



arcola  
energy

## Hydrogen and Fuel Cell Solutions

Zero emission vehicles for busy operations

Richard Kemp-Harper



## More than 300 km range, and always ready to work



### How does it work

- 1** The electric motor ensures zero emission propulsion.
- 2** The hydrogen fuel cell produces electricity on board.
- 3** Both battery and hydrogen fuel cell power the motor. When the powertrain does not require energy, the fuel cell charges the battery.
- 4** The battery recharges from the grid, hydrogen at the station.

(1) Longest range record, established by Cetup corporation in France, on september 23rd, 2016 and proven by bailiff

### Usual available range : 300 km

#### 350 bar version

A 300 km range available  
(all-time high : 370 km <sup>(1)</sup>)

#### 700 bar version

A 350 km range available

### Energy recharge within 5 minutes

After 5 minutes of hydrogen recharge at the station, your vehicle is always available.

Recharge the battery at any electrical station when it suits you.

### Easy to use

Kangoo ZE H2 offers you the pleasure of driving an electric vehicle: powerful acceleration and silence.

The dashboard dedicated to the hydrogen fuel cell allows the display and control of its operation.

## “Best of both”

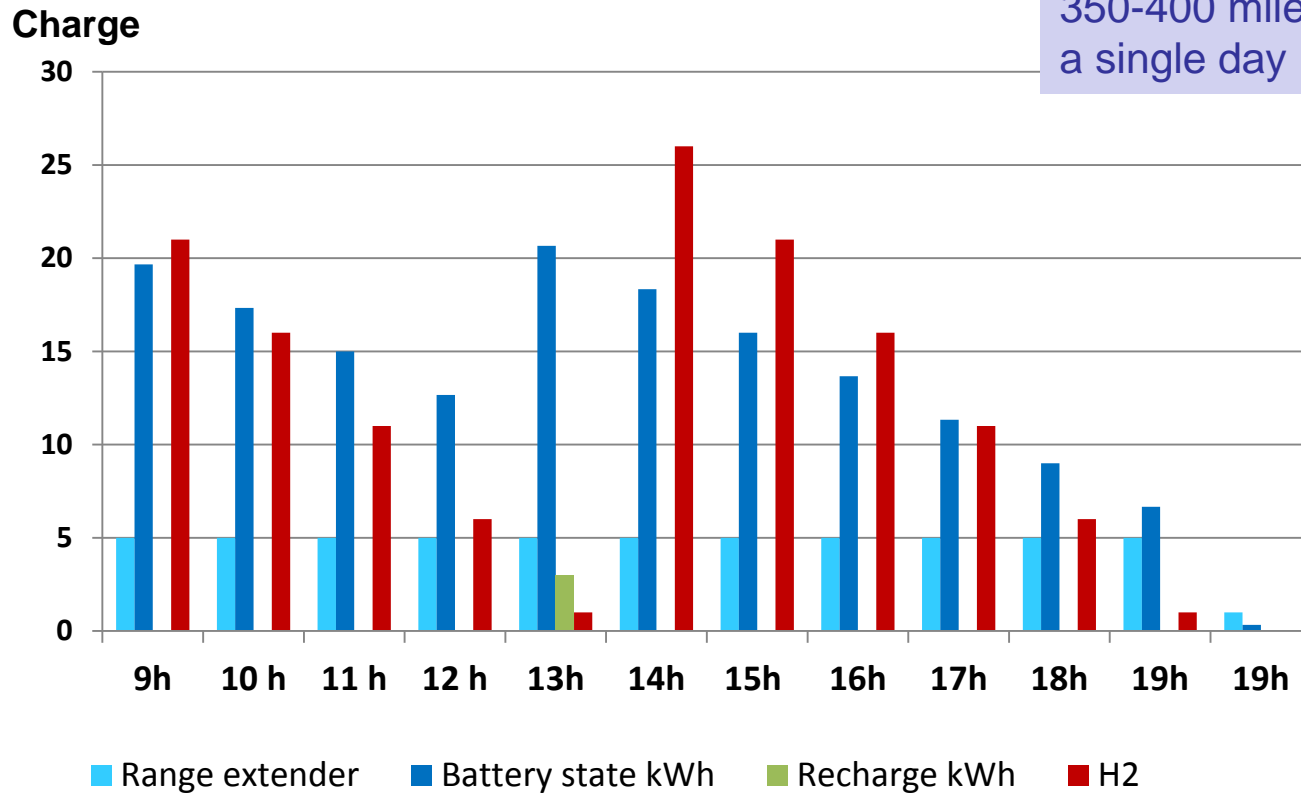
- EV plugin charging provides low cost zero emissions operation
- Hydrogen provides range and flexibility
- Up to 250 mile range – 100 miles EV only
- Refilling with hydrogen adds 110 miles of range
- Balance charging vs hydrogen refuelling
- Normal operations without compromise

## Operating modes

- Daily operation > 100miles
- Multiple shifts –1 vehicle replaces 2-3 EVs
- Flexibility – short routes some days, long routes on others
- Charging from fuel cell where plugin not available – at home or on the road

# Base range – 250 miles

Two H2 loads:  
 350-400 miles within  
 a single day





# Commercial arrangements

- Arcola Energy is a specialist in hydrogen and fuel cells
- UK distributor for Symbio Fcell vehicles with the Kangoo ZE van available now
- Sales, deployment and technical support for fleets
- Full technical support and maintenance for fuel cell vehicles
- Engaging, hands-on training for drivers and fleet managers
- Wider public communications for authorities wishing to highlight the benefits of hydrogen powered fleets
- Contract hire with maintenance to direct purchase – working with a number of established leasing companies
- Separate maintenance contracts are also available which encompass both the Renault and Symbio warranties.

# Vehicles to date

- Aberdeen CC – 2 vehicles 2015
- Fife Council and partners – 10 vehicles 2016
- Orkney Council – 5 vehicles delivered last week
- 28 being delivered in next few months, customers include
  - TfL – Tubelines
  - Sheffield City Council
  - Yorkshire NHS Trust
  - BAM
  - Skanska
  - Amey
  
- 45 vehicles operating in UK by end of August



# Funding for future vehicles

## Kangoo ZE H2

- EU funded projects providing discounts €8k per vehicle
- Plug in van grant £8k for Kangoo-ZEH2
- List price of 700bar version after discounts £34k

## Further funding

- £23m announced by OLEV for vehicles and infrastructure
- Expect H2 vehicle for price of electric
- Looking for cities and sites with critical mass of vehicle needs to justify new refueling
- Further EU projects potential

## 3.5t - available 2018

- Based on a Renault Master ZE
- Up to 350km range using 5kg of hydrogen
- Payload approx 750kg
- Available in 350bars and 700bar versions
- H2 refuel within 7 minutes max



# Taxi – pre-orders now for 2018

- Based on Nissan eNV
- NEDC: 642 km
- Hydrogen refuel in 3 mins
- Fuel Cell System: 15 kW net
- Hydrogen tanks: 3.6 kg at 700 bar
- Batteries: 24 kWh to 36 kWh
- 5-7 seats



# RCV - available

## 2018/19

- 85 kWh battery Li-ion
- Charging plug 64A/400V, Three-phase
- Hydrogen System 40kW range extender by Symbio
- 19 kg hydrogen at 350bar
- GVW 26t, payload: 17t
- Range: 150 km when collecting
- 80% of range available with hydrogen refill
- 15 minute fill



Thank you

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