Maryland
Department of
the Environment

2019 Greenhouse Gas Emissions Reduction Act Draft Plan

Maryland Commission on Climate Change Meeting
October 16, 2019

The *2019 GGRA Draft Plan*

- MDE has proposed the *2019 GGRA Draft Plan*
  - In coordination with other state agencies and stakeholders
  - Must achieve Maryland's goal of reducing greenhouse gas (GHG) emissions by **40 percent** by 2030 from a 2006 baseline
    - More ambitious than the Paris Climate Accord goal of 26% to 28% reduction by 2025
  - Must also benefit the State's economy and creates jobs

- ***Sets Maryland on a path to achieve the States ambitious GHG emissions reduction goal for 2030 and to achieve much deeper reductions in the 2040 to 2050 time frame***

- ***Serves as an example for the nation showing how state action can reduce the threat of climate change while growing the economy and creating jobs***

Key Results - Quick Snapshot

- Comprehensive suite of over 100 measures that provides a plan, which if fully implemented:
  - **Will achieve GHG reductions greater than 40 percent … about 44% by 2030**
  - **Puts the State on a path to achieve significantly deeper reductions by 2050**
  - **Will achieve as much as $11.54 billion in increased economic activity and over 11,000 new jobs by 2030**
  - **Drive investments in energy efficiency and clean and renewable energy**
  - **Advance widespread adoption of electric vehicles**
  - **Supports new industries and technologies**
  - **Improve management of forests and farms to sequester more carbon in trees and soils**

- That said … this is a draft … there is still work to be done
  - Programs can still be added, modified and improved
  - Adjustments to the entire plan can still be made, if needed

Outreach and Stakeholder Input

- Before finalizing the 2019 GGRA Plan, Maryland will be undertaking a significant stakeholder process to ensure that opportunities exist for the interested parties to provide additional input on the Draft Plan

- Maryland invites comment on:
  - The measures that are being counted on to reduce emissions
  - Potential new programs
  - The emissions and economic analyses
  - Opportunities to better address social equity issues
  - Other aspects included within the Draft Plan

- Maryland will consider these comments in the development of the final 2019 GGRA Plan

Proposed Public Input Process

- Numerous meetings with the citizens, communities, and businesses
  - Geographically diverse - Central Maryland, Eastern Maryland, Northeastern Maryland, Western Maryland and Southern Maryland
- MCCC public meetings - Commission and Workgroup meetings
- Webinar series supported by ECO Workgroup
- Other Forums – MDE to participate in meetings held by groups like the Maryland Chamber of Commerce, the Sierra Club, local government, etc.
- Dates/locations/times are still being finalized. More meetings/webinars to be scheduled as needed. Input from Commission members is welcome and desired


What’s in the Plan?

The Plan in General

- Over 100 regulations, strategies, programs, and initiatives are included in the Draft Plan
- Some strategies are already being fully implemented, others are in an earlier phase of the implementation process, while others are still being adopted
- All inventory sectors
  - Energy/Electricity … Transportation … Agriculture and Forestry … The Built Environment … Waste … and more
- Broad Public, Private and Federal, State and Local Partnerships
  - Underserved communities, state universities, local government, Port of Baltimore, etc.

Major Programs

Electricity Supply
Clean and Renewable Energy Standard
Continued RGGI Geographic Expansion

Transportation
Numerous MDOT Investments (e.g., transit)
Clean Cars / ZEV Mandate
50% ZEV Transit Buses
Compact Development
Transportation and Climate Initiative (TCI) could fund & enable other measures.

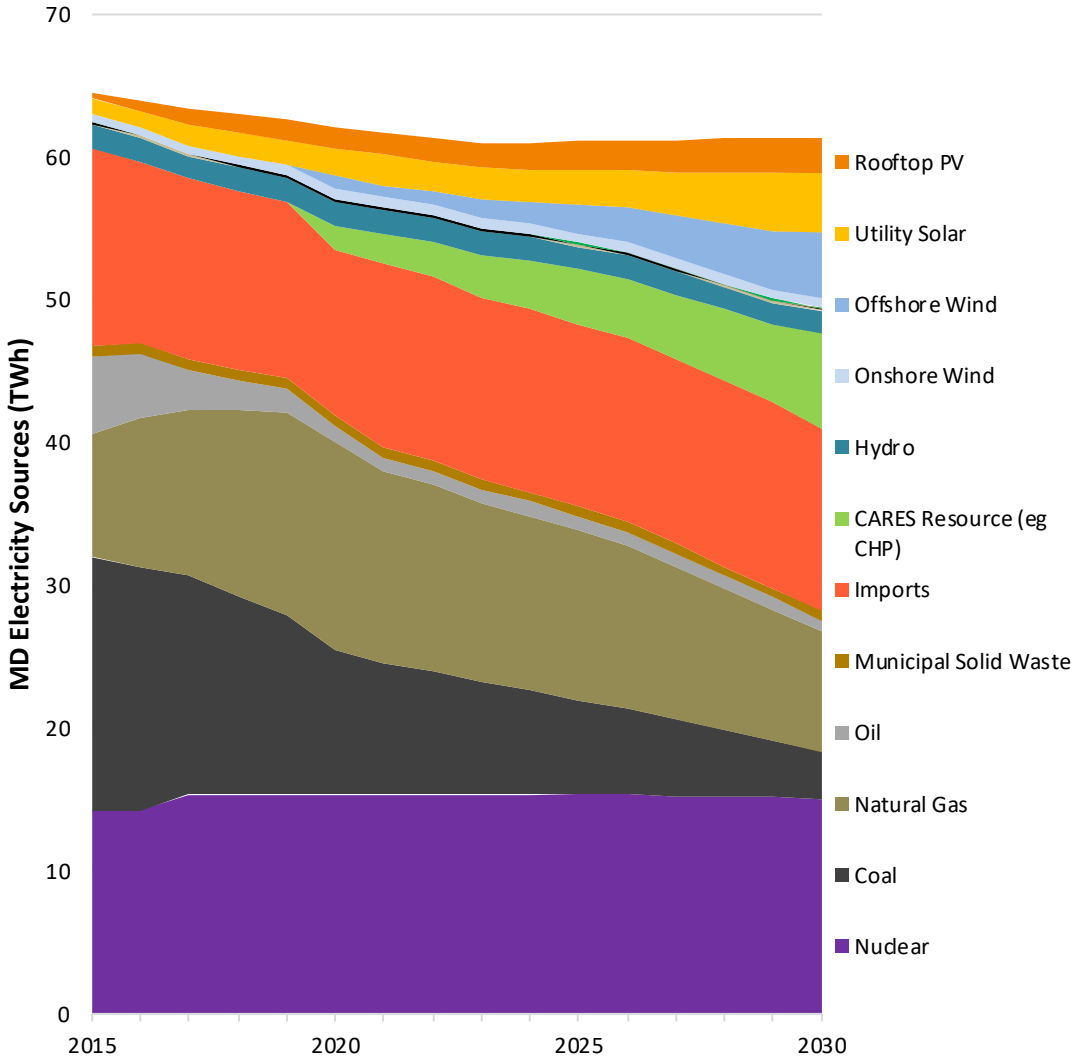
Carbon Sequestration
Enhanced Forest Management
Enhanced Healthy Soils Incentives

Building Energy Use
Extended EmPOWER
Heat Pump Incentives
Compact Development
State Building Efficiency EO

Other
HFCs

Electricity Supply Programs

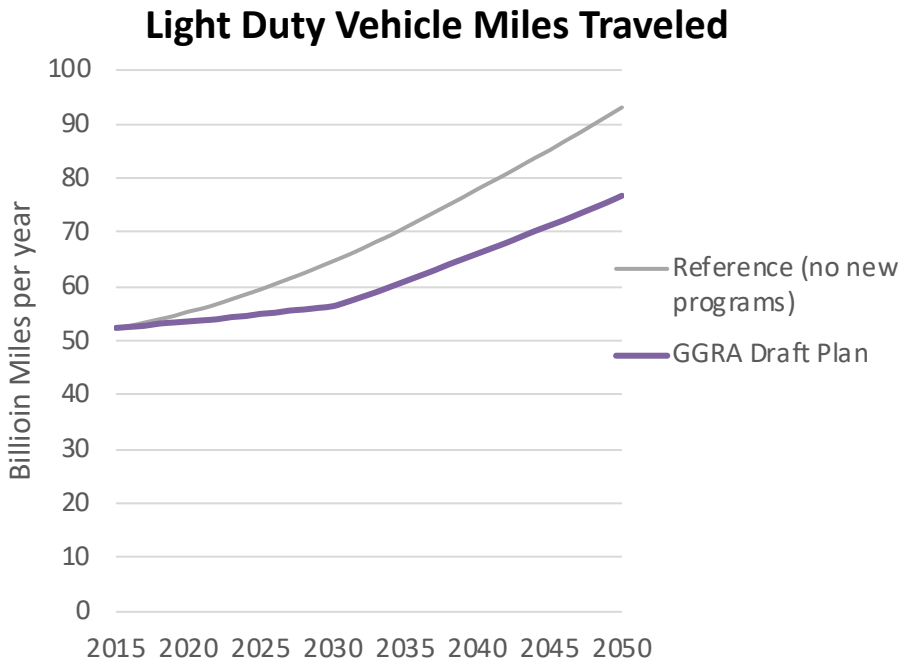
- CARES
  - Still under development; example impacts in the *2019 GGRA Draft Plan*
  - 100% Clean Electricity by 2040
- RGGI Expansion
  - RGGI participation in more nearby states will reduce emissions from imported power.
  - New Jersey recently renewed participation, Virginia promulgated a regulation (on hold), and Pennsylvania announced rulemaking.

