Somerset Waste Board meeting
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Report for decision

Approach to Partial Refleet

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Forward Plan Reference:	**08.06.22**
Summary:	Whilst most of SWP's fleet was bought in 2020 and is expected to last until 2030, 22 of SWP's fleet of vehicles used on the collection contract were bought in 2016. These are scheduled to be replaced in 2024 and with long lead times on vehicle production a decision is needed in the current year's capital programme. A thorough review of all technologies has identified that potentially 10 of these 22 vehicles could be replaced by electric alternatives – reflecting how decarbonised alternatives for larger/heavier vehicles lags behind technology for cars. This paper sets out the options explored, the recommended approach, the further work necessary to fully explore the viability of electric vehicles (particularly around charging infrastructure). It also sets out the options being explored to further decarbonise the remainder of SWP's fleet. A final decision on whether to purchase the fleet is not being asked for at this time, instead a steer on the direction of travel is requested ahead of a capital bid in the Autumn of 2022.
Recommendations:	**That the Somerset Waste Board:** **1) Provides a steer on the approach to the partial refleet in 2024, in particular on the approach to maximise the electric fleet.** **2) Notes the further work proposed to be undertaken and the risk associated with not committing to purchase vehicles in the current financial year.** **3) Notes the options being explored for the wider decarbonisation of SWP's fleet ahead of their expected replacement in 2030**
Reasons for recommendations:	22 of our fleet needs replacing in 2024 and we need to commit to a purchase in this financial year in order to ensure we have a reliable fleet capable of delivering good service quality. Having already purchased 1 e-RCV SWP is seeking to maximise the number of decarbonised vehicles used to deliver services, but

	this is not viable for many of those vehicles we need to replace.
Links to Priorities and Impact on Annual Business Plan:	Section 4 of the Business Plan 2022-27 focuses on decarbonising our operations. Action 4.5 focuses on the Partial refleet noting that we will learn "from the trial electric refuse vehicle our trials and emerging technology will inform the partial refleet, as will future national legislative change and changes in tonnage/behaviour (to inform the number and type of vehicles we require)." Action 4.4 looks at piloting alternative fuels in our fleet and action 4.6 focuses on green infrastructure.
Financial, Legal and HR Implications:	The final cost of the partial refleet is not yet known, as it depends upon which vehicles are chosen, the infrastructure requirements and commercial dialogue with SUEZ (who offer us a contractual discount if SWP's partner provide the capital – which enables us to be sure that borrowing is financially worthwhile). The indicative costs are set out below but are potentially in the order of £5.8m should we maximise the electric fleet based on current technology (noting that this will cost £2,360 more than a fully diesel fleet but deliver £1,150 revenue savings and 38,000 tonnes of carbon compared to a fully diesel fleet. There are no HR implications. The default contractual requirement is for SUEZ to replace like for like with diesel fleet (as this was the only thing that could be reliably costed when the contract was entered into) so a minor change to the contract will be required should we refurbish some vehicles and procure electric fleet.
Equalities Implications:	An impact assessment will be undertaken ahead of any final decision being made on the partial refleet.
Risk Assessment:	If we do not commit to replacing our 2016 vehicles this year then the age of this fleet is likely to have a negative affect on service quality due to vehicle breakdown/failure. If we do not take the opportunity to replace vehicles with electric technology (where this is viable) we risk failing to deliver on the partner's climate emergency ambitions. Conversely, technology is rapidly changing so it may be that e-RCVs become cheaper/more effective in the future, and the use of significant amounts of capital to fund e-RCVs may have an opportunity cost in preventing the partners from implementing other measures which save more carbon per £ spent. There is a risk that we cannot cost effectively implement charging infrastructure, but this is mitigated by not seeking a final decision at this point

3. Background

3.1. SWP's fleet and what needs replacing

SWP's collection contract fleet is made up of 108 recycling vehicles (mostly Romaquips, but three are top loaders for communals and eighteen are smaller vehicles used to get to those hard-to-reach properties. We have forty-three refuse vehicles 25 x 26t but just under half of the fleet is made up of more specialist vehicles 6 x 7.5 tonne, 8 x 16 tonne and 4 x 26 tonne pod vehicles. The vast majority, 140 of this fleet was renewed at the start of the contract in 2020 to ensure that we had the right fleet to deliver our environmental and service quality ambitions. The 2020 fleet is expected to last until 2030. They are located across 4 depots: Bridgwater (Colley Lane), Evercreech Junction, Williton (Roughmoor) and Yeovil (Lufton).

