Zen Smart IDSR – Project Update

June 2023

SysMech

Background

Zen Digital Integration Platform

IoT device and application enablement platform for Energy Service Providers

Telecom Operators & CSPs

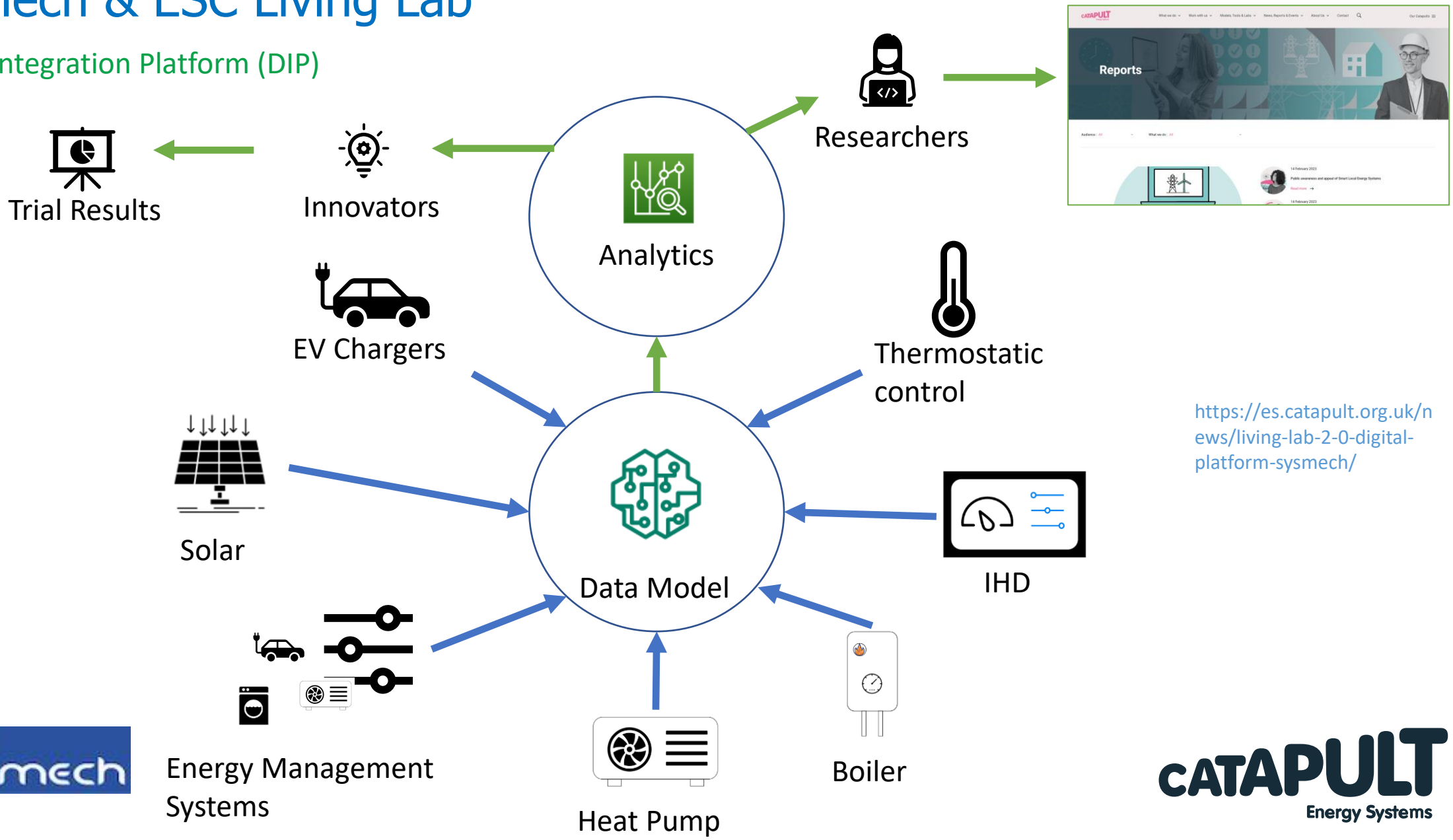
A complete end-to-end view of the network as the foundation to systems consolidation

Government & Large Enterprise

Zen Fault and Performance management of large, evolving, enterprise and safety critical networks

SysMech & ESC Living Lab

Digital Integration Platform (DIP)



https://es.catapult.org.uk/news/living-lab-2-0-digital-platform-sysmech/

IDSR Programme (Interoperable Demand Side Response)

