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Real-time energy-trading marketplace with dynamic pricing reflecting supply and demand, at low transaction cost, with high security.

November 2018

Distributed intelligence to optimize energy usage and empower communities

Energy flow (kWh)

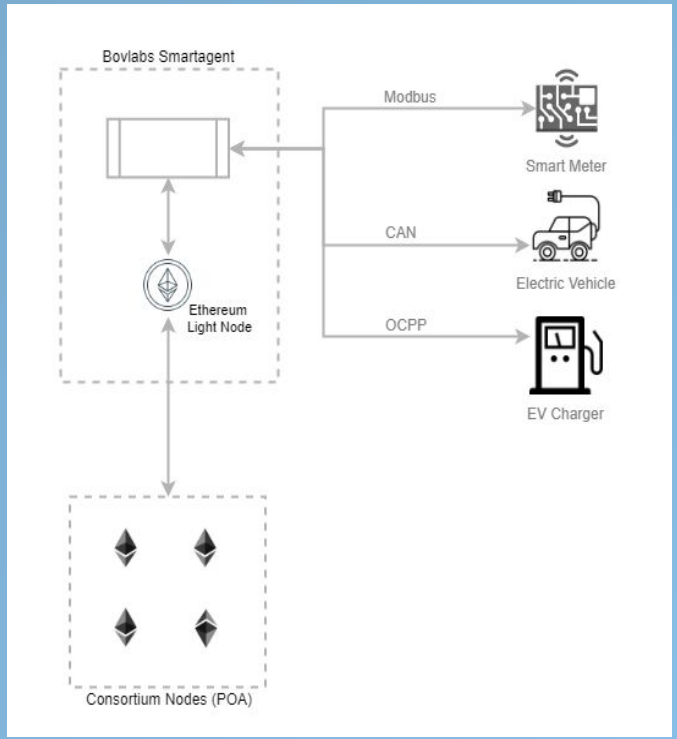
Contracts / tokens / data

BOXLABS

- Real-time peer-to-peer energy trading
- Tracks Certificates of Origin (Renewables)
- Bridges with e-mobility
- Users engagement through incentives

Smart Agents and Consortium Blockchain

- Use smart agents as distributed nodes
- Smart agent to run on lightweight machine such as Raspberry Pi or embedded directly into utility device
- Proof of Authority consensus using Ethereum smart contracts
- Permission based blockchain with encrypted data
- Digitization through tokens of the value to assets
- Configurable rules engine which can be configured by the consortium both on transaction and pricing



Case #1: Pilot completed with ERock, Texas

ENCHANTED ROCK
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Utility-grade backup power.

