HOLLISTON Public Schools

Unit 1: Intro to Climate Change

Subject Area: Science Technology	**Course**: Climate Campaign		
Unit Title: Intro to Climate Change	**Grade(s)**: 9-12	**Start**: September	**End**: September
Unit Summary: *Unit 1, Introduction to Climate Change*, will facilitate students' understanding of the causes of global warming and ensuing changes in global and regional climate patterns. Students will learn about the historical use of various energy sources and implications of increased use of fossil fuels from the 19th century onward. Through varied learning activities students will attain mastery of climate science terms and concepts.			

Stage 1: Desired Results

Massachusetts Learning Standards

HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's hydrosphere can create feedbacks that cause changes to other Earth systems.

HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems over different time scales result in changes in climate. Analyze and interpret data to explain that long term changes in Earth's tilt and orbit result in cycles of climate change such as Ice Ages.

HS-ESS2-6. Use a model to describe cycling of carbon through the ocean, atmosphere, soil, and biosphere and how increases in carbon dioxide concentrations due to human activity have resulted in atmospheric and climate changes.

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HS-ESS3-5. Analyze results from global climate models to describe how forecasts are made of the current rate of global or regional climate change and associated future impacts to Earth systems.

- ***Clarification Statement:*** • Climate model outputs include both climate changes (such as precipitation and temperature) and associated impacts (such as on sea level, glacial ice volumes, and atmosphere and ocean composition).

Vision of a Graduate Performance Outcome(s)

- **Innovative Thinker** - Uses reasoning to question, process, and evaluate Information.
- **Effective Communicator** - Collaborates with others in order to achieve desired learning outcomes.

Transfer (Authentic, relevant application of learning to new situations)

Students will be able to independently use their learning to…

- Effectively communicate their understanding of the concepts, causes, and impacts of climate change through writing, multimedia presentations and oral discourse.
- Competently engage in the consideration, analysis, and discussion of ongoing climate related news, data and events.

Meaning

Enduring Understandings	Essential Questions
Students will understand… • the scientific principles behind global warming and	**Students will consider…** • what are the primary causes of global warming, and

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the role of greenhouse gases and human activities in driving this phenomenon. ● how global warming influences climate patterns worldwide and regionally, identifying observable impacts such as shifts in precipitation, temperature, and extreme weather events. ● the historical evolution of energy consumption, focusing on the transition from traditional renewable sources to the increased reliance on fossil fuels during the industrial era. ● the environmental, social, and economic consequences associated with the widespread adoption of fossil fuels since the 19th century. ● and display fluency in climate science terminology, enabling them to communicate effectively about climate change concepts, processes, and impacts.	how do human activities contribute to the accumulation of greenhouse gases in the atmosphere? ● how have global and regional climate patterns changed over time, and what evidence supports these changes? ● what are the historical trends in energy consumption, and how did the widespread adoption of fossil fuels impact global development and industrialization? ● what are the environmental, social, and economic implications of relying heavily on fossil fuels since the 19th century? ● what climate science terms and concepts are essential for understanding climate change, and how do these concepts relate to real-world phenomena and observations?
Acquisition	
Knowledge **Students will know…** **1.** Causes of Global Warming: ● Greenhouse gases	**Skills** **Students will be skilled at…** **1.** Analyzing: ● Analyzing the causes and effects of global

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● Anthropogenic activities ● Deforestation ● Fossil fuel combustion **2.** Climate Patterns: ● Global climate change ● Regional climate variability ● Temperature trends ● Precipitation patterns ● Extreme weather events **3.** Historical Energy Sources: ● Industrial revolution and energy demands ● Fossil fuels (coal, oil, natural gas) ● Traditional renewable energy (e.g., biomass, wind) **4.** Implications of Fossil Fuel Use: ● Environmental impacts (e.g., air pollution, carbon emissions) ● Social consequences (e.g., economic development, public health) ● Economic implications (e.g., energy dependence, resource depletion) **5.** Climate Science Terms and Concepts: ● Greenhouse effect ● Carbon footprint ● Renewable energy ● Mitigation vs. adaptation ● Climate models **6.** Scientific Principles:	warming. ● Analyzing historical trends in energy consumption and their impacts on climate. **2.** Understanding: ● Understanding the mechanisms behind global warming and climate change. ● Understanding the relationships between energy use and environmental consequences. **3.** Identifying: ● Identifying key climate science terms and concepts. ● Identifying regional and global climate patterns and trends. **4.** Explaining: ● Explaining the implications of increased fossil fuel use on climate and society. ● Explaining the significance of renewable energy sources in mitigating climate change. **5.** Applying: ● Applying climate science knowledge to interpret real-world climate phenomena. ● Applying critical thinking to evaluate energy policies and their environmental impacts. **6.** Communicating: ● Communicating scientific ideas and findings related to climate change effectively. ● Communicating the importance of

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● Radiative forcing ● Ocean acidification ● Climate feedback loops ● Carbon cycle **7.** Environmental Policy and Regulations: ● International agreements (e.g., Paris Agreement) ● National, state and local emission reduction strategies and policies ● Renewable energy targets **8.** Interdisciplinary Connections: ● Interactions between climate and ecosystems ● Socioeconomic factors influencing climate change perceptions	sustainable energy use and practices to different audiences. **7.** Synthesizing: ● Synthesizing information from multiple sources to understand complex climate issues. ● Synthesizing historical data with current climate science concepts. **8.** Problem-solving: ● Problem-solving to address challenges related to climate change mitigation and adaptation. ● Problem-solving to assess alternative energy solutions and their feasibility. **9.** Evaluating: ● Evaluating the effectiveness of climate policies and regulations. ● Evaluating the role of individual and collective actions in combating climate change.