Moving toward Fleet Scale Hydrogen Vehicle Trials in the UK

Making Way for Scotland's Hydrogen Economy
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Scope of Presentation

- Introduction
  - What role fleet scale demonstrators in the UK
- An example of trial activities in Scotland
  - Cenex\Revolve\Royal Mail\Comhairle nan Eilean Siar
- Near term activities
  - Bristol Accord
- Conclusions

Hydrogen and Fuel Cells in the UK

- A longstanding legacy of year-on-year funding for hydrogen and fuel cell RD&D
  - reflecting established political and industry support
- Key capabilities in hydrogen and fuel cell technologies within academia and industry
- A mature industrial base for hydrogen production and distribution
- An emerging set of stakeholders actively seeking to link UK renewable investments to hydrogen production
- A closely networked and collaborative stakeholder community
  - Merged UK Hydrogen and Fuel Cell Association , Regional Associations in London (LHP), Scotland (SHFCA), Midlands (BMHF)
- Established regional technology and deployment clusters;
  - Technology development and deployment
    - Midlands, North East, Wales (All Low Carbon Economic Areas) and Scotland
  - Technology deployment
    - London

UK has a coordinated focus on hydrogen & fuel cell RD&D

Hydrogen Vehicles in the UK

Lessons to be Learnt from UK Electrification of Transport Small Fleet Demonstration

Technology Providers in academia and industry

End User Fleets in Public and Private Sector Organisations

→ Supply push Innovation → → Demand (Customer) pull Innovation →

Research → R&D → Demonstration 1st Prototypes → Demonstration Small Fleet → Deployment

c340 various ultra low carbon plug in vehicles being demonstrated

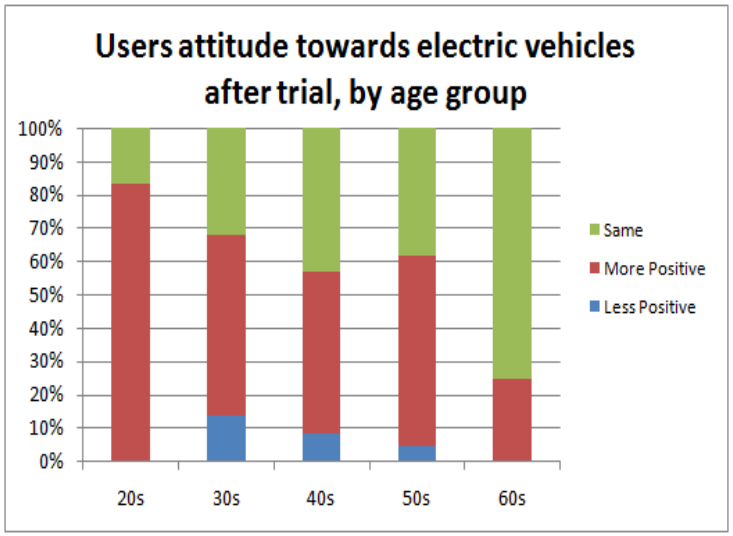
Smartmove, ULCVD

c1000 plug in vehicles being monitored from first wave of commercially available vehicles

ETI planning → ETI Project

Scope of Fleet Scale Vehicle Trials
Example: Smartmove (Battery EV trials)

- Vehicle performance
  - Real world and laboratory performance
- Acceptance and integration into fleet operation
- Environmental impact
  - Tank-to-wheel CO_2 emissions
  - Well-to-wheel CO_2 emissions
  - Noise
  - Air quality emissions



- Reliability
- Economic and payback analysis
- Matching customer expectations
  - Fleet characterisation
  - Fit for purpose application
  - Low carbon and business delivery match

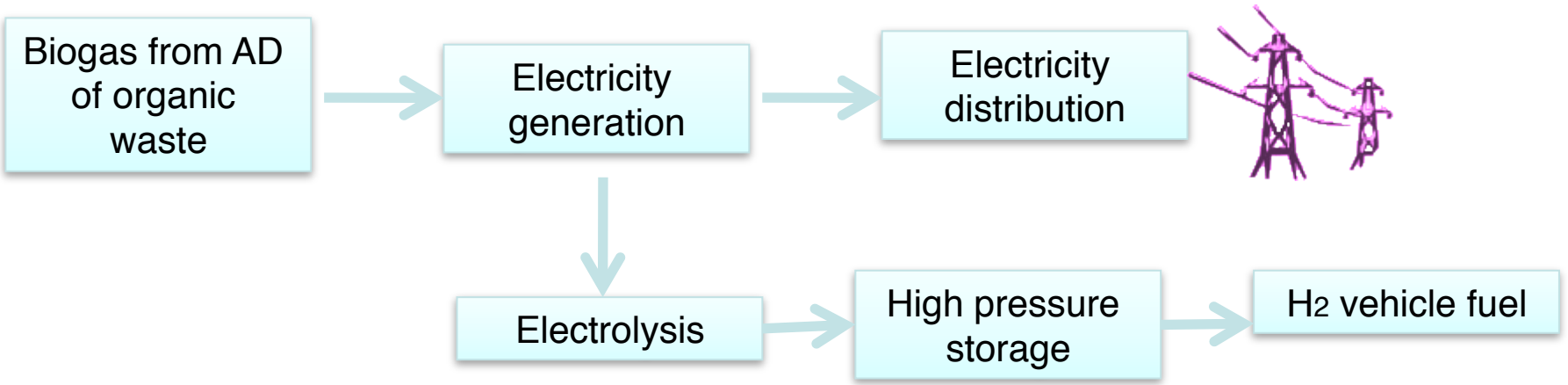
Revolve transit Stornoway deployment

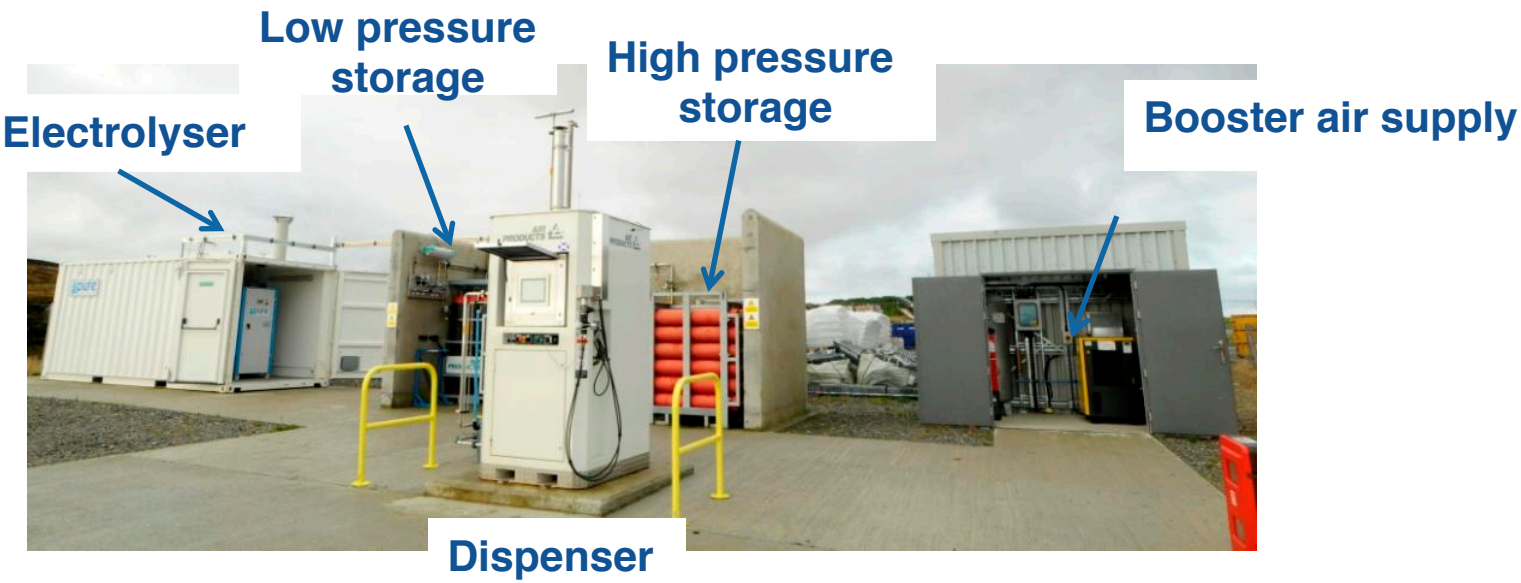
- 6 week deployment of 2.3 litre 1st generation Revolve hydrogen transit van
  - Petrol / Hydrogen bi-fuel ICE vehicle
  - 4.5 kg hydrogen storage capacity
  - Published range 60 – 80 miles

- Integration into Royal Mail fleet, Stornoway

- Green hydrogen created from H2 Seed facility, Stornoway

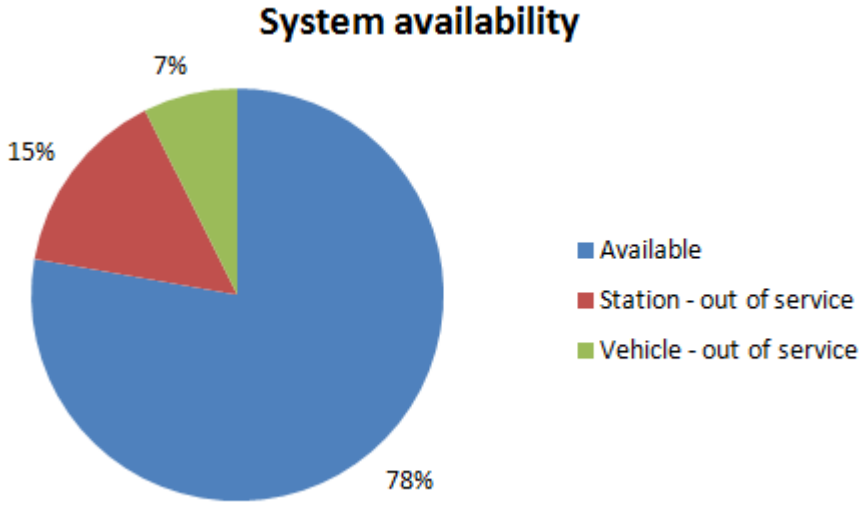
Comhairle nan Eilean Siar's H2 Seed Facility

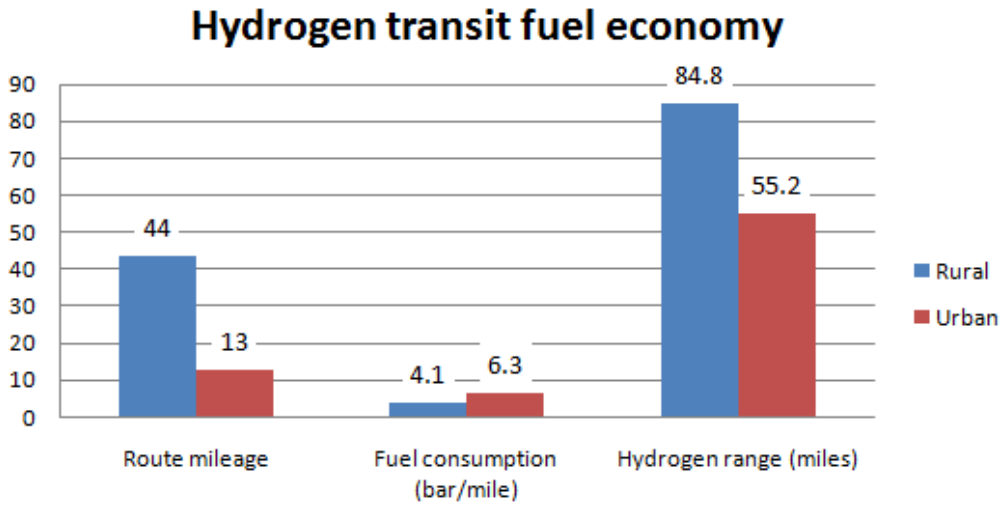




Revolve transit Stornoway deployment

Performance





Revolve transit Stornoway deployment

Feedback to system providers

- **2nd Generation hydrogen transits (2010 release)**
  - Injector modification for improved fuel economy
  - Improved inter-cooling for increase power output (~ + 10hp)
  - Calibration upgrade to improve NOx performance (euro 4) - (testing Oct 2010)

- **3rd Generation hydrogen transits (2011 +)**
  - Graduated H2 in-cab fuel gauge
  - Mass base algorithm for fast fill capability and leak detection strategy
  - ECU upgrade allowing fuel system switch during driving

UK Plans for Infrastructure Rollout

- Three phase project foresees the roll out of a distributed network of hydrogen refuelling stations (UKHyNet project)
  - Phase 1: to support prototype RD&D & small fleets
  - Phase 2: to support fleet scale demonstration and early deployment
  - Phase 3: to support initial commercial rollout

- Rate of rollout in Phases 2 and 3 and station sizing will be governed by OEM response (cars & buses, etc)

- Plans under development to undertake scoping and scenario planning for hydrogen infrastructure rollout via Bristol Accord Partnership
  - Also London Hydrogen Partnership plan for c150 vehicles

Summary

- UK has an increasingly coordinated approach to hydrogen for transport
- Hydrogen vehicles to be deployed in the UK
  - Trial design being informed by UK Electrification of Transport projects
- Trials (Stornoway+) contributing to trial implementation knowhow as move toward fleet scale vehicle trials in UK
  - For Revolve vans, more results to follow from Stornoway, along with further trial work of upgraded vehicles (via ITM Power projects)
- Initiatives including the Bristol Accord set to address scenario planning for infrastructure and vehicle roll out

Thank you for your attention

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