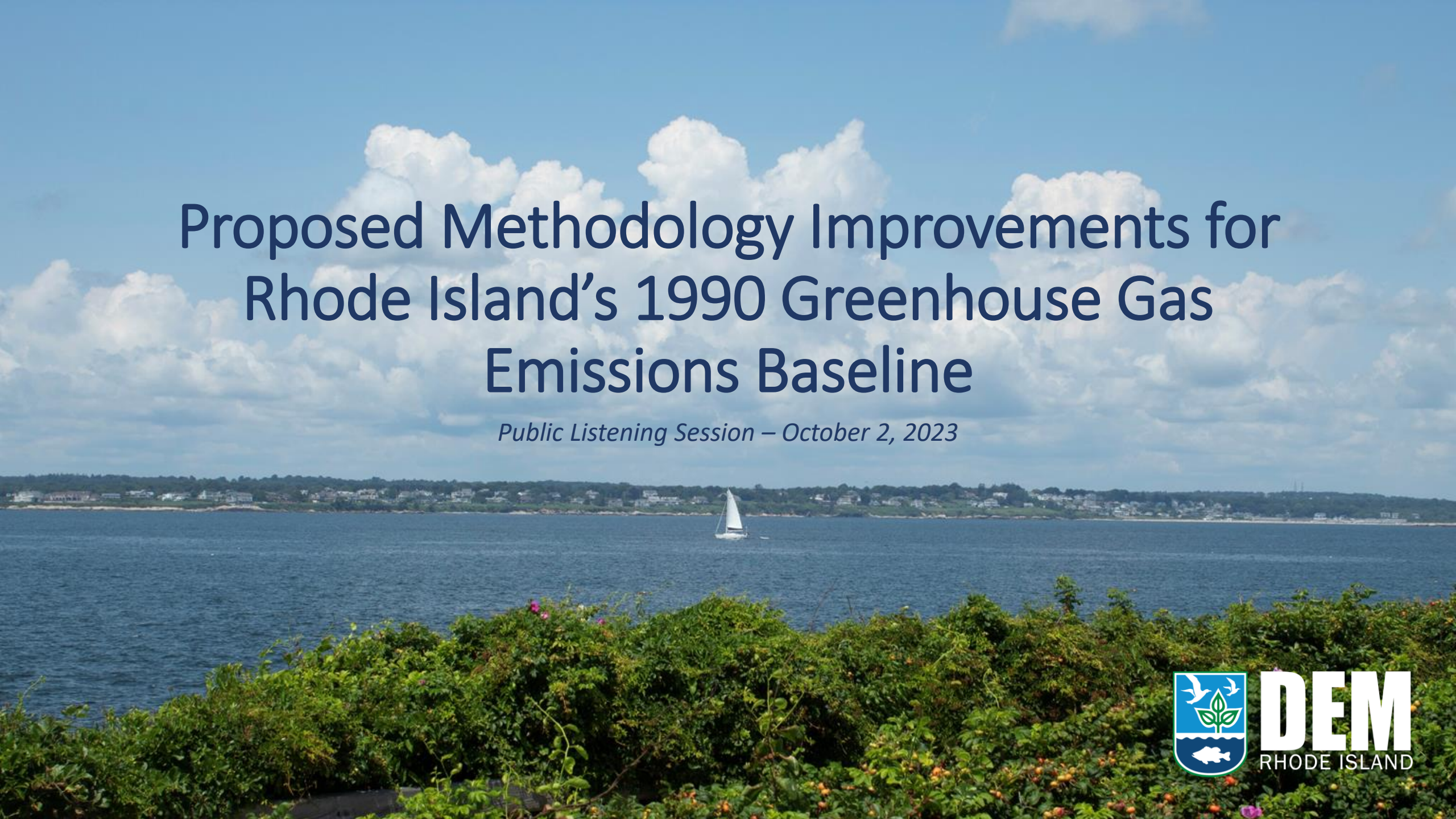
Proposed Methodology Improvements for Rhode Island's 1990 Greenhouse Gas Emissions Baseline

