Climate Change in Delaware Vulnerabilities and Opportunities

July 14, 2021

The Division of Climate, Coastal and Energy

Clean Energy. Sustainable Coasts. Livable Climate.

- Prepare for the effects of climate change – reducing greenhouse gases and building sustainable communities
- Balance the use and protection of coastal, estuarine and ocean resources
- Support energy efficiency and renewable energy

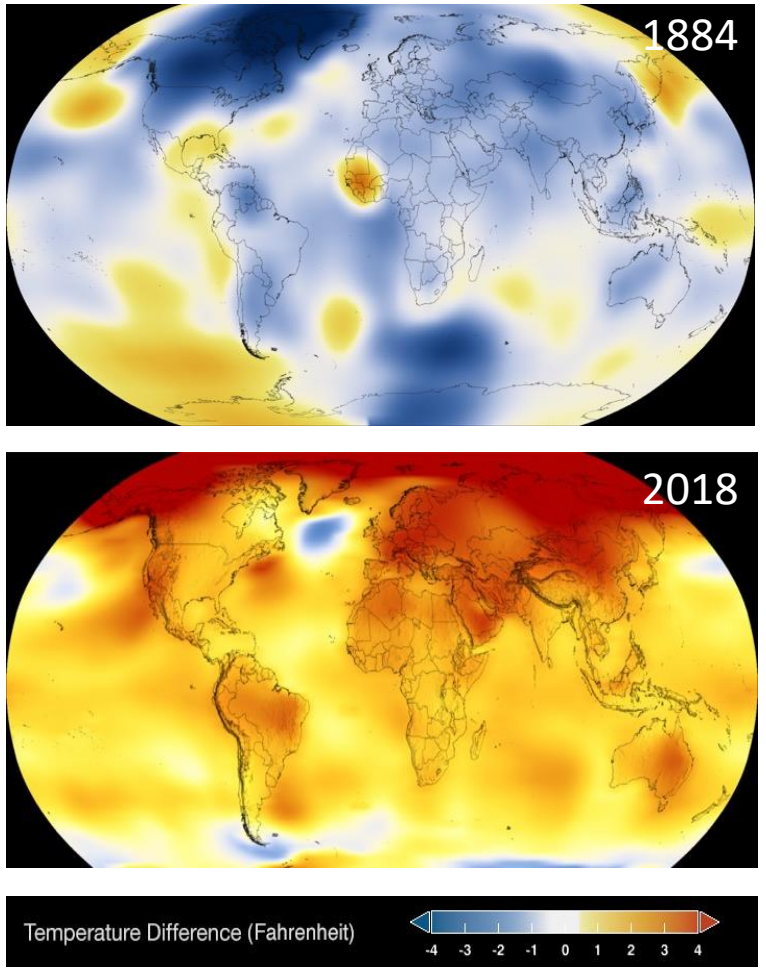
www.de.gov/climatecoastalenergy

DISCUSSION TOPICS

- Climate Impacts and vulnerabilities in Delaware
- Delaware's Climate Action Plan (coming soon!)
- Deep Dive into Greenhouse Gas Emission Pathways, including energy efficiency

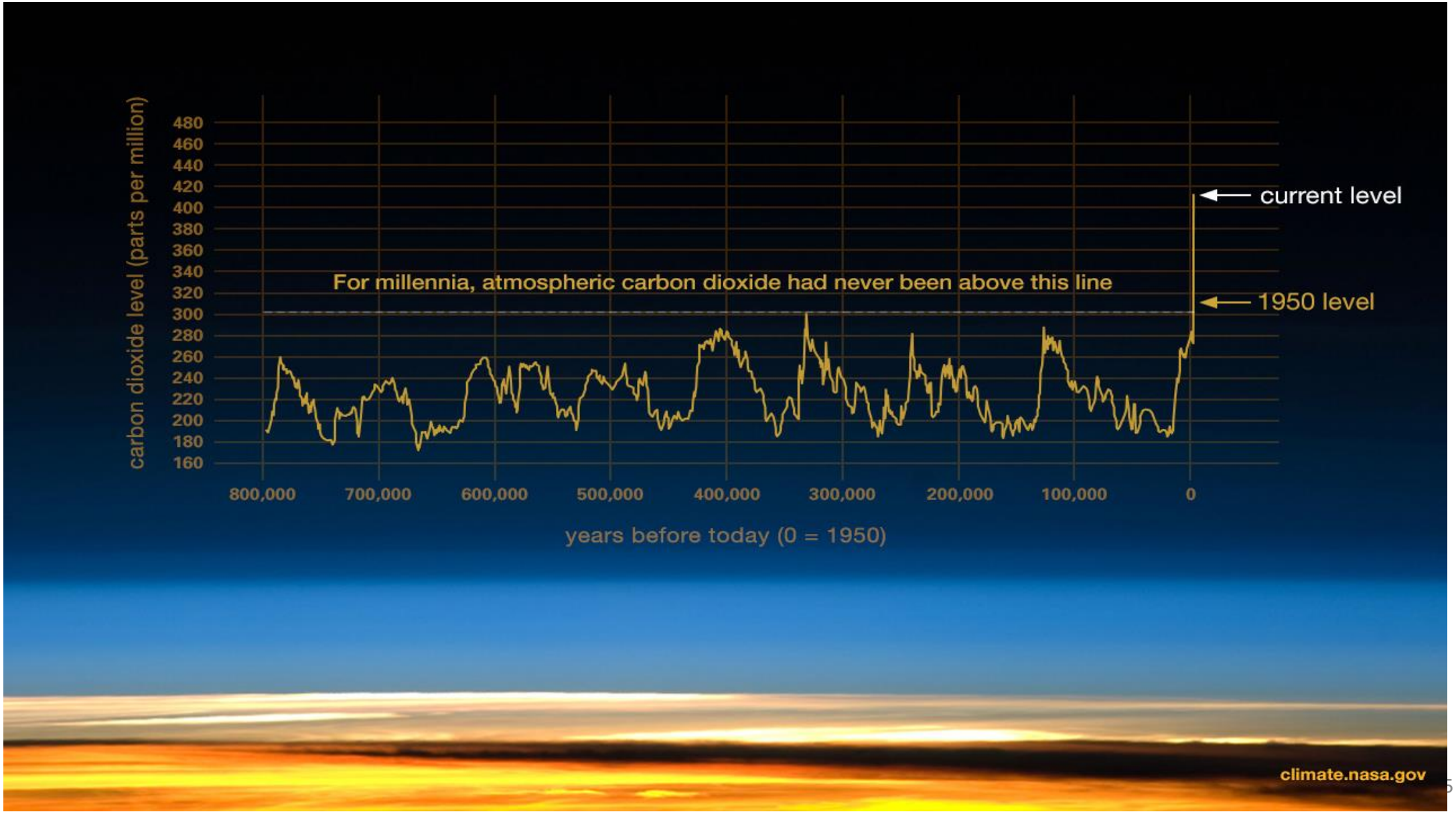
The evidence is clear across the globe

- The 19 warmest years on record have occurred since 2000.
  - 2016 and 2020 are tied for the warmest years on record since 1880
- Historical low extent of arctic sea ice
- Record number and intensity of Atlantic hurricanes
- Rate of sea level rise double that of last century and accelerating



