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CASTROL

PAS 2060 Qualifying Explanatory Statement

1st Application Period: January – December 2021

This is a PAS2060 Qualifying Explanatory Statement to demonstrate that Castrol Ltd has committed to carbon neutral in accordance with PAS2060:2014 reporting

Carbon Neutrality Declaration

"Carbon neutrality of the products in scope will be achieved by Castrol in accordance with PAS 2060 at 31st December 2021 for the period commencing 1st January 2021, DNV certified"

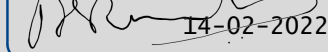
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This Qualifying Explanatory Statement (QES) contains all the required information on the carbon neutrality of the given subject. All information provided within this report has been reviewed by a third party and is believed to be correct. If provided with any information affecting the validity of the following statements, this document will be updated accordingly to reflect Castrol's current status towards carbon neutrality. This report will be made publicly available on Castrol's carbon neutral webpage: www.castrol.com/cneutral. The publicly available version will be redacted to protect commercially sensitive information and any internal targets that underpin external aims.

This is Castrol's first declaration of commitment to carbon neutrality for this combined portfolio of products. Subsets of this portfolio have achieved carbon neutrality over the 2014-2020 period, but Castrol is re-establishing its carbon neutral commitment with the launch of its PATH360 Sustainability Strategy and this combined and significantly increased set of products which encompasses lead brands in every space Castrol sells to, all products sold in the Australia, New Zealand, and Vietnam markets, all products that have achieved carbon neutral historically and other additional ad hoc product lines having significant sales within key geographies. **Please see Annex D for a complete list of products in scope and their classification within this carbon neutral application.** For reference, these products made up ~30% of Castrol's sales volume in 2020.

Castrol's carbon neutrality declaration has been reviewed and verified by an independent third party, DNV. Their Assurance Statement can be found in Annex B of this report.

1. TERMS & DEFINITIONS

100-year Global Warming Potential	Figures by the IPCC to account for the global warming potential of GHG emissions
Carbon	Carbon is used as shorthand for aggregated greenhouse gas (GHG) emissions, reported as carbon dioxide equivalents (CO ₂ e). Throughout the report, the full term (CO ₂ e) is employed. A full list of GHG emissions included in the inventory is provided in Annex C of this report
GHG	Greenhouse Gas refers to carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), sulphur hexafluoride (SF ₆), perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs). A full list of GHG emissions included in the inventory is provided in Annex C of this report
GHGP	Greenhouse Gas Protocol sets the standards to measure and report GHG emissions
GHGP Product Standard	Greenhouse Gas Protocol Product Standard: https://ghgprotocol.org/product-standard
IPCC Fifth Assessment Report	The Intergovernmental Panel on Climate Change (IPCC) provides an international statement on the scientific understanding of climate change
I3P-1 (for third party)	The conformity assessment type as outlined in PAS2060, in this case: Independent 3P certification - commitment
PAS 2060	Publicly available Specification for the Demonstration of Carbon Neutrality. PAS 2060:14 (referenced in this document) refers to the latest 2014 version of the document
QES	The Qualifying Explanatory Statement (QES) contains all the required information on the carbon neutrality of the given subject.

2. INTRODUCTION

2.1 Foreword

This Qualifying Explanatory Statement (QES) demonstrates Castrol's commitment to achieve carbon neutrality of its PATH360 Carbon Neutral Products at 31st December 2021 in accordance with PAS 2060. Please see Annex D for a summarized list of the scope of products and product types.

This QES provides details on how the carbon emissions of the products in scope were assessed, Castrol's carbon management plan inclusive of emission reduction initiatives and the carbon offset process which will be used to achieve carbon neutrality.

A checklist of requirements to demonstrate conformance to PAS 2060 and their respective location within the QES can be found in Annex A.

Table 2.1 - General Information

PAS 2060 Information Requirement	Information as it relates to Castrol Ltd
Entity making PAS 2060 declaration	Castrol Limited (hereafter "Castrol")
Individual responsible for the evaluation and provision of data necessary for the substantiation of the declaration including that of preparing, substantiating, communicating, and maintaining the declaration	Carolyn Bongard, Sustainability Accounting Manager
Subject of the declaration	Castrol's PATH360 carbon neutral products. See Annex D for a complete list of products in scope and their classification within this carbon neutral application.
Chosen consolidation approach (equity share, operational control, or financial control)	Operational Control
Characteristics of the subject	Castrol is a global lubricants manufacturing and marketing company offering a wide range of products and services across the automotive, industrial, marine and energy spaces.
Rationale for the selection of the subject and boundary	Castrol is making this selection of products carbon neutral in support of its recently launched PATH360 Sustainability Strategy. Subsets of this portfolio have achieved carbon neutrality over the 2014-2020

	period, but Castrol is re-establishing its carbon neutral commitment with the launch of this strategy and combining into one QES the historical carbon neutral ranges and several new ones. This results in a significantly increased set of products which includes a lead brand in every space as well as all products sold in the Australia, New Zealand, and Vietnam markets. For ease, this group of products will be referred to herein as 'average Castrol product'. Please see Annex D for more details.
Conformity assessment type	I3P-1 Independent third-party certification – commitment
Baseline date (Date of first determined footprint)	1st Jan – 31 st Dec 2021
Commitment period for carbon neutrality	1st Jan – 31 st Dec 2021

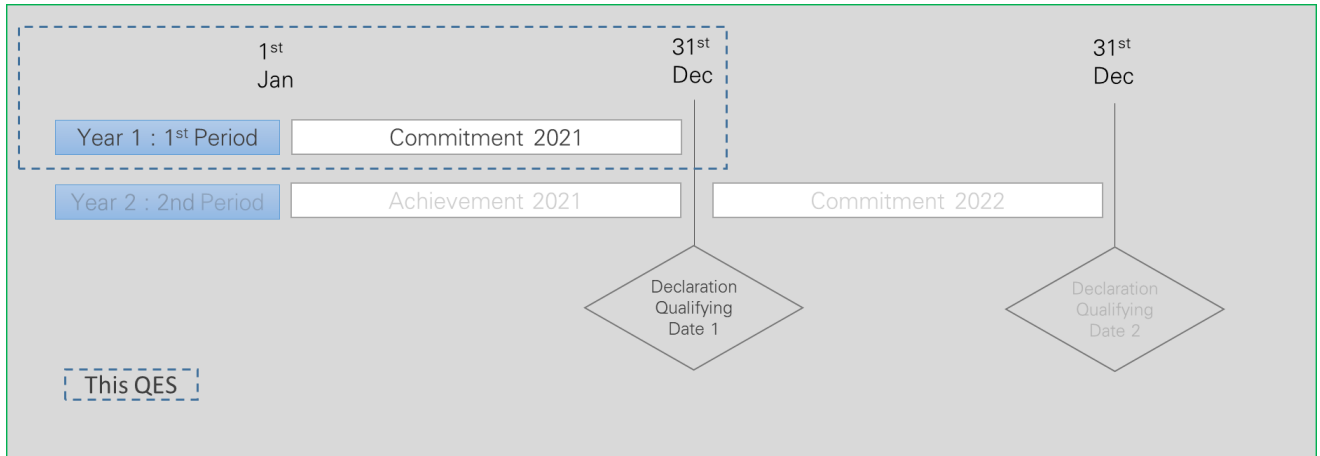
2.2 PAS 2060 Carbon Neutrality

Castrol will demonstrate carbon neutrality as set out in PAS 2060:2014 using an independent 3rd party certification in accordance with 10.3.2. For the application period following the baseline date, declaration I3P-1 from Annex A shall be used. For the second and all subsequent periods with an unchanged subject, declaration I3P-3 modified as per A.2 shall be used.

Castrol is following the timeline for carbon neutrality in accordance to Figure 2.1 carbon neutrality declaration periods. This is Castrol's first application for the commitment to carbon neutrality for this selected group of products, the timing of which aligns with the launch of Castrol's PATH360 Sustainability Strategy. The baseline period is 2021 (based on calendar year 2020 data), the subject has been defined (as described in Table 2.1) and its carbon footprint quantified. The QES is officially released to the public after the independent third-party assurance of Castrol's carbon neutral program and will be updated accordingly to reflect any changes and actions that could affect the validity of the declaration of commitment.

