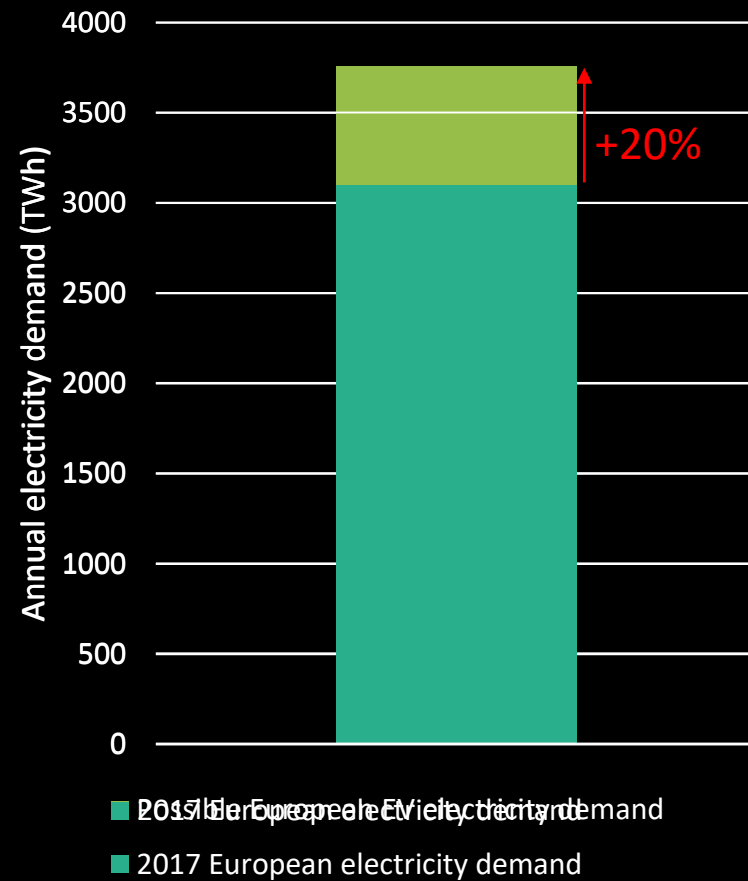


Intelligent integration of vehicle-to-grid technology into energy system models

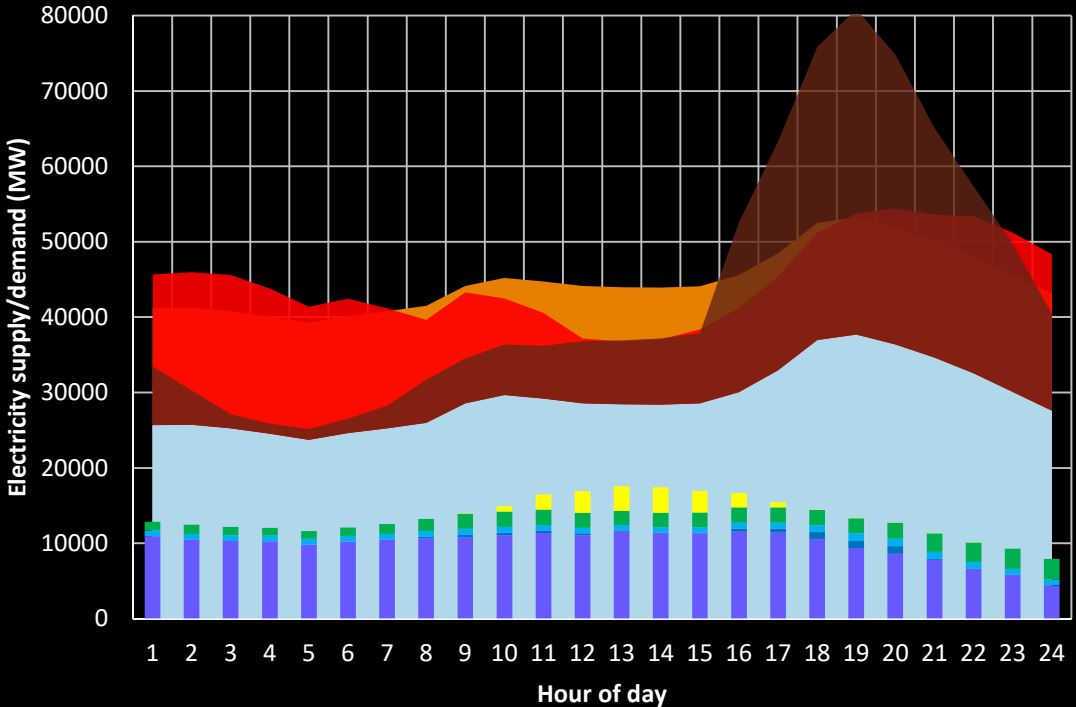
Bryn Pickering (ETH Zürich) and Alice Stamp (Arup)