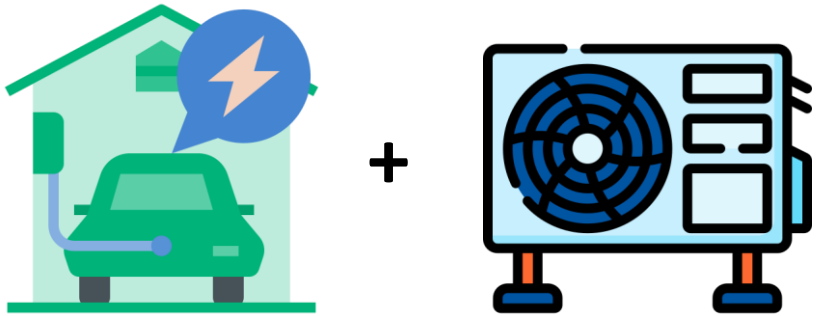
NZIP Portfolio

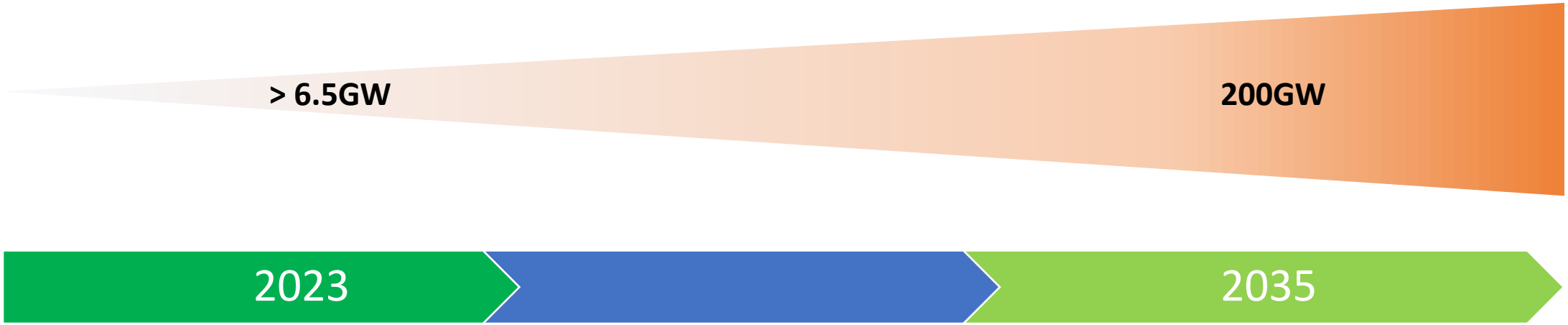
The IDSR programme is part of the up to £65m Flexibility Innovation Programme within the Department for Energy Security and Net Zero's £1 billion Net Zero Innovation Portfolio.

Project Overview

Background

EV & Heat pump deployed capacity - UK



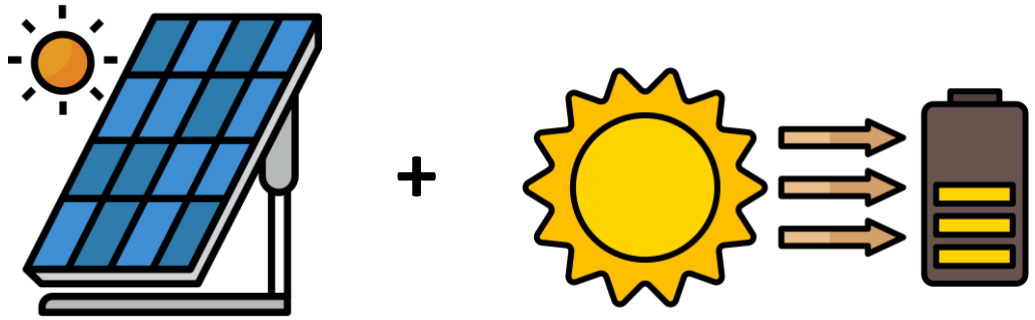


Capacity projections based on figures from “STATE OF UK FLEXIBILITY INNOVATION” (Draft, ESC, February 2023)

Air source heat pump icons created by Freepik - Flaticon

Ev icons created by GOWI - Flaticon

Solar & Battery deployed capacity - UK



Capacity projections based on figures from “STATE OF UK FLEXIBILITY INNOVATION” (Draft, ESC, February 2023)

Solar panel icons created by small.smiles - Flaticon

Solar power icons created by cah nggunung - Flaticon

IDSR Programme (Interoperable Demand Side Response)

Core Principles

Principle	Description
Interoperability	The ability of an energy smart appliance (ESA) to be operated by any authorised DSR Service Provider for DSR services.
Data privacy	The secure transmission and storage of data on the device or with any controlling party
Grid-stability	The prevention and mitigation of negative impacts to the energy system caused by inappropriate operation of ESAs
Cyber-security	The appropriate protection of an ESA, systems and data from unauthorised access, to reduce the risk of cyber attack

Key that the data collected is standardised and interoperable.

