

Carbon connections



Energy at work

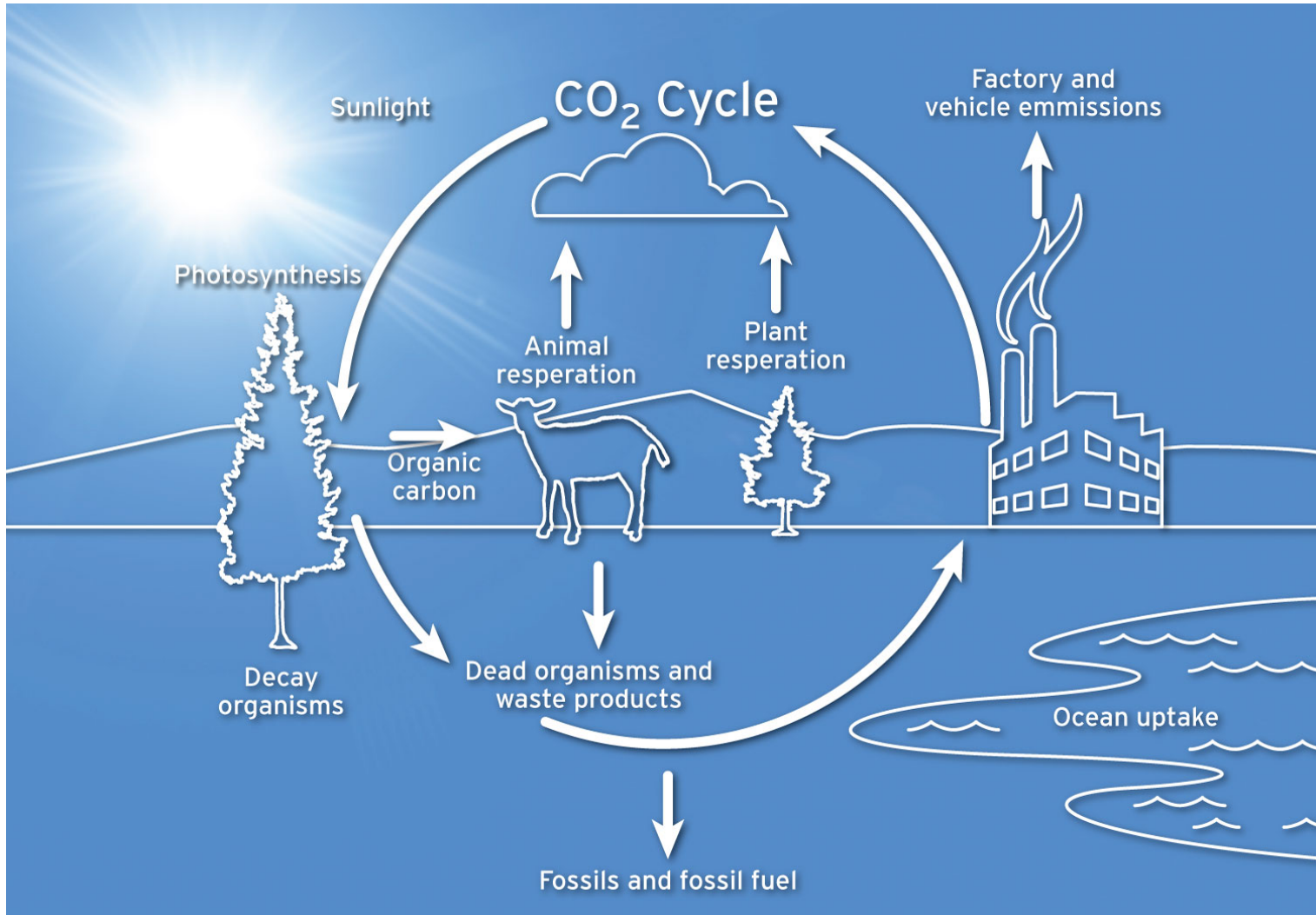


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Carbon molecules

- Carbon, an element found on the periodic table, is a form of **matter**.
- Carbon has the ability to combine with up to **four** different elements to create large, complex molecules.
- The **carbon cycle** refers to carbon moving through the different spheres of Earth.

Carbon cycle



Carbon cycle

- Carbon cycles through both **biotic** (living) and **abiotic** (non-living) components.
- Both biotic and abiotic components are found among the biosphere, geosphere, hydrosphere and atmosphere.
- Carbon can exist in four different states, based on its molecular form:
 1. as a **solid** (e.g. sugar or protein)
 2. as a **liquid** (e.g. liquefied natural gas)
 3. as a **gas** (e.g. carbon dioxide [CO₂] or methane [CH₄])
 4. as a **plasma** (e.g. Earth's cool and dense plasmasphere)

Carbon in the spheres

- After decomposing (**naturally** or through **human use**), carbon is released back into the atmosphere, biosphere, hydrosphere or geosphere.
- Thus, carbon continues its process of cycling through the four spheres of Earth.

Carbon in the biosphere

- Carbon exists in the **biosphere** as living, biotic matter such as the sugars, proteins and fats in animals, plants and fungi.

Carbon in the geosphere

- When biotic forms of carbon decay over long periods of time, they become **fossil fuels**.
- Fossil fuels are stored underground in the **geosphere**.
- Different types of fossil fuels include:
 - coal
 - petroleum
 - natural gas

Coal

- formed from **decayed plant matter**
- converted from organic plant matter into the mineral **anthracite** over many years
- currently the largest source of energy worldwide

Petroleum

- form of crude (unrefined) oil
- composed of **decayed algae and zooplankton**
- also refined into many products, such as **plastics** and **cosmetics**

Natural gas

- decomposed natural plant and animal matter that has been exposed to **high heat and pressure**
- **refined** before being used as energy for heating homes, cooking food, heating water and as a transportation fuel
- cleanest-burning fossil fuel

Renewable natural gas

- Bacteria breaks down organic waste to create **biogas**.
- The biogas is captured and purified to provide **renewable** natural gas.
- Renewable natural gas can be considered carbon neutral because it is produced from organic waste and no additional carbon is released into the atmosphere.

Carbon neutral

- Being carbon neutral means balancing carbon emissions released into the atmosphere with projects or actions that **remove** carbon emissions from the atmosphere.
- Renewable natural gas can reduce greenhouse gas emissions as it displaces traditional fossil fuels that **release** greenhouse gases into the atmosphere.

Carbon cycle