A carbon management plan has been initiated to reduce emissions across the lifecycle of Castrol's products, and any residual emissions within the carbon neutral portfolio will be mitigated through the purchase and retirement of offsets.

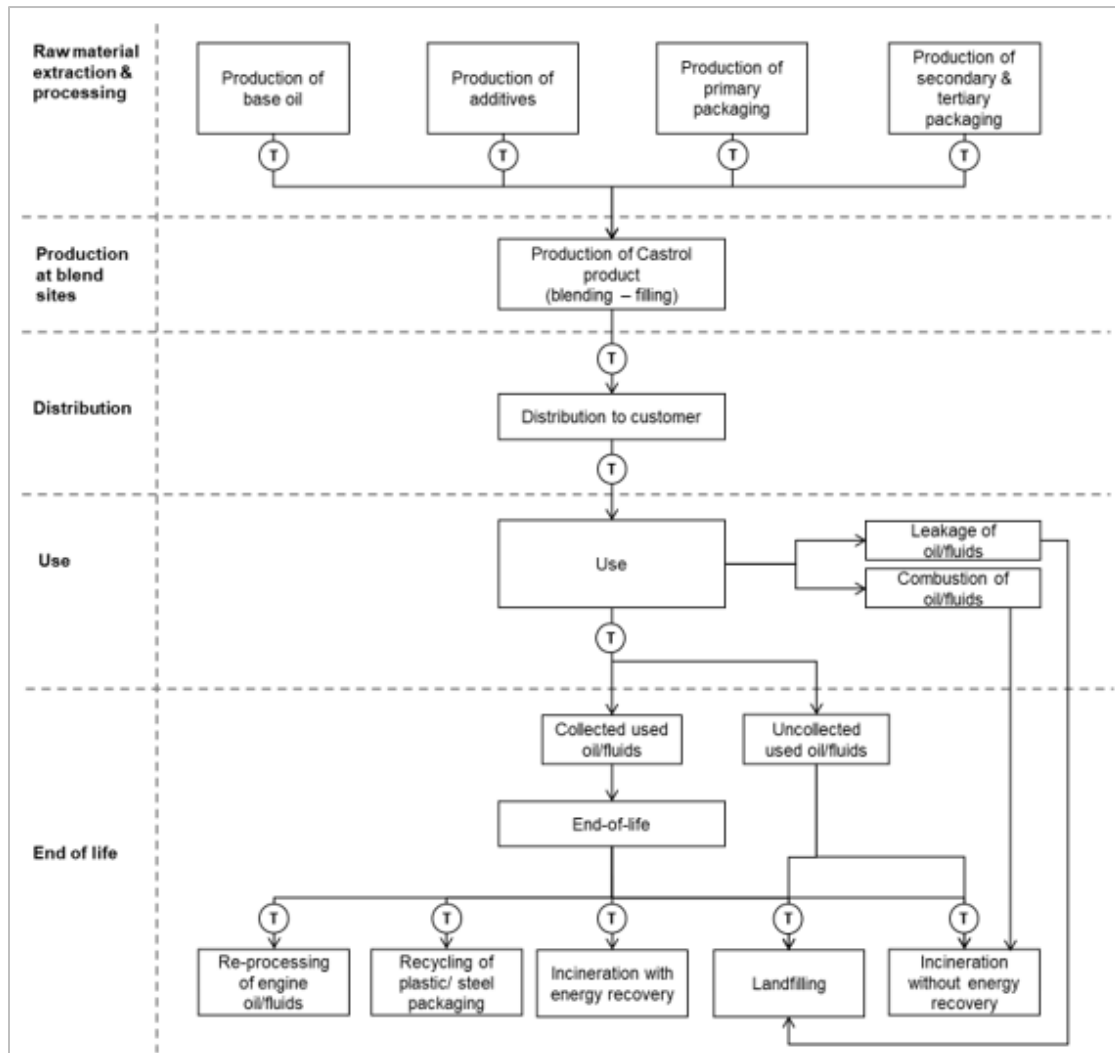
Figure 2.1 – Carbon Neutral Declaration Periods



2.3 Boundaries of the Subject

The commitment to carbon neutrality covers all activities that are material for the functionality of the subject. Due to the markets that the product is sold in, it means it has clear end-of-life processes that make it practical to conduct 'cradle-to-grave' lifecycle analysis in accordance with the requirements of the Greenhouse Gas Protocol Product Life Cycle Accounting and Reporting Standard (GHGP Product Standard). The system boundary considered in assessing the carbon footprint of these products is described in Figure 2.2.

Figure 2.2 – Process Map



(T = transport)

3. QUANTIFICATION OF CARBON FOOTPRINT

3.1 Standard Chosen and Emissions Sources


The GHGP Product Standard was used to quantify the GHG emissions associated with the subject. This method was chosen as it provides an internationally recognised approach to the calculation of product CO₂e footprints and meets the requirements of PAS 2060 for the substantiation of GHG emissions (PAS 2060:2014 5.2.2 to 5.2.4). The GHGP Product Standard was applied in accordance with its provisions and the principles set out in PAS 2060. The product CO₂e footprints have been prepared by a third party (ERM).

GHG emissions that are accounted for in the study are based on the 100-year Global Warming Potential figures published in Table 2.14 of the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (2014) and include those required by the GHGP Product Standard, which specifies emissions to and removals from the atmosphere of: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulphur hexafluoride (SF₆), perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs). A full list of GHG emissions included in the inventory is provided in Annex C of this report.

All Scope 1, 2 and 3 emissions relevant to the product are included in the carbon footprint and are summarised in Table 3.1 below. Where GHG emissions have been estimated, these have been determined based on a conservative approach that precludes underestimation. Sources of biogenic carbon in the average Castrol product system are limited to the production of selective ingredients, cardboard, and wood packaging materials, which are identified as negligible. Therefore, the carbon footprint results from this study do not provide separate reporting of biogenic carbon emissions. Any exclusions are anticipated to be less than 1% of the total GHG emissions and no weighting factors have been included for delayed emissions. Offsetting has not been included in calculations and no avoided emissions have been included in calculations.

3.2 Emissions Profiles of the Subject

Table 3.1 – Cradle-to-grave GHG Emissions per litre of product (Carbon Neutral KPI)

Inventory results: kg CO ₂ e per unit of analysis	
Product group description	GHG Emissions per litre of product
Global (products in scope for the Castrol Carbon Neutral Portfolio)	 kg CO ₂ -eq per litre of average Castrol product from the Castrol Carbon Neutral Portfolio

The total GHG emissions of Castrol's Carbon Neutral Portfolio based on 2020 sales volume is 1,252,014 tonnes of CO₂e. The 2021 Actuals sales volume will be used to determine the amount of offsets required to demonstrate carbon neutrality for the 2021 Achievement period. This will be explained in more detail in Section 6.

Table 3.2 – Value (% of total CO₂e) by Life Cycle Stage

Inventory results: percent of total inventory results per life cycle stage					
Stage definition	Value (% of total CO ₂ -eq)				
	Material acquisition & processing	Production	Distribution & storage	Use	End of life
Global products in scope for the Castrol Carbon Neutral portfolio	60.24%	1.56%	4.38%	17.34%	16.47%

NB Totals may not equal 100% due to rounding.

