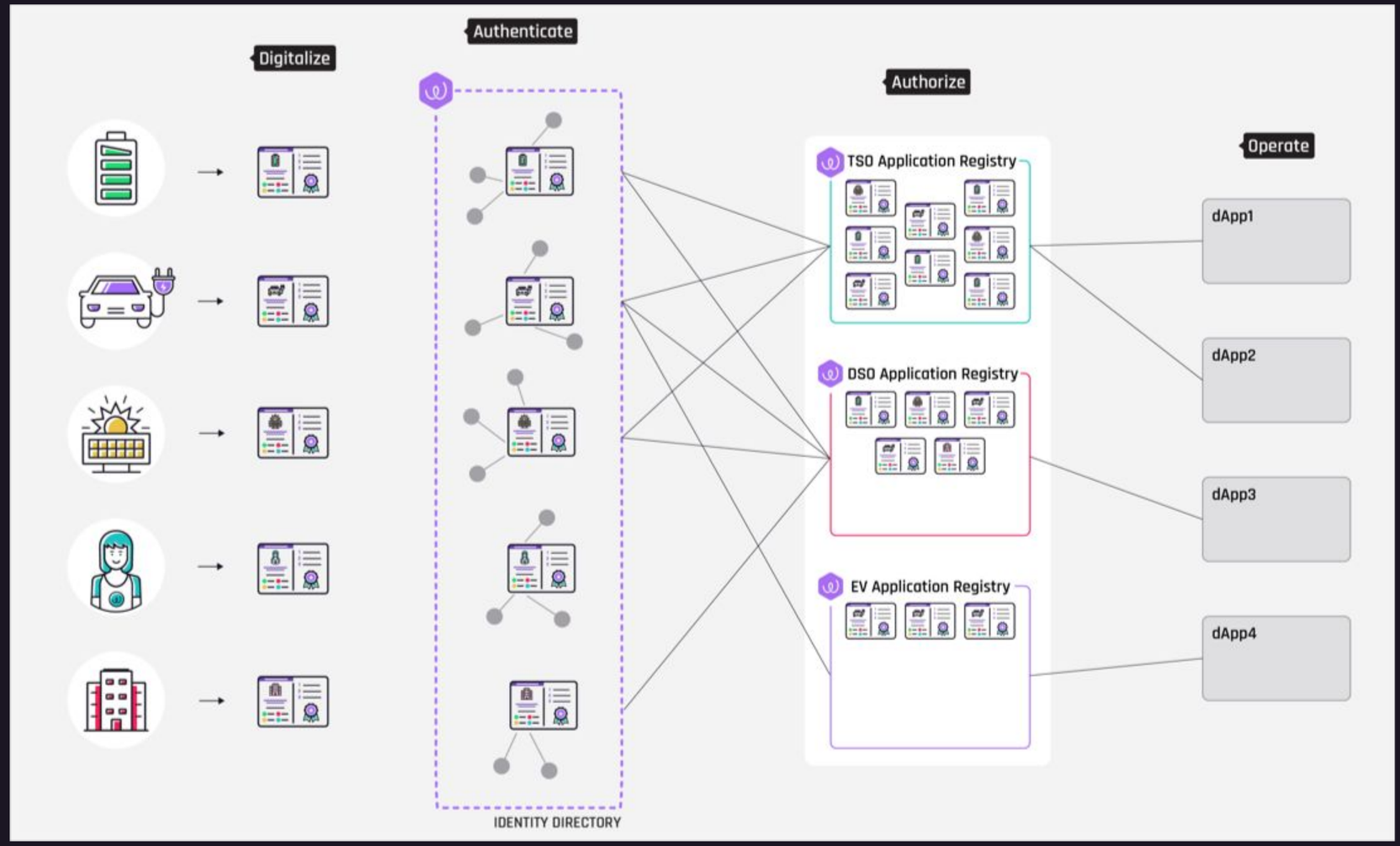


Serves as the **Digital Passport** of the energy asset that can be populated with **static**, **dynamic**, and **calculated data**

