

Nottingham City Council



Sustainable Transport and CleanMobilEnergy

Steve Cornes

Innovative Transport & Energy Projects

- Workplace Parking Levy
- Electric public transport
- Large Go-Ultra-Low Emission Vehicles (ULEV) funds
- D2N2 Public charge point network
- ICE to EV Fleet conversion and adoption of smart charging
- Largest UK LA PV Program
- First Municipal Energy Company
- CME V2G City Pilot



CleanMobilEnergy

Project Overview

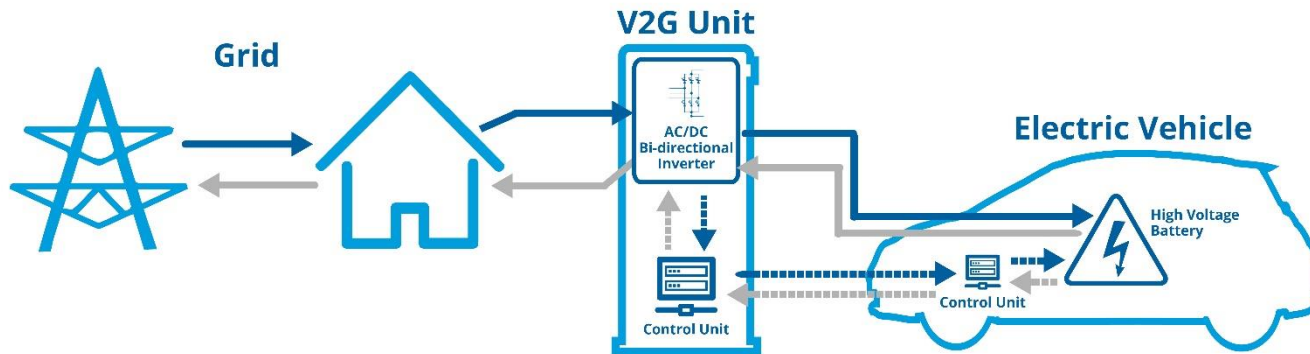
The integration of renewable energy sources, a stationary battery and vehicle-to-grid assets at an NCC Municipal Depot.

- September 2017 to March 2021
- Funding:
 - €918,684 Interreg NWE
 - £193,497 Innovate UK
 - NCC match (EDF, GUL, Fleet Replacement)

Aims and Objectives

- 1. Maximise use of renewable energy generation, no export to grid**
 - Supply building with RE
 - Charge vehicles with RE
 - Store any excess RE in stationary battery for later use (least efficient option, 83%?)
- 2. Reduce energy bills**
 - Avoid DUoS, TNUoS, Capacity Mechanism charges (4-7pm)
 - If RE not available, make use of “cheap” night tariff
- 3. Generate revenue**
 - Use an aggregator to access Capacity Mechanism/STOR/FFR/Demand turn up contracts
- 4. Lower NCC carbon footprint and emissions**

Eastcroft Depot City Pilot



- Integration of
 - > 88kW solar photovoltaics
 - 300kW/300kWh BESS
 - 40 V2G bidirectional charging units.
 - Procurement of 40 battery electric V2G compatible vehicles
 - Development of Energy Management System (iEMS – overall project objective)

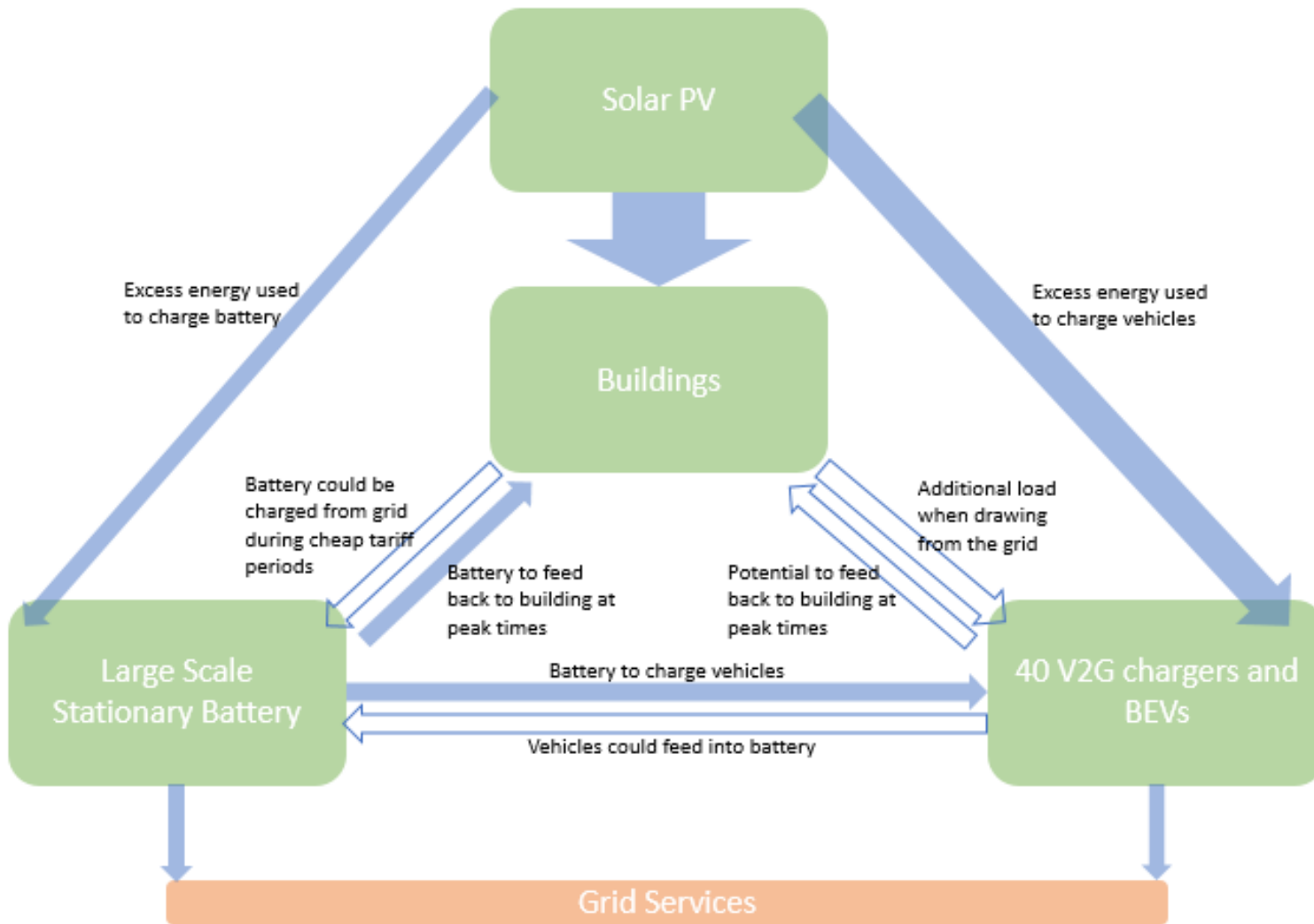
Hardware: Typical Stationary Battery



Hardware: Bidirectional charger EV

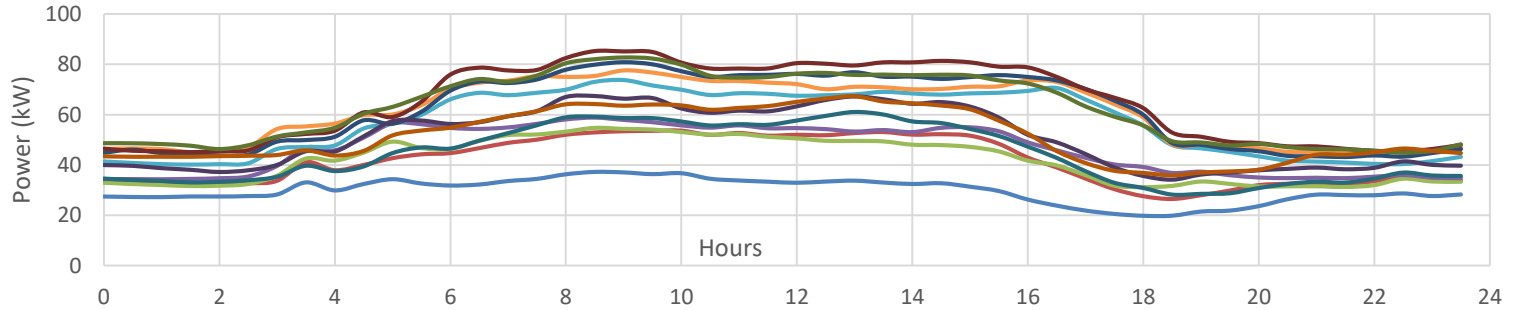


Energy Flows

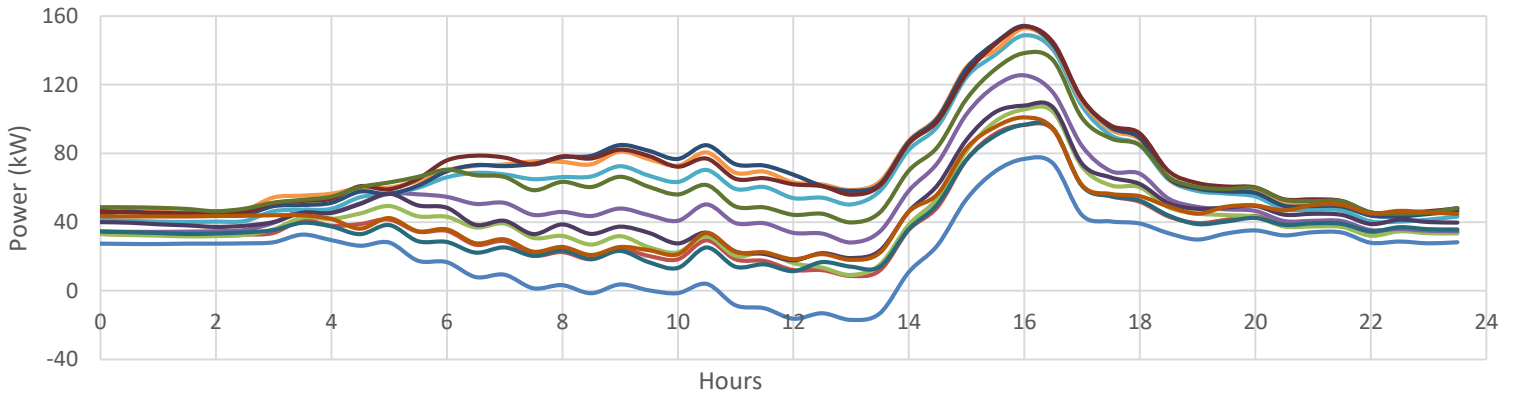


