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PAS 2060 Qualifying Explanatory Statement – Castrol Carbon Neutral Scope 1 and 2

3rd Application Period: January – December 2022

This is a PAS 2060 Qualifying Explanatory Statement to demonstrate that Castrol has achieved carbon neutrality with a commitment to maintain in accordance with PAS 2060:2014 reporting

Carbon Neutrality Declaration

“Carbon neutrality of Scope 1 and Scope 2 GHG Emissions achieved by Castrol in accordance with PAS 2060:2014 at 31st December 2022 with the commitment to maintain to 31st December 2023, for the period commencing 1st January 2023, DNV certified”

Rachel Bradley

Rachel Bradley

Rachel Bradley (Mar 27, 2024 11:37 GMT)

**Global Sustainability Manager,
C&P – Castrol**

Sydelle Elshenawy

Sydelle Elshenawy

Sydelle Elshenawy (Mar 26, 2024 07:29 EDT)

**Global Supply Chain Sustainability Lead,
C&P - Castrol**

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 DNV Business Assurance Services UK Limited¹, a third-party assurer. If provided with any information affecting the validity of the following statements, this document will be updated accordingly. 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 milestones that underpin external aims.

This is Castrol’s second declaration of achievement of carbon neutrality for Scope 1 and 2 GHG emissions.

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

¹ DNV is one of the world’s leading certification and assurance bodies, helping businesses assure the performance of their organisations, products, people, facilities and supply chains through certification, verification, and assurance.

1. TERMS & DEFINITIONS

100-year Global Warming Potential	Factor describing the radiative forcing impact of one mass-based unit of a given greenhouse gas relative to an equivalent unit of carbon dioxide over a given period of time NOTE: Carbon dioxide is assigned a GWP of 1, while the GWP of other gases is expressed relative to the GWP of carbon dioxide from fossil carbon sources. Global warming potentials for a 100-year time period are produced by the Intergovernmental Panel on Climate Change ² .
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
Carbon Credit	A generic term to assign a value to the carbon offset. One carbon credit is usually equivalent to one tonne of carbon dioxide.
Carbon Offsets	Discrete reduction in greenhouse gas emissions not arising from the defined subject, made available in the form of a carbon credit meeting the requirements of 9.1.2 of PAS 2060:2014 and used to counteract emissions from the defined subject. PAS 2060:2014 specifies that carbon offsets are acquired to compensate for greenhouse gas emissions arising from a defined subject. Offsets are calculated relative to a baseline that represents a hypothetical scenario for what emissions would have been in the absence of the mitigation project that generates the offsets.
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. Annex C of PAS 2060:2014 Table C.1 includes the GHG Protocol, Product lifecycle accounting and reporting standard as an example of a document providing methodologies appropriate for use in the quantification and reduction of GHG emissions. Greenhouse Gas Protocol (ghgprotocol.org)

² Taken from the Terms and definitions in PAS 2060:2014

GHGP Corporate Standard	Greenhouse Gas Protocol Corporate Standard: (Scope 1 and 2 emissions) https://ghgprotocol.org/corporate-standard
GHGP Corporate Value Chain Standard	Greenhouse Gas Protocol Corporate Value Chain Standard: (Scope 3 emissions) https://ghgprotocol.org/corporate-standard
IPCC Fifth Assessment Report	The Intergovernmental Panel on Climate Change (IPCC) provides an international statement on the scientific understanding of climate change IPCC – Intergovernmental Panel on Climate Change
I3P-1 (for third party)	The conformity assessment type as outlined in PAS2060:2014, in this case: Independent 3P certification - commitment
I3P-3 (for independent third-party certification – unified)	The conformity assessment type as outlined in PAS2060:2014, in this case: Independent 3P certification - unified (achievement of and future commitment to, carbon neutrality)
PAS 2050	PAS 2050 is a publicly available specification that provides a method for assessing the life cycle greenhouse gas (GHG) emissions of goods and services (jointly referred to as ‘products’).
PAS 2060	Publicly available Specification for the Demonstration of Carbon Neutrality. PAS 2060:2014 (referenced in this document) refers to the latest 2014 version of the document
QES	Collation of evidence in support of the declaration of a commitment to carbon neutrality and/or the declaration of achievement of carbon neutrality, in compliance with PAS 2060 (as per PAS 2060:2014).
Renewable Energy Certificates (RECs)	A REC (Renewable Energy Certificate) is a type of Energy Attribute Certificate (EAC) that represents the environmental attributes of the generation of a one-megawatt hour (MWh) of energy produced by renewable sources. I-REC Standard - The International REC Standard Foundation (irecstandard.org)

2. INTRODUCTION

2.1 Foreword

This Qualifying Explanatory Statement (QES) demonstrates Castrol's achievement of carbon neutrality of its Scope 1 and 2 GHG emissions at 31st December 2022 in accordance with PAS 2060:2014, with the commitment to maintain such achievement to 31st December 2023, for the period commencing 1st January 2023

This QES provides details on Castrol's Scope 1 and 2 carbon footprint, how it was calculated, and Castrol's carbon management plan inclusive of emission reduction initiatives and the offset process to compensate for residual emissions.

A checklist of requirements to demonstrate conformance to PAS 2060:2014 and their respective location within the QES can be found in Annex A.

Table 2.1 - General Information

PAS 2060:2014 Information Requirement	Information as it relates to Castrol Ltd
Entity making PAS 2060:2014 declaration	Lubricants UK 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	Scope 1 and 2 GHG emissions across Castrol's Global Operations (see Characteristics of the subject below for further details.)
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. Castrol's Scope 1 and 2 GHG emissions include stationary emissions from 19 owned blend plants and 1 owned office and mobile emissions from light vehicles for the sales fleet globally. Castrol's logistics fleet is 100% outsourced.
Rationale for the selection of the subject and boundary	Castrol is making its Scope 1 and 2 GHG emissions carbon neutral in support of its PATH360 Sustainability Strategy. Castrol first determined its baseline Scope 1, 2 and 3 GHG emissions in 2020, but is excluding Scope 3

	from carbon neutrality due to its practicability. Within a separate QES, <i>PAS 2060 Qualifying Explanatory Statement – Castrol Carbon Neutral Products</i> , Castrol has demonstrated its achievement of and ongoing commitment to carbon neutrality over a significant portion of its Scope 3 emissions through its carbon neutral products programme which covers ~33% of its 2022 sales volume.
Conformity assessment type	I3P-3 Independent third-party certification – unified
Baseline date (Date of first determined footprint)	1 st Jan – 31 st Dec 2019
Achievement period for carbon neutrality	1 st Jan – 31 st Dec 2022
Commitment period for carbon neutrality	1 st Jan – 31 st Dec 2023

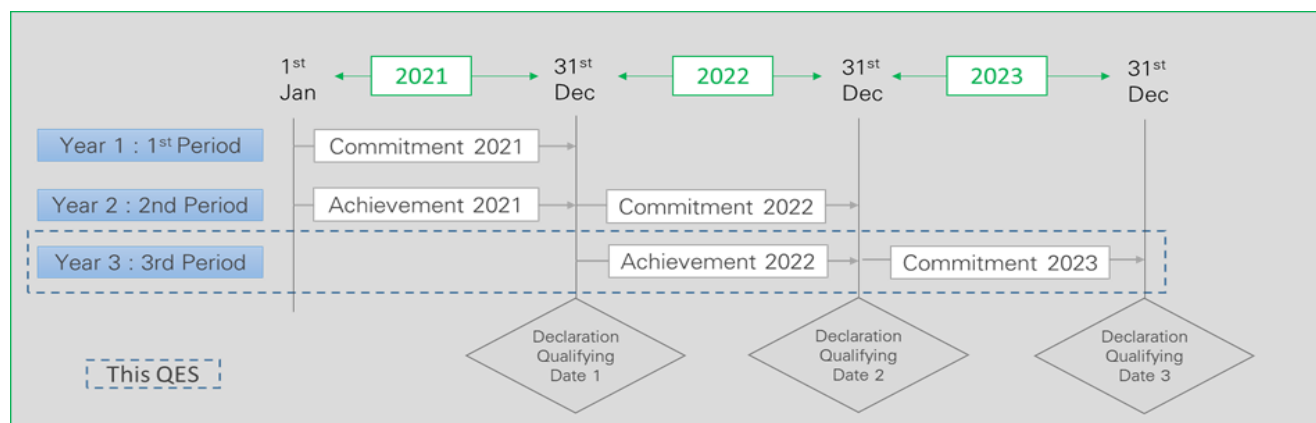
2.2 PAS 2060 Carbon Neutrality

Castrol will demonstrate carbon neutrality of the subject as set out in PAS 2060:2014 using an independent 3rd party certification in accordance with 10.3.2 of PAS 2060:2014. For the 1st application period following the baseline date, declaration I3P-1 from Annex A had been used. For this and all subsequent application periods with an unchanged subject, declaration I3P-3 modified as per A.2 of PAS 2060:2014 shall be used. In the event that material change to the subject occurs, the sequence shall be re-started on the basis of a newly defined subject.

Castrol is following the timeline for carbon neutrality in accordance to Figure 2.1 - Carbon Neutrality Declaration Periods. Castrol has now completed its third application period by demonstrating carbon neutral achievement for 2022 and a commitment to maintain through 2023. The first period represents the baseline period and the commitment to carbon neutrality for calendar year 2021, and the second period represents the achievement of calendar year 2021 with the commitment to maintain through 2022. The subject has been defined and its carbon footprint quantified. The QES is officially released to the public after the independent third-party assurance of Castrol's QES and will be updated accordingly to reflect any changes and actions that could affect the validity of the declaration of achievement with the commitment to maintain.

