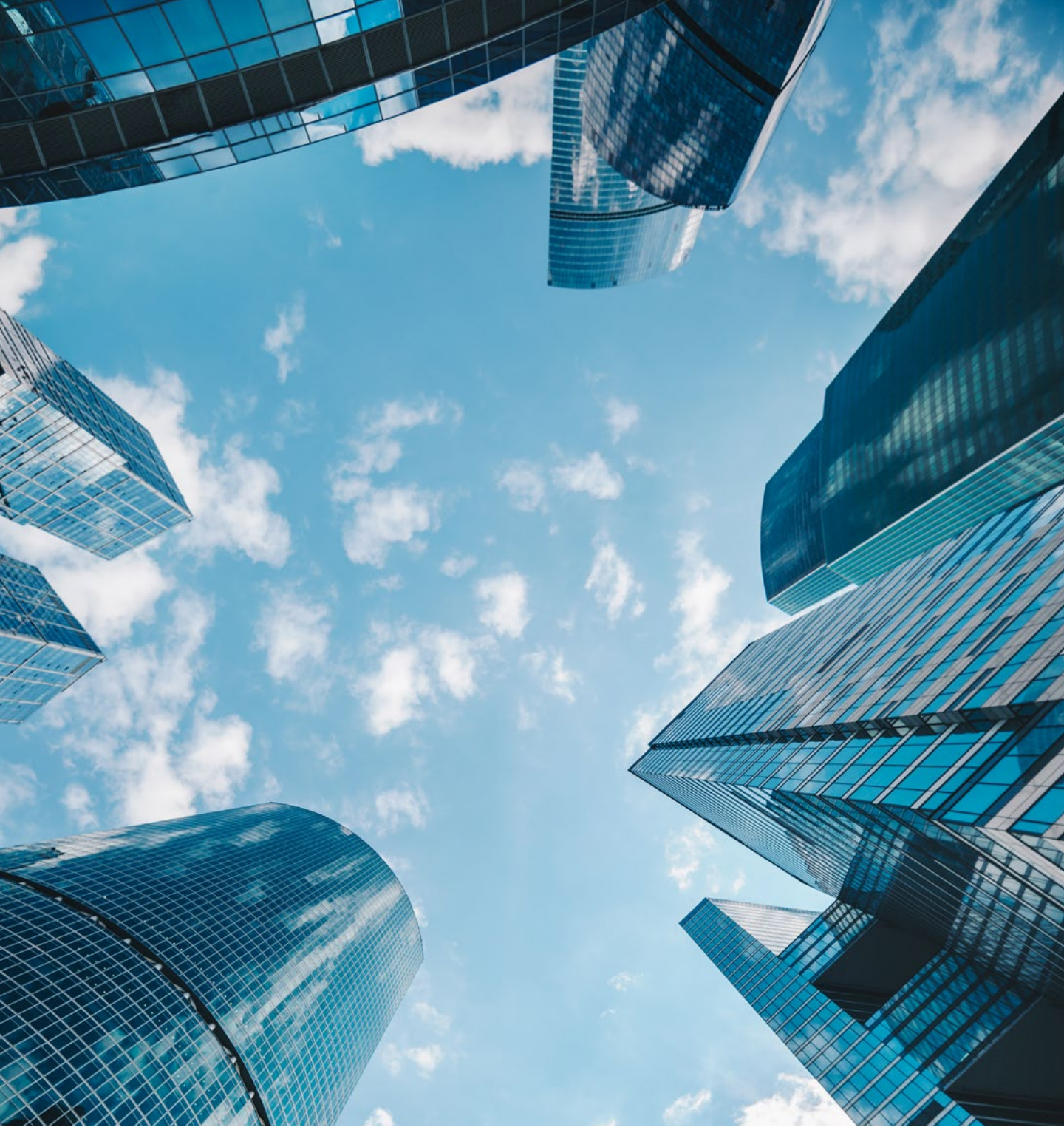
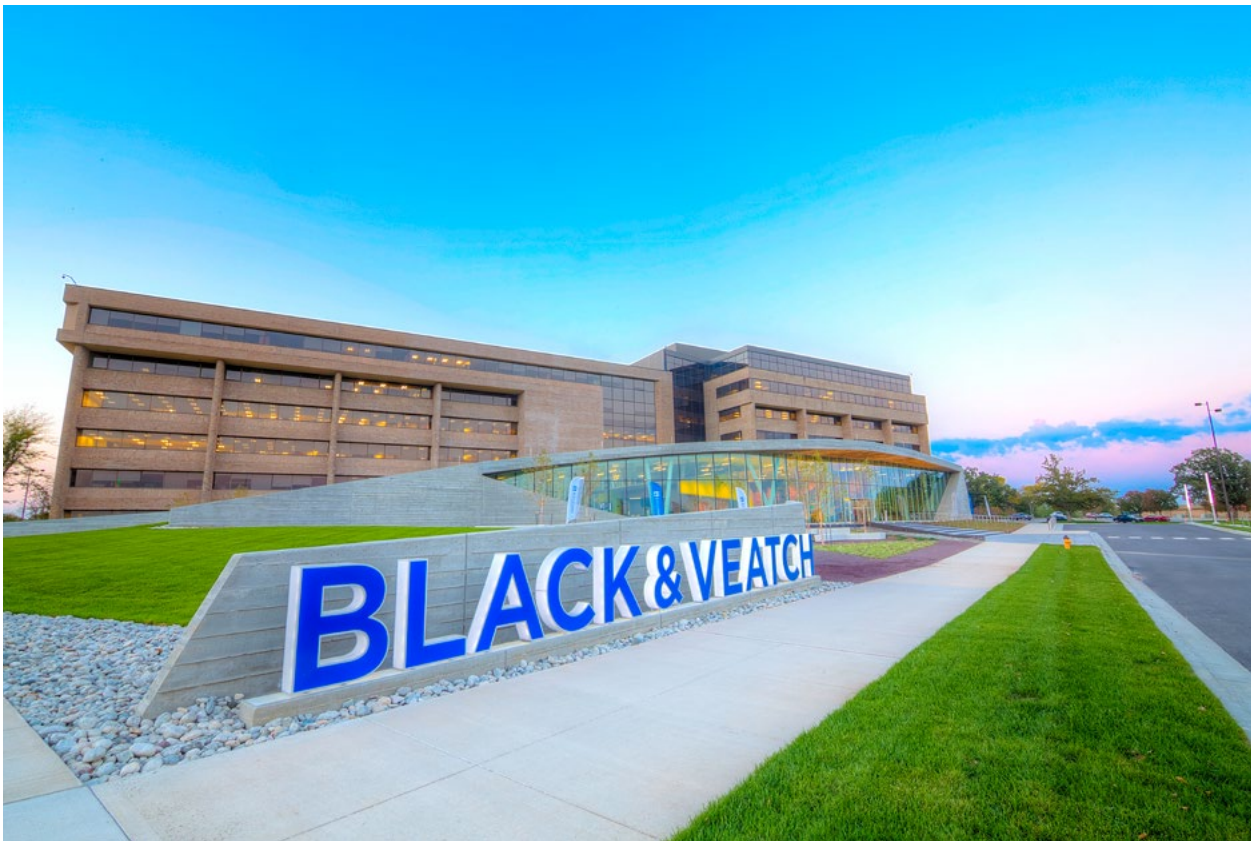