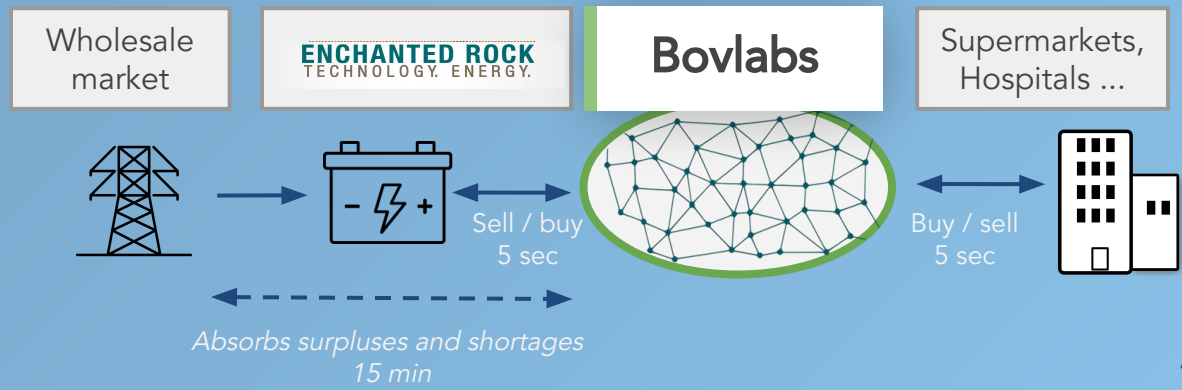
erockhold.com

ERock microgrid operator

- Offers local capacity and electrical resiliency

Objectives

- Enable 2-way transactions with their customers and gain in efficiency



Case #1: Pilot completed with ERock, Texas

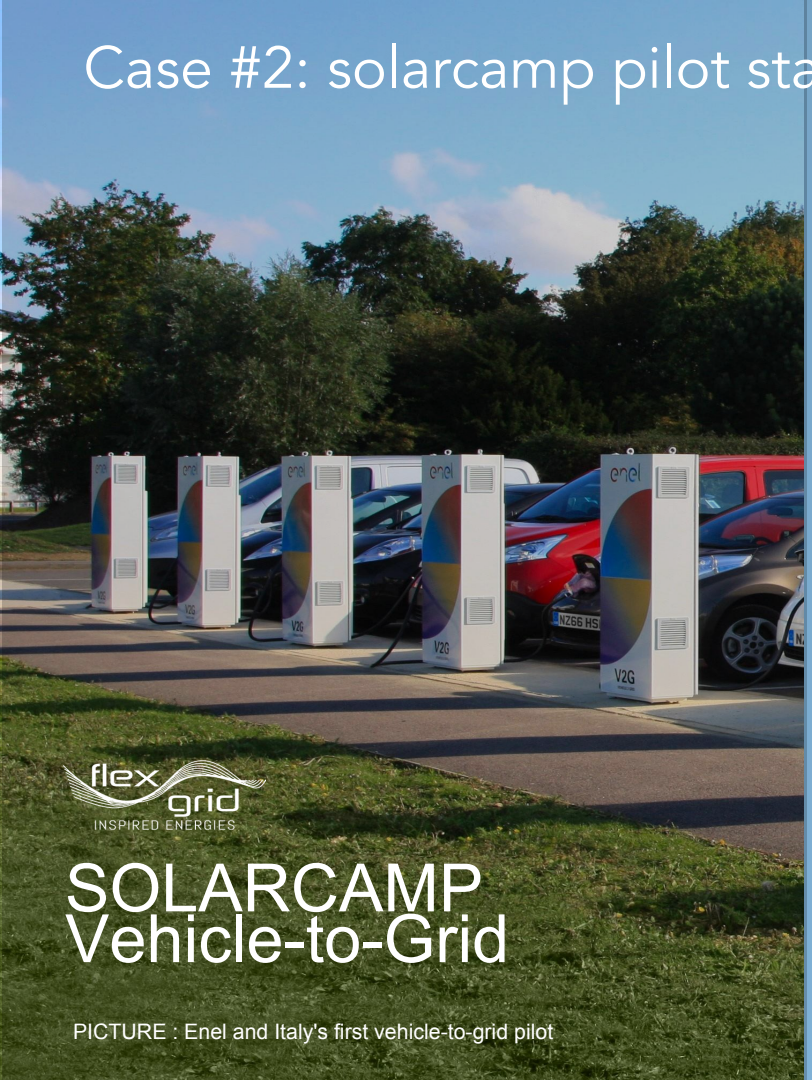
Value proposition to ERock

- Decrease credit risks
- Lower cost for billing and accounting
- Optimize energy arbitrage
- Increase reliability and ancillary services
- Increase customer base with 2-way transactions

Promising results

- Estimated operational saving up to 5% from year 1

Case #2: solarcamp pilot started with thecamp and SNCF, France



PICTURE : Enel and Italy's first vehicle-to-grid pilot

Objective:

Integrate Vehicle-to-Grid (V2G) use case within auto-consumption model between two remote sites

- Electrical vehicles as stability and reserve services
  - ➜ OPEX rather than CAPEX
  - ➜ V2G as part of resiliency to blackouts
- Increase user participation through tokenization
  - ➜ Change behaviour by rewarding drivers
- Explore new business models with Vehicle-to-Grid
  - ➜ e-mobility
  - ➜ Certificate of origin / Carbon Emission certificates

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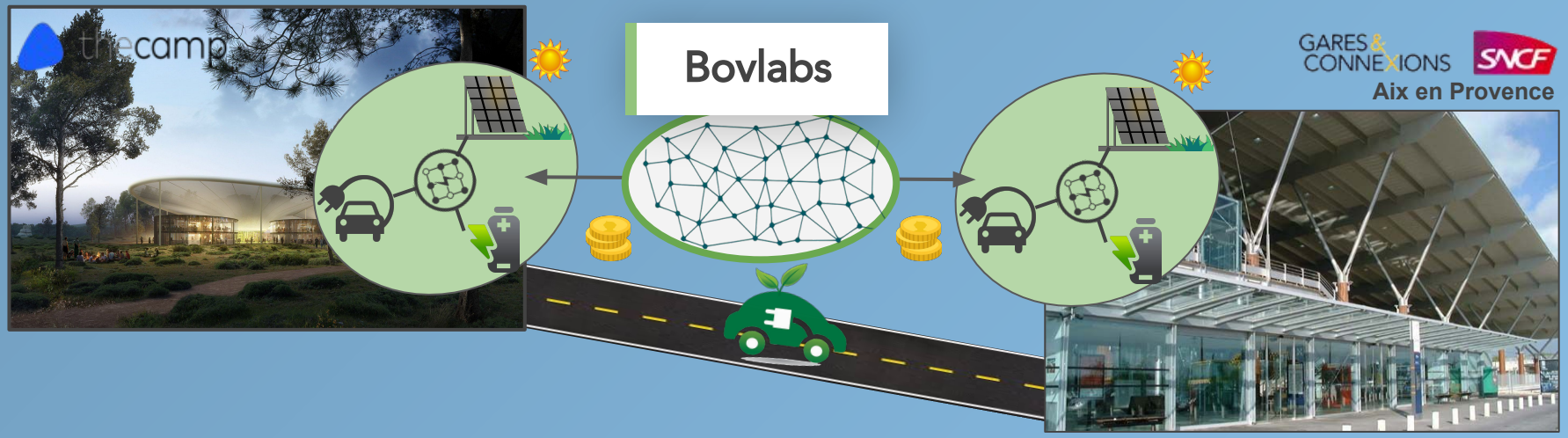
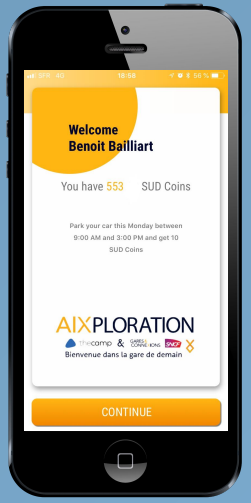
Case #2: solarcamp pilot started with thecamp and SNCF, France