Includes data governance

ESAs update flexibility information to DSRSPs whenever their status changes whilst respecting consumer wishes

IDSR Programme

Competition Aim

Design and develop ESAs, including Customer Energy Manager (CEM), and demand side response service provider (DSRSP) platforms according to the PAS 1878 and PAS 1879 technical frameworks:

OpenADR and PAS1878

Relationship

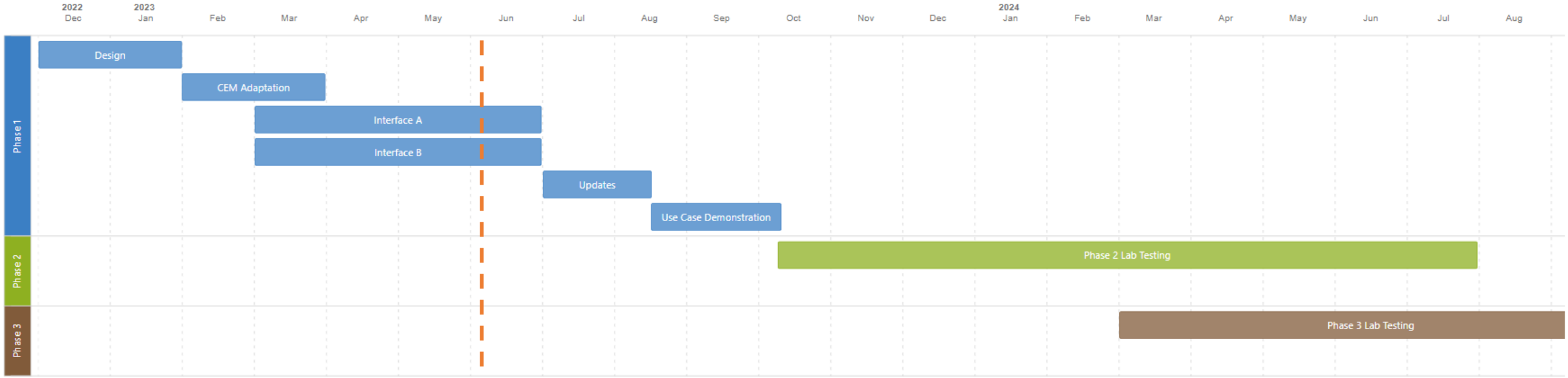
- PAS 1878 references a subset of OpenADR 2.0b
- VTN = DSRSP (Demand Side Response Service Provider)
- VEN = CEM (Customer Energy Manager)
- Our consortium are one of several projects implementing PAS 1878 solutions to prove the feasibility for UK markets