Public Listening Session – October 2, 2023



DEM
RHODE ISLAND

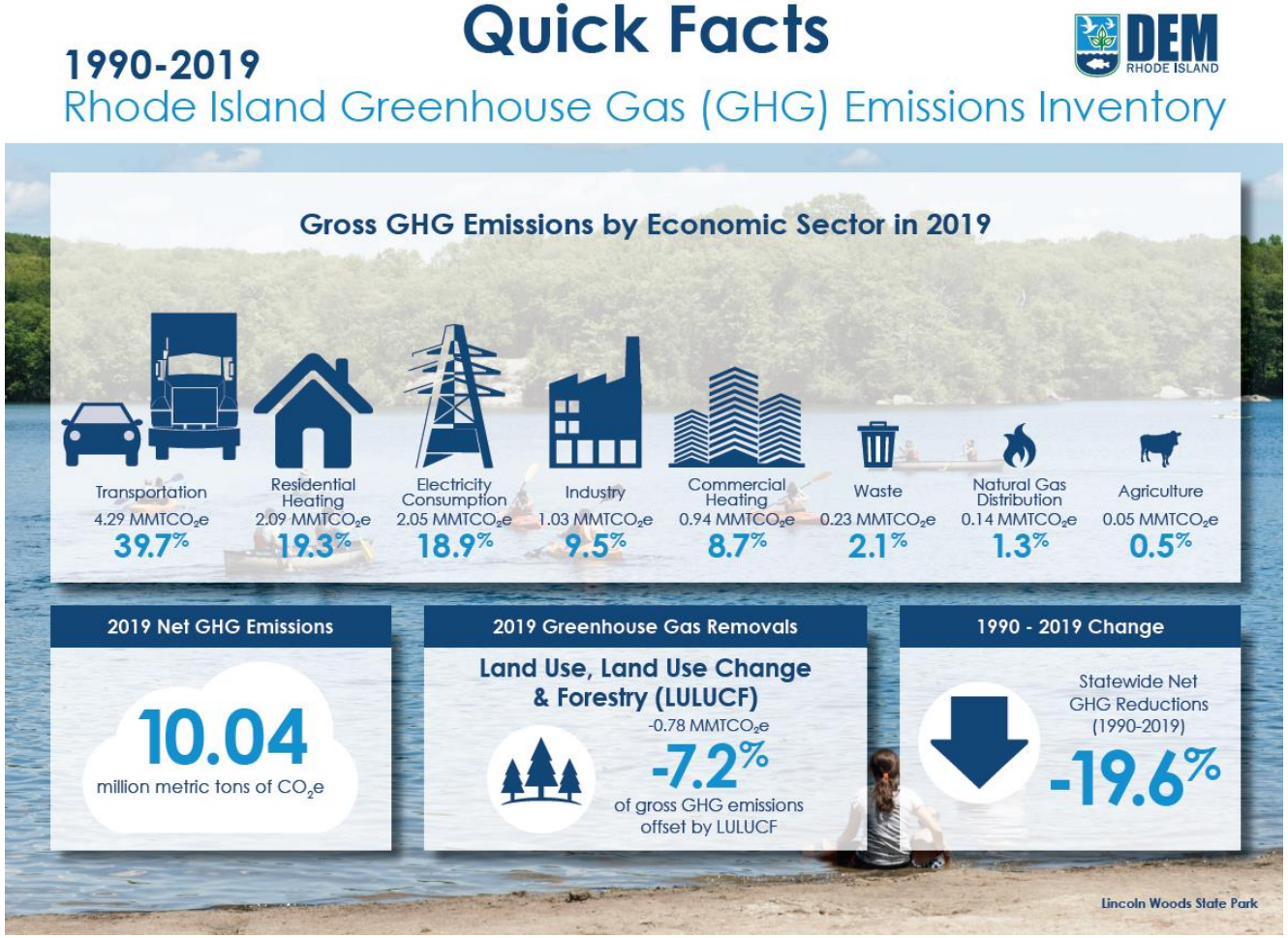
Agenda

- Background
- 2021 Act on Climate
- History of the 1990 Baseline
- Why We're Here
- Proposed Methodology Improvements
  - Update Global Warming Potentials
  - Align the Land Use, Land Use Change, and Forestry sector with international guidelines
- Next Steps
- Questions and Answers

Background

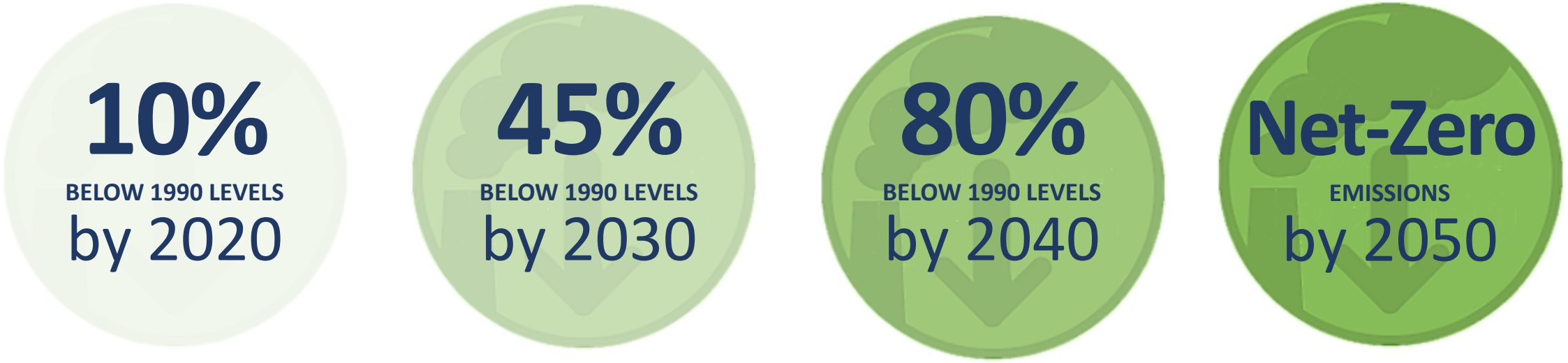
Today's Discussion:

1990 Baseline



2021 Act on Climate

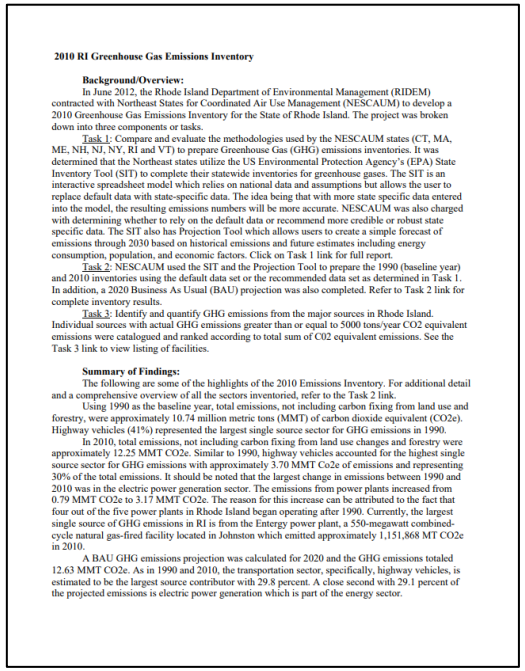
The Act on Climate's greenhouse gas emission reduction mandates:



1990: Chosen as baseline year to align with national and international agreements to reduce GHG emissions

History of the 1990 Baseline

Original 1990 Baseline (Created 2013)



2010 RI Greenhouse Gas Emissions Inventory

Background/Overview:

In June 2012, the Rhode Island Department of Environmental Management (RIDEM) contracted with Northeast States for Coordinated Air Use Management (NESCAUM) to develop a 2010 Greenhouse Gas Emissions Inventory for the State of Rhode Island. The project was broken down into three components or tasks.