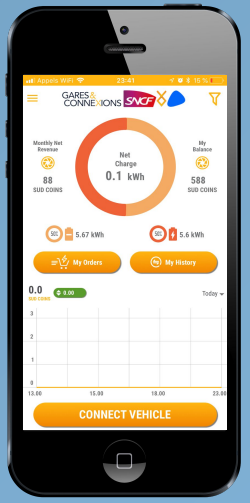


- Track real time energy transactions and origin
- Manage smart-contracts to trigger smart actions
- Incentivize driver through tokenization

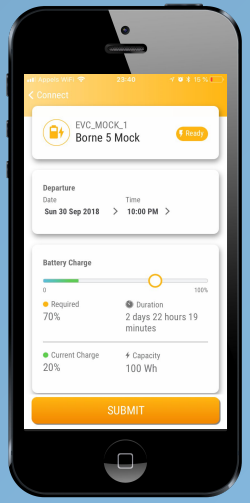
Case #2: User engagement through app and tokens



Park your car
and participate to V2G

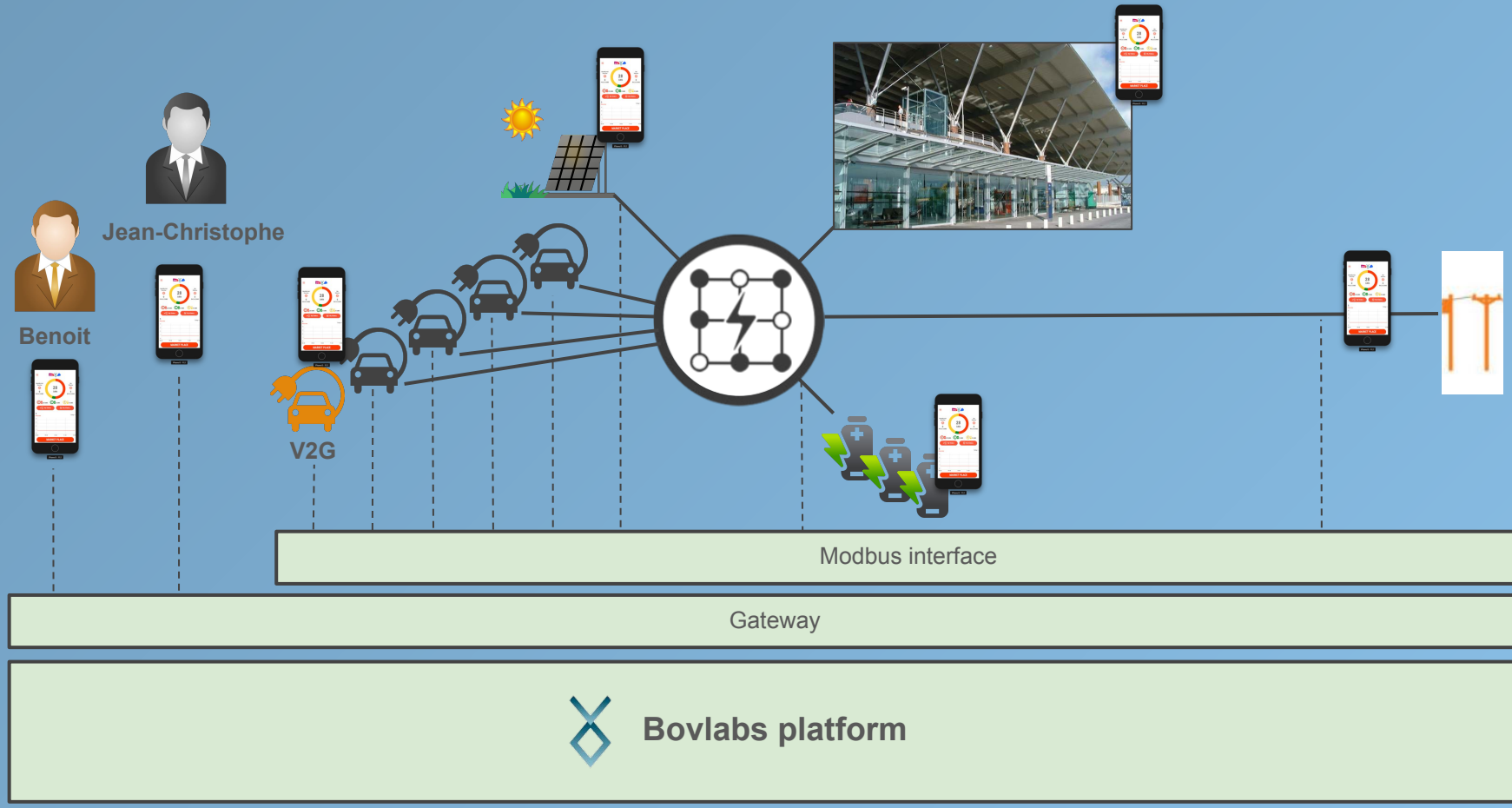


Gain tokens as your car
contributes to grid stability

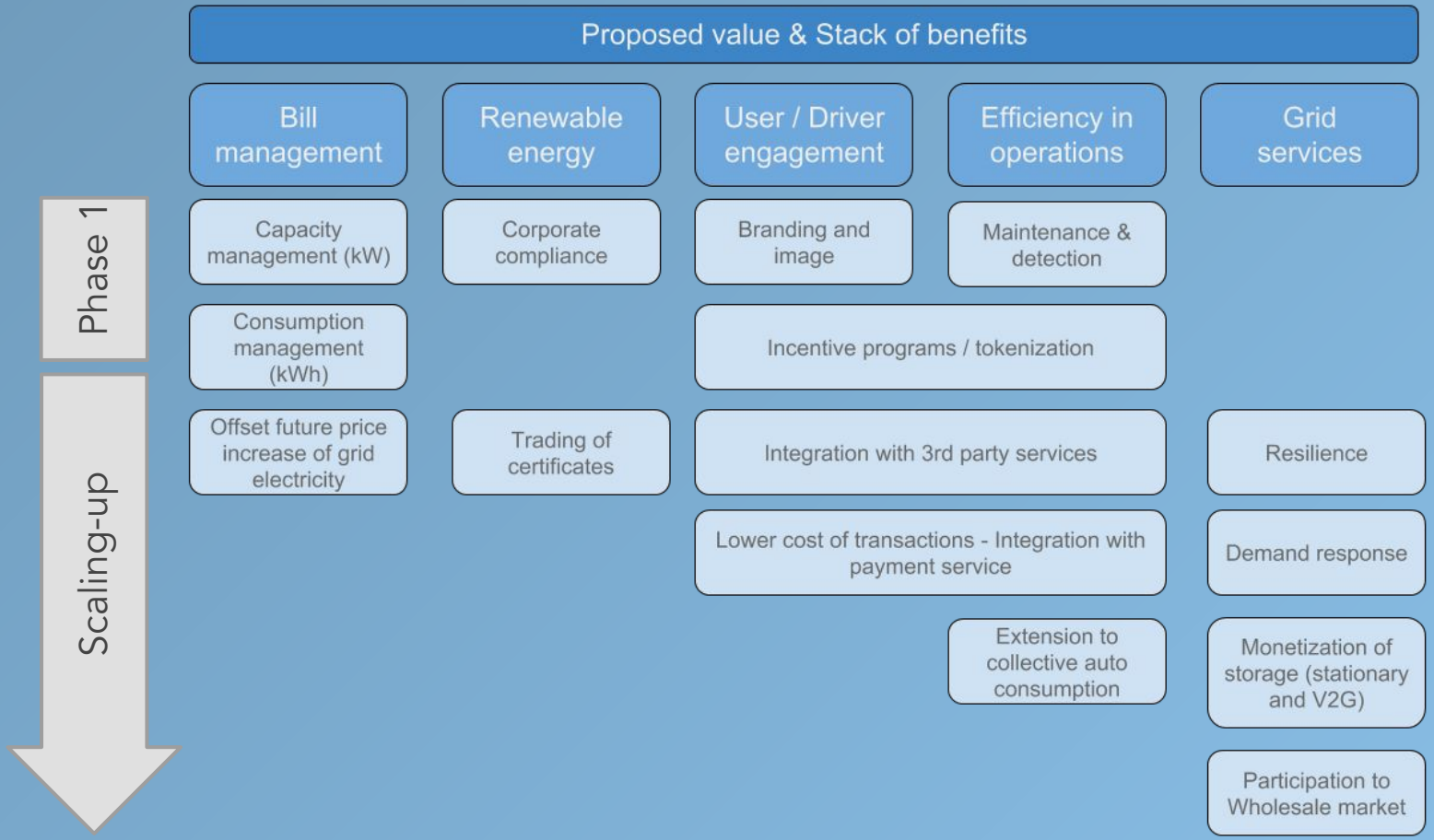


Use tokens for
third party services

Case #2: solarcamp pilot started with thecamp and SNCF, France



Case #2: Value proposition - Stack of benefits



Case #2: Takeaways and challenges

Legal framework

- Collective auto-consumption in France:
  - Constraint regarding the “same HV/LV transformer” rule (or 1 km range)
  - Same tax principle still applies within collective auto-consumption
  - V2G use case not integrated yet in collective auto-consumption

Business

- Fragmentation of standards (Smart-charging, IoT ...) ➜ Requires interoperability
- Adoption of Vehicle-to-Grid in a wider scale

Bovlabs - Further points of testing and investigation

Legal Framework

- Using incentive tokens for third party services:
  - car rental, car parking, third party shops ...
- Modeling collective auto-consumption around the train station (shops, offices ...)

Technical

- Further testing on scalability for larger systems
- From distributed deployment to distributed intelligence to build up resiliency
- Security assessment at edges (energy meters ...)

Developing a replicable model: train stations, airports, ports, malls...

Energy transition

E-mobility

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Opportunity for better efficiency

Align charging with solar production

V2G storage as reserve for grid services

Bridging public transportation with EVs

Incentivize e-drivers

Empower communities

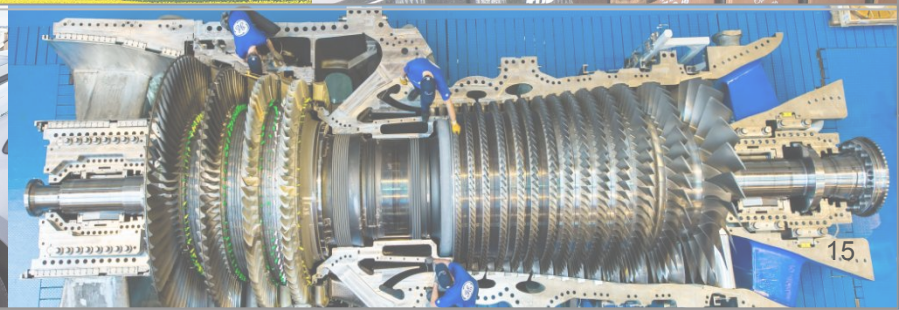
Corporate compliance

Annexure



A pronounced **decentralization** of energy production sources

A growing number of
Distributed Energy Resources
(DERs)



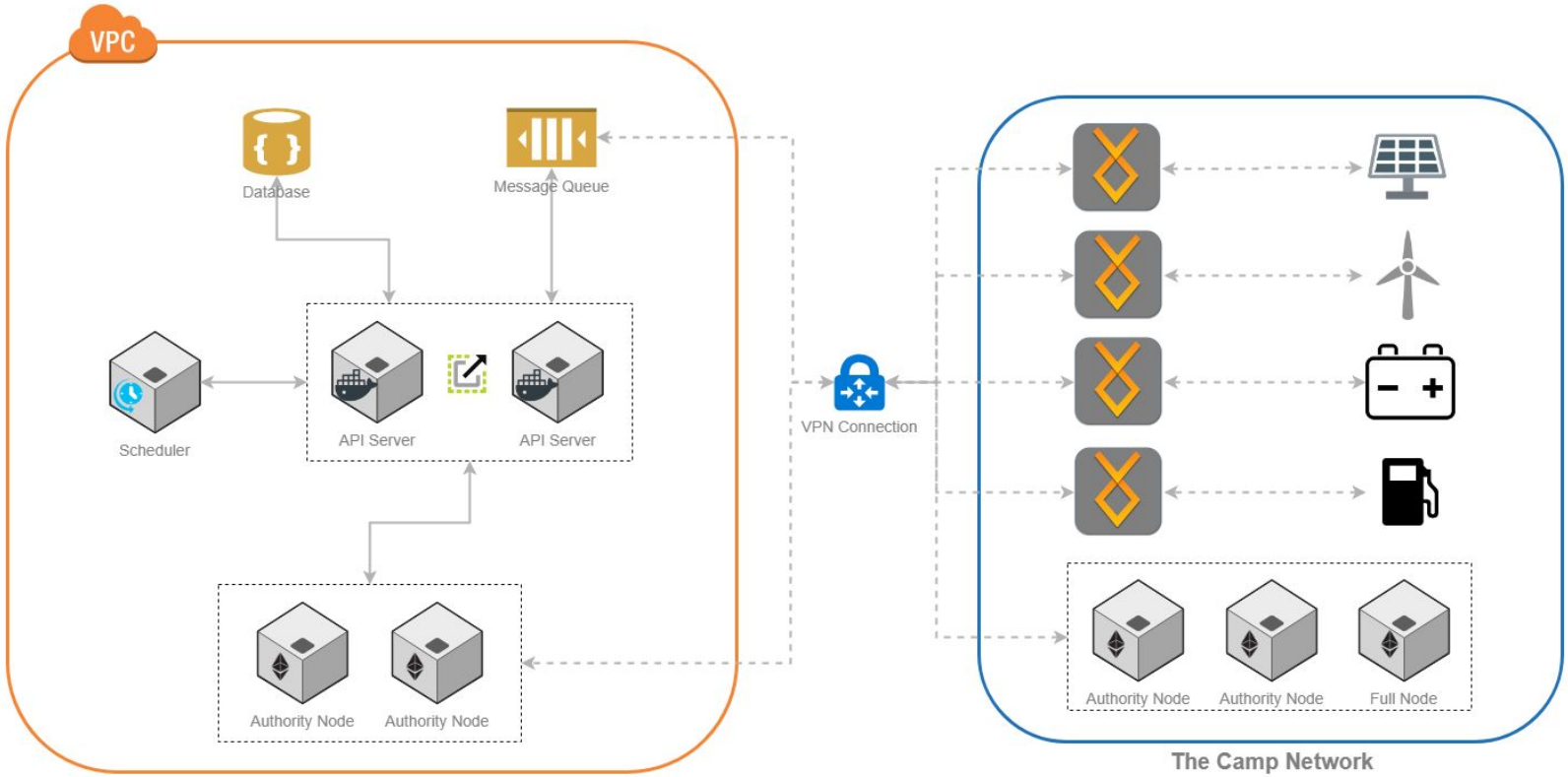
Problem - Current tools are inefficient - Major loss of efficiency

Generation → Transmission → Distribution → Services → Prosumers

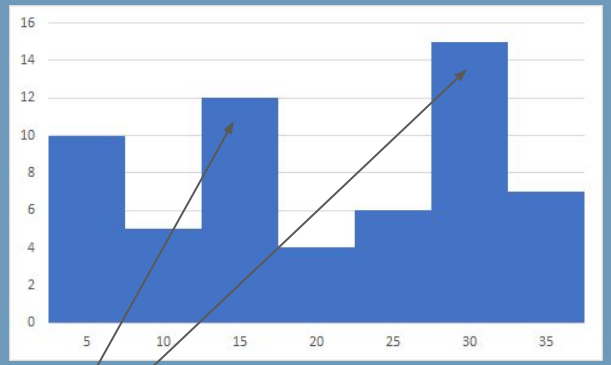
- HIGH COST of customer-related expenses (reading meters, billing ...)
- Renewable energy credits are NOT REAL TIME
- LOST REVENUE as no marketplace for small energy producers
- Flexibility to integrate DERs is VERY LIMITED

Distributed resources ecosystem (generation, storage, EV, microgrid)

Smart Agents and Consortium Blockchain - Possible deployment



Case #1: Demand Management efficient use of DERs



Sub-minute coincident peak could be significantly less than typical 15 minute or 1 hour coincident peak estimates

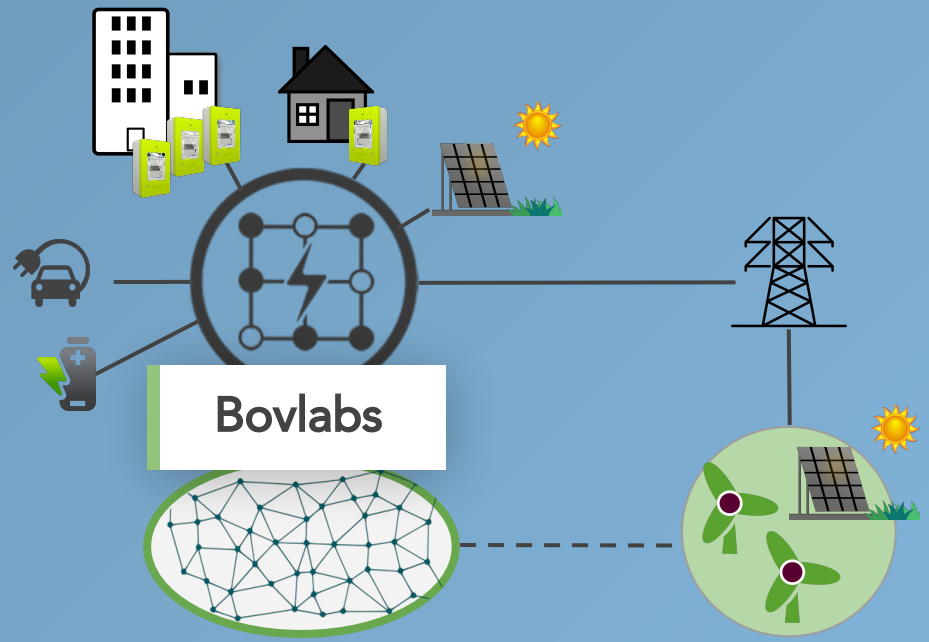
End-Customers Use Case:

- Use DERs (e.g. storage) at 5 second intervals to reduce peak demand
- ***More Efficient*** use of dispatched DERs: by targeting sub-minute peaks, resulting in equivalent peak demand reduction with less kWh dispatched

T&D and Wholesale Market Use Case:

- Enable sub-minute DER deployment to regulate voltage and demand surges
- Community Bovlabs marketplace example: Gather sub-minute demand data from end customers and intelligently dispatch DERs at sub-minute intervals to maximize load reduction with minimized kWh dispatched