A carbon management plan has been developed and implementation initiated to drive carbon reductions within Castrol's defined boundaries, where the business is able to have direct influence over the carbon emissions. Section 5 of this QES provides details on this carbon management plan and the progress made in reducing carbon between 2019 (the baseline date / first assessment of Castrol's Scope 1 and 2 GHG emissions) and this 2022 achievement period. Section 6 provides details on the amount of offset credits used to compensate for the residual emissions and the projects associated with these credits.

Figure 2.1 – Carbon Neutral Declaration Periods



2.3 Boundaries of the Subject

The declaration of carbon neutrality covers GHG emissions relating to all of the activities across Castrol's owned / controlled manufacturing facilities (19), owned office locations (1- Castrol's headquarters in the UK) and the fleet of light vehicles used by the sales force to service Castrol customers globally.

Castrol conducted its first corporate footprint³ (Scope 1, 2 and 3 GHG emissions) in 2020 using calendar year 2019 as the baseline date. This assessment of its full corporate value chain emissions helped inform Castrol's PATH360 Sustainability Strategy and its aim to halve the net carbon intensity of the products it sells by 2030 or sooner. In a separate QES and carbon neutrality declaration, Castrol has demonstrated its achievement of carbon neutrality over ~33% of its products sold in 2022 and the related Scope 3 GHG emissions for those products. Within this QES, Castrol is focusing on the GHG emissions within its operational control (Scope 1 and 2 emissions) and the associated carbon reduction activities which will help to underpin its 2030 aim. Since 2021, Castrol has limited the update of the GHG accounting to Scope 1 and 2 emissions, and for this QES and carbon neutrality declaration, Scope 3 has been excluded. The quantified carbon footprint covers at least 95% of the emissions from the subject.

³ In accordance with the GHGP Corporate Standard and Corporate Value Chain Standard

3. QUANTIFICATION OF CARBON FOOTPRINT

3.1 Standard Chosen and Emissions Sources

Castrol has accounted its GHG emissions as per the GHG Protocol Corporate Standard; the most widely used accounting platform for corporate GHG reporting programs globally. The GHG Protocol Corporate Standard was applied in accordance with its provisions and the principles set out in PAS 2060:2014. The boundary for the subject has been defined as ‘operational control.’

GHG emissions 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 Corporate 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.

100% of the Scope 1 and 2 GHG emissions within Castrol’s operational control are included and summarised in Table 3.1. Where GHG emissions have been estimated, these have been determined based on a conservative approach that precludes underestimation. Sources of biogenic carbon in Castrol’s Scope 2 emissions are limited to 953 tCO₂e and are not included in the boundary of Castrol’s Scope 1 and Scope 2 GHG emissions⁴.

Emissions for Scope 1 fuels and Scope 2 steam for were calculated using emission factors sourced from DEFRA 2022. Scope 2 electricity emission factors were primarily sourced from IEA 2022 (2020 figures) - CO₂, CH₄ and N₂O + Trade induced. In 2022, 5 additional sites moved to Renewable Energy Certificates and 4 sites have been closed. In total, 11 of the 20 sites in scope are reporting a zero under market-based scope 2 GHG emissions.

Table 3.1 – Carbon Footprint for Carbon Neutrality

PAS 2060:2014 Requirement	3 rd Application Period		
	2019 Baseline	2021 Data (Used to estimate offsets in 2022 Commitment Period)	2022 Achievement Period
Standard used	The GHG Protocol Corporate Accounting and Reporting Standard		
Emissions covered	Scope 1 and 2		
Scope 1 (tCO ₂ e) ⁵			
Scope 2 (tCO ₂ e) ⁶			
Total (tCO₂e)			

⁴ Indirect biogenic CO₂ emissions are due to the use of biogenic material within steam generation.

⁵ Direct stationary emissions from fuel used in boilers and furnaces, mobile emissions from light vehicles. Fugitive emissions from refrigerants being pursued but likely immaterial.

⁶ Indirect emissions from the use of purchased electricity, steam, heating, or cooling

Castrol has achieved a reduction in emissions of [REDACTED] tCO₂e in the 2022 achievement period, 17% vs 2021 and 38% vs the baseline date, and is committed to its continued carbon reduction efforts within its carbon management plan (refer to section 5 for further details).

In 2022, Castrol improved its methodology for calculating Scope 1 mobile GHG emissions. Explained further in Section 4.2.1, the result of this improved methodology had a material (>1%) impact on the baseline calculations⁷. To address this, Castrol has reassessed the 2019 Baseline and all subsequent year's data with the new methodology. These results can be found in Table 3.1a below.

Table 3.1a – Carbon Footprint for Carbon Neutrality (Re-baseline)

PAS 2060:2014 Requirement	3 rd Application Period		
	2019 Baseline	2021 Data (Used to estimate offsets in 2022 Commitment Period)	2022 Achievement Period
Standard used	The GHG Protocol Corporate Accounting and Reporting Standard		
Emissions covered	Scope 1 and 2		
Scope 1 (tCO ₂ e) ⁵	[REDACTED]		
Scope 2 (tCO ₂ e) ⁶			
Total (tCO₂e)			

The results with this improved methodology result in a [REDACTED] tCO₂e reduction in the 2022 achievement period, 18% vs 2021 and 38% vs the baseline date.