Energy Profiles

Daily energy consumption profile at the Eastcroft depot by month



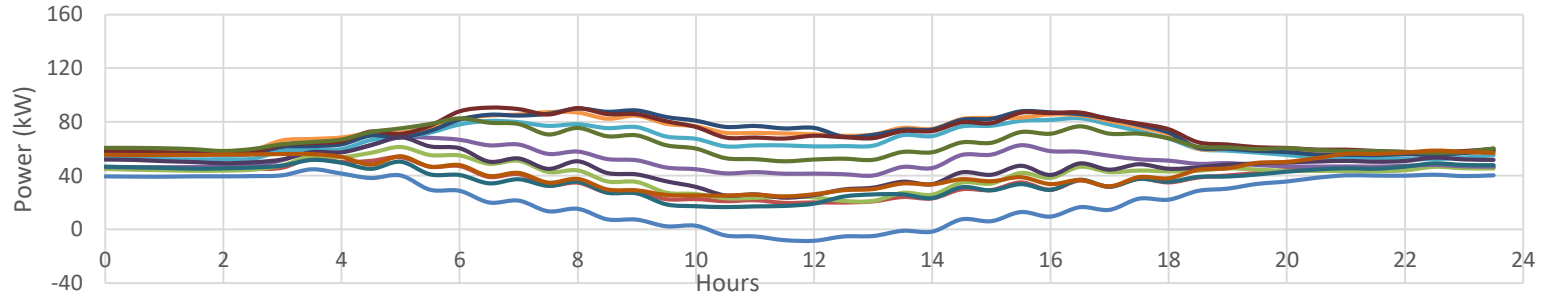
Daily energy consumption profile including predicted PV generated energy and EV charging requirements