Task 1: Compare and evaluate the methodologies used by the NESCAUM states (CT, MA, ME, NH, NJ, NY, RI and VT) to prepare Greenhouse Gas (GHG) emissions inventories. It was determined that the Northeast states utilize the US Environmental Protection Agency's (EPA) State Inventory Tool (SIT) to complete their statewide inventories for greenhouse gases. The SIT is an interactive spreadsheet model which relies on national data and assumptions but allows the user to replace default data with state-specific data. The idea being that with more state specific data entered into the model, the resulting emissions numbers will be more accurate. NESCAUM was also charged with determining whether to rely on the default data or recommend more credible or robust state specific data. The SIT also has Projection Tool which allows users to create a simple forecast of emissions through 2030 based on historical emissions and future estimates including energy consumption, population, and economic factors. Click on Task 1 link for full report.

Task 2: NESCAUM used the SIT and the Projection Tool to prepare the 1990 (baseline year) and 2010 inventories using the default data set or the recommended data set as determined in Task 1. In addition, a 2020 Business As Usual (BAU) projection was also completed. Refer to Task 2 link for complete inventory results.

Task 3: Identify and quantify GHG emissions from the major sources in Rhode Island. Individual sources with actual GHG emissions greater than or equal to 5000 tons/year CO2 equivalent emissions were catalogued and ranked according to total sum of C02 equivalent emissions. See the Task 3 link to view listing of facilities.

Summary of Findings:

The following are some of the highlights of the 2010 Emissions Inventory. For additional detail and a comprehensive overview of all the sectors inventoried, refer to the Task 2 link.

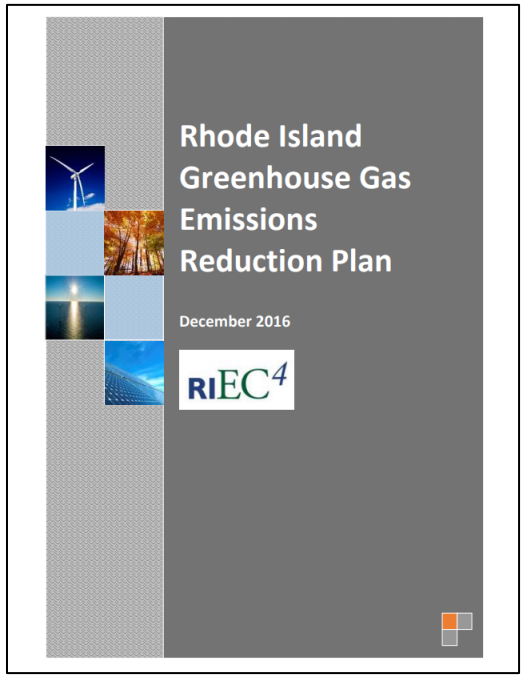
Using 1990 as the baseline year, total emissions, not including carbon fixing from land use and forestry, were approximately 10.74 million metric tons (MMT) of carbon dioxide equivalent (CO2e). Highway vehicles (41%) represented the largest single source sector for GHG emissions in 1990.

In 2010, total emissions, not including carbon fixing from land use changes and forestry were approximately 12.25 MMT CO2e. Similar to 1990, highway vehicles accounted for the highest single source sector for GHG emissions with approximately 3.70 MMT Co2e of emissions and representing 30% of the total emissions. It should be noted that the largest change in emissions between 1990 and 2010 was in the electric power generation sector. The emissions from power plants increased from 0.79 MMT CO2e to 3.17 MMT CO2e. The reason for this increase can be attributed to the fact that four out of the five power plants in Rhode Island began operating after 1990. Currently, the largest single source of GHG emissions in RI is from the Entergy power plant, a 550-megawatt combined-cycle natural gas-fired facility located in Johnston which emitted approximately 1,151,868 MT CO2e in 2010.

A BAU GHG emissions projection was calculated for 2020 and the GHG emissions totaled 12.63 MMT CO2e. As in 1990 and 2010, the transportation sector, specifically, highway vehicles, is estimated to be the largest source contributor with 29.8 percent. A close second with 29.1 percent of the projected emissions is electric power generation which is part of the energy sector.

1990 Baseline: Always used global warming potentials from the IPCC's *Second Assessment Report* (1995)

Current 1990 Baseline (Adjusted 2016)



Mainly EPA SIT default data, with two exceptions:

- Electricity Consumption
- Natural Gas Distribution

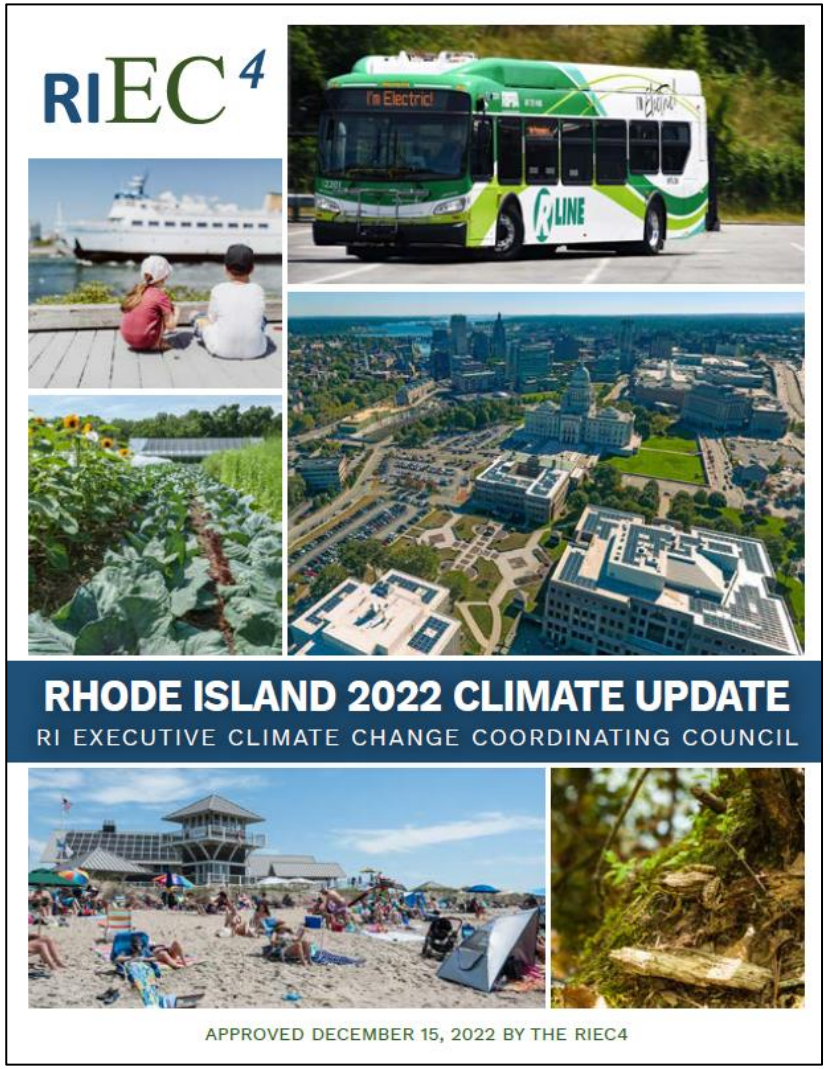
2016 Plan adjusted baseline for first and only time:

- Electricity Consumption
- Land Use, Land Use Change, and Forestry (LULUCF)

It's Time to Update the Baseline

EC4 Recommendation:

"We recommend further evaluation and discussion of updating the 1990 baseline if the best science suggests new and reasonable parameters or methods."



Proposed Methodology Improvements

Update Global Warming Potentials

Align LULUCF with International Guidelines

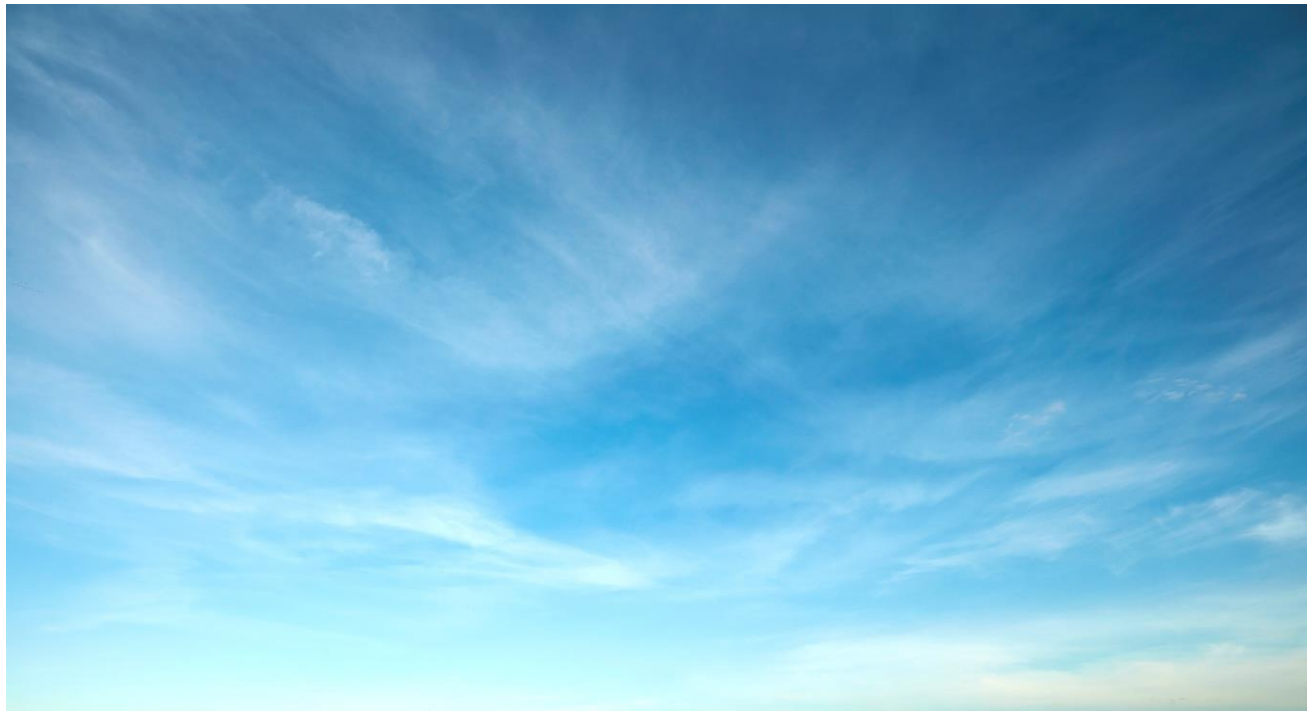
Important: all other aspects of current 1990 baseline will remain as-is

What's a Global Warming Potential?

Global Warming Potentials (GWPs) evaluate:

How much heat a greenhouse gas traps

How long a greenhouse gas remains in the atmosphere



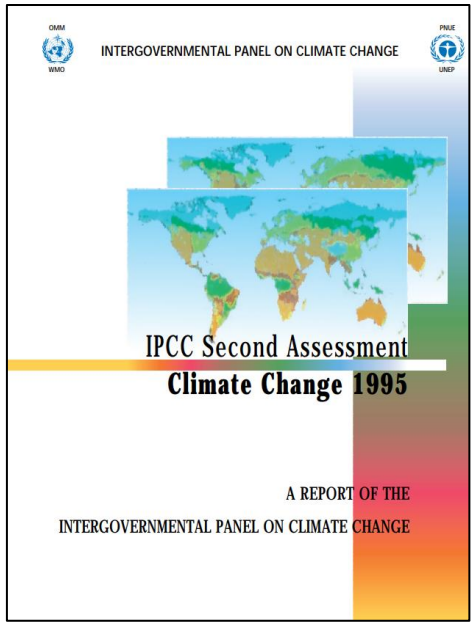
GWPs are expressed on either:

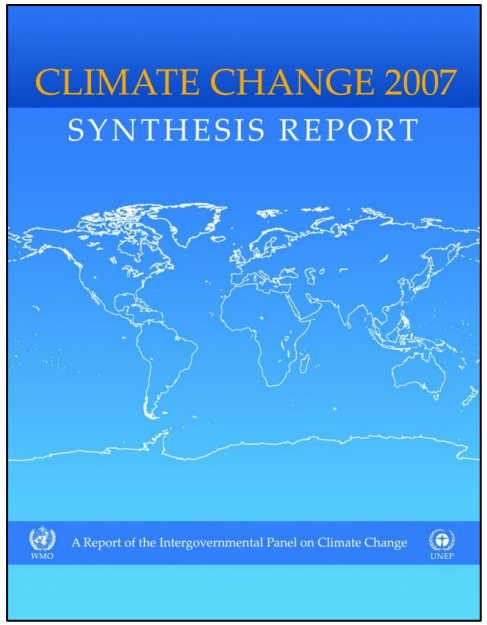
100-Year Timescale

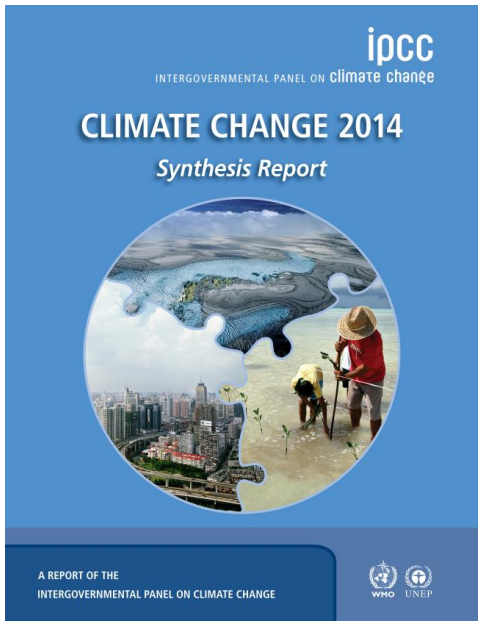
20-Year Timescale

What's a Global Warming Potential?

	IPCC *Second Assessment Report* (1995)	IPCC *Fourth Assessment Report* (2007)	IPCC *Fifth Assessment Report* (2014)
Carbon Dioxide	*1*	*1*	*1*
Methane	*21*	*25*	*28*
Nitrous Oxide	*310*	*298*	*265*







Proposal: Adopt 100-Year AR5 GWPs

UNFCCC requires **100-year AR5 GWPs**

EPA uses **100-year AR5 GWPs.**

United Nations
Framework Convention on Climate Change

COP27 SHARM EL-SHEIKH EGYPT 2022

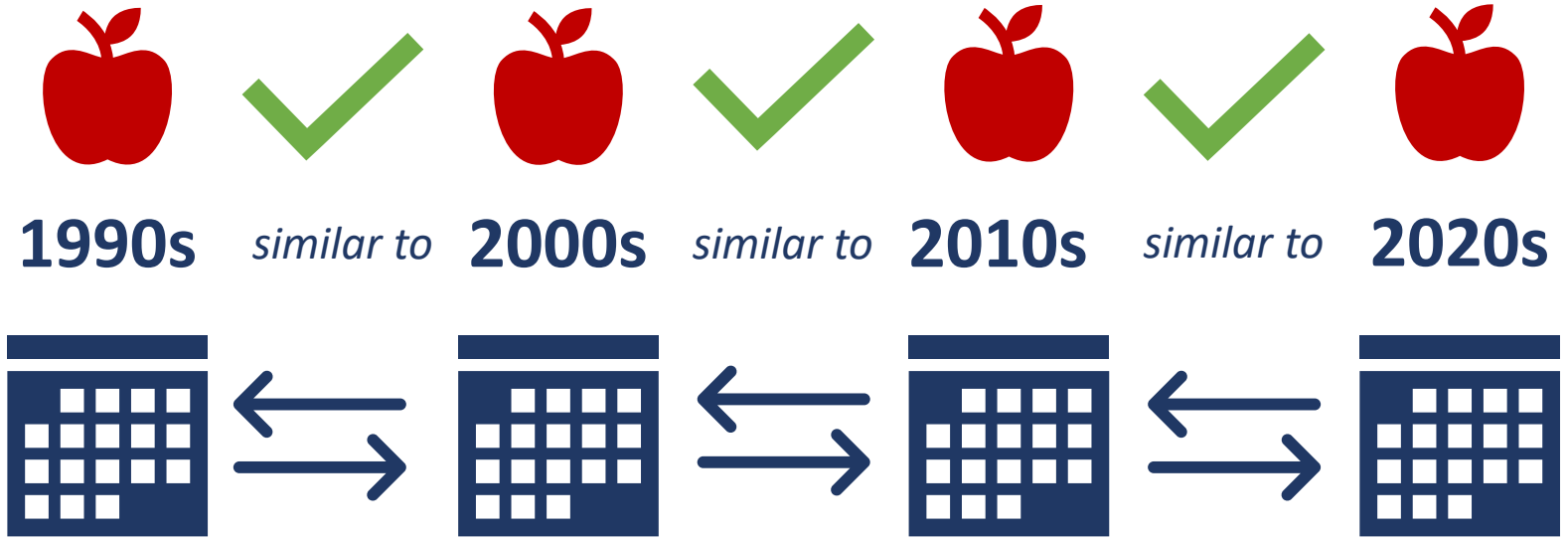
EPA

To align with international and national best-practice, ***DEM proposes to upgrade the Rhode Island Greenhouse Gas Emissions Inventory to 100-year AR5 GWPs***

Proposal: Adopt 100-Year AR5 GWPs

Benefits:

1. Follows national (EPA) and international (UNFCCC) reporting guidelines
2. Incorporates contemporary climate science into the inventory
3. Promotes consistency: would use the same GWPs across 30 years of data



Land Use, Land Use Change, & Forestry

Forest Land

Croplands

Grasslands

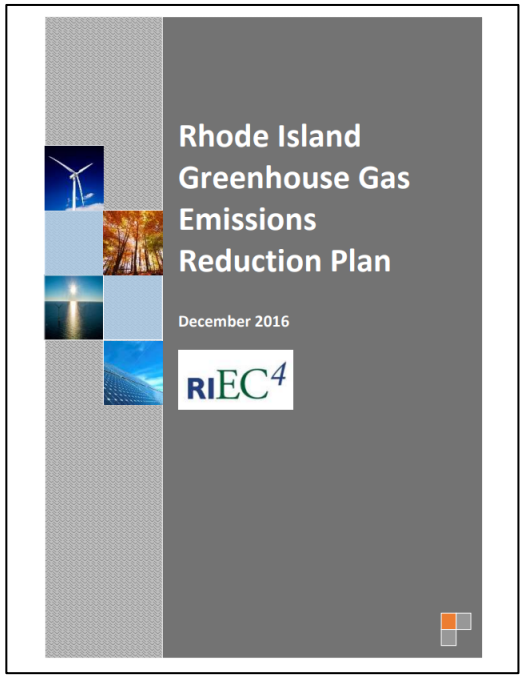
Wetlands

Settlements

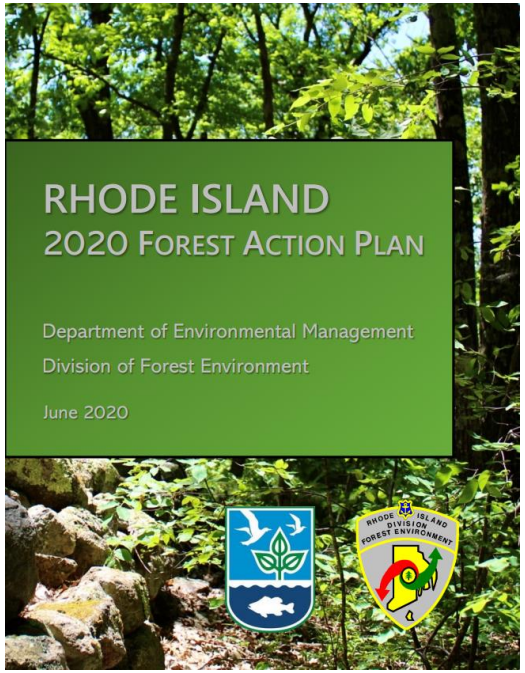
“Other Land”

Current LULUCF Methodologies

1990 Baseline's Current Methodology



2019 Inventory's Current Methodology



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2019 Rhode Island Greenhouse Gas Emissions Inventory

Accounting Carbon Sequestration from LULUCF

The Executive Climate Change Coordinating Council (EC^4) sharing session on March 16, 2022 highlighted the need for a carbon-sequestration sector in Rhode Island's annual greenhouse gas (GHG) emissions inventory. According to the U.S. Geological Survey, carbon sequestration is the process of capturing and storing atmospheric carbon dioxide. The state's 1990 GHG inventory and 2010 GHG inventory account for seven GHG emission sectors and one GHG sequestration sector, known as Land-Use, Land-Use Change, and Forestry (LULUCF). The presence of this sector in 1990 and 2010 prevents an apples-to-apples comparison to inventory years 2011 - 2018. To meet the 2021 Act on Climate's emission reduction mandates and achieve net-zero in 2050, all new inventories must include a LULUCF sector.

Background

Rhode Island's small and diverse landscape is inherently difficult to account for carbon sequestration. The 1990 LULUCF estimate was calculated through a one-time contract with the Northeast States for Coordinated Air Use Management (NESCAUM) and is not replicable. Additionally, the 2010 LULUCF estimate was calculated through the Long-range Energy Alternatives Planning (LEAP) model used in the *Rhode Island Greenhouse Gas Emissions Reduction Plan (2016)* and is not replicable.

RIDEM can estimate LULUCF through the EPA's State Inventory Tool (SIT), which is used for most of the statewide GHG emissions inventory. The SIT is preloaded with default LULUCF data that is nationally apportioned to Rhode Island. Default inputs are listed below and ranked by their share of the total. Asterisks indicate inputs already provided by RIDEM's Division of Forest Environment (DFE) annually.

Extent of Forests in Rhode Island

Forest Carbon Flux

1. Aboveground Biomass (30%)
2. Deadwood (19%)
3. Mineral Soil (7%)
4. Belowground Biomass (6%)
5. Litter (5%)
6. Organic Soil (1%)
7. Wood Products/Landfills (<1%)

Additional Inputs

1. Carbon Sequestration from Urban Trees (28%) *
2. Carbon Stored in Yard Trimmings (3%)
3. Agricultural Soil Carbon Flux (1%)
4. Carbon Emissions from Forest Fires (<1%) *
5. N_2O From Settlement Soils (<1%)

Quantitative estimates may be subject to change. Annual inventories allow the Department to track progress towards Act on Climate mandates but are not considered official until published in a triennial summary.

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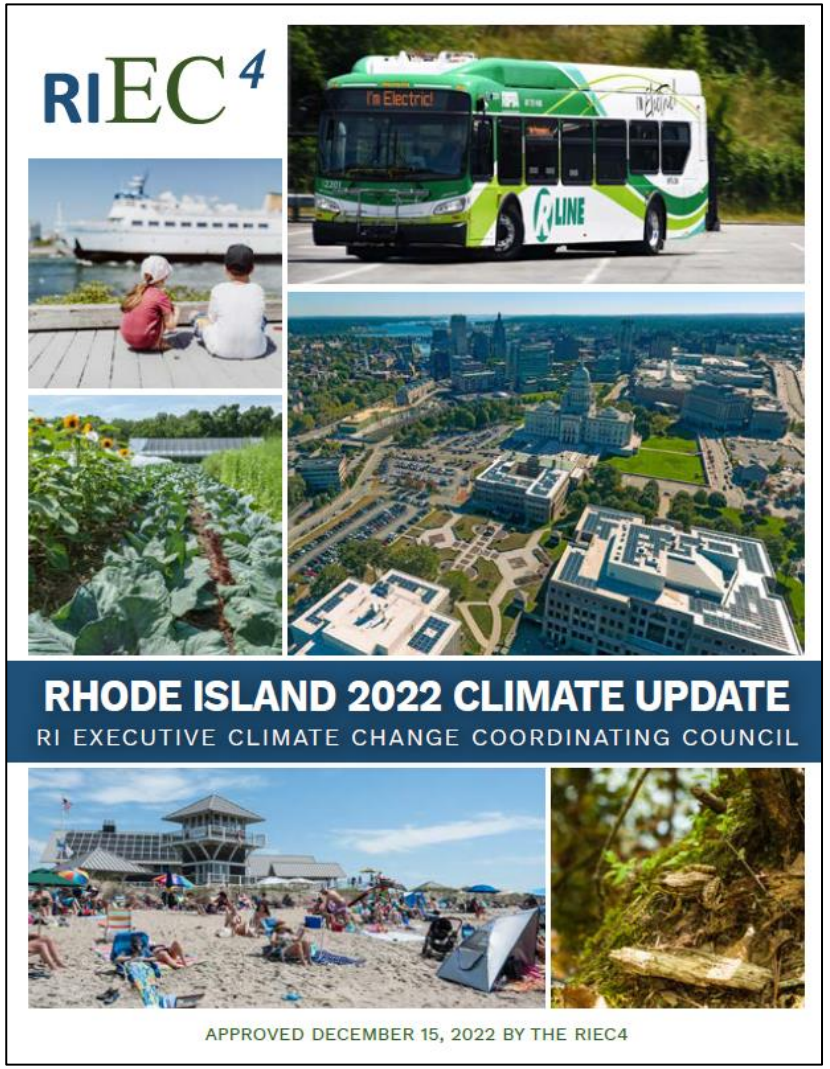
It's Time to Improve LULUCF

EC4 Recommendation:

"We recommend RIDEM continue to collaborate with its DAFE [Division of Agriculture and Forest Environment] and the U.S. Climate Alliance to continuously improve the LULUCF sector."



Proposal for LULUCF Sector

2019 Inventory's LULUCF Subsectors

- Forest Land
  - Forest Land Remaining Forest Land (Aboveground Biomass, Forest Fires)
- Croplands
  - Agricultural Soil Carbon Flux
- Grasslands
  - Agricultural Soil Carbon Flux
- Wetlands
  - Not Included
- Settlements
  - Settlements Remaining Settlements (Urban Trees, Settlement Soils, Yard Trimmings)

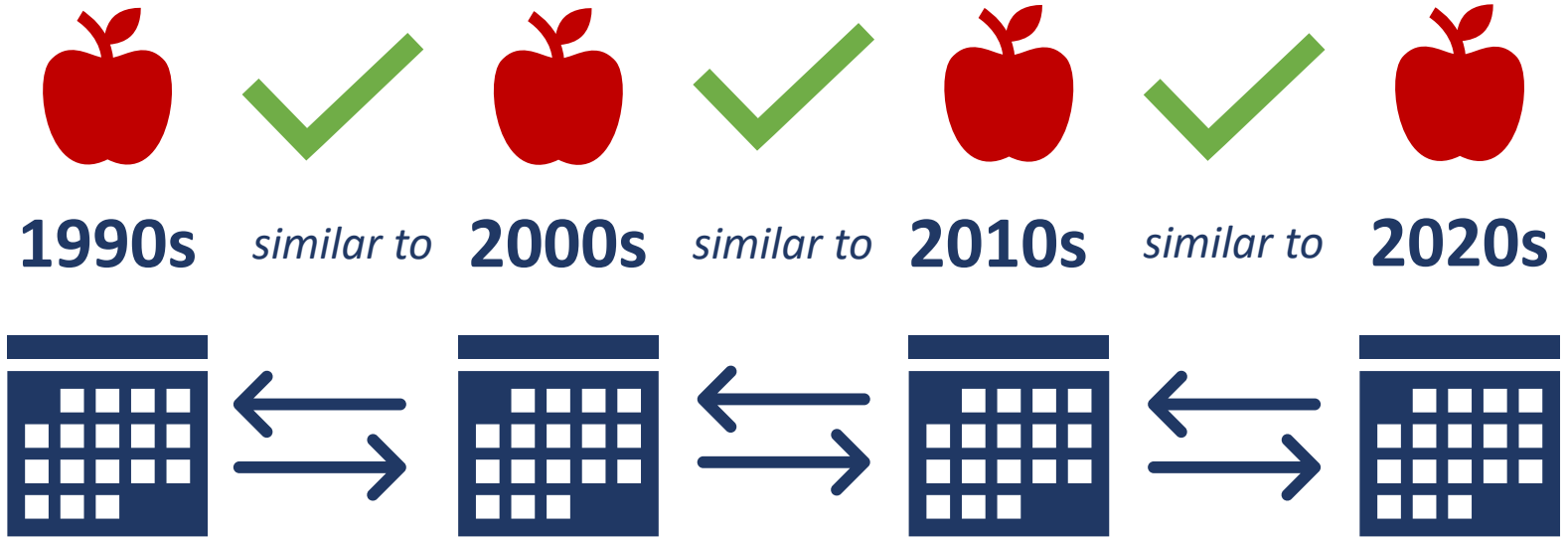
Proposed LULUCF Subsectors (NEW)

- Forest Land
  - Forest Land Remaining Forest Land (Aboveground Biomass, Forest Fires)
  - Land Converted to Forest Land
- Croplands
  - Cropland Remaining Cropland
  - Land Converted to Cropland
- Grasslands
  - Grassland Remaining Grassland
  - Land Converted to Grassland
- Wetlands
  - Coastal Wetlands Remaining Coastal Wetlands
  - Land Converted to Coastal Wetlands
- Settlements
  - Settlements Remaining Settlements (Urban Trees, Settlement Soils, Yard Trimmings)
  - Land Converted to Settlements

Proposal for the LULUCF Sector

Benefits:

1. Follows national (EPA) and international (UNFCCC) reporting guidelines
2. Creates a net emissions total for each inventory year
3. Promotes consistency: would use the same methodology across 30 years of data



Conclusion

Update Global Warming Potentials to 100-Year AR5 for 1990 Baseline and Entire Timeseries

Align LULUCF Sector with IPCC Land-Use Categories for 1990 Baseline and Entire Timeseries

