



CLIMATE CHANGE

Climate change is any significant change in climate lasting for an extended period. Climate change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer.

The Eco-Committee Conversation: Why do we care?

The global average temperature is rising, these warming patterns are a result of human activities. In the 11,000 years before the industrial revolution, the average temperature across the world was stable at around 14C. The industrial revolution in the mid 1800 kick started the burning of fossil fuels such as coal, oil and gas. Burning fossil fuels for transportation, manufacturing, heating and cooling, and electricity generation releases greenhouse gases into the atmosphere. Levels of these heat-trapping gases, particularly carbon dioxide (CO₂), are increasing at a faster rate than at any other time on record. For example, the level of carbon dioxide in the atmosphere rose by 40% during the 20th and 21st century and is now over 400ppm (parts per million). This level of carbon dioxide is higher than at any time in the past 800,000 year. The consequences of this unprecedented change in the atmosphere are both uncertain and likely to be extreme, as is evident by the increase in extreme weather events, such as superstorms, wildfires, droughts, and floods.

Here in Bermuda our power station BELCO burns a heavy fuel oil and diesel to power the island with electricity. These fossil fuels can be seen polluting the air on a calm day over Hamilton. In 2016 there were 47,834 registered cars in Bermuda, for every gallon of petrol your car burns, 19.64 pounds of carbon dioxide are released into our atmosphere. It is important that we understand that no country is exempt from the responsibility of cleaning our atmosphere and environment, we are all responsible for this rapid change in our global climate.

Education is one of the key steps in creating change. Whole school communities can play a key role in reducing greenhouse gas emissions by taking actions to shrink their carbon footprints. Schools can take a systems-thinking approach to engage in evidence-based science investigations in efforts to reduce their overall carbon footprint and, Through collaboration, design resilience and mitigation solutions to the climate crisis.

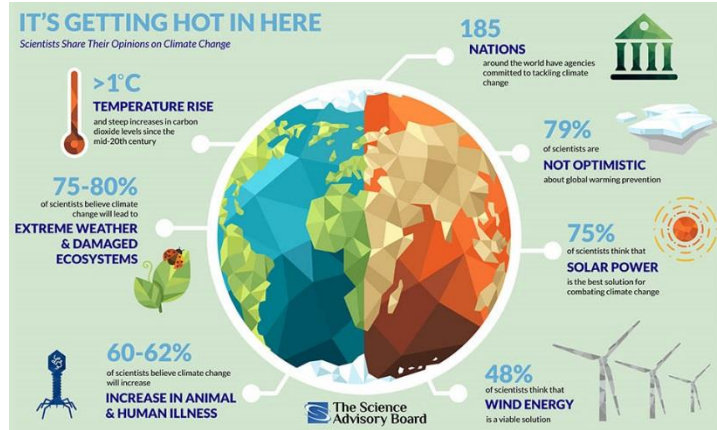
The aim of this pathway is to help students:

- Understand climate change
- Understand the negative effects climate change has on flora and fauna globally
- Understand how greenhouse gas emissions negatively effects the entire globe
- Understand how burning fossil fuels is link to ocean acidification
- Learn about alternative ways to reduce emissions at home
- Carry out calculations using a variety of techniques and strategies
- Present findings to others in a way that will persuade them to change their attitudes and behavior



Did you know?

- Greenhouse gases—including carbon dioxide, methane, and water vapor—trap heat in the Earth's atmosphere and warm the planet.
- The concentration of carbon dioxide (CO₂) in our atmosphere, as of 2018, is the highest it has been in 3 million years.
- Eleven percent of all global greenhouse gas emissions caused by humans are caused by deforestation — comparable to the emissions from all the cars and trucks on the planet.
- Burning one gallon of gasoline puts 19.64 pounds of carbon dioxide into the atmosphere.
- Rainforest destruction contributes to climate change. Because trees store carbon dioxide as they grow, clearing and burning forests releases large amounts of carbon dioxide into the atmosphere.
- The Ocean absorbs 40% of fossil fuel emissions making the ocean more acidic, which indirectly leads to the bleaching of coral reefs.
- The United States is the second largest contributor to carbon dioxide in our atmosphere, though it is home to just 4.3 percent of the world's population. If everyone in the world lived the way people do in the U.S., it would take four Earths to provide enough resources for everyone.
- If the Earth warms by 2.7°F (1.5°C)—which, on our current path, is expected between 2030 and 2050—6 percent of insects, 8 percent of plants, and 4 percent of vertebrates will lose more than half their range.
- Eleven percent of the world's population, 800 million people are currently vulnerable to climate change impacts such as droughts, floods, heat waves, extreme weather events and sea-level rise.



Things to investigate

- How many students arrive at school by car? Do any students carpool?
- Does the school use LED light bulbs? If so, how many are LED and how many aren't?
- Are the lights in the school on all night?
- What does the school's electricity bill look like per month? Brainstorm with students on how they can reduce this.
- How long do the air-conditioners run daily?
- Do the students and teachers turn off the lights as they leave the room?
- Does someone's ecological footprint, in Bermuda, get larger in the winter or the summer? Why would there be changes if any?



Action Plan Ideas

- Action:** Complete a project that raises awareness of the climate crisis and promotes behavior that can reduce our impact on the environment
 - Have students create posters that highlight steps other peers and staff can take to reduce their own impact on the environment.
- Action:** Aid students in starting a student run Eco club where environmentally passionate students can come together and act in the school to raise awareness and implement change.
- Action:** Calculate the carbon footprints for each student and find the average. Then brainstorm as a class, create a mind map on how they can personally reduce their ecological footprint.
 - <https://www.nature.org/en-us/get-involved/how-to-help/carbon-footprint-calculator/>
 - <https://offset.climateutralnow.org/footprintcalc>

- <http://www.epa.ie/climate/calculators/>
 - <https://www.carbonfootprint.com/calculator.aspx>
4. *Action:* perhaps in a mathematics class the students can create graphs and diagrams that present the schools ecological footprint.
- What is the school energy budget look like? Thinking about LED lights and how often AC and computers are running in the school.
 - Could be a good way to get the attention of influential staff members.
5. *Action:* Investigate how we generate energy in Bermuda.
- Go on a tour of BELCO or have a member of their team come and present to the class.
 - Bermuda's incinerator contributes to the production of electricity as well, this could be another interesting talk/tour



Monitor and Evaluate

Once your action plan has been implemented and the various projects and/or campaigns have run for a while, it is important to check in and measure if any improvements have been made. This can be done by conducting the audit again to have pre- and post- data. If improvements are not evident, discuss any possible reasons the projects and/or campaigns may not have worked and suggest ways to improve them. Initiate these improvements and set a goal to review later.

You want to see an improvement in our knowledge understanding of how to combat the current climate crisis.

Suggested Curriculum Integration

The list below gives ideas on how to integrate climate change into the classroom.

Science:

Understanding climate change and how all areas of the globe are affected.
Understanding what a warming earth is doing to coral reefs and other key habitats.

Math:

Carbon footprint calculations of the school and students
Using diagrams and graphs to show global increases in greenhouse gasses over the years.
Make graphs to show changes in schools energy use

Social studies

Have students create concept maps showing links between social, environmental and economic issues
Look at an electricity bill, teach students to understand electricity bills, brainstorm together on how to reduce the monthly bill
Have students write journals documenting how they feel about taking part in a climate action project.

Art and Design

Create posters and other visual representations to highlight effects of climate change and steps combat climate change.

Language

Practice the communication skills they need to speak out about the issues affecting their lives.
Have climate change debates to enhance student's confidence in speaking.

Geography

Create maps showing areas of the world most at risk due to climate change, make note of the populations in these areas.

Health and physical education

Examine the health risks associated with environmental factors such as air pollution ` List the environmental benefits of healthy practices such as active transportation.