EVs: a sleeping giant of the energy system

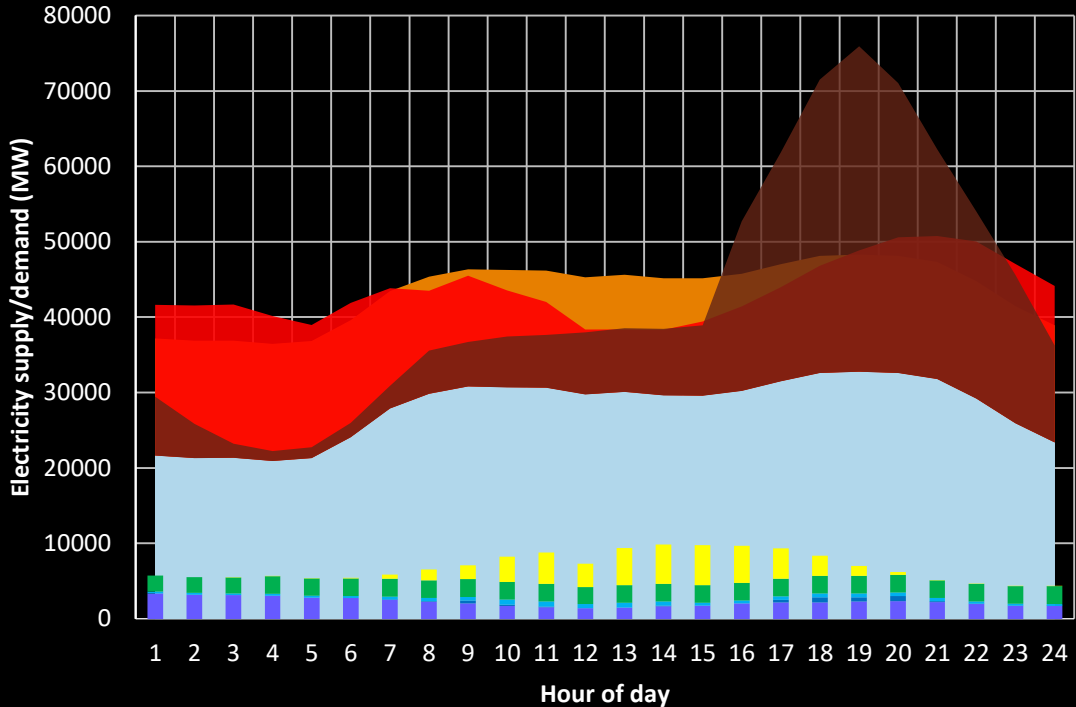


Impact of EVs on hourly dispatch (UK example)