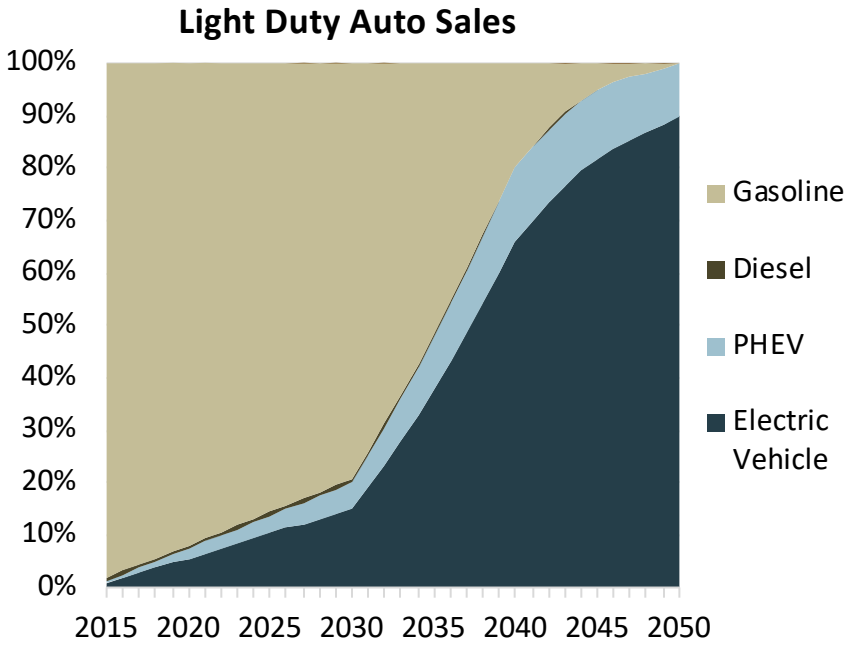


*Analysis assumes no new nuclear or carbon capture before 2030

Transportation Programs

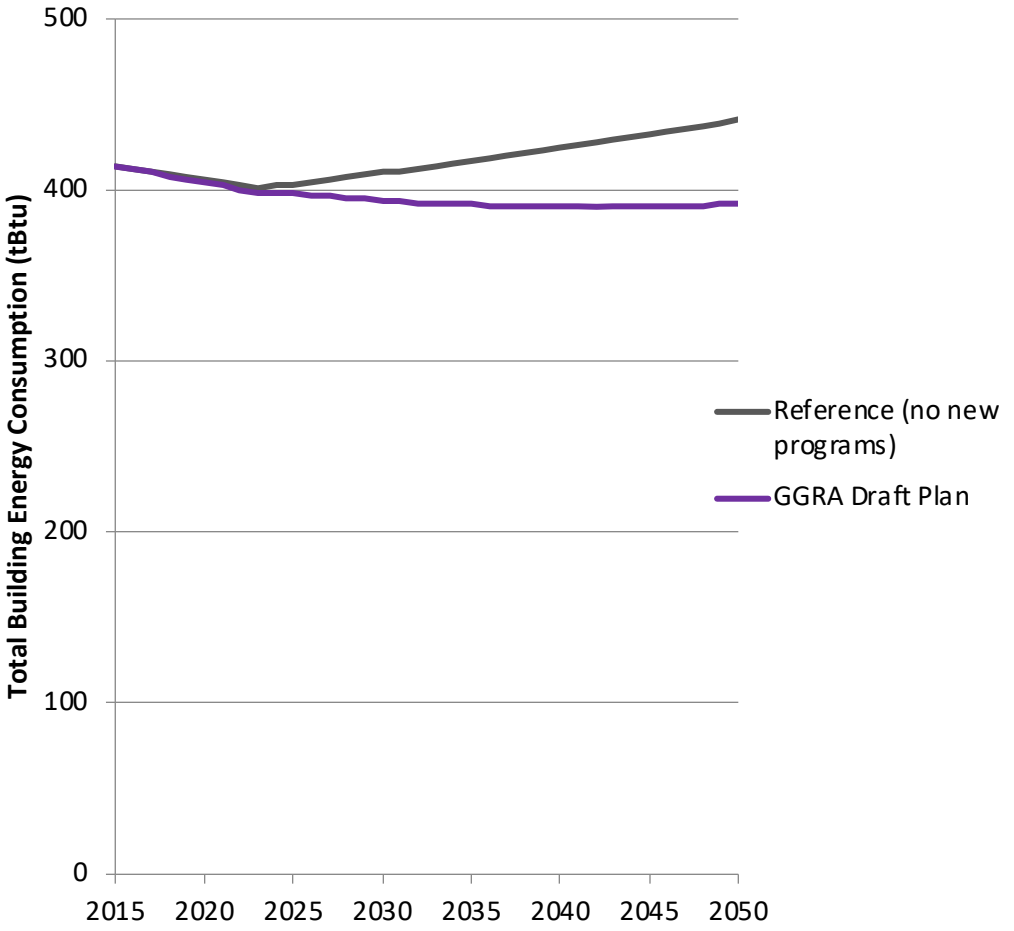
- Reducing Vehicle Miles Traveled:
  - Transit Capacity & Operations
  - Intercity Transportation
  - Active Transportation (e.g., bike lanes)
  - Compact Development
- Deploying electric and other Zero Emission Vehicles:
  - Clean Cars Program
  - 50% ZEV Transit Buses by 2030
  - Transportation and Climate Initiative





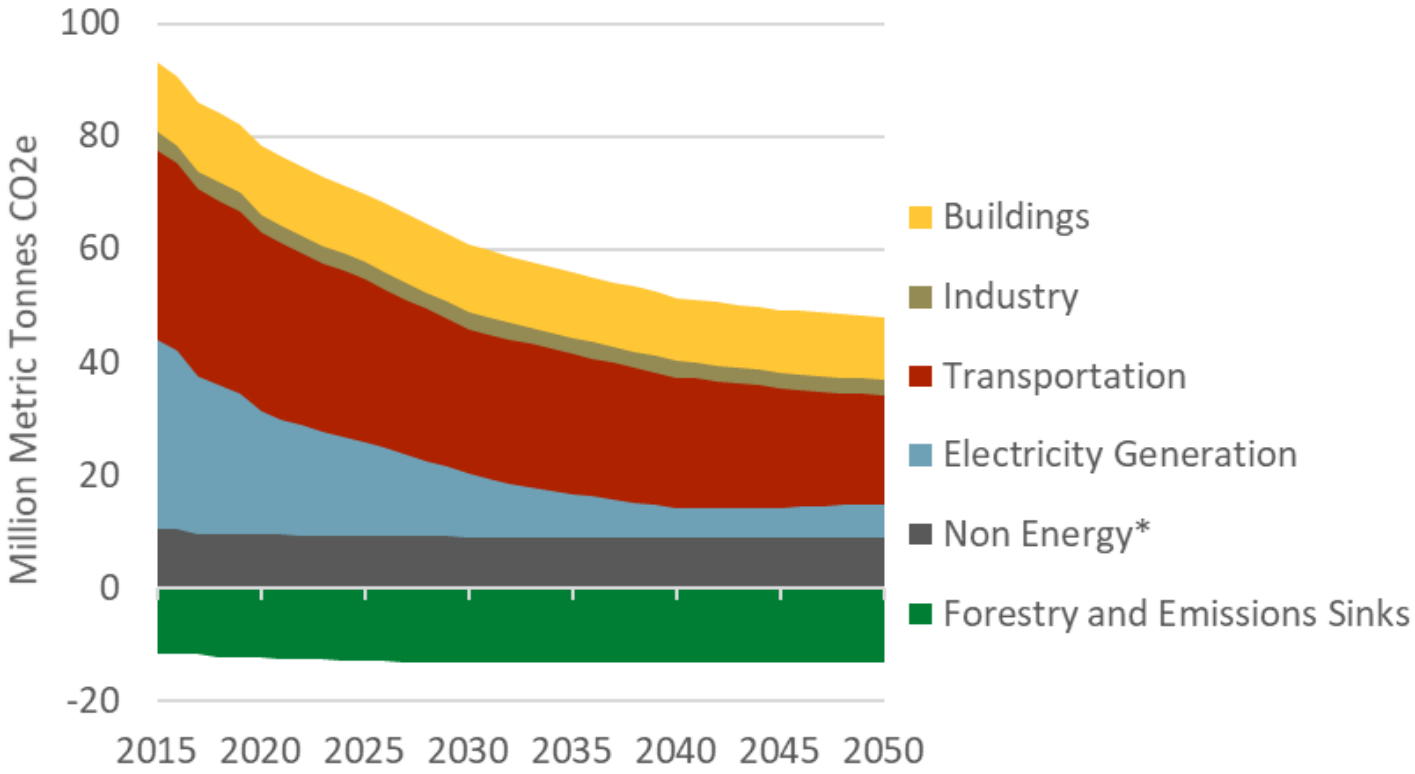
Buildings Programs

- Prioritize energy efficiency to counteract growth:
  - Continue EmPOWER beyond 2023
  - Achieve State Building Efficiency Goal
  - Achieve Compact Development Goal
- Begin to convert heating systems to efficient heat pumps that run off increasingly clean electricity.



