Somerset Waste Board meeting
9 December 2022
Report for Information

Update on exploring partial electrification of fleet.

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Forward Plan Reference:	
Summary:	At the Board meeting in September further information was requested on the data behind the recommendations on the numbers of electric refuse fleet proposed to be bid for as part of the partial refleet in 2024. This paper provides that additional information but does not repeat what was set out in the September Board paper. Decisions on capital funding are being taken by Somerset County Council as the continuing authority, and members will be aware of the very constrained financial position.
Recommendations:	**The Joint Waste Scrutiny Panel considers and comments on the following recommendations in this report.** **That the Somerset Waste Board:** **I. Notes the information presented to explain the proposed approach being taken to considering the possibility of electric refuse vehicles as part of the partial refleet and notes the further work undertaken on exploring HVO.**
Reasons for recommendations:	**For information only.**
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 specifically set out that we should pilot alternative fuels in our fleet.

Financial, Legal and HR Implications:	The capital costs of two electric refuse vehicles were set out in the September paper and are reflected in capital bids submitted to SCC. Risk normally sits with the contractor in ensuring that the fleet procured is adequate to deliver the services – we cannot force SUEZ to use vehicles they are not confident in without changing the risk profile in the contract. There are no HR implications.
Equalities Implications:	An impact assessment has been undertaken and can be shared on request – no impacts were identified.
Risk Assessment:	Risk on vehicles sits with SUEZ – their contractual requirement is to deliver the services, and as such if vehicles do not perform as expected then this is at SUEZ's risk. If we do not commit to replacing our 2016 vehicles this year, then the age of this fleet is likely to have a negative effect 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 given the low number of electric vehicles sought this is low risk. There is a risk that by not simply replacing all vehicles like for like, i.e., different from how our contract originally envisaged, that we do not secure optimal terms.

1. Background

1.1. Quick recap on the SWP's partial refleet

Whilst more fully set out in the September Board report, 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. As set out in June, 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. Suitable electric vehicles do not exist for most of these (12 vehicles: pod vehicles, 7.5tonne and 16 tonne vehicles). 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. Our contractor, SUEZ, is required to fund the vehicle replacement (SWP can choose to if there is sufficient capital discount) but SWP would have to fund the additional costs of any electric vehicle. Globally progress in electrifying large (over 3.5 tonne) vehicles is much slower than progress on electric cars and much of SWP's fleet doesn't reach the end of its useful life until 2030, and hence SWP is exploring other options to decarbonise our fleet in the short term.

The up-front cost (excluding infrastructure costs) of an electric vehicle is £471k compared to their diesel alternative (£193k) partly offset by expected lifetime revenue savings of £120k – so over the full expected life of the vehicle it costs £186k more but delivers 760 tonnes of carbon saving.

- Cost of e-RCV £471k (gross)
- Infrastructure Costs £28k (per vehicle)
- Saving: diesel RCV £193k
- Annual fuel saving £10k per annum (noting that electricity and fuel process are very volatile, and further sensitivity analysis is needed)
- Annual m'tce saving £2k per annum (subject to commercial negotiation between SUEZ and their maintenance provider)
- Financial case £186,000 (i.e., extra cost over lifetime of the truck)
- Annual co2 saving 38 tonnes (380t over its useful life)
- Cost of co2 saving £489.4 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 e-RCVs do not yet deliver particularly good value for money compared to other potential carbon saving options. Note that the 1 e-RCV that SWP has already purchased and is using around Somerset was a refurbished model and therefore the financial case was different.

In June when we reported to the Board that the desktop analysis had indicated that 10 refuse vehicles could be electrified. As reported to the Board in September the results of the testing mean that we are not yet confident in purchasing 10 e-RCVs. 6 of those vehicles would have been based in Evercreech and Lufton and we have not yet tested the vehicle on those rounds, and as such are not yet confident that those are suitable for e-RCVs. Of the 4 that we indicated could be used in the Bridgwater and Taunton area, the results of the testing indicate that we are only confident that 2 of those vehicles can be replaced with electric vehicles (i.e., all rounds over their whole three weekly cycle can be completed adequately). As reported to the Board in September we did consider options to extend the life of a number of our current refuse vehicles in the hope that technology improves, but due to reliability issues on those vehicles and uncertainty on the pace of technological change this is not a recommended option. This paper provides more information underpinning the recommendation that only 2 vehicles can realistically be electrified, especially given that forcing Suez to use vehicles that they are not confident in would fundamentally change the risk sharing within the contract and therefore have significant operational and financial consequences.

