Bus Decarbonisation Taskforce

Paper 1.3 Draft workplan

The Taskforce agreed at its first meeting on 11 November 2020 that the hurdles and opportunities identified in Paper 1.2 – amended with comments made during the meeting in Annex A - will form the basis of a work plan for the group for the next 12 months.

This paper provides a draft workplan for comment and improvement by all members of the Taskforce. It is not intended to be either comprehensive or rigid at this stage. If the Taskforce is content with the approach then the workplan will be kept live by the Secretariat, and will be developed iteratively over the coming months in light of Taskforce decisions, Industry Advisory Group meetings and workshops, and ever evolving context.

The taskforce are invited to:

a) provide comments and improvements to the draft workplan

b) agree that the workplan be maintained as a live document throughout the life of the Taskforce

Please note that information about timing of Scottish Government subsidy provision is presented in the table for information but that this is not within the remit of the Taskforce.

<table>
<tr><th></th><th>Bus Decarbonisation Taskforce meetings</th><th colspan="2">Finance</th><th>Energy Provision, Technology & Infrastructure*</th><th>Supply-chain*</th><th colspan="2">Subsidy provision</th></tr>
<tr><td>November 2020</td><td>1: vision (co-chair: Ralph Roberts)</td><td></td><td></td><td></td><td></td><td rowspan="2">SULEBS round 1 >(£10 million)</td><td></td></tr>
<tr><td>December 2020</td><td></td><td rowspan="3">Exploration of current/potential financial products: 1-2-1 meetings with stakeholders followed by a workshop, leading to an information and ideas pack.</td><td rowspan="12">Exploration of costs and opportunities to drive down costs</td><td></td><td></td><td></td></tr>
<tr><td>January 2021</td><td></td><td rowspan="3">Development of guides for bus operators about a) DNOs, the process of securing connections and the opportunities of electrifying buses and depots and b) the potential role of hydrogen.

Scenario modelling of energy capacity requirements for the electricity network and hydrogen infrastructure.</td><td></td><td rowspan="4">SULEBS round 2 (£25 million)</td></tr>
<tr><td>February 2021</td><td>2: finance. What financial models & action to reduce costs need to be included in our pathway to achieve the vision (co-chair: Keith Anderson)</td><td></td><td rowspan="2"></td></tr>
<tr><td>March 2021</td><td></td><td rowspan="9">Assessment of SULEBS versus other possible frameworks for using Government capital subsidy to support swift transition to zero-emission buses</td><td></td><td></td></tr>
<tr><td>April 2021</td><td>3: energy. What action to secure zero-carbon energy supply & infrastructure need to be included in our pathway to achieve the vision.
+ communication plan.</td><td rowspan="8">Exploration of opportunities to build on Scotland’s R&D capacity, and to develop the domestic supply-chain for battery manufacturing and hydrogen generation</td><td></td><td></td></tr>
<tr><td>May 2021</td><td></td><td></td><td rowspan="7">Potentially SULEBS round 3 (£15 million), subject to range of factors including progress on consideration of alternative frameworks</td></tr>
<tr><td>June 2021</td><td></td><td></td></tr>
<tr><td>July 2021</td><td>4: supply-chain & interim report on pathway</td><td></td></tr>
<tr><td>August 2021</td><td></td><td></td></tr>
<tr><td>September 2021</td><td>5: aligning Government support with commercial investment</td><td></td></tr>
<tr><td>October 2021</td><td>draft final report on pathway</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>November 2021</td><td>Final meeting, prior to COP 26: pathway to zero-emissions</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

ANNEX: Opportunities and Hurdles – Paper 1.2 amended with comments made during the first meeting in red.

Financial

Running costs of zero-emission buses are lower than those of diesel buses, but battery-electric buses have higher up-front purchase costs compared to diesel buses, and hydrogen fuel-cell buses even more so. Full life costs are not proven, experience from the transition to hybrid buses indicates that technical issues arising through the life-cycle are likely and need to be better understood. Upfront cost challenges are exacerbated where charging infrastructure also has to be paid for up front. At any time this could reasonably be expected to lead to bus operators favouring diesel buses, and this is amplified by impact of COVID on bus operator finances and ability to consider fleet renewal at all at the current time. Operators are already making commitments on not buying internal combustion engines, with clear policy signals from governments, which provides confidence for industry to make decisions.

Rapid decarbonisation is dependent on orders and infrastructure being deployed at scale and at pace. Affordability is dependent on high volumes to drive costs down, which in turn depends on ensuring a healthy commercial environment for bus operators.

There is a requirement for innovation and change with respect to the products offered by the financial and manufacturing sectors; an opportunity to build on Scotland's strong finance skills and capacity; and a need to flex the support provided by Government so it both aligns with operator and

manufacturer decision making processes, and enables innovative commercial investments.

Asset financing may play a significant role in the decarbonisation of the bus industry. Institutional investors such as pension funds, banks etc. have a lot of liquidity to invest in asset classes which provide a stable revenue stream in a similar manner to RoSCos in the railway sector. Government, bus manufacturers, operators, energy companies and financiers have been brought closer together by COVID with opportunities for working together providing benefits. The composition of the Taskforce demonstrates that a degree of maturity and attractive financial/lending opportunities could be developed.

Piecemeal or ad-hoc approach to infrastructure and fleet investments may unduly increase costs.

This group has the potential to better understand who bears the burden of risk and could develop models which may improve the relative position of bus operators, who currently bear the most risk.

Capital markets are seeking investment opportunities which can provide a stable return on investment, and there is sufficient liquidity in the market to fund decarbonisation for the right pathways.

There is the potential for new income streams from new battery uses/recycling/second-use.

Energy provision, technology and infrastructure

There is a strong interplay between the different energy provision, technology and infrastructure requirements for zero-emission buses and the potential for novel and innovative financial structures to enable the transition. Planning in a comprehensive, holistic way may identify the most cost-effective and technically effective investments, although this is dependent on long-term focus and information sharing.

Even though significant advances have been made on developing EV technology, uncertainties remain regarding the battery lifecycle and the residual value of EV buses at their point of retirement. Almost no EV buses have been operating long enough to reach their estimated decommission date, so there is currently very little information on how long they will last and how these old buses will perform. One key risk, therefore, is the continued ability of the battery in the vehicle to deliver the desired range and the need to replace parts or all of the battery during the life of the vehicle.

Whether a bus operator chooses battery-electric or hydrogen fuel-cell buses, charging infrastructure is required and opportunities for collaboration with other energy users, and providers, emerge. This may relate to other energy users in the same geographical area (reconfiguring bus depots may, in some cases, be a significant undertaking) or in relation to the technology (e.g. batteries) having value to another part of the value-chain after the value to bus operations has receded.

Scotland has ample renewable and water resources for hydrogen fuel cell production and technology, including curtailed electricity. Electricity grid/ hydrogen infrastructure upgrades could be made in a holistic way if total demand is understood and depots are connected ahead of zero emission vehicles being deployed.

There is an opportunity and a need for greater information sharing and strategic planning between energy providers, technological innovators and bus operators, and there may be a need for awareness raising and knowledge sharing about infrastructure, grid and connection solutions across bus operators.

Buses could improve their digitalisation and information gathering capabilities on bus usage etc. with a new generation of vehicles.

Supply-chain

There are opportunities to build on Scotland's R&D capacity, and to develop the domestic supply-chain for battery manufacturing and hydrogen

generation, to drive down costs, provide high quality skilled jobs, and reduce carbon in the manufacturing and shipping of parts.

Can the supply chain (including the international supply chain) keep up with projected demand from success?

Battery technology and resources are currently dominated by companies based in China.

An accelerated transition may result in diesel buses being retired before natural end-of-life with consequences for balance sheets and waste.

There is a requirement to understand and support the skills required.