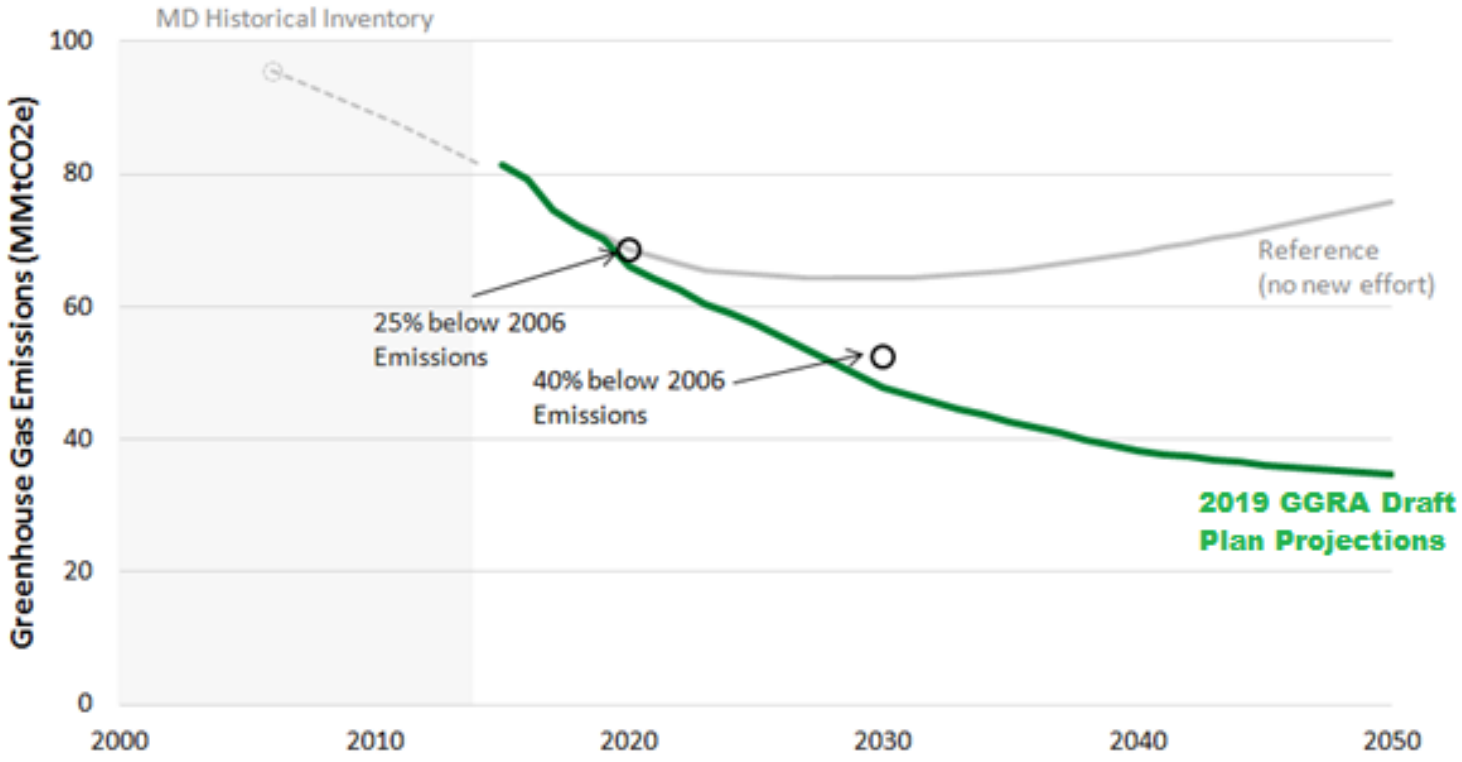
Sequestration Programs

Forest management, tree planting, and Healthy Soils programs accelerate carbon sequestration in forests and agricultural soils, adding benefit on top of emission reduction programs.



*Non Energy includes Agriculture, Waste Management, Industrial Process and Fossil Fuel Industry.

Net Emissions

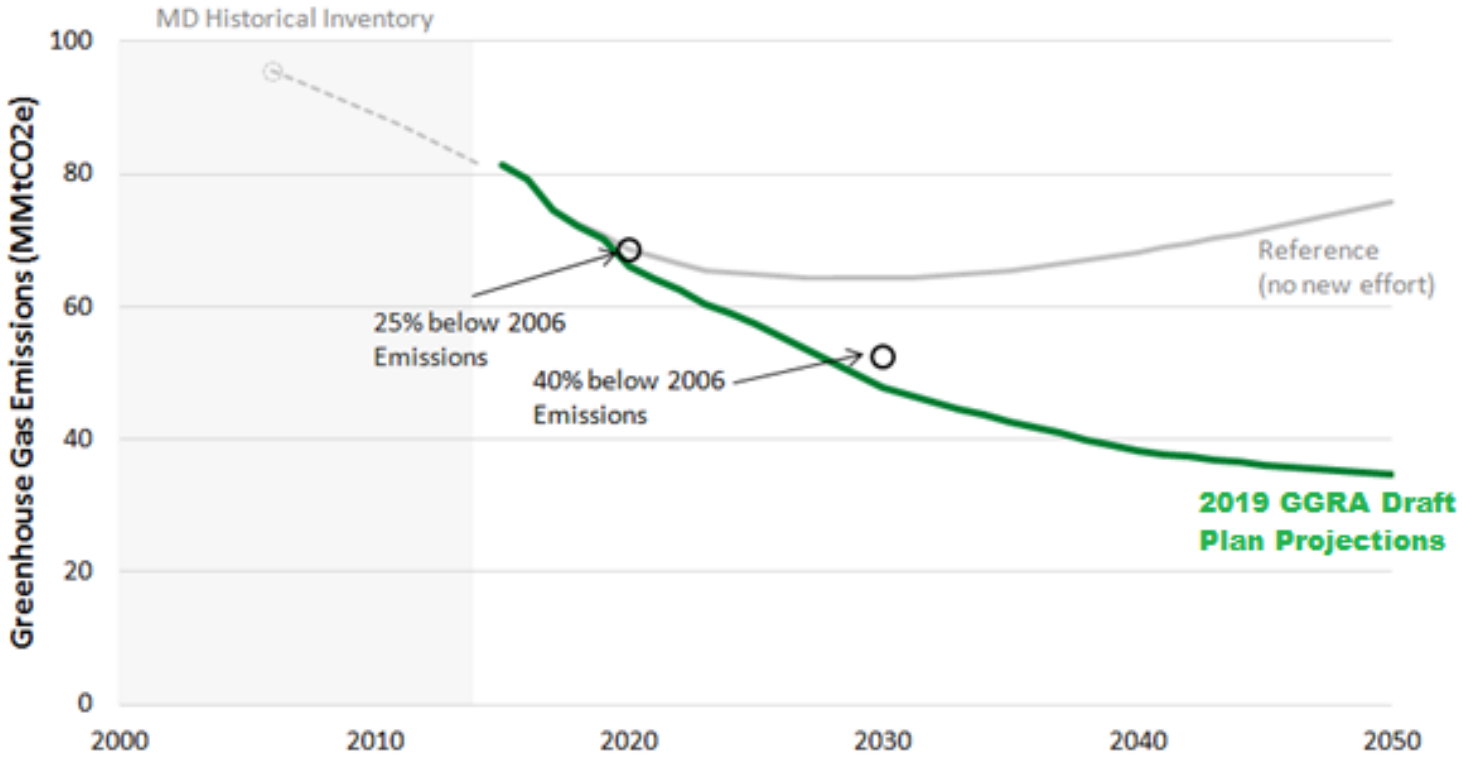


The GGRA Draft Plan reduces emissions by 44% by 2030 (extra 4.5MMTCO2e)

What Does the Plan Achieve?

(Emission Reductions, Economic Benefits, Jobs and More)

Net Emissions



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Economic Impacts

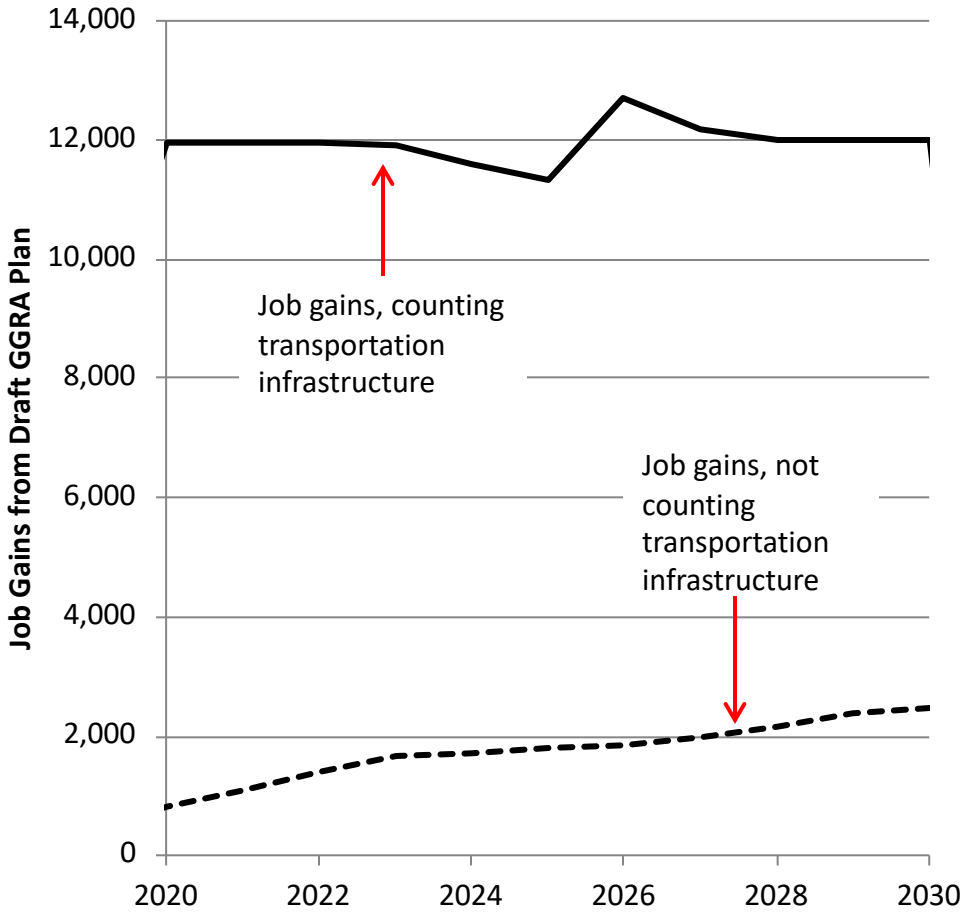
The GGRA Draft Plan achieves the 2030 goal with significant benefit to the state's economy.

MD impact relative to Reference Case	Through 2030	Through 2050
Average job impact*	+ 11,649 job-years	+ 6,703 job-years
GDP Impact**	+ $ 11.54 billion	+ $ 18.63 billion
Personal Income Impact**	+ $ 10.04 billion	+ $ 15.67 billion
Avoided Mortality**	+ $ 0.74 billion	+ $ 4.79 billion
Avoided Climate Damages**	+ $ 4.30 billion	+ $ 27.11 billion

* Average number of job-years created or sustained each year.
** 2018 Dollars, Cumulative, Net Present Value using 3% discount rate.
Climate damage evaluated using Federal Social Cost of Carbon (2015 Update)

GGRA Draft Plan Employment Results

- The Draft Plan drives substantial job gains.
- Almost all of MD's fossil fuel comes from out of state.
- Investments that reduce fossil fuel consumption drive positive impacts for MD's economy.

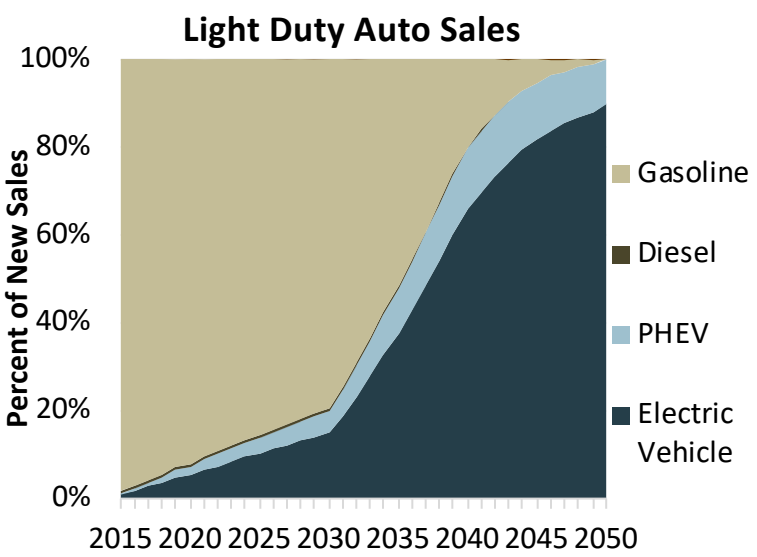


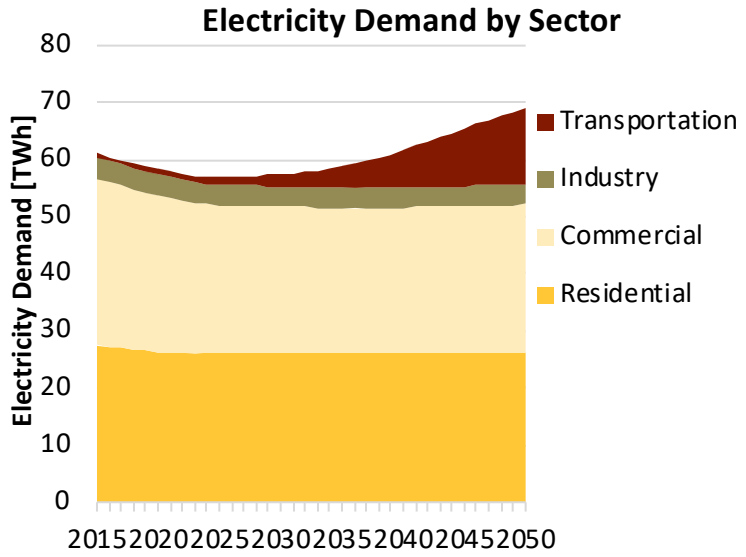
Large transportation projects drive substantial job gains in the near-term; investments in in-state clean energy and fuel-saving measures provide more modest underlying gains. (Transportation gains dependent on Federal funding)

Analysis Tools: GHG Emissions

E3's PATHWAYS tool, customized for Maryland

- Model of all energy consuming stock in the state
- Captures interactions among programs and sectors:



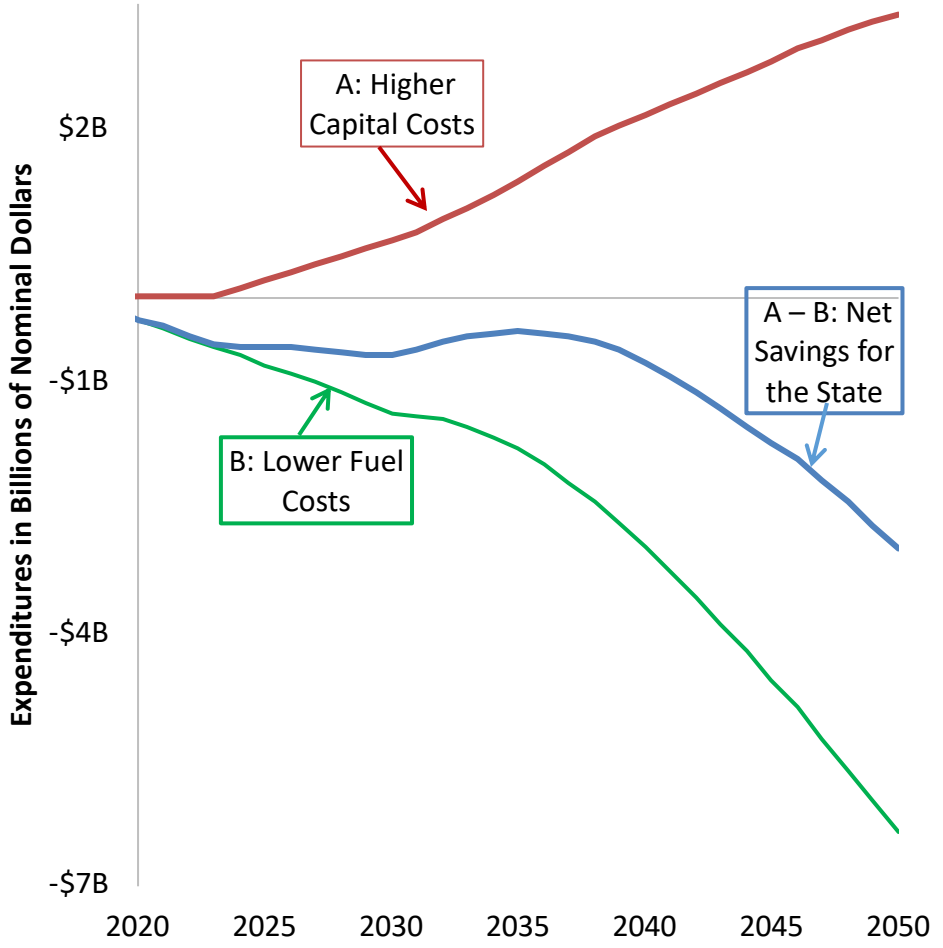


Modeling documentation in Appendix F

Analysis Tools: Economic Impacts

REMI model, run by Towson's Regional Economic Studies Institute

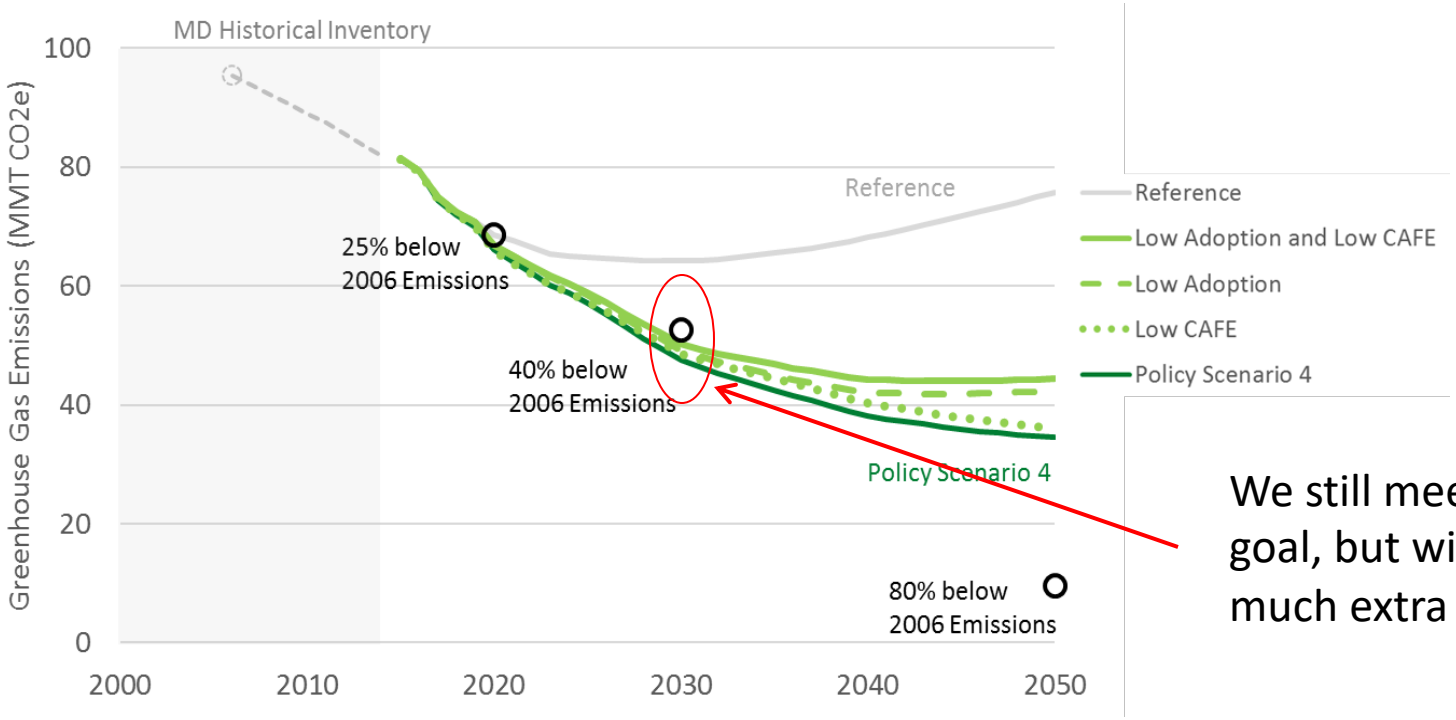
- Captures effect on Maryland's economy from:
  - Up-front capital costs from programs and measures;
  - The savings enjoyed by consumers and businesses from energy efficiency, EVs, and other clean energy measures;
  - Transportation and clean energy infrastructure projects; and
  - Improvements in public health.



Modeling documentation in Appendix G

Sensitivity Analyses

- What if:
  - The Federal government rolls back vehicle standards?
  - Consumer adoption of EVs is half of what we modeled?
  - Consumer adoption of efficient appliances is half of what we modeled?
  - All of those things happen at once?



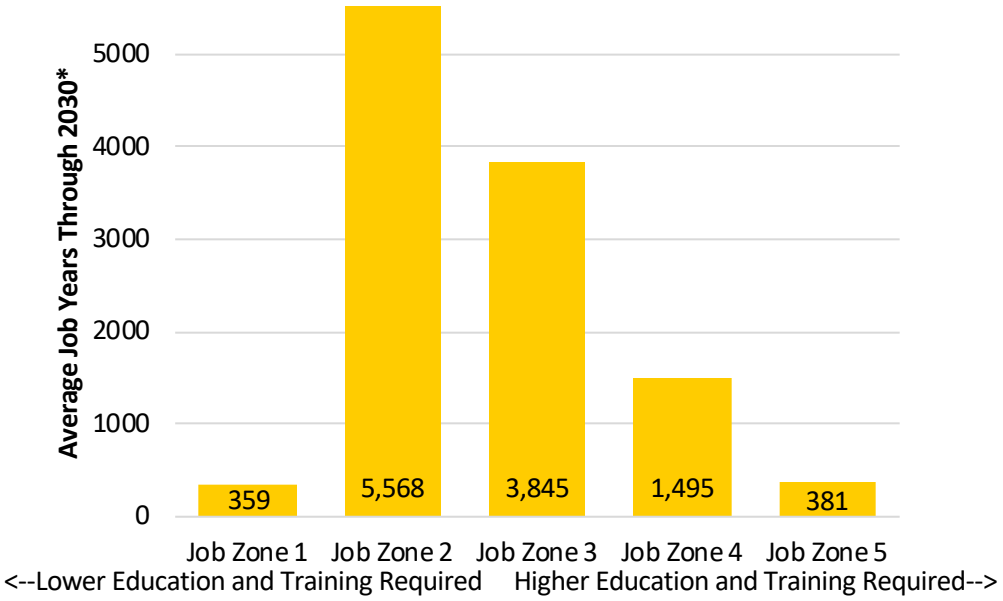
We still meet the 2030 goal, but without as much extra reduction.

Equity in the *2019 GGRA Draft Plan*

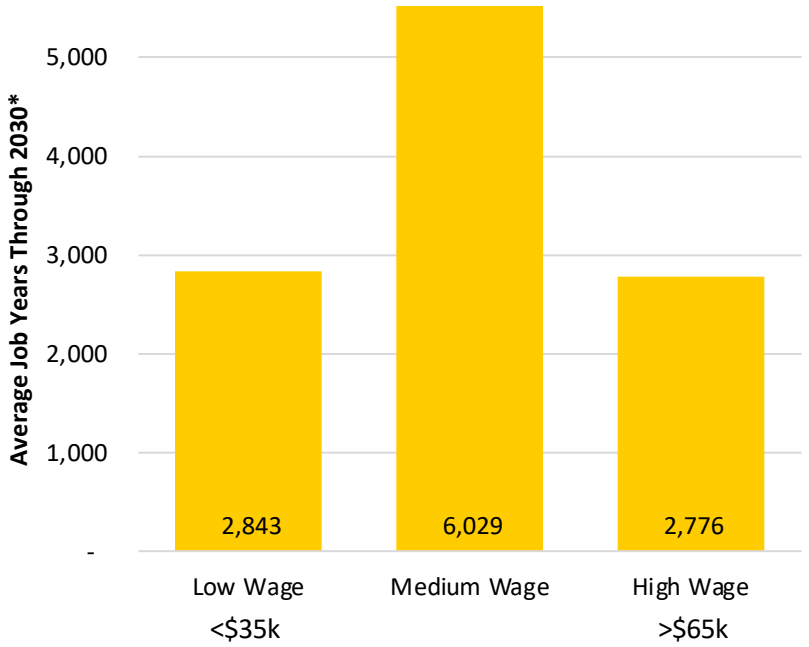
- Full Chapter in the Draft Plan addressing social equity
- MDE, MDH, and DNR have all participated in multiple meetings with overburdened communities throughout 2017 and 2018.
  - MDE's meetings have focused on mitigation strategies while DNR and MDH have addressed resiliency, and the public health implications of climate change.
- Draft Plan includes multiple efforts that help these communities. Examples include:
  - Low income ratepayer relief through RGGI, MEA and DHCD programs that provide low income support for energy efficiency and renewable energy, and more

Modeling and Analysis of Equity Issues

- Projected job creation mostly in professions requiring some education, but not advanced degrees.



- Projected job creation mostly in middle-income professions



Draft Plan also breaks down impacts by geography, industry, and ethnicity.

Just Transition

- The Draft Plan includes a Just Transition report:
  - Inventories fossil fuel-dependent jobs throughout Maryland
  - Identifies transition opportunities for dependent job categories that have:
    1. Similar skill sets
    2. Expected future growth
  - Estimates fiscal impact from fossil fuel dependent firm closures

Just Transition analysis in Appendix I

Adaptation and Resiliency

- Climate change impacts are already being felt in some places in Maryland, and include:
  - Increased risk for extreme events such as drought, storms, flooding, and forest fires;
  - More heat-related stress;
  - The spread of existing or new vector-borne disease or shifts in public health challenges due to climate-driven stressors; and
  - Increased erosion and inundation of low-lying areas along the state's shoreline and coast.

- Climate change raises the stakes in managing these problems by changing their frequency, intensity, extent, and magnitude.

Adaptation and Resiliency

- Climate change adaptation is an extremely complex process and there is no single means of response.

- Maryland is taking major action to address a wide range of climate impacts to multiple sectors. Programs are being implemented to address issues in the following areas:
  - Bay and aquatic environments;
  - Agriculture;
  - Human health;
  - Water resources;
  - Population growth;
  - Infrastructure;
  - Forest and terrestrial ecosystems; and
  - Coastal zone.

Conclusions

- ***The 2019 GGRA Draft Plan is both ambitious and comprehensive.***
  - Includes over 100 important large and small initiatives to reduce GHG emissions in Maryland.

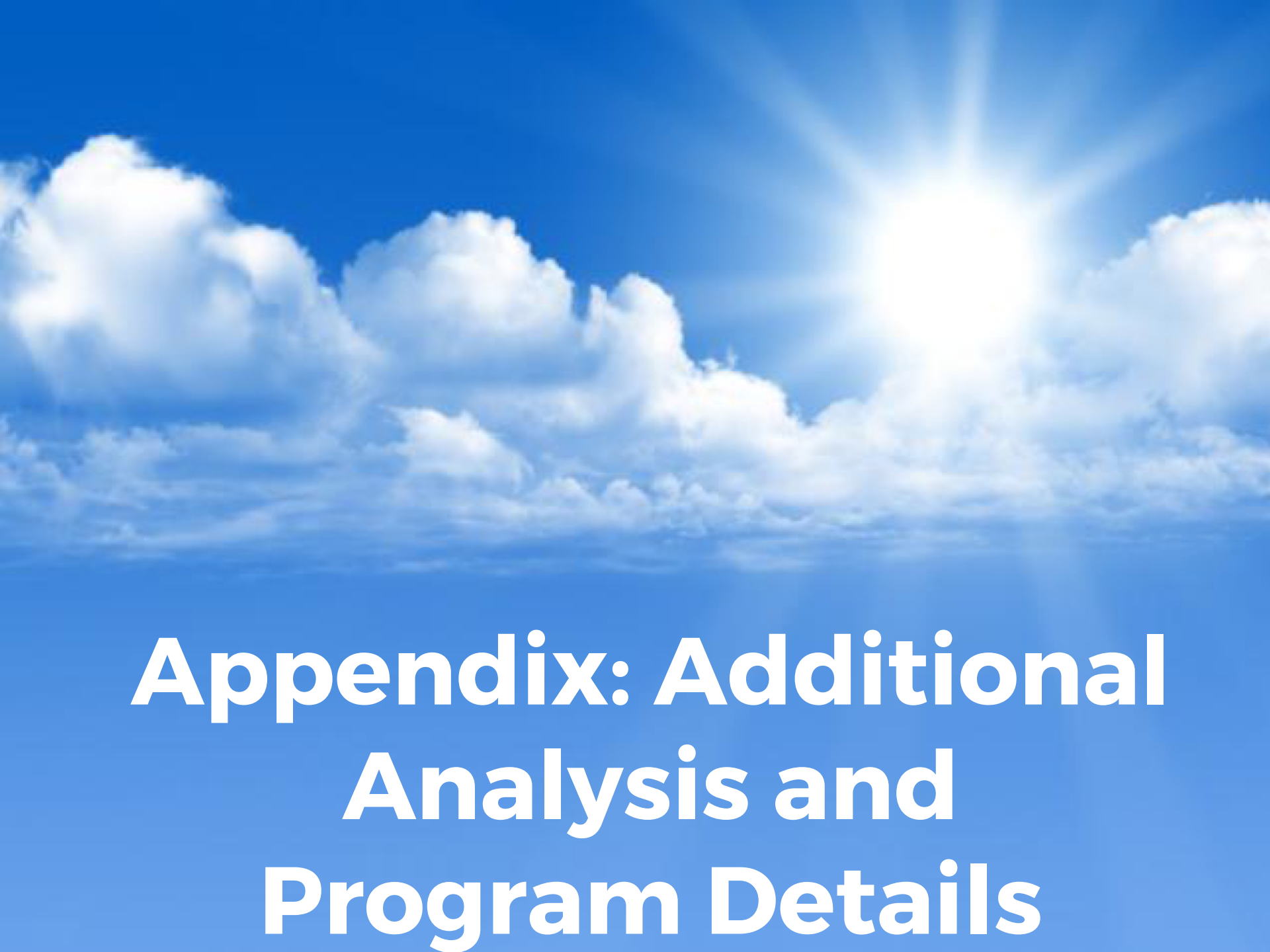
- When fully implemented, the *2019 GGRA Draft Plan* will:
  - Achieve **more than the 40 percent** by 2030 emissions reduction required by the GGRA of 2016 law;
  - Have a positive impact on Maryland's economy;
  - Create and maintain new jobs; and
  - Help Maryland protect public health and meet Chesapeake Bay and air quality goals.

Conclusions

- Progress made through implementation of the *2019 GGRA Draft Plan* will position the State to achieve longer term goals like reducing GHG emissions between **80 percent** and **95 percent** from 1990 levels by 2050.

- The State aims to incorporate:
  - Traditional strategies (e.g., energy and transportation), and
  - Non-traditional strategies (e.g., partnerships, healthy soils).

- ***When combined with proposals for several bold new programs like CARES and TCI, the 2019 GGRA Draft Plan will result in great success for Maryland.***



Appendix: Additional Analysis and Program Details

Meeting Longer-Term Goals (2040, 2050 and Beyond)

- GGRA requires incremental emission reduction steps intended to demonstrate progress towards a much deeper long-term goal.
  - 25% by 2020, 40% by 2030
  - Also includes non-binding aspirational goals of **80 percent** to **95 percent** GHG reduction in the 2050 time frame.
  - More recently, the concept of carbon neutrality has entered into the discussion of long-term goals.
    - Has become a major item of discussion between the state agencies implementing the GGRA and the MCCC.

- The Draft Plan includes many measures that will continue to reduce emissions beyond 2030. It also places the State in a good position to achieve even deeper reductions in the 2040 to 2050 time frame

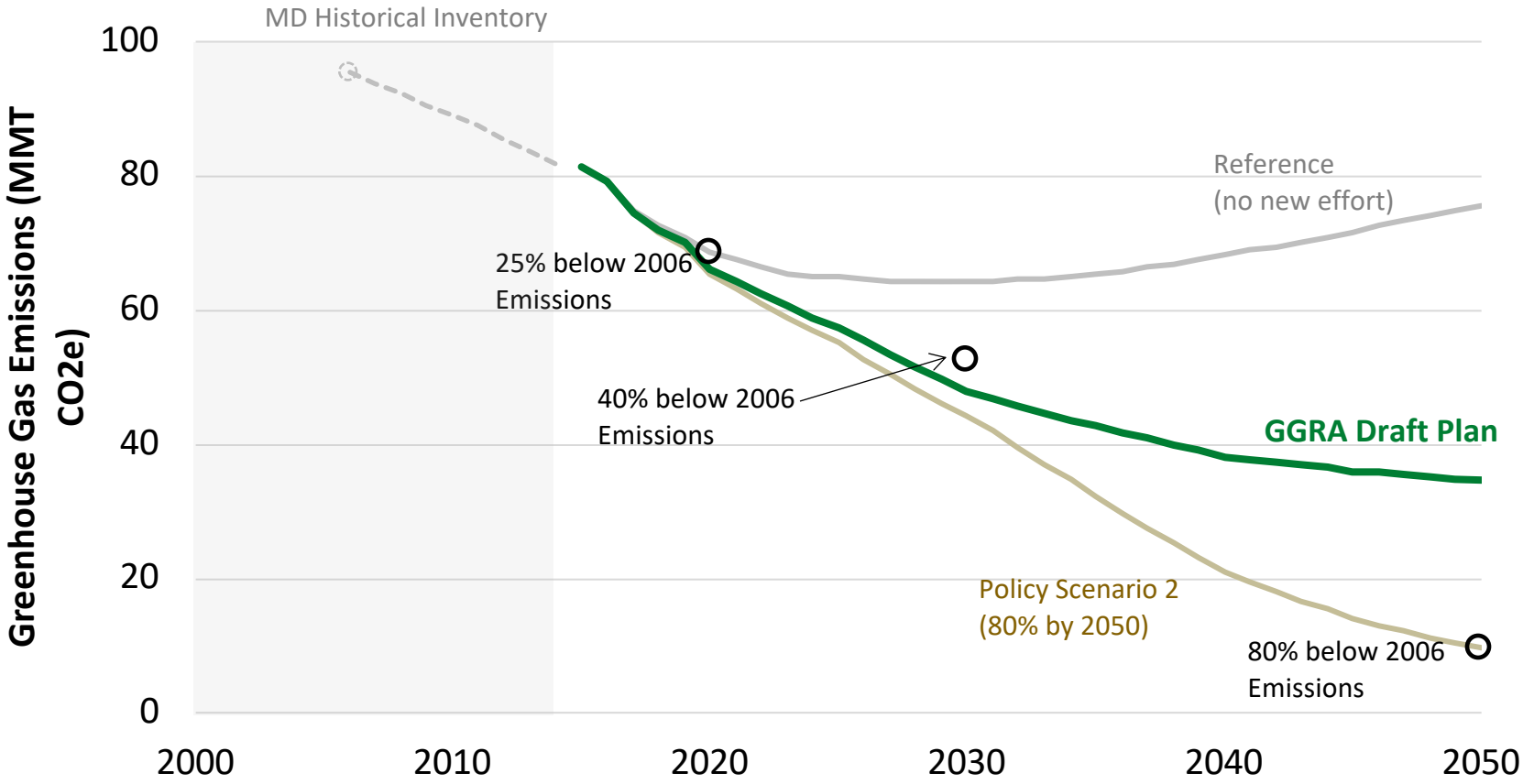
- The MDE modeling also included analyses of 2050 and identified strategies and technologies to continue to analyze as part of the States effort to achieve deeper reductions.

Other Key Issues for Meeting Longer-Term Goals

- Efforts to weaken climate change programs at the Federal level is a major concern
- Maryland is challenging the EPA over multiple efforts to weaken key federal rules.
- Over 20 areas where Maryland has initiated legal or administrative action … including
  - Clean cars and other vehicle rules, GHG reductions from the energy sector (CPP and ACE), methane and more
- The GGRA could be reauthorized again after December 31, 2023.
  - Almost certain that there will be a more in-depth discussion of long-term goals during reauthorization.
  - Possible that a post-2023 reauthorization of the GGRA could specifically establish deeper emission reduction goals for the 2040 to 2050 time frame.

Long Term Goals

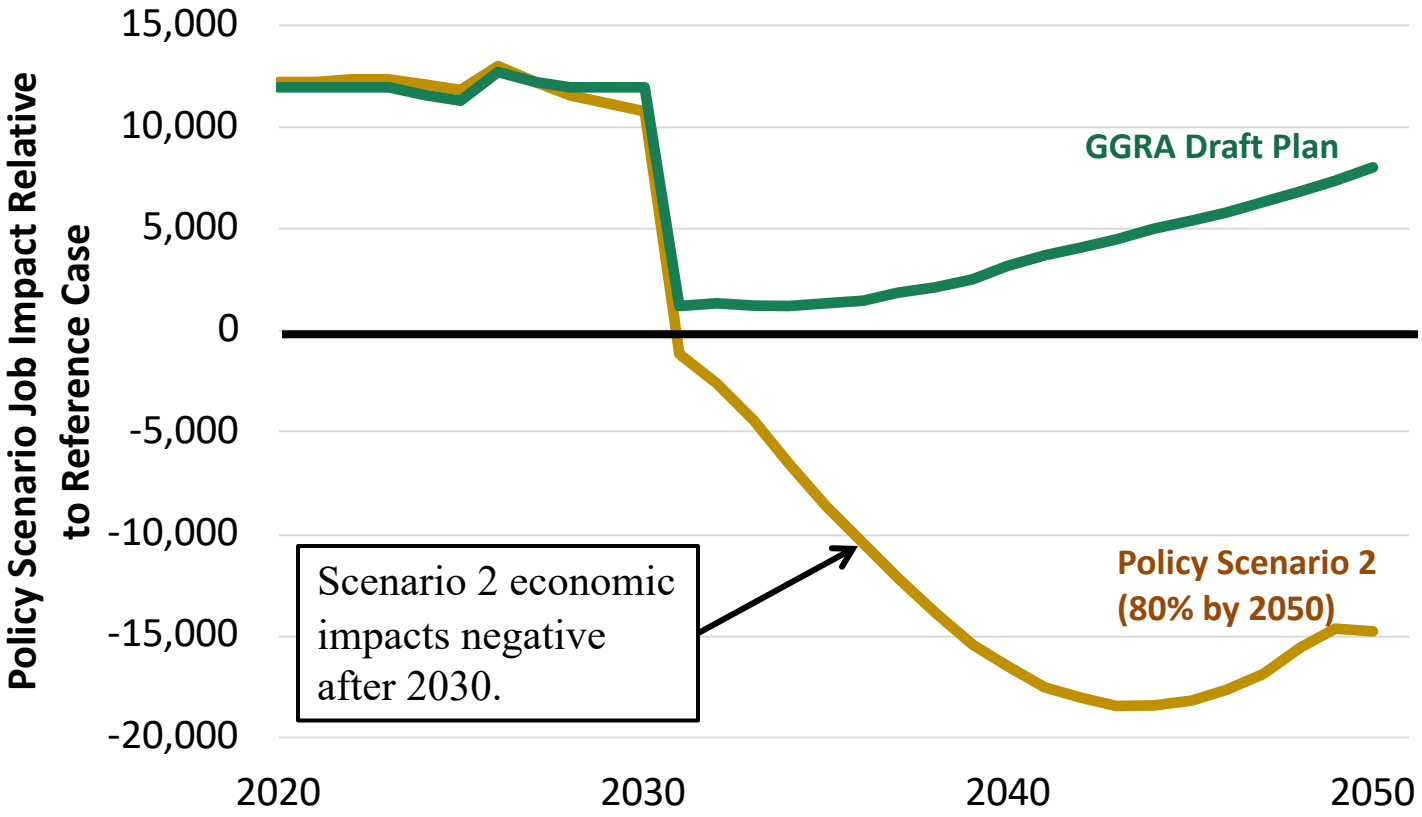
MDE analyzed a scenario that achieves 80% reduction by 2050 ("Scenario 2")



Important long-term measures included: renewable natural gas, other advanced biofuels, electric or other zero-emission heavy trucks and non-road vehicles.

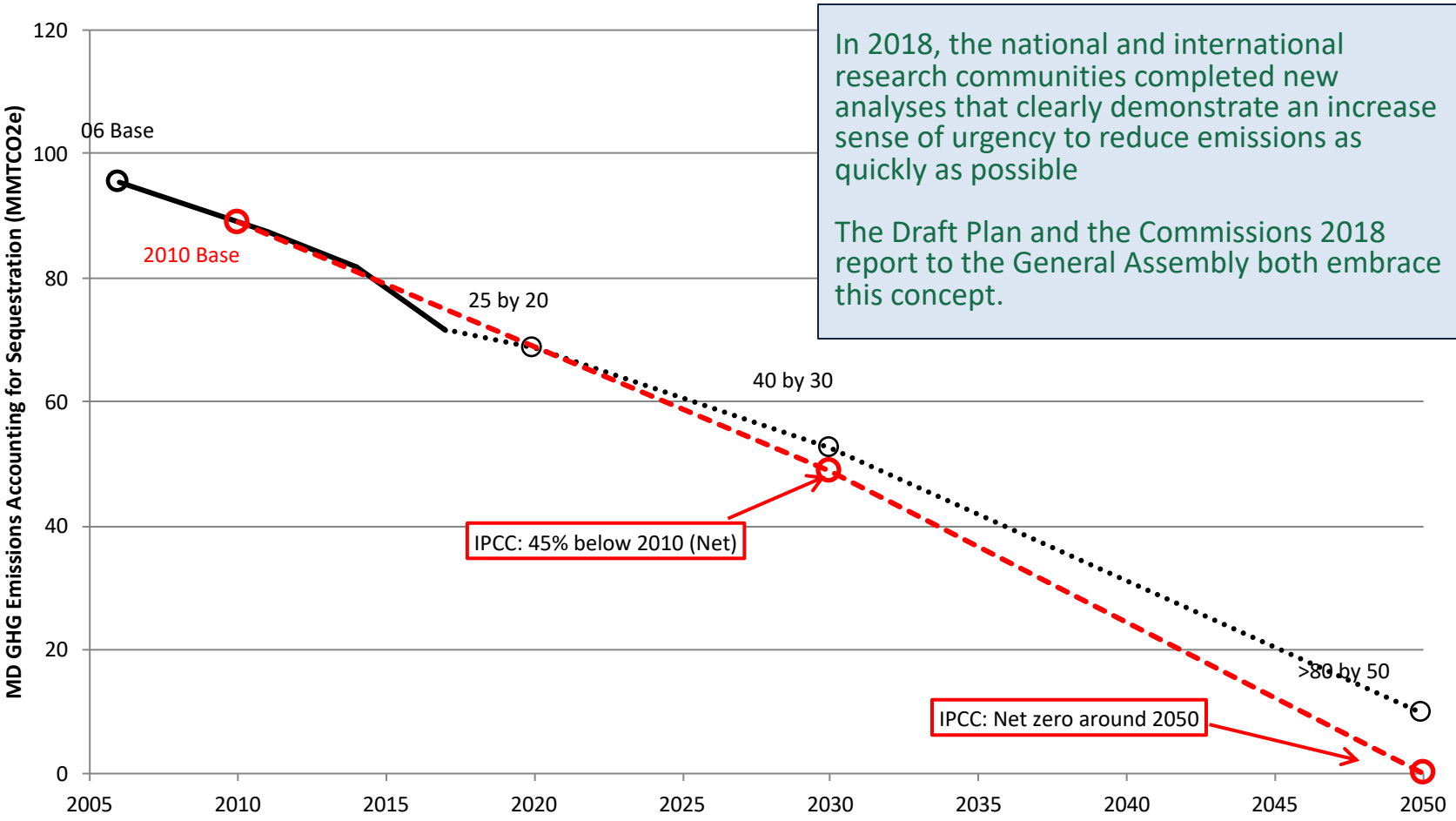
Long Term Challenges

Scenario 2 identified important long-term measures that should be re-evaluated as technologies mature, but are currently expensive.



These measures may be necessary for deeper reductions, and may be cost-effective when the time comes. In the meantime, the Draft Plan focuses on measures necessary for 2030.

An increased Sense of Urgency



In 2018, the national and international research communities completed new analyses that clearly demonstrate an increase sense of urgency to reduce emissions as quickly as possible

The Draft Plan and the Commissions 2018 report to the General Assembly both embrace this concept.

Recent findings from the IPCC, the National Climate Assessment, and UMD point to increasing urgency to reducing emissions, even beyond GGRA goals.

The Clean and Renewable Energy Standard (CARES)

- **100 percent Clean Electricity by 2040**
  - Requires that 100 percent of Maryland's electricity come from clean sources by 2040.
  - Among the most ambitious goals in the nation.

- ***A major component of the 2019 GGRA Draft Plan to reduce GHG emissions from electricity generation.***
  - Requires that an increasingly large share of Maryland's electricity be generated by zero- and low-carbon resources.
  - Will build upon the progress we've already made in cleaning up our electricity grid under RGGI … Builds from the Clean Energy Jobs Act
  - Steers clear of unacceptable impacts to farms, forests and watersheds

- **Market Based, Technology-Neutral … Focus on Home Grown Jobs**
  - Would adopt a technology-neutral approach to achieving 100 percent clean electricity at the lowest cost. Will foster greater competition among available renewable and clean energy resources
  - Would reduce costs for ratepayers.
  - Would focus on home grown energy and in-state job creation

Strengthened RGGI

- Under Maryland's leadership … in 2017 … RGGI was strengthened to achieve an additional 30 percent reduction in power plant emissions by 2030.

- MDE (as Chair of RGGI) also led deliberations to broaden participation in RGGI to include other states
  - New Jersey finalized regulations in July 2019 and will renew participation in Jan. 2020.
  - Virginia also finalized regulations, but are unable to participate in 2020 due to budget restrictions.
  - Just a few weeks ago, Pennsylvania's Governor Wolf announced their intent to join RGGI
  - Other states have taken important steps that could lead to future participation.

- Expanding the program to new participating states in the region will also reduce pollution from power plants supplying electricity into Maryland.

EmPOWER Maryland

- Each utility is responsible for procuring or providing programs in its service territory designed to meet the EmPOWER program goals.

- Initially established a goal to reduce per capita electricity consumption and peak demand by Maryland consumers by **15 percent** by 2015 from 2007 baseline.

- PSC directed utilities to ramp up electricity savings to **2 percent** of each company's gross retail sales baseline based on three-year cycles, through 2023.
  - General Assembly codified the energy savings goals and cost-effectiveness measurements in PSC Order No. 87082 in 2017.
  - Savings come from a variety of sources, including equipment-based measures, "smart meter" enabled analytics, and more efficient distribution grid hardware.

- The GGRA Draft Plan proposes that utility EmPOWER investments continue beyond 2023

State Building Efficiency

- On June 25, 2019, Governor Hogan issued an executive order establishing a new energy savings goal for State government. (EO 01.01.2019.08)
- DGS, in cooperation with MEA is to manage a "Maryland Leads by Example" energy savings initiative that will oversee reducing, by the year 2029, the energy use of State-owned buildings by 10 percent compared to a 2018 baseline.
- EO outlines five specific tasks
  - These tasks include an overall inventory, energy audits, energy reduction measurement, progress reports and multi-agency collaboration on designing and implementing additional cost-effective energy saving programs

Clean Cars and Zero Emission Vehicle (ZEV) Mandate

- The Maryland Clean Cars Act of 2007 required MDE to adopt regulations implementing California's stricter vehicle emission standards.
  - First motor vehicle program to directly regulate CO_2 emissions.
  - Includes a Zero Emissions Vehicle (ZEV) mandate.

- California has since developed stricter tailpipe and GHG standards referred to as Cal LEV III.
  - Adopted by Maryland in 2012.
  - LEVIII Program will reduce GHG emissions from vehicles by **34 percent** when fully implemented in 2025.
  - LEVIII Program also strengthens the ZEV mandate, increasing the requirements beginning in 2018.

- California working on even more stringent standards

- Will discuss Maryland challenges to federal rollbacks later in this presentation

Clean Cars and Zero Emission Vehicle (ZEV) Mandate - Continued

- The ZEV mandate is a critical technology forcing component of the Clean Car Program.

- ***Maryland continues to be a national leader in supporting the LEVIII Program by:***
  - Deploying ZEVs;
  - Supporting legislation and initiatives to remove barriers
  - Developing EV charging infrastructure; and
  - Providing incentives in support of these vehicles.

- ***The Clean Cars Acts of 2017 and 2019 are examples of Maryland's commitment.***

- California is in the early stages of developing a regulatory update to the Clean Cars Program.
  - Will strengthen the GHG standards beyond 2025.
  - Maryland will continue to work with California and ?? other states that have adopted the California Car Program.

Public Transit Expansion

- Maryland continues to devote record levels of funding for public transportation.
  - Public transportation emits roughly 40 to 50 percent less GHG emissions per passenger mile than an average single occupancy vehicle.
- Programs in this policy category include transit initiatives that support goals of:
  - Increasing public transit ridership.
  - Increasing intercity transportation initiatives that support Maryland Area Regional Commuter and regional and national passenger rail services such as Amtrak.
- By providing alternatives to vehicle transit, these initiatives have the potential to reduce vehicle miles traveled (VMT) and GHG emissions.
- Public transportation strategies are broadly classified into two strategy groups:
  - Transition to cleaner and efficient public transportation fleets, and
  - Expansion of public transportation or intercity passenger service (new or increased capacity, improved operations).

Transportation and Climate Initiative (TCI)

- TCI is a regional effort of Maryland and 11 other Northeast and mid-Atlantic states and Washington, D.C.

- TCI is designed to:
  - Reduce GHG emissions in the region's transportation sector;
  - Minimize the transportation system's reliance on high-carbon fuels;
  - Promote sustainable growth to address the challenges of VMT; and
  - Help build the clean energy economy across the region.

- TCI will also drive investment in clean transportation infrastructure, and encourage widespread use of EVs powered by increasingly clean electricity.

- TCI is looking to apply the proven "carbon cap-and-invest" model to transportation emissions. Framework for a draft regional policy proposal released on October 1, 2019

- Maryland specific stakeholder meetings are being planned

Transportation Investments Modeling

Funded Strategies	2030 Impacts			
Strategy	**Approx. Reductions (MMT CO2e)**	**VMT Reduction**	**Fuel reduction (g gasoline)**	**Fuel reduction (g diesel)**
2018 MPO Plans & Programs yield lower annual VMT growth (1.4%/yr)	**1.06**	3,158,758,638	-	-
On-Road Technology (CHART, Traveler Information)	**0.163**	-	16,165,665	1,326,297
Freight and Freight Rail Programs (National Gateway and MTA rail projects including new locomotive technologies)	**0.072**	26,431,915	-	-
Public Transportation (new capacity, improved operations/ frequency, BRT)	**0.033**	84,137,696	-	-
Public Transportation (fleet replacement / technology)	**0.024**	-	-	2,367,995
Transportation Demand Management	**0.142**	486,499,923	-	-
Pricing Initiatives (Electronic Tolling)	**0.018**	-	2,241,454	209,554
Bicycle and Pedestrian Strategies (Provision of non-motorized infrastructure including sidewalks and bike lanes)	**0.004**	79,504,966	-	-
Land-Use and Location Efficiency	**0.318**	979,733,809	-	-
Drayage Track Replacements	**0.005**	-	-	590,523
BWI Airport parking shuttle bus replacements	**0.001**	-	-	150,000

Transportation Investments Modeling

Emerging Strategies		2030 Impacts		
Strategy	**Approx. Reductions (MMT CO2e)**	**VMT Reduction**	**Fuel reduction (g gasoline)**	**Fuel reduction (g diesel)**
Freeway Management/Integrated Corridor Management (I-270 example, SHA I-95/MD 295 pilot)	**0.052**		5,209,998	427,449
Arterial System Operations and Management (expanded signal coordination, extend CHART coverage)	**0.049**		5,546,896	402,247
Limited Access System Operations and Management (other management technologies including ramp metering)	**0.023**		2,319,544	190,305
Managed Lanes (Traffic Relief Plan Implementation)	**0.053**		5,231,211	429,189
Intermodal Freight Centers Access Improvement (Strategic Goods Movement Plan)	**0.017**			415,997
Commercial Vehicle Idle Reduction (Maryland's Idling Law)	**0.050**		1,676,878	137,578
Medium/Heavy Duty Vehicle Low-Carbon Fleet/Fueling Incentives and Programs (inc. dray trucks)	**0.005**			42,823
Eco-Driving (informal implementation underway)	**0.042**		4,136,469	339,373
Lead by example - Alternative Fuel Usage in State/Local Govt Fleet	**0.004**		10,301	374,635
Truck Stop Electrification	**0.007**			150,000
Transit capacity/service expansion (fiscally unconstrained)	**0.069**	251,126,400		
Expanded TDM strategies (dynamic), telecommute, non-work strategies	**0.314**	1,142,326,291		
Expanded bike/pedestrian system development	**0.081**	293,542,659		
Freight Rail Capacity Constraints/Access (Howard St. Tunnel)	**0.072**	46,253,740		
MARC Growth and Investment Plan / Cornerstone Plan completion	**0.052**	206,630,615		

Transportation Investments Modeling

Innovative Strategies	2030 Impacts			
Strategy	**Approx. Reductions (MMT CO2e)**	**VMT Reduction**	**Fuel reduction (g gasoline)**	**Fuel reduction (g diesel)**
Autonomous/Connected Vehicle Technologies (Transit/Passenger/Freight Fleet)	**0.647**		72,765,759	5,276,787
Speed Management on Freeways (increased levels of enforcement)	**0.083**		9,353,658	678,303
Zero-Emission Trucks/Truck Corridors	**0.059**			482,152
Ridehailing / Mobility as a Service (MaaS)	**0.256**	995,937,400		
Pay-As-You-Drive (PAYD) Insurance	**0.062**	223,902,645		
Freight Villages/Urban Freight Consolidation Centers	**0.023**			186,396

Enhanced Forest Management

- Maryland forests on both public and private lands are managed to capture carbon through sustainable forest management practices.

- Enrolling unmanaged forests into management regimes will:
  - Increase rates of carbon sequestration in forest biomass;
  - Increase amounts of carbon stored in harvested, durable wood products; and
  - Result in economic benefits and increased availability of renewable biomass for energy production.

- Goals are to:
  - Improve sustainable forest management on approximately 30,000 acres of private land annually;
  - Ensure third-party certified sustainable forest management on approximately 200,000 acres of State Forests;
  - Support forest markets that keep land in forest use; and
  - Provide sustainable management for multiple benefits on other DNR lands when possible.

Enhanced Healthy Soils Incentives

- Agronomic and conservation practices used by Maryland's farmers have the potential to:
  - Sequester carbon and other GHG emissions.
  - Reduce nutrient and sediment flows into the Chesapeake Bay and it's tributaries.
- The 2017 Healthy Soils Act charged MDA to develop a healthy soils program to improve the health, yield, and profitability of Maryland's soils.
  - Also promote the further adoption of conservation practices that foster soil health while increasing sequestration capacity.
- MDA collaborated with stakeholders from the Healthy Soils Consortium to identify practices that are most effective in improving soil health and building soil carbon stocks.
- Just last week, the Soil Health Advisory Committee was announced
- This group will help to determine the metrics and tools used to:
  - Quantify soil carbon;
  - Provide incentives to encourage the additional implementation of climate-friendly soil practices; and
  - Find ways to capitalize on co-benefits for both water quality and carbon sequestration.

Hydrofluorocarbon (HFC) Regulation

- The Clean Air Act requires use of alternatives to stratospheric ozone-depleting substances. HFCs are among most common alternatives.
- HFCs are extremely potent GHG emissions.
  - 1 pound of certain HFCs is potentially as potent as 1,400 pounds of CO_2.
- After efforts have stalled at the federal level, states have begun their own phase out initiatives.
  - MDE will develop regulations similar to those being developed by other U.S. Climate Alliance states … California, Delaware, New York, Massachusetts, Connecticut, and other states.
  - Would phase out the use of certain HFCs in multiple end uses.
  - Supported by private sector and environmental advocates
- Maryland regulations going to Air Quality Advisory Council on December 16th

Methane Regulations

- MDE is working on programs to reduce methane leakage from natural gas compressor stations and related infrastructure, landfills, waste water treatment plants and the natural gas distribution system
  - Transmission and Storage sector regulations expected to be presented to the Maryland Air Quality Advisory Council on December 16th
- Coordinating with U.S. Climate Alliance states
- Also working with University of Maryland researchers to use recent research to enhance inventories
- MDE initial analysis of “upstream” methane emissions associated with natural gas use in Maryland posted on the MDE/Climate Commission web site

Maybe not “Core Programs” But Still Important

- The Draft Plan includes numerous “non-traditional” emission reduction programs. Some through partnerships, some through voluntary and outreach efforts. Examples include:
  - The Climate Champions initiative
  - The Climate Ambassadors effort
  - The U.S. Climate Alