



Swindon
Drives Hydrogen

Swindon Hydrogen Group

Swindon Hydrogen Roadmap: 2013 - 2020

October 2013

This Swindon Hydrogen Group includes the following organisations:



1. Why Hydrogen?

- Hydrogen is an extremely high-quality and versatile form of energy with (potentially) zero carbon content. It can be produced from almost any energy source and converted to power and heat with high efficiency and zero emissions for both transport and stationary end-use applications. It has the potential to be stored in large amounts and, as such, can address issues associated with security of supply and flexibility for existing power production methods.
- As acknowledged in its 2013 Economic Strategy, Swindon already has competitive advantage in the UK's hydrogen sector with its notable demonstrator projects and related organisations / businesses. Its further development locally could present significant economic opportunities (i.e. investment, jobs, skills and innovation), in addition to environmental and quality-of-life benefits.
- A bespoke strategy is proposed to build on the momentum already gained in Swindon on its hydrogen agenda¹, with the aim of identifying, developing and delivering an integrated programme of hydrogen-based projects through a consortium of relevant stakeholders. The vision is to:

Establish Swindon as a 'Centre of Excellence' in the UK for hydrogen technologies and services.

2. Opportunities

- As an extremely versatile form of energy, potential applications for hydrogen include: road transport and materials handling vehicles; renewable energy generation; residential / industrial heat and power; energy storage; grid balancing; and, remote / portable power solutions.
- It is predicted that early adoption of hydrogen and fuel cell technologies in the UK will focus on commercial applications for distribution, including light duty vehicles and fork lift trucks (FLT's). In this respect, Swindon is well placed to benefit from its high concentration of logistics firms. However, significant progress is also being made to introduce fuel cell passenger cars to the market. UK H₂Mobility and OLEV predict a significant number of fuel cell electric vehicles (FCEVs) on the UK's roads by 2030, with associated hydrogen infrastructure opportunities. OLEV has committed £500 million of funding between 2015 and 2020 to support the delivery of this vision.
- Whilst the use of hydrogen for on-grid power generation is not anticipated to be an economic proposition for the foreseeable future, DECC has predicted a significant role for hydrogen in temporary energy storage and grid balancing. As such, BIS predicts that the UK fuel cell market might be worth around £1 billion by 2020. Swindon, potentially, is very well placed to benefit from this growth in the hydrogen fuel cell market through indigenous companies and subsequent inward investment opportunities.
- Ultimately, a future vision for Swindon would see the town benefitting from an increased share of manufacturers and employees in the hydrogen technologies sector, built on an attractive and dedicated inward investment offer, a bespoke programme of education and training opportunities, and a diverse range of related demonstrator projects. In realising elements of this vision there is a potential role for the EU's Structural and Investment Fund (€43.6 million), as administered by the SWLEP².

¹ See Appendix 1.

² Swindon and Wiltshire Local Enterprise Partnership

3. Challenges

- Contrary to common perception, the often-quoted technical obstacles to a hydrogen economy, namely the storage, safety, cost and distribution of hydrogen have already been sufficiently resolved to support its rapid deployment 'here and now'. Nevertheless, the phase-in of hydrogen technologies will require careful planning at an early stage before it is accepted as an 'everyday' fuel.
- Cost is the principal barrier to investment in hydrogen in these early years of its use. But as markets develop and the benefits of mass production bring lower costs, additional opportunities will ultimately arise for the more profitable development of hydrogen technologies. In this context, establishing a realistic market price for 'green' hydrogen (per kilogram) represents a significant challenge.
- At a relatively high level, it is anticipated that developing Swindon's early hydrogen infrastructure and economy will require the following:
 - An understanding of the political commitment and policy platform at European, national and local levels, to create stable and supportive conditions for investment;
 - The identification of opportunities to access public sector finance / support to enable maximum leverage of private sector investment;
 - The identification of potential new business / support opportunities and partner organisations;
 - Effective leadership to ensure collaboration between relevant stakeholders and the integration and co-ordination of projects and other initiatives;
 - The addressing of any social barriers (e.g. perceived safety concerns) that could influence the widespread adoption of hydrogen technologies.

4. Approach

- Acknowledging the various opportunities and challenges around hydrogen, a single body is considered necessary to address and co-ordinate these issues and actions at the local level. A **Swindon Hydrogen Group** is proposed to progress the following key themes:
 - i) Hydrogen-powered vehicles and associated infrastructure
 - ii) Hydrogen production and storage
 - iii) Stationary and early market applications
 - iv) Education, skills and communication
- As a starting point, the group will refer to the hydrogen-based projects identified in the 'Future Swindon' proposition³. The **Swindon Hydrogen Roadmap** acknowledges these projects in the individual aims and objectives identified below. By spring 2014 the group will have identified a number of priority projects and initiatives to pursue.
- It is intended that, in the main, the Swindon Hydrogen Group will operate 'virtually' (i.e. through electronic communication). On-going governance will be provided by Forward Swindon and Swindon Borough Council.

³ See Appendix 1.

5. Swindon Hydrogen Delivery Plan 2013-2020: Aims & Objectives

i) Hydrogen-powered vehicles and associated infrastructure:

- Increase the variety and through-put of hydrogen vehicles at Honda's refuelling station.
- In conjunction with the on-going SWISH₂ project, identify end users for fleet hydrogen vehicle trials (including materials handling vehicles) and subsequent commercial deployment.
- Implement a hydrogen car club.
- Investigate the feasibility of deploying a hydrogen bus and / or taxi (fleet).
- Research the types of funding mechanisms and supply / maintenance contracts available from vehicle suppliers to support hydrogen fleet vehicle procurement.
- Contribute to the UK H₂Mobility initiative (and any other relevant initiatives that arise in the period) by offering appropriate assistance and resources.
- Identify potential funding opportunities, locations and partner organisations to support the deployment of at least two additional open-access, 'green' hydrogen refuelling stations.

ii) Hydrogen production and storage:

- Achieve 100% 'green' sources of hydrogen for all fuel cell electric vehicles.
- Facilitate the delivery of at least two 'green' hydrogen production facilities with sufficient capacity to allow the achievement of commercial opportunities from distributed production.
- Investigate the potential of hydrogen to integrate into Swindon's existing energy grid through the use of alternative storage solutions (e.g. the natural gas network).

iii) Stationary and early market applications:

- Identify two projects to demonstrate the use of large-scale fuel cell systems (potentially in association with a suitable waste programme / project) in providing reliable and commercially viable heat and power (CHP) for industrial and residential needs.
- Identify potential new development schemes to demonstrate the reliability and commercial viability of micro-CHP applications for residential and SME markets.
- Ensure that local planning policies and guidance actively support and enable the installation of hydrogen infrastructure at all scales.
- Establish a shortlist of public and private end-user organisations interested in incorporating or retrofitting fuel cell technologies into their buildings.
- Promote fuel cell solutions (including backup / remote and portable power solutions) as an alternative and competitive technology option in early market applications.

iv) Education, skills and communication:

- Identify the skills and training needs of current and future hydrogen-sector organisations, linking with existing educational programmes and designing new ones where required (potentially in partnership with the forthcoming Swindon University Technical College).
- Arrange a UKHFCA event in Swindon in 2014 to raise awareness of opportunities using hydrogen.
- Raise the profile of Swindon's hydrogen programme to demonstrate commitment and intent in this sector, and to attract related opportunities, support and investment.
- Improve levels of awareness and understanding on hydrogen technologies to encourage the widespread acceptance and uptake of hydrogen as a safe, clean and viable form of energy.

Appendix 1: Swindon's Hydrogen Activity Timeline 2011 →



October 2011: The installation of the country's first open-access, state-of-the-art, 350 and 700 bar hydrogen refuelling station at the Honda plant identified Swindon as a leader in this field in the UK. The facility was delivered through a public / private partnership arrangement, involving Honda of the UK Manufacturing, BOC, Forward Swindon and the former South West Regional Development Agency.



June 2012: Building on the significant lead and momentum gained from the launch of the Honda station, a wider consortium was developed in 2012 to further Swindon's hydrogen credentials. The consortium was fortunate to secure £1.75 million from the Technology Strategy Board to produce on-site 'green' hydrogen and to trial a fleet of hybrid hydrogen / diesel powered Ford Transit vans and fuel cell FLT's. This demonstration project is scheduled to commence in November 2013 with the aim of proving the commercial application of the technology.



October 2012: Swindon hosted seven hydrogen fuel-cell cars (from Honda, Mercedes, Hyundai and Toyota) as they refuelled at the Honda station on the UK leg of the European Hydrogen Road Tour. The aim of the tour, which was part of a programme involving the European Commission and European industry stakeholders, was to increase customer acceptance for fuel cell electric vehicles (FCEVs) and associated refuelling infrastructure. The event at Swindon included a 'ride and drive' opportunity and a seminar on the merits of hydrogen technology.



November 2012: Recognising Swindon's competitive advantage in the early adoption of hydrogen technologies, the focus of the 'Future Swindon' bid to the Technology Strategy Board was on the development of additional hydrogen infrastructure allied to IT monitoring systems and an associated learning hub at the Swindon University Technical College (with its engineering-based curriculum). The focus of the hydrogen infrastructure was on the provision of an additional refuelling station to complement the existing station at Honda, with hydrogen being supplied (via a tri-generation process) as part of an on-site CHP facility for adjoining housing and commercial occupiers. A FCEV car-club was also proposed to demonstrate the robustness of these vehicles under high-load conditions. Despite an unsuccessful bid, it is considered that these projects still have considerable merit and potential.



October 2013: The Swindon Hydrogen Group is formed with the release of the Swindon Hydrogen Roadmap: 2013-2020.

Swindon Hydrogen Group - Contacts

Lawrence Murphy

Forward Swindon

Email: lawrencemurphy@forwardswindon.co.uk

Tel: (01793) 429251

Web: www.forwardswindon.co.uk / www.swindon.uk.com

Steve Cains

Swindon Borough Council

Email: scains@swindon.gov.uk

Tel: (01793) 466405