1st February 2020

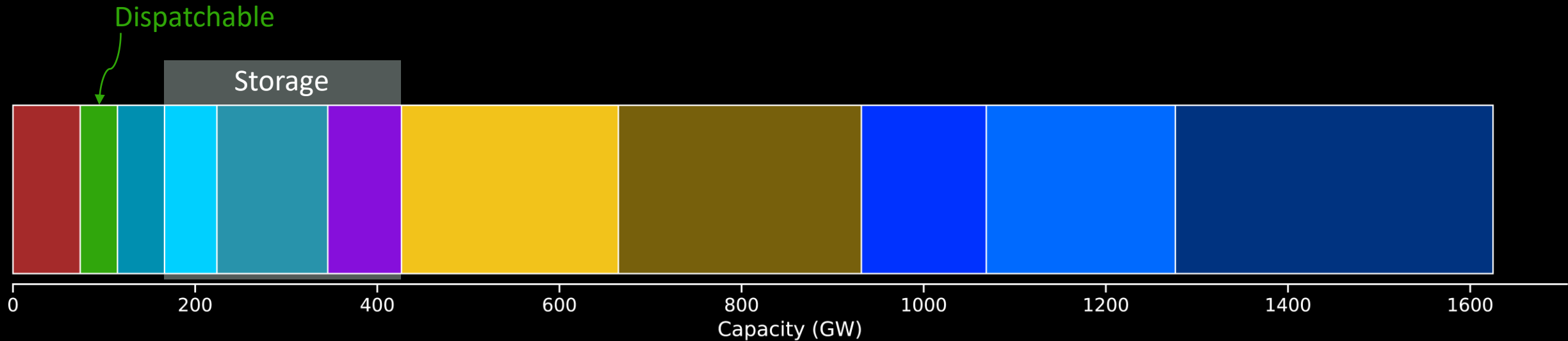


1st August 2019



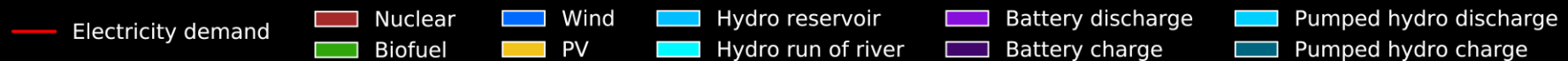
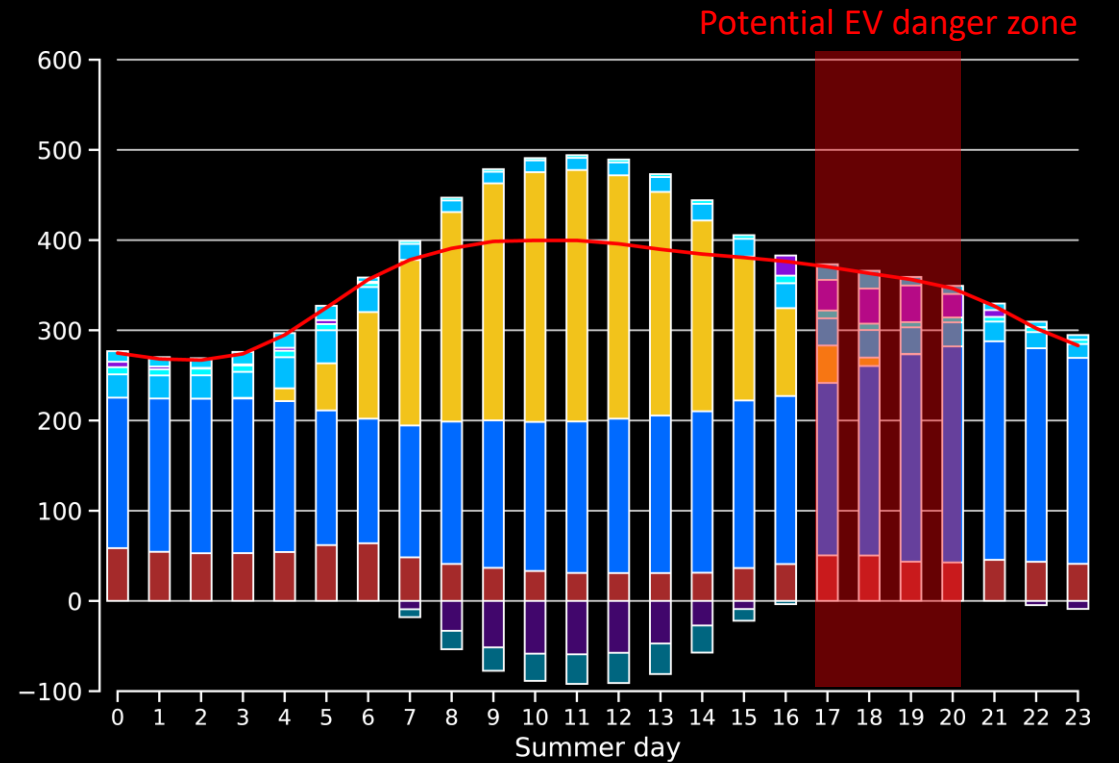
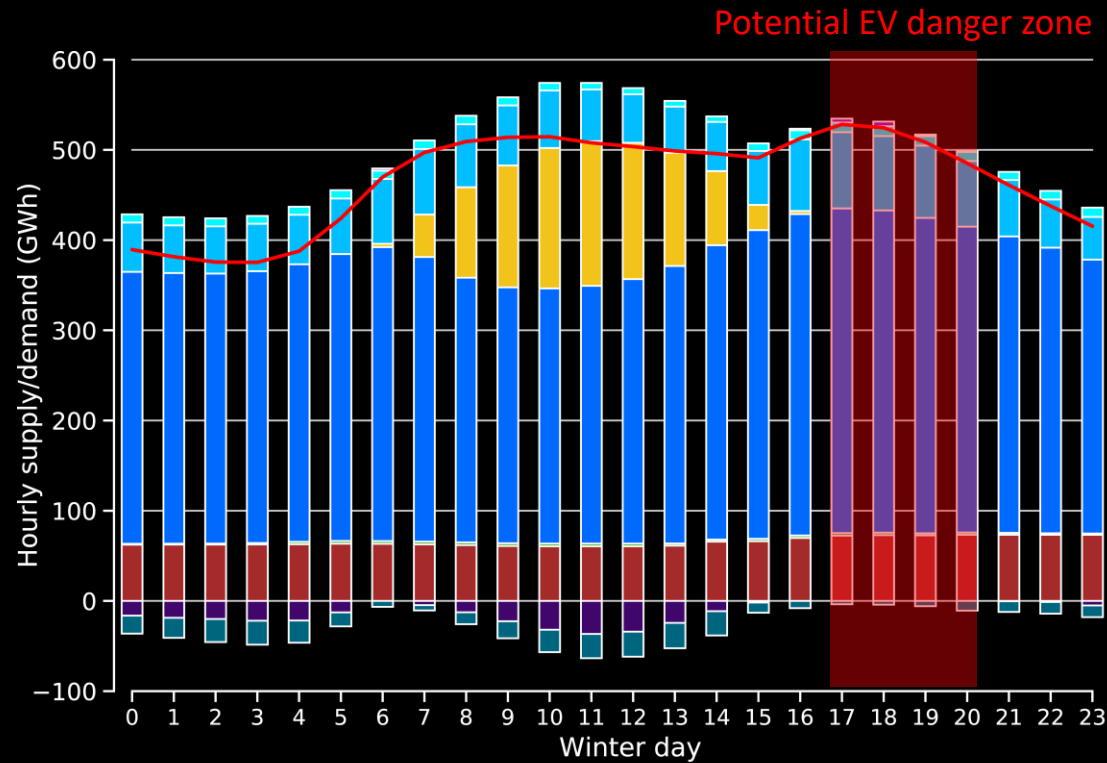
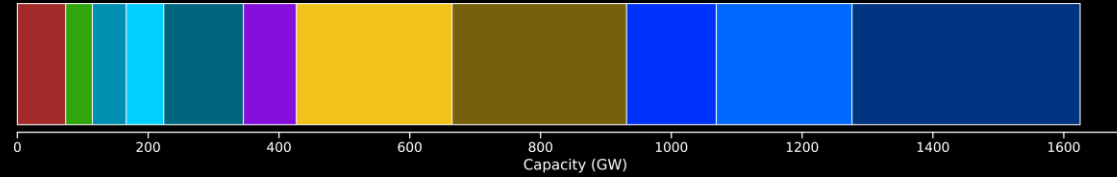
- Electricity demand
- Equally distributed EV electricity demand
- EV electricity demand based on slow charge
- EV electricity demand based on fast charge
- Wind supply
- Hydro supply
- Pumped hydro supply
- Biomass supply
- PV supply

