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STAFFORDSHIRE MOORLANDS DISTRICT COUNCIL

CABINET DELEGATED DECISIONS

**COUNCILLOR SAV SCALISE
PORTFOLIO HOLDER FOR ENVIRONMENT**

Friday, 11 February 2022

1 2021/09 - OUTCOMES OF ALTERNATIVE FUEL TRIAL.

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STAFFORDSHIRE MOORLANDS DISTRICT COUNCIL

Cabinet Delegated Decisions

11 February 2022

TITLE:	Outcomes of Alternative Fuel Trial
PORTFOLIO HOLDER:	Councillor Scalise - Portfolio Holder for Environment
CONTACT OFFICER:	Nicola Kemp - Head of Service Commissioning
WARDS INVOLVED:	Non specific

1. Reason for the Report

- 1.1 To report to the Portfolio Holder for the Environment the outcomes of a fuel trial that has been conducted by AES.

2. Recommendation

- 2.1 That the Portfolio Holder for the Environment:
- approves the transition to hydrotreated vegetable oil (HVO) by AES for their primary and suitable fleet as is proposed within this report.
 - recognises the financial implications of this change which will require an increase to the contract management fee payable to AES from the 2022-23 financial year.

3. Executive Summary

- 3.1 Due to the significant impacts of carbon dioxide (CO₂) on the environment this Council has committed to reducing CO₂ equivalent emissions to a Net Zero position by 2030.
- 3.2 Local authorities are under increasing pressure to reduce CO₂ outputs from their fleet by replacing diesel and petrol fuelled vehicles with Ultra Low Emission Vehicles (ULEVs). Most commonly, ULEVs are plug-in hybrid or pure electric. However, for high power-demand activities such as refuse collection, ULEVs are yet to have reached a development stage that meets our needs.
- 3.3 AES are the Council's fleet maintenance and management provider and as a result are leading on behalf of the Council trials in regards to alternative fuelled

vehicles. This was evidenced by the trialling of pure electric RCVs by AES/ANSA in 2021 in both rural and urban settings, unfortunately these trials were not successful as they had insufficient battery range to cope with a standard working day.

- 3.4 There are alternative options in development that may provide zero emission refuse collection in the future (such as improved pure electric or hydrogen fuel vehicles) but these are not at the stage of adoption yet.
- 3.5 The Council is committed to consider alternative fuelled vehicles as part of all procurement exercises undertaken, but to date such procurement activity has provided only limited results for alternative fuelled vehicles.
- 3.6 The Council has quite a new fleet as most vehicles have been purchased in the last 2-3 years or are soon to be replaced, we are currently awaiting a large number of light commercial vehicles (LCV's) which were ordered in 2021. These new purchases are of the most fuel efficient diesel engines on the market.
- 3.7 As a result we are unable at this time to move to an electric fleet, however, recognising that the usage of our fleet is a significant contributor to the Council's CO₂ emissions, AES has explored other opportunities to aid a reduction in such now, to act as a transition to this Council achieving its carbon reduction targets.
- 3.8 AES has investigated options considering the age and type of the current Council fleet and have identified that the use of HVO provides an opportunity to achieve significant CO₂e savings prior to the 2030 target.
- 3.9 Since 4th October 2021 AES trialled the usage of HVO in four refuse collection vehicles (a 15 tonne, two 26 tonne and a 32 tonne vehicle) for a period of 3 months in order to assess engine/vehicle performance and giving time to validate the fuel's CO₂ credentials claims. Due to the size and nature of the vehicles, RCVs have the lowest average miles per gallon (MPG) of all vehicles used and therefore are the biggest users of diesel on our fleet.
- 3.10 This trial sought to facilitate analysis of both RCV fleets (HVO and diesel operated) for a full three month period providing analysis of the fuel in operation, monitoring MPG, cold weather performance and engine reliability.
- 3.11 Upon completion of the trial AES has estimated the potential CO₂ savings based on the fuel supply data and the results of this trial. These reductions are substantial. When modelled across the SMDC refuse collection fleet (using Government published CO₂e conversion factors) it is estimated that CO₂ emissions will reduce by 88% from 553 tonnes annually to approximately 67 tonnes.
- 3.12 In addition, tailpipe emissions were also monitored as is detailed further at 9.4 and 9.5 of this report. The results clearly indicate that all emissions have been lowered substantially in the vehicles using HVO compared to that of the

vehicles using standard diesel. CO² emissions reduced by 9.5% and NOx by 31% and PN by 44%.

