



To: **GREENER RENFREWSHIRE THEMATIC BOARD**

On: **1 February 2016**

Report by:
John Binning, SPT

LOW CARBON AND ELECTRIC VEHICLES

1 SUMMARY

- 1.1 This report provides details on the fuel types used by SPT's fleet of buses and cars/vans. The report also provides information alternative fuel vehicles in the wider bus network across the west of Scotland and provides some analysis of current experience of SPT and bus operators in emerging fuel technologies.

2 RECOMMENDATIONS

- 2.1 It is recommended that the Greener Thematic Board notes this update.

3 THE BUS MARKET AND SPT

- 3.1 SPT is the Regional Transport Partnership for the west of Scotland, a partnership of twelve councils including Renfrewshire. SPT has responsibility for the planning and promotion of public transport and the wider transport network. SPT is committed to greening the public transport fleet and a key outcome of the Regional Transport Strategy is reduced emissions. More information on SPT is available at www.spt.co.uk.
- 3.2 Transport is the second biggest contributor to carbon dioxide emissions¹. And a significant contributor to air pollution². SPT supports the Scottish Government's vision that Scotland's towns, cities and communities will be free from the damaging effects of petrol and diesel vehicles by 2050 as set out in Switched On Scotland: A Roadmap to Widespread Adoption of Plug-in Vehicles. SPT also supports Cleaner Air for Scotland The Road to a Healthier Future (CAFS), the Scottish Government's national framework setting out how the Scottish Government and its partner organisations propose to achieve further reductions in air pollution³

¹ In 2014, an estimated 36% of carbon dioxide emissions were from the energy supply sector, 28% from transport, 17% from business and 15% from the residential sector. 2014 UK Greenhouse Gas Emissions, Provisional Figures, Department of Energy & Climate Change

² Overall, transport contributes some 30% of total nitrogen oxide (NOx) emissions and 20% of total PM emissions, RAC Foundation

- 3.3 Bus is by far largest public transport mode and the importance of bus travel to the SPT area is underlined by the fact that one in every ten residents uses a bus as the main mode of travel, representing around half a million journeys a day. The majority of bus services are provided commercially by the 60 plus private bus operators across the west of Scotland.
- 3.4 SPT supports socially necessary bus services when private bus operators cannot provide, withdraw or change services, potentially leaving rural towns and villages without public transport. As a result 25 per cent of all network services are subsidised by SPT to some degree or another. More than 130 bus services were financially supported by SPT in 2014/15, carrying 5.6 million passengers and equating to a two per cent increase on 2013/14.
- 3.5 SPT works with member councils and bus operators to ensure successful management of the five statutory Quality Partnerships (sQP), including the Paisley sQP and newly formed sQPs in Inverclyde and covering Fastlink. Over the past year, the SPT service compliance team checked over 17,500 vehicles operating in sQP areas against agreed standards in Paisley, Glasgow and Ayr-Prestwick. Additionally, the service compliance team worked to reduce instances of illegal parking by bus operators, engine idling and other issues such as services not operating to the registered timetable. In total, 335 issues were identified across our partner councils in 2014/15.
- 3.6 Substantial investment in bus infrastructure continued in 2014/15. This included investment in Fastlink bus rapid transit; £7 million investment to develop the Subway/Bus interchange at Govan; and £5 million in capital funding for new bus shelters, high access kerbs, real time passenger information, bus priority measures and other improvements. Additionally, SPT continues to maintain over 12,300 bus stops, 3,500 bus shelters and more than 14,300 bus information cases across the region. SPT owns and manage four strategic bus stations, delivers on street bus shelters and stops and helps to plan the bus network. SPT is also a co-funder of the Paisley Bus Improvements project which is delivering a revamped bus hub in Paisley town centre.
- 3.7 SPT plans routes, schedules pick-ups, tenders and manages 1300 school bus contracts, covering 38,000 pupils, for 11 Councils, all aimed at driving the best value. SPT service compliance officers also carried out 1536 on-site inspections at schools and SPT vehicle examiners made 2758 vehicle inspections.
- 3.8 SPT continues to support and co-ordinate the development of Community Transport throughout Strathclyde as the need for these flexible, accessible and affordable services grows against the backdrop of an ageing population and resources becoming tighter. The work of the West of Scotland Community Transport Network, which is a partnership between SPT, the Community Transport Sector, volunteers and the health sector, continues to make excellent progress with 16 member organisations. The Network aims to bring co-ordination, enhanced quality and better use of resources within the Community Transport sector.
- 3.9 SPT is a partner in the Greener Renfrewshire Transport Sub Group and participated in the Scottish Government's National Low Emission Framework (NLEF) - Next STEPS Framework Working Group Promoting Green Transport.