Context of a zero-carbon Europe



- Nuclear
- Biofuel
- Run of river hydro electricity
- Pumped hydro power storage
- Hydro electricity with a reservoir
- Battery storage
- Open field PV
- Roof mounted PV
- Offshore wind
- Onshore wind competing with open field PV on land
- Onshore wind without land competition

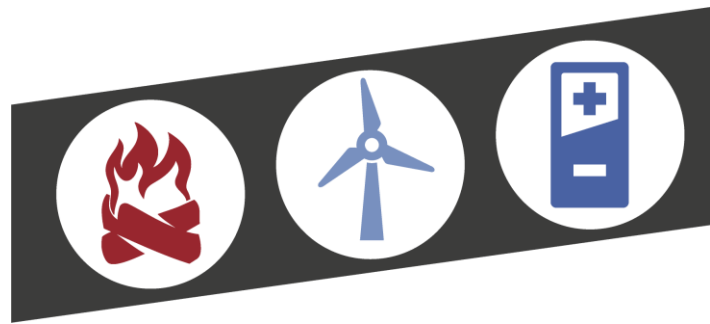
Context of a zero-carbon Europe



No EV demand considered in this study

Arup Global Research Challenge

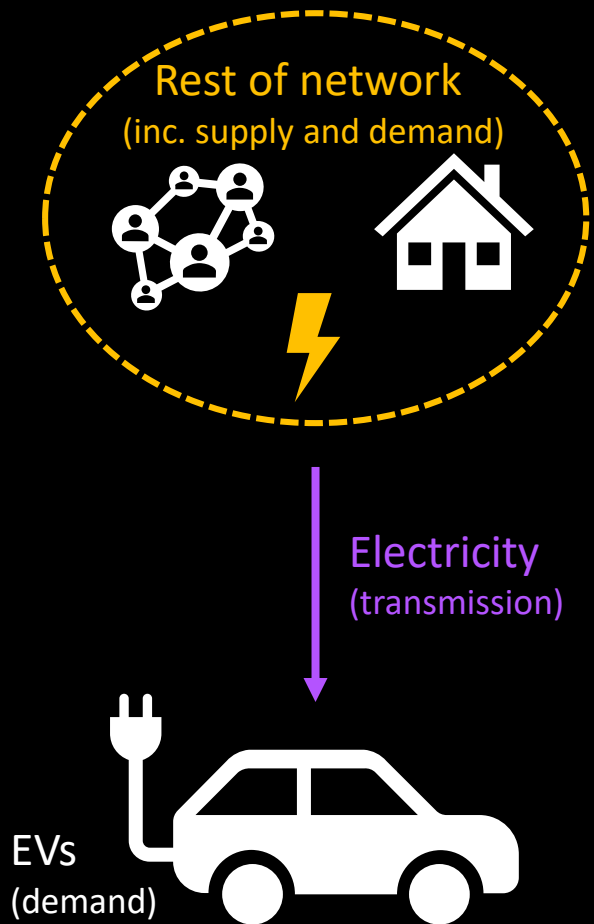
Linking academic research and industry



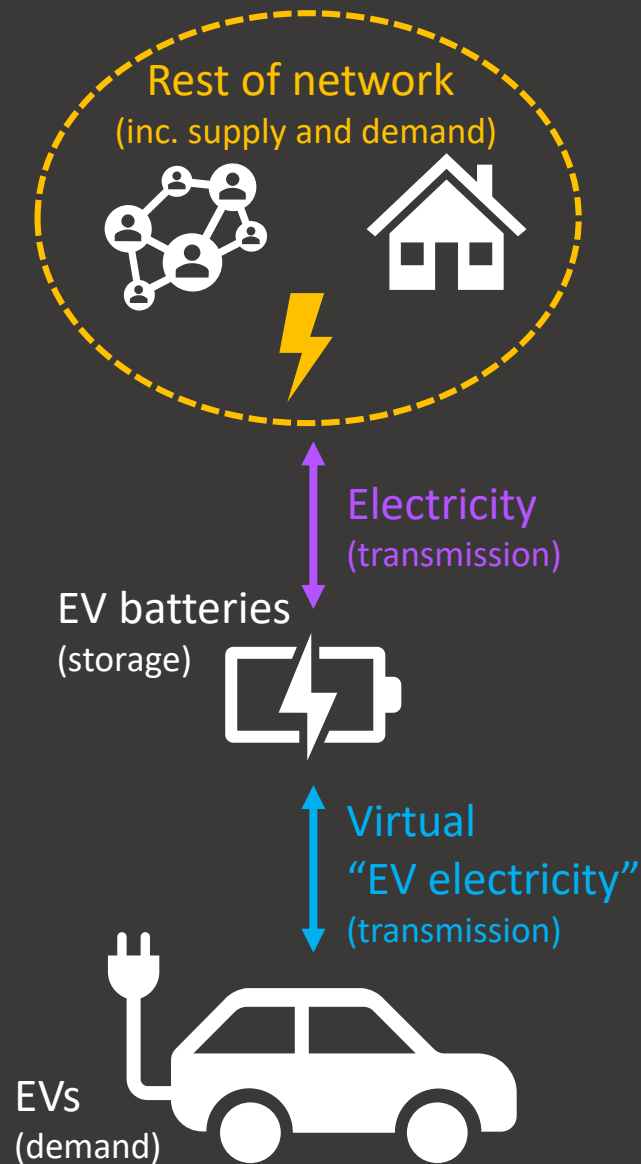
Calliope

www.callio.pe

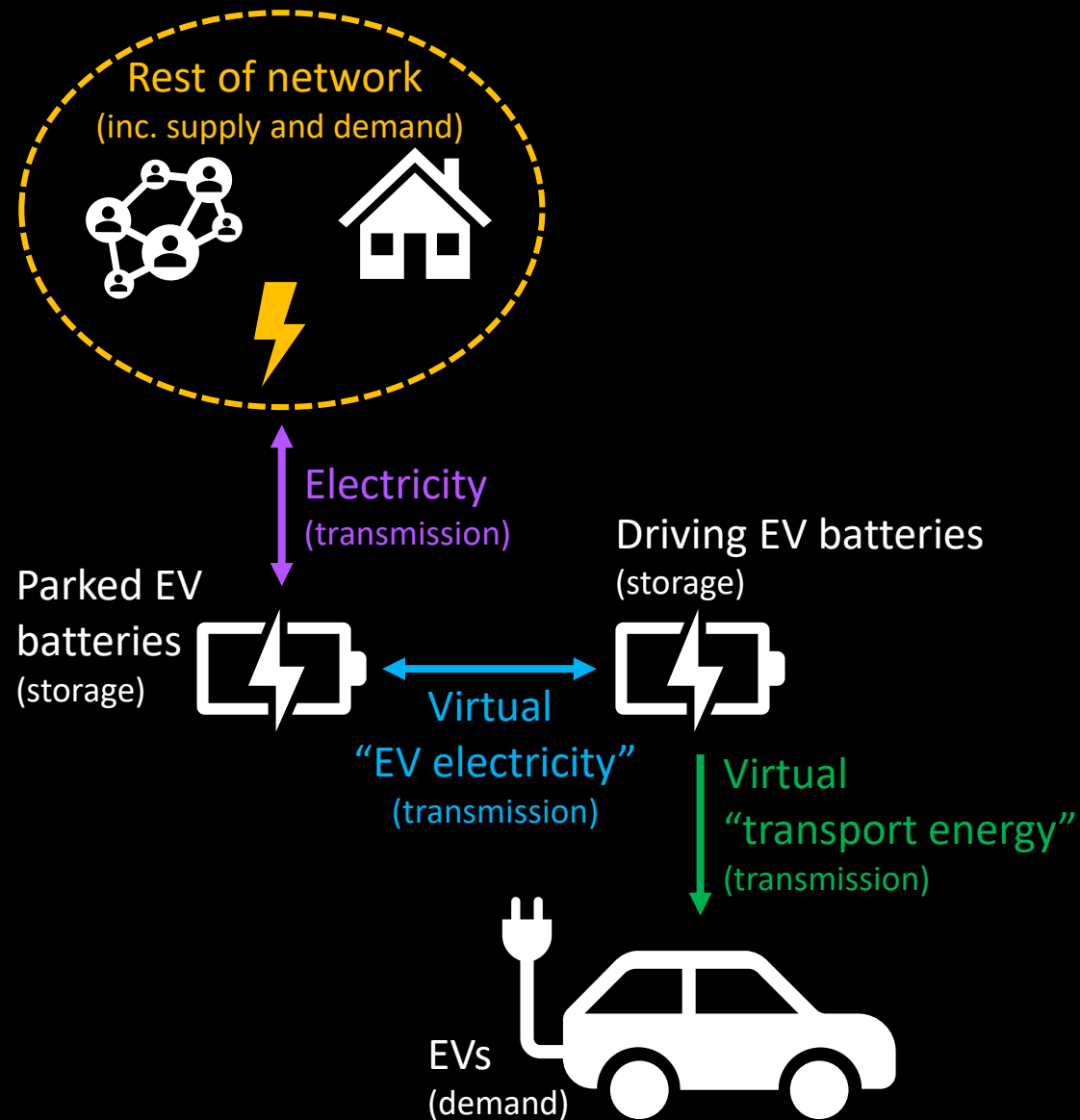
Demand only