1.2. Refurbished e-RCV Trial Performance

The refurbished eRCV is sited at Bridgwater Depot, the purpose of the trial was to establish real world data and to stretch the vehicle to its operational limits. Much of the feedback from crews using the vehicle have been positive, relating to less noise and vibration. The reliability of the vehicle has been poor and significant maintenance has been required to ensure that the vehicle is operative, issues have ranged from Faulty Battery Packs, complex electrical issues as well run of the mill of the RCV type issues. The more complex issues have required specialist knowledge have resulted in the vehicle being withdrawn from service for considerable periods of time and returned to Magtec (fitters) for specialist repair. This has slowed down the pace at which we can trial the vehicle – noting that it takes 3 weeks to trial one RCVs full route given the 3 weekly refuse cycle. The variability of the eRCV range is problematic and a number of factors affect this:

- Topography: variability in terrain significantly reduce the effective mileage of the eRCV as gravity increases the work required by the motors and power required to travel, trials have shown this to be a key factor in the range

achieved in practice

- Ambient Temperature: Batteries are less efficient in cold weather and have a reduction in efficiency
- Auxiliary Systems: Bin Lift frequency, compaction, wipers and in-cab heaters all have an effect on the power drain and can vary from 3.6% to 8.5% of total power usage dependant on conditions and usage
- Battery Degradation: All batteries degrade over the lifetime of a vehicle, and we want to ensure that at the end of its useful life the vehicle can still complete rounds even if the battery is degraded, possibly by as much as 20%. The range figures shown throughout this report reflect an undegraded battery, and therefore we need to be careful that it may not deliver this over its whole life, though it is hard to predict the degradation.

To date it has been trialled in both Bridgwater and Taunton areas. The trial has taken place across a number of rounds that are of appropriate size and distance and serviced by the existing 26 tonne RCV fleet. The vehicle has achieved as much as 102 miles on a single charge without issue whilst achieving a 5% auxiliary energy draw, however at other times the vehicle has not achieved 70 miles range. Crews operating the vehicle have taken returning to the depot for lunch breaks or after tipping to recharge the vehicle to ensure that the round is completed. This behaviour is adopted when the round length is greater than 80 miles or when the crews have had concerns surrounding the vehicles capacity to complete the round. This activity generally provides an addition 10 to 15% of charge to the vehicle. On average the vehicle can achieve 79 miles on a single charge in an environment with moderate changes in terrain and in fair weather.

Round Suitability

Refuse collection routes in Somerset operate on a three-weekly basis, the way in which individual collection days are arranged means that some areas for collection require more travel distance, and inevitably they cover different types of terrain and service different numbers of properties. This means that whilst on some days many rounds are low mileage and suitable for the ranges that e-RCVs can comfortably achieve, across the full cycle this is much more challenging.