EW establishes decentralized identifiers (DID) that provide a secure, shared state for all assets, customers, and participants in a given market



Identities can then register to different energy markets according to local / regional / global rules and regulations



Decentralized identifiers (DIDs) are the foundation

- Standardized by W3C: https://w3c.github.io/did-core/
- DIDs underpin most use cases (registries, lifecycle management, DER integration, EVs)
- DIDs can allow the ecosystem to benefit from network effects
- DID adoption is on the rise
- No decentralized solutions exist for identity and access management

Let's build an open, flexible solution that everyone can use

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E-Mobility Dashboard

- Visibility of assets for grid operators
- Assets proof their participation in energy markets
- Enable TSO - DSO coordination

- Establish a decentralized identity using DID & Verifiable Credentials (VCs) for:
  - Each vehicle and vehicle owner
  - Charge points, Charge Point Operator (CPO), eMSP, OEM
  - TSO, DSO, Aggregators

- Use that identity to participate in markets:
  - Prequalify the devices
  - Activation of the assets

E-Mobility Dashboard: TSO visibility of electric vehicles

elia group
Elia | 50Hertz | EGI

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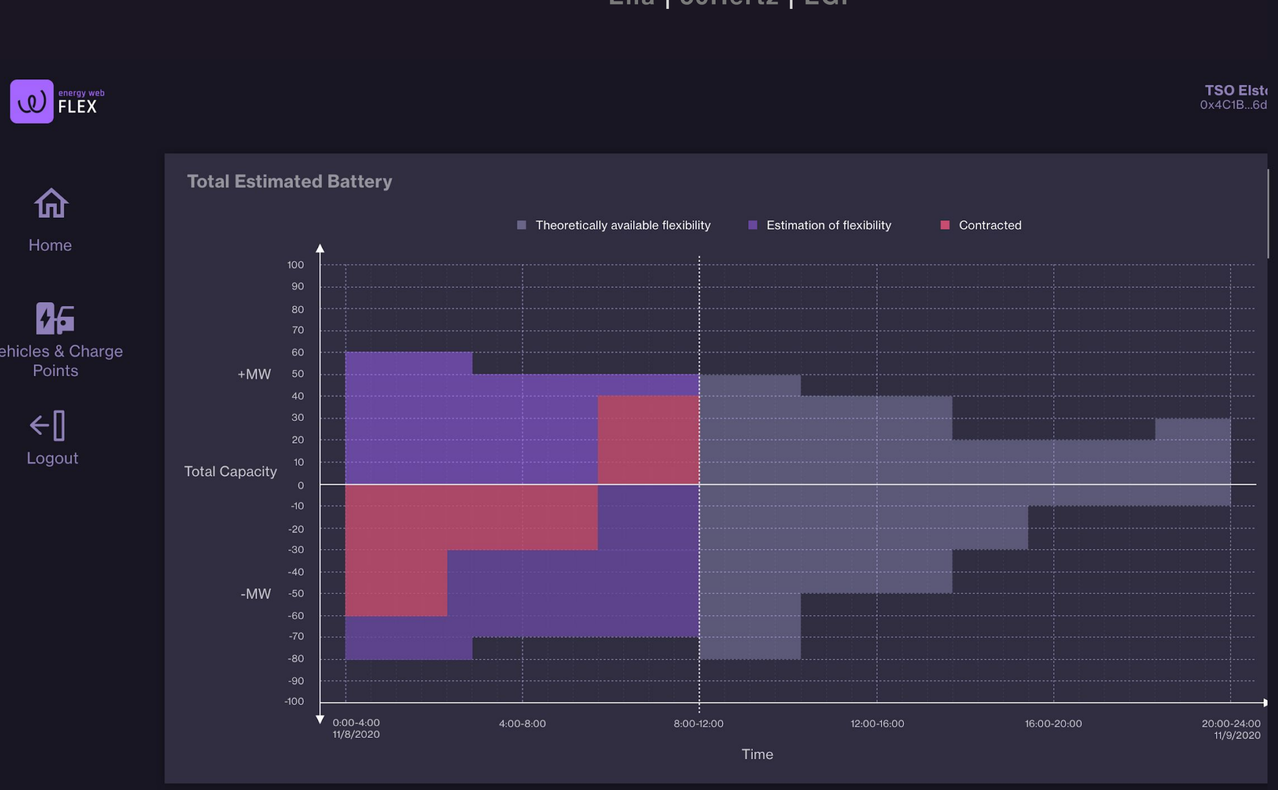
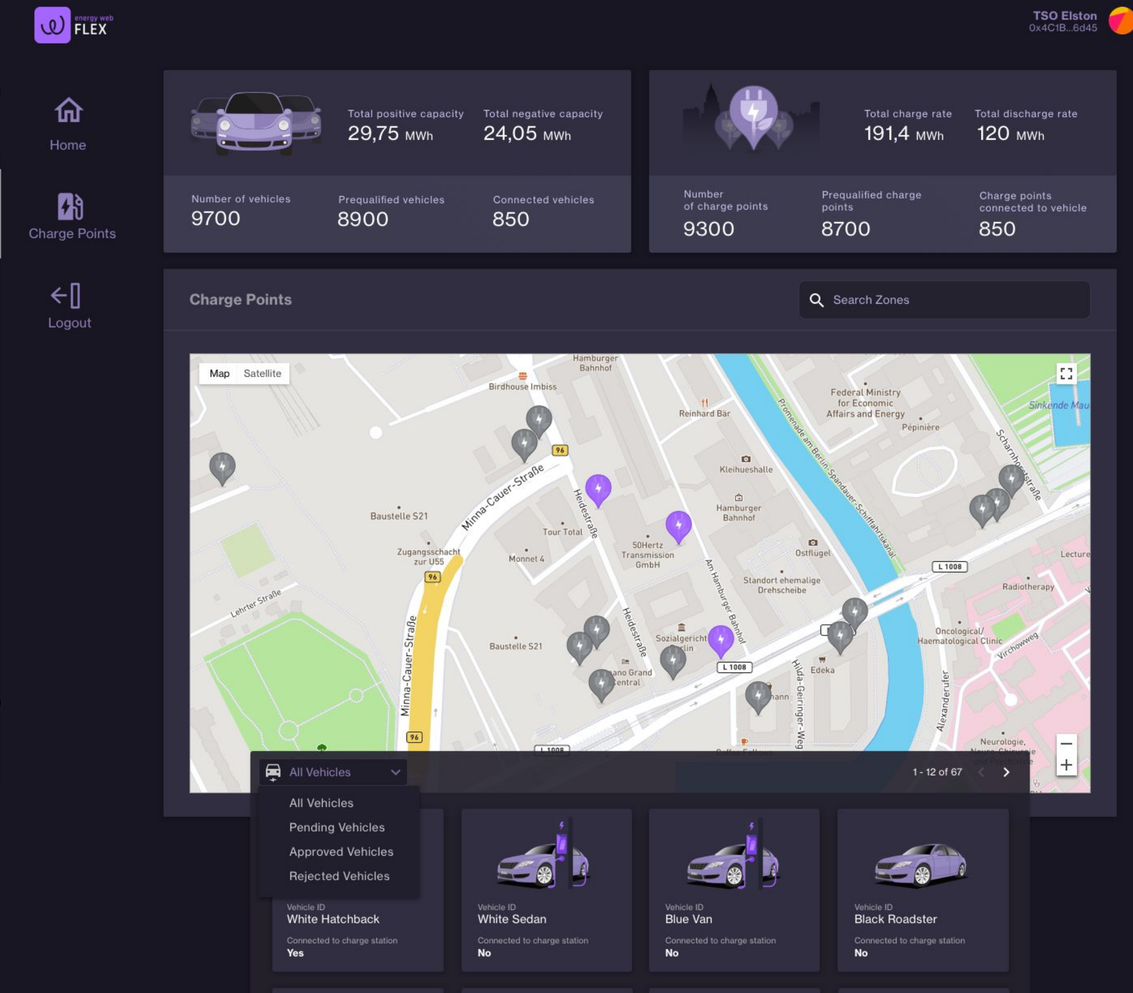
SHARE & CHARGE