Temporary storage

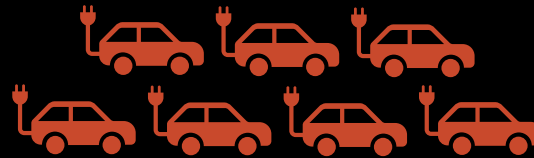


V2X feedback

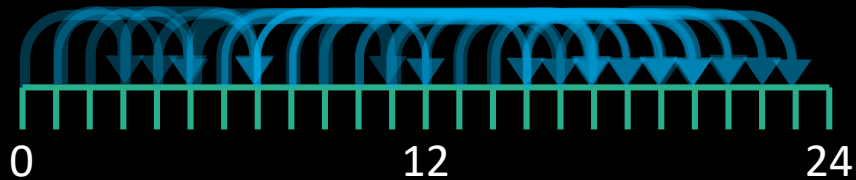


Input data

EV fleet data



Fleet movement patterns



EV driving benchmarks



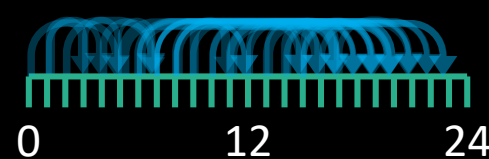
Number of parked / driving vehicles



Aggregated demand for driving



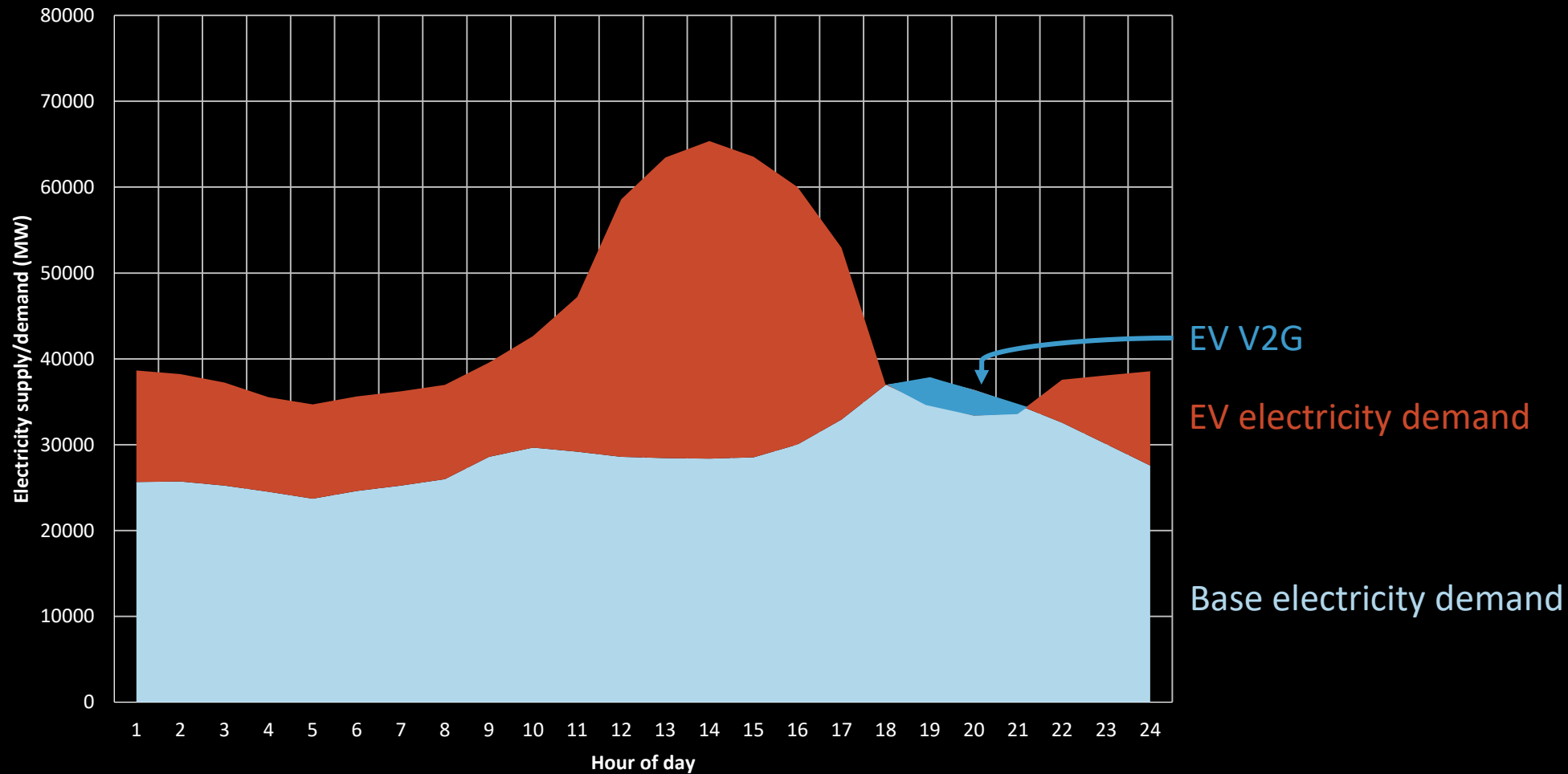
Average journey patterns



Minimum state of charge for vehicle group



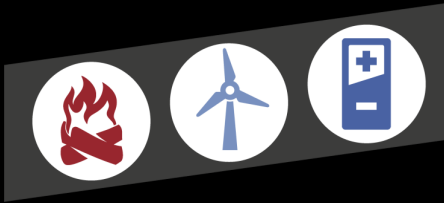
What could it look like?



Next steps



- Finalise implementation of functionality
- Identify relevant case studies
- Test functionality at urban and international scales



Calliope
www.callio.pe