³ Cleaner Air for Scotland – The Road to a Healthier Future (CAFS)

4 GREENING THE BUS FLEET IN THE WEST OF SCOTLAND

- 4.1 SPT is working to reduce the impact of transport on the environment. A key indicator for this outcome is the share of all journeys that are made by different modes of transport. This measure is affected by many issues which reach across all aspects of the transport network and travel behaviour. Over the past decade car use has plateaued although there is some evidence that is once again on the increase. There has been little change in main mode of travel over the past decade and much work remains for SPT and all partners to increase use of more sustainable modes of transport.
- 4.2 SPT's direct role in improving this measure reaches across all areas of our work, but those most focused on this outcome include supporting more journeys to be made by walking and cycling; supporting more sustainable travel behaviour; encouraging car users to reduce the length of their car journeys through park and ride; and investing in cleaner technologies, fuels and vehicles. SPT has also installed electric charging points at Buchanan Bus Station and, in partnership with Glasgow City Council, at Shields Road Subway park and ride for private cars.
- 4.3 SPT is not a bus operator but it does have a fleet of 135 buses for use on supported bus services, MyBus (SPT's demand responsive bus service which provides door to door services for people who find mainstream transport challenging) and Community Transport. SPT's fleet comprises adaptable vehicles, enabling use for conventional bus services, the school run, Community transport and to provide MyBus services. SPT also continues to invest in its bus fleet to ensure vehicles are of the highest standard. These vital local bus services keep communities connected and many of these services also provide access to hospitals. SPT's fleet is comprises modern, low-floor buses to make it easier for passengers to use them.
- 4.4 SPT, with funding provided by and on behalf of Glasgow City Council, has delivered the first fully electric bus service in the west of Scotland, the service 100 from Glasgow City Centre to the Riverside Museum. These are the only fully electric buses in the west of Scotland (See Table 1 below for a profile of vehicle types). Outwith SPT's area, a similar vehicle operates a shuttle between Stranraer & Cairnryan ferry port, and two operate local services in Inverness.
- 4.5 SPT compiles bus fleet details for each level of vehicle emission standards and for number of vehicles complying with the Equality Act 2010 and subsequent Public Service Vehicle Accessibility Regulations, based on information returned to us by 47 operators. Operators who have not responded have been re-contacted with a further request for the information to be provided. These statistics are provided twice yearly.
- 4.6 The total number of vehicles for the 47 operators who responded is 3,442. It is estimated that those operators who did not respond account for approximately 207 vehicles and these have been included in the percentage calculation. The current fleet profile of those operators who responded to date is shown in tables 7A and 7B.
- 4.7 A more extensive analysis of the fleet registration details accessible via the VOSA website suggest that the number of undeclared vehicles is far higher than previously thought from registered services. As a consequence the overall number of reported vehicles has increased dramatically. The survey will be re-issued to endeavour to capture more details than has previously been shown. This has become more of an

imperative due to the forthcoming introduction of SQP's and the linkage to lower emission vehicles and air quality.

- 4.8 SPT's investment in vehicles over the last 18 months has contributed to a 9.9% decrease in the oldest vehicle categories (pre Euro, Euro 1 and Euro 2). In addition, SPT's policy of procuring only vehicles which comply with the UK Equality Act 2010, including a number of hybrid vehicles, has contributed to a 10% increase in vehicles with engine emission standards of Euro 3 or better and Equality Act compliant categories.

Table 1 Total number of Euro 6, hybrid or fully electric vehicles operating in the SPT area

Category	October 2015		April 2015		October 2014		April 2014	
	No. of vehicles	% of total	No. of vehicles	% of total	No. of vehicles	% of total	No. of vehicles	% of total
Pre Euro (pre 1993)	125	3.4%	157	4.3%	170	4.6%	167	4.4%
Euro 1 (1993 - 1995)	80	2.2%	63	1.7%	79	2.1%	93	2.5%
Euro 2 (1996-1999)	340	9.3%	427	11.6%	502	13.5%	676	17.9%
Euro 3 (2000 - 2004)	1140	31.2%	1128	30.7%	1103	29.7%	1116	29.6%
Euro 4 (2005 - 2007)	549	15.0%	565	15.4%	584	15.7%	556	14.7%
Euro 5 (2008 - 2013)	1063	29.1%	1064	29.0%	1018	27.4%	910	24.1%
Euro 6 (2014 - to date)	90	2.5%	38	1.0%	25	0.7%	7	0.2%
Hybrid	53	1.5%	27	0.7%	29	0.8%	29	0.8%
Fully electric	2	0.1%	2	0.1%	2	0.1%	n/a	n/a
No response	207	5.7%	198	5.4%	202	5.4%	216	5.7%
Total number of vehicles	3649	100.0%	3669	100.0%	3714	100.0%	3770	100.0%