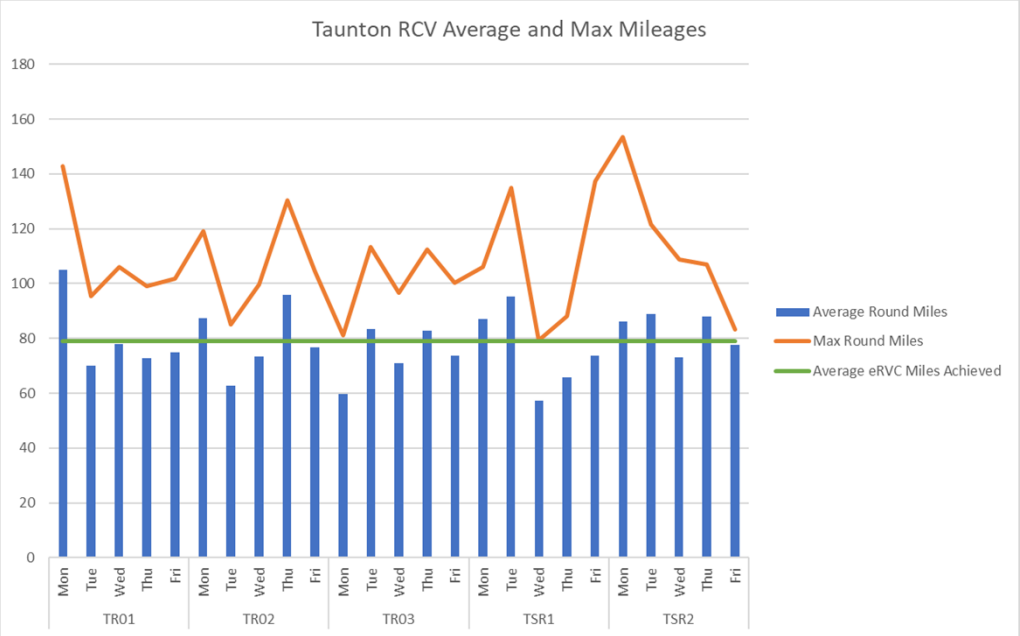
A data review has been conducted of all waste collection rounds, examining suitability of raw mileages against the introduction of the eRCV. The data review has taken account of average mileages, what the rounds usually does, and maximum mileages. Maximum mileage is important because it takes account of variations in quantities of waste presented, meaning that the vehicle may have to tip more than usual. Also,

using the maximum mileage metric, this allows the vehicle to be re-deployed throughout the working day – part of normal operations is to provide help on other nearby rounds if there are issues, again involving further distances and travel time. A depot-by-depot summary of this data is provided below.

Taunton

Fleet servicing the Taunton area are operated from Bridgwater depot and vehicles tip at Walpole transfer station. Figure 1 shows the average & maximum mileage achieved by day within the operation. The existing fleet mileage patterns from the operating centre show that mileages achieved are at or around the limits for the RCV. There are very few candidate rounds and maximum mileages is significantly above the best-case range of the eRCV.