Table 3.3: Description of GHG emissions

Boundary setting	
Life cycle stage definition	
Material acquisition and pre-processing	<p>Raw material extraction and processing to produce base components for use in the average Castrol product production process for all products in scope for the Castrol Carbon Neutral portfolio.</p> <p>The following processes are included within the boundary of this life cycle stage:</p> <ul style="list-style-type: none"> • Production of base oils, comprising extraction of crude oil; transportation of crude oil to refining; and refining of crude oil to produce base oil and co-products, with burdens allocated to base oils on a mass basis • Production of additives, comprising production of chemicals and processing to make average Castrol product additives and viscosity modifiers, and associated transport; and • Production of packaging materials (plastics, steel, wood), comprising extraction and transportation of raw materials; processing to packaging base materials; and fabrication of packaging products. <p>The following processes are not included within the boundary of this life cycle stage.</p> <ul style="list-style-type: none"> • Capital goods and infrastructure (i.e., manufacture and maintenance of buildings and machinery),

	<p>which are considered to be negligible in relation to one litre of average Castrol product.</p>
Production	<p>Blending of base components (base oils and additives) to produce average Castrol product and filling into product packaging (plastic bottles, steel drums, IBCs, etc.) for all products in scope for the Castrol Carbon Neutral portfolio .</p> <p>The following processes are included within the boundary of this life cycle stage:</p> <ul style="list-style-type: none"> • Incoming transport of average Castrol product ingredients and packaging to Castrol sites • Blending operations for production of average Castrol products at Castrol sites • Filling to packaging (including plastic bottles, steel drums, bulk packaging, etc.) of average Castrol products; and • Management of wastes and emissions from Castrol sites producing average Castrol products worldwide. <p>The following processes are not included within the boundary of this life cycle stage.</p> <ul style="list-style-type: none"> • Capital goods and infrastructure (i.e., manufacture and maintenance of buildings and machinery), which are considered to be negligible in relation to one litre of average Castrol product and • Personnel activities (e.g., commuting to and from work).
Distribution and storage	<p>Distribution of packed products in scope for the Castrol Carbon Neutral portfolio from Castrol blending sites to customers (e.g., dealerships and retailers) comprising:</p> <ul style="list-style-type: none"> • Transportation by third party fleet to distribution hub in the market country; and • Transportation by in-country third party carrier from distribution hub to customer (e.g., car dealerships). <p>The following processes are not included in the boundary of this life cycle stage.</p> <ul style="list-style-type: none"> • Capital goods and infrastructure (i.e., manufacture and maintenance of buildings and machinery),

	<p>which are considered to be negligible in relation to one litre of average Castrol product</p> <ul style="list-style-type: none"> • Storage at distribution warehouse. Average Castrol products are stored at ambient temperature and do not require any additional treatment for storage. The impact from storage, comprising energy for lighting, is considered to be negligible per litre of product. • Personnel activities (i.e., commuting to and from work).
Use	<p>The Castrol Carbon Neutral portfolio has several use applications e.g., vehicles, marine, energy, and industrial etc.</p> <p>In these application groups, average Castrol product are used to facilitate the efficient running of, for example, engines, equipment, and machinery. They are not typically consumed during use, although there is inevitably some average Castrol product loss through leakage or, where combustion is applicable, with the fuel. Leakage and use rate percentages have been applied to these cases and it is assumed that the percentage leaked or combusted degrades to carbon dioxide. In contrast, some applications (e.g., greases, marine, and cleaners etc) have a high loss rate in use. In these cases, it is assumed that 100% is lost and eventually degrades into carbon dioxide.</p> <p>Use of average Castrol product includes the following:</p> <ul style="list-style-type: none"> • Filling of product application system (e.g., vehicles, equipment, and machinery) with average Castrol product • Leakage of average Castrol product during use • Where applicable, combustion of average Castrol product with fuel during use <p>The following processes are not included in the boundary of this life cycle stage.</p> <ul style="list-style-type: none"> • Capital goods and infrastructure (i.e., manufacture and maintenance of buildings and machinery), which are considered to be negligible in relation to one litre of average Castrol product. • Draining of used average Castrol product from product application system as this is a manual operation.

	<ul style="list-style-type: none"> • Personnel activities (e.g., commuting to and from work).
End-of-life	<p>Depending on the percent loss during the use phase, there will be different end of life considerations. For applications with 100% loss (e.g., greases and marine), there is no further end-of-life treatment as it is assumed the average Castrol product is 100% released into the environment during the use phase.</p> <p>In contrast, for average Castrol products which do not have 100% loss during the use phase, the used average Castrol products can be re-refined, incinerated for energy recovery, incinerated without energy recovery, or landfilled, the packaging must also be treated. It is assumed that no improper disposal (e.g., dumping to land) occurs for products sold via 'dealership' marketing channels. The following processes are included in the boundary of this life cycle stage:</p> <ul style="list-style-type: none"> • Transportation of used average Castrol product to a waste management facility • Used average Castrol product incineration with and without energy recovery, landfill, or re-refining; and • Treatment of waste packaging to recycling, incineration with energy recovery, incineration without energy recovery or landfill. <p>In line with the recycled content method (Chapter 9 of the GHG Product Protocol), the following processes are not included in the boundary of this life cycle stage:</p> <ul style="list-style-type: none"> • Processes that transform waste to a useful material in another process (e.g., re-refining of used oil and recycling of plastic).

4. DATA METHODS

4.1 Data Sources

Data used for the study are derived from a mix of primary and secondary sources. Where possible, primary data were used. Secondary data were used only where primary data were not available or where the impact on the carbon footprint result was nominal.

Primary data were sourced for all Castrol activities, comprising product specifications and formulations; operational data at blend sites; production output from blend sites; sales data in market countries; packaging material inputs; incoming material transport distances; and distribution modes of transport. Primary data were also sought from a number of Castrol's suppliers for base oil, additives, and primary packaging as part of previous GHG inventories. However, primary data were not received in relation to all data requests. Where primary data were lacking, secondary data were used to fill gaps based on documented assumptions.

Distribution routes and distances were estimated based on the regional location of the blending site where a product is manufactured and the regional location of Castrol warehouse facilities in the market country.

Secondary data were sourced to define appropriate use and disposal scenarios and for all other activities associated with the life cycle of average Castrol product, comprising: GHG emission factors, which were sourced from reputable published databases; secondary and ancillary packaging materials; and average country specific waste management rates for used oil and packaging materials.

4.2 Data Quality and Uncertainties

Data quality assessments were undertaken for all activity data and emission factor data. Activity data were assessed for the following data quality criteria geography, time period, and reliability. Emission factor data were assessed for the following data quality criteria; technology, geography, time period, completeness and reliability for each data quality criterion, a score was assigned on a scale of 1 to 4 (1 being poor; 4 being good). A single data quality score was calculated as the simple average of all five representativeness categories (equal weighting for each category). The quality of the overall dataset was appraised as a percentage of the total carbon footprint result that relies on data is appraised as 'poor' (<1.5), 'fair' (1.5 – 2.5), 'good' (2.5 – 3.5) and 'very good' (>3.5)

The following table provides an overview of the Activity Data Quality Appraisal for all products in scope:

Table 4.1 – Activity Data Quality Appraisal

Data Quality Appraisal - Activity Data	% contribution to total GHG footprint
Poor	0.00%
Fair	10.97%
Good	77.76%
Very good	11.27%

The following provides an overview of the Emission Factor Data Quality Appraisal for all products in scope:

Table 4.2 – Emissions Factor Data Quality Appraisal

Data Quality Appraisal - Activity Data	% contribution to total GHG footprint
Poor	0.00%
Fair	0.64%
Good	81.22%
Very good	18.11%

The following identifies specific areas of uncertainty in the product carbon footprint results:

Raw material inputs – for raw material inputs for which primary data were not received, secondary data were used. The nature of key raw material inputs (base oil and additives) is such that there is potentially a high degree of variability between suppliers and consequently the GHG impact can vary accordingly. Given the contribution to total GHG emissions from the production of raw materials, the assumptions made relating to raw material impacts have the potential to have a significant effect on the overall result.

End-of-life management – waste management rates are assumed based on national/ regional averages. Waste management rates can vary significantly between different countries in the same region or between different areas in the same country. Similarly, given the contribution to total GHG emissions from the end-of-life management, the assumptions made relating to waste management rates have the potential to have a significant effect on the overall result.

Improvements to data quality

Not applicable as first GHG inventory.

4.3 Key uncertainties, assumptions, estimations, and allocations

4.3.1 Scenario Uncertainty

Blending Locations - In some cases, data to link the production of a formulation at a specific blend site and its subsequent sale to an end market were not available. Therefore, some assumptions were required to map the formulation through the life cycle. Castrol sales data provide volumes sold to each end market, broken down by product code. Product codes were then mapped to formulation codes and blend sites. Where formulations were blended at more than one blend site, a blend site was selected based on geographic proximity to the end market. The assumption for blending site location only significantly affects impacts associated with blending and distribution processes. Given the availability of data and the relatively small contribution to the total footprint from blending and distribution, this is considered a reasonable approach.

Use Profile – Average Castrol product are used in different product application systems to enhance the intended application system efficiency and are not typically consumed by the application system.

Average Castrol product are not intended to be consumed by the product application system. However, depending on the application there is either 100% direct loss (e.g., greases and marine), leakage of fixed % of the product, as well as unintended combustion (where applicable) with fuel in the product application system. Information relating to the quantity of average Castrol product that is lost, leaked, or is burned with fuel is limited. Therefore, in order to remain conservative, it is assumed the following:

- 100% direct loss: Degrades completely to carbon dioxide.
- Leakage of fixed % of product and/or combustion: Assumed 100% combusted (i.e., incinerated without energy recovery).

Data relating to the proportion of average Castrol product that leaks or is combusted (where applicable) with fuel is taken from both Castrol technology experts and Kline (2010), 'Global Used Oil 2009: Market Analysis and Opportunities'¹. The data from Kline was reviewed by Castrol and adjusted accordingly to reflect Castrol's knowledge on product application systems in the market.

End of Life – For products which are not 100% directly lost during the use phase, the average Castrol product can be drained from the product application system for end-of-life treatment.

Following the drainage of used product from the product application system, it is assumed a fixed % of used product is collected by a reputable waste contractor for management. At end-of-life, used oil can be recycled (requiring a re-refining process to remove impurities and produce a re-refined average Castrol product); incinerated with recovery of energy; incinerated without recovery of energy; or landfilled. The proportion of used average Castrol product

¹ Current Kline (2019) is not applied due to ambiguity of information and lack of details on methodology

following each waste management route is estimated, based on country-specific or region-specific average rates.

4.3.2 Parameter Uncertainty

The model contains complete referencing of all GWP factors. The sources are:

- 2020 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting for UK grid electricity, liquid and gaseous fuels and freight transport.
- Ecoinvent 3.6.
- Confidential supplier data; and
- 2020 International Energy Agency (IEA) grid factors.

4.3.3 Model Uncertainty

Not applicable. Material issues relating to uncertainty are covered under parameter and scenario uncertainty.

4.3.4 Allocation

Production of base oils - Impacts from crude oil refining have been allocated to base oil and co-products on a mass basis. As per Chapter 9 of the GHG Product Protocol, allocation has been based on the underlying relationship between the quantity of the co-products and quantity of emissions generated. Refining of crude oil results in several co-products, none of which can be assumed to be the primary reason for refining. It is therefore considered reasonable to allocate emissions on a mass basis, assigning impacts relative to the quantity (by mass) of each co-product output.

Incineration with energy recovery (use of used oil as fuel) - Cut-off approach has been applied for impacts from incineration at end-of-life with energy recovery as per the direction made in Chapter 9 of the GHG Product Protocol. This accounts for the use of used average Castrol product as a fuel for the generation of heat and electricity and is reflected in the applied emission factor (0 kg CO_{2e} per kg of used oil). This is equivalent to the recycled content approach where 100% of the emissions are allocated to the generation of electricity and useful heat. Emissions associated with energy recovery processes are already included in electricity grid mix datasets, so these have been omitted to avoid double counting these burdens.

Incineration without energy recovery - In this case, the waste is not incinerated for a useful purpose and the associated emissions are allocated to the average Castrol product system (e.g., incineration of used oil without energy recovery).

Recycling/re-refining at end-of-life - The recycled content approach has been used to account for recycling of materials at end-of-life. All impacts associated with recycling processes (e.g., cleaning, sorting, chipping) are allocated to the system using the recycled material as input (i.e.,

the next life cycle). This method has been applied to all materials that are recycled at end of life.

In this inventory, recycling relates to the end-of-life stage and refers to used oil and packaging materials. It is reflected in the relevant emission factors for recycling at end of life (all 0 kg CO₂e per kg of waste):

- Used oil recycling (i.e., re-refining) – 0% of re-refining process allocated to Castrol system and 100% allocated to system that uses re-refined oil; and
- Packaging materials – 0% of recycling processes allocated to Castrol; 100% allocated to system that uses recycled materials.

Site operational data - Castrol's blend sites typically produce more than one type of product. However, the process for blending and filling is comparable regardless of product (confirmed by Castrol). Therefore, total site operational data have been allocated to products in scope for the Castrol Carbon Neutral portfolio on a mass basis.

Displaced emissions and removals using the closed loop approximation method - Not applicable.

5. CARBON MANAGEMENT PLAN

5.1 Commitment

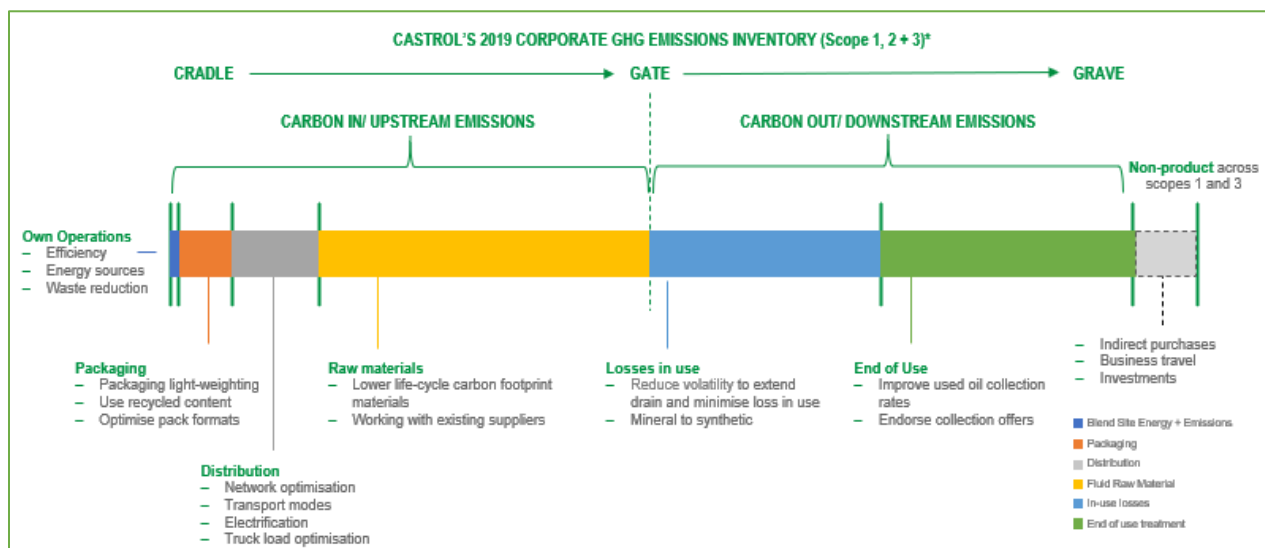
Castrol is committed to achieve carbon neutrality of the subject for the period of 1st January 2021 to 31st December 2021 in accordance with PAS 2060:2014. This commitment can be broken down as follows:

- Offset GHG emissions for the commitment period based on 2021 actuals sales data; to be completed in early 2022.
- Continue to define and implement its carbon reduction plan during the commitment period.

5.2 Carbon Reduction Plan

Castrol's carbon reduction plan is a global approach encompassing activities across Scope 1, 2 and 3 emissions in support of its aim to halve the net carbon intensity of its products sold by 2030 or sooner. Castrol measured its corporate footprint for the first time in 2020 and it has used the insights from that assessment to inform a key focus area of Castrol's PATH360 sustainability strategy: reducing carbon. In addition to assessing the scale and materiality of Scope 1,2 and 3 emissions and the opportunities for reductions within, Castrol has transformed its organisational structure by developing a sustainability squad made up of a series of workstreams focusing on the key categories across the lifecycle of Castrol's products. Leveraging agile ways of working, digital platforms and skills, and the collaboration of sustainability leaders across multiple sectors, Castrol continues to pursue activities that directly reduce and indirectly influence its carbon emissions as well as exploring options to accelerate its progress towards its aims.

Figure 5.1 – Castrol's Corporate GHG Emissions Inventory and Reduction Opportunities



Castrol is in action. After having set the baseline, strategy, ambition, ways of working and people, Castrol is building a roadmap by lifecycle category to measure the progress against its aims and implement interventions as required.

To reduce carbon emissions within the raw materials Castrol purchases, the focus is on three different activities. Firstly, the Castrol Technology team is committed to look for lower carbon footprint materials as a design-in approach to develop new products in select geographies. Secondly, within the current product portfolio, Castrol is working to optimize formulations by choosing lower carbon options, without compromising their performance. As an example, Castrol has made a shift in formulations where feasible from Group III to Group II base oils because of the relative improvement in product carbon intensity. Thirdly, Castrol is working in collaboration with its suppliers to understand their supplier-specific product carbon footprints, what they are doing to reduce their CO₂e emissions and to support them on their carbon reduction plans where possible. Castrol has also modified its RFQ process to include a sustainability questionnaire in an effort to benchmark its suppliers.

Castrol is committed in its transition to renewable energy across its owned assets, with 4 manufacturing sites already on renewable electricity contracts. Castrol's roadmap also includes replacing fuel oil combustion with natural gas in the limited sites where fuel oil is still used, reducing blending temperature and heating of raw materials where possible, and implementing smart energy management systems and equipment upgrades to improve efficiency and conserve energy.

Under the packaging category, Castrol has set a clear strategy to reduce, reuse and recycle plastic within its value chain, all in support of its aim to halve its plastic footprint per litre by 2030. Within the reduce plastic category, Castrol is focusing on light-weighting containers, looking for alternative materials and formats and increasing use of recycled resin. Under reuse, Castrol is exploring innovative solutions as refillable bottles (DIY), wash & refill solutions, foldable IBCs, and minibulk/dispense systems. Finally, under the recycle category Castrol is investigating potential collection schemes, closed & open loop recycling and designing for recycling alternatives.

At the end-of-life stage, Castrol is conducting market research in targeted geographies to understand industry assumptions and opportunities, as well as evaluating its participation and partnership strategy around end-of-life treatment and used oil collection rates.

Castrol has leveraged its digital platforms and skills to be able to track the carbon intensity for its products, identify future areas for carbon reductions and allocate and action the required resources to mitigate any potential risk to meet the reduction plan. Castrol will assess the performance against its carbon management plan at a minimum of once per annum.

6. CARBON OFFSET PROGRAM

Offset program for the 1st application Period

Credits for the period covering 1st Jan 2021 – 31st Dec 2021 will be ordered through bp Target Neutral (www.bptargetneutral.com) based on 2021 Actual tCO₂e. These credits will be procured in advance, forming BP Target Neutral's Project Portfolio, and will be purchased from sources which guarantee that:

- The offsets purchased represent genuine, additional GHG emissions reductions; and
- The projects involved in delivering offsets meet the criteria of additionality, permanence, leakage, and double counting.

The purchase of offsets via these schemes also guarantees that they will have been verified by an independent third party, only issued after the emission reductions had taken place, and were retired within 12 months from the date of the declaration of the achievement. These credits will be supported by publicly available project documentation, with references provided and stored and retired in an independent and credible registry.

Offsets will be calculated at the product variant level by multiplying the average carbon intensity for each product variant by its respective 2021 sales volume. In the instance where a new product variant has been introduced (i.e., sold) within an existing carbon neutral category but after the carbon footprinting period has closed, the average product carbon intensity for that carbon neutral category will be used to calculate the tonnes of offsets required for retirement. The product variant would then be included in the carbon footprinting process from the following application period.

If Castrol is able to demonstrate evidence where tonnes of CO₂e relative to this application period have been previously offset, it will include this in the calculation of required offsets. This would include Castrol's Scope 1 and 2 emissions which has its own carbon neutral commitment and application, as well as emissions from purchased raw materials made carbon neutral at the gate-to-gate or cradle-to-gate level.

Table 6.1 Carbon Offsets to Account for 1H Sales Volumes in the 1st Commitment Period

Project Name	Account Name	Standard and registry type	Date of retirement	Actual carbon offset (credits/tCO _{2e})
Orb Energy Solar Program in India	BP Gas Marketing Limited	Gold Standard / Verified Emission Reductions (VERs)	05/08/2021	90,000
Reducing Gas Leakages within the Titas Gas Distribution Network in Bangladesh	BP Gas Marketing Limited	UN registry for CDM projects	22/09/2021	93,533
Zhaoyuan Zhangxing Wind Power Project	BP Gas Marketing Limited	UN registry for CDM projects	22/09/2021	52,830
Korat Waste To Energy	BP Gas Marketing Limited	UN registry for CDM projects	22/09/2021	100,189
Switching of fuel from coal to palm oil mill biomass waste residues at Industrial de Oleaginosas Americanas S.A. (INOLASA)	BP Gas Marketing Limited	UN registry for CDM projects	22/09/2021	3,754
Fertinal Nitrous Oxide Abatement Project	BP Gas Marketing Limited	UN registry for CDM projects	22/09/2021	32,401
REDD project in Brazil nut concessions in Madre de Dios, Peru	BP International Limited	VCS / Markit Env Registry	23/09/2021	55,920
REDD project in Brazil nut concessions in Madre de Dios, Peru	BP International Limited	VCS / Markit Env Registry	22/09/2021	309,344
TOTAL H1 2021				737,971

The calculations to determine the required offsets based on 1H sales are performed at the SKU level across 1000+ product variants. The details of this were provided to the Independent 3P Assurer through interviews conducted in the assurance process.

Annex A: Qualifying Explanatory Statement (QES) Checklist

Table A.1 Checklist for QES supporting declaration of commitment to carbon neutrality

The following table has been extracted from PAS 2060:2014. It provides a checklist of information that should be included in the commitment to carbon neutrality, as well as identification of where this information is located.

#	Item Description	Status	Section in this QES
1	Identify the individual responsible for the evaluation and provision of data necessary for the substantiation of the declaration including that of preparing, substantiating, communicating, and maintaining the declaration.	✓	Section 2.1, Table 2.1
2	Identify the entity responsible for making the declaration.	✓	Section 2.1, Table 2.1
3	Identify the subject of the declaration.	✓	Section 2.1, Table 2.1, Annex D, Table D.1, Table D.2, Table D.3
4	Explain the rationale for the selection of the subject. <i>(The selection of the subject should ideally be based on a broader understanding of the entire carbon footprint of the entity so that the carbon footprint of the selected subject can be seen in context; entities need to be able to demonstrate that they are not intentionally excluding their most significant GHG emissions (or alternatively can explain why they have done so).)</i>	✓	Page 2, Section 2.1, Table 2.1, Section 2.3, Section 5.2, Figure 5.1, Annex D, Table D.1, Table D.2
5	Define the boundaries of the subject.	✓	Section 2.3, Table 2.1, Figure 2.2
6	Identify all characteristics (<i>purposes, objectives, or functionality</i>) inherent to that subject.	✓	Section 2.3, Table 2.1, Figure 2.2, Table D.2
7	Identify and take into consideration all activities material to the fulfilment, achievement or delivery of the purposes, objectives, or functionality of the subject.	✓	Section 2.3
8	Select which of the 3 options within PAS 2060 you intend to follow.	✓	Section 2.2, Table 2.1, Figure 2.1
9	Identify the date by which the entity plans to achieve the status of 'carbon neutrality' of the subject and specify the period for which the entity intends to maintain that status.	✓	Section 2.2, Figure 2.1, Section 5.1
10	Select an appropriate standard and methodology for defining the subject, the GHG emissions associated with that subject and the calculation of the carbon footprint for the defined subject.	✓	Section 2.3, Section 3.1
11	Provide justification for the selection of the methodology chosen. <i>(The methodology employed shall minimise uncertainty and yield accurate, consistent, and reproducible results.)</i>	✓	Section 3.1

12	Confirm that the selected methodology was applied in accordance with its provisions and the principles set out in PAS 2060.	✓	Section 3.1
13	Describe the actual types of GHG emissions, classification of emissions (<i>Scope 1, 2 or 3</i>) and size of carbon footprint of the subject exclusive of any purchases of carbon offsets:	✓	Section 3.1, Section 3.2, Table 3.1, Annex C
	<i>a) All greenhouse gases shall be included and converted to tCO₂e.</i>	✓	Section 3.1, Section 3.2
	<i>b) 100% Scope 1 (direct) emissions relevant to the subject shall be included when determining the carbon footprint.</i>	✓	Section 3.1, Table 3.1, Table 3.2
	<i>c) 100% Scope 2 (indirect) emissions relevant to the subject shall be included with determining the carbon footprint.</i>	✓	Section 3.1, Table 3.1, Table 3.2
	<i>d) Where estimates of GHG emissions are used in the quantification of the subject carbon footprint (particularly when associated with Scope 3 emissions) these shall be determined in a manner that precludes underestimation.</i>	✓	Section 3.1, Table 3.3
	<i>e) Scope 1, 2 or 3 emission sources estimated to be more than 1% of the total carbon footprint shall be taken into consideration unless evidence can be provided to demonstrate that such quantification would not be technically feasible or cost effective. (Emissions sources estimated to constitute less than 1% may be excluded on that basis alone.)</i>	✓	Table 3.1, Table 3.3
	<i>f) The quantified carbon footprint shall cover at least 95% of the emissions from the subject.</i>	✓	Table 3.2, Table 3.3
	<i>g) Where a single source contributes more than 50% of the total emissions, the 95% threshold applies to the remaining sources of emissions.</i>	✓	Table 3.2, Table 3.3
	<i>h) Any exclusion and the reason for that exclusion shall be documented.</i>	✓	Section 3.1, Table 3.3
14	Where the subject is an organisation/ company or part thereof, ensure that:		
	<i>a) Boundaries are a true and fair representation of the organisation's GHG emissions (i.e., shall include GHG emissions relating to core operations including subsidiaries owned and operated by the organisation). It will be important to ensure claims are credible – so if an entity chooses a very narrow subject and excludes its carbon intensive activities or it if outsources its carbon intensive activities, then this needs to be documented.</i>	✓	Section 3.1, Table 3.3
	<i>b) Either the equity share or control approach has been used to define which GHG emissions are included. Under the equity share approach, the entity accounts for GHG emissions from the subject according to its share of equity in the subject. Under the control approach, the entity shall account for 100% of the GHG emissions over which it has financial and/or operational control.</i>	✓	Table 2.1
15	Identify if the subject is part of an organisation or a specific site or location and treat as a discrete operation with its own purpose, objectives, and functionality.	N/A	

16	Where the subject is a product of service, include all Scope 3 emissions (<i>as the life cycle of the product/ service needs to be taken into consideration</i>).	✓	Section 3.2
17	Describe the actual methods used to quantify GHG emissions (<i>e.g., use of primary or secondary data</i>), the measurement unit(s) applied, the period of application and the size of the resulting carbon footprint. (<i>The carbon footprint shall be based as far as possible on primary activity data.</i>) Where quantification is based on calculations (<i>e.g., GHG activity data multiplied by greenhouse gas emission factors or the use of mass balance/ life cycle models</i>) then GHG emissions shall be calculated using emissions factors from national (<i>Government</i>) publications. Where such factors are not available, international or industry guidelines shall be used. In all cases the sources of such data shall be identified.	✓	Page 1, Page 2, Section 2.1, Table 2.1, Figure 2.1, Section 3.1, Section 3.2, Table 3.1, Table 3.2, Section 4.1, Section 4.3.2, Section 6
18	Provide details of, and explanation for, the exclusion of any Scope 3 emissions.	✓	Section 3.1, Table 3.3
19	Document all assumptions and calculations made in quantifying GHG emissions and in the selection or development of greenhouse gas emissions factors. (<i>Emission factors used shall be appropriate to the activity concerned and current at the time of quantification.</i>)	✓	Section 3.1, Section 3.2, Section 4.1, Section 4.2, Section 4.3
20	Document your assessments of uncertainty and variability associated with defining boundaries and quantifying GHG emissions including the positive tolerances adopted in association with emissions estimates. (<i>The statement could take the form of a qualitative description regarding the uncertainty of the results, or a quantitative assessment of uncertainty if available (e.g., carbon footprint based on 95% of likely greenhouse gas emissions; primary sources are subject to variation over time; footprint is best estimate based on reasonable costs of evaluation)</i>).	✓	Section 4.2, Section 4.3
21	Document Carbon Footprint Management Plan:		
	a) <i>Make a statement of commitment to carbon neutrality for the defined subject.</i>	✓	Section 5.1
	b) <i>Set timescales for achieving carbon neutrality for the defined subject.</i>	✓	Section 5.1
	c) <i>Specify targets for GHG reduction for the defined subject appropriate to the timescale for achieving carbon neutrality including the baseline date, the first qualification date and the first application period.</i>	✓	Section 5.2
	d) <i>Document the planned means of achieving and maintaining GHG emissions reductions including assumptions made and any justification of the techniques and measures to be employed to reduce GHG emissions.</i>	✓	Section 5.2
	e) <i>Specify the offset strategy including an estimate of the quantity of GHG emissions to be offset, the nature of the offsets and the likely number and type of credits.</i>	✓	Section 6, Table 6.1
22	Implement a process for undertaking periodic assessments of performance against the Plan and for implementing corrective action to ensure targets are achieved. The frequency of assessing performance against the Plan should	✓	Section 5.2

	be commensurate with the timescale for achieving carbon neutrality.		
23	Where the subject is a non-recurring event, such as weddings or a concert, identify ways of reducing GHG emissions to the maximum extent commensurate with enabling the event to meet its intended objectives before the event takes place and include 'post event review' to determine whether the expected minimisation in emissions has been achieved.	N/A	
24	Any reductions in the GHG emissions from the defined subject delivered in the three years prior to the baseline date and not otherwise considered in any GHG emissions quantification have been made in accordance with this PAS.	N/A	
25	Record the number of times that the declaration of commitment has been renewed without declaration of achievement.	✓	This is the first declaration of commitment without a declaration of achievement
26	Specify the type of conformity assessment:		
	<i>a) independent third-party certification</i>	✓	Section 2.1, Table 2.1
	<i>b) other party validation</i>	N/A	
	<i>c) self-validation</i>	N/A	
27	Include statements of validation where declarations of commitment to carbon neutrality are validated by a third-party certifier or second party organisations.	✓	Annex B
28	Date the QES and have signed by the senior representative of the entity concerned (e.g., CEO of a corporation; Divisional Director, where the subject is a division of a larger entity; the Chairman of a town council or the head of the household for a family group).	✓	Page 2
29	Make the QES publicly available and provide a reference to any freely accessible information upon which substantiation depends (e.g., via websites).	✓	A redacted version of the QES will be made publicly available.
30	Update the QES to reflect changes and actions that could affect the validity of the declaration of commitment to carbon neutrality.	✓	A commitment has been made by the business to do this; reflected on Page 2

Annex B: Carbon Neutrality Assurance Statement



WHEN TRUST MATTERS

Independent Limited Assurance Report

to the Management of Lubricants UK Ltd

Lubricants UK Ltd ("Castrol") commissioned DNV Business Assurance Services UK Limited ("DNV", "us" or "we") to conduct a limited assurance engagement over the declaration of carbon neutrality in the **Qualifying Explanatory Statement** (the "Report") for its PATH360 Carbon Neutral Products for the commitment period ending 31 December 2021.



Our Conclusion: Based on the procedures we have performed and the evidence we have obtained, nothing has come to our attention that causes us to believe that the Report is not fairly stated and has not been prepared, in all material respects, in accordance with the Criteria. This conclusion relates only to the Report, and is to be read in the context of this Independent Limited Assurance Report, in particular the inherent limitations explained below.

Scope of work

The scope and boundary of our work is restricted to assessing that Castrol's preparation of the declaration of carbon neutrality presented in the Report, is in accordance with the Publicly Available Specification (PAS) 2060:2014 Demonstration of Carbon Neutrality (the "Criteria").

The products included within the PATH360 Carbon Neutral Products are included in Annex D of the Report.

We have not performed any work, and do not express any conclusion, on any other information that may be published outside of the Report and/or on Castrol's websites for the commitment period or for previous periods. Our work also excluded assessing the reliability of the inputs of the carbon footprint model.

Basis of our conclusion

We are required to plan and perform our work in order to consider the risk of material misstatement of the Report; our work included, but was not restricted to:

- Conducting interviews with Castrol's management to obtain an understanding of the key processes, systems and controls in place to generate and produce the content of the Report;
- Conducting interviews with the third party in charge of maintaining and updating the carbon footprint model, used in the production of the Report;
- Assessing whether the standards and methodologies used in the carbon footprint model met the Criteria;
- Performing limited substantive testing of the carbon footprint model to check that its data and underlying assumptions had been appropriately measured, recorded and reported; and
- Reviewing that the evidence, calculations and the context provided in the Report is prepared in line with the Criteria.

<p>Our competence, independence and quality control</p>	<p>Inherent limitations</p>
<p>DNV's policies and procedures are designed to ensure that DNV, its personnel and others where applicable, are subject to independence requirements (including personnel of other entities of DNV) and maintain independence where necessary by relevant ethical requirements. This engagement was carried out by an independent team of sustainability assurance professionals. DNV holds other contracts with Castrol, none of which conflict with the scope of this work. Our multi-disciplinary team consisted of professionals with a combination of environmental and sustainability assurance experience.</p>	<p>All assurance engagements are subject to inherent limitations as selective testing (sampling) may not detect errors, fraud or other irregularities. Non-financial data may be subject to greater inherent uncertainty than financial data, given the nature and methods used for calculating, estimating and determining such data. The selection of different, but acceptable, measurement techniques may result in different quantifications between different entities. Our assurance relies on the premise that the data and information provided to us by Castrol have been provided in good faith. DNV expressly disclaims any liability or co-responsibility for any decision a person or an entity may make based on this Independent Limited Assurance Report.</p>
	
<p>Standard and level of assurance</p> <p>We performed a limited assurance engagement in accordance with the International Standard on Assurance Engagements (ISAE) 3000 revised – 'Assurance Engagements other than Audits and Reviews of Historical Financial Information' (revised), issued by the International Auditing and Assurance Standards Board. This standard requires that we comply with ethical requirements and plan and perform the assurance engagement to obtain limited assurance.</p> <p>DNV applies its own management standards and compliance policies for quality control, in accordance with ISO/IEC 17021:2015 - Conformity Assessment Requirements for bodies providing audit and certification of management systems, and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.</p> <p>The procedures performed in a limited assurance engagement vary in nature and timing from, and are less in extent than for, a reasonable assurance engagement; and the level of assurance obtained is substantially lower than the assurance that would have been obtained had a reasonable assurance engagement been performed. We planned and performed our work to obtain the evidence we considered sufficient to provide a basis for our opinion, so that the risk of this conclusion being in error is reduced but not reduced to very low.</p>	<p>Responsibilities of Castrol's Management and DNV</p> <p>The Management of Castrol have sole responsibility for:</p> <ul style="list-style-type: none"> • Preparing and presenting the Report in accordance with the Criteria; • Designing, implementing and maintaining effective internal controls over the information and data, resulting in the preparation of the Report that is free from material misstatements; • Measuring and reporting the Report's data based on the established Criteria; and • Contents and statements contained within the Report. <p>Our responsibility is to plan and perform our work to obtain limited assurance about whether the Report has been prepared in accordance with the Criteria and to report to Castrol in the form of an Independent Limited Assurance Report, based on the work performed and the evidence obtained. We have not been responsible for the preparation of the Report.</p>
<p>DNV Business Assurance Services UK Limited</p> <p>London, UK 9 February 2022</p> 	<p>DNV Business Assurance</p> <p>DNV Business Assurance Services UK Limited is part of DNV – Business Assurance, a global provider of certification, verification, assessment and training services, helping customers to build sustainable business performance.</p> <p>www.dnv.co.uk/BetterAssurance</p>



Annex C: Included GHG Emissions

Table C.1 Global warming potential (GWP) values relative to CO₂

The following table includes the 100-year time horizon global warming potentials (GWP) relative to CO₂, which have been used for the carbon footprint assessment of the subject. This table is adapted from the IPCC Fifth Assessment Report, 2014 (AR5). For more information, please see the IPCC website (www.ipcc.ch).

Industrial designation or common name	Chemical formula	GWP values for 100-year time horizon from IPCC Fifth Assessment Report (AR5)	
Carbon dioxide	CO ₂	1	kg CO ₂ -eq per kg
Methane	CH ₄	28	kg CO ₂ -eq per kg
Nitrous oxide	N ₂ O	265	kg CO ₂ -eq per kg
Substances controlled by the Montreal Protocol			
CFC-11	CCl ₃ F	4,660	kg CO ₂ -eq per kg
CFC-12	CCl ₂ F ₂	10,200	kg CO ₂ -eq per kg
CFC-13	CClF ₃	13,900	kg CO ₂ -eq per kg
CFC-113	CCl ₂ FCClF ₂	5,820	kg CO ₂ -eq per kg
CFC-114	CClF ₂ CClF ₂	8,590	kg CO ₂ -eq per kg
CFC-115	CClF ₂ CF ₃	7,670	kg CO ₂ -eq per kg
Halon-1301	CBrF ₃	6,290	kg CO ₂ -eq per kg
Halon-1211	CBrClF ₂	1,750	kg CO ₂ -eq per kg
Halon-2402	CBrF ₂ CBrF ₂	1,470	kg CO ₂ -eq per kg
Carbon tetrachloride	CCl ₄	1,730	kg CO ₂ -eq per kg
Methyl bromide	CH ₃ Br	2	kg CO ₂ -eq per kg
Methyl chloroform	CH ₃ CCl ₃	160	kg CO ₂ -eq per kg
HCFC-21	CHCl ₂ F	148	kg CO ₂ -eq per kg
HCFC-22	CHClF ₂	1,760	kg CO ₂ -eq per kg
HCFC-123	CHCl ₂ CF ₃	79	kg CO ₂ -eq per kg
HCFC-124	CHClFCF ₃	527	kg CO ₂ -eq per kg
HCFC-141b	CH ₃ CCl ₂ F	782	kg CO ₂ -eq per kg
HCFC-142b	CH ₃ CClF ₂	1,980	kg CO ₂ -eq per kg
HCFC-225ca	CHCl ₂ CF ₂ CF ₃	127	kg CO ₂ -eq per kg
HCFC-225cb	CHClFCF ₂ CClF ₂	525	kg CO ₂ -eq per kg
Hydrofluorocarbons (HFCs)			
HFC-23	CHF ₃	12,400	kg CO ₂ -eq per kg
HFC-32	CH ₂ F ₂	677	kg CO ₂ -eq per kg
HFC-41	CH ₃ F	116	kg CO ₂ -eq per kg
HFC-125	CHF ₂ CF ₃	3,170	kg CO ₂ -eq per kg
HFC-134	CHF ₂ CHF ₂	1,120	kg CO ₂ -eq per kg
HFC-134a	CH ₂ FCF ₃	1,300	kg CO ₂ -eq per kg
HFC-143	CH ₂ FCHF ₂	328	kg CO ₂ -eq per kg
HFC-143a	CH ₃ CF ₃	4,800	kg CO ₂ -eq per kg
HFC-152	CH ₂ FCH ₂ F	16	kg CO ₂ -eq per kg
HFC-152a	CH ₃ CHF ₂	138	kg CO ₂ -eq per kg
HFC-161	CH ₃ CH ₂ F	4	kg CO ₂ -eq per kg
HFC-227ea	CF ₃ CHFCF ₃	3,350	kg CO ₂ -eq per kg
HFC-236cb	CH ₂ FCF ₂ CF ₃	1,210	kg CO ₂ -eq per kg
HFC-236ea	CHF ₂ CHFCF ₃	1,330	kg CO ₂ -eq per kg
HFC-236fa	CF ₃ CH ₂ CF ₃	8,060	kg CO ₂ -eq per kg
HFC-245ca	CH ₂ FCF ₂ CHF ₂	716	kg CO ₂ -eq per kg
HFC-245fa	CHF ₂ CH ₂ CF ₃	858	kg CO ₂ -eq per kg
HFC-365mfc	CH ₃ CF ₂ CH ₂ CF ₃	804	kg CO ₂ -eq per kg
HFC-43-10mee	CF ₃ CHFCF ₂ CF ₃	1,650	kg CO ₂ -eq per kg
Perfluorinated compounds			
Sulphur hexafluoride	SF ₆	23,500	kg CO ₂ -eq per kg
Nitrogen trifluoride	NF ₃	16,100	kg CO ₂ -eq per kg
PFC-14	CF ₄	6,630	kg CO ₂ -eq per kg
PFC-116	C ₂ F ₆	11,100	kg CO ₂ -eq per kg
PFC-218	C ₃ F ₈	8,900	kg CO ₂ -eq per kg
PFC-318	c-C ₄ F ₈	9,540	kg CO ₂ -eq per kg
PFC-31-10	C ₄ F ₁₀	9,200	kg CO ₂ -eq per kg