- 4.9 While the initial cost of purchasing electric vehicles is considerably greater than for conventional diesel or hybrid vehicles they are obviously significantly cheaper to charge than the cost of conventional fuels. For example, on average it would cost circa £80 – 90 to fill a tank of diesel for a bus per day as opposed to the cost of charging an electric vehicle overnight which would be only around 10p per hour.
- 4.10 However, there are issues in terms of the range available for electric vehicles in general and also the ability of electric buses to cope with the often demanding terrain of the west of Scotland, particularly in remote rural areas. Compared to a diesel bus, an electric bus costs about twice as much to buy or lease, but has lower running and maintenance costs. However if the battery does not provide sufficient range and more vehicles are needed, then capital costs rise making electric buses very expensive⁴. To achieve efficient operation and justify investment, bus operators require vehicles to be capable of operating for up to 18 hours per day in some cases, and with a range of several hundred miles. With current technology, electric vehicles cannot replicate this, and are best suited to routes operating low mileages and short operating hours per day.
- 4.11 Bus operators are bound by European Emission Standards. Independent vehicle emission testing shows very good NOx emissions performance of Euro VI buses which while not fully electric nevertheless combine the benefits of acceptable cost for operators while limiting carbon emissions and air pollutants. The latest range of heavy-duty vehicles (trucks and buses) are already showing the drastic emission reductions Euro-6 can offer, with this standard in place for all vehicles since the end of 2013. Real world tests conducted by Transport for London on the cross-city London 159 Bus Route show a 95% reduction in emissions of NOx over older technology vehicles⁵.

⁴ Open Research Online, The Open University's repository of research publications: Developing a viable electric bus service: the Milton Keynes demonstration project, Miles, John and Potter, Stephen (2014)

⁵ <http://www.smmmt.co.uk/industry-topics/air-quality/euro-6-mean>

- 4.12 In terms of electric vans and cars, SPT's piloted use of electric vehicles but our experience of their performance was disappointing compared to that claimed by the manufacturer. SPT leased a number of converted electric vehicles but these did not provide the kind of range required for SPT's purposes e.g. to transport survey staff and deliver travel information across the west of Scotland. The range averaged around 60 miles maximum in summer and only 40 miles in winter which did not meet operational requirements.
- 4.13 SPT participated in the EU ZeEUS programme aimed at encouraging take up of electric buses but factors such as risk, operational feasibility and the attractiveness of other technologies viz conventional or hybrid vehicles, made it extremely challenging to gather industry support for a commercial commitment to be secured.
- 4.14 First Glasgow, a partner in the project, estimated projected running time via emission-free electric power was only 15% compared with an initial aspiration of 80%. With no clear benefit to passengers, First did not consider the investment to be viable at this stage. First consider there is more positive environmental benefit where funding is spread over more services on low-carbon vehicles, such as its 'Wright Streetlite' buses, several of which have been placed into service in recent years. Other manufacturers such as Alexander Dennis can also supply such low-carbon vehicles, and indeed some are in use in Renfrewshire with McGills.
- 4.15 SPT continues to seek opportunities to explore further funding opportunities through European, UK and Scottish Government funding, including the Scottish Government's Green Bus Fund. First have also recently placed into service 24 new Alexander Dennis double-deckers with 'stop-start' technology which are classified as low-carbon vehicles, as are a similar quantity of Alexander Dennis single-deckers received simultaneously.
- 4.16 The Scottish Green Bus Fund operates as a Challenge Fund with a fixed budget of around £3 million in the financial year 2015-2016. Grants are offered to successful bidders for up to 80% of the price differential between a LCV and its diesel equivalent. SPT's purchase of electric vehicles in Glasgow was part funded through this fund (see para 4.4 above).
- 4.17 So significant challenges remain for the promotion of electric and other low carbon vehicles such as electric/natural gas/biomethane dual fuel and hydrogen.
- Limited capital funding to meet the significantly higher cost of electric buses;
 - Uncertainty over whole life costs versus conventional buses;
 - Doubts over the durability of battery life / replacement cost;
 - The payload penalty for vans and lack of availability of low emission vans with higher payloads;
 - Range limitation;
 - Lower and uncertain resale value;
 - Lack of information about financial benefits and suitability of different technologies;
 - Lack of public refuelling;
 - Long recharge times;
 - Questions over performance and reliability; and
 - Cost of infrastructure for small operators / Councils

- 4.18 For these reasons it will be essential that the Scottish Government provides substantial investment in taking forward new technologies. While the Green Bus Fund is a welcome source of funding, the sums available are modest and do not cover the full capital costs of new vehicles. It is likely that hybrid buses and low-carbon diesel-powered buses will continue to be the focus of investment by bus operators for several years.

5 **NEXT STEPS**

- 5.1 The focus of current future investment will be in sourcing the lowest carbon, lowest polluting buses in line with EU requirements. As EU requirements continue to become more stringent, older higher mission and polluting vehicles will be replaced and there has been significant movement towards lower carbon vehicles over recent years.
- 5.2 SPT continues to evaluate the performance and costs associated with electric vehicles both in terms of potential investment in its own fleet and the wider bus network. SPT will continue to work with our partner councils, the bus industry, Transport Scotland and the Scottish Government to pursue opportunities to further green the transport fleet in the west of Scotland consistent with maintaining effective bus services within available resources. In particular, SPT will work within the framework of Switched On Scotland and CAFS to promote greener technologies.

Author: John Binning, Principal Policy Officer, SPT
Tel: 0141 333 3248
E-mail: john.binning@spt.co.uk