



Pennsylvania Climate Program

Agricultural Advisory Board
June 10, 2021

Tom Wolf, Governor

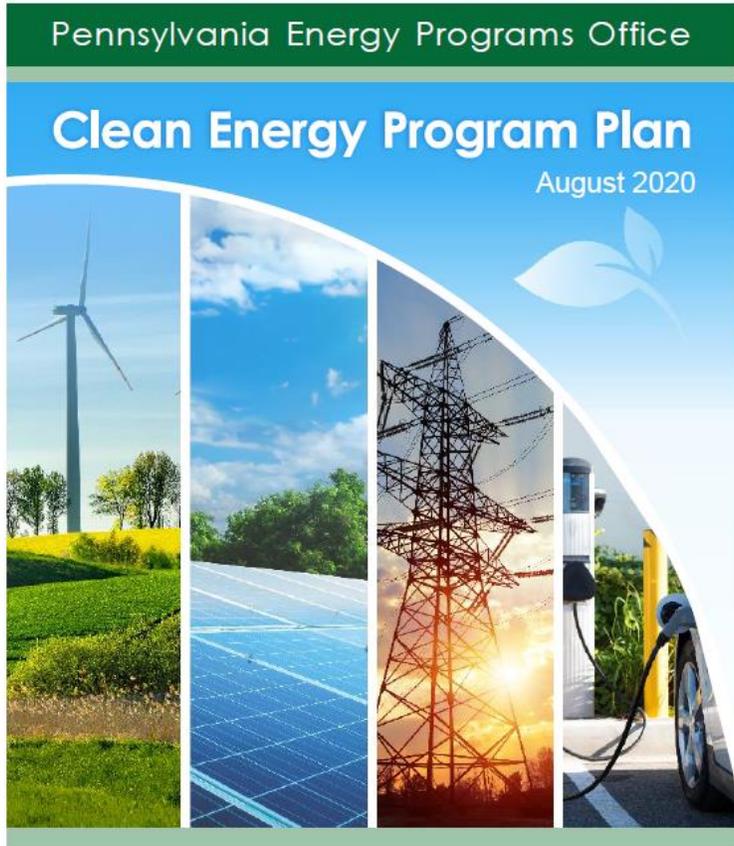
Patrick McDonnell, Secretary

Today's Presenters



Lindsay Byron
DEP Environmental Group
Manager, Climate Program
Manager

DEP Energy Programs Office (EPO)



- EPO is the primary agency responsible for implementing clean energy programs in Pennsylvania.
- Responsible for supporting renewable energy, energy efficiency and conservation, climate change mitigation and adaptation, alternative transportation, energy assurance, and associated education, outreach and technical support efforts.
- EPO works with its partners to implement, coordinate, and facilitate clean energy programs

DEP Climate Program

- **Pennsylvania Climate Change Act (Act 70 of 2008) Requires DEP to:**
 - Develop a climate impacts assessment (3 yrs.)
 - Prepare and update a climate action plan (3 yrs.)
 - Develop an inventory of greenhouse gases (GHGs) (update annually)
 - Administer a climate change advisory committee (CCAC) (bimonthly)
 - Set up a voluntary registry of GHG emissions (TCR)

Why a Climate Program?

“Climate change is the most critical environmental threat confronting the world...Given the urgency of the climate crisis facing Pennsylvania and the entire planet, the commonwealth must continue to take concrete, economically sound and immediate steps to reduce emissions.”

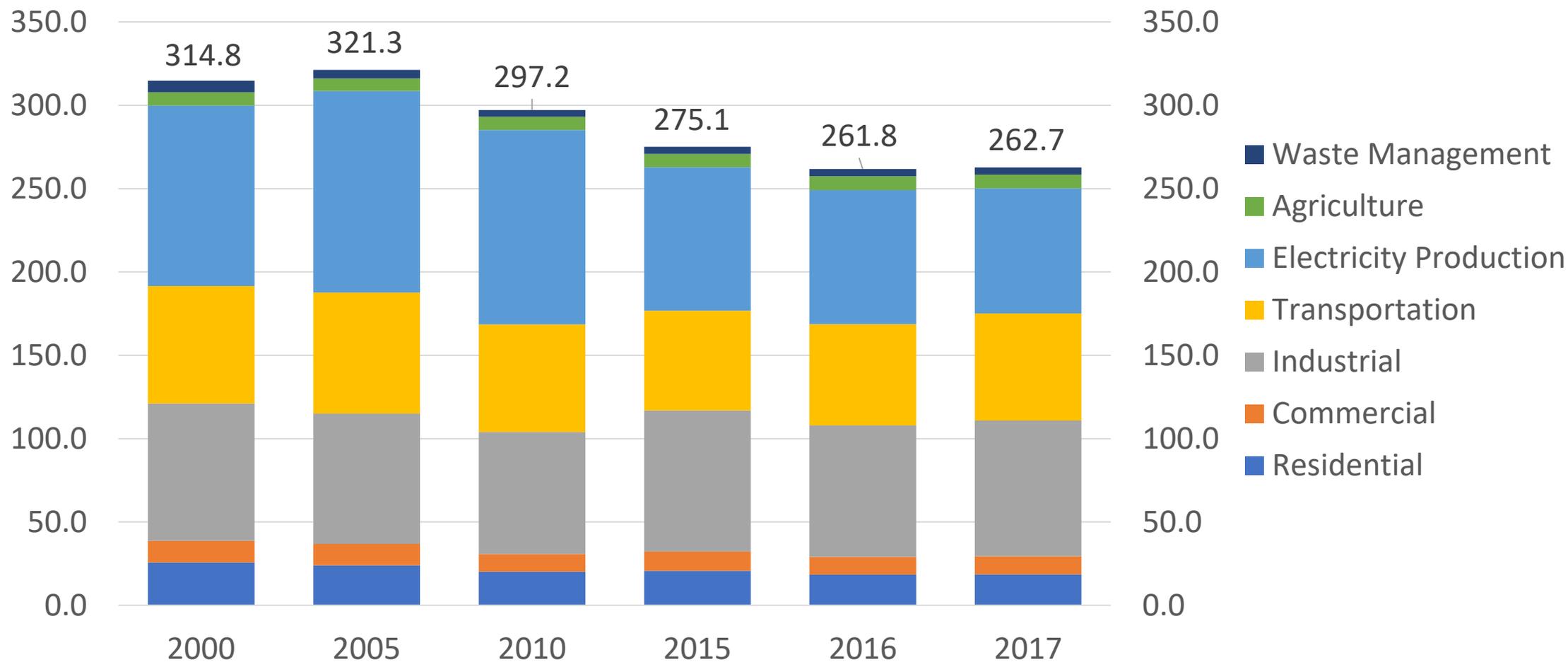
– *Governor Tom Wolf, October 3, 2019*

Why a Climate Program?

- **PA is getting warmer and wetter.**
- Over past 110 years, temperatures in PA increased by more than 1.8°F and are expected to increase by an additional 5.9°F by 2050
- Cities are expected to see increased frequency of 100+ degree days
- Annual precipitation in PA has increased by 10% since early 20th century and is expected to increase by another 8% by 2050, with a winter increase of 14%

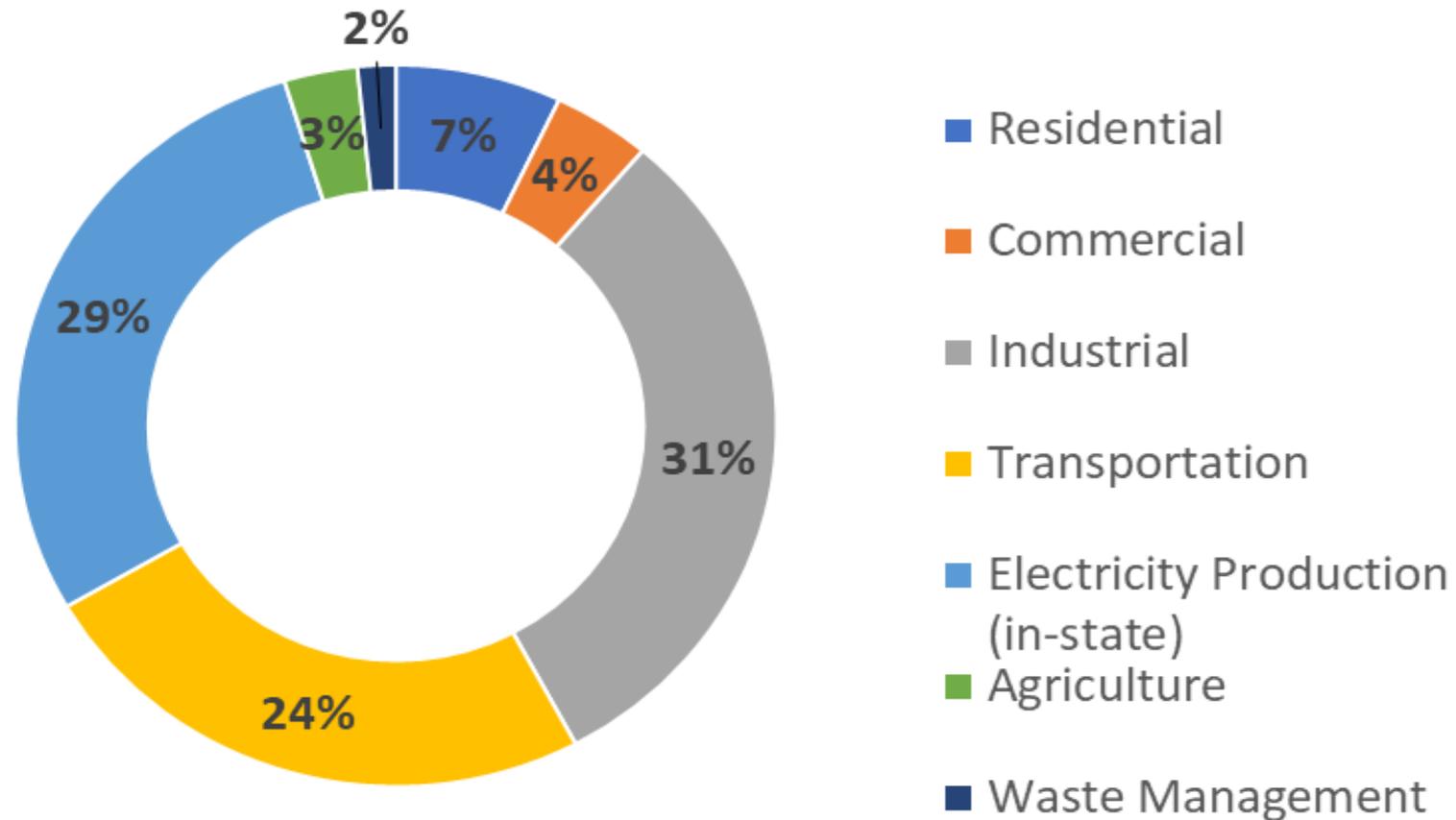
Greenhouse Gas Emissions by Sector

Greenhouse Gas Emissions (MMTCO₂e) by Sector



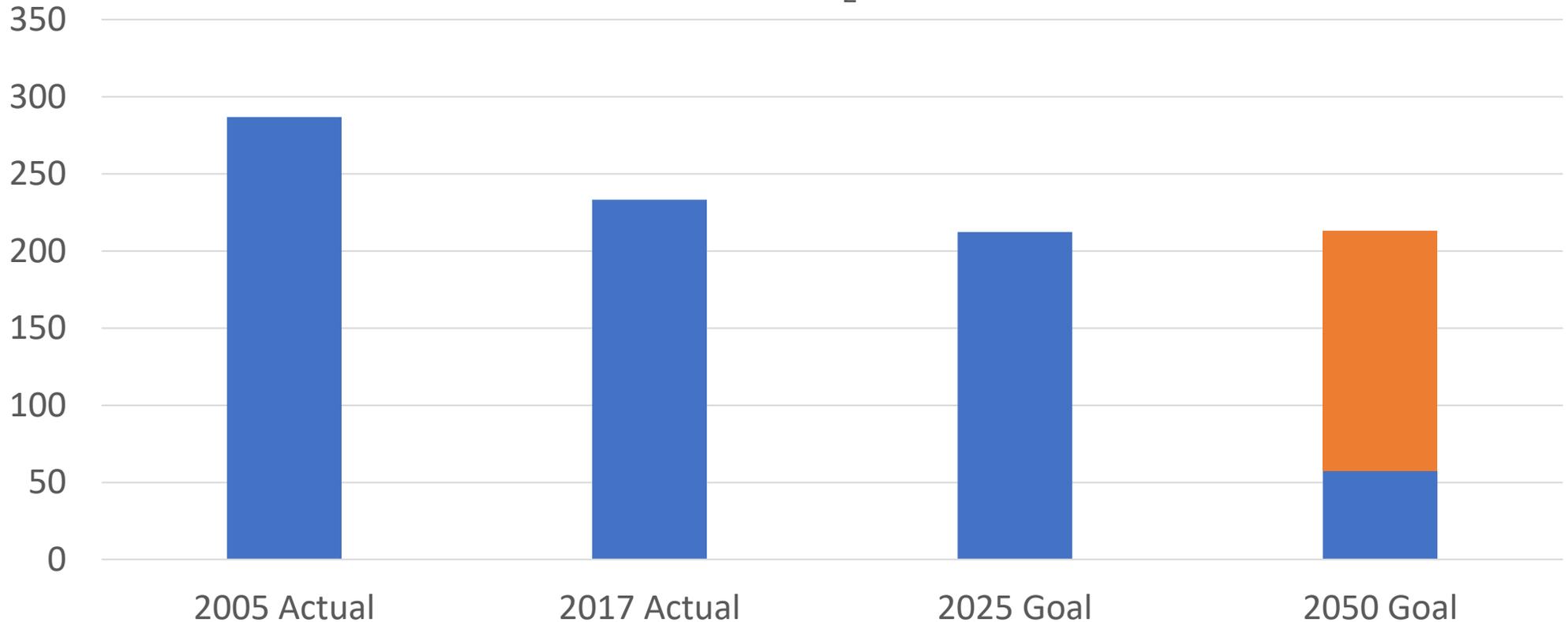
Greenhouse Gas Emissions by Sector (2017)

Pennsylvania 2017 GHG Emissions



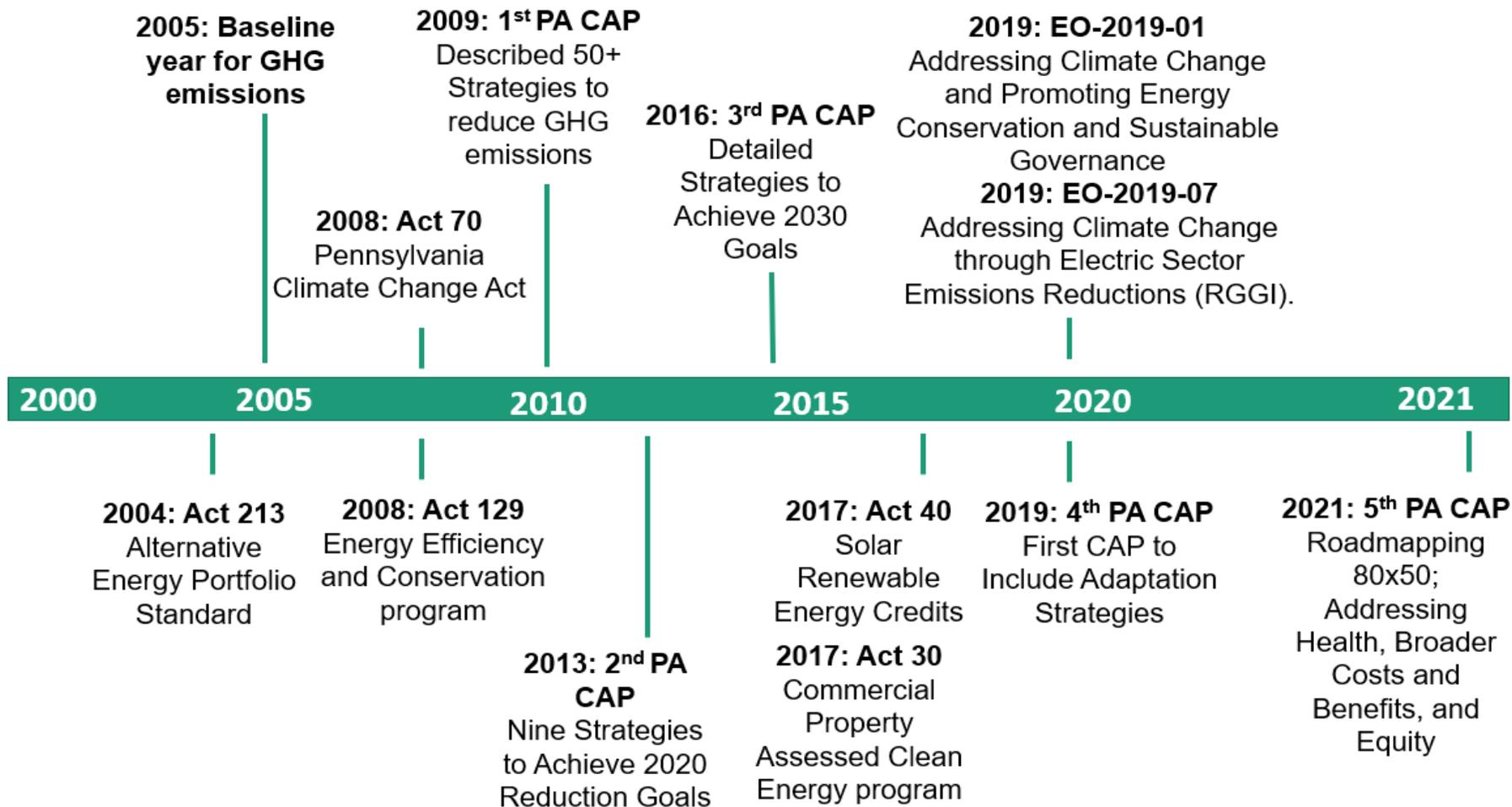
Greenhouse Gas Reduction Goals

Greenhouse Gas Reductions Needed to Meet 2025 and 2050 Goals
(MMTCO₂e)



■ Reductions from BAU ■ GHG Emissions (Net)

PA's Energy and Climate Planning Efforts



2021 Climate Impacts Assessment and Action Plan



PennState



HAMEL
ENVIRONMENTAL
CONSULTING

The Impacts Assessment and Climate Action Plan team includes experts in:

- Buildings
- Transportation
- Energy Production, Supply and Electricity
- CHP
- Waste
- **Agriculture, Land Use, Forestry**
- Climate Science and Risk
- Adaptation
- Economics
- GHG Accounting
- Health and Air Quality
- Equity
- Policy

2021 Impacts Assessment Focus Areas and Updates

- **Update:** Reflect latest available information on climate science and impacts
- **Risk-based approach:** Understand relative timing and severity of impacts to inform overall risk ratings and priorities for adaptation
- **Make it actionable:** Directly inform priority adaptation actions in the Climate Action Plan (CAP)

Traditional Approach

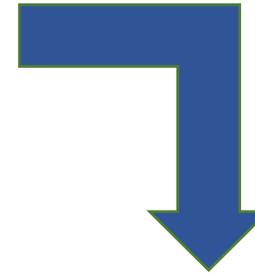
Impacts by Sector

Human Health

- Higher temperatures will increase mortality from heat-related stress, but will decrease mortality from cold-related stress.
- Climate change will worsen air quality relative to what it would otherwise be, causing increased respiratory and cardiac illness.
- The risk of injury and death from extreme weather events could increase as a consequence of climate change.

Agriculture

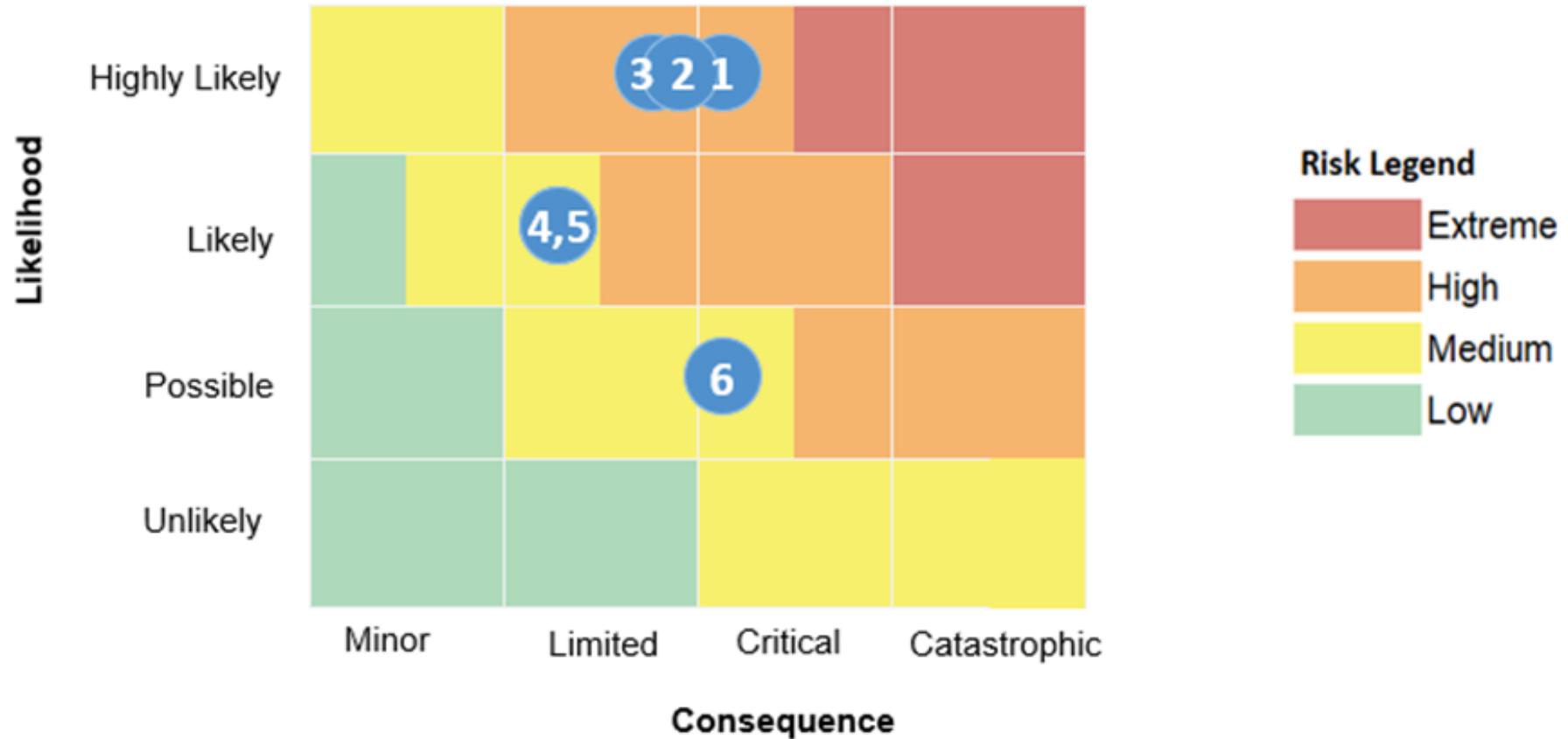
- Mixed effects on Pennsylvania field crop production.
- Pennsylvania dairy production is likely affected by climate change due to losses caused by heat stress, additional energy expenditures to mitigate heat stress, and forage quality.
- Forage yields may increase due to a longer growing season and more precipitation on average.



Risk-based Approach

	SECTOR					
STRESSOR	Human Health	High	Medium	Low	Medium	High
	Agriculture	High	Low	Medium	Medium	High
	Water	Low	High	Medium	Medium	High
	Energy	Medium	Medium	Medium	High	Medium

2050 Risk Assessment Results



1 = Increasing average temperatures

2 = Heavy precipitation and inland flooding

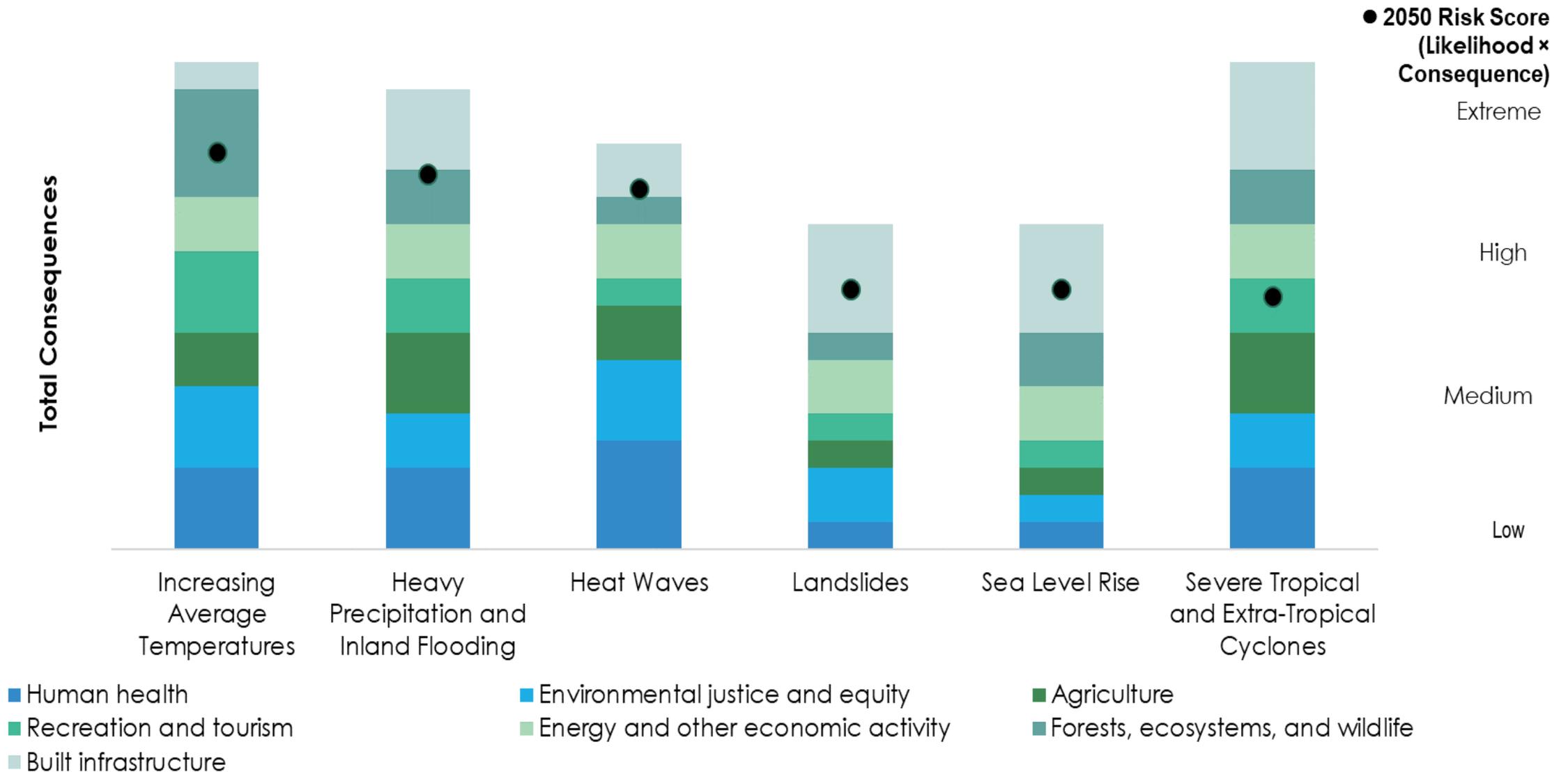
3 = Heat waves

4 = Landslides

5 = Sea level rise

6 = Severe tropical and extra-tropical cyclones

2050 Risk Assessment Results



2050 Risk Assessment Results

	Human health	Environmental justice and equity	Agriculture	Recreation and tourism	Energy and other economic activity	Forests, ecosystems, and wildlife	Built infrastructure	Overall Risk Rating
Increasing average temperatures	12	12	8	12	8	16	4	10.7
Heavy precipitation and inland flooding	12	8	12	8	8	8	12	9.9
Heat waves	16	12	8	4	8	4	8	9.3
Landslides	3	6	3	3	6	3	12	5.6
Sea level rise	3	3	3	3	6	6	12	5.6
Severe tropical and extra-tropical cyclones	6	4	6	4	4	4	8	5.3

Risk Assessment Key Findings

- **Flooding is currently the highest-risk hazard** facing Pennsylvania, and flood risks are projected to increase; at the same time, risks from **increasing average temperatures and heat waves** could rise to be as high as flooding is today by mid-century
 - Flooding from heavy rain events affects built infrastructure, human health, and agriculture, with ripple effects throughout the economy
 - Increasing average temperatures could affect nearly every aspect of life
- **Heat waves will become increasingly common** and will create particular health and economic risks for vulnerable populations
- **All hazards could affect public health negatively**—especially heat waves, increasing temperatures, and flooding
- **Climate change will not affect all Pennsylvanians equally.** Some may be more at risk because of their location (and inability to relocate), income, housing, health, or other factors
- **Landslides and sea level rise can cause severe impacts in the locations where they occur**, but pose relatively low risks statewide
- **Severe tropical storms, flooding, and landslides already pose risks**, and these could become more likely or severe in the future

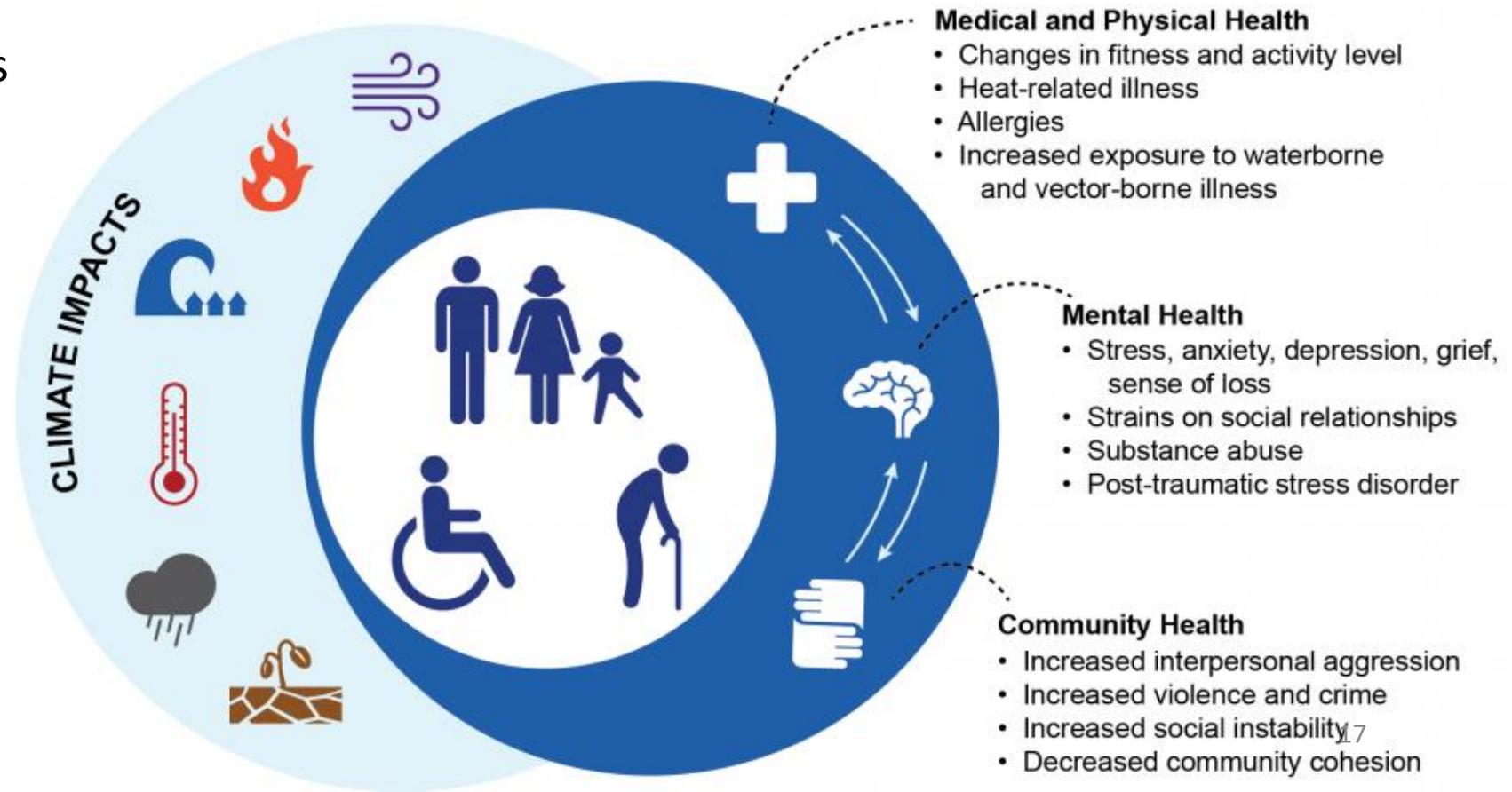
Impacts to Human Health

Increasing average temperatures and heat waves are projected to increase:

- heat-related illnesses or deaths
- allergies
- violence and crimes
- anxiety and mood disorders

Flooding and severe cyclones can also have severe health impacts such as:

- disrupting critical services
- making conditions are more hazardous



Impacts to Human Health

Impacts to human health will not affect Pennsylvanians equally

Underlying health conditions, age, race, limited access to air conditioning, outdoor employment (e.g., farm labor or logging), and living in urban areas can all increase risk to heat-related health conditions

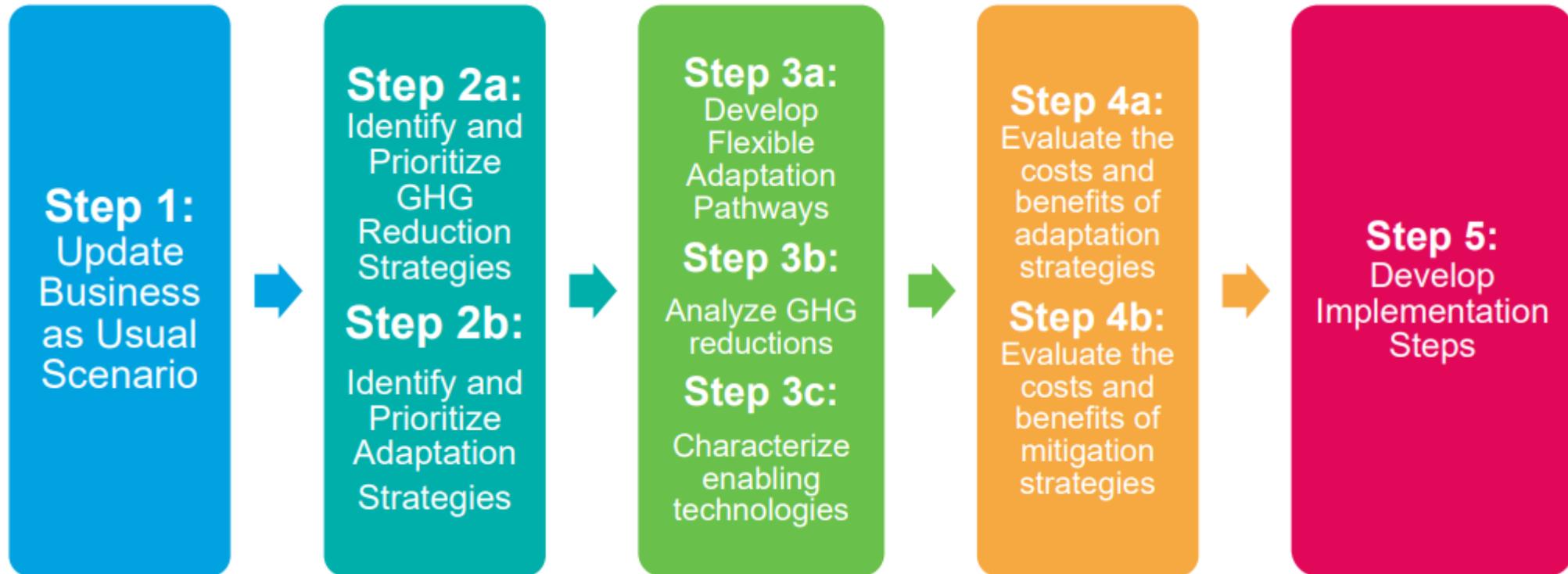
Populations at greater risk from heat include:

- The elderly
- Low-income communities
- Pregnant women
- Individuals with cardio-vascular disease
- Outdoor workers

2021 Climate Action Plan Approach

- Final expected: Fall 2021
- Will include greenhouse gas mitigation strategies, implementation plan, adaptation pathways
- Focus on Equity
- Co-benefits to include health benefits
- Will include discussion on the role of “enabling technologies” in meeting PA’s greenhouse gas emissions reduction goals

2021 Climate Action Plan Approach



2021 Climate Action Plan Strategies

Sector	Greenhouse Gas Reduction Strategy
Residential and Commercial (R&C) Buildings	<ul style="list-style-type: none"> • Support energy efficiency through building codes • Improve residential and commercial energy efficiency (electricity) • Improve residential and commercial energy efficiency (gas) • Incentivize building electrification • Introduce state appliance efficiency standards • Increase distributed onsite solar • Take actions to promote and advance C-PACE financing and other tools for Net Zero Buildings and high-performance buildings
Transportation	<ul style="list-style-type: none"> • Increase fuel efficiency of all light duty vehicles and reduce vehicle miles traveled for single occupancy vehicles • Implement the multi-state medium-and heavy-duty zero-emission vehicle memorandum of understanding • Increase adoption of light-duty electric vehicles • Implement a Low Carbon Fuel Standard
Industrial	<ul style="list-style-type: none"> • Increase industrial energy efficiency and fuel switching

2021 Climate Action Plan Strategies

Sector	Greenhouse Gas Reduction Strategy
Fuel Supply	<ul style="list-style-type: none"> • Increase production and use of biogas/renewable gas • Incentivize and increase use of distributed Combined Heat and Power • Reduce methane emissions across oil and natural gas systems
Electricity Generation	<ul style="list-style-type: none"> • Maintain nuclear generation at current levels • Create a carbon emissions free grid
Agriculture	<ul style="list-style-type: none"> • Use programs, tools, and incentives to increase energy efficiency for agriculture • Provide trainings and tools to implement agricultural best practices
LULUCF	<ul style="list-style-type: none"> • Increase land and forest management for natural sequestration
Waste	<ul style="list-style-type: none"> • Reduce food waste • Reduce waste generated by citizens and businesses and expand beneficial use of waste

Adaptation Planning – Climate Action Plan

- For each adaptation priority, develop an “adaptation pathway” – a recommended sequence of strategies to adapt to and prepare for climate change impacts
- Environmental justice and equity focus areas prioritize reducing impacts on already overburdened and vulnerable populations
- Adaptation priority areas by hazard and consequence category:
 - Primary focuses: health, environmental justice and equity, and built infrastructure
 - Primary hazards: increasing average temperature, heat waves, and flooding

1. Impacts of Increasing Average Temperatures and Heat Waves on Health

2. Impacts of Flooding and Storms on Health

3. Impacts of Increasing Average Temperatures on Environmental Justice and Equity

4. Impacts of Flooding on Environmental Justice and Equity

5. Impacts of Increasing Average Temperatures on Forests, Ecosystems, and Wildlife

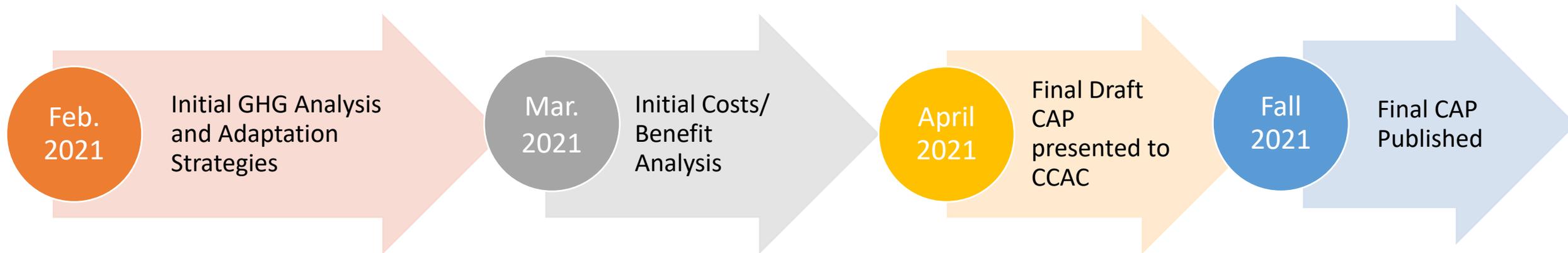
6. Impacts of a Warmer and Wetter Climate on Agriculture

7. Impacts of Increasing Average Temperatures on Recreation and Tourism

8. Impacts of a Changing Climate on Built Infrastructure

9. Impacts of Landslides on Built Infrastructure

2021 Climate Action Plan Timeline



Pennsylvania's Ongoing Energy and Climate Efforts

PA's Ongoing Energy and Climate Efforts

Executive Order 2019-01 directs commonwealth agencies to:

- Reduce energy use by 3% per year and 21% by 2025 from 2017 levels
- Procure renewable energy to offset at least 40% of the Commonwealth's annual electricity use
- Design and construct new buildings/renovation projects as a high-performance buildings
- Replace 25% of the state vehicle fleet with battery electric and plug-in electric hybrid cars by 2025
- **Established the GreenGov Council** – helps incorporate environmentally sustainable practices into the Commonwealth's policy, planning, operations, procurement, and regulatory functions. It promotes best practices and energy efficiency, including solar purchase for state buildings.

PA's Ongoing Energy and Climate Efforts

- **Methane regulations** – reduces emissions from natural gas well sites, compressor stations and along pipelines, to not only contribute to climate change mitigation, but also help businesses reduce the waste of a valuable product.
- **Act 129 Phase IV** – expands on phase III, as electric distribution companies incorporate energy efficiency and conservation programs into their operations.
- **DCNR's adaptation plan** – outlines over 100 action steps to increase resiliency against climate change impacts.

PA's Ongoing Energy and Climate Efforts

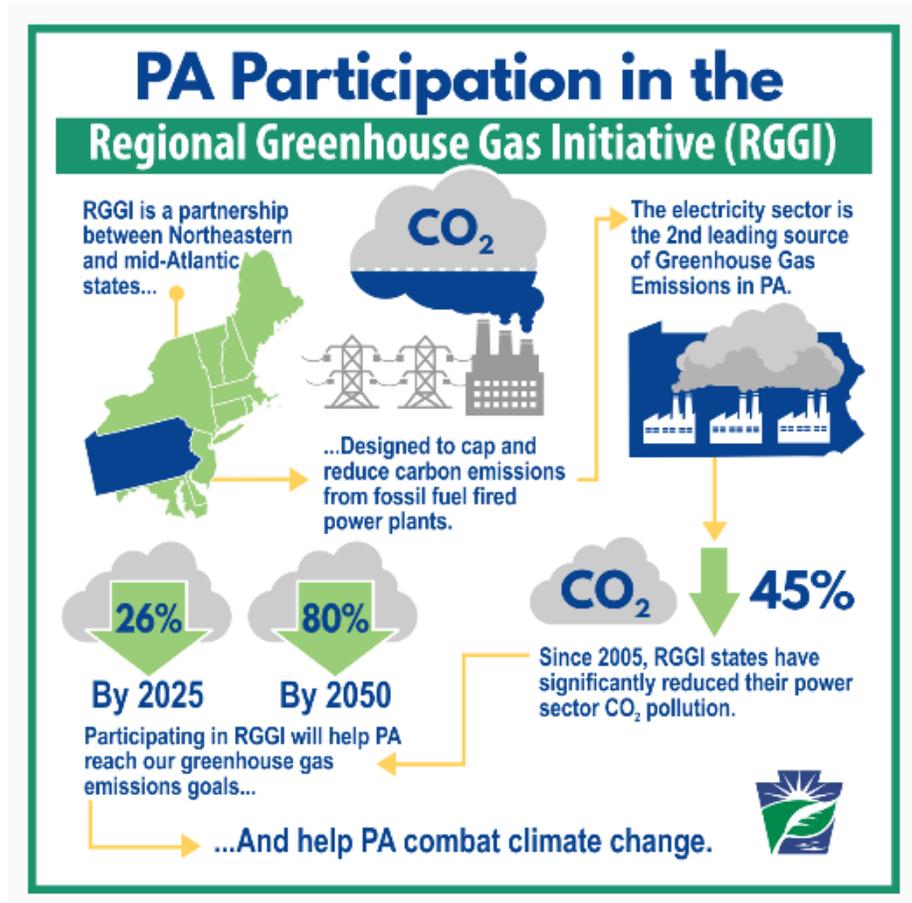
- **PennDOT's vulnerability study** – helps anticipate the impacts of extreme weather events so that transportation funding and resiliency may be prioritized.
- **Medium- and Heavy-Duty Zero Emission Vehicles MOU** – advances and accelerates the market for electric medium- and heavy-duty vehicles.
- **EV Roadmap** – identifies strategies to increase the adoption of EVs. The Roadmap identifies near-, mid-, and long-term strategies to incentivize and remove barriers to EV adoption.

PA's Ongoing Energy and Climate Efforts

- **Driving PA Forward** – creates grants and rebate programs aimed at improving air quality in Pennsylvania by spurring the transition from older, polluting diesel engines to clean engine technologies powered by electricity, compressed natural gas, propane, or clean diesel. This initiative is a product of the Volkswagen Mitigation Trust Fund, a one-time penalty settlement that provided funds to establish a series of grants and the rebate program.
- **AFIG** – promotes the use of alternative fuels in Pennsylvania. AFIG has operated four incentive programs: Alternative Fuel Vehicle Rebate Program, AFIG Grant Program, AFIG Fixing America's Surface Transportation (FAST) Act Infrastructure Program, and Alternative Fuels Technical Assistance Program.

PA's Ongoing Energy and Climate Efforts

- **RGGI** – reduces GHG emissions from the power sector while also generating economic growth. It sets a regional cap on emissions from electric power plants.



PA's Ongoing Energy and Climate Efforts

- **PEDA COVID-19 Restart Grant** – awarded \$1.7 million in grant funding to restart 11 clean energy projects disrupted by the COVID pandemic in urban, rural with an emphasis on environmental justice neighborhoods. The projects were intended to: Re-hire workers or hiring of additional workers to complete the project quickly, make immediate equipment payments to restart the supply chain, and overcome lost revenue due to market stagnation. Clean energy projects supported included: 4 solar projects, 3 energy efficiency projects, 1 solar & energy efficiency project, 1 EV charger project, and 2 high performance building projects.
- **C-PACE expansion** – provides business property owners with low-interest, long-term loans for clean energy and clean water projects that are repaid as property tax to benefit the community.

PA's Ongoing Energy and Climate Efforts

- **Green Bank** – The Pennsylvania Energy Development Authority (PEDA) working together with the PA Treasury is establishing a Keystone Green Bank Partnership to: Create a facility including access to a finance facilitator who can serve to translate, coordinate and provide a communication bridge between contractors and finance providers, provide product enhancements for the small commercial and small agricultural sectors such as interest rate buy-down, loan loss reserve and other appropriate credit enhancements to make financing products for clean energy projects more accessible, and develop new mechanisms such as a specific finance product or market facilitation to connect Keystone Green Bank Partnership investments to private capital.

PA's Ongoing Energy and Climate Efforts

- **DEP's Local Climate Action Program** – allows local governments and college students to work together to develop GHG inventories and climate action plans.
- **Shared Energy Manager Program** – DEP hired a contractor to serve as a part-time Shared Energy Manager (SEM) for five jurisdictions that had participated in DEP's Local Climate Action Program (LCAP). The SEM supported those local governments in implementing many of the energy-related strategies from their CAPs such as energy benchmarking, energy audits, solar PV feasibility assessments, development of energy management plans, and alternative fuel evaluations for fleet vehicles.
- **PA Climate Leadership Academy** – advances the capacity of state and local government agencies, infrastructure organizations, and businesses to develop and implement sound climate change initiatives via comprehensive training programs.



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION



Energy Programs Office

Thank you!

DEP Climate Website: www.dep.pa.gov/climate

DEP Website: www.dep.pa.gov

Key Definitions

Climate hazard

- Climate related events or indicators, such as temperature and precipitation. Climate hazards can be discrete (e.g., heat wave) or ongoing (e.g., increasing average temperature).

Risk

- The chance a climate hazard will cause harm. Risk is a function of the likelihood of an adverse climate impact occurring and the severity of its consequences.

Likelihood

- The probability or expected frequency a climate hazard is expected to occur.

Consequence

- A measure of the severity of impacts from a climate hazard.