23 of our fleet date from 2016 and were not replaced at the start of the contract and are not due for replacement until April 2024. The long lead time on such fleet (exacerbated by the global semi-conductor shortage and the aftermath of Covid) means that to be confident of vehicles being ready for service in 2024 we need to place orders before the end of the 2022/23 financial year.

SWP have already replaced one of the 23 vehicles with the refurbished electric-RCV as previously agreed by the Board. This vehicle has been used on many routes across the county – driver feedback is good (less vibration and noise), so far it has completed the rounds it was expected to (but will be tested on more challenging rounds in the future). We will know more once the vehicle has been used on a wider range of rounds around the County. It has highlighted to SWP/SUEZ the importance of driver training ahead of using an e-RCV, in particular to combat range anxiety, weight is less of a factor although it will carry around 0.5 of a tonne less than a standard truck, range is by far the main limiting factor. It has not yet been fitted with the dual gearbox necessary to enable it to travel at speeds up to 50mph due to issues with the manufacturer (Dennis Eagle) but this is still expected to be installed, at no further cost to SWP, in this calendar year.

The 22 vehicles which remain to be replaced are:

Size	No.	Type
7.5 tonne	4	Refuse vehicle
16 tonne	4	Refuse vehicle
26 tonne	10	Refuse vehicle
26 tonne	4	Pod vehicle*

* The Pod vehicle is a specialist vehicle used mainly on the schools service.

As set out in the performance report, vehicle reliability has been a particular issue with the 2016 vehicles recently, which has been a causal factor behind some of the recent service quality issues. This is despite a refurbishment to the operating

equipment, bin lifts, compaction equipment etc. on 9 of these trucks in the early half of 2021 in order to make them operational. The faults now mainly relate to driveline/engine issues which were not part of the refurbishment and are likely to become more common as vehicles age but delays and some difficulty in getting parts are exacerbating this issue

3.2. Options explored

The Board will be aware that there is a rapid pace of technological change in vehicles, and that electric technology is less advanced for vehicles over 3.5 tonnes. This is particularly true for specialist waste vehicles where industry investment is focussed in the most common vehicle types (for commercial reasons), meaning that development of more niche vehicles (e.g. our Pod vehicles, 7.5 tonne or 16 tonne vehicles) lags behind development of 26 tonne refuse vehicles. Unlike a purely urban authority many of our vehicles cover large distances (round distances vary from 30 to 80 miles), often over challenging terrain. This can mean that even where e-RCVs do exist, they can only serve our urban or semi-urban rounds and not the most rural rounds. It is also important that vehicles come with a manufacturer warranty – where a chassis is modified to an alternative fuel by a company unrelated to the manufacturer of the chassis this can lead to issues around liability for faults/mechanical issues.

1.2.1 Options explored for 7.5, 16 and 26 tonne refuse vehicles

Accordingly, SWP have worked closely with SUEZ to explore options and trial vehicles, a process which is ongoing. This includes understanding the zero carbon options available to us as well as how we can reduce carbon emissions if there are currently no viable zero carbon options:

- Desktop modelling of which 26 tonne refuse vehicle routes (based on vehicle telemetry) could feasibly be electric or hydrogen fuel cell, and using the existing e-RCV to test routes. Early indications are that this might enable all 10 26 Tonne refuse vehicles to be electric, but we need to undertake more testing before we are certain of this. This is likely to be in the urban and semi-urban areas of Somerset (5 in the Bridgwater/Taunton area, 1 in the Yeovil area and 4 serving the larger communities in Mendip). This testing is expected to conclude over the Summer, and it may be that not all 10 can be replaced with electric vehicles following this testing phase. The constraints in terms of charging these vehicles are discussed in section 3.2.4 below.
- Testing of normal width (i.e. not narrow-bodied) 26 tonne refuse vehicles can be used as this would open up a wider choice of e-RCV (only one manufacturer currently makes a narrow bodied low access e-RCV).
- Exploring whether 12 tonne or 18 tonne vehicles can replace 7.5 tonne and 16 tonne vehicles as electric vehicles are available whilst those at 7.5 tonne and 16 tonne are not. Whilst this process is ongoing it appears that the long distances these vehicles cover means that they will not be suitable.

