Low Carbon Innovation in Practice

Coventry City Council
07.06.2018
Low Carbon innovation in Coventry

- Very Light Rail (VLR)
- Ultra Low Emission Taxi charging
- On-Street Residential Charging Units
- Ultra Low Emission Buses (ULEB)
- Charging on the move: Dynamic Wireless Power Transfer (DWPT)
Objectives

- A low cost/affordable tram system for medium sized towns and cities
- Generate local jobs - local manufacturers and supply chain
- Modal shift
- Improve Air Quality
- Enable growth
- Enhance the region’s reputation for innovation
VLR will be a modern, affordable urban transport system and R&D-led advanced manufacturing initiative, which will deliver significant economic benefits.

The aim is to achieve a total whole system target cost of around £7m per kilometre.

The R&D is split into four work streams:

- **Vehicle** — (WMG) design and construction of a lightweight vehicle prototype, including a battery propulsion system
- **Track** — (WMG) production of an innovative low cost track form which can be installed with minimal disruption to utilities’ equipment
- **Route** — (CCC) route development, business case and Transport & Works Act Order
- **Operations** — (TFWM) system operations, passenger information and communications
Partnership Approach

Provide ICP and ongoing expert advice and guidance

Utilities companies will work with us to develop the track

Centre of Excellence - deliver value to UK manufacturing by de-risking innovation in the following areas:
- Lightweighting
- Advanced Propulsion Systems
- Intelligent Vehicles
- Energy Storage and Management
The Vehicle

• Contract to awarded to
• £4m budget to build a prototype that is ready for certification
VLR Technology

- self-propelled vehicle
- battery powered vehicle
- lightweight design
- much lower axle load compared with a conventional tram
- no requirement for overhead power lines
- laden weight of only 3 tonnes per axle
- lightweight track requiring only shallow excavations within the highway
- new charging technologies

- Ultimately autonomous operation at a high frequency in order to provide a “turn up and go” service.
• WMG are pulling together a consortium of partners including representatives from utilities companies

• Innovation: resilient, long life and shallow trackform. Minimal excavation and laid over existing utilities to allow fast access for repairs
Vehicle and Track Testing

CCC are working in partnership with Dudley Metropolitan Borough Council.

The testing of the VLR prototype vehicle and track will be undertaken at the Hub to Home Transport Innovation Centre in Dudley, due to open in Autumn 2019.

The test track will be built on a test road with mock utilities beneath, to enable stats companies to experience track removal for ease of access to their apparatus.
Strategic Benefits

• **high value training, apprenticeship and job opportunities** in the West Midlands – associated with design, construction and information technology

• **innovative Research & Development capability** for light rapid transit, developing new technologies, including autonomy, which can be exported to other areas of the UK and abroad

• **a substantially lower cost system**, that is capable of moving large numbers of people (potentially up to 1,200 per hour)

• **an affordable and flexible system** which can be implemented in areas where passenger demand is lower than can be supported by conventional trams

• **reduced levels of traffic congestion** within the West Midlands by offering a high quality public transport alternative to the car

• **A low emission environmentally friendly form of mass transit** – with no tailpipe emissions or visually intrusive overhead line equipment

• **Last mile connections** - opportunity to use VLR technology to develop autonomous pods to compliment the VLR service

• **High density development** along VLR corridors and around stops
Ultra Low Emission Taxi (LEVC)
ULEV Taxi Infrastructure Charging Point Project

- £1.2m (75%) for ULEV Taxi Infrastructure funding awarded to Coventry City Council.
- Installation of 39 rapid (50kw) electric charging units for electric taxis around the city
- 75% of the cost of a chargepoint funded by the grant and the remaining 25% is being matched by the supplier
Rapid Charging Units
Delivery Programme
ULEV Taxi Infrastructure Project:

• Commencement of Marketing Strategy from July 2018 for uptake of E-taxis
• TRO in July 2018 and September 2018
• Install 4 charging units in August 2018 followed by another 4 in November 2018
• Installation of remaining 31 units to follow on rolling basis after November 2018 to be completed by December 2019
NO2 Reduction Early Measures

- £2M AQ Early Measures funding awarded by JAQU to Coventry City Council to deliver NO2 reduction early measures project

- Cleaner Taxis
- Traffic Management and Monitoring
Cleaner Taxis

• Engagement with taxi trade to promote ‘try before you buy’ scheme
• CCC working collaboratively with LEVC to promote E-taxi uptake
• CCC is also working collaboratively with Virgin Trains to promote uptake of E-taxis
On-Street Residential Charging Scheme (ORCS)
On street Residential Charge point Scheme

• £300k for On street Residential Charge point Scheme (ORCS)
• 23 streets identified through online survey in January 2018
• Installation of 80 slow (3kw) Lighting column electric charging units and 5 fast (7kW) for residents in 23 identified streets around the city
• 75% of the cost of a chargepoint funded by the grant and the remaining 25% will be matched by the supplier
On-street Residential Charging-point Scheme
Delivery Programme
On-street Residential Charge-point Scheme (ORCS)

- Commencement of ORCS consultation with residents from June 2018
- TRO in August 2018
- R & D exercise on solution to charging units on lighting columns set at the back of the footway by September/October 2018
- Installation of chargepoints January 2019 for completion in March 2019
Ultra Low Emission Buses (ULEB)
Ultra-Low Emission Bus (ULEB)

• CCC is currently working in collaboration with Transport for West Midlands (TfWM) and National Express (NX) to procure up to 10 number E-buses

• Siemens will supply and install 175kW chargers
Charging on the move: Dynamic Wireless Power Transfer (DWPT)
Charging on the move

Overview:

- Dynamic Electric Vehicle Charging (DEVC) or Dynamic Wireless Power Transfer (DWPT) is a way forward in making 100% EV uptake globally.
- Currently only three companies have trialled this technology successfully; Electroad, Qualcomm and Korean Advanced Institute of Technology (KAIST).
- As a Highway Authority, installation of rapid/super chargers alongside the highway network is now consistently in demand.
- There are several issues with providing this infrastructure in its current form: Additional street clutter, not enough space on the footpaths and the overarching issue of energy supply availability from the grid.
- A way forward is to look at ‘charging on the move’, locally generating energy through natural sources and storing/using the generated energy supply to power this technology.
- It is proposed that this technology is trialled on a bus route within Coventry. ‘Conduit Charging’ technology is also being explored for a trial in conjunction with WMG.
Charging on the move

20km Route identified
Charging on the move

install energy generation solution (Solar PV’s and wind turbine on the route)

Install storage systems (PV Batteries) along the route

finally use the stored energy it to either boost the local power substation or directly to supply power to the inductive charging units (invertors).
How does DWPT work

EV is charged and propelled by power from the interaction of two electromagnetic fields.

Each trial EV will still need a small onboard battery;

a) to accelerate, because the jolt of energy required to propel a stationary EV is far greater than the energy required to drive down the street and

b) is to provide power on short stretches of the road that are not fitted with this technology
Installation of DWPT

Similar copper plates are installed on the EV’s underside. As the EV passes over the charged carriageway, the two fields interact and generate power.

Inverters installed along the side of the road provide power to plates of copper embedded in the road.
Coventry & Warwickshire Energy Innovation Zone: Powering a new era for the UK’s smart motor city
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