## Unit 4

### Lesson 4.1

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| **Term** | **Definition** | **Example Sentence** |
| **emissions** | The release of substances, such as gases, particles, or radiation, into the air, water, or soil. | The factory installed new filters to reduce its emissions of harmful pollutants into the air. |
| **Grand Challenges** | The five categories of human emissions sources, which are also the five categories of mitigation solutions. | The breakdown of the five Grand Challenges looks different in every country. |
| **decarbonization** | The reduction or elimination of greenhouse gas emissions from processes, products, and systems. | Decarbonization is essential for combating climate change, requiring a shift from fossil fuels to low- or zero-carbon alternatives. |
| **manufacturing** | The use of labor, machinery, and chemical processes to turn raw materials into products like cement, steel, and plastic. | The manufacturing processes we use to create concrete, steel, glass, and other  materials produce almost a third of humanity’s annual carbon emissions. |

### Lesson 4.2

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| **Term** | **Definition** | **Example Sentence** |
| **decarbonization** | The reduction or elimination of greenhouse gas emissions from processes, products, and systems. | Decarbonization is essential for combating climate change, requiring a shift from fossil fuels to low- or zero-carbon alternatives. |
| **carbon capture and sequestration (CCS)** | The technology and processes that collect CO2 at the point of emissions to then store underground or elsewhere. | Many power plants are investing in carbon capture and sequestration (CCS) technology to trap CO₂ emissions and store them underground, reducing their environmental impact. |
| **direct air capture (DAC)** | Technology that pulls CO2 directly from the atmosphere to filter, collect, concentrate, and permanently store it deep underground or to use it in other processes. | In 2023, only 27 direct air capture plants were operational, with another 130 in development. |
| **hydroelectric power** | Energy generated by the movement of water through the use of turbines and gravity. | Many countries rely on hydroelectric power as a renewable energy source, using dams to generate electricity from flowing water. |
| **nuclear energy** | Energy generated from nuclear reactions, which involve the splitting or fusing of atoms | But despite its bad reputation, nuclear energy is statistically one of the safest ways that humans generate electricity. |
| **renewable energy** | Energy derived from natural sources that are continuously replenished. | Solutions that produce electricity through renewable energy, such as wind and solar, can make a big difference. |

### Lesson 4.3

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| **Term** | **Definition** | **Example Sentence** |
| **policy** | A law, rule, process, practice, or action of a government or other organization, often used as a basis for decision-making. | The government implemented a policy requiring all new buildings to use energy-efficient heating and cooling systems. |
| **subsidy** | Money provided by the government to help make a product or service more affordable. | The government introduced a subsidy for electric vehicles to make them more affordable and to encourage the transition to clean transportation. |
| **research and development (R&D)** | The process of investigating, designing, and creating new products, technologies, or improvements to existing systems. | For many companies, zero-carbon cement is still in the research and development phase with the processes and designs still being developed. |
| **standards** | Models or expected rules of measure established by an authority such as a government. | Many countries have adopted strict emissions standards to reduce air pollution and combat climate change. |
| **cap-and-trade** | A program that sets a cap on greenhouse gas emissions that steadily lowers over time in order to curb emissions and, in many cases, raise money to address climate change. | The cap-and-trade system allows companies to buy and sell emissions permits, creating a financial incentive to reduce greenhouse gas emissions over time. |
| **Inflation Reduction Act** | A US federal law that aims to encourage clean energy and low-carbon technologies while also investing in domestic energy production, reducing the budget deficit, and lowering prescription drug prices. | Legislation like the Inflation Reduction Act promotes climate action through things like subsidies and tax incentives. |

### Lesson 4.4

| **Term** | **Definition** | **Example Sentence** |
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| **crop yields** | Amount of crop grown, usually for food, livestock feed, or fuel. | Both droughts and floods are expected to become more common, reducing crop yields and livestock production. |
| **malnutrition** | A health condition that develops when someone is missing key nutrients from their diet that they need to maintain healthy tissues and organ function. | In regions like sub-Saharan Africa, where over half the population depends on farming, less productive farms could lead to more malnutrition, poverty, and economic hardship. |
| **infrastructure** | The physical assets and systems that enable our daily lives, including transportation, energy, buildings, and sanitation. | Extreme weather events like floods, hurricanes, and wildfires can damage or destroy infrastructure. |
| **hydrogen fuel** | A clean energy source that produces energy from the conversion of gaseous hydrogen to water. | Heavy-duty vehicles, such as trucks and ships, will need new technologies like hydrogen fuel cells and biofuels to continue to move the goods we use every day. |
| **biofuel** | A liquid fuel made from renewable biological sources, such as plants and algae. | Many airlines are exploring biofuel made from plant-based materials to reduce their dependence on fossil fuels. |