- Exploring whether some of our smaller recycling vehicles procured in 2020 could be rebodied to become refuse vehicles and replaced with electric panel vans. This appears unviable due to the range.
- Learning from others who have already deployed Hydrogen dual fuel vehicles (which appear to give limited carbon reduction at a very high cost) and the real-world practicality of hydrogen fuel cell vehicles. The latter appears to be a very attractive technology, but it is far from mature – operational results from key trials in Aberdeen and St Helens are unlikely to be available for a further year.
  Exploring the viability of CNG fuelled vehicles produced from Anaerobic Digestion in Somerset. This still requires an internal combustion engine to operate and is likely to become obsolete when these vehicles are banned in 2035.
- Exploring whether fuel use can be lowered by using Rotopress bodies (effectively a rotating drum rather than a compacting plate that moves back and forward) with a claimed fuel saving of 20%. Trials are ongoing.

1.2.2 Options for 26 tonne Pod vehicles

Technological change is not the only change in the waste and resources sector that we need to take account of in our choice of vehicles. Legislative change is likely to change the waste we are collecting in the future, and we need to understand this before we commit to purchasing vehicles as having an under-utilised or inappropriate asset would be financially and environmentally sub-optimal. We are confident in the future need for all vehicles except for the 4 pod vehicles and possibly top loaders. These vehicles serve schools and communal properties (e.g. flats) lifting large 1100l bins. They collect card and paper, plastics, glass and the schools' pods also collect food. It is possible that national legislation will change to require the collection of food at communal properties, and if it does then this will considerably change how much food we are collecting and hence what vehicles do this most efficiently – it may be that we require some vehicles dedicated to food waste. However, we cannot be certain of this until we know the outcome of the national legislation and have the time to model the impact on Somerset. Hence the recommendation for these vehicles is to seek to extend their useful life in order to give us time to understand these changes and identify the optimal service and hence vehicle. Options explored are;

Option	Explanation	Recommendation
Do nothing	Option rejected as likely to lead to high degree of service unreliability due to vehicle failure (and noting that SWP would have very limited contractual recourse to SUEZ as fleet would be beyond its useful life)	
Partial refurbishment	Partial refurbishment of the bodies on these	Rejected as minimal cost saving compared to re-body and

	vehicles in 2024 (following a partial refurbishment in 2021). Whilst this will potentially extend the vehicles for a further year we expect that there will be issues with reliability based on our experience since 2021, and this may affect service quality. The estimated cost of refurbishment is £30k per vehicle (c£120k in total)	refurbish but much higher likelihood of vehicle failure and hence service quality impact
Re-body and refurbish	Replace the bodies with refurbished Dennis bodies and refurbish the pods at a cost of £40k per vehicle (£160k in total). This would improve the reliability and potentially increase the life by two years. This option would have to progressed ASAP whilst the bodies are available.	Recommended option – SWP are likely to have to share risk of drivetrain failure with SUEZ (as we would with partial refurbishment) as it is not cost effective to fully replace engines and gearboxes.
Replace with hire/2nd hand vehicle	Option rejected as extremely limited availability of these specialist vehicles in 2nd hand or hire market, and older vehicles may have reliability issues	
Replace with electric or hydrogen alternatives	Option rejected as no such vehicles currently exist (but may do in the future as technology matures)	
Replace like for like now	Option rejected as highly likely to result in SWP being stuck with vehicles for 8-10 years that do not meet our service needs	

1.2.3 Exploring lower (but not zero) carbon interim solutions

Not all of the vehicles due for replacement in 2024 can viably be replaced with electric or hydrogen and the majority of our fleet is expected to last until 2030. Accordingly we are currently exploring the extension of the Hydrogenated Vegetable Oil (HVO) trial from depot plant to using it on frontline vehicles. This is

not a long term solution but it may significantly help us achieve our decarbonisation goals in the short to medium term.

