

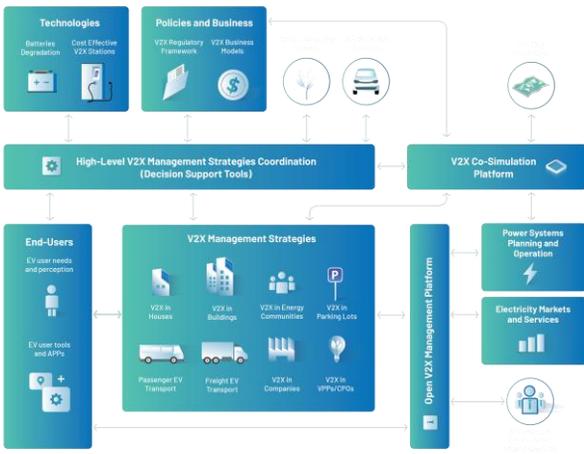
Company Energy Management System for Optimising EV Charging: Integration of V2V Technology and Real-Time Control

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EV4EU Framework



Pilot Sites Details

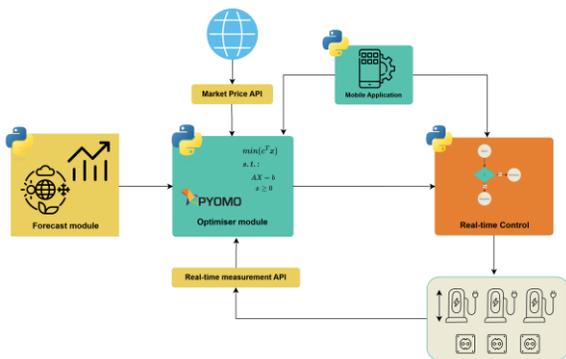
Building (Regional Civil Engineering Laboratory - L.R.E.D.)
 • Contracted Power: 18.25 kW
 • Annual Consumption (2020): 332.6 MWh
 • Solar PV: 16 kWp
 • 40 daily users - visits
 • Controllable Loads: Water heater, Central Air Conditioning

Campus (EDA HQ)
 • Secondary Substation installed Power: 400 kVA
 • Annual Consumption (2020): 852 MWh
 • Charging Points: 7x fleet + 5x employees + 10x V2G
 • EV Fleet: approx. 32 vehicles (Nissan Leaf, Nissan e-NV200)

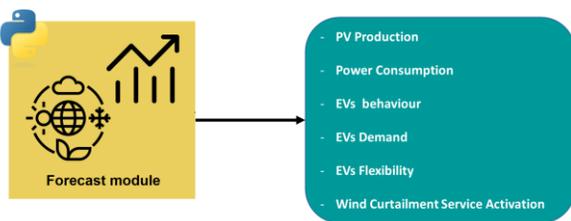
Houses
 • 7x Houses (4x Single-Phase + 3x Three-Phase)
 • 2x Solar Panels (1x Energy Sale)
 • Average Daily Usage of EVs: 40 - 120 km
 • Charging sessions: 95% at home
 • EV Fleet: 3x Nissan Leaf + 2x Mazda MX-30 + 1x Opel Mokka-E + 1x BMW i3

Services: Grid services, Vehicle-to-Building, Smart charging, Vehicle-to-Vehicle, Vehicle-to-Home.

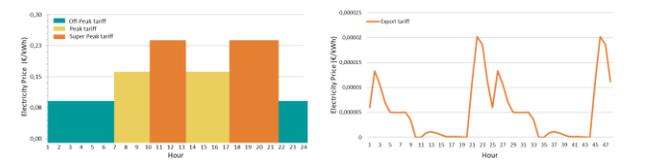
Company Management Framework



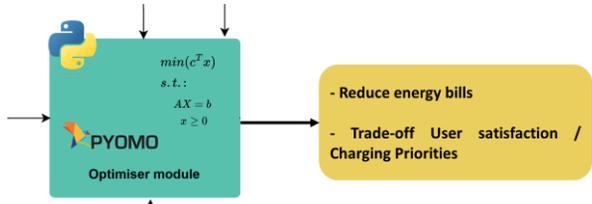
Forecasting Algorithm



- A transformer with a 75 kVA operational limit
- Typical corporate load profile
- Six available connectors
- Three connector with smart charging
- Three non-controllable (on/off)
- 1 with V2X available

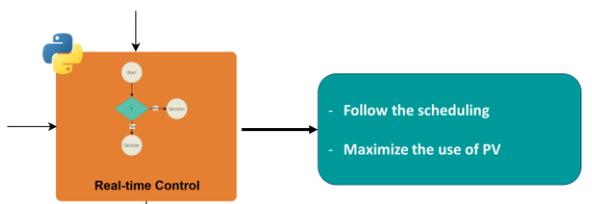


Optimization Algorithm



- CEMS integrates both controllable (smart) and non-controllable (on/off) ports to handle diverse charging needs.
- Super-priority (Directors) and high-priority (Fleet) users are served first during peaks; medium- and low-priority (Employees, Visitors) are allocated power based on remaining capacity
- In standard operation, the CEMS algorithm achieved a 27.62 % reduction in energy tariff costs by shifting charging to off-peak and super-off-peak periods.
- Even with the transformer limit halved, the system reallocates charging to unconstrained hours, meets user requirements, and maintains target SoCs to protect battery health.
- Vehicle-to-vehicle energy transfers and real-time market price inputs optimize costs, reduce grid reliance, and boost overall system adaptability.

Control Functions



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