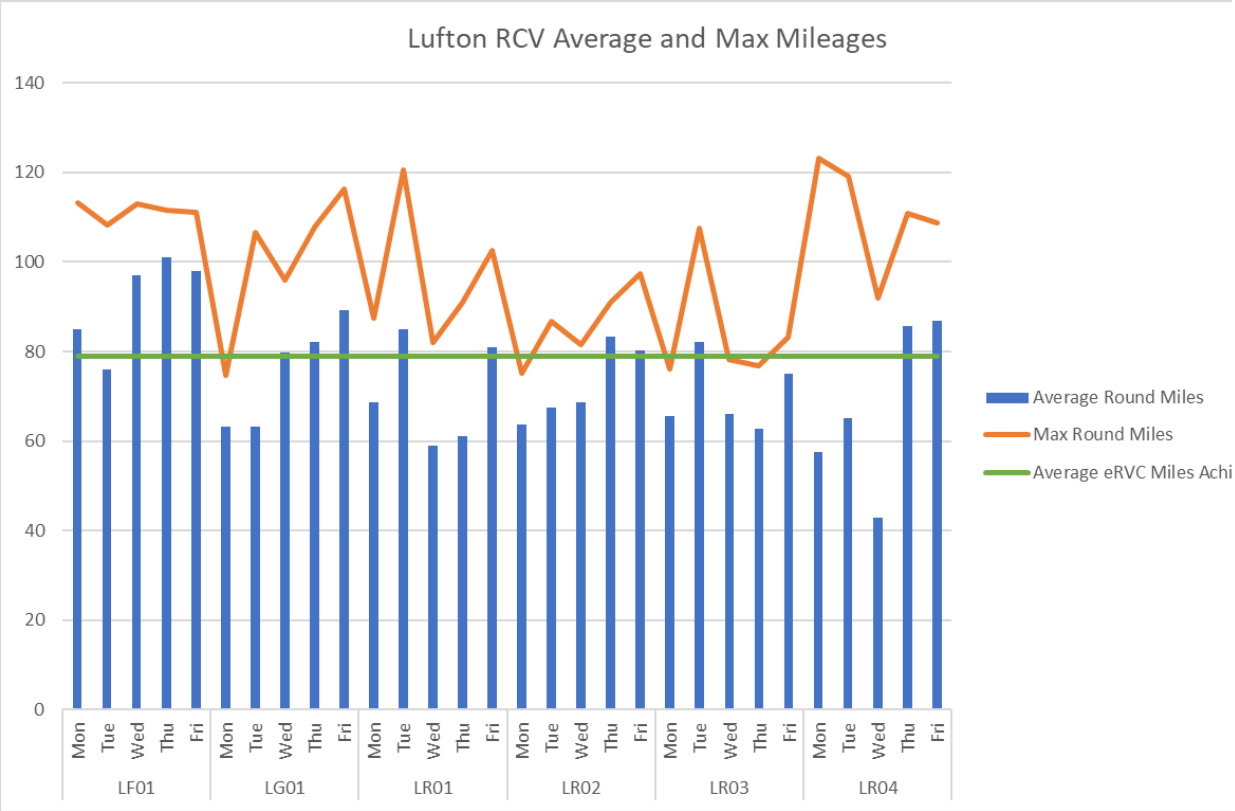
Figure 1 – Taunton RCV Mileages



South Somerset

Fleet servicing the South Somerset area is operated from the Lufton depot in Yeovil and vehicles tip at Dimmer transfer station near Highbridge. Figure 2 shows the average & maximum mileage achieved by day within the operation. The existing fleet mileage patterns from the operating centre show that mileages achieved are at or around the limits for the RCV. There are very few candidate rounds and maximum mileages are significantly above the best-case range of the eRCV. The refurbished eRCV has yet to be trialled in South Somerset and based on what we know at this point and current technology, Suez would be unwilling to operate eRCVs in South Somerset without substantial change to the risk profile in the contract.

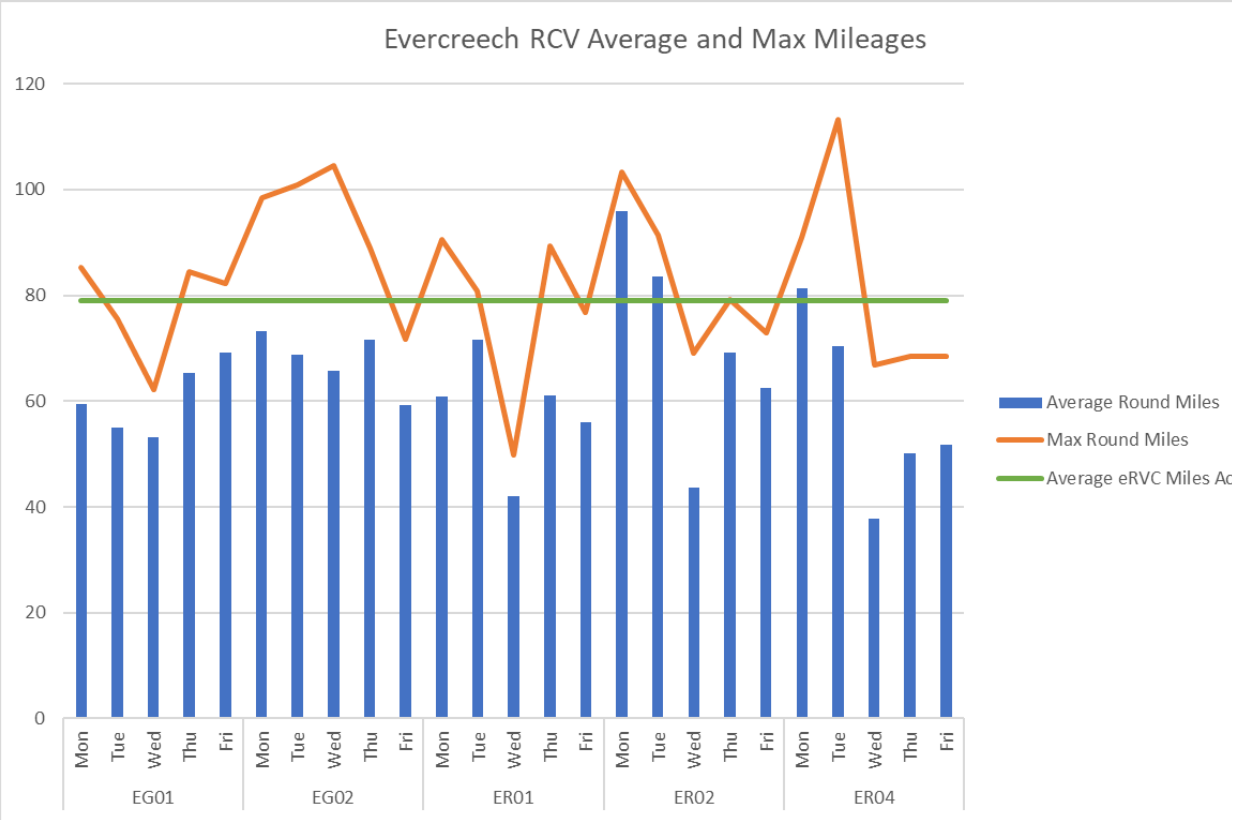
Figure 2 – Lufton RCV Mileages



Mendip

Fleet servicing the Mendip area is operated from the Evercreech depot and vehicles tip at Dimmer transfer station. Figure 3 shows the average & maximum mileage achieved by day within the operation. The existing fleet mileage patterns from the operating centre show that mileages achieved are for two rounds would fit the criteria for utilisation for at or around the limits for the RCV. However, with these rounds they are very close to average achievement levels for the eRCV. Additionally, the topography of the Mendips is variable, we would expect that some vehicles may not deliver the average mileage. With fewer 26 tonne vehicles operated out of Evercreech than out of Bridgwater, a fleet too reliant on e-RCVs (with current technology) would represent a significant risk to service quality. The refurbished eRCV has yet to be trialled in Mendip and based on what we know at this point and current technology, Suez would be unwilling to operate eRCVs in Mendip without substantial change to the risk profile in the contract. Clearly Evercreech rounds are closer to being viable than some other areas, however on balance the risk is too great for us to recommend committing to e-RCVs, not least as we do not have the financial headroom to cope with any transfer of risk from Suez.