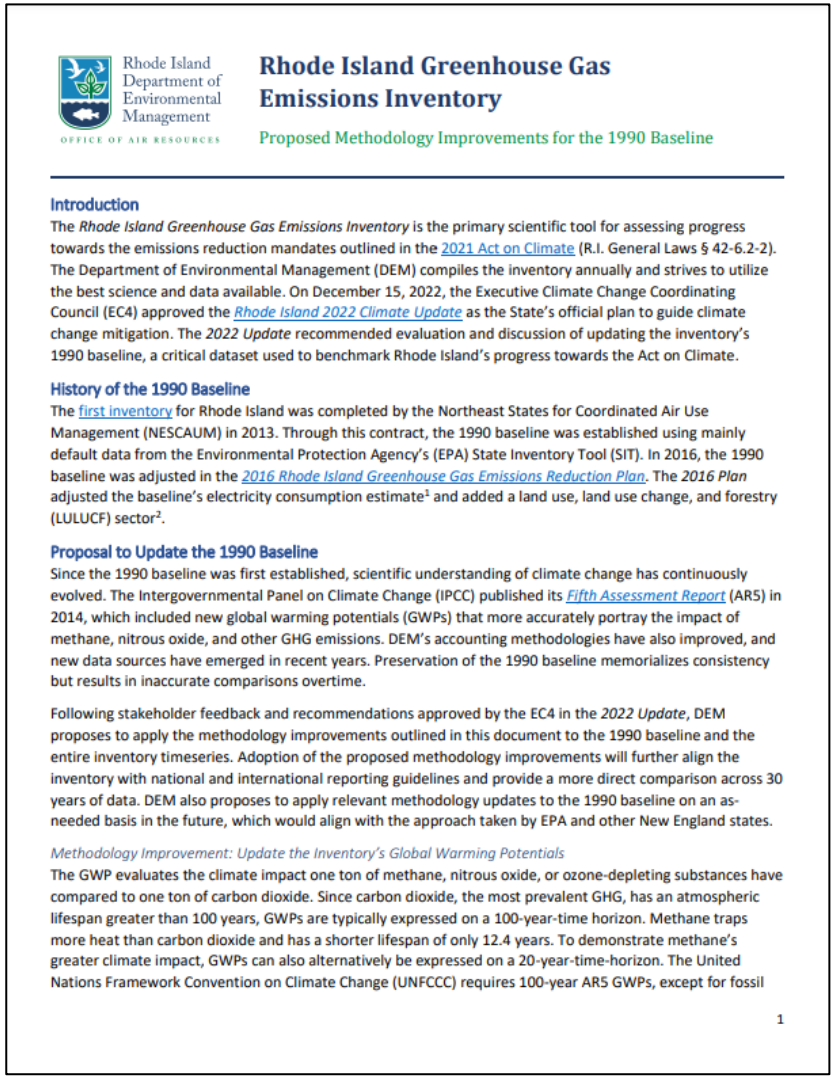
Reminder: all other aspects of current 1990 baseline will remain as-is!

Next Steps

We want to hear from you!

- Let us know what you think about the 1990 baseline
- Go to www.dem.ri.gov/ghg-inventory and navigate to the green "Quick Links" box
- Submit comments via **SmartComment**

Comments due Friday, October 6th at 4 PM



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Rhode Island Greenhouse Gas Emissions Inventory

Proposed Methodology Improvements for the 1990 Baseline

Introduction

The *Rhode Island Greenhouse Gas Emissions Inventory* is the primary scientific tool for assessing progress towards the emissions reduction mandates outlined in the 2021 Act on Climate (R.I. General Laws § 42-6.2-2). The Department of Environmental Management (DEM) compiles the inventory annually and strives to utilize the best science and data available. On December 15, 2022, the Executive Climate Change Coordinating Council (EC4) approved the *Rhode Island 2022 Climate Update* as the State's official plan to guide climate change mitigation. The *2022 Update* recommended evaluation and discussion of updating the inventory's 1990 baseline, a critical dataset used to benchmark Rhode Island's progress towards the Act on Climate.

History of the 1990 Baseline

The first inventory for Rhode Island was completed by the Northeast States for Coordinated Air Use Management (NESCAUM) in 2013. Through this contract, the 1990 baseline was established using mainly default data from the Environmental Protection Agency's (EPA) State Inventory Tool (SIT). In 2016, the 1990 baseline was adjusted in the *2016 Rhode Island Greenhouse Gas Emissions Reduction Plan*. The *2016 Plan* adjusted the baseline's electricity consumption estimate[1] and added a land use, land use change, and forestry (LULUCF) sector[2].

Proposal to Update the 1990 Baseline

Since the 1990 baseline was first established, scientific understanding of climate change has continuously evolved. The Intergovernmental Panel on Climate Change (IPCC) published its *Fifth Assessment Report* (AR5) in 2014, which included new global warming potentials (GWPs) that more accurately portray the impact of methane, nitrous oxide, and other GHG emissions. DEM's accounting methodologies have also improved, and new data sources have emerged in recent years. Preservation of the 1990 baseline memorializes consistency but results in inaccurate comparisons overtime.

Following stakeholder feedback and recommendations approved by the EC4 in the *2022 Update*, DEM proposes to apply the methodology improvements outlined in this document to the 1990 baseline and the entire inventory timeseries. Adoption of the proposed methodology improvements will further align the inventory with national and international reporting guidelines and provide a more direct comparison across 30 years of data. DEM also proposes to apply relevant methodology updates to the 1990 baseline on an as-needed basis in the future, which would align with the approach taken by EPA and other New England states.

Methodology Improvement: Update the Inventory's Global Warming Potentials

The GWP evaluates the climate impact one ton of methane, nitrous oxide, or ozone-depleting substances have compared to one ton of carbon dioxide. Since carbon dioxide, the most prevalent GHG, has an atmospheric lifespan greater than 100 years, GWPs are typically expressed on a 100-year-time horizon. Methane traps more heat than carbon dioxide and has a shorter lifespan of only 12.4 years. To demonstrate methane's greater climate impact, GWPs can also alternatively be expressed on a 20-year-time-horizon. The United Nations Framework Convention on Climate Change (UNFCCC) requires 100-year AR5 GWPs, except for fossil

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Questions and Answers

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Rhode Island Greenhouse Gas Emissions Inventory:

www.dem.ri.gov/ghg-inventory