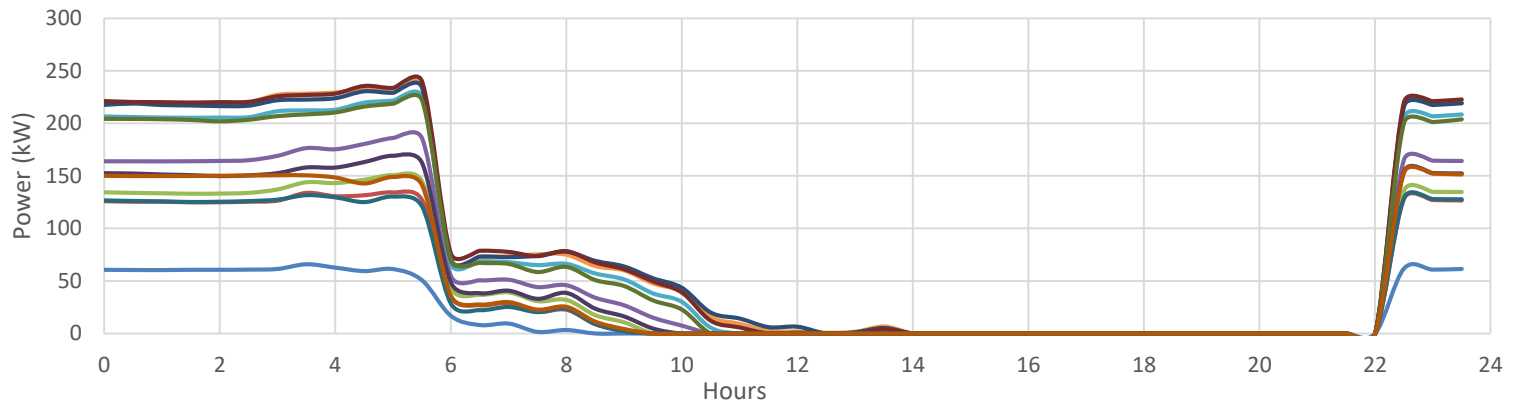
- July
- August
- September
- October
- November
- December
- January
- February
- March
- April
- May
- June

Energy Profiles

Daily profile including predicted PV generation and EV charging requirements with smart charging adopted



