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Praxis Final Project
Company: Comcast
Course: Carbon Footprint Analysis

Businesses today are beginning to see the importance of turning their attention to the issue of climate change. With the increase of extreme weather events caused by climate change, most businesses have seen an impact on how they operate. Fixing centers impacted by extreme weather increases expenses significantly, and oftentimes affects how businesses can reach customers, reducing revenue. Climate change also affects the resources available to businesses and can affect their investors who want to invest in greener companies. Climate change presents a huge risk to how a business is run and those who have already begun addressing this risk will have a competitive edge in the future. The best way to begin addressing this risk is by tracking how much CO₂ a business is emitting and how that can be reduced. This can be achieved through Carbon Accounting.

In order to compare emissions across different businesses who report their emissions, a standard approach by the World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI) can be used. This standard breaks emissions up into three scopes:

Scope 1: Direct GHG Emissions

- Emissions that are directly controlled by the company
- Includes fuels used by generators and fleet

Scope 2: Electricity Indirect GHG Emissions

- Purchased electricity used to run buildings

Scope 3: Other GHG Indirect Emissions

- Other emissions as a result of company activities
- Includes contracted transportation not included in fleet, purchased goods and services, how goods are used over their lifetime

By looking at these three scopes together, the company will have a baseline for all of the GHG emissions they are responsible for and how they can begin to reduce them.

(source: <https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>)

Scope 1 emissions are what a company has direct control over and include a variety of uses for fuels, including generators and HVAC equipment. Below are some further explanations and sample calculations:

Generators

A generator often uses diesel and acts as a backup generator to produce electricity. That electricity is then used to power other things, like motors or lights. When it's used, these emissions are accounted for differently. Sometimes, the generator runs without producing

electricity, consuming diesel and producing emissions that must be accounted for. Every generator has the following variables and factors:

Capacity (kw): This is the amount of electricity a generator can produce if it's operating at full capacity.

Hours Idling (per year): how many hours in a year that the generator is running (consuming diesel) without producing electricity

Load (gal/hour): device that converts electrical energy into other types of energy. For example, a motor. This is dependent on the generator capacity.

Mmbtu per gallon diesel: 0.138

Kg CO₂ per mmbtu: 73.96

To calculate emissions for one generator:

Diesel Used (gal/ year) = Hours Idling (hr/ year) * Load (gal /hour)

Emissions (kg CO₂) = Diesel Used (gal/ year) * 0.138 (mmbtu/ gal) * 73.96 (kg CO₂ / mmbtu)

HVAC Refrigerants

HVAC Systems help heat and cool buildings. To do so, air conditioning uses refrigerants that, when released, are accounted for as emissions. There is an expected amount of refrigerant that escapes the HVAC system that must be accounted for. The following variables are used:

Ton Capacity: The total capacity of an HVAC generator

Pounds of refrigerant per ton: Typically between 2-4 lbs (we will use 3 lbs)

Leakage Factor: For example, it might be expected that 10% of refrigerant leaks from the system.

Kg per lb: 0.453592 kg/ lb

Refrigerant Type: Different refrigerants are used in different systems

Global Warming Potential (GWP) of Refrigerant Type: Global warming potential is a measure of how much heat a greenhouse gas traps in the atmosphere over a specific time (generally 100 years) relative to CO₂. This will give values of CO₂e (CO₂ equivalent), so multiple greenhouse gases can be compared.

To calculate emissions for one HVAC system:

refrigerant used (lbs) = Ton capacity (tons) * (3 pounds refig/ ton)

Expected refrigerant leakage (lbs) = Refrigerant Used (lbs) * Leakage Factor

Expected Refrig. Leakage (kg) = Expected Refrig. Leakage (lbs) * 0.453592 kg/ lb

$\text{CO}_2\text{e emissions (kg)} = \text{Expected Refrig. Leakage (kg)} * \text{GWP of Refrig. Type}$

By looking at their own carbon footprint, companies can see where their emissions can be reduced. This often saves money while also being good for the environment and for their business. As investor preferences and government policies change, companies that are proactive with their response will be the most competitive.