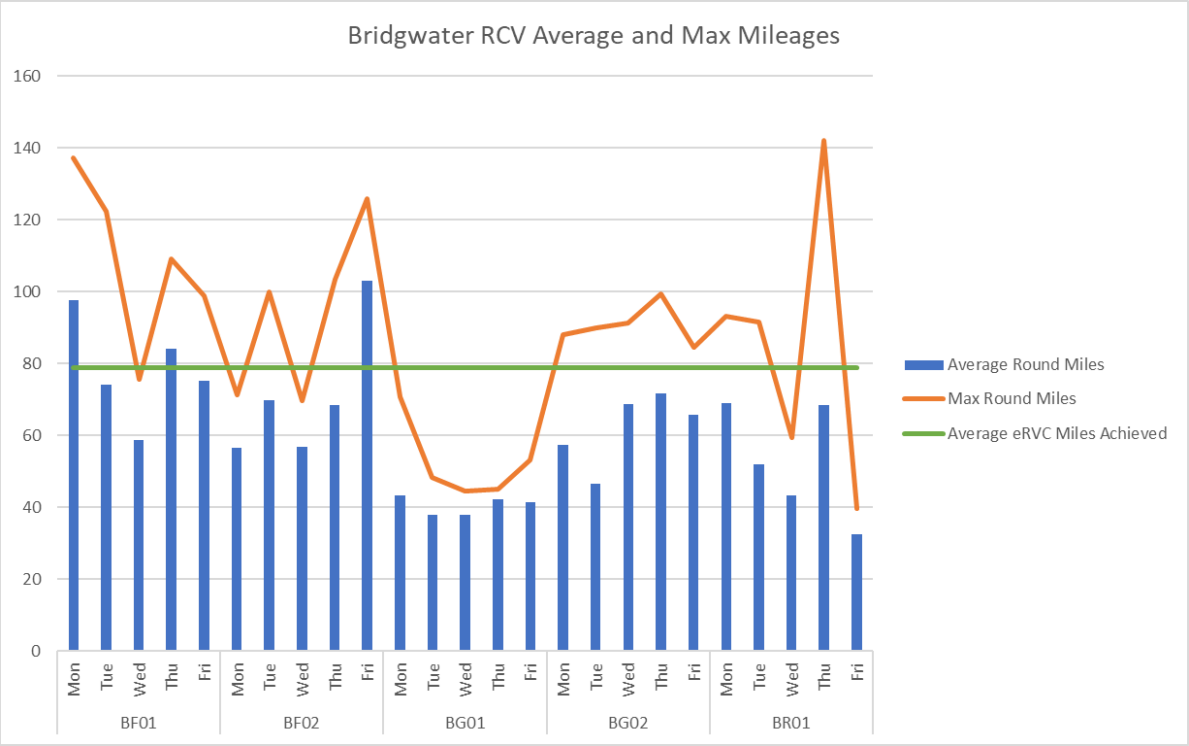
Figure 3 – Evercreech RCV Mileages



Bridgwater

Fleet servicing the Bridgwater area are operated from Bridgwater depot and vehicles tip at Walpole transfer station. Figure 4 shows the average & maximum mileage achieved by day within the operation. The existing fleet mileage patterns from the operating centre show that mileages achieved are conducive to the candidate rounds for the eRCV (one existing refurbished e-RCV and the two being bid for in this capital round).

Figure 4 – Bridgwater RCV Mileages



2. Update on piloting alternative fuels

2.1. As explicitly agreed in the 2022-27 Business Plan, we are currently piloting an alternative fuel (Hydrogenated Vegetable Oil - HVO) in our frontline vehicles. This is not a long-term solution (it lowers emissions significantly but is still based on an internal combustion engine) but it may significantly help us achieve our decarbonisation goals in the short to medium term. This trial is being funded 50:50 by SWP and SUEZ from the SW:EEP fund at an estimated total cost to SWP of £10k (final costs may be available by the time of the board meeting and are expected to be lower).

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 claimed to reduce CO2 emissions by up to 90% and will greatly reduce NOx and particulate emissions. It is a drop-in-fuel with no requirement for modifications to vehicle or maintenance regimes and can be added to existing fuel tanks at our depots. There is no need to modify any of our new/existing vehicles to use it. However, HVO is currently 20% more expensive than regular diesel and consumption compared to regular diesel is increased by c10% (i.e., you need to use more of it) and there are concerns about the reliability and robustness of supply of HVO made from waste (as opposed to energy crops). The September Board report highlighted that the cost of replacing diesel with HVO on all vehicles in our contract would be c£1.2m per annum (saving over 4000 tonnes of carbon). This represents a cost per tonne of carbon saved of £294. SWP do not have this funding, nor have we bid for it in future years given the ongoing pilot and the uncertainty around the full environmental credentials of HVO.

The other area we were exploring was the environmental credentials of HVO itself. Many fleets are reported to have or are making the temporary transition to HVO (including, Kier, Skanska, Amey and Sir Robert McAlpine). As discussed at the Board in September, Balfour Beatty and the Environment Agency have recently made decisions to not use HVO (noting that Defra itself has made no such stance and is reported still to be exploring it for its own fleet). The key certification scheme for HVO is the International Sustainability and Carbon Certification scheme (ISCC) which describes itself as a "sustainability certification system covering the entire supply chain and all kinds of biobased feedstocks and renewables."

Most UK suppliers of HVO are certified to ISCC standards, and SWP insisted on this in our trial. SWP have no reason to doubt that fuel certified as such comes from anything other used oil as it is purported to – i.e., no virgin crops or feedstocks. However, we cannot be confident that there is no evidence behind Balfour Beatty's view that *"There is a high risk that the resulting increase in demand for used cooking oil is causing deforestation and the draining of peatland and marshland in countries such as Malaysia and Indonesia where farmers are having to grow palm oil to produce animal feedstock"* – i.e. that the use of used oil to make HVO reduces the availability of used oil for other purposes, and therefore indirectly results in deforestation/growing of crops to create oil. Nor do SWP have the resources to test whether the overall carbon emissions (i.e., scope 3 emissions) are what they are purported to be. SWP remains therefore uncertain as to whether the environmental benefits of HVO are what they claim to be, and we await further study from reputable bodies (rather than relying on individual company views) as to the environmental benefit of HVO as a transitional fuel. SWP do not recommend not using HVO, simply that we await further evidence as to the risk/benefit of using HVO as a transitional fuel.

3. Options Considered and reasons for rejecting them

3.1. None other than commissioning expensive research on HVO directly by SWP rather than awaiting reputable bodies to undertake further analysis.

4. Background papers

4.1. September Board paper on partial refleet