HVO is made from raw materials such as food production residues and wastes, and assurance schemes exist to ensure that no fuel is sourced from energy crops. HVO is considered better than 1st Generation biodiesel as it can reduce CO2 by up to 90% (compared to 78% for 1st Generation biodiesel) and will greatly reduce NOx and particulate emissions. It is a true drop-in-fuel with no requirement for modifications to vehicle, maintenance regimes, or refuelling infrastructure. There is no additional cost for new vehicles (or our 2020 fleet) as it uses existing diesel engine technology. HVO is slightly more expensive than regular diesel, and consumption compared to regular diesel is increased by c10%

This means that where we can't yet replace diesel with electric or hydrogen vehicles (either because the technology isn't there or because much of our fleet should last until 2030) we can significantly reduce carbon emissions – by up to 90%. The business case for a trial on frontline vehicles is being developed but is likely to involve slightly higher revenue costs (but no significant capital costs – potentially additional fuel bunkers if the front-line trial is successful). Our experience of trialling this on our plant at one depot gives us confidence that it is a workable technology to help us bridge the gap to a fully decarbonised fleet. The trial is likely to involve emissions monitoring at the tailpipe so that we are not just reliant on manufacturer claims in terms of carbon reduction but can see the carbon saving it delivers in real-use on our rounds. Consistent availability of HVO made from waste oil (as opposed to energy crops) remains the greatest risk, but diesel can be substituted back in should waste oil HVO not be available.

1.2.4 Infrastructure implications of electric fleet

Each e-RCV requires 600 volts DC/40 kW to charge it at a rate that would allow it to operate effectively. The current e-RCV uses a mobile charger (as we are testing it at different depots across the County), but permanent connections will be required if an e-RCV is to be permanently based at a depot. A DC charger is expected to fully recharge an e-RCV in 9 hours (and AC charger could take 16 hours, which may cause operational difficulties) – costs appear to have reduced recently from £18k to £15k for a charger which can charge two vehicles, but clearly these are significantly more expensive than a standard domestic electric vehicle charger. In terms of the options being explored at each depot:

- SWP are working closely with SSDC who are leading work to explore how the Lufton depot could be upgraded to allow electric vehicles to be charged, and how the depot could be reconfigured to allow this to be done safely. Whilst charging one e-RCV overnight may be possible, it may also be that this requires infrastructure improvements, and SWP/SSDC are exploring this with the Distribution Network Operator (DNO).
- At Evercreech SWP are working closely with Western Power (the DNO) and the developers of an adjacent commercial Anaerobic Digestor (AD) plant. The developers of the AD plant are putting in a high voltage cable and it

may be that a relatively low-cost extension of the high voltage cable (c£45k) might mean that we can charge 4 vehicles at this location (with two chargers at c£15k each). Work is still ongoing to identify the best value for money solution at this depot.

- Colley Lane in Bridgwater is a more challenging depot – the latest feedback from Western Power is that a new sub-station may not be required and costs may be c£40k, but further work is required to validate this. There are also operational challenges in where to safely charge the vehicles on a congested site, and whether this depot would ever be viable to charge a fully electric fleet given its constraints. SWP are working with SCC's property team to explore a 'plan b' interim location to charge the 5 vehicles which would serve the Bridgwater/Taunton area. SWP are working with SCC to explore if the Saltlands 2 development (solar panels and battery storage) could provide a viable location.

4. Interim conclusions and next steps

2.1. The interim conclusions from this process of review and trials is as follows:

Vehicle type	No.	Interim conclusion and rationale	Indicative cost per vehicle
7.5 tonne refuse vehicle	4	Replace with like for like (i.e. diesel) vehicle as no electric or hydrogen alternatives exist of the type or size which can cover the distances required. Continue to explore whether Rotopress vehicles can use less fuel and whether slightly larger capacity vehicles provide further efficiency. Consider use of HVO fuel.	£120k
16 tonne refuse vehicle	4		£159k
26 tonne refuse vehicle	10	Provisional conclusion is that these can be replaced with electric vehicles (5 in Evercreech, 1 in Lufton, 4 in Bridgwater/Taunton) subject to further testing and ability to charge them overnight. Explore different potential e-RCVs/configurations to maximise value for money	£429k
26 tonne Pod vehicle	4	Rebody and refurbish to extend their useful life up to 2026 so that we can review what types of vehicles we need to support schools and communals in light of major national legislative change	£40k

Costs above are indicative and are likely to increase (at least with inflation),

balanced by ongoing work to try and mitigate the costs (e.g. by not buying narrow bodied vehicles we may have a wider choice of manufacturer and achieve better value, but we need to be confident these vehicles will work on rounds). The total additional cost (excluding infrastructure costs, which are still being quantified) of 10 electric vehicles is £2,360k compared to their diesel alternative (£185-197k each depending upon configuration/manufacturer), partly offset by expected lifetime revenue savings of £1,150k.