Black & Veatch Carbon Footprint

Emissions Summary

BUILDING A WORLD OF DIFFERENCE®

BLACK & VEATCH



This report summarizes the results of Black & Veatch's 2017 greenhouse gas (GHG) emissions from its global operations.[1] Table 1 summarizes the 2017 emissions by reporting category. Black & Veatch's 2017 metric tons of carbon dioxide equivalent (mtCO2e) emissions represent a 13.3 percent reduction from 2016.

These greenhouse gas emissions calculations are attached as Climate Registry Information System (CRIS) report printouts, and the boundary selection, methodology, and source data are discussed in the following pages. The final section of this summary addresses benchmarking of the Black & Veatch GHG inventory against other similar companies, GHG reduction goal-setting guidelines, reporting with The Climate Registry, third-party verification, and recommendations for future action.

TABLE 1 2017 Global GHG Emissions by Scope

Scope 1	mtCO2e
Stationary Combustion	1,146
Mobile Combustion	2,315
Fugitive	6
Scope 2	
Purchased Electricity	17,856
Purchased Heating	1,084
Subtotal (Scope 1+2)	22,407
Scope 3 (optional)	22,664
Total	45,071

[1] United States, Canada, the United Kingdom, Australia and Asia

METHODOLOGY AND APPROACH

Black & Veatch's GHG emissions inventory was completed in accordance with The Climate Registry's General Reporting Protocol (GRP), version 2.1, which provides guidance on how to quantify and account for GHG emissions.[2] The GRP protocol provides strict guidance for Scope 1 (direct emissions from owned or controlled sources) and Scope 2 (indirect emissions from the generation of purchased energy) emissions, and more general guidance for Scope 3 emissions (indirect emissions not included in Scope 2 that occur in the value chain of the company). The operational control approach was used to set the boundary for this exercise.[3]

In addition, in 2017, Black & Veatch utilized the location-based and market-based emissions approach. Table 2 shows the emissions sources included in Black & Veatch's GHG Emissions Inventory.

TABLE 2: Black & Veatch Emissions Sources

Scope	Source	Asset	Reporting Required?	Data Source
Scope 1	Stationary Combustion	Leased Offices	Yes	UK CEMARS reports
	Gasoline/Diesel	Owned Vehicles, Owned Construction Equipment	Yes	Black & Veatch records
	Refrigerants	Fugitive emissions	Yes	Black & Veatch records
Scope 2	Electricity	Leased Offices	Yes	Black & Veatch logs
	Electricity	Owned Offices	Yes	Black & Veatch logs
	Heating - Natural Gas	Leased Offices	Yes	Building Managers
	Heating - Natural Gas	Owned Offices	Yes	Building Managers
Scope3	Gasoline/Diesel	Business Travel - Rental Cars, Rented Construction Equipment	No	Rental Company records
	Jet Fuel	Business Travel – Flights	No	iNet travel records

[2] Note that this protocol is consistent with GRI and WBCSD protocols.
[3] The protocol allows two possibilities for defining the system boundary when performing a GHG inventory: the Equity Share Approach and the Control Approach. Under the Equity Share Approach, a reporting entity would only report emissions from assets owned by the reporting agency. For Black & Veatch that would mean that only emissions from P-Building and the fleet vehicles would be counted.

Black & Veatch chose to estimate Scope 3 emissions, even though it is not required, because valuable insight into its GHG emission trends and opportunities for improvement is gained from tracking and recording as much of GHG emissions as possible. Quantifying and reporting Scope 3 emissions is optional because there is higher uncertainty in Scope 3 emissions estimates, and less corporate control, as methodologies are not well standardized across reporting agencies. Black & Veatch estimated Scope 3 emissions using readily available data regarding the number of passenger miles flown for business trips and the fuel efficiency and distance traveled by rental cars for business trips. Black & Veatch did not have data from other potential Scope 3 emissions sources (e.g., from employee commutes, waste disposal, water delivery and treatment, material procurement and consumption, construction and demolition, etc.) readily available and gathering such data is currently prohibitively labor-intensive; therefore, data from those emissions sources were not included, but may be included in the future GHG Emissions Inventories.

Control Approach was selected, in which emissions are reported from sources that are controlled by Black & Veatch (either operationally or financially). The Operational Control Approach was selected.

DATA SOURCES, ASSUMPTIONS, AND CALCULATION METHODOLOGY

Key assumptions and data sources are noted in the following paragraphs. The attached calculations have more detail. Refer to the Climate Registry General Reporting Protocol, V2.1 for descriptions of methodology. Specifically, refer to Ch. 12 for stationary combustion calculations, Ch. 13 for mobile emissions sources, and Ch. 16 for fugitive refrigerant emissions calculations.

SCOPE 1

Scope 1 includes emissions from fuel used in company-owned and leased vehicles and the onsite combustion of natural gas for space and water heating, as well as fugitive emissions from refrigeration systems.

Fleet vehicles and Owned Construction Equipment:
Black & Veatch Fleet Services provided the total fleet vehicle miles traveled in 2017. CAFÉ mileage standards were assumed based on the model year of vehicles to determine the total amount of fuel consumption because a detailed mileage breakdown by vehicle type was not available. Fuel consumption was calculated and GHG emissions were then estimated, as per TCR's General Reporting Protocol, Chapter 13, method MO-04, equation 13b.

Construction equipment fuel consumption was calculated using a simplified estimation method. Fuel consumption is estimated using Black & Veatch fuel purchase-card fuel charges, an estimated split between owned and rented equipment, heavy and light equipment, diesel and gasoline equipment, and the 2017 average fuel costs. This methodology results in a large amount of error and an improved methodology will be investigated.

Refrigeration (fugitive emissions):
Black & Veatch owns two facilities: the Overland Park Global Headquarters and Ann Arbor, buildings. In addition to electricity and natural gas consumed on-site, the Corporate Headquarters refrigeration system releases fugitive emissions. These fugitive emissions were estimated using the charge capacity of each system, refrigerant type, refrigerant data, and assumed leakage rates, per the protocol.

Fugitive emissions reporting for leased buildings with no refrigeration within operational boundaries is an optionally-reported Scope 3 emission. Black & Veatch included fugitive emissions in the 2017 reporting.

SCOPE 2

Indirect emissions occur because of Black & Veatch's activities, but are produced by sources owned or controlled by another entity. Black & Veatch's Scope 2 emissions result from purchased electricity and purchased heating.

Global Headquarters Facility Electricity:

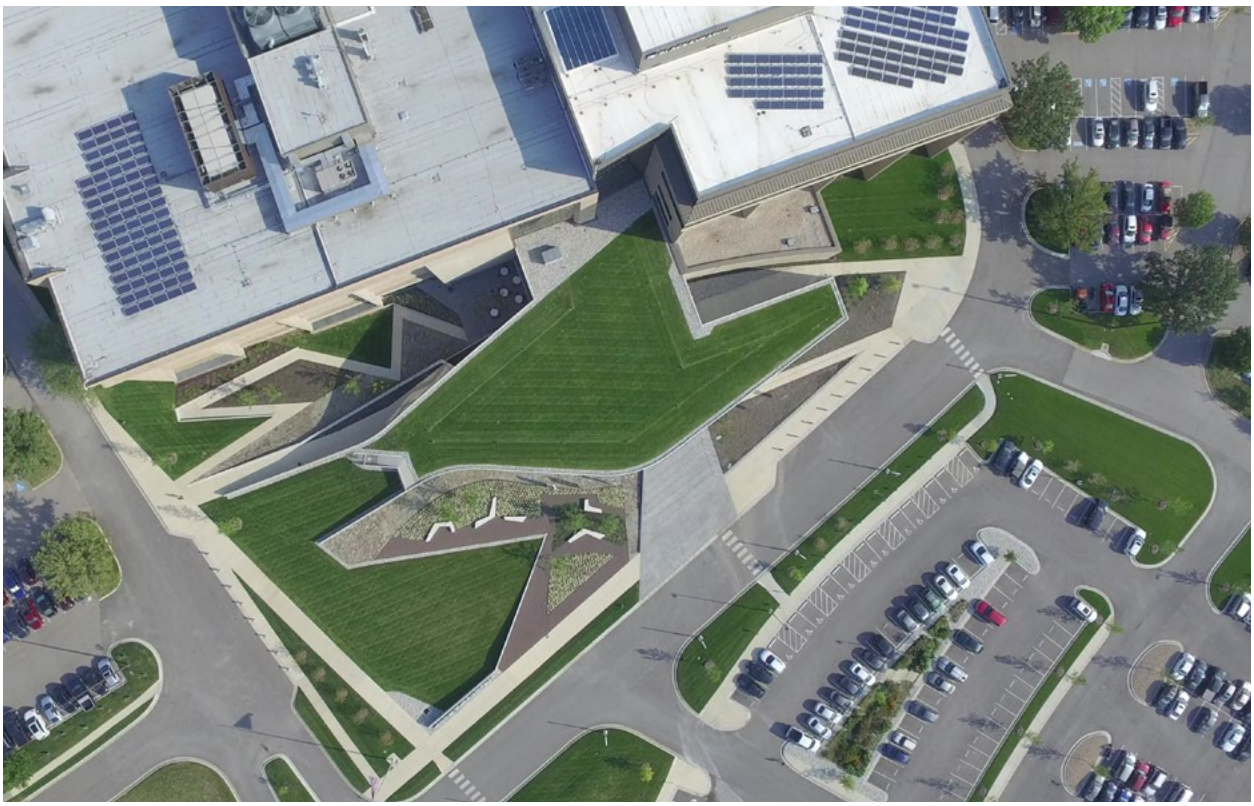
Total 2017 electricity consumption was obtained from Black & Veatch records, and the GHG emissions from this source were calculated using default regional emissions factors in TCR's online reporting tool, CRIS.

Leased Office Space Electricity:

Electricity consumption data is not available for the majority of leased offices. Consequently, Black & Veatch estimates electricity consumption using an emissions factor based on the footprint of the office space. This methodology is permitted by the TCR Protocol. Where available, actual office electric consumption values were used.

Natural Gas (leased office space):

Natural gas consumption data is not available for the majority of leased offices. Consequently, Black & Veatch estimates natural gas consumption using an emissions factor based on the footprint of the office space. This methodology is permitted by the TCR Protocol. Where available, actual office natural gas consumption values were used.



SCOPE 3

Scope 3 includes other indirect emissions that are a consequence of Black & Veatch's operations, but that are from sources neither owned nor directly controlled by Black & Veatch. Heavy equipment and business travel (flights and car rentals) were included in this assessment. The GRP protocol provides greater flexibility in Scope 3 emissions calculation methodologies.

Commercial Flights:
Black & Veatch's travel vendor's database provided the total passenger flight miles in 2017. GHG emissions for business flights were estimated using calculations provided by 501(c)3 the Carbon Fund based on total passenger miles and length of flight segment.

Rental Cars and Construction Equipment:
Black & Veatch's Travel and Transport department provided the total 2017 rental car miles driven for business purposes. CAFÉ mileage standards were assumed based on the model year of the vehicle to determine the total amount of fuel consumption. Fuel consumption was calculated and GHG emissions were then estimated, as per TCR's General Reporting Protocol, Chapter 13, method MO-04, equation 13b.

Construction equipment fuel consumption was calculated using a simplified estimation method. Fuel consumption is estimated using Black & Veatch fuel purchase, an estimated split between owned and rented equipment, heavy and light equipment, diesel and gasoline equipment, and the 2017 average fuel costs. This methodology results in a large amount of error and an improved methodology will be investigated.

RESULTS

As seen in Table 4 below, the 2017 footprint for Black & Veatch facilities (including owned and leased buildings, and including electricity and natural gas) was 22,407 mtCO2e. This reflects a reduction of 13 percent from 2016 levels, and two percent above the initial 2011 baseline value. The reduction in estimated GHG Emissions from 2016 to 2017 is largely due to reduction in office footprint. It is important to note that there is a significant level of uncertainty in these estimates, due to data quality, which can be mitigated through improved tracking tools and third party reporting and verification.

The offices listed in Table 3 below contribute 47 percent of the buildings-based footprint of the company.

Additionally, Table 4 shows that electricity in buildings contributes the bulk of Black & Veatch's US GHG emissions (79.7 percent of Scope 1 & 2 GHG emissions), providing a potential target area to set improvement goals.

Black & Veatch is aware of some reporting discrepancies associated with UK due to differences in Scope 1 and Scope 2 reporting criteria between the TCR GRP, under which all Black & Veatch emissions are reported, and the Certified Emissions Measurement and Reduction Scheme (CEMARS), under which Black & Veatch's UK offices are separately required to report. Black & Veatch is working to correct these discrepancies for future reporting periods.

TABLE 3: Black & Veatch Offices with Largest Carbon Footprint

Location	MT CO2e	Percent of Scope 1 &2 GHG
Corporate Headquarters	6,537	29.2%
Overland Park, KS	1,976	8.8%
Kansas City, MO	1,518	6.8%

TABLE 4: Black & Veatch Year-Over-Year Comparison

	2017 TCO2e (t)	2016 TCO2e (t)
Scope 1 – Direct Emissions		
Stationary Combustion	1,146	1,506
Mobile Combustion	2,315	2,118
Fugitive	6	7
Scope 2 – Indirect Emissions		
Purchased Electricity – Market Based	17,856	21,193
Purchased Heating – Market Based	1,048	1,043
Subtotal (Scope 1+2)	**22,407**	**25,867**
Scope 3 – Optional		
	22,664	23,612
Total GHG	**45,071**	**49,479**

RECOMMENDATIONS FOR FUTURE GHG INVENTORIES: 2018 AND BEYOND

Key recommendations are discussed in this section, as well as several additional suggestions based on lessons learned during the 2017 GHG inventory process and in previous years.

It should be noted that Black & Veatch is currently in the process of reviewing company-wide GHG reduction targets and formally reporting company-wide GHG emissions to The Climate Registry. Black & Veatch had these calculations verified by a third party for the first time in 2016 but did not in 2017. Several changes to how the data was calculated to simplify the process and make the data more reliable from year-to-year were implemented.

Recommendations include:

STREAMLINE DATA COLLECTION PROCESS FOR LEASED OFFICE SPACE.

- Communicate to property managers that these requests will be ongoing.
- Write into lease agreements that property managers will provide requested information each year.
- Have property management provide scanned copies of utility bills (with confidential information redacted if needed) – in case required for review by 3rd party verifiers.
- For those offices where Black & Veatch cannot obtain data in a timely manner or verify usage for the Black & Veatch portion of the offices, square footage will be used to calculate emissions per the TCR Reporting Protocol.

STREAMLINE DATA COLLECTION PROCESS WITH INTERNAL BLACK & VEATCH CHAMPIONS.

- During the collection of fleet vehicle fuel usage data it became clear that Black & Veatch logs are not designed for the reporting of vehicle usage data on a level of granularity required to complete the GHG emissions calculations. Measures should be taken to ensure that all Black & Veatch systems are in harmony with the overarching goal of monitoring GHG emissions and tracking progress in achieving improvements.
- Copies of logs and backup records should be made available in case 3rd party verifiers require them.

INCLUSION OF HEAVY EQUIPMENT AND RENTALS

- Track heavy equipment and other equipment rentals on projects and use maintenance records and contracts to estimate emissions for inclusion in Scope 3 Reporting data.

BENCHMARKING AND GOAL SETTING

Black & Veatch has monitored its North American corporate carbon footprint since 2010, and its global corporate carbon footprint since 2011. Black & Veatch is well positioned to set an emissions reduction target based on lessons learned during the inventory updates and based on a benchmarking study that compare Black & Veatch's GHG emissions and targets to its peers.

The following sections of this memorandum summarize previous years' analysis summarizing:

1) Activities by other corporations considered to be peers, and

2) The recommended path forward for Black & Veatch greenhouse gas emissions reductions, including goal-setting, monitoring, and reporting.

Black & Veatch has demonstrated its commitment to measuring and reporting its carbon footprint by updating the carbon footprint analysis annually since 2010, by registering to report the carbon footprint results with The Climate Registry, and for the first time in 2016 pursuing third party verification with SCS Global. Black & Veatch has set the direction for future progress by establishing a quantitative, time-bound, measurable reduction goal. Strategies for achieving that goal need to be identified.

Black & Veatch has positioned itself to determine a reasonable GHG emission reduction goal by consistently estimating annual GHG emissions. Table 5 summarizes the steps Black & Veatch needs to take to continue building the foundation for accountability and success by working toward an attainable emissions reduction goal.

TABLE 5: Steps to setting a rational GHG reduction goal

Step	Status	Result or Recommended Solution
Establish baseline GHG inventory	In progress	Initial baseline established as 2011 global GHG emissions =29,939 mTCO2e (2.9 mTCO2e per employee – Scopes 1 and 2 only). Reporting methodology was changed significantly for 2016 inventory, so recommend reestablishing this as the baseline.
Monitor year-over-year historic trends	Complete	Delta from 2016 to 2017 = ~-13%
Identify which types of emissions to address: Scope 1 Scope 2 Scope 3	2,315	Including Scopes 1 and 2 only.*
Select timeframe to achieve emission reduction: 1 year 10 years 20 years	In progress	Recommend 10 years and 15 year timeframe .**
Select metrics for success: Annual global mTCo2e mTCo2e per employee mTCO2e per dollar annual revenue	In progress	
Identify projected Business-As-Usual (BAU) GHG emissions	In progress	
Select target: percent reduction from Business-As-Usual	In progress	
Identify strategies for achieving the goals	In progress	

* Rationale for selecting scopes 1 and 2 only: It is important to identify priorities in goal-setting process, and it is recommended that scopes 1 and 2 should be prioritized, since these two scopes have the highest levels of accuracy and control. There is more uncertainty in the estimation methods for scope 3 emissions, and the control mechanisms for these emissions are not as clear or direct as they are for scopes 1 and 2. It is possible to waste a lot of time and effort for little impact on scope 3 emissions, so it is recommended that these emissions should be de-prioritized.

**Rationale for selecting 10 and 15 year targets: For an organization as large as Black & Veatch, it is possible to plan farther ahead in the future than it is for smaller organizations. Consequently, 10 and 15 year targets are recommended with smaller interim targets to be adopted as needed.

***Rationale for selecting mTCO2-per-employee as the metric: Because Black & Veatch is a services company, the output is directly tied to the number of employees. Selecting this metric means that progress can be made regardless of the size of the company. In any given year, whether the company has a year of growth, or decline in total size, the target will still be relevant, as long as it is specified in terms of number of employees.

MONITORING AND REPORTING PROGRESS

Black & Veatch signed a memorandum of understanding for reporting GHG emissions with The Climate Registry and uploaded 2017 GHG emissions data to TCR's online reporting tool.