Case #3: Real estate and Collective auto-consumption



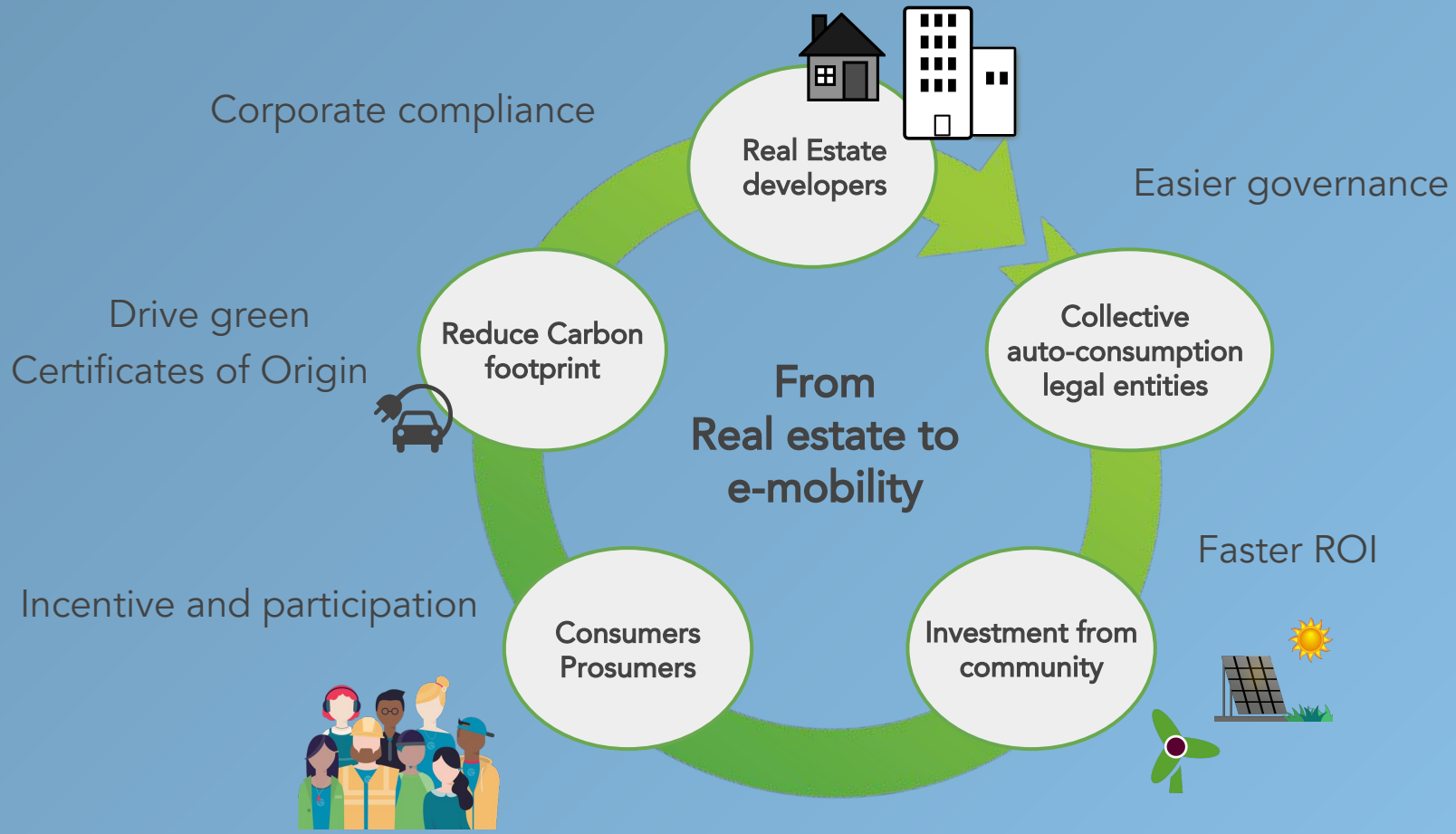
Collective auto-consumption legal structure

Energy optimisation

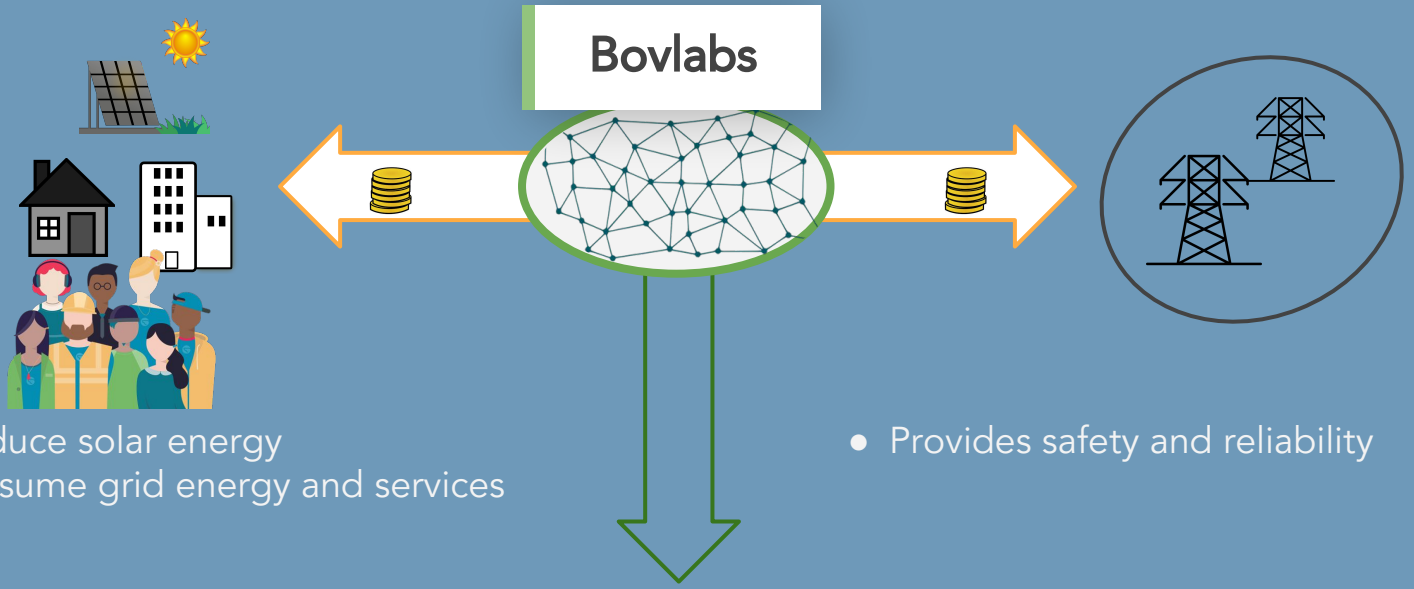
Facilitate governance

Engage participation - E-mobility

Case #3: Value proposition fuels a virtuous cycle



Case #4: Tracking Community Renewable Energy Credits



- Produce solar energy
- Consume grid energy and services

- Provides safety and reliability

✔ Records transaction at source: amount of energy produced and traded

✔ Source: identified as specific device or customer, i.e. rooftop solar inverter, customer smart meter...

✔ Tokenization: energy transactions and REC values

Our Team

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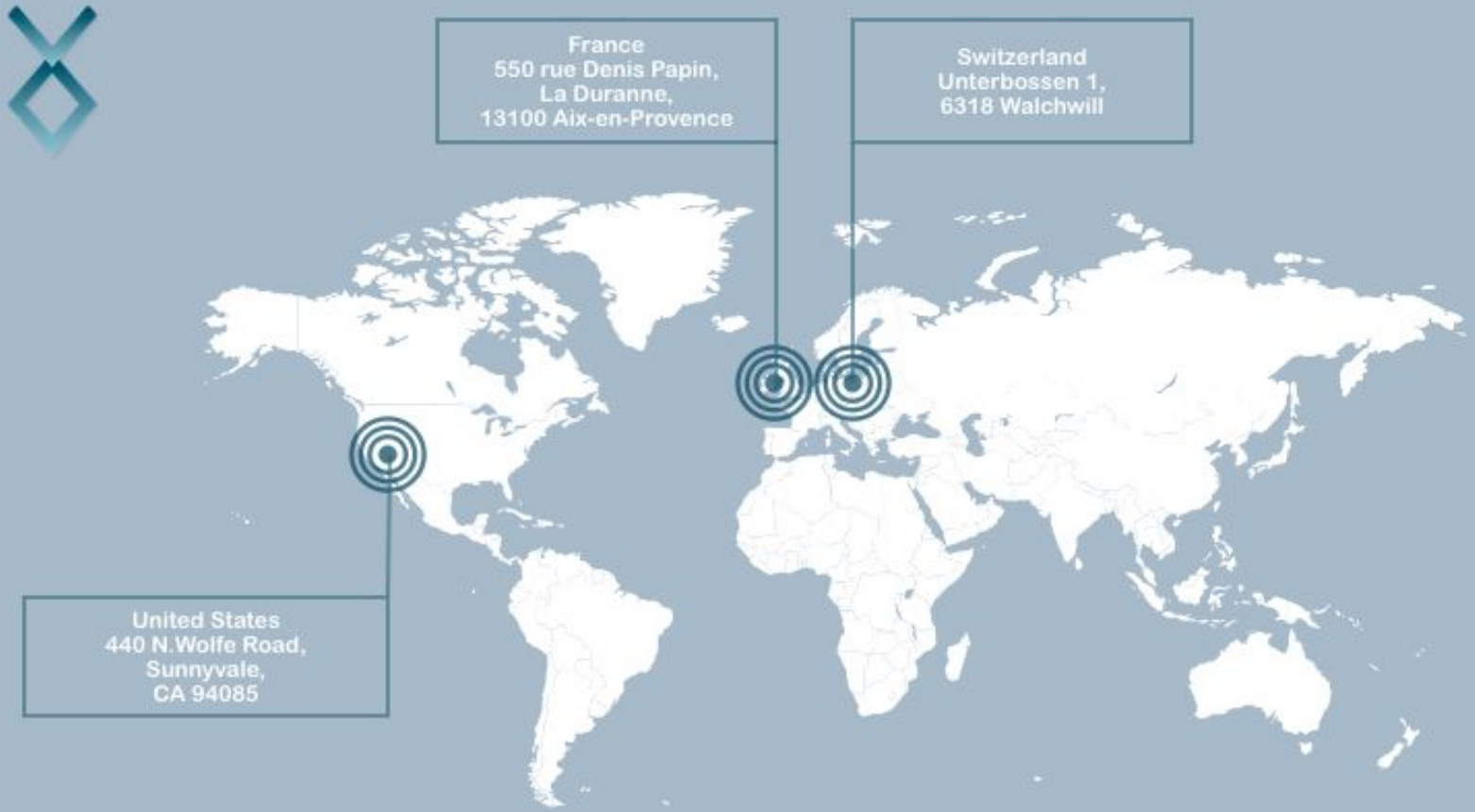
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