- Cost of diesel RCV £193,279
- Cost of e-RCV £428,865 (may be lower as SUEZ are exploring other manufacturers)
- Annual fuel saving £10k per annum (noting that electricity and fuel process are very volatile)
- Annual m'tce saving £1.5k per annum (subject to commercial negotiation between SUEZ and their maintenance provider)
- Financial case £120,586 (i.e. extra cost over lifetime of the truck)

- Annual co2 saving 380 tonnes
- Cost of co2 saving £317 per tonne of CO2 saved

With no accepted benchmark for what an acceptable cost per tonne of carbon saved is, SWP have compared to the figures developed by SALIX nationally for the Public Sector Decarbonisation Scheme. The first phase of the Public Sector Decarbonisation Scheme had a £500 per tonne of CO_2e threshold. The latest phase (Phase 3) had a £325 per tonne of CO_2e threshold (over which match funding was required) – and on this basis the electrification of fleet delivers reasonable value for money, noting that the cost of infrastructure has not yet been factored into this (though any significant costs e.g. sub-station upgrades may have wider benefits). Note that carbon savings of diesel vehicles compared to their 2016 equivalents have not yet been calculated, nor has the reduced emissions that might come from different types of vehicles (e.g. the Rotopress alternative) or different fuels (HVO).

To estimate the potential total capital costs (noting that there is further work ongoing on all aspects of this, so these are indicative):

	Total cost estimate (£)
22 diesel replacements	£3,209k
Maximum electric fleet (10) additional vehicle costs (additional up-front capital cost)	£2,360k
Potential infrastructure costs for electric fleet (6 chargers at £15k and £40k per depot for other infrastructure)	£210k

Total capital costs	£5,779k
Estimated revenue saving over 10 years from electric fleet	*£1,150k*
Estimated carbon saving from 10 e-RCVs for 10 years	*38,000 tonnes*

The key next steps are (subject to views of the Board):

- Continue with trials to ensure SWP and SUEZ are confident that they have identified the best value lowest carbon options. The board will be updated on this, in particular on whether all 10 26 tonne RCVs can be electric.
- Commercial negotiations with SUEZ to maximise contract discount and to reflect minor contract variations linked to partial electrification of fleet
- Liaise with SCC finance as there is likely to be a capital bid in this year's capital programme in the order of c£5.8m should the board wish us to proceed with maximising the electrification of fleet
- Develop the business case for HVO as an interim decarbonisation option
- Continue to work up service proposals (and hence future replacements for 26tonne Pod vehicles) when national legislation is finalised.
- Bring a final recommendation to the Board in September (noting that formal decision making will be through the capital programme linked to the new Authority).

5. Options Considered and reasons for rejecting them

3.1. Options considered on different vehicle types have been set out above. Delaying replacing the fleet entirely is rejected as it is likely to have significant negative implications on vehicle reliability, with consequences for service quality, reputation and commercial issues. If capital is not secured in this financial year then due to the long lead times on all vehicles, we are unlikely to have new vehicles by 2024, which will impact on service quality.

6. Consultations undertaken

4.1. Monthly meetings of the Strategic Management Group (senior officers from each partner) have kept officers up to date with progress. SWP have discussed issues with SCC's energy, property, fleet and climate change experts, as well as linking closely with partner officer working on fleet alignment for the new unitary. SWP and SUEZ have met with other authorities who are also exploring different technologies to learn lessons.

7. Implications

7.1. Whilst it is disappointing that not all the 2024 fleet can be replaced with electric or hydrogen vehicles, this reflects the reality of the availability of this technology for a large rural county like Somerset. The interim conclusions do suggest however that where we can change to electric vehicles, we can save 380 tonnes of carbon each year and may be able to save 90% of carbon emissions from the remainder of the fleet by moving to HVO.

7.2. Despite many of the technologies not being at a point where they can serve a large rural County like Somerset and, some e.g., hydrogen may prove to be a better option come 2030 when we replace the majority of our fleet. Battery technology is moving at a pace and electric will be at least part of the solution and infrastructure to support this will take time to develop and should form part of the fleet replacement strategy.

8. Background papers

8.1. None