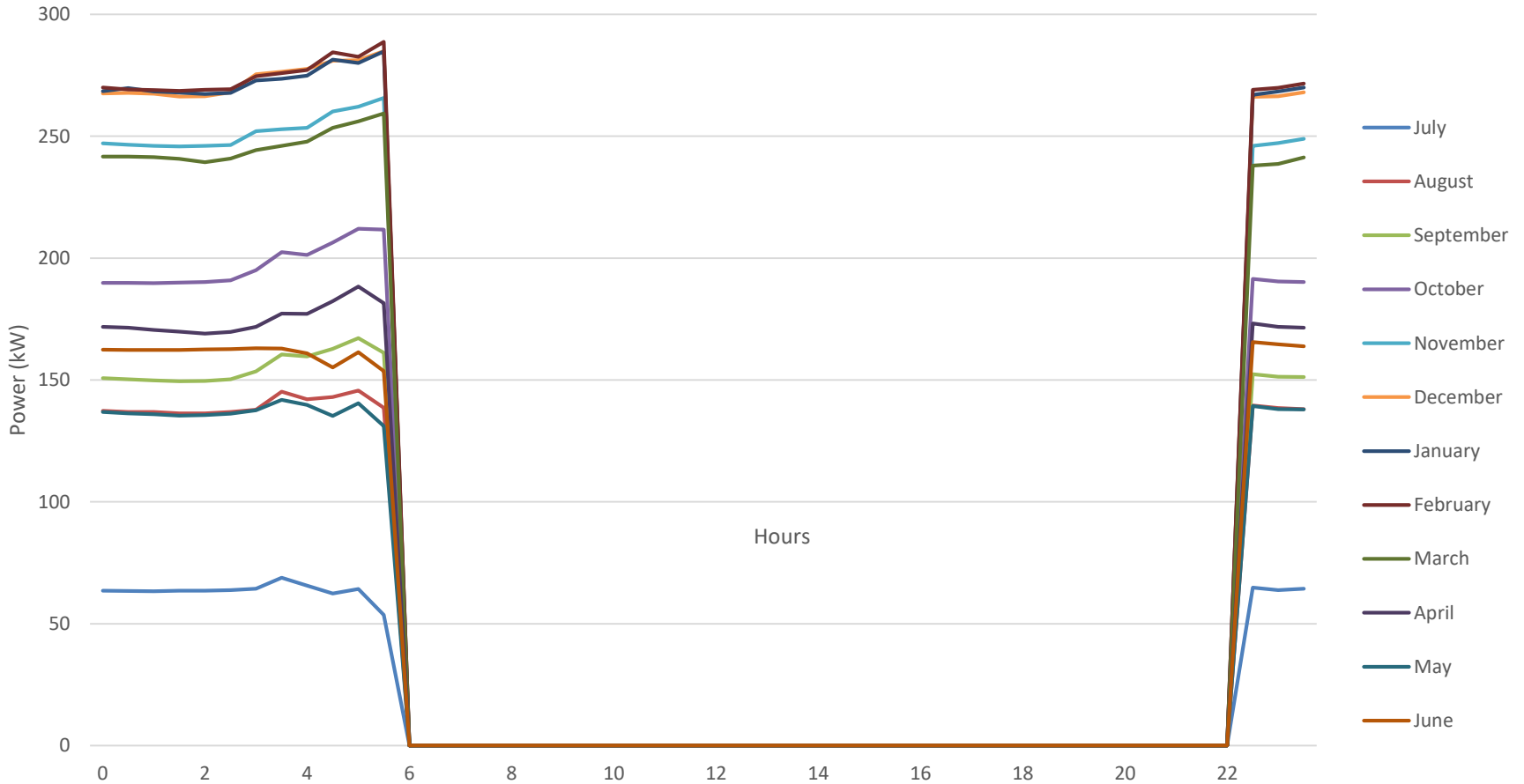
Daily profile with V2G Assets



- July
- August
- September
- October
- November
- December
- January
- February
- March
- April
- May
- June

Energy Profiles: CME System

Daily profile with addition of V2G assets & stationary battery



Project Challenges

- Requires 6 MPANS on the LV network to be consolidated into 1 large incoming supply on the HV network - current supply points are in the region of 70kVA ea.
- DNO considers the battery, PV and V2G units all to be “generators” capable of exporting to the grid
- Requires upgrade to a supply large enough to connect the sum of these components c.700kVA
- Consideration for depots future needs - fleet charging, increased building usage and increased PV installation
- Lack of market readiness for V2G capable electric vehicles & V2G charging units.
- Vehicle warranty issues re. V2G use
- Component compatibility (hardware and software)
- Operations engagement to maximise smart charging/V2G potential

CME Progress

- Site survey and feasibility of works report completed
- WPD formal offer accepted for 2mVA supply
- 40 Nissan ENV200s procured
- Solar PV installations complete
- Appointment of independent project management team to design and oversee works
- Production of detailed plan of works (CDM, operational requirements, welfare facilities, communications etc.)
- Appointment of principal contractor for works (Scape Framework)

Next...

- Procurement of bidirectional chargers and BESS

Future Plans



- **Further electrification of fleet vehicles** c.120 EVs procured by 2020 including cage tippers and sweepers, RCVs?
- **Nottingham Electric Vehicle Service Centre** to open September 2019
- **Taxi age and Emissions policy** from 2020
- **Carbon Neutral City by 2028.**



steve.cornes@nottinghamcity.gov.uk