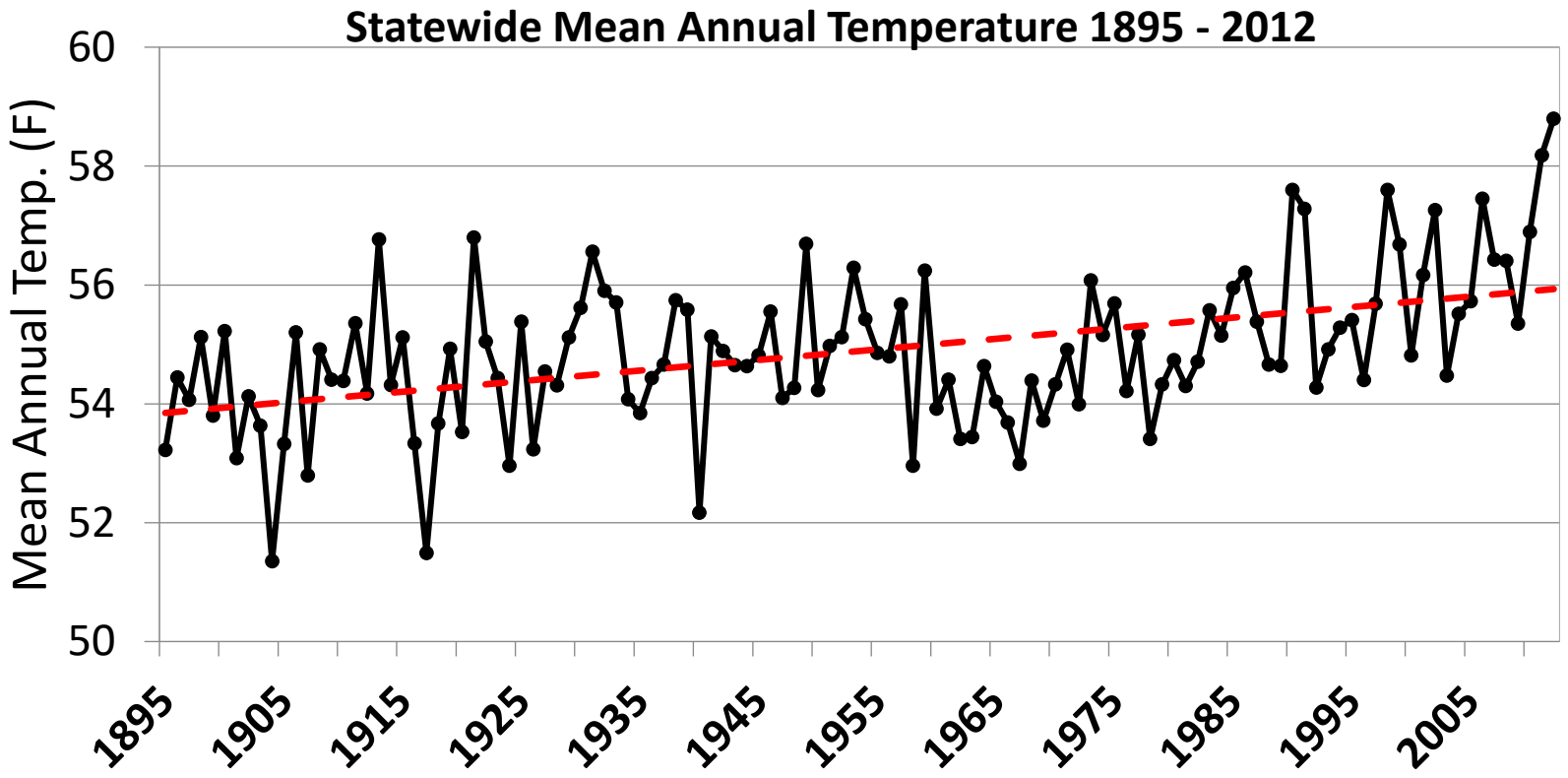
Images courtesy of NASA

Global CO2 Concentrations



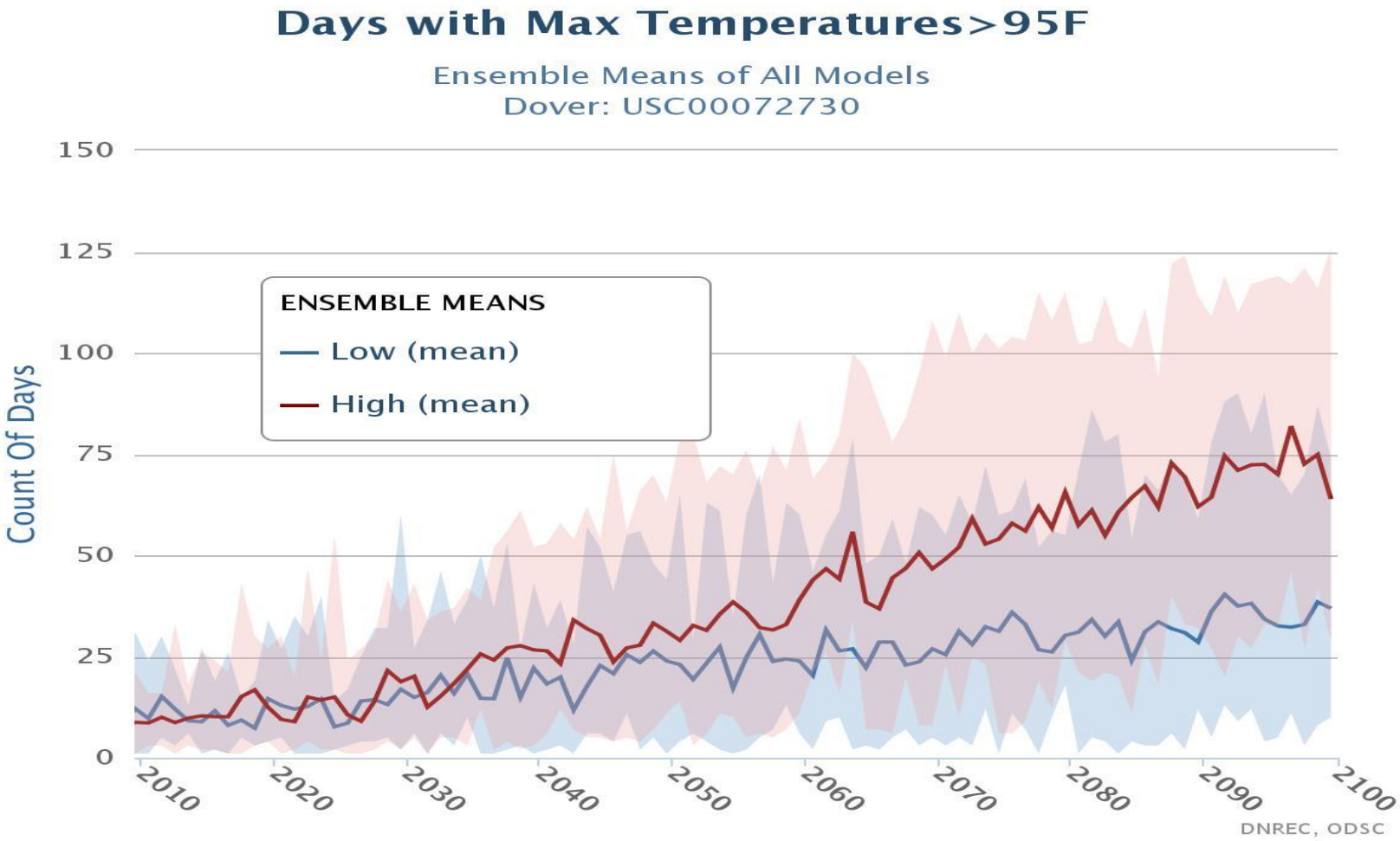
Delaware's average temperature has increased

+0.2°F per decade in every season except Autumn



Source: Dr. Daniel J. Leathers, State Climatologist

Temperatures will continue to increase

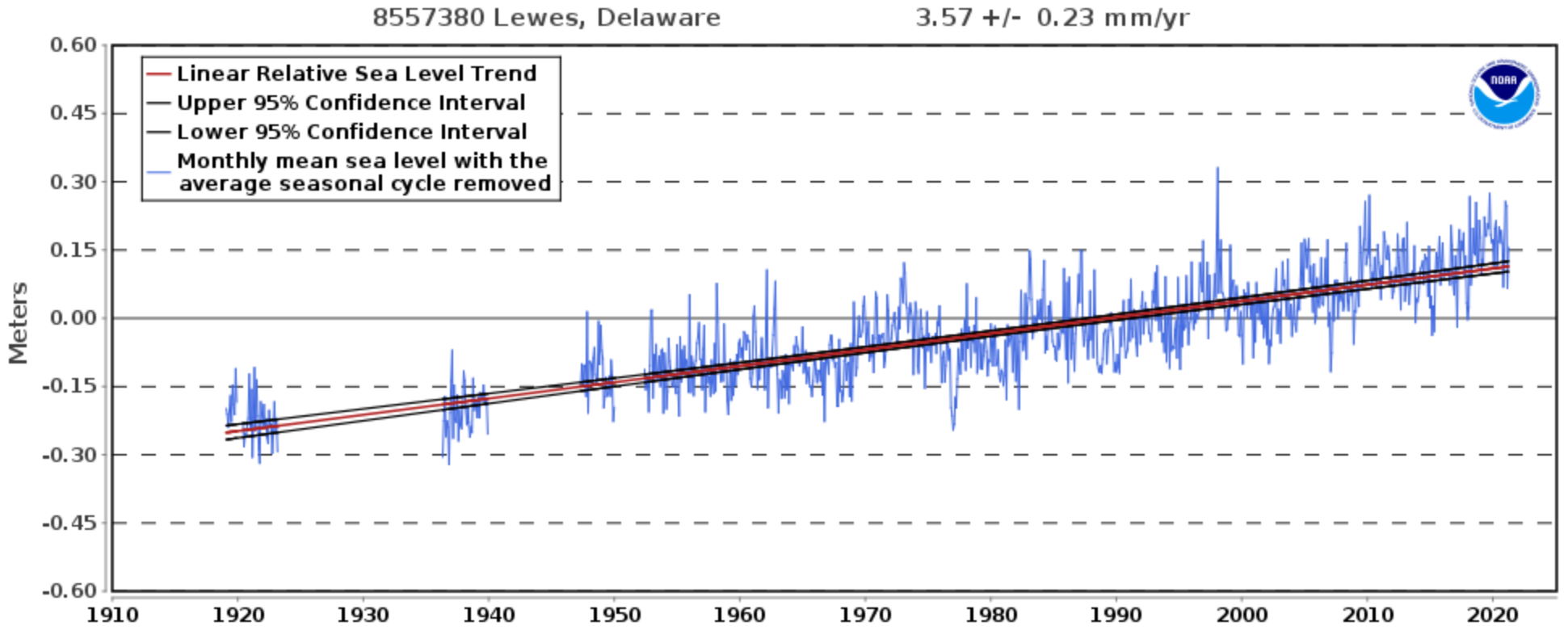


Visit http://cema.udel.edu/declimateprojections/ to explore and use this data set!

Effects of Increasing Temperatures

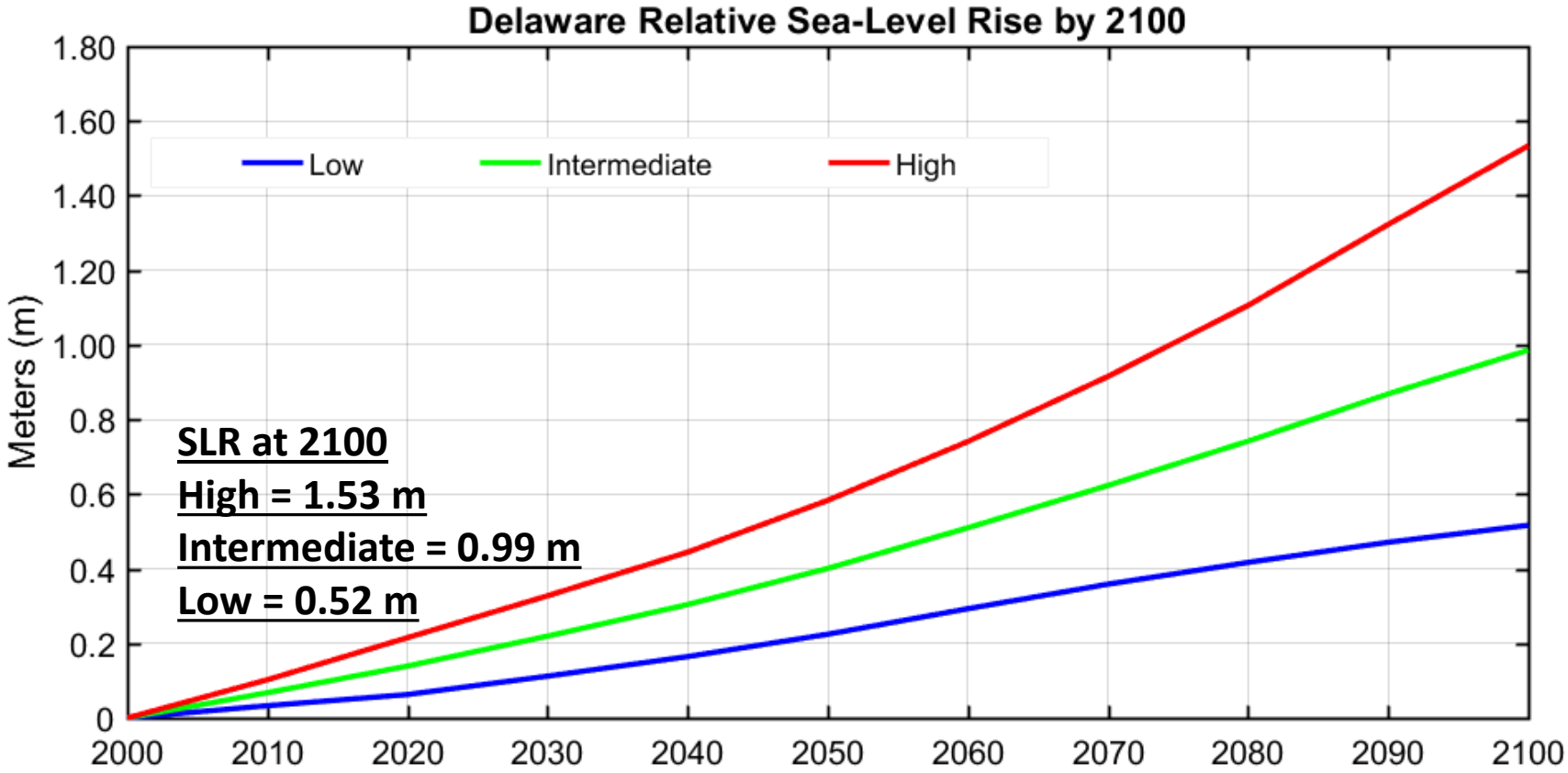
- Human Health
  - Ozone/Asthma
  - Heat Stress
- Plants
  - Longer Growing Season
  - Invasive species
  - Increased irrigation needs
- Infrastructure
  - Heat damage
  - Changes in heating and cooling degree days and energy demand

Delaware's Sea Levels are Rising



Source: NOAA. Accessed online July 12, 2021.
https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=8557380

And will keep rising

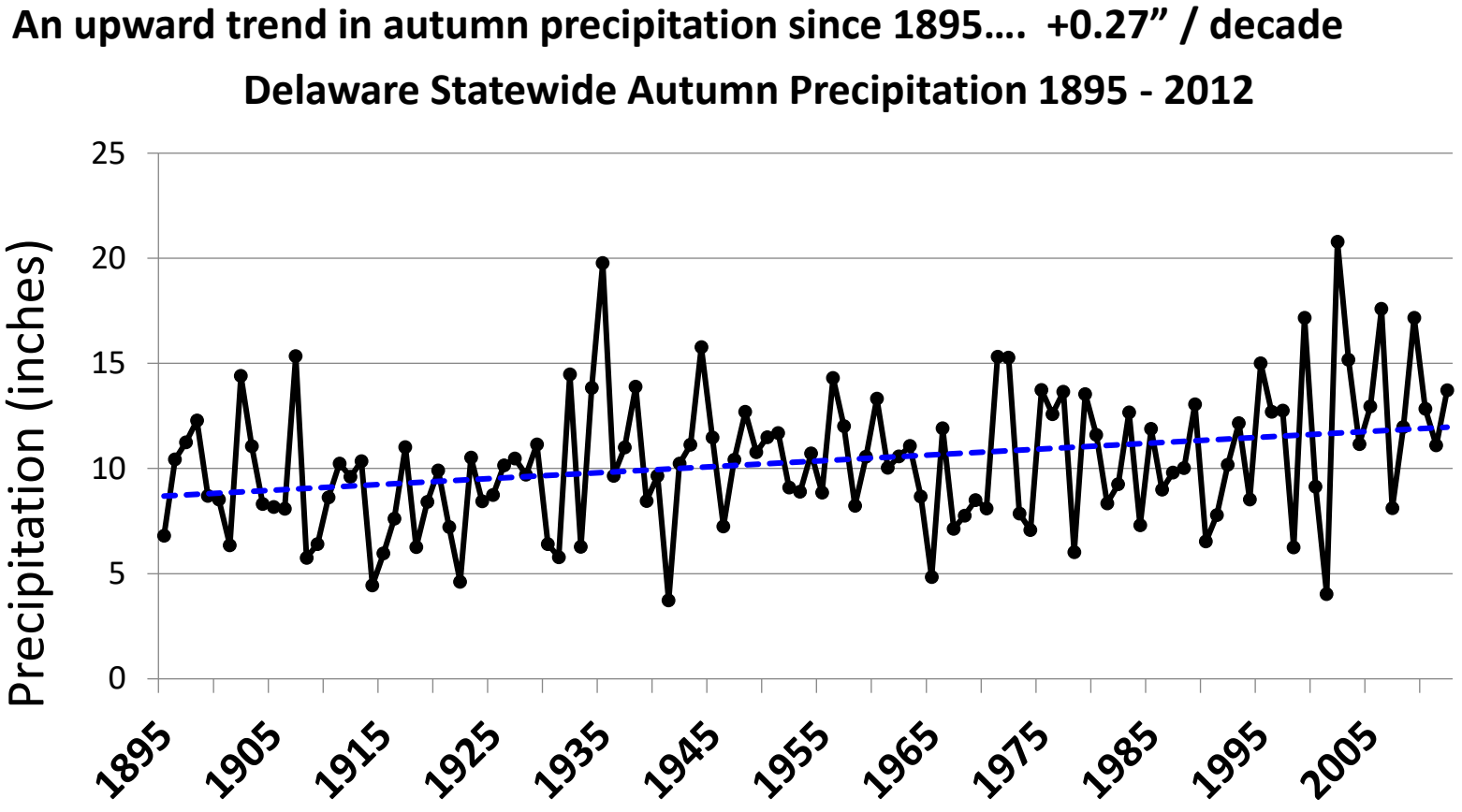


Based upon "business as usual" greenhouse gas emissions future. For full report, see:
https://www.dgs.udel.edu/sites/default/files/projects-docs/Delaware%20SLR%20Technical%20Report%202017.pdf

Effects of Sea Level Rise in DE

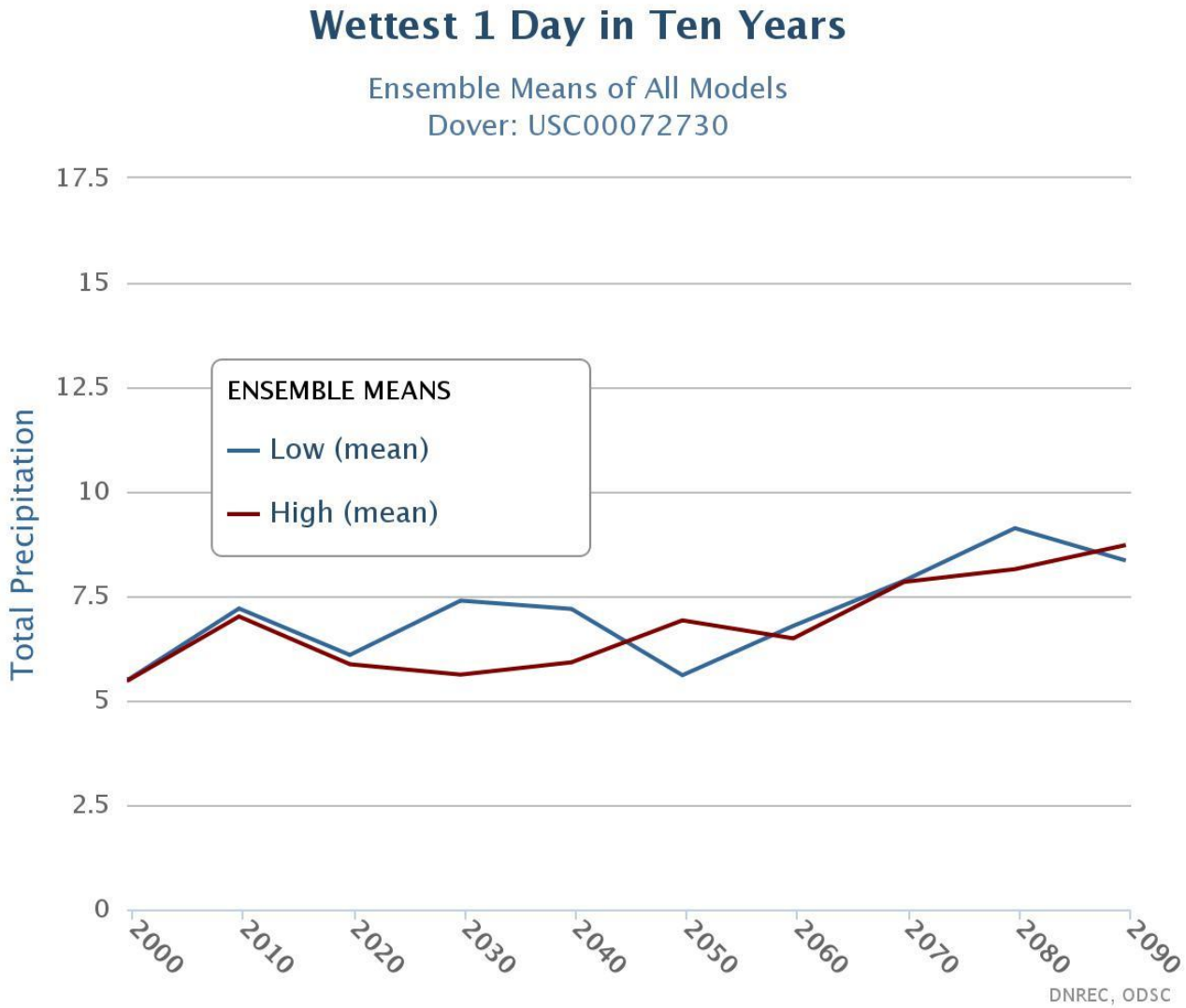
- Increasing flooding events and permanent inundation
- Saltwater Intrusion
- Rising water tables
- Secondary effects:
  - ✓ Infrastructure damage, including water and energy
  - ✓ Transportation disruptions
  - ✓ Contaminant release

Delaware's Autumn Precipitation has Increased



Source: Dr. Daniel J. Leathers, State Climatologist

Delaware will keep getting wetter



Effects of Increasing Precipitation

- Flood damage to homes and roads
- Crop Damage
- Safety
- Increasing insurance costs
- Mosquitoes
  - Vector borne disease

Why is It Important to Take Action Now?

There is broad consensus among climate scientists that minimizing the risk of catastrophic climate change impacts requires significant reductions in greenhouse gas emissions by mid-century.

While there is no single pathway to do this, strategies include:

- Making our buildings and vehicles more efficient
- Switching to low-carbon fuels
- Electrifying both buildings and the transportation sector
- Adding solar and wind power to the electricity supply

Why is It Important to Take Action Now?

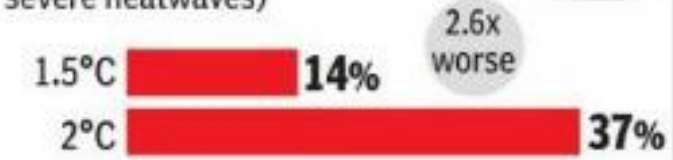
Many countries – and 16 U.S. states – have set mandates, targets and/or goals to reduce greenhouse gas emissions by at least 80% by 2050.

Delaware currently has a short-term emissions reduction target of 26-28% from 2005 levels by 2025.

Why is It Important to Take Action Now?

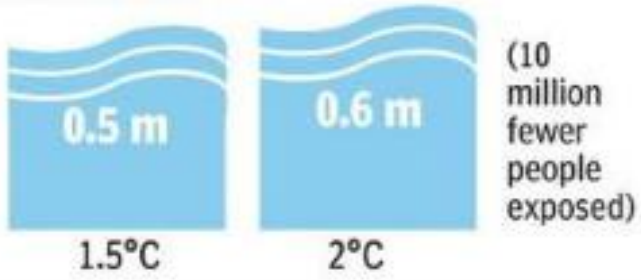
WARMING: WHAT HALF-DEGREE CHANGE MEANS

Extreme Heat
(% of global population exposed to severe heatwaves)



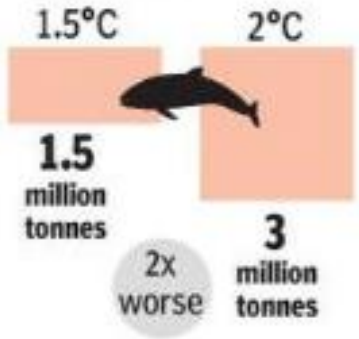
Arctic Ocean Free of Sea Ice In Summer

Sea level rise

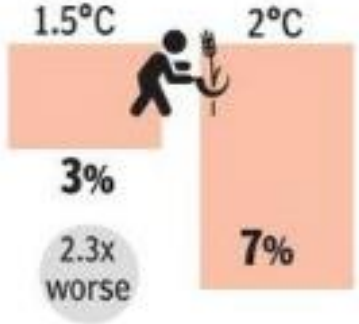


(10 million fewer people exposed)

Decline in annual catch of marine fishries

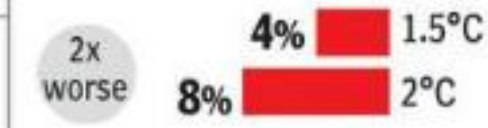


Crop yield (Reduction in maize production in tropics)



Species Loss (Plants)

Species Loss (Vertebrates)



Decline in coral reefs

Up to 29% worse

DELAWARE'S Climate Action Plan

A Plan to Protect and Strengthen Delaware

Implementing Delaware's Climate Action Plan will protect and strengthen:

- Our agricultural and tourism economies
- The natural places we enjoy for recreation
- Our infrastructure
- The health of our residents and visitors
- Access to clean energy and transportation for all Delawareans

Plan Overview

- Delaware's Climate Action Plan guides state efforts to:
  - **Minimize greenhouse gas emissions**, and
  - **Maximize resilience to climate change impacts**
- The Plan was created to:
  - Help Delaware meet its emissions reduction goal (26-28% from 2005 levels by 2025)
  - Integrate emissions reduction and climate change adaptation actions
  - Set a course for state climate action in the decades ahead


Plan Timeline

Public & Stakeholder Engagement

Generate ideas for strategies and actions for the Plan

Spring 2020

Public & Stakeholder Engagement

Get feedback on strategies and actions considered for the Plan

Fall 2020

Plan Implementation

Beyond

Data Analysis & Interviews

- Model Delaware's emissions – from now to 2050 – with (and without) new emissions reduction actions
- Interview staff from 10 state agencies on resilience actions they'd like to implement in the next 5 years

Summer 2020

Plan Drafting & Review

NOW IN PROCESS

Preparing and Responding to Climate Change

- Adaptation
  - Adjust how we live and how we make decisions to account for hotter temps, wild weather, flooding and sea level rise
- Mitigation
  - Reduce/eliminate emissions of greenhouse gases.
  - Every ton counts

Everyone has a role in climate solutions

- Individuals
  - Demand for sustainable products, housing choices, engagement with elected officials
- Businesses/Non-Profits
  - Create sustainable products, innovation, partnerships, goals, financing
- Federal Government
  - Tax incentives, federal rules, budgets, contracting, lead by example, research and development
- State Government
  - Tax incentives, regulations, stretch goals, technical assistance, infrastructure development, research, education, financing, planning
- Local Government
  - Zoning, building codes, subdivision approval, infrastructure development

What We Learned from modeling emissions

In collaboration with consultants who are experts in modeling greenhouse gas emissions, **we learned what Delaware emissions could look like in the next three decades**.

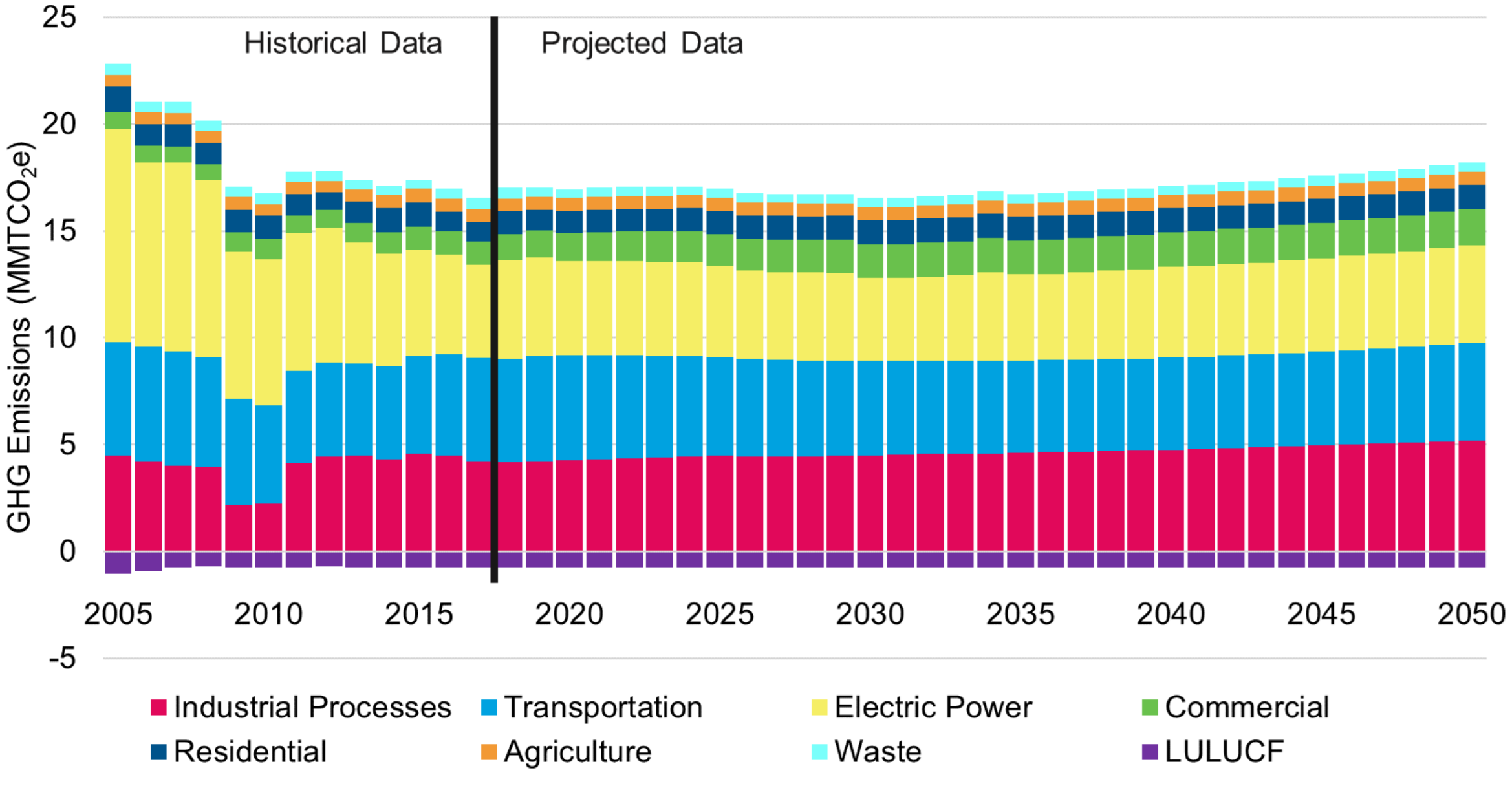
Without new actions to reduce emissions…

Delaware will just miss its 2025 target to reduce emissions by 26-28% from 2005 levels, reducing emissions by 25.4% by 2025. Without new actions, modeling shows that emissions will start to rise again around 2030.

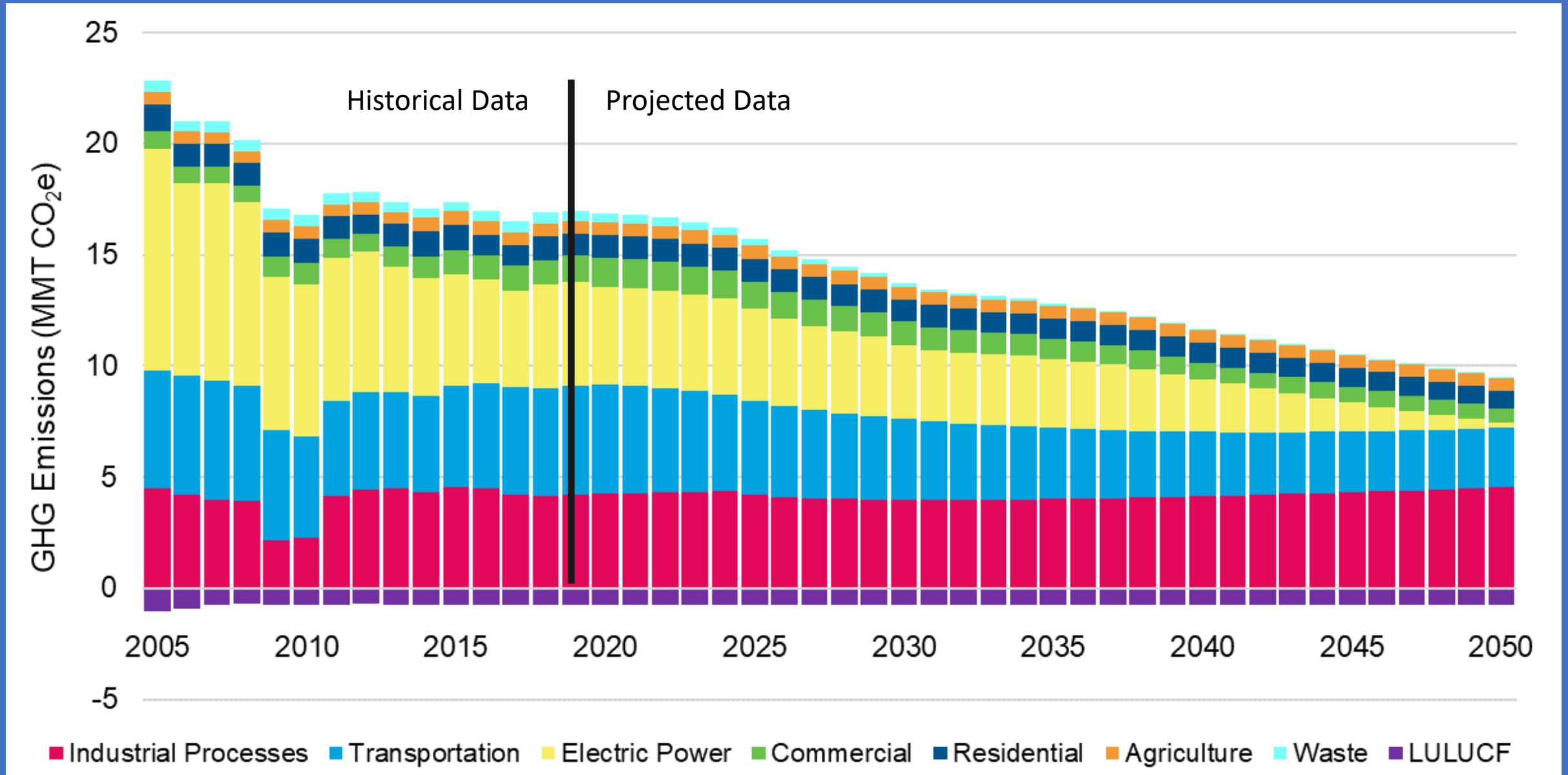
With a suite of 20 new actions…

Delaware can meet or exceed its 2025 target and set the stage for even greater emissions reductions going forward.

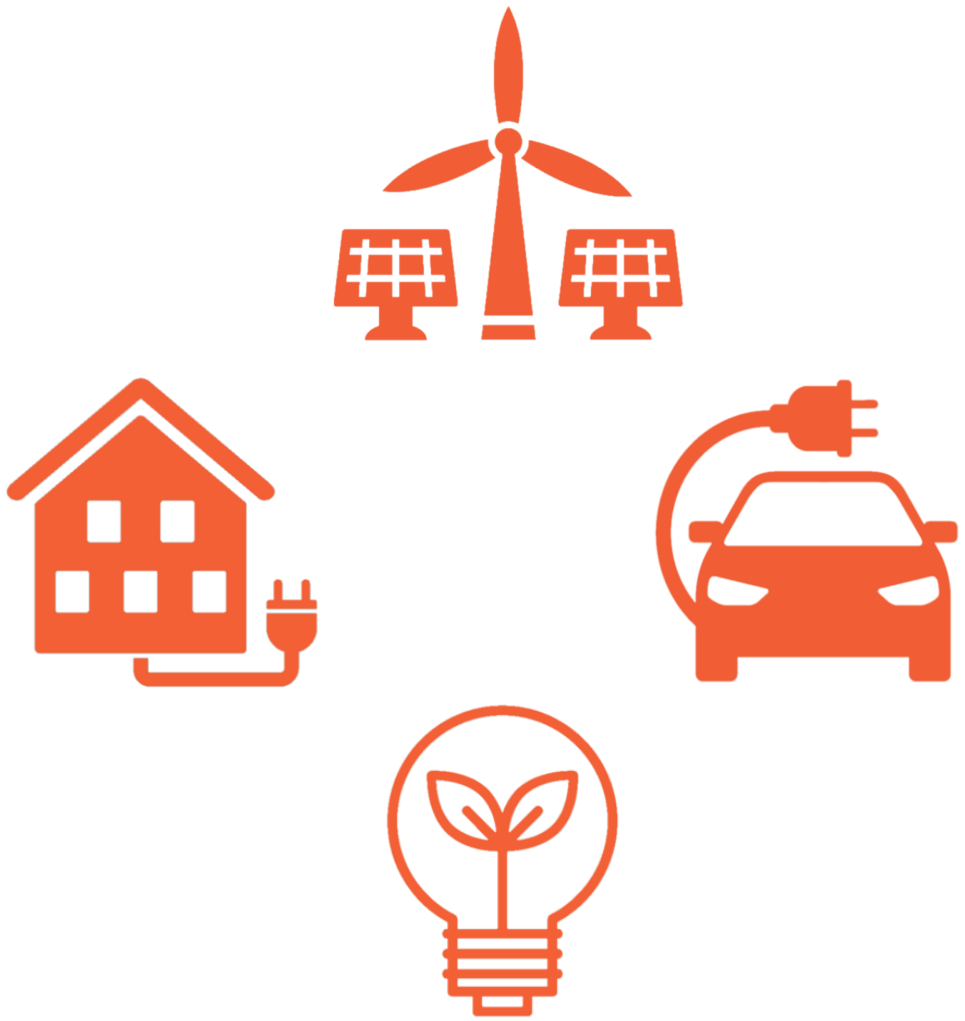
Without new action: 25.4% reduction by 2025



With modeled actions: 31.1% by 2025, 59.7% by 2050



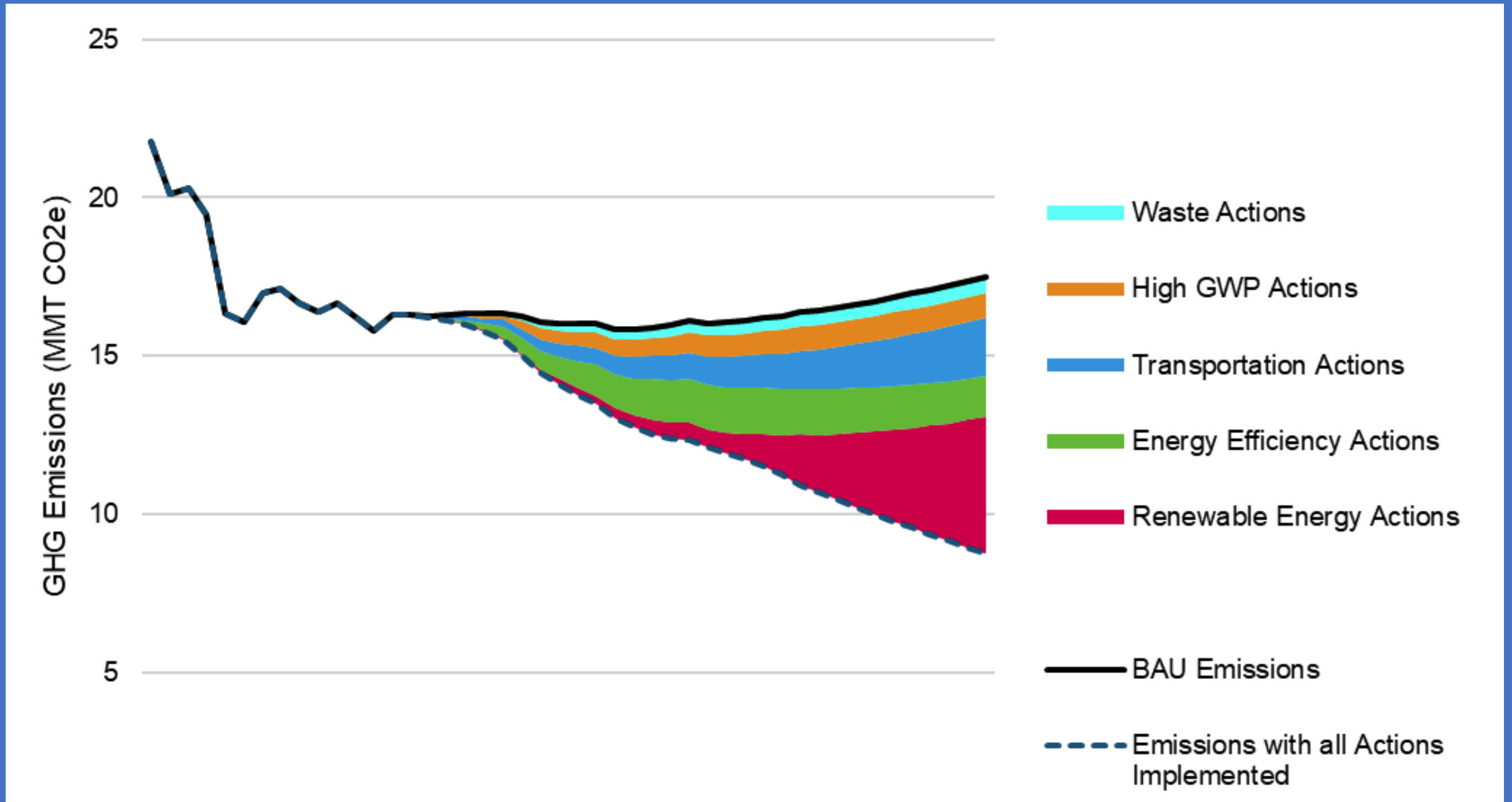
What We Learned



With modeled actions…

- **Energy efficiency** is an important short-term (and a relatively lower cost) strategy
- **Decarbonizing the electricity grid** has the greatest potential in the medium and long terms
- **Electrification of buildings and the transportation sector** can achieve significant emissions reductions over time

Same data; different graph!
(grouped by 'action category')



DELAWARE'S Climate Action Plan

GREENHOUSE GAS EMISSIONS REDUCTION POTENTIAL

What is $MTCO_2e$?

METRIC TONS OF CARBON DIOXIDE EQUIVALENT

Each greenhouse gas (GHG) has a different ability to trap heat in the atmosphere. We can compare each GHG's heat-trapping ability to that of the GHG carbon dioxide (CO_2). This is called the CO_2 equivalent (CO_2e) and allows us to use a single measure to calculate all GHG emissions: metric tons of CO_2e ($MTCO_2e$).

CO-BENEFITS

- IMPROVED AIR QUALITY
- JOB CREATION
- COST SAVINGS
- ENERGY RESILIENCE
- ENHANCED MOBILITY

The values on top of each bar indicate the **2050 GHG emissions reduction potential** for implementing that strategy. Reduction potential values come from GHG modeling carried out in the summer of 2020, taking into account market feasibility for the earliest time each strategy could be put into place.

What does it mean?

Renewable Energy

4,333,200 $MTCO_2e$
GHG reduction potential

Installation of on-site renewable energy at homes and businesses

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More renewables in the grid

Zero-Emission Vehicles

1,184,500 $MTCO_2e$
GHG reduction potential

More electric, plug-in hybrid and fuel cell vehicles available

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More charging infrastructure

Vehicle purchase incentives

Building Energy Efficiency

732,200 $MTCO_2e$
GHG reduction potential

Higher standards for energy performance

Buildings cost less to operate

More financial incentives available to implement upgrades

Fuel and Roadway Efficiency

649,800 $MTCO_2e$
GHG reduction potential

More efficient, cleaner running vehicles

More options to get around without a car

More walking and biking opportunities

Building Electrification

545,700 $MTCO_2e$
GHG reduction potential

Buildings increasingly rely on electricity for all energy uses to maximize renewable benefits

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Options for homes and businesses to upgrade building systems

Waste Diversion and Reduction

211,400 $MTCO_2e$
GHG reduction potential

Increased options to divert waste through recycling and composting

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Encourage the principles of "reduce, reuse, recycle (or compost)"

Renewable Energy

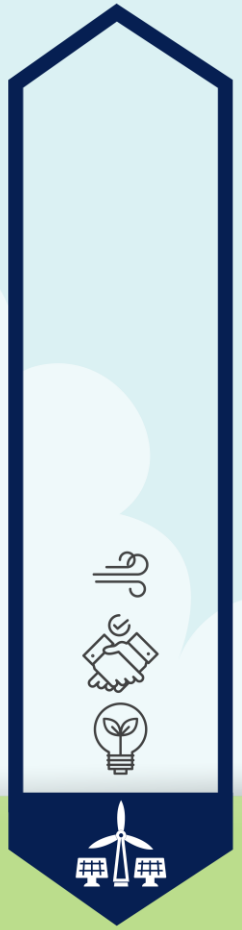
2050 GHG Reduction Potential = 4,333,200 $MTCO_2e$

Efforts to increase the amount of clean, renewable energy (such as wind and solar) on the electricity grid has the largest long-term potential to reduce emissions. Strategies include:

- Increasing the number of homes and businesses with solar panels
- Increasing solar and geothermal systems on industrial properties
- Phasing out fossil fuels in utility scale electric generation

4,333,200 $MTCO_2e$

GHG reduction potential



Renewable Energy

Installation of on-site renewable energy at homes and businesses

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More renewables in the grid

Zero-Emission Vehicles

2050 GHG Reduction Potential = 1,184,500 $MTCO_2e$

Zero-emission vehicles (ZEVs) rely on electricity or hydrogen fuel cells to power them, creating no direct emissions. As our electric supply comes increasingly from renewable sources, electric vehicles (EVs) will increasingly be free of emissions. Strategies include:

- Providing more EV charging infrastructure
- Consumer incentives for purchasing ZEVs
- Increasing the number ZEVs in the state fleet

Building Energy Efficiency

2050 GHG Reduction Potential = 732,200 $MTCO_2e$

Reducing the amount of energy we need to power our homes, offices and industries is an easy way to reduce energy demand. Strategies include:

- Increasing the energy performance standards that new buildings must meet
- Providing incentives to upgrade existing building systems and envelope
- Identifying operational efficiencies to save money

Fuel and Roadway Efficiency

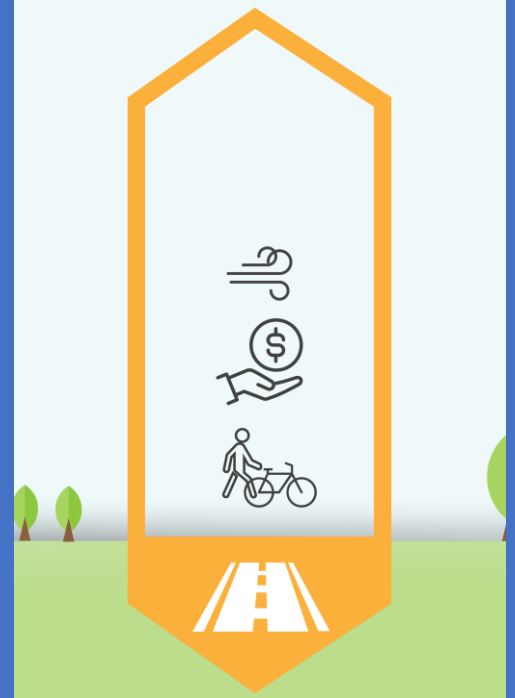
2050 GHG Reduction Potential = 649,800 $MTCO_2e$

The transportation sector currently accounts for about a third of GHG emissions in Delaware. Along with more zero-emissions vehicles, reducing the amount of fuel used by vehicles already on the road is critical. Strategies include:

- Improving the efficiency with which we transport goods and materials
- Enhancing public transit options and creating more bikeable and walkable neighborhoods

649,800 $MTCO_2e$

GHG reduction potential



Fuel and Roadway Efficiency

More efficient, cleaner running vehicles

More options to get around without a car

More walking and biking opportunities

Building Electrification

2050 GHG Reduction Potential = 545,700 $MTCO_2e$

Building electrification is the shift from fossil fuel-powered appliances (gas and propane furnaces and hot water heaters) to clean electric appliances (electric heat pumps and hot water heaters), ideally powered by renewable energy. Strategies include:

- Transitioning existing buildings to utilize an all-electric energy source for heating and cooling spaces and water
- Moving the electricity grid toward 100% clean, renewable energy to multiply the impact of electrification

545,700 $MTCO_2e$

GHG reduction potential

Building Electrification

Buildings increasingly rely on electricity for all energy uses to maximize renewable benefits

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Options for homes and businesses to upgrade building systems

Waste Diversion and Reduction

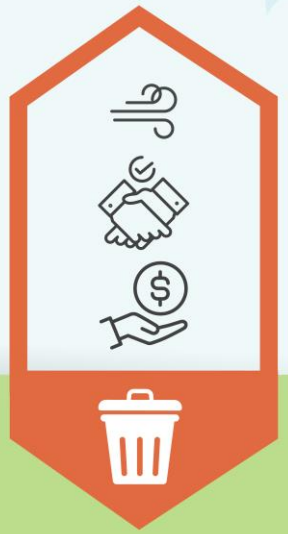
2050 GHG Reduction Potential = 211,400 $MTCO_2e$

Diverting and reducing waste applies to the entire life cycle of the goods we buy and use – from the energy, water and raw materials required to make them to the emissions associated with tossing them in landfills. Waste diversion strategies include:

- Reducing the amount of new materials we need to create by promoting the reuse of existing products
- Enhancing opportunities to compost and recycle those materials we cannot reuse

211,400 $MTCO_2e$

GHG reduction potential



Waste Diversion and Reduction

Increased options to divert waste through recycling and composting

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Encourage the principles of "reduce, reuse, recycle (or compost)"

Potential Opportunities

EEAC provides the framework and partnerships for energy efficiency actions that can help drive emissions reductions

To help advance climate and resiliency goals:

- Incorporate broader climate goals into EE programs and EE targets considerations, including emission reductions and resiliency
- Use the Climate Plan and emissions modeling to guide efforts
- Use data and information available at declimateinfo.org
- Seek opportunities to incentivize new low and no carbon alternatives
- Adopt strategies to address beneficial electrification in reporting progress
- Continue seeking ways to ensure equity and access to programs for the most vulnerable communities

THANK YOU
De.gov/climateplan

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