PFC-41-12	C ₃ F ₁₂	8,550	kg CO ₂ -eq per kg
PFC-51-14	C ₆ F ₁₄	7,910	kg CO ₂ -eq per kg
PCF-91-18	C ₁₀ F ₁₈	7,190	kg CO ₂ -eq per kg
Trifluoromethyl sulphur pentafluoride	SF ₅ CF ₃	17,400	kg CO ₂ -eq per kg
Perfluorocyclopropane	c-C ₃ F ₆	9,200	kg CO ₂ -eq per kg
Fluorinated ethers			
HFE-125	CHF ₂ OCF ₃	12,400	kg CO ₂ -eq per kg
HFE-134	CHF ₂ OCHF ₂	5,560	kg CO ₂ -eq per kg
HFE-143a	CH ₃ OCF ₃	523	kg CO ₂ -eq per kg
HCFE-235da2	CHF ₂ OCF ₂ CF ₃	491	kg CO ₂ -eq per kg
HFE-245cb2	CH ₃ OCF ₂ CF ₃	645	kg CO ₂ -eq per kg
HFE-245fa2	CHF ₂ OCH ₂ CF ₃	812	kg CO ₂ -eq per kg
HFE-347mcc3	CH ₃ OCF ₂ CF ₂ CF ₃	530	kg CO ₂ -eq per kg
HFE-347pcf2	CHF ₂ CF ₂ OCH ₂ CF ₃	889	kg CO ₂ -eq per kg
HFE-356pcc3	CH ₃ OCF ₂ CF ₂ CHF ₂	413	kg CO ₂ -eq per kg
HFE-449sl (HFE-7100)	C ₄ F ₉ OCH ₃	421	kg CO ₂ -eq per kg
HFE-569sf2 (HFE-7200)	C ₄ F ₉ OC ₂ H ₅	57	kg CO ₂ -eq per kg
HFE-43-10pccc124 (H-Galden 1040x)	CHF ₂ OCF ₂ OC ₂ F ₄ OCHF ₂	2,820	kg CO ₂ -eq per kg
HFE-234ca12 (HG-10)	CHF ₂ OCF ₂ OCHF ₂	5,350	kg CO ₂ -eq per kg
HFE-338pcc13 (HG-01)	CHF ₂ OCF ₂ CF ₂ OCHF ₂	2,910	kg CO ₂ -eq per kg
HFE-227ea	CF ₃ CHFOCF ₃	6,450	kg CO ₂ -eq per kg
HFE-236ea2	CHF ₂ OCHF ₂ CF ₃	1,790	kg CO ₂ -eq per kg
HFE-236fa	CF ₃ CH ₂ OCF ₃	979	kg CO ₂ -eq per kg
HFE-245fa1	CHF ₂ CH ₂ OCF ₃	828	kg CO ₂ -eq per kg
HFE-263fb2	CF ₃ CH ₂ OCH ₃	1	kg CO ₂ -eq per kg
HFE-329mcc2	CHF ₂ CF ₂ OCF ₂ CF ₃	3,070	kg CO ₂ -eq per kg
HFE-338mcf2	CF ₃ CH ₂ OCF ₂ CF ₃	929	kg CO ₂ -eq per kg
HFE-347mcf2	CHF ₂ CH ₂ OCF ₂ CF ₃	854	kg CO ₂ -eq per kg
HFE-356mec3	CH ₃ OCF ₂ CHF ₂ CF ₃	387	kg CO ₂ -eq per kg
HFE-356pcf2	CHF ₂ CH ₂ OCF ₂ CHF ₂	719	kg CO ₂ -eq per kg
HFE-356pcf3	CHF ₂ OCH ₂ CF ₂ CHF ₂	446	kg CO ₂ -eq per kg
HFE-365mcf3	CF ₃ CF ₂ CH ₂ OCH ₃	<1	kg CO ₂ -eq per kg
HFE-374pc2	CHF ₂ CF ₂ OCH ₂ CH ₃	627	kg CO ₂ -eq per kg
Perfluoropolyethers			
PFPME	CF ₃ OCF(CF ₃)CF ₂ OCF ₂ OCF ₃	9,710	kg CO ₂ -eq per kg
Hydrocarbons and other compounds – direct effects			
Chloroform	CHCl ₃	16	kg CO ₂ -eq per kg
Methylene chloride	CH ₂ Cl ₂	9	kg CO ₂ -eq per kg
Methyl chloride	CH ₃ Cl	12	kg CO ₂ -eq per kg
Halon-1201	CHBrF ₂	376	kg CO ₂ -eq per kg

Annex D: Products in Scope

Table D.1 List of Carbon Neutral Categories and Reason for Inclusion (Classification)

Carbon Neutral Category	Products in Scope	Carbon Neutral Classification
AUSTRALIA	All Products Sold	Lead CLT
NEW ZEALAND	All Products Sold	Lead CLT
VIETNAM	All Products Sold	Lead CLT
EDGE	All Products Sold ¹	Lead Brand : Cars
POWER1	All Products Sold ²	Lead Brand : Motorcycles
VECTON	All Products Sold	Lead Brand : Commercial Vehicles & Existing
OPTIGEAR	All Products Sold	Lead Brand : Industrial / Wind Turbines & Existing (2 variants)
BRAYCO & TRANSAQUA	All Energy-Owned BRAYCO & TRANSAQUA Products Sold	Lead Brands : Energy / Subsea
BIO RANGE	BIO TAC, BIO STAT and BIO BAR	Lead Brand : Marine / improved biodegradation, reduced bioaccumulation or toxicity
XBB & XBC	ALUSOL & HYSOL XBB; TECHNICLEAN XBC	Lead Brand : Industrial Coolants and Cleaners / reduce water use and waste
Castrol ON	All Products Sold	Lead Brand: e-Fluids
EUROPE & RUSSIA PCO	All Products Sold	Existing
JAPAN PCO	All Products	Existing
JAPAN TRANSMAX	All Products Sold	Existing
PROFESSIONAL	All Products Sold	Existing
EUROPE CRB	All Products Sold	Market Specific Request
US TRANSYND & AUTRAN	TRANSYND, TRANSYND RD and AUTRAN SYN 295 sold in the US	Market Specific Request

Lead CLT: One of 3 countries making all the products they sell carbon neutral in year one of the PATH360 Carbon Neutral Program

Lead Brand: Brands of significance for each Product Owner (sales space) due to either scale of volume sold or PATH360 sustainability qualifying criteria

Existing: Introduced as a carbon neutral product prior to the PATH360 launch (2014-2020) and included in discrete previous carbon neutral applications (QES's).

¹EDGE: Excluding EDGE in the US which will be included from 2022

²POWER1: Excluding POWER1 in China which will be included from 2022

Table D.2 List of Product Types by Category Sold (Product Owner)

Product owner	Product Type	Product owner	Product Type
Cars	Additives	Industrial	Additives
	Antifreeze/ Coolants (automotive)		Chain Lubricants
	Automatic Transmission Fluid		Circulating Oils
	Brake Fluid		Compressor oils
	Engine oils: Passenger Car (and car derived van)		Coolants (Industrial)
	Gear oils		Corrosion preventives
	Greases		Food grades
	Hydraulic fluids		Forming oils
	Industrial Cleaners		Gear oils
	Manual Transmission Fluids		Greases
	Other		Heat transfer oils
	Specialties		Hydraulic fluids
	Commercial Vehicles		Additives
Antifreeze/ Coolants (automotive)			Other
Automatic Transmission Fluid			Process Oils
Chain Lubricants			Quenching Oils
Coolants (Industrial)			Refrigerator Compressor Oil
Engine oils: Commercial Vehicle			Slide Way Oils
Engine oils: Marine			Specialties
Engine oils: Off Highway			Specification grades
Gear oils			Steam Reciprocating Engine Oils
Greases			Wire Rope Protectives
Hydraulic fluids		Energy	Compressor oils
Industrial Cleaners			Engine oils: Gas-Industrial
Manual Transmission Fluids			Heat transfer oils
Multifunctional fluids			Hydraulic fluids
Other			Specification grades
Specialties		Transformer Oils	
Motorcycles	Chain Lubricants		Turbine oils
	Engine oils: Motorcycle	Marine	Engine oils: Marine
	Greases		Gear oils
	Motorcycle Ancillaries		Greases
	Small Engine Oil		Hydraulic fluids
			Other
		Refrigerator Compressor Oil	
		Turbine oils	

Table D.3 Complete List of Product Variants by Carbon Neutral Category



Carbon Neutral
Product List - QES.xl: