What is a Carbon Footprint?

A **carbon footprint** is the total amount of carbon dioxide (CO_2) and other greenhouse gases that are released into the atmosphere from activities like driving a car, running a factory, or even producing food. When we calculate a carbon footprint, we're measuring how much CO_2 and other gases are being emitted by an individual, company, or even an entire country.

What Are Scope 1, Scope 2, and Scope 3 Emissions?

Carbon emissions are divided into three "scopes" based on where they come from. These scopes help companies and organizations track emissions more accurately.

Scope 1: Direct Emissions

- **Definition**: These are emissions that come directly from sources that are owned or controlled by the company or individual.
- **Simple Example**: Imagine a company has a fleet of trucks. The **emissions from the fuel burned** in those trucks are Scope 1 emissions. These emissions are caused directly by the activities of the company.

Example:

- A factory burns **coal** to produce energy or heat, and the emissions from this burning process are Scope 1.
- If your company has its own vehicles (e.g., delivery trucks) that use fuel, the CO_2 emitted from driving these vehicles is **Scope 1**.

Scope 2: Indirect Emissions from Energy

- **Definition**: Scope 2 emissions come from the energy that the company or individual buys and uses (e.g., electricity, heating, cooling).
- **Simple Example**: A company doesn't produce its own electricity, but it buys electricity from a power plant. If the power plant burns coal or natural gas to generate the electricity, the **emissions from the power plant** are considered Scope 2 emissions for the company that uses the electricity.

Example:

- Your company uses electricity to run its office lights, computers, and other devices. If the electricity is produced using **fossil fuels** like coal or natural gas, the emissions from burning those fuels are Scope 2 emissions for your company.

Scope 3: Other Indirect Emissions (Upstream & Downstream)

- **Definition**: These are emissions that occur **outside** of the company's direct control, including emissions from the supply chain (upstream) and the product's lifecycle (downstream). These can also include the transportation of goods, waste disposal, business travel, and more.
- **Simple Example**: A company makes a product, but it doesn't make all the parts itself. Instead, it buys materials from suppliers. The emissions from producing those materials and transporting them to the company are Scope 3 emissions. Also, when customers use or dispose of the product, that contributes to Scope 3 emissions.

Example:

- The company manufactures shoes. The emissions from **producing the leather** (if sourced from a supplier) or **shipping the shoes** to stores are Scope 3 emissions.
- After the customer buys the shoes, the emissions from their **use** (e.g., washing the shoes) and **disposal** (e.g., throwing them away in a landfill) are also Scope 3 emissions.

How to Calculate Carbon Footprint (Scopes 1, 2, and 3)

Example 1: A Small Business (Simple Calculation)

Let's say you run a small coffee shop. You need to calculate the carbon footprint of your shop by looking at **Scope 1, Scope 2, and Scope 3 emissions**.

1. **Scope 1** (Direct Emissions):
    - You have a delivery truck that uses **diesel** fuel.
    - The truck emits CO2 when it drives to deliver coffee supplies.
    - To calculate this, you'll measure how much diesel the truck uses and then use a conversion factor to figure out how much CO2 is released. (E.g., 1 liter of diesel = 2.68 kg of CO2)
2. **Scope 2** (Indirect Emissions from Energy):
    - Your coffee shop uses **electricity** for lighting, coffee machines, and refrigeration.
    - If the electricity comes from a coal-fired power plant, it will have a carbon footprint.
    - You'll look at your **monthly electricity usage** (in kilowatt-hours) and multiply it by the CO2 emissions factor for your local electricity grid (e.g., 0.4 kg CO2 per kWh).

3. **Scope 3** (Other Indirect Emissions):
    - The coffee beans you use come from a farm in another country, and they are shipped by **truck and ship**.
    - To calculate this, you would work with your supplier to get data on how far the coffee beans travel and how much CO2 is emitted in the process. This includes transportation emissions, packaging, and even the waste generated when coffee cups are discarded by customers.

Example 2: A Larger Organization (Detailed Calculation)

Imagine a larger company that produces **t-shirts**.

1. **Scope 1** (Direct Emissions):
    - The factory where t-shirts are made burns **natural gas** for heating.
    - You calculate how much natural gas is used and convert that into CO2 emissions (e.g., 1 cubic meter of natural gas = 1.88 kg CO2).
2. **Scope 2** (Indirect Emissions from Energy):
    - The factory uses **electricity** to power sewing machines and other equipment.
    - You calculate how many kilowatt-hours of electricity are used and find out how much CO2 emissions are produced from the local grid.
3. **Scope 3** (Other Indirect Emissions):
    - **Upstream emissions**: The cotton used for t-shirts is grown and processed by a supplier.
    - **Downstream emissions**: The t-shirts are shipped to stores, and customers buy and wear them.
    - You'll work with your supply chain to calculate emissions from cotton farming, transportation, and the end-of-life disposal of t-shirts.

Tools You Can Use to Measure Emissions

There are several tools that make carbon footprint calculation easier:

1. **Carbon Trust Footprint Calculator**: A simple tool to measure emissions for small businesses and individuals.
2. **GHG Protocol Tools**: Tools from the World Resources Institute that help measure Scope 1, 2, and 3 emissions.

3. **SimaPro**: A software used to perform Life Cycle Analysis (LCA), especially for complex products and processes.

Key Takeaways

- **Scope 1**: Emissions you directly control (e.g., from company vehicles, burning fuel).
- **Scope 2**: Emissions from the energy you purchase (e.g., electricity, heating).
- **Scope 3**: Emissions from your supply chain and product lifecycle (e.g., production, transportation, product use, waste).