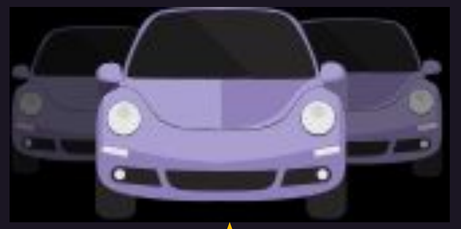


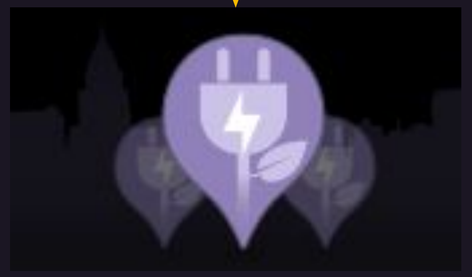


EW-DOS at a glance: Energy Web Decentralized Operating System

Layer	Function
Applications fluvius. · ptt group · energy web ZERO · SPgroup · Volkswagen · dena Deutsche Energie-Agentur · elia group (Elia | 50Hertz | EGI) · APG Austrian Power Grid – Strom bewegt	Enables specific traceability, DER integration, LCM, and other use cases.
Software Development Toolkits (SDKs) Your Use Case Issuer Module · Exchange Module · energy web ORIGIN — Green Charging IoT connection · Market Operations · Activation & Delivery · energy web FLEX — Smart Charging	Provides common components to jump-start dApp development.
OCN Service Interface SWITCHBOARD	Securely connects devices & companies
Open Charging Network (OCN) SHARE & CHARGE — Open Charging Network (OCN) ISO 15118 · Key Manager · Messaging · ID Directory · Gas Relay Storage · Oracles · Bridges	
Blockchain energy web CHAIN	Establishes trust.

Mobility and Energy





OEM

Fleets

eMSP

CPO

Open Charging Network

E-Mobility Dashboard

TSO

DSO

Aggregator

Auditors

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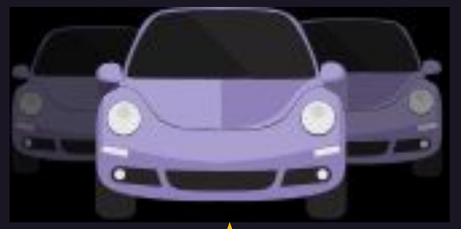

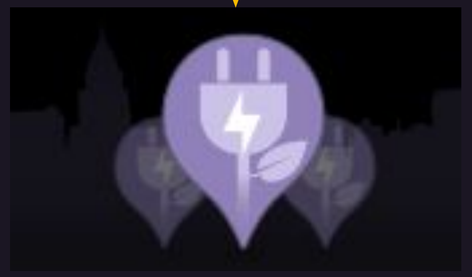

OEM

Fleets

eMSP

CPO

Open Charging Network
an extensible e-roaming platform

- In production on the Energy Web Chain
- Customers charge their vehicles with just one contract and participate in energy markets
- Open Platform based on **OCPI 2.2**, no gatekeepers, no lock-in

Open Charging Network

E-Mobility Dashboard

- Third parties build services offering additional value for mobility & energy companies and customers (B2B2C)

TSO

DSO

Aggre gator

Auditors

Open Charging Network Services

Clearing

Instant Payment

Clearing

Settlement

Connection

Easy Connect

eRoaming contracts

Contracting

Certificates

Green Charging

Analyse tool

Smart Charge Now

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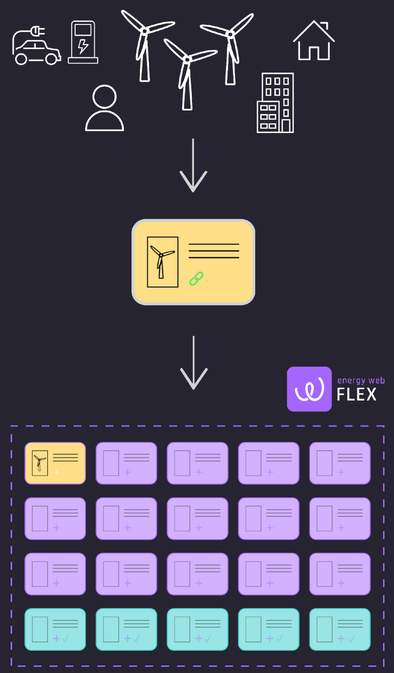
We have identified three application domains where the EW stack can unlock the most value

Flex
increasing grid flexibility



Origin
re-defining energy traceability

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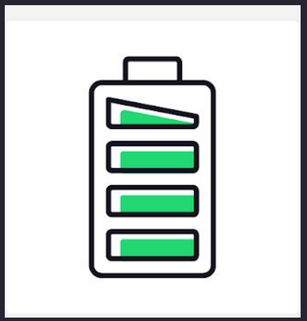
ORIGIN

Trace
trace assets globally



The bridge between mobility and energy: Interoperability

“**bloXmove** is redefining urban mobility. We provide a shared, collaborative network which acts as a common, decentralized infrastructure for mobility providers. We like to call ourselves ‘The Star Alliance of Mobility’ ” - Harry Behrens, bloXmove, CTO

“The **Energy Web** Decentralized Operating System enables electrical vehicles to seamlessly participate in the different energy markets. Combined with smart charging applications this will have a positive effect on accelerating the decarbonization of the electricity grid” Walter Kok, Energy Web, CEO

Open Source & Standards for transparency and mitigating lock-in effects

OPEN CHARGE POINT INTERFACE

EVRoaming Foundation
Realising cross-border charging

- Traceability and verification of functionalities
- Smooth collaboration with project partners and beyond
- Experience in the introduction of Open Source
- License compliance including all dependencies
- No lock-in effects through technology or suppliers

ISO 15118

GPL Free Software
Free as in Freedom

THE APACHE™ SOFTWARE FOUNDATION

Energy Web Membership

Tech Benefits

- Access Plug-and-Play Energy Web software
- Access to pre-built dashboards to monitor your Apps/Nodes
- Host a Validator Node on the EW Chain
- Host utility service nodes on EW-DOS
- Direct Energy Web's technology development roadmap
- EW-DOS technology on-boarding

Business Benefits

- Private Slack Channel: contact and post requests to the Energy Web Slack team
- Access to Energy Web Academy content
- Access to Energy Blockchain Market Research
- Business Support in building partnerships in the energy/blockchain space
- Unlimited access to EW Events and Forums

Thank You!
Questions?

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Next steps - “Acting our way into new thinking”

Green Mobility

Connection of green energy with the urban mobility market for green charging deals in a share & charge community

Set up PoC-team with experts from bloXmove and Energy Web Foundation

Incentivation for private customers producing renewable energy (solar panels) with discounts for services by our mobility alliance partners like car sharing, rental (green balance/CO2 neutral for fleets)

Integration of a NL fleet provider (e.g. ATHLON) that offers green energy cards to their fleet customers

Free & Open Source Code

Released:
https://github.com/energywebfoundation/origin
https://github.com/energywebfoundation/ew-did-registry
https://github.com/energywebfoundation/switchboard-dapp
https://github.com/energywebfoundation/ev-dashboard-client
https://bitbucket.org/shareandcharge/

Soon:
https://github.com/energywebfoundation/flex
https://github.com/energywebfoundation/ev-dashboard-frontend