planning
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Document 3.1 – ES Volume 2

Appendix 6.1: K3 Proposed Development Carbon Assessment

Wheelabrator Kemsley (K3 Generating Station) and Wheelabrator Kemsley North (WKN) Waste to Energy Facility DCO

September 2019 – Submission Version

PINS ref: EN010083

CARBON ASSESSMENT REPORT FOR THE KEMSLEY K3 WTE CHP FACILITY, SITTINGBOURNE, KENT

Carbon Assessment

Prepared for: WTI UK Ltd

SLR Ref: 402.06981.00007
Version No: Final
November 2018

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CONTENTS

DOCUMENT REFERENCES

FIGURES

APPENDICES

GLOSSARY

Abbreviation	Definition
%	Percent
APCr	Air Pollution Control Residues
CCGT	Closed Cycle Gas Turbine
CHP	Combined Heat and Power
CO_2e / CO_2eq	Carbon Dioxide Equivalent
CV	Calorific Value
DCO	Development Consent Order
GIB	Green Investment Bank
GWP	Global Warming Potential
IBA	Incinerator Bottom Ash
km	Kilometres
kt	Kilo tonnes (thousands of tonnes)
ktpa	Kilo tonnes per annum (thousands of tonnes per year)
LCA	Life Cycle Assessment
LCIA	Life Cycle Impact Assessment
UDP	User Defined Process
WRATE	Waste and Resource Assessment Tool for the Environment
WtE	Waste to Energy

1.0 Introduction

This Carbon Assessment technical report supports the Development Consent Order (DCO) application by Wheelabrator Technologies Inc. (WTI) to increase the capacity of the Kemsley K3 CHP facility – a waste to energy (WtE) facility located off Barge Way, Kemsley, Kent, ME10 2SG (herein referred to as the Facility).

The Facility is currently in construction and permitted to process up to 550,000 tonnes per annum. The facility has previously been assessed for carbon footprint purposes with a design point of 527,000 tonnes per annum (527ktpa) of feedstock from residual municipal, commercial and industrial waste sources; diverting the waste from landfill. The Facility is to operate in combined heat and power (CHP) mode, generating low carbon/renewable energy in the form of steam which will be supplied to the adjacent DS Smith Kemsley Paper Mill and electricity which will be exported to the national grid.

This report outlines the main assumptions, results and interpretation of a carbon assessment (based on Life Cycle Assessment (LCA) principles) to support the DCO application.

The LCA software ‘Waste and Resource Assessment Tool for the Environment’ (WRATE) was utilised to model the potential environmental impacts. The WRATE software is an LCA tool specifically designed to model the environmental impacts of waste and waste management processes. In particular, the LCA tool helps with the identification and quantification of the following environmental impacts:

- **Direct Burdens –** defined as emissions from the process itself, for example carbon dioxide as a consequence of combustion or aerobic degradation;
- **Indirect Burdens –** associated with the supply of energy and materials to the process, for example construction materials, electrical energy for motors and fans, and chemicals for pollution abatement equipment; and
- **Avoided Burdens –** associated with the recovery of energy and materials from the waste stream resulting in the avoidance of primary energy production and mineral extraction.

As part of the carbon assessment, two scenarios have been developed to reflect the current and proposed feedstock scenarios. The two WRATE scenarios modelled are as follows:

- **Baseline –** the management of 527kt of waste at the Facility (current planning permission with existing energy performance assumptions) and disposal of 130kt of waste in landfill in order to assess the current waste management route; and
- **Proposal –** the management of 657kt of waste with all feedstock to the Facility (with improved energy performance assumptions) in order to assess the environmental impact of the proposed DCO application and expansion of the Facility capacity.

The WRATE model and scenario assumptions are presented and discussed in the subsequent sections of this report.

2.0 Measuring Carbon Emissions (Methodology)

This section provides an introduction to the WRATE software, provides details of the modelling assumptions and outlines how the results from the WRATE software are presented and interpreted.

2.1 WRATE Software

The LCA software WRATE was utilised to model the potential environmental impacts of the development and operation of the proposed Facility. The WRATE software is an LCA tool specifically designed to model the environmental impacts of waste and waste management processes.

The software was developed to comply with the International Organization for Standardization (ISO) standards for LCA to ensure studies using the WRATE tool can be delivered to a high technical standard. The WRATE tool utilises a background database supplied by the Ecoinvent centre, a Swiss organisation with unrivalled expertise in the supply of consistent and transparent life cycle inventory data. The use of the WRATE software is endorsed and encouraged by the Environment Agency (EA) and Department for Environment, Food and Rural Affairs (Defra).

As a WRATE model can only be opened and interrogated by users with the WRATE software installed and licensed, this report presents an overview of the key assumptions and the output results.

2.2 WRATE Modelling Assumptions

The WRATE model has been developed in the latest available version (Version 4) of the WRATE software. The following is a list of key model assumptions applied:

- **Assessment Year:** 2020;
- **Waste Tonnage:** 657ktpa;
- **Waste Composition:** derived by using the WRATE default municipal waste composition for England and modelling waste through a pre-treatment process to reflect the CV that matches the design of the Facility (see Appendix 01);
- **Scenario Scope:** See table below for scenario scope inclusions:

	Baseline	Proposal
Waste Collection Containers	✗	✗
Waste Collection Rounds	✗	✗
Intermediate Transfer Facilities	✗	✗
Transport of Waste To WtE / Landfill	✗	✗
WtE Operations	✓	✓
Landfill Operations	✓	✓
Downstream Transport of WtE outputs (IBA and APCr)	✓	✓

	Baseline	Proposal
Point of Final Recycling or Disposal of WtE outputs (IBA and APCr)	✓	✓

- **Transportation:** Collection and transport by Local Authority and commercial collection vehicles is excluded from the modelled scenarios. All downstream transportation from the delivery point is included (this includes transportation of process outputs and residues from the Facility to final destination).
- **Electricity Mix:** WRATE GIB[1] Energy Mix for UK 2020 (updated 2015) – see Appendix 02[2]:
    - Waste management facilities utilise electricity (for office/welfare buildings, weighbridge operations and process equipment), therefore an assumed energy mix must be defined in order to calculate the environmental burdens from any energy purchased.
    - Where a waste management facility generates energy, the avoided burdens associated with the net electricity generation (i.e. the benefit of not having to produce electricity from traditional generation methods using predominantly fossil based fuels) are offset against an inventory for the marginal grid energy mix. The use of the marginal energy mix, as opposed to the baseline or average energy mix, is a standard life cycle convention.
    - The GIB baseline and marginal energy mixes for the UK for 2020 assessment year were utilised. In WRATE for those processes that generate usable heat, the heat energy is offset against the combustion of natural gas.

2.3 Global Warming Potential and WRATE Results Presentation

The outputs from the WRATE software are life cycle impact assessments (LCIA). LCIAs present the impacts of a range of solid, liquid and gaseous pollutants on the environment, and compare them to a specific environmental impact. WRATE includes six default environmental impacts: global warming, acidification, eutrophication, aquatic ecotoxicity, human toxicity and resource depletion. This assessment focuses on the emissions of greenhouse gases and therefore the global warming impact of the scenarios.

Greenhouse gas refers to those gaseous compounds that are known to contribute to the warming of the atmosphere, the so called ‘global warming’ effect. The most common greenhouse gas is carbon dioxide (CO_2) however other species, primarily methane (CH_4) and nitrous oxide (N_2O), are equally important in waste management[3].

Methane is formed by the biological reaction of carbon under anaerobic conditions, and is most commonly associated with landfill gas emissions. Nitrous oxide is formed by the biological breakdown of nitrogen containing material and is therefore closely associated with composting processes. To a lesser extent nitrous oxide may also be formed in combustion processes.

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[1] Green Investment Bank. The GIB requested that the WRATE developers created an energy mix which offsets Gas CCGT, the assumption utilised by the GIB in all its waste investment transactions.

[2] Only one year (2020) can be modelled when using the GIB Energy Mix.

[3] The latter species should not be confused with nitric oxide and nitrogen dioxide, both commonly referred to as NOx, and which play no part in global warming but, instead, are powerful contributors to acid rain.

The degree to which a greenhouse gas contributes to global warming is measured by its Global Warming Potential (GWP). This is a relative scale which compares the gas in question to that of the same mass of carbon dioxide (whose GWP is by definition 1)[4]. A GWP is calculated over a specific time interval and the value of this must be stated whenever a GWP is quoted or else the value is meaningless. Life cycle analysis convention dictates that the GWP is commonly measured over a 100 year timespan and consider abiotic (manmade) sources only; results are therefore reported as GWP100a.

A carbon impact (sometimes referred to as a carbon footprint) is expressed in the form of mass carbon dioxide equivalency (CO_2e or CO_2eq), a concept that describes, for a given mixture and amount of greenhouse gas, the amount of CO_2 that would have the same global warming potential, when measured over a specified timescale. The carbon dioxide equivalency for a gas is obtained by multiplying together the mass and the GWP of the gas.

In this report, carbon impact results (GWP100a) are presented as thousands of tonnes of carbon dioxide equivalent ($ktCO_2e$). A positive value represents an environmental burden, whereas a negative value represents an environmental benefit (sometimes referred to as a saving).

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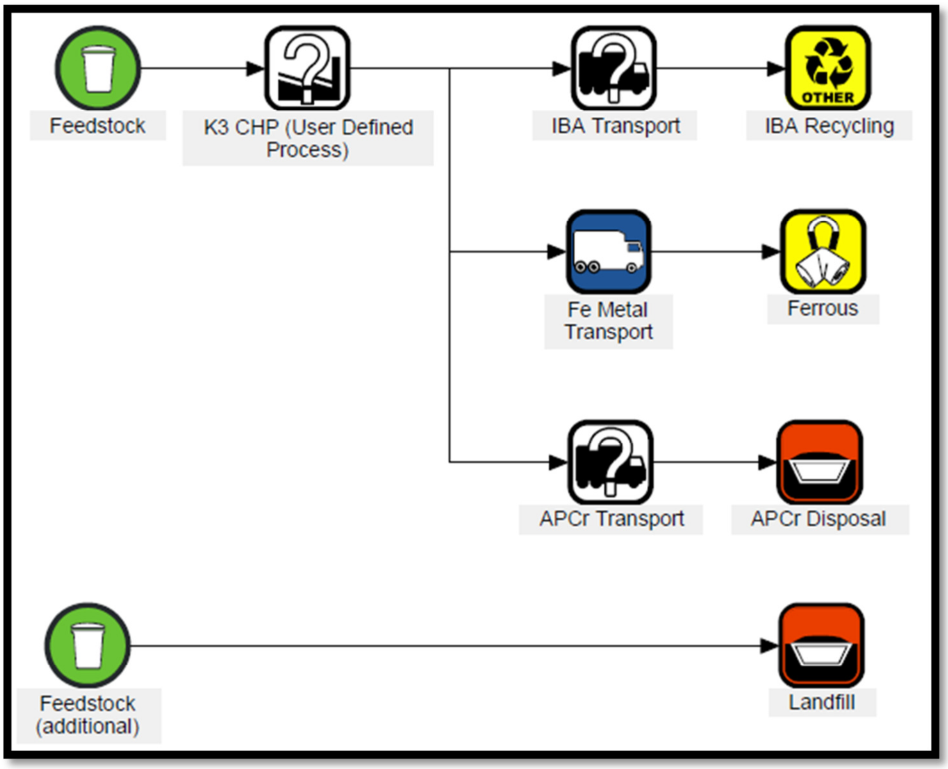
[4] In WRATE Version 4 the GWP for methane and nitrous oxide is 25 and 298 respectively.

3.0 Carbon Impact Modelling and Results

This section provides additional information regarding the scenarios and background assumptions, followed by presentation and interpretation of the carbon impact results.

3.1 Baseline (Current Permission)

The Baseline scenario was developed to assess the carbon impact of the current permission of treatment of 527kt of waste at the Facility (based on existing energy performance assumptions) and disposal of 130kt of waste in landfill. The impact of waste collection and transportation of feedstock to the Facility or landfill is excluded from the analysis. The scenario map from WRATE is provided in Figure 3-1.



Note: WRATE icons with '?' symbol identify processes which are User Defined.

Figure 3-1: WRATE Scenario Map for Baseline Scenario

The disposal process utilised within the WRATE scenario is a WRATE standard process. The processes utilised for treatment and road transportation are 'User Defined Processes' (UDP). A UDP is where a WRATE standard process is duplicated, and changes are made to the background allocation table to better represent the process or treatment technology.

The treatment UDP is modelled using a default WRATE process with allocation rules amended to better present the process material inputs, heat recovery and electrical export of the K3 WtE technology. The WRATE scenario assumes that IBA is recycled with metals removal and that APCr is disposed to landfill[5].

The WRATE default process for the bulker 'Intermodal Road Transport' assumes a vehicle payload of 17.6 tonnes. Given the passage of time since the WRATE software was developed, haulage vehicles have become lighter and are therefore able to transport a greater payload. To account for this increase in vehicle payload, transport UDPs have been developed for the transportation of IBA and APCr from the Facility. For each, the modelled payload has been assumed using SLR's knowledge from other projects involving haulage of these material types. The modelled vehicle payloads are as follows:

- Transportation of IBA by road (25 tonnes); and
- Transportation of APCr by road (20 tonnes).

3.1.1 Results – Baseline (Current Permission)

Figure 3-2 below presents the results of the WRATE analysis for the Baseline scenario for the assessment year 2020. The results represent the carbon impacts (GWP100a) of the current permission of treatment of 527kt of waste at the Facility (based on existing energy performance assumptions) and disposal of 130kt of waste in landfill.

As previously stated, results are presented in thousands of tonnes carbon dioxide equivalent (ktCO$_2$e); a positive value represents an environmental burden and a negative value presents an environmental benefit – also sometimes referred to as an avoided burden.

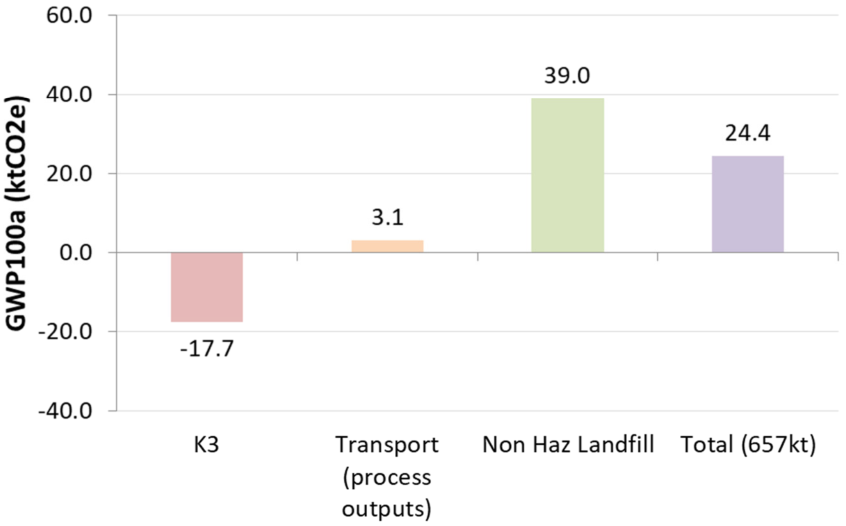


Figure 3-2: Baseline Carbon Impact of 527kt of Waste to Facility and 130kt to Landfill

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[5] There have been technological advancements in the management of APCr which involves the recycling of APCr to generate aggregates for use in dense and medium dense aggregate blocks; however the WRATE software does not currently include an APCr recycling process. The results presented in the report are therefore based on landfill of APCr, and are potentially conservative, as future recycling of APCr will provide further carbon benefits.

Figure 3-2 shows the following:

- An avoided carbon burden of 17.7ktCO_2e associated with the processing of 527kt of waste at the Facility (inclusive of the burden associated with disposal of APCr and the benefit associated with energy generation and recycling).
- A burden of 3.1ktCO_2e associated with the onward transportation of process residues from the Facility.
- A significant carbon burden of 39ktCO_2e associated with the disposal of 130kt of waste in landfill.
- An overall carbon burden of c.24.4ktCO_2e for the Baseline scenario.

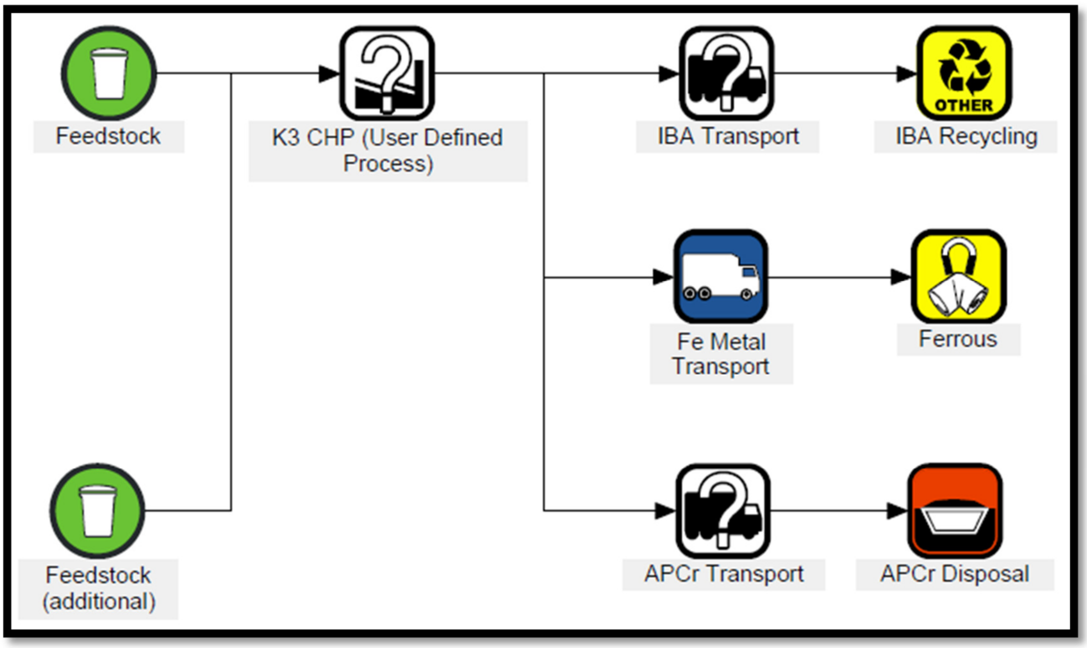
3.1.2 Summary Conclusions – Baseline (Current Permission)

The disposal of waste to landfill is shown to result in a significant carbon burden. Onward transportation of process residues from the Facility and disposal of APCr in landfill will result in a carbon burden, however this is offset by the benefit associated with energy generation and recycling of metals and IBA.

In developing the model for the Baseline scenario, it has been assumed that IBA is reprocessed at the Fortis IBA facility in Andover. WTI is investigating IBA reprocessing solutions in closer proximity to the Facility. Therefore, if IBA reprocessing occurs closer to the Facility in future, the impacts associated with transportation will be considerably reduced.

3.2 Proposal (Application)

The Proposal scenario was developed to assess the carbon impact of the management of 657kt of waste with all feedstock to the Facility (with improved energy performance assumptions) in order to assess the environmental impact of the proposed variation under the DCO application. As for the case of the Baseline, the impact of waste collection and transportation of feedstock to the Facility is excluded from the analysis. The scenario map from WRATE is provided in Figure 3-3.



Note: WRATE icons with '?' symbol identify processes which are User Defined.

Figure 3-3: WRATE Scenario Map for Proposal Scenario

The WtE technology is modelled using a default WRATE process with allocation rules amended to better present the process material inputs, heat recovery and electrical export of the WtE technology (i.e. improved energy performance assumptions). The WRATE scenario assumes that IBA is recycled with metals removal and that APCr is disposed to landfill[6].

3.2.1 Results – Proposal (Application)

Figure 3-4, below, presents the results of the WRATE analysis for the Proposal scenario for the assessment year 2020. The results represent the carbon impacts (GWP100a) of managing 657kt of waste at the Facility.

Results are presented in thousands of tonnes carbon dioxide equivalent (ktCO_2e), a positive value represents an environmental burden and a negative value presents an environmental benefit.

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[6] There have been technological advancements in the management of APCr which involves the recycling of APCr to generate aggregates for use in dense and medium dense aggregate blocks; however the WRATE software does not currently include an APCr recycling process. The results presented in the report are therefore based on landfill of APCr, and are potentially conservative, as future recycling of APCr will provide further carbon benefits.

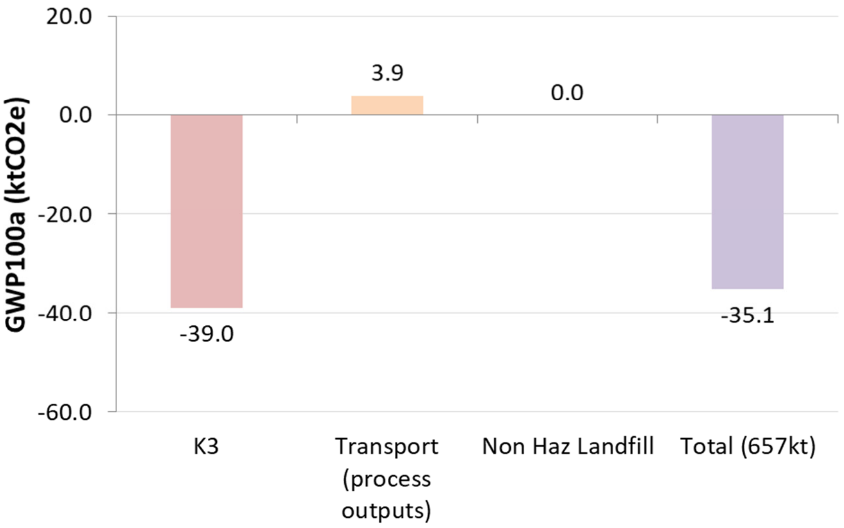


Figure 3-4: Carbon Impact of Proposal Scenario (657kt to the Facility)

Figure 3-4 shows the following:

- An avoided burden of 39.0ktCO_2e associated with the processing of 657kt of waste at the Facility (inclusive of the burden associated with disposal of APCr and the benefit associated with energy generation and recycling).
- A burden of 3.9ktCO_2e associated with the onward transportation of process residues from the Facility.
- An overall avoided carbon burden of c.35.1ktCO_2e for the Proposal scenario.

3.2.2 Summary Conclusions – Proposal (DCO Application)

Due to the carbon benefits of the increased heat and electricity production, overall capacity of the Facility, and the recycling of IBA with metals recovery, the facility demonstrates an overall carbon saving. As in the case of the Baseline scenario, if IBA reprocessing occurs closer to the Facility in future, the impacts associated with transportation will be reduced.

3.3 The Net Benefit (Comparison of Proposal to Baseline)

The results in Figures 3-2 and 3-4 present the carbon impact results of each individual scenario assessed. Comparison of the 'Proposal' emissions (i.e. treatment of the 657kt of waste at the Facility) to the 'Baseline' emissions (i.e. treatment of the 527kt of waste at the Facility and continued disposal of 130kt of waste in landfill) derives the overall 'net' carbon impact.

Presentation of results as a net benefit is a common LCA convention. Comparison of the carbon impact of the Proposal to the Baseline results in a net avoided carbon burden of c.59.5ktCO_2e.

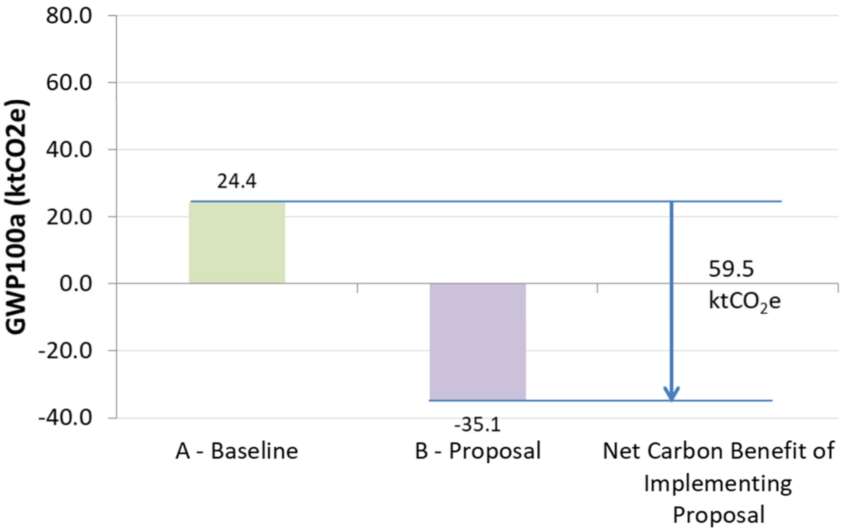


Figure 3-5: Comparison of Proposal to Baseline Showing Net Carbon Benefit

The above demonstrates that variation of the current permission for the Facility via the DCO application, reflecting improvements in Facility energy performance and diversion of an additional 130ktpa of waste from landfill disposal results in a significant carbon benefit.

4.0 Sensitivity Analysis

The analysis in Section 3 is based on an assumption that the 657kt of feedstock has a calorific value (CV) of 9.5MJ/kg and a biogenic CV content of 45%.

Composition of input feedstock for a facility managing fuel derived from waste can be uncertain. Although fuel supply contractors will be required to achieve set broad fuel specification parameters (such as CV, biogenic content, particle sizing) the actual material type composition (paper, organics, plastic, textiles etc.) is poorly defined across the industry. In recognition of this uncertainty, sensitivity analysis on fuel composition has been developed.

The additional sensitivity scenarios have been developed in WRATE to model the environmental impacts of the Facility operating in CHP mode if the feedstock composition is changed. The results below are based on an assumption that the feedstock CV is increased from 9.5MJ/kg to 10.5MJ/kg, with biogenic CV content remaining at 45%. Further details regarding the feedstock composition assumptions are included in Appendix 01 of this report.

4.1 Baseline (Current Permission)

Figure 4-1 below presents the results of the WRATE analysis for the Baseline scenario for the assessment year 2020, but with a feedstock CV of 10.5MJ/kg.

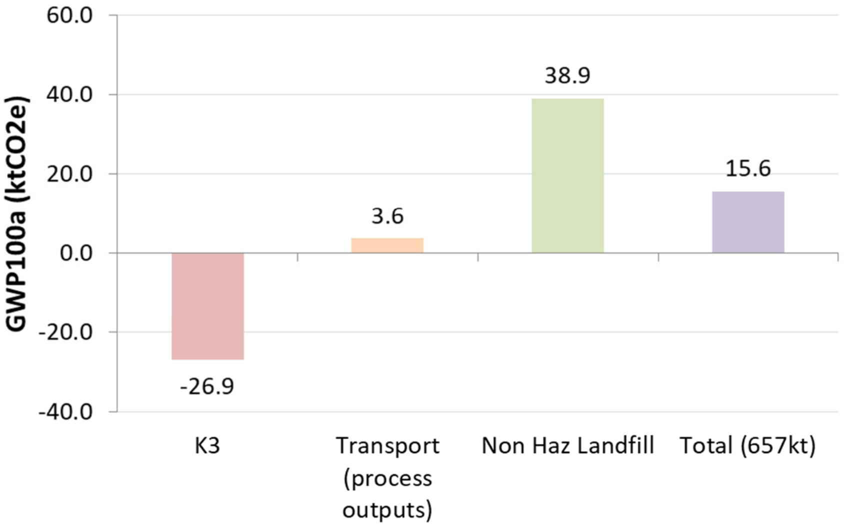


Figure 4-1: Carbon Impact of Baseline Scenario (Sensitivity Analysis)

Figure 4-1 shows the following:

- An avoided carbon burden of 26.9ktCO_2e associated with the processing of 527kt of waste at the Facility (inclusive of the burden associated with disposal of APCr and the benefit associated with energy generation and recycling).
- A burden of 3.6ktCO_2e associated with the onward transportation of process residues from the Facility.
- A significant carbon burden of 38.9ktCO_2e associated with the disposal of 130kt of waste in landfill.
- An overall carbon burden of c.15.6ktCO_2e for the Baseline scenario.

4.2 Proposal (Application)

Figure 4-2 below presents the results of the WRATE analysis for the Proposal scenario for the assessment year 2020, but with a feedstock CV of 10.5MJ/kg.

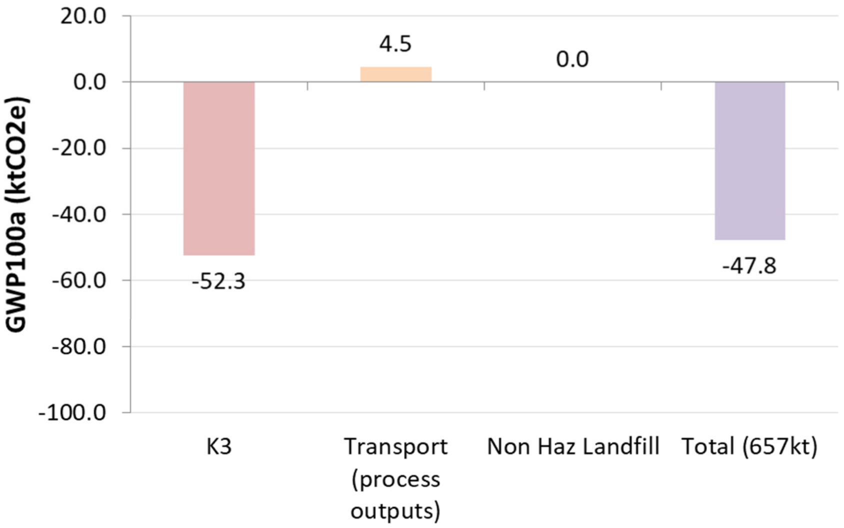


Figure 4-2: Carbon Impact of Proposal Scenario (Sensitivity Analysis)

Figure 4-2 shows the following:

- An avoided burden of 52.3ktCO$_2$e associated with the processing of 657kt of waste at the Facility (inclusive of the burden associated with disposal of APCr and the benefit associated with energy generation and recycling).
- A burden of 4.5ktCO$_2$e associated with the onward transportation of process residues from the Facility.
- An overall avoided carbon burden of c.47.8ktCO$_2$e for the Proposal scenario.

4.3 Net Benefit (Comparison of Proposal to Baseline)

Comparison of the carbon impact of the Proposal to the Baseline for the sensitivity model results in a net avoided carbon burden of c.63.3ktCO$_2$e.

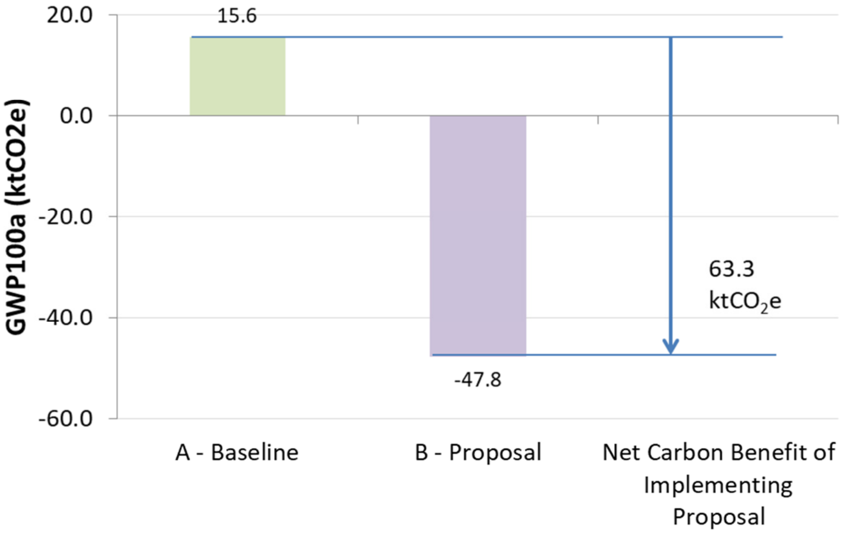


Figure 4-3: Comparison of the Proposal to Baseline Showing Net Carbon Benefit (Sensitivity Analysis)

The above demonstrates that if waste composition varies and a higher CV feedstock is delivered to the Facility, the variation of the current permission for the Facility will deliver significant carbon benefit. The net carbon benefits are of a similar scale for the base and sensitivity models. As the higher CV feedstock (in the sensitivity scenario) includes a higher proportion of plastics (fossil carbon), this results in lower landfill emissions in the baseline (as the fossil carbon is sequestered) and increased direct emissions from the combustion of the fossil carbon in the proposal which in part will offset the increased energy outputs associated with higher CV feedstock.

4.4 Summary Conclusions –Sensitivity Scenarios

The analysis undertaken and results presented in this report demonstrate that variation of the current permission for the Facility through improvements in energy performance and diversion of an additional 130ktpa of waste from landfill disposal results in a significant carbon benefit.

The feedstock composition (and resultant CV) will ultimately influence the direct emissions from combustion, the quantities of energy recovered and the amount of IBA and metals recovered for recycling etc. The principal modelling and sensitivity analysis illustrate how indicative compositional variations affect the overall results.

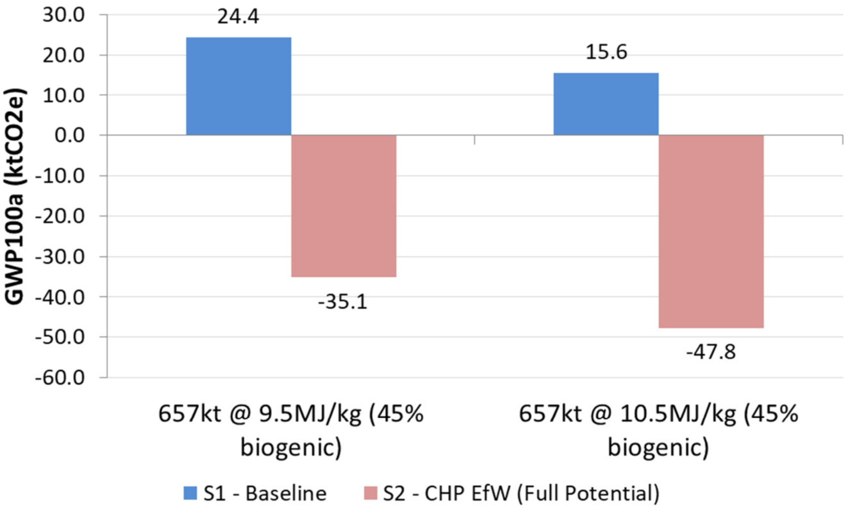


Figure 4-4: Comparison of the Principal Analysis and Sensitivity Analysis

In recognition of the uncertainty around the material composition of the feedstock that will be received at the Facility, sensitivity analysis on fuel composition has been undertaken and the results show a significant net carbon benefit in both composition scenarios.

5.0 Conclusions

This report presents the Global Warming Potential (commonly known as carbon footprint) for two primary scenarios assessing current and proposed management of 657ktpa of waste. The modelling has been carried out using the Environment Agency's life cycle assessment tool, WRATE.

The results of the modelling demonstrate the following:

- Approval of the DCO application and therefore the treatment of an additional 130ktpa of waste at the Facility will deliver carbon benefits over the current management methods due to a combination of increased diversion from landfill and improved energy efficiency performance associated with the optimised Facility.
- Approval of the DCO application will result in a net avoided burden of c.59.5-63.3ktCO_2e in 2020 (depending on the composition and CV of the waste diverted from Landfill).
- The results show that the transportation of process residues from the Facility, although resulting in a carbon burden, has only a small impact on the overall carbon benefits of diverting waste from landfill to the Facility. In developing the model, it has been assumed that IBA is reprocessed at the Fortis IBA facility in Andover (a conservative assumption). WTI are investigating IBA reprocessing solutions on site or in closer proximity to the Facility. Therefore, if IBA reprocessing occurs closer to the Facility in future, the impacts associated with transportation will be reduced.
- Treatment of 657kt of waste at the Facility will assist in minimising waste quantities to landfill and will contribute to the generation of additional renewable energy in the form of heat for the proximate DS Smith Kemsley Paper Mill and electricity for export to the national grid; thus utilising domestic resources to produce energy for local businesses.

On this basis, it is concluded that the proposed DCO application for the Facility will deliver significant carbon benefits.

APPENDIX 01

WRATE Model Feedstock Composition

The below table presents the indicative compositions of the waste feedstock utilised in the WRATE models.

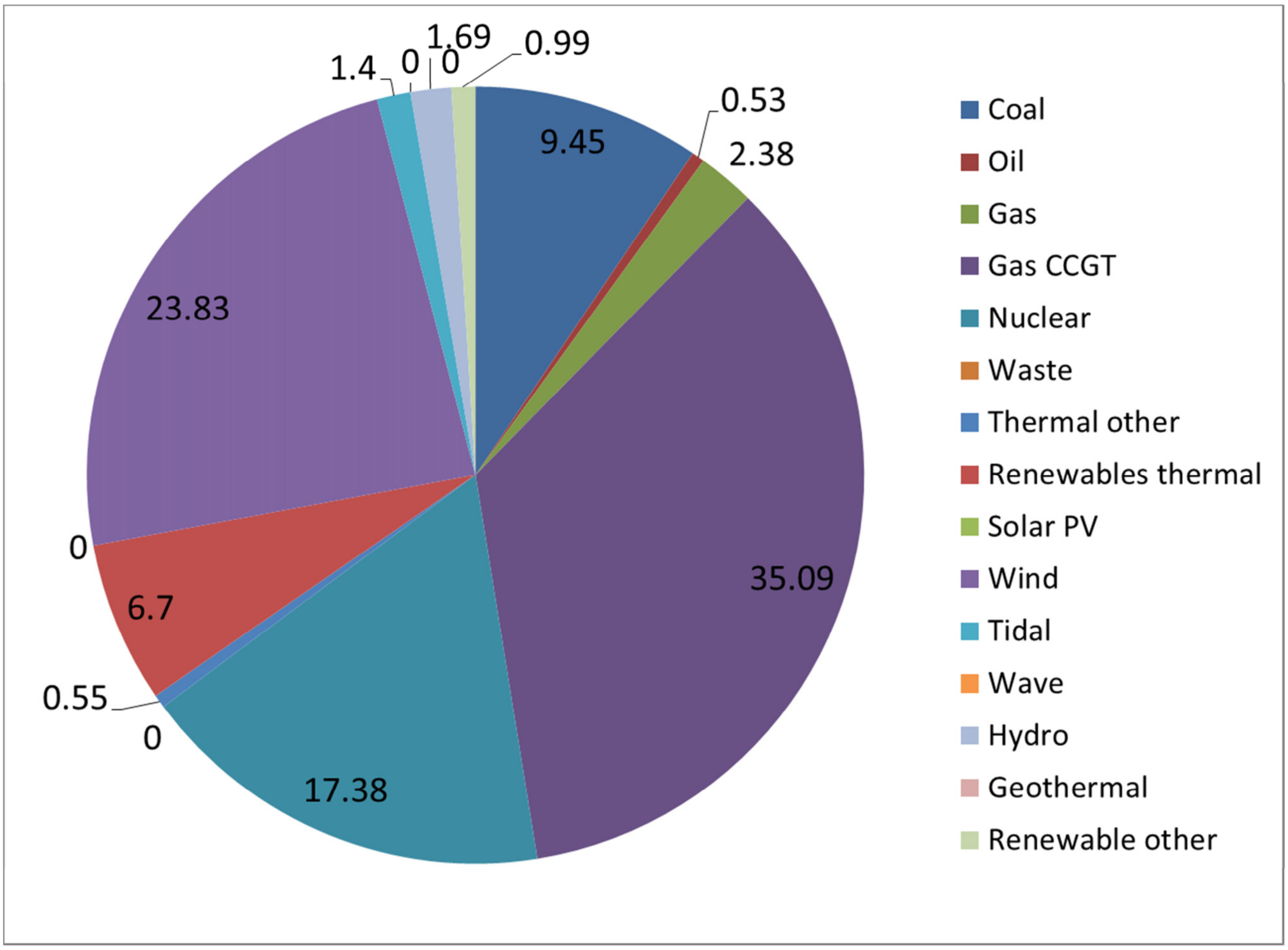
	Principal Analysis (CV @ 9.5MJ/kg)	**Sensitivity Analysis (CV @ 10.5MJ/kg)**
Paper	9.34%	26.43%
Plastic film	5.59%	6.08%
Dense plastic	1.77%	7.72%
Textiles	17.75%	3.89%
Absorbent hygiene products	9.71%	2.12%
Wood	5.14%	4.80%
Misc. combustibles	10.44%	11.35%
Misc non-combustibles	5.21%	9.61%
Glass	1.57%	1.71%
Organics	19.13%	17.87%
Ferrous	0.55%	0.60%
Non-ferrous	0.33%	0.36%
Fines	8.28%	1.81%
WEEE	4.27%	4.65%
Hazardous	0.92%	1.00%
	100.00%	**100.00%**

APPENDIX 02

WRATE Model Baseline and Marginal Electricity Mix

Baseline Electricity Mix

The below chart presents the WRATE Baseline Electricity Mix (GIB, 2020).



Marginal Electricity Mix

For the WRATE Marginal Electricity Mix (GIB, 2020), the assumed offset is 100% closed cycle gas turbine (CCGT). Given the reduction in coal based energy production, the use of Gas CCGT as the marginal mix is deemed appropriate.

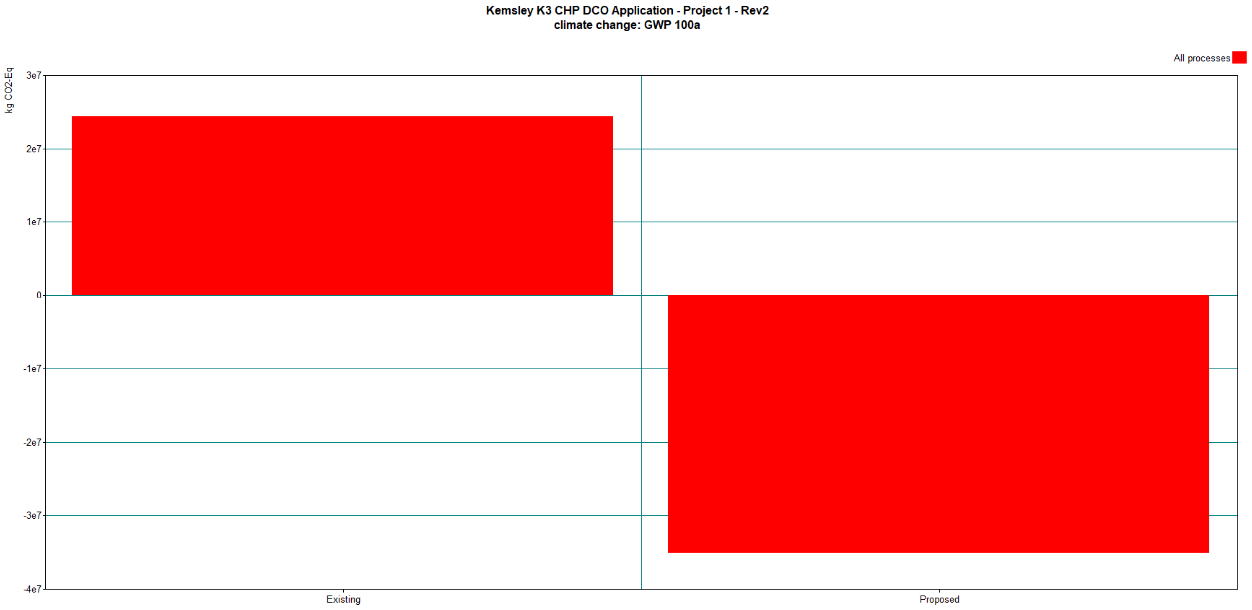
The carbon benefit assigned to electricity generation (offsetting Gas CCGT) in WRATE is 349kgCO_2e/MWh.

APPENDIX 03

Detailed WRATE Results – Principal Analysis

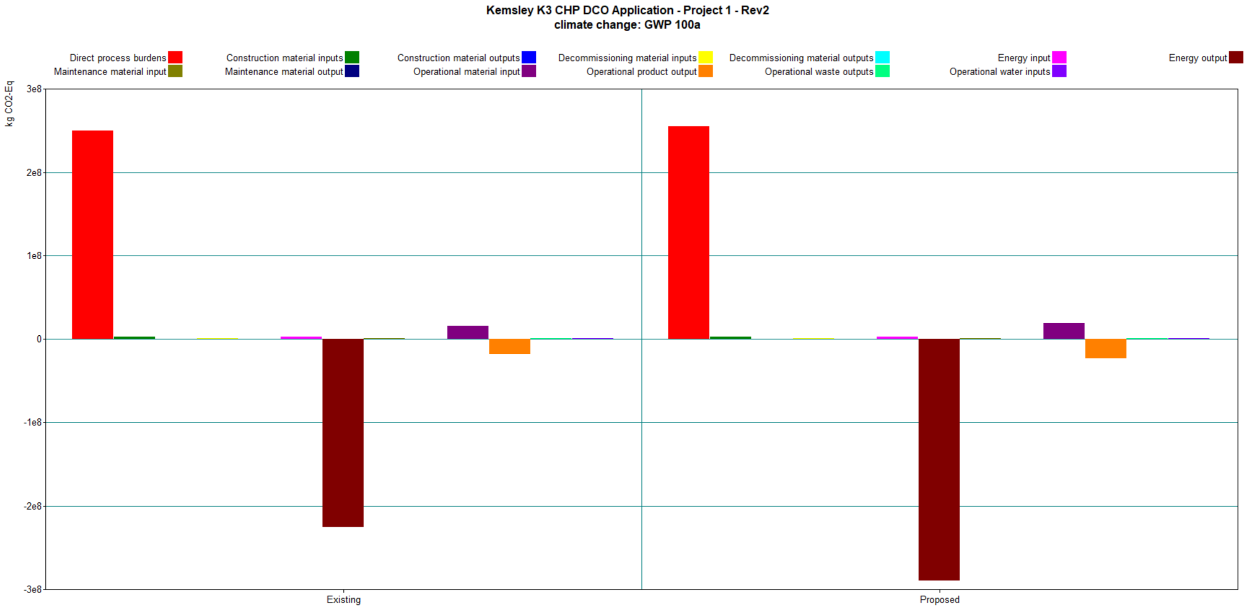
Feedstock CV at 9.5MJ/kg.

All Processes



The chart above compares the total carbon emissions of the two scenarios considered. A positive figure represents a carbon burden while a negative figure denotes a carbon saving.

All Process Stages



To provide further clarity, the process emissions can be disaggregated by process emission stage. The chart above shows that the main source of positive emission (carbon burden) for both scenarios is direct process emissions as denoted by the red bars; these carbon burdens are from fugitive emissions of landfill gas, emissions of combustion gases from the WtE plant and also other emissions sources including onsite fuel usage in mobile plant.

The next largest positive emissions for both scenarios are operational material inputs (mainly associated with chemicals for abatement systems) as denoted by the purple bar.

Positive emissions (carbon burdens) are largely offset by energy output avoided burdens associated with the displacement of conventional energy (predominantly sourced from fossil carbon) as denoted by the brown bars[7]. There are also net avoided burdens associated with operational product output (i.e. the recycling of metals and IBA) as denoted by the orange bars.

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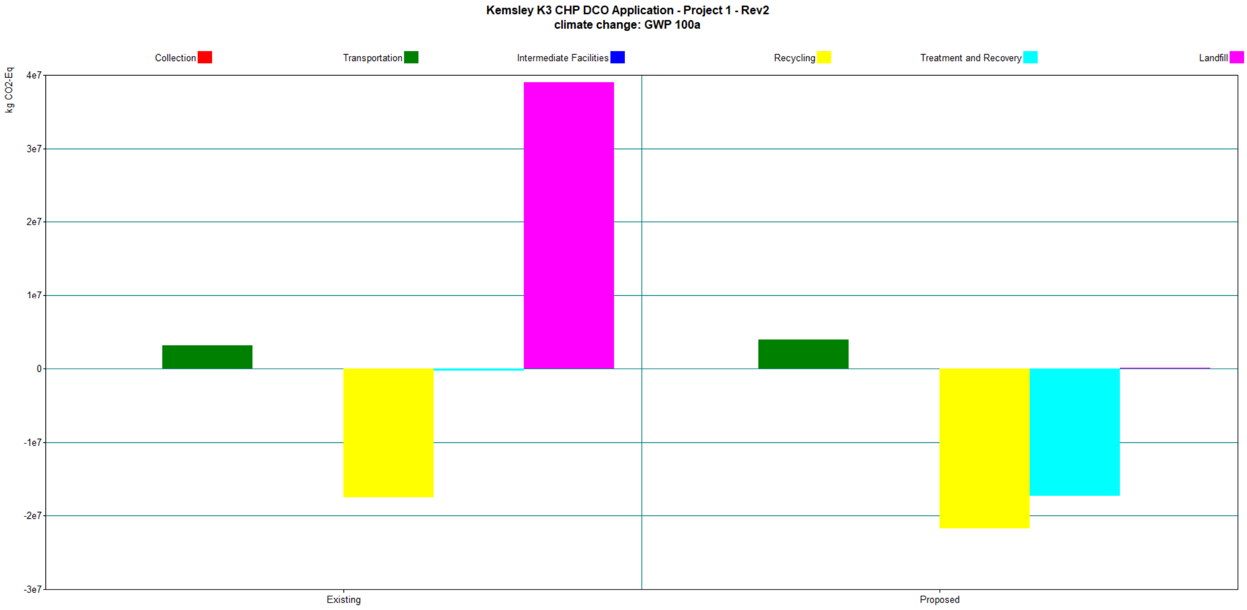
[7] The avoided carbon emission factor for electricity generation (based on 100% Gas CCGT) is 349kgCO_2e/MWh.

All Categories



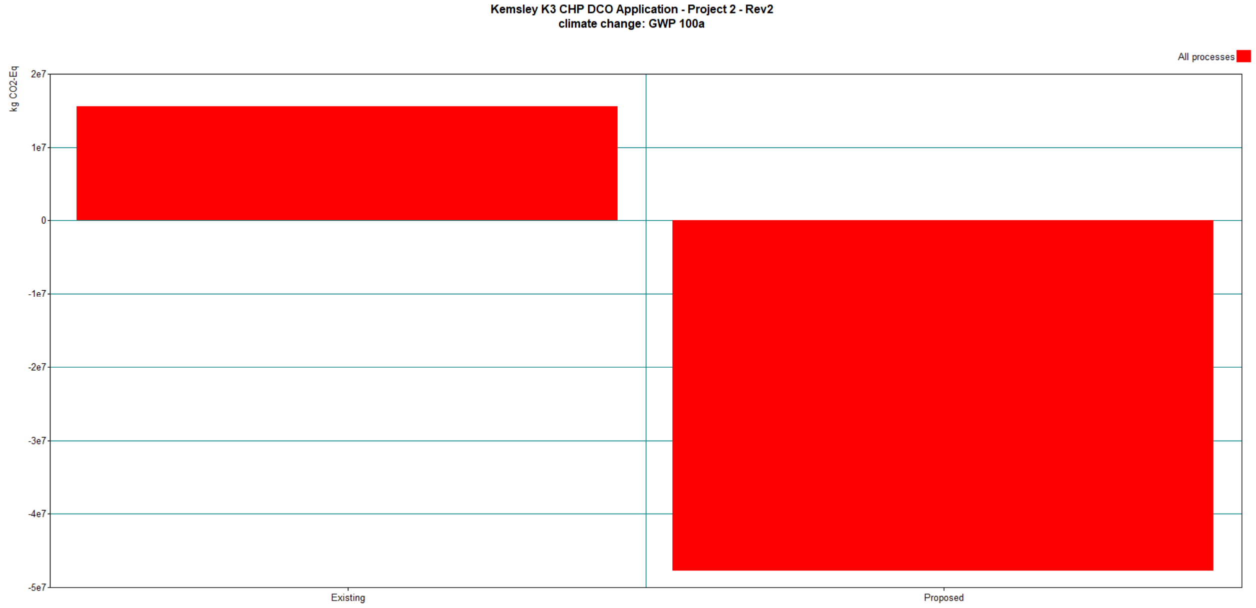
The WRATE results can also be presented by category / process type. The chart above shows the benefit associated with the recycling of metals and IBA as denoted by the yellow bar. Furthermore, the chart also shows that transport emissions (as denoted by the green bar) are minor when compared the magnitude of the impact of the other processes.

Detailed WRATE Results – Sensitivity Analysis

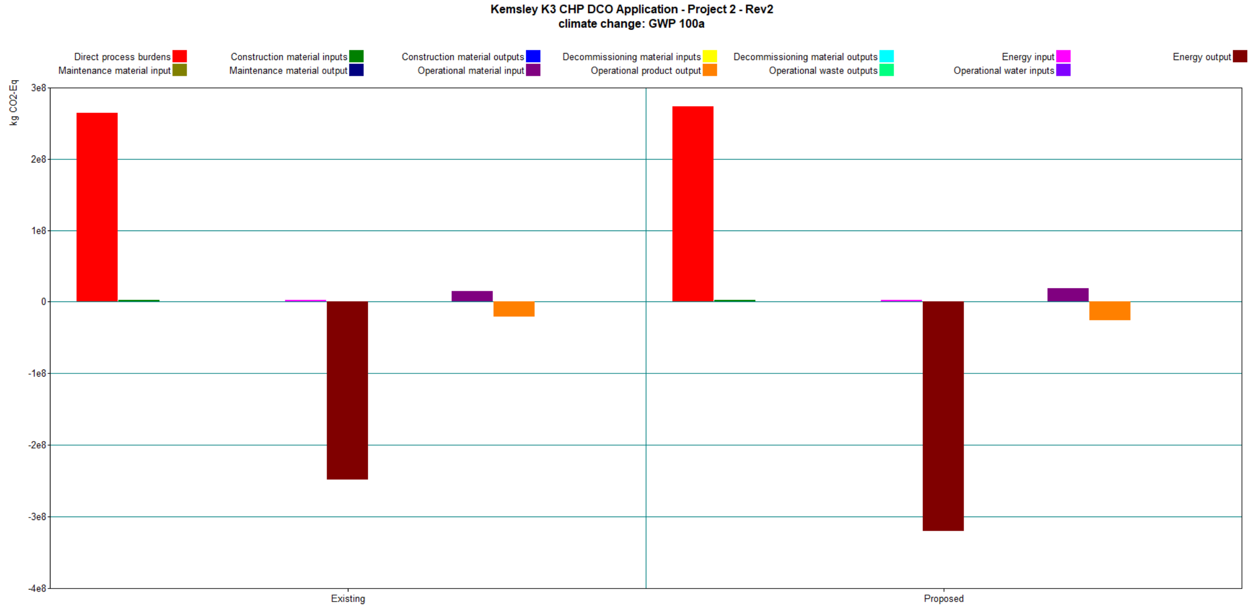
Feedstock CV at 10.5MJ/kg.

See above for interpretive commentary on the WRATE output graphs.

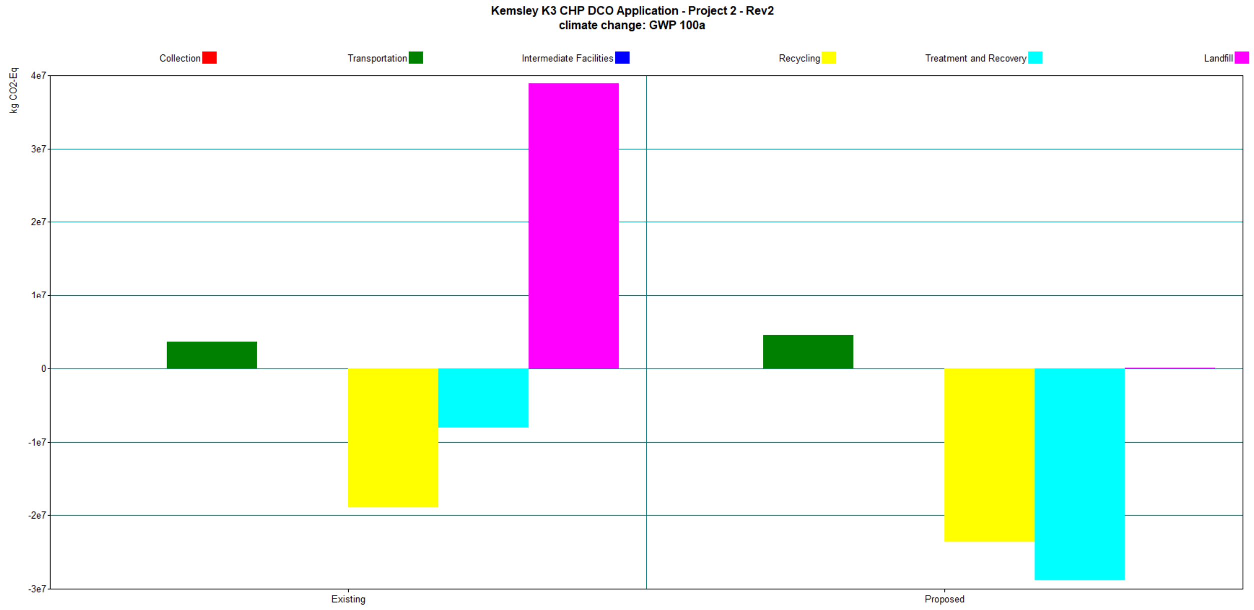
All Processes



All Process Stages



All Categories



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