

# CARBON TRAVEL GAME

## EXPLORE 2 LESSON 10



### FOSSIL FUEL EMISSIONS CARDS

#### Atmosphere – Carbon Dioxide

**You are paired with two oxygen – you are in carbon dioxide or CO<sub>2</sub>!**

Roll the dice. If you roll a:

- **1, 2, or 3:** Stay in the Atmosphere 1 turn, then roll again.
- **4 or 5:** A plant has taken you up as part of photosynthesis and synthesized you into sugar or a longer carbon chain. Become part of Terrestrial Life.
- **6:** You have dissolved in the waters of the Surface Ocean.

#### Terrestrial Life

**You are taken up as a part of photosynthesis and become a part of a carbon chain in a plant, such as cellulose in a tree trunk or sugar in fruit.**

Roll the dice. If you roll a:

- **1 or 2:** You've been eaten by an animal and converted by respiration into carbon dioxide (CO<sub>2</sub>), go to the Atmosphere.
- **3:** You're wood or another material that has been burned (combustion) by natural wildfires or by humans as a part of changing land use. Go to the Atmosphere.
- **4, 5 or 6:** The organism you were a part of died, and now the carbon that made it up has fallen to the ground, where it will soon decay. Go into the Soil because carbon never dies!



## Soil/Detritus

**You are part of a carbon chain, such as cellulose in a fallen leaf.**

Roll the dice. If you roll a:

- **1:** Human disturbance of the land causes you to be carried away in a rainstorm, as runoff, to streams and rivers. Eventually, you arrive at the Surface Ocean.
- **2 or 3:** Stay in the Soil 1 turn, then roll again.
- **4:** Stay in the Soil 1 turn, then roll again. If you roll 4 five times in a row, you are buried to where no oxygen is available and become a Fossil Fuel.
- **5 or 6:** The chain you are a part of decayed and became carbon dioxide. Go into the Atmosphere.

## Intermediate/Deep Ocean

**You are carbon dioxide dissolved in the deeper waters of the ocean.**

Roll the dice. If you roll a:

- **1:** Stay where you are 1 turn, then roll again. If you roll 1 twice in a row, you settle to the bottom of the ocean and become part of Ocean Sediment.
- **2, 3, or 4:** Stay where you are 1 turn, then roll again.
- **5 or 6:** The processes of water currents and ocean mixing sends you up to the Surface Ocean.

## Marine Life

**You are part of a carbon chain in algae or a marine mammal!**

Roll the dice. If you roll a:

- **1, 2, 3, 4, or 5:** You've been exhaled/respired by marine life and converted to carbon dioxide gas. Go to Surface Ocean.
- **6:** The organism you were a part of died, and the carbon that made it up is now drifting downwards in the ocean. Carbon never dies! Go to the Intermediate/Deep Ocean.

## Ocean Sediment

**You can roll the die, but you're not going anywhere anytime soon! You are Ocean Sediment, and will become sedimentary rock.**

Roll the dice. Stay unless:

- **You roll a 1 five times in a row:** After 10 million years you are compressed under conditions of great temperature and pressure to become Fossil Fuel Deposits.
- **You roll a 6 five times in a row:** After 10 million years you are released by a volcano as carbon dioxide gas. Go to the Atmosphere.

## Surface Ocean

**You are carbon dioxide dissolved in the surface waters of the ocean.**

Roll the dice. If you roll a:

- **1:** Stay where you are in the Surface Ocean 1 turn, then roll again.
- **2 or 3:** Through wave action, you have come out of a solution as carbon dioxide gas. Go to the Atmosphere.
- **4 or 5:** The processes of water currents and ocean mixing sends you to the Intermediate/Deep Ocean layers.
- **6:** Algae has taken you up out of the water through photosynthesis and synthesizes you into a carbon chain. Become part of the Marine Life cycle.

## Fossil Fuel Deposits

**You are part of a carbon chain in oil or natural gas.**

Roll the dice. If you roll a:

- **1 or 2:** Stay where you are in Fossil Fuel Deposits for 1 turn. You have not been extracted from underneath the rocks. Roll again.
- **3, 4, 5 or 6:** You've been extracted and then burned in a car or power plant and converted into carbon dioxide gas. Go to the Atmosphere.

## DAIRY CATTLE AND METHANE CARDS

### Atmosphere – Carbon Dioxide

**You are CO<sub>2</sub> in the atmosphere.**

Roll the dice. If you roll a:

- **1 or 2:** Stay in the Atmosphere – Carbon Dioxide for 1 turn, then roll again.
- **3 or 4:** You are taken up by a plant. This happens because you are needed for photosynthesis. You are synthesized into sugar or a longer carbon chain. Become part of Terrestrial Life.
- **4, 5 or 6:** You have dissolved in the waters of the Surface Ocean.

### Atmosphere – Methane

**You are CH<sub>4</sub> released from a belching cow to the atmosphere.**

Roll the dice. If you roll a:

- **1 or 2:** Stay in the Atmosphere – Methane for 1 turn, then roll again.
- **3, 4, 5, or 6:** You are converted into CO<sub>2</sub> by hydroxyl oxidation after 12 years. Move to Atmosphere – Carbon Dioxide.

### Surface Ocean

**You are carbon dioxide dissolved in the surface waters of the ocean.**

Roll the dice. If you roll a:

- **1:** Stay where you are in the Surface Ocean 1 turn, then roll again.
- **2 or 3:** Through wave action, you have come out of a solution as carbon dioxide gas. Go to the Atmosphere – Carbon Dioxide.
- **4 or 5:** The processes of water currents and ocean mixing sends you to the Intermediate/Deep Ocean layer as methane clathrates.
- **6:** Algae has taken you up out of the water through photosynthesis and synthesizes you into a carbon chain. Become part of the Marine Life cycle.

### Terrestrial Life

**You are part of a carbon chain – cellulose in a plant.**

Roll the dice. If you roll a:

- **1, 2, 3 or 4:** You are a plant that has been eaten by a grazing cow. In their gut, you have been turned into methane as a byproduct of digestion. Go to Atmosphere - Methane.
- **5 or 6:** The plant you were a part of died, and now the carbon that made it up has fallen to the ground where it will soon decay. Go into the Soil because carbon never dies!

## Marine Life

**You are part of a carbon chain in algae or a marine mammal.**

Roll the dice. If you roll a:

- **1, 2, 3, 4, or 5:** You've been exhaled/respired by marine life and converted to carbon dioxide gas. Go to Surface Ocean.
- **6:** The organism you were a part of died, and the carbon that made it up is now drifting downwards in the ocean. Carbon never dies! Go to the Intermediate/Deep Ocean.

## Intermediate/Deep Ocean

**You are methane hydrates (clathrates) found in the deeper waters of the ocean.**

Roll the dice. If you roll a:

- **1:** Stay where you are 1 turn, then roll again. If you roll 1 twice in a row, you settle to the bottom of the ocean and become part of the Ocean Sediment.
- **2, 3, or 4:** Stay where you are 1 turn, then roll again.
- **5 or 6:** The processes of water currents and ocean mixing sends you up to the Surface Ocean.

## Ocean Sediment

**You can roll the die, but you're not going anywhere anytime soon! You are Ocean Sediment and will become sedimentary rock.**

Roll the dice. Stay unless:

- **You roll a 1 five times in a row:** After 10 million years you are compressed under conditions of great temperature and pressure to become Fossil Fuel Deposits.
- **You roll a 6 five times in a row:** After 10 million years you are released by an underwater volcano as carbon dioxide gas. Go to the Atmosphere – Carbon Dioxide.

## Fossil Fuel Deposits

**You are part of a carbon chain as a hydrocarbon natural gas.**

Roll the dice. If you roll a:

- **1 or 2:** Stay where you are in Fossil Fuel Deposits for 1 turn. You have not been extracted from underneath the rocks. Roll again.
- **3, 4, 5 or 6:** You've been extracted and then burned as natural gas (a methane hydrocarbon). Go to the Atmosphere - Methane.

## Soil/Detritus

**You are a decaying plant. Methanogens are microorganisms in soil that decompose your organic material.**

Roll the dice. If you roll a:

- **1:** Human disturbance of the land causes you to be carried away in a rainstorm, as runoff, to streams and rivers. Eventually, you arrive at the Surface Ocean.
- **2 or 3:** Stay in the Soil 1 turn, then roll again.
- **4:** Stay in the Soil 1 turn, then roll again. If you roll 3 five times in a row, you are buried to where no oxygen is available and become a Fossil Fuel.
- **5 or 6:** The chain you are a part of completely decayed. You are oxidized by soil microbes called methanotrophs and released at the soil surface. Go into the Atmosphere - Methane.

## TITLES

**Atmosphere  
Carbon Dioxide**

**Atmosphere  
Methane**

**Terrestrial Life**

**Soil/Detritus**

**Intermediate  
Deep Ocean**

**Marine Life**

**Ocean Sediment**

**Surface Ocean**



# Fossil Fuel Deposits