- 3.13 The trial also confirmed there were no detrimental effects to the engines nor affect on mpg, demonstrating that HVO is safe to use.
- 3.14 On the basis of the positive outcomes of the trial, it is proposed that HVO fuel is used as the primary fuel choice for all vehicles with Euro VI engines that are operated by AES from April 2022. This will include all of the frontline RCV's, the pavement sweepers and suitable LCV fleet. The LCV fleet is currently being replaced with a significant number of vehicles due to arrive before 31st March 2022 and the remainder by the end of the 22-23 financial year.
- 3.15 The anticipated full year cost of moving to HVO by all fleet used by AES would be circa £58,537. This is the approximate annual cost if all vehicles convert to HVO on 1st April 2022. However, as the Council is expecting replacement vehicles for a significant number of the LCV fleet used by AES during 2022-23, a number of existing vehicles will not be able to move onto HVO from April 2022, therefore the increase in fuel costs for 2022-23 will be lower than the figure above, and is estimated to be in the region of £52,000.
- 3.16 In undertaking grounds maintenance functions for the council, AES has advised that not all equipment i.e. large ride on mowers, can transition onto HVO fuel. As and when these items are replaced, consideration will be given to available alternative fuelled equipment or the potential use of HVO if alternative fuels such as electric is not possible.
- 3.17 It should also be noted that AES does not operate all fleet owned by the Council. A number of Council service areas directly use fleet, including Service Commissioning and Environmental Health, and the Council has a pool car available for use by all employees. This report does not consider the option for these vehicles to move onto HVO. A number of these vehicles are too old and do not have a Euro VI engine, preventing HVO from being used. Exploration with the vehicle manufacturers will be undertaken for the newest vehicles to determine if they can transition onto HVO now or at the time of their next replacement if alternative fuels are not suitable i.e. electric.

4. How this report links to Corporate Priorities

- 4.1 One of the four aims of the Council's 2015-2019 Corporate Plan is "to protect and improve the environment". This includes an objective to meet the challenges of climate change

5. Alternative Options

- 5.1 There are in effect two options available to the council:
 - 1. For AES to move onto the use of HVO fuel for the majority of its fleet where it is possible to do so and to ensure the transition occurs onto HVO as older vehicles are to be replaced. This change will incur costs to the Council of

approximately circa £58,537, although this is likely to be lower in 2022-23, amounting to circa £52,000. **(Recommended)**

2. Do nothing, this would mean the Council has failed to implement a change which could dramatically reduce its CO2 emissions. (Not recommended)

6. Implications

- 6.1 Community Safety - (Crime and Disorder Act 1998)
Not applicable
- 6.2 Workforce
Not applicable
- 6.3 Equality and Diversity/Equality Impact Assessment
The report is detailing an operational change which will not require completion of full EIA.
- 6.4 Financial Considerations
As detailed within the report.
- 6.5 Legal
Not applicable
- 6.6 Climate Change
The trial has confirmed reductions in CO₂, NO_x and particulate emissions demonstrating there are significant environmental benefits to using HVO.
- 6.7 Consultation
Not applicable as this is an operational decision.
- 6.8 Risk Assessment
AES is mindful that the Government could change the environmental certification of HVO and will monitor this closely. If this happens then the benefit of using HVO would no longer exist. Vehicles could return to using diesel immediately with no detrimental effects to the engines.

Mark Trillo

Executive Director (Governance & Commissioning)

**Web Links and
Background Papers**

Contact details

Nicola Kemp
Head of Service Commissioning
nicola.kemp@highpeak.gov.uk

7. Detail

- 7.1 Due to the significant impacts of carbon dioxide (CO₂) on the environment this Council has committed to reducing CO₂ equivalent emissions to a Net Zero position by 2030.
- 7.2 Local authorities are under increasing pressure to reduce CO₂ outputs from their fleet by replacing diesel and petrol fuelled vehicles with Ultra Low Emission Vehicles (ULEVs). Most commonly ULEVs are plug-in hybrid or pure electric. However, for high power-demand activities such as refuse collection, ULEVs, are yet to have reached a development stage that meets our needs.
- 7.3 AES are the Council's fleet maintenance and management provider and as a result are leading for the Council trials in regards to alternative fuelled vehicles. This was evidenced by the trialling of pure electric RCVs by AES/ANSA in 2021 in both rural and urban settings, unfortunately these trials were not successful as they had insufficient battery range to cope with a standard working day.
- 7.4 There are alternative options in development that may provide zero emission refuse collection in the future (such as improved pure electric or hydrogen fuel vehicles) but these are not at the stage of adoption yet.
- 7.5 The Council is committed to consider alternative fuelled vehicles as part of all procurement exercises undertaken but to date such procurement activity has provided suitable or limited results for alternative fuelled vehicles.
- 7.6 The Council has quite a new fleet as most vehicles have been purchased in the last 2-3 years or are soon to be replaced, as we are currently awaiting a large number of light commercial vehicles (LCV's) which were ordered in 2021. These new purchases are of the most fuel efficient diesel engines on the market.
- 7.6 The Council funds the purchase of all new fleet using capital, including that used by AES in providing waste, streets and parks services. In order to maximise the value of these assets we generally operate our vehicles for 7 to 10 years based on type of vehicle or the functions it is used for.
- 7.7 As a result we are unable at this time to move to an electric fleet, however recognising that the usage of our fleet is a significant contributor to the councils CO₂ emissions, AES has explored other opportunities to aid a reduction in such now, to act as a transition to this council achieving its carbon reduction targets.

8. HVO Trial

- 8.1 AES has investigated options considering the age and type of the current council fleet and have identified that the use of HVO provides an opportunity to achieve significant CO₂e savings prior to the 2030 target.

- 8.2 HVO is a fuel made from 100% renewable organic materials such as waste cooking oils, animal fats, tallow, etc. The product is 'cleaner' compared to conventional diesel offering 92.5% Green House Gas (GHG) savings according to UK Government, Renewable Transport Fuel Obligation (RTFO) guidance.
- 8.3 HVO can be made from a wide variety of organic sources such as waste fats, vegetable oils and similar residues. As such its use reflects the waste hierarchy and meets our objectives in this regard. The environmental credentials of HVO are also relevant, the fuel is certified as sustainable by ISCC (a globally applicable sustainability certification system) and AES has copies of this certification as well as a biofuel sustainability statement for HVO.
- 8.4 As a fuel, HVO can be mixed with diesel and so does not require any change of storage infrastructure. The Fowlchurch Depot which is used by AES as their Moorlands operational base has multiple fuel tanks, enabling the storage of different fuels at any one time.
- 8.5 The HVO product AES have selected is called *Green D+*, this is manufactured to EN15940 which is approved for use by most major manufacturers in their latest Euro VI engines and that includes the manufacturers of our refuse collection vehicles (RCVs) and for other vehicles currently in the fleet and those on order.
- 8.6 Since 4th October 2021 AES has trialled the usage of HVO in four refuse collection vehicles (a 15 tonne, two 26 tonne and a 32 tonne vehicle) for a period of 3 months in order to assess engine/vehicle performance and giving time to validate the fuel's CO₂ credentials claims. Due to the size and nature of the vehicles, RCVs have the lowest average miles per gallon (MPG) of all vehicles used and therefore are the biggest users of diesel within our fleet.
- 8.7 This trial sought to facilitate analysis of both RCV fleets (HVO and diesel operated) for a full three month period providing analysis of the fuel in operation, monitoring MPG, cold weather performance and engine reliability.

9. Outcomes of the trial

CO2 emissions

- 9.1 The 3 month trial has now been completed. The table below details the average tonnes of CO₂e emitted based on 6 months before the commencement of the trial and the average during the 3 months of the trial.

Vehicle Registration	Weight	Average Tonnes of CO ₂ e per month Pre-Trial	Average Tonnes of CO ₂ e per month Trial	Reduction of Tonnes of CO ₂ e per month
VK69 XVA	26 Tonnes	2.561	0.412	2.149
VX69 XVW	26 Tonnes	3.554	0.357	3.197

VK69 YOG	32 Tonnes	2.451	0.287	2.164
VX69 YOH	32 Tonnes	3.334	0.297	3.037
Total		11.900	1.353	10.547

- 9.2 The results equate to a 88.63% reduction in Carbon Dioxide Equivalent (CO₂e) using a government approved conversion value for diesel versus HVO.
- 9.3 AES has estimated the potential CO₂ savings based on the fuel supply data and the results of this trial. These reductions are substantial. When modelled across the SMDC refuse collection fleet (using Government published CO₂e conversion factors) it is estimated that CO₂e emissions will reduce by 88% from 553 tonnes annually to approximately 67 tonnes.

CO₂, NO_x & Particulate Emissions (PN)

- 9.4 As part of the trial a fuel pipe emission test was also undertaken to provide evidence that the HVO fuel used reduced emissions. Testing took place on 23rd November 2021 on two identical RCV's; one using HVO and the other using Diesel. The results are as follows:

Test	Vehicle 1 (HVO)	Vehicle 2 (Diesel)	Difference
NOx (ppm)	94	135	-41 (31%)
PN (pcm ³)	2218	3676	-1458 (44%)
CO ₂ (%v)	3.22	3.56	-0.34 (9.5%)

- 9.5 The results clearly indicate that all emissions have been lowered substantially in the vehicle using HVO compared to that of the vehicle using standard diesel. CO₂ emissions reduced by 9.5% and NO_x by 31% and PN by 44%.

MPG

- 9.6 The table below shows the average MPG of the vehicles based on 6 months before the commencement of the trial and the average during the 3 month trial.

Vehicle Reg	Weight	Average MPG per month Pre-Trial	Average MPG per month Trial	Difference in MPG
VK69 XVA	26 Tonnes	3.26	3.07	- 0.19
VX69 XVW	26 Tonnes	3.89	4.18	+ 0.29
VK69 YOG	32 Tonnes	3.36	3.35	- 0.01
VX69 YOH	32 Tonnes	2.85	2.97	+ 0.12

- 9.7 The results show that there is a negligible difference in the MPG's whilst using HVO with two vehicles having a positive increase in their MPG's and two vehicles having a negative reduction in their MPG's. If this trend was to be replicated across the whole of the fleet the net result to budgets would be negligible.

Maintenance

- 9.8 Analysis of the RCVs showed that the use of HVO did not affect the cold weather performance or engine reliability during the trial period. In addition, the fuel filters that were replaced during routine servicing were cleaner indicating that HVO burns cleaner than diesel. If replicated may have a positive effect on the future engine maintenance.
- 9.9 The trial therefore confirmed there were no detrimental effects to the engines demonstrating that HVO is safe to use.

Financial implications

- 9.10 The anticipated full year cost of moving to HVO by all fleet used by AES would be circa £58,537. This is the approximate annual cost if all vehicles convert to HVO on 1st April 2022. However, as the Council is expecting replacement vehicles for a significant number of the LCV fleet used by AES during 2022-23, a number of existing vehicles will not be able to move onto HVO from April 2022. Therefore the increase in fuel costs for 2022-23 will be lower than the figure above, and is estimated to be in the region of £52,000.
- 9.11 There are no capital costs associated with the roll out of HVO as the Fowlchurch depot has multiple fuel tanks enabling storage of HVO and diesel as necessary.
- 9.12 The HVO pence per litre (ppl) costs increased significantly compared to diesel during the trial period. This was due to the refinery increasing wholesale costs by 10 ppl in November 2021. This doubled the price difference between diesel and HVO.
- 9.13 The most significant risk that emerged during the trial was the exposure to fuel pricing fluctuations therefore, to mitigate this, AES would seek to undertake a formal procurement exercise to give more cost certainty.

10. Next steps

- 10.1 On the basis of the positive outcomes of the trial it is proposed that HVO fuel is used as the primary fuel choice for all vehicles with Euro VI engines that are operated by AES from April 2022. This will include all of the frontline RCV's, the pavement sweepers and suitable LCV fleet. The LCV fleet is currently being replaced with a significant number of vehicles due to arrive before 31st March 2022 and the remainder by the end of the 22-23 financial year.
- 10.2 The table overleaf shows the current breakdown of the fleet used by AES across the service areas and the number of vehicles that will convert to HVO by the end of the financial year 2022-23.

Service Area	Total number of HGV's	Total number of LCV's	Number of HGV's to be run on HVO	Number of LCV's to be run on HVO	Number of HGV's to be run on Diesel	Number of LCV's to be run on Diesel
SM Waste	23	3	20	3	3	0
SM Streets	3	11	2	11	1	0
SM Parks	0	8	0	8	0	0
Total	26	22	22	22	4	0

- 10.3 It is anticipated that by the end of the 2022-23 financial year all but 4 vehicles operated by AES will be running on HVO fuel. These 4 vehicles cannot be converted due to their age and will continue to use diesel. When these vehicles are due to be replaced all alternative fuel options will be considered.
- 10.4 In undertaking grounds maintenance functions for the council, AES have advised that not all equipment i.e. large ride on mowers, can transition onto HVO fuel. As and when these items are replaced consideration will be given to alternative fuelled equipment or the potential use of HVO if alternative fuels i.e. electric is not possible.
- 10.5 It should also be noted that AES does not operate all fleet owned by the council. A number of Council service areas directly use fleet including Service Commissioning and Environmental Health, and the Council has a pool car available for use by all employees. This report does not consider the option for these vehicles to move onto HVO. A number of the vehicles are too old and do not have a Euro VI engine preventing HVO from being used. Exploration with the vehicle manufacturers will be undertaken for the two newest vehicles to determine if they can transition onto HVO or at the time of their next replacement if alternative fuels are not suitable i.e. electric.
- 10.6 HVO is an important first step in the transition to a Zero Emissions service - it is not, however, the long-term solution. The adoption of HVO provides time for the development and evaluation of alternative emissions-free technologies suitable for the full range of vehicles operated by AES and perhaps across the wider Council.
- 10.7 The next major fleet replacement cycle for those vehicles used by AES commences in 2026/27 and it is anticipated that we will then be in a position to start to build a zero emissions fleet from that time. The Council is currently working with the Energy Saving Trust to develop a green fleet replacement strategy to enable us to achieve carbon neutrality on our fleet by 2030. Its likely a report on the outcomes of this work will be brought to members this year.

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