2023 Envirothon Oral Presentation Problem Statement

# Current Issue: Adapting to a Changing Climate

***Scenario: Designing a High Impact Regional Initiatives to Reduce Emissions***

Climate change poses a threat to people and environments all around the globe. Although the climate has changed throughout all of Earth's 4.5 billion year history it is now changing at a faster rate than at any other time during the 300,000 year existence of our species. And it is changing so rapidly because of human activity.

Greenhouse gases are gases that trap heat in the atmosphere, warming our planet. Greenhouse gas (GHG) emissions include carbon dioxide, methane, hydrofluorocarbons, and water vapor. In New York State, the two largest sources of GHGs are driving vehicles and heating buildings. In both cases, the root source of emissions is the burning of fossil fuels. Mostly gasoline, derived from petroleum, for powering motor vehicles, and burning natural gas to heat buildings.

## The New York State Climate Act and its Implementation:

The New York State legislature has passed one of the most ambitious state-level legislative responses to climate change in the United States, the 2019 New York Climate Act. The Climate Act required the issuance of a scoping plan by January 1, 2024. The New York State Climate Action Council Scoping Plan was passed in December 2022. The plan includes recommendations to meet the act's requirements.

The plan identifies actions needed for New York to achieve:

- 70% renewable electricity by 2030
- 100% zero-emission electricity by 2040
- 40% reduction in statewide GHG emissions from 1990 levels by 2030
- 85% reduction in statewide GHG emissions from 1990 levels by 2050
- Net zero emissions statewide by 2050

See the plan at: http://climate.ny.gov/ScopingPlan.

While the Scoping Plan makes general recommendations for achieving the goals laid out in the New York Climate Act, implementation of these recommendations will require further details that attend to local contexts and challenges. **Your task is to outline two initiatives to lower GHG emissions within the state and present this to the governor and state legislature. One initiative should be specific to a rural community and the second should target a metropolitan area.**

Your committee will present a report to the governor and the legislature on the findings of a pilot study identifying the largest sources of GHG emissions and the main actions that can be taken to reduce those emissions. Here are some guidelines and other considerations for developing the pilot study and for the oral presentation:

1. **Pay careful attention to issues of relative scale.** The activities producing the most emissions in New York State are road transportation and heating buildings. Twenty percent reductions in emissions from either of these activities would reduce emissions as much as a 50% reduction in livestock related emissions.
2. **Pay careful attention to geography.** Reliance on hydropower and nuclear power makes it so the electricity produced in Upstate New York has lower emissions per unit of power than most of the rest of the country. New York City and Long Island rely heavily on natural gas for electricity production so the generation of electric power Downstate produces more GHG emissions per watt than those Upstate. See https://www.epa.gov/egrid/power-profiler#/ for more on electric power production and GHG emissions. Driving patterns, the nature of housing, and industry are among the things that are quite different in different parts of the state that highlight the need for regional approaches to GHG emissions.
3. **Serve as a model for other communities.** This will include some attention to how the initiative will be shared with people, especially those in leadership positions, across the state.
4. **Multisolve - address multiple problems simultaneously.** For example, efforts to make communities more walkable and bikeable reduce emissions will also improve the health of individuals and communities.
5. **Include attention to both costs and benefits of the effort.** There is no such thing as free energy, either in terms of financial or environmental costs. While all actions have economic and environmental costs, the costs of inaction are very great indeed. The Executive Summary of the Scoping Plan notes "The cost of inaction exceeds the cost of action by more than $115 billion."
6. **Address issues of environmental justice.** The Scoping Plan states, “A fundamental objective of New York’s nation-leading climate and energy agenda is to ensure that the State’s transition to a clean energy economy addresses health, environmental, and energy burdens that have disproportionately impacted underrepresented or underserved communities (including people of color, indigenous populations, low-income individuals, and women) and to remedy the structural causes that underpin these burdens.” Specifically address ways that your effort reduces burdens on marginalized communities.

Please note that the above guidelines and considerations do not all have to be discussed in the final oral presentation. These are listed here to give the committee ideas to work from when developing the action plan and oral presentation. Refer to the 2023 Oral Presentation Judges Score Sheet for guidance on how judges will assign points.

# Supporting notes:

The following sector overviews are taken directly from the Scoping Plan. The sectors are in order from largest to smallest emissions. Note that each sector includes multiple kinds of activities that produce emissions. The two activities that generate the most emissions are heating buildings and driving motor vehicles.

### Buildings Emissions Overview

The buildings sector was the largest source of emissions in 2019, responsible for **32% of emissions statewide**, which includes the combustion of fossil fuels in residential (34%) and commercial buildings (19%), emissions from imported fuels (33%), and hydrofluorocarbons released from building equipment and foam insulation (14%). The fuels used in buildings today include fossil natural gas, distillate fuel (e.g., heating fuel oil #2), wood, propane, kerosene, and residual fuel (New York State Climate Action Council, 2022, p. 175).

### Transportation Emissions Overview

The transportation sector was responsible for approximately **28% of the New York's greenhouse gas emissions** in 2019, which includes road transportation (59%), non-road such as aviation (12%), emissions from imported fuels (26%), and hydrofluorocarbons used in vehicle air-conditioning and refrigeration (3%). Transportation sector emissions are about 16% higher today than they were in 1990. The transportation sector today is largely dependent on petroleum-based fuels such as gasoline, diesel, and jet fuel, but the State has made strong progress in transitioning from petroleum-based fuels to zero-emission technologies (New York State Climate Action Council, 2022, p. 147).

### Electricity Emissions Overview

The electricity sector comprised **13% of statewide emissions** in 2019, including electricity generation within the State (44%), imported electricity (15%), emissions from imported fuels (41%), and the SF6[1] used in electricity distribution and transmission (<1%). Electricity sector emissions have declined 46% since 1990 (New York State Climate Action Council, 2022, p. 219).

### Waste Emissions Overview

GHG emissions from the waste sector represent **about 12% of statewide emissions**, including landfills (78%), waste combustion (7%), and wastewater treatment (15%). Most of these emissions represent the long-term decay of organic materials buried in a landfill, which will continue to emit methane at a significant rate for more than 30 years. It also represents both waste landfilling in New York and waste export to landfills in other states (New York State Climate Action Council, 2022, p. 219).

[1] Sulfur hexafluoride (SF6), which is 17,500 times more potent than CO2, based on a 20-year global warming potential (GWP), and persists in the atmosphere for thousands of years. SF6 is most commonly used as an insulator in electricity transmission and distribution equipment and its use continues to grow.

## Industry Emissions Overview

Industrial emissions made up **9% of statewide emissions** in 2019, including emissions from methane leaks and combustion from the oil and gas system in New York (45%), the direct combustion of on-site fuel (27%), emissions from imported fuels (20%), and non-combustion industrial processes (6%) (New York State Climate Action Council, 2022, p. 257).

## Agriculture and Forestry Emissions Overview

Agricultural emissions consisting of methane, nitrous oxide ($N_2O$) and a small amount of carbon dioxide ($CO_2$) represented approximately **6% of statewide emission**s in 2019 from livestock (92%) and soil management practices (8%). However, agriculture and forestry also provide carbon sequestration benefits and can provide significant contributions toward achieving net zero total emissions from all sectors in the State. For example, annual carbon sequestration in forestlands (77%) and urban forests (14%) and long-term storage of carbon in harvested wood products (5%) provided 97% of the State's greenhouse gas (GHG) emissions removals in 2019. The remaining greenhouse emissions removals are from natural and working lands (New York State Climate Action Council, 2022, p. 271).