Project Overview

Solution

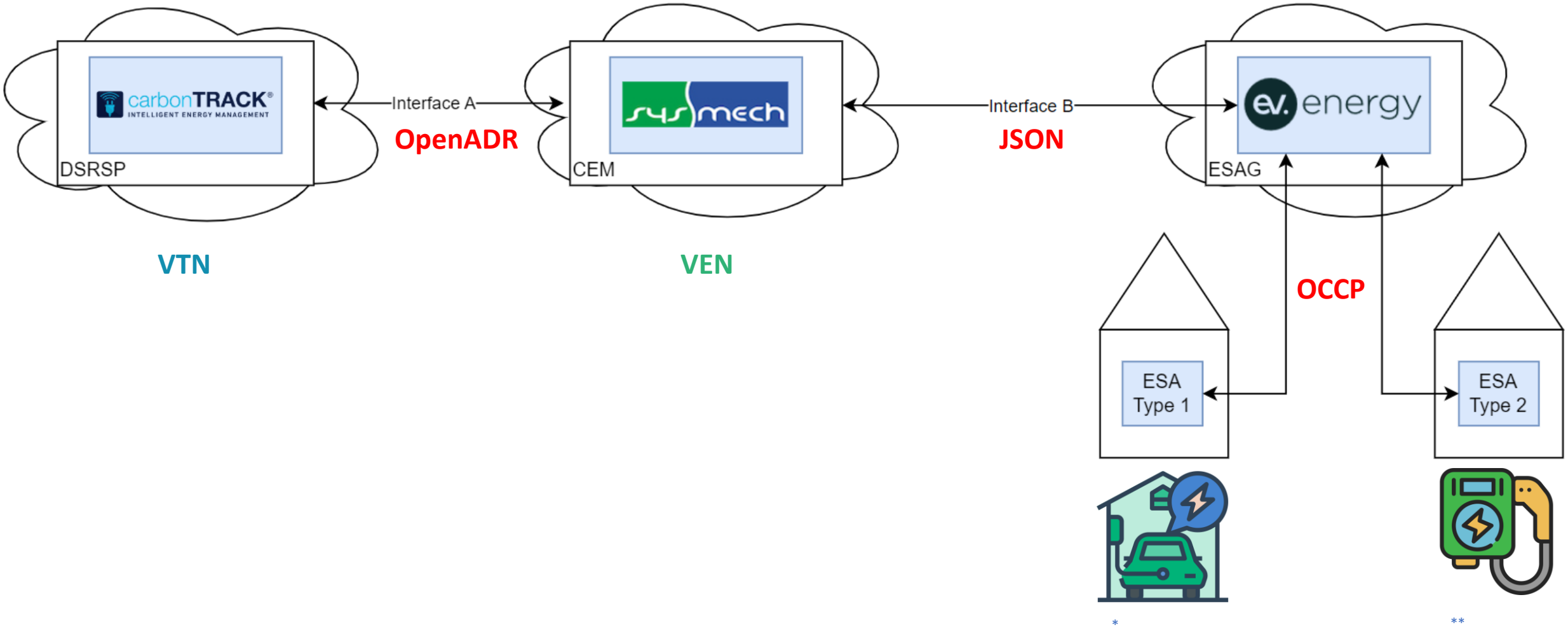
Project Progress

Timeline



Solution Overview

Components



*Ev icons created by GOWI - Flaticon

**Ev icons created by Umeicon - Flaticon

CEM

Benefits of a cloud hosted CEM

- Can support multiple different Interface B protocols
- Not resource constrained
- Simplified patching and maintenance
- Can be hosted by a carbon neutral data centre
- Avoids additional clutter in the home (hardware gateways may still be required for non-IP devices)
- Could also function as HEMS, more compelling when multiple ESA types are connected, can self-manage a cohort of devices based on consumer preferences in terms of tariff / environmental impact.

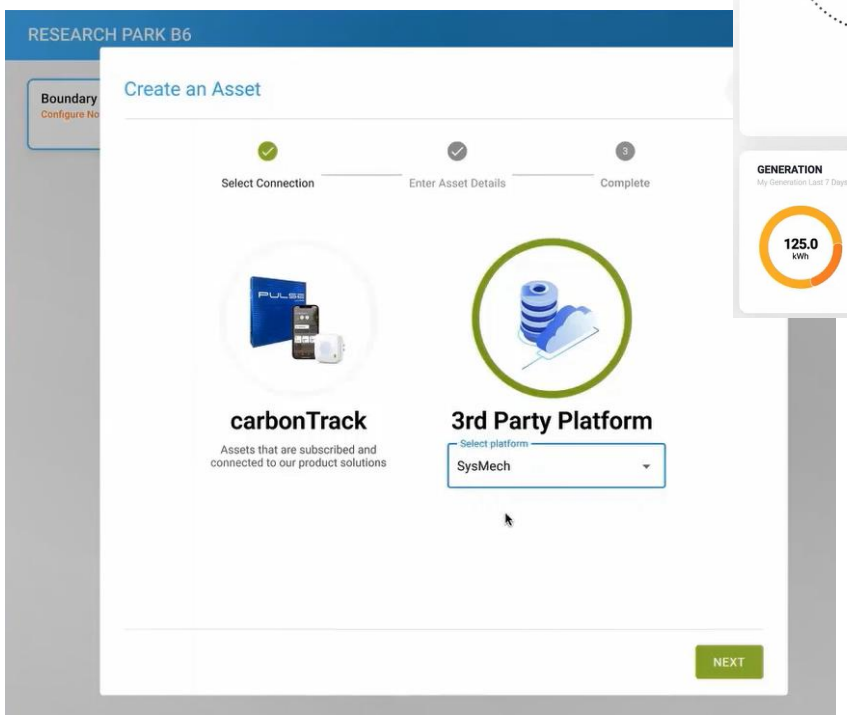
Solution Overview

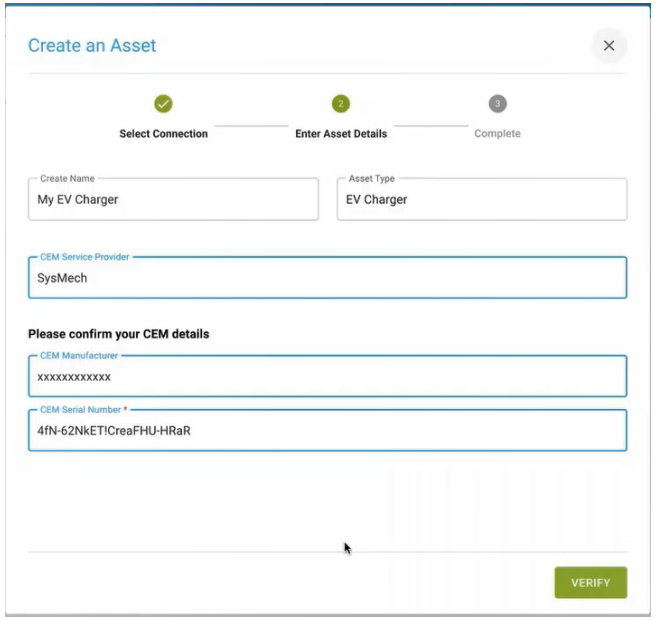
Message Flows

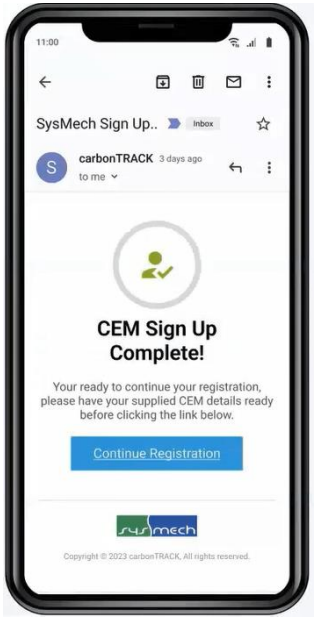
	DSRSP	CEM	ESAG
Consumer Registration with DSRSP	☑	N/A	N/A
CEM and ESA Mutual Authentication	N/A	☑	☑
Device registration of the CEM and the ESA with the DSRSP	☑	☑	☑
Initialization	☑	☑	☑
Normal Operation	☑	☑	☑
Exception Conditions	☑	☑	☑
Deregistration	☑	☑	☑

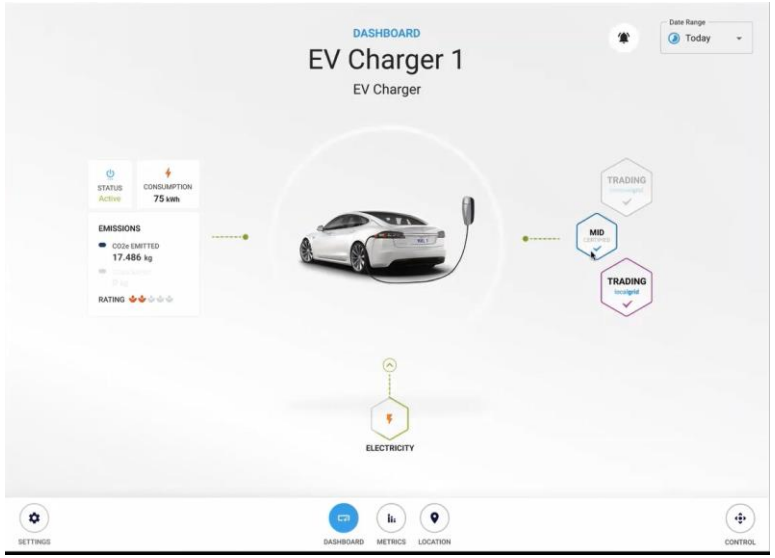
DSRSP

carbonTRACK







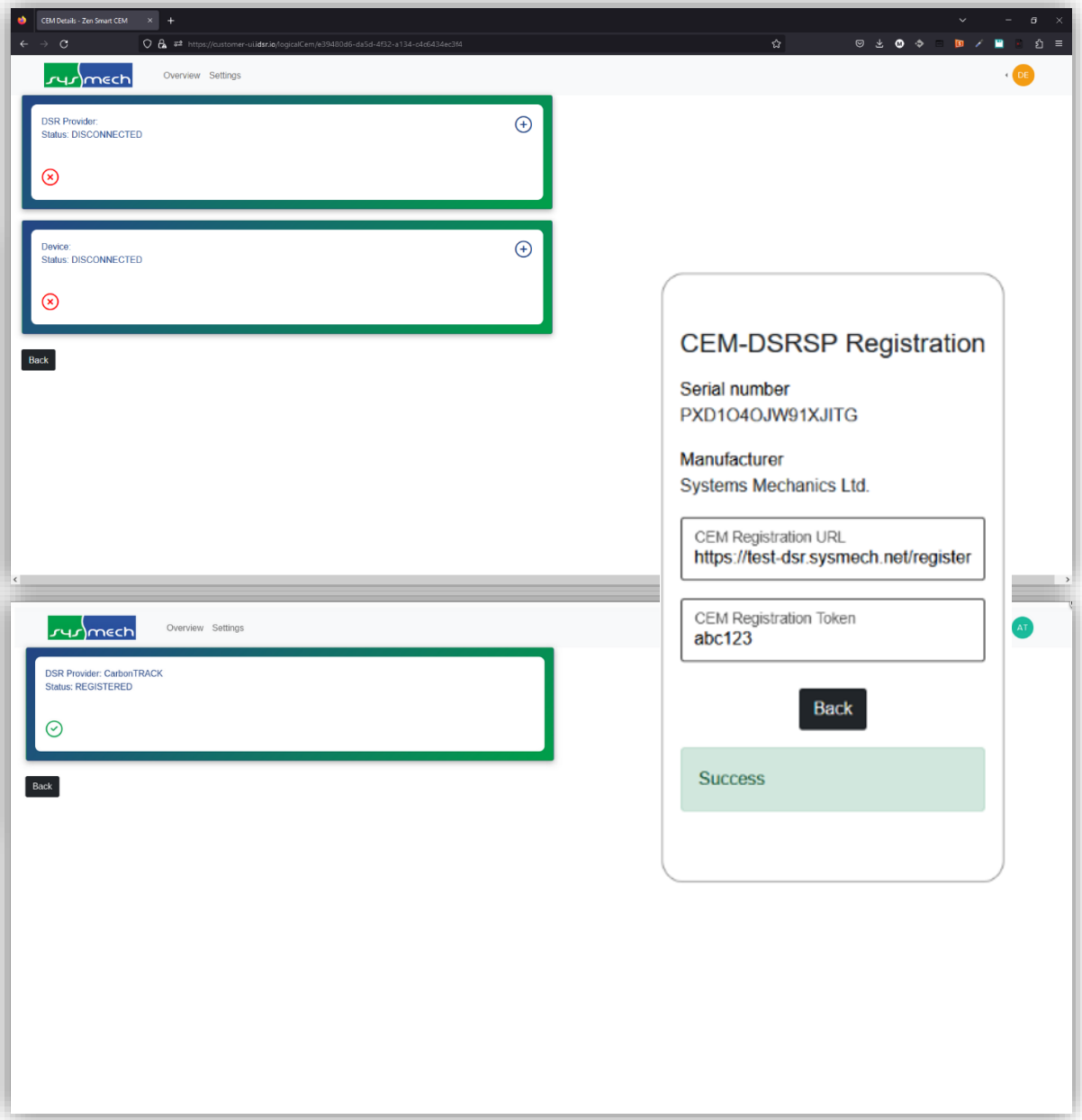


carbonTRACK®
INTELLIGENT ENERGY MANAGEMENT

CEM

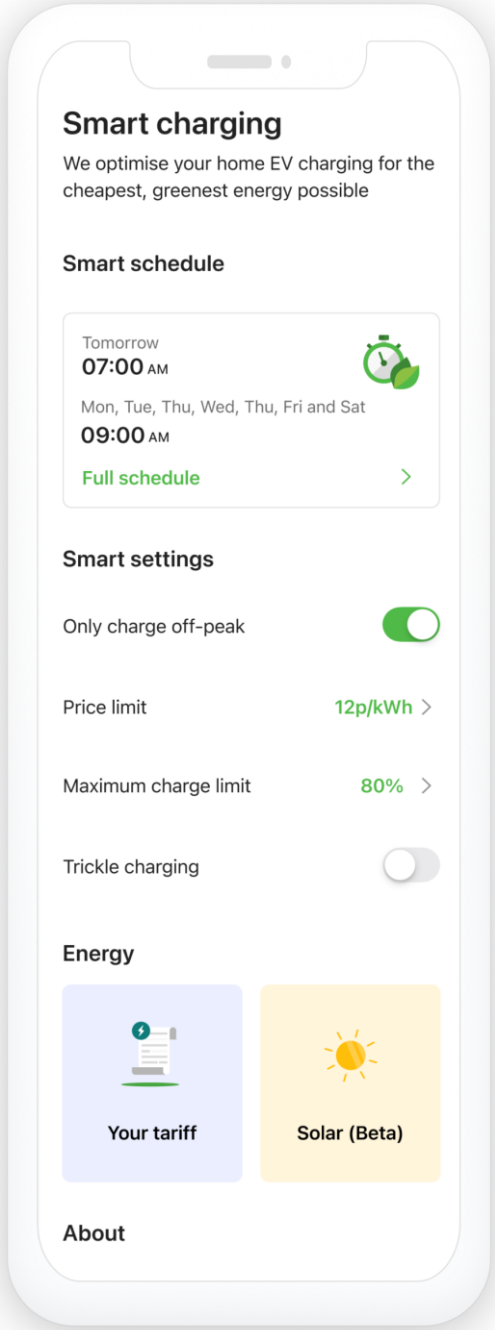
SysMech

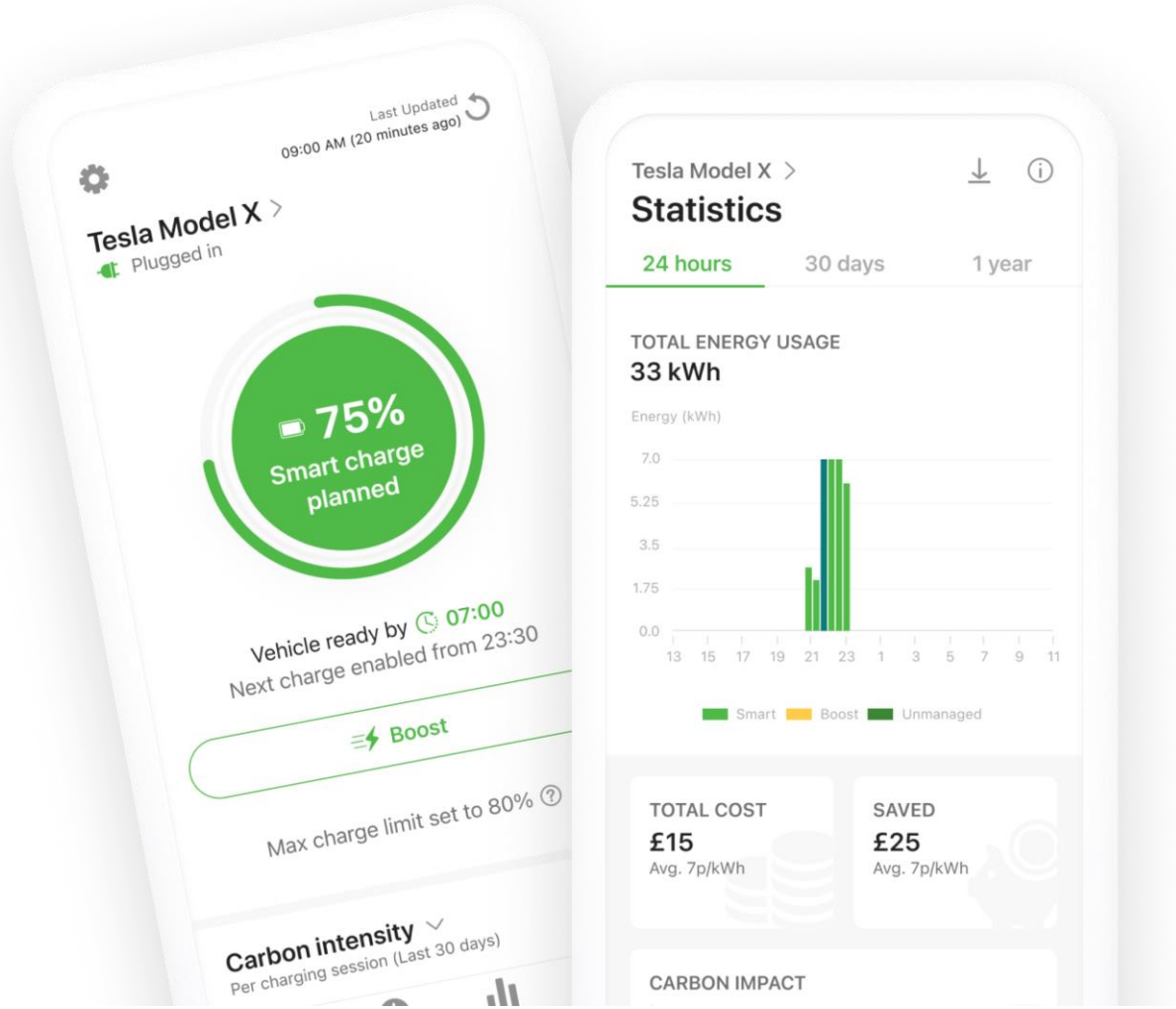

Zen Smart IDSR
https://customer-ui.idsr.io/login
Zen Smart Customer Energy Manager
Log In


Overview
Settings
DSR Provider:
Status: DISCONNECTED
Device:
Status: DISCONNECTED
Back
CEM-DSRSP Registration
Serial number
PXD1O4OJW91XJITG
Manufacturer
Systems Mechanics Ltd.
CEM Registration URL
https://test-dsr.sysmech.net/register
CEM Registration Token
abc123
Back
Success
DSR Provider: CarbonTRACK
Status: REGISTERED
Back

ESAG & ESA's

ev.energy

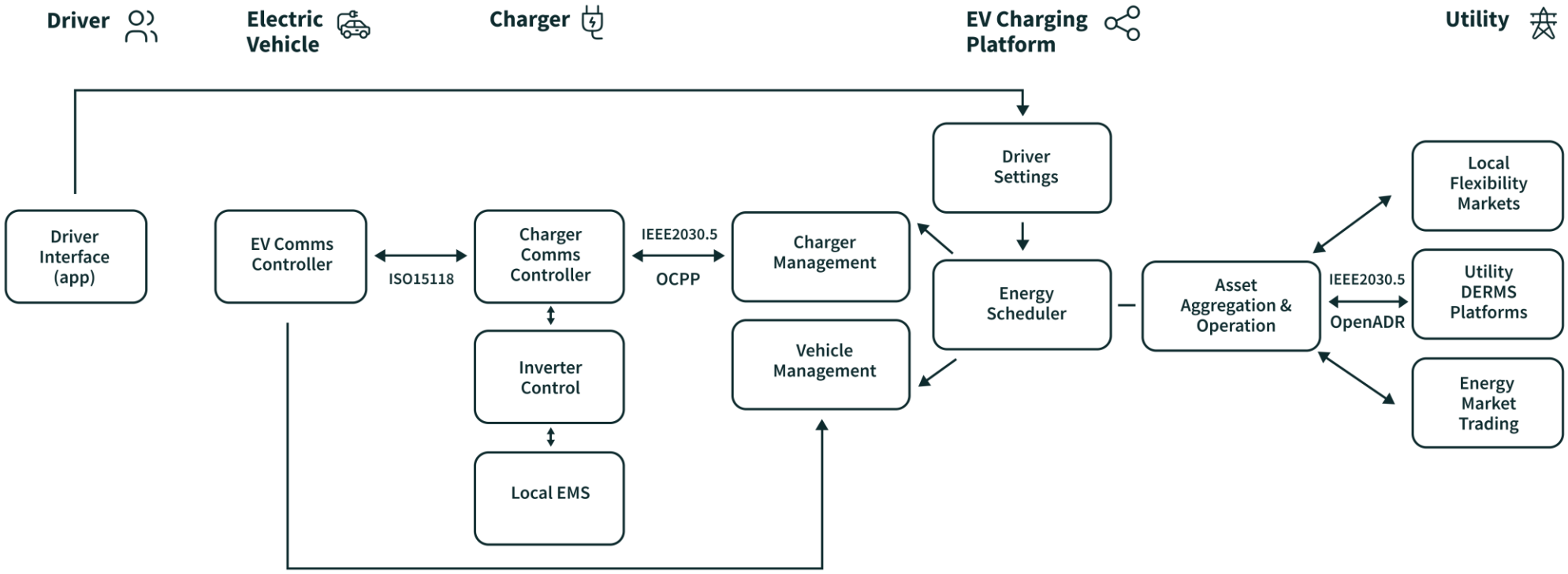




ESAG & ESA's

ev.energy

V1G/V2X eco-system diagram



Interoperability Standards:

ISO 15118-20:2022: International vehicle-to-grid communications interface being developed between the EV comms controller and bi-directional charger.

OCPP: The Open Charge Point Protocol provides a standard for connecting chargers to EV charging platforms

IEEE 2030.5: Developed primarily for California this is a standard for Smart Energy Profile Application Protocol

OpenADR: Developed primarily for California this is a standard for Smart Energy Profile Application Protocol

OpenADR

Benefits for Interface A

- Defined, accepted, open standard
- Should increase code quality and reduce in-house development effort
- Limits vendor lock-in
- Used internationally

OpenADR

Implementation of Interface A

- “Report Only” VEN, which only includes the following services:
    - EiReport
    - EiRegisterParty
- The periodic power report (Instantaneous) power values shall be implemented as described in the OpenADR 2.0 Demand Response Program Implementation Guide [17], “A.4.2 Fast DR Scenario 2 – Typical Use Case, B profile”, substituting the required reporting interval.
- PUSH vs PULL, VEN & VTN

QualityLogic OpenADR test tool

How we utilise it for Automated testing

- Containerised, so we can now run outside of Eclipse, or any other Java IDE
- REST Endpoint added so that we can remotely trigger any test case via a request (e.g. a curl command)
  - Also returns a response, including the result of the test and a tracelog, including things like the OpenADR payloads sent/received during the test
- Additional logic & endpoint added to simulate the CEM registering with a DSRSP
- Disabled user prompts, so that we can automate our test procedures
- Seeking clarification on whether the tool can perform XML signature signing and verification as per the “high security” profile (conformance rule 514)

https://www.openadr.org/assets/SE%20-%20Data%20Sheet%20-%20OpenADR%20Tools.pdf

Thank You

- Feedback and questions
- Contact SysMech at sales@sysmech.co.uk