Table 3.2 Inclusions & Exclusions

Scope 1	Included: <ul style="list-style-type: none"> ○ Direct emissions from combustion of fuels occurring at Castrol-owned sites. ○ Emissions from combustion of fuels in light vehicles where kilometers driven by employees are in support of the Castrol business. ○ Direct emission of refrigerants from Castrol-owned sites were previously excluded from Scope 1 emissions reporting. As part of Castrol's continuous improvement in collection and quality of data, emissions from refrigerants is now available, and has therefore been included in the latest iteration of our Scope 1 energy consumption reporting.
Scope 2	Included: <ul style="list-style-type: none"> ○ Indirect emissions associated with the purchase of energy for Castrol-owned sites (i.e., electricity and steam).
Scope 3	Excluded:

⁷ PAS 2050:2011 establishes materiality as being more than 1% of the anticipated total GHG emissions associated with the subject being assessed.

	<ul style="list-style-type: none">○ All Scope 3 emissions have been excluded from carbon neutrality due to its practicality. Within a separate QES, Castrol has demonstrated its achievement of carbon neutrality with a commitment to maintain over a significant portion of its Scope 3 emissions through its carbon neutral products programme.
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4. DATA METHODS

4.1 Description of Methodologies and Data Used

Scope 1: Average-data method⁸ and distance-based method - Fuel consumption data for all Castrol operated facilities are reported in kWh or L, along with distances driven in km for mobile emissions. Castrol consumption data (e.g., litres, kWh) are multiplied with secondary emission factors for direct emissions.

Scope 2: Average-data method - Site electricity and steam consumption data (kWh) are collected for all facilities operated by Castrol. Castrol consumption data (e.g., kWh) are multiplied with market-based emission factors where available and default to location-based emission factors for the remaining sites in order to calculate indirect emissions.

4.2 Data Quality

All data points were assessed for data quality to appraise representativeness in relation to – technology, geography, time-period, completeness, and reliability – and assigned a score on a scale of 1 to 4 (1 being poor; 4 being very good). ERM (Castrol's environmental consultancy partner for the development and calculation of the carbon footprint) were in constant communication with Castrol throughout the assessment, this included weekly data review meetings throughout the assessment process. All data provided by Castrol were subject to review and checked for completeness. Data clarifications were sought and promptly addressed by Castrol. All data gaps relating to Castrol operations were addressed. Castrol and ERM were prompt in responding to Critical Reviewer data queries and in implementing suggestions for improving data quality. A single data quality score was calculated as a weighted average of all four representativeness categories (applying equal weighting). The quality of the overall dataset was appraised as a percentage of the total carbon footprint result which relies on data that is appraised as 'poor' (weighted average score <2.5) as follows:

Table 4.1 Data Quality Scale

% Total Footprint results from 'poor' data	Data Quality Category
<10%	Very good
10% to <30%	Good
30% to <50%	Satisfactory
>50%	Poor

Separate data quality assessments were undertaken for activity data and secondary emission factor data.

Table 4.2 Data Quality Appraisal – Activity Data

Data Quality Appraisal – Activity Data	
Scope 1	Very good
Scope 2	Very good

⁸ **Average-data method** – estimates emissions for goods and services by collecting data on the mass (e.g., kilograms or pounds), or other relevant units of goods or services purchased and multiplying by the relevant secondary (e.g., industry average) emission factors (e.g., average emissions per unit of good or service).

Overall	Very good
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Table 4.3 Data Quality Appraisal – Emission Factor Data

Data Quality Appraisal – Emission Factor Data	
Scope 1	Very good
Scope 2	Very good
Overall	Very good

4.2.1 Change in Methodology for Mobile Emissions (Leading to Rebaseline)

Scope 1 baseline emissions have been updated to reflect an update to the methodology, whereby light vehicles used to support the Castrol business are modelled using the DEFRA emission factor for an average passenger car, unknown fuel type. This differs to the previous methodology, whereby these vehicles were all assumed to use petrol and emissions were calculated as complete combustion using an assumed fuel density and MPG value (provided by Castrol).

4.3 Data Uncertainties

4.3.1 Scenario Uncertainty

Mobile emissions - The data collected comprised the total distance driven by the light vehicles used to support the Castrol business by geography. However, the data was not further disaggregated by vehicle size or fuel type. All vehicles were modelled using a Defra emission factor for an average passenger car for 'unknown' type (modelled based on a representative UK mix of petrol, diesel, CNG, LPG, hybrid and fully electric vehicles). If more data were available on the specific sizes and types of vehicle used, these calculations could be tailored to better fit the actual vehicle mix used in different regions.

4.3.2 Parameter Uncertainty

Uncertainty has not been appraised as parameter uncertainty is unknown for most of the measured activity and emission factor data.

The greatest uncertainty is associated with the GWP factors for CO₂, reported to be $\pm 26\%$ in the IPCC Fifth Assessment Report, 2014 (AR5) referenced above and in Annex A 9.

9 IPCC Fifth Assessment Report, 2014 (AR5) <https://www.ipcc.ch/report/ar5/wg1/>

5. CARBON MANAGEMENT PLAN

5.1 Commitment

Castrol is committed to achieve carbon neutrality of its Scope 1 and 2 GHG emissions for the period of 1st January 2023 to 31st December 2023 in accordance with PAS 2060:2014.

As a sub-entity of bp, Castrol's Scope 1 and 2 GHG emissions target is aligned with bp's Aim 1 to be net zero across its entire operations on an absolute basis by 2050 or sooner. bp is also targeting a 20% reduction in its operational GHG emissions by 2025 and will aim for a 50% reduction by 2030 against the 2019 baseline.

Castrol is committed to continually exploring opportunities to reduce carbon and improve energy efficiency across its manufacturing sites. Section 5.2 provides details on the 3 main pillars of Castrol's management plan: operational efficiency, transitioning to renewable energy, and replacing carbon-intensive energy sources with cleaner, lower carbon alternatives.

5.2 Carbon Reduction Plan

The key components of Castrol's Scope 1 and 2 carbon reduction activities include:

- Operational Efficiency
 - a) Raising awareness of energy consumption and energy waste
 - b) Reviewing current energy intensive processes for potential optimisation
 - c) Using capital expenditure to invest in energy saving solutions
- Transitioning to renewably sourced electricity where possible, using a combination of on-site installations of renewable energy (e.g., solar panels and wind turbines) and procurement of green energy through virtual purchase power agreements and green tariffs
- Replace carbon-intensive energy sources with cleaner, low carbon alternatives where commercially, technically, and practically feasible.

5.2.1 Carbon Reductions vs 2019

Castrol is in action on its carbon reduction plan and has delivered a 38% (██████ tCO₂e) reduction at the end of 2022 vs its 2019 baseline (re-baseline) and an 18% (██████ tCO₂e) reduction vs 2021(which has also been updated using the rebaseline methodology). Some of the highlights underpinning this reduction are:

- 4 additional sites (11 in total as of end 2022) now on Renewable Electricity Certificates (RECs)
- 4 sites have installed solar panels during 2021
- 46% reduction in kWh of grid electricity consumed vs 2019
- 2 sites have transitioned from fuel oil or diesel to natural gas in 2022 reducing Scope 1 GHG emissions by site 29% and 24% respectively and 1 additional site reduced their Scope 1 GHG emissions by 17% through operational efficiencies and improved blending temperatures.

- 43% decrease in light vehicle km driven vs 2019

As part of its supply chain strategy and network optimization plans, Castrol did close 3 facilities in 2022. The WRI's GHG Corporate Standard's position on organic growth and decline is that no recalculation or rebaseline is required. "Base year emissions and any historic data are not recalculated for organic growth or decline. Organic growth/decline refers to increases or decreases in production output, changes in product mix, and closures and openings of operating units that are owned or controlled by the company. The rationale for this is that organic growth or decline results in a change of emissions to the atmosphere and therefore needs to be counted as an increase or decrease in the company's emissions profile over time."¹⁰

5.2.2 Carbon Reduction Roadmap

Castrol's carbon management plan is updated and maintained regularly as part of its Sustainability Programme execution and progress against key activities are reviewed with leadership quarterly so that any corrective actions can be implemented to ensure targets are achieved. Performance against targets are measured on an absolute tonnes basis and progress against initiatives requiring capital investment are tracked using a stage gate process. Underlying energy consumption for Scope 1 + 2 GHG emissions are also tracked on a per litre basis to account for any significant variation in volume throughput.

Key Activities for the commitment period are listed below and are expected to deliver a further 11% reduction in GHG emissions vs 2022 and 7% vs the 2019 baseline (re-baseline).

- Further transition of 4 additional sites to RECs
- Further installation of solar panels in 1 site and continued exploration of solar and/or wind. A wind turbine is being commissioned in our plant in Belgium by the end of 2023.
- Further transition of 1 additional site from fuel oil to natural gas.
- Initiated energy studies to reduce energy consumption in 6 sites and started exploring opportunities to install Energy Management Systems.
- Continued improvements in heating and blending efficiency through processes and investments on HVAC, pumps, LED lighting

¹⁰ [ghg-protocol-revised.pdf \(ghgprotocol.org\)](https://ghgprotocol.org/ghg-protocol-revised.pdf)

6. CARBON OFFSET PROGRAM

Since the inception of its carbon neutral programme in 2014, Castrol has been ordering its carbon credits from bp Target Neutral. The purchase of these credits supports and contributes to a portfolio of carbon reduction, avoidance and removal projects around the world. Some of these projects have additional benefits that support the UN Sustainable Development Goals, improving the lives of millions of people through better health, decent work, training and gender equality.

These credits have been purchased from sources based on schemes with criteria intended to ensure:

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

Castrol only purchases credits that are independently verified against methodologies from leading carbon offset programmes such as the CDM and VCS. Offset credits issued under these programmes are assigned a unique serial number once they are verified which allows them to be sold onto the voluntary carbon market. When making a claim against these credits, Castrol then retires the credits in a public registry under these programmes and retains the retirement certificate as proof of cancellation, including the unique serial number of the credits. This process prevents any “double counting” or “double selling” of offset credits, where more than one party claims that a retirement was made on their behalf.

The purchase of offsets via these schemes also guarantees that the credits 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 are supported by publicly available project documentation, with references provided and stored and retired in an independent and credible registry.

6.1 Offset program for the 2022 Achievement Period

Credits for the period covering 1st Jan 2022 – 31st Dec 2022 were purchased and retired in advance through bp Target Neutral (www.bptargetneutral.com) based on 2021 Actual tCO₂e of [REDACTED], less the balance of [REDACTED] carried forward from 2021. This resulting amount of [REDACTED] tCO₂e means that an excess of [REDACTED] credits have been purchased and retired compared to the 2022 Actual emissions of [REDACTED] tCO₂e and will be carried forward for the next application period.

Note – late in Castrol’s annual carbon neutral process, an error in 2022 energy consumption reporting was found at one of the Castrol-owned plants. The error has resulted in an estimated increase to 2022 actuals of [REDACTED] t CO₂e. Since Castrol’s credits are purchased and retired based on forecast, no additional credits were required to account for this error. The [REDACTED] t CO₂e have been reduced from the [REDACTED] credit balance mentioned above. The new balance to be carried forward is [REDACTED] t CO₂e.

Table 6.1 Carbon Offsets to Account for Scope 1 and 2 emissions in the 2022 Achievement Period

Project Name	Account Name	Location	Standard and registry type	Date of retirement	Scope 1 & 2	LINKS for QES	Vintage
El Arrayan Wind Farm - CHILE	BP Gas Marketing Limited	Chile	UN registry for CDM projects	3/9/2022		El Arrayan Wind Farm - CHILE	2020
Brazil NovaGerar Landfill gas to energy project	BP Gas Marketing Limited	Brazil	UN registry for CDM projects	2/28/2023		Brazil NovaGerar Landfill gas to energy project	2016
C-Quest Guatemala	BP International Limited	Guatemala	VCS / Markit Env Registry	2/28/2023		C-Quest Guatemala	2011
C-Quest Guatemala	BP International Limited	Guatemala	VCS / Markit Env Registry	2/28/2023		C-Quest Guatemala	2013
Jilin Taonan Xinli 49.5MW Wind Power	BP Gas Marketing Limited	China	UN registry for CDM projects	2/28/2023		Jilin Taonan Xinli 49.5MW Wind Power	2019
TOTAL FY 2022							

6.2 Offset program for the 2023 Commitment Period

For the commitment period of 1st January 2023 – 31st December 2023, Castrol will repeat the same process as followed for the 2022 commitment period but using 2022 Actual tCO₂e () less the existing buffer of offsets (tCO₂e) as the estimate for 2023 requirements (tCO₂e). Castrol will notify bp's Low Carbon Trading Team¹¹ of the volume of credits required in advance of the retirements completing in 1Q 2024. Any difference between this estimation for 2023 and the Actuals will again be adjusted in the following application period.

¹¹ From 2023 forward, Castrol will be purchasing and retiring credits directly through bp's Low Carbon Trading team rather than working indirectly through bp Target Neutral who managed this process on Castrol's behalf prior to 2023.

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
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>	✓	Section 2.1, Table 2.1, Section 2.3
5	Define the boundaries of the subject.	✓	Section 2.3, Table 2.1
6	Identify all characteristics <i>(purposes, objectives, or functionality)</i> inherent to that subject.	✓	Section 2.3, Table 2.1
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
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 3.1, Table 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, Section 4.2.1
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, Table 3.1, Table 3.2
	<i>a) All greenhouse gases shall be included and converted to tCO₂e.</i>	✓	Section 3.1, Table 3.1
	<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
	<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 3.2
	<i>f) The quantified carbon footprint shall cover at least 95% of the emissions from the subject.</i>	✓	Section 2.3
	<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>	N/A	
	<i>h) Any exclusion and the reason for that exclusion shall be documented.</i>	✓	Section 3.1, Table 3.2
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 2.3
	<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, Section 2.3, Section 3.1
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.	✓	Section 2.3
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>).	N/A	
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</i>	✓	Page 2, Section 2.1, Table 2.1, Figure 2.1, Section 3.1, Table 3.1, Table 3.2, Section 4.1, Section 4.2, Section 4.2.1

	<i>activity data.) Where quantification is based on calculations (e.g., GHG activity data multiplied by greenhouse gas emission factors or the use of mass balance/ life cycle models) then GHG emissions shall be calculated using emissions factors from national (Government) 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.</i>		
18	Provide details of, and explanation for, the exclusion of any Scope 3 emissions.	✓	Section 2.3, Table 2.1, Table 3.2
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 4.1, Section 4.2, Section 4.2.1, 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:		
	<i>a) Make a statement of commitment to carbon neutrality for the defined subject.</i>	✓	Section 5.1
	<i>b) Set timescales for achieving carbon neutrality for the defined subject.</i>	✓	Section 5.1
	<i>c) 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 5.1
	<i>d) 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 5.2.2
	<i>e) 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, Section 6.2
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 be commensurate with the timescale for achieving carbon neutrality.	✓	Section 5.2.2
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	N/A	

	determine whether the expected minimisation in emissions has been achieved.		
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.	N/A	
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

Table A.2 Checklist for QES supporting declaration of achievement of carbon neutrality

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

#	Item Description	Status	Section in this QES
1	Define standard and methodology to use to determine its GHG emissions reduction.	✓	Section 2.3, Section 3.1, Section 4.1, Section 4.2.1
2	Confirm that the methodology used was applied in accordance with its provisions and the principles set out in PAS 2060 were met.	✓	Section 3.1
3	Provide justification for the selection of the methodologies chosen to quantify reductions in the carbon footprint, including all assumptions and calculations made and any assessments of uncertainty. <i>(The methodology employed to quantify reductions shall be the same as that used to quantify the original carbon footprint. Should an alternative methodology be available that would reduce uncertainty and yield more accurate, consistent, and reproducible results, then this may be used provided the original carbon footprint is re-qualified to the same methodology, for comparison purposes. Recalculated carbon footprints shall use the most recently available emission factors, ensuring that for purposes of comparison with the original calculation, any change in the factors used is considered.)</i>	✓	Section 3.1, Table 3.2, Section 4.1, Section 4.2.1, Section 4.3.1, Section 5.2.1,
4	Describe how reductions have been achieved and any applicable assumptions or justifications.	✓	Section 5.2.1
5	Ensure that there has been no change to the definition of the subject. <i>(The entity shall ensure that the definition of the subject remains unchanged through each stage of the methodology. If material change to the subject occurs, the sequence shall be re-started based on a newly defined subject.)</i>	✓	Section 2.2, Section 4.2.1, Section 5.2.1
6	Describe the actual reductions achieved in absolute and intensity terms and as a percentage of the original carbon footprint. <i>(Quantified GHG emissions reductions shall be expressed in absolute terms and shall relate to the application period selected and/or shall be expressed in emission intensity terms (e.g., per specified unit of product or instance of service).)</i>	✓	Section 5.2.1, Section 3.1
7	State the baseline/ qualification date.	✓	Table 2.1, Section 2.2
8	Record the percentage economic growth rate for the given application period used as a threshold for recognising reductions in intensity terms.	N/A	

9	Provide an explanation for circumstances where a GHG reduction in intensity terms is accompanied by an increase in absolute terms for the determined subject.	N/A	
10	Select and document the standard and methodology used to achieve carbon offset.	✓	Section 6.1
11	Confirm that:		
	a) Offsets purchased or allowance credits surrendered represent genuine, additional GHG emission reductions elsewhere	✓	Section 6
	b) Projects involved in delivering offsets meet the criteria of <i>additionality</i> , <i>permanence</i> , <i>leakage</i> , and <i>double counting</i> . (See WRI Greenhouse Gas Protocol for definitions of <i>additionality</i> , <i>permanence</i> , <i>leakage</i> , and <i>double counting</i> .)	✓	Section 6
	c) Carbon offsets are verified by an independent third-party verifier	✓	Section 6
	d) Credits from carbon offset projects are only issued after the emission reduction has taken place	✓	Section 6
	e) Credits from carbon offset projects are retired within 12 months from the date of the declaration of achievement	✓	Section 6
	f) Credits from carbon offset projects are supported by publicly available project documentation on a registry which shall provide information about the offset project, quantification methodology and validation and verification procedures	✓	Section 6.; Table 6
	g) Credits from carbon offset projects are stored and retired in an independent and credible registry	✓	Section 6; Table 6
12	Document the quantity of GHG emissions offset and the type and nature of offsets purchased including the number and type of credits used and the time over which credits were generated including:	✓	Section 6; Table 6.1
	a) Which GHG emissions have been offset	✓	Section 6; Table 6.1
	b) The actual amount of carbon offset	✓	Section 6; Table 6.1
	c) The type of offset and projects involved	✓	Section 6; Table 6.1
	d) The number and type of carbon offset credits used and the time over which the credits have been generated	✓	Section 6; Table 6.1
	e) Information regarding the retirement/cancellation of carbon offset credits to prevent their use by others including a link to the registry where the offset has been retired.	✓	Section 6.1
13	Specify the type of conformity assessment:		
	a) independent third-party certification	✓	Section 2, Table 2.1
	b) other party validation	N/A	
	c) self-validation	N/A	

14	Include statements of validation where declarations of achievement of carbon neutrality are validated by a third-party certifier or second party organisations.	✓	Annex B
15	Date the QES and have it 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).	✓	Section 1
16	Make the QES publicly available and provide a reference to any freely accessible information upon which substantiation depends (e.g., via websites).	✓	Carbon Neutrality Declaration, 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 Organisational Scope 1 and 2 greenhouse gas (GHG) emissions for the achievement period commencing 1st January 2022 to 31st December 2022 and the commitment period commencing 1st January 2023 to 31st December 2023.



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 subject of the declaration of carbon neutrality is Castrol's Organisational Scope 1 and 2 GHG emissions.

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 current reporting period or for previous periods.

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 calculation, used in the production of the Report;
- Assessing whether the standards and methodologies used in the carbon footprint calculation met the Criteria;
- Performing limited substantive testing of the carbon footprint calculation 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.

In performing these activities, we did not come across limitations to the scope of the agreed assurance engagement.

We found a limited number of non-material errors, which were corrected prior to inclusion in the Report.

Our competence, independence and quality control

DNV established policies and procedures are designed to ensure that DNV, its personnel and, where applicable, others are subject to independence requirements (including personnel of other entities of DNV) and maintain independence where required by relevant ethical requirements. This engagement work was carried out by an independent team of sustainability assurance professionals. DNV holds other assurance contracts with Castrol, none of which, in our opinion, conflict with the scope of this work. Our multi-disciplinary team consisted of professionals with a combination of environmental and sustainability assurance experience.

Inherent limitations

DNV's assurance engagements are based on the assumption that the data and information provided by Castrol to us as part of our review have been provided in good faith, is true, complete, sufficient, and authentic, and is free from material misstatements. Because of the selected nature (sampling) and other inherent limitations of both procedures and systems of internal control, there remains the unavoidable risk that errors or irregularities, possibly significant, may not have been detected. The engagement excludes the sustainability management, performance, and reporting practices of the Company's suppliers, contractors, and any third parties mentioned in the Report. We understand that the reported financial data, governance and related information are based on statutory disclosures and Audited Financial Statements, which are subject to a separate independent statutory audit process. We did not review financial disclosures and data as they are not within the scope of our assurance engagement.



Standard and level of assurance

We performed a **limited** assurance engagement of specified data and information using the 'Greenhouse Protocol – A Corporate Accounting and Reporting Standard' (revised 2015) and international assurance best practice including the International Standard on Assurance Engagements (ISAE) 3000 – 'Assurance Engagements other than Audits and Reviews of Historical Financial Information' (revised) issued by the International Auditing and Assurance Standards Board. To ensure consistency in our assurance process, we conducted our work in accordance with DNV's assurance methodology, Verisustain™, applying only the pertinent sections of the protocol relevant to the specific purpose of the activity. This methodology ensures compliance with ethical requirements and mandates planning and execution of the assurance engagement to obtain the desired level of assurance.

DNV applies its own management standards and compliance policies for quality control, which are based on the principles enclosed within ISO IEC 17029:2019 - Conformity Assessment - General principles and requirements for validation and verification bodies, 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.

The procedures performed in a limited assurance engagement vary in nature and are shorter in extent than for a reasonable assurance engagement. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained if a reasonable assurance engagement had been performed.

Disclaimers

The assurance provided by DNV is limited to the selected indicators and information specified in the scope of the engagement. DNV has not conducted an assessment of the reporting organisation's overall adherence to reporting principles or the preparation of the report. Therefore, no conclusions should be drawn regarding the reporting organization's compliance with reporting principles or the quality of the overall report. The assurance provided by DNV is based on the selected indicators and information made available to us at the time of the engagement. DNV assumes no responsibility for any changes or updates made to the indicators or information after the completion of the assurance engagement.

Use and distribution of our Independent Limited Assurance Report

This report is intended solely for the information and use of the Directors of Castrol and is not intended to be and should not be used by anyone other than these specified parties. 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.

for DNV Business Assurance Services UK Limited

London, UK
15 March 2024

Holly Wallis-Copley
Lead Verifier
DNV Business Assurance Services UK
Limited

Paul O'Hanlon
Technical Reviewer
DNV Business Assurance Services UK
Limited



WHEN TRUST MATTERS

Responsibilities of Castrol's Management and DNV

The Management of Castrol have sole responsibility for:

- 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.

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.

DNV Supply Chain and Product Assurance

DNV Business Assurance Services UK Limited is part of DNV – Supply Chain and Product Assurance, a global provider of certification, verification, assessment and training services, enabling customers and stakeholders to make critical decisions with confidence.

www.dnv.co.uk/BetterAssurance

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 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	165	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 FCF ₃	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	CHClF ₂ CF 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	CHClF 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 CH ₂ CF 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 CH ₂ CF 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 CH ₂ CH 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 ₅ 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 CHFCF 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









PAS-2060-scope-1-2-ghg-emissions-2021-achievement-EXTERNAL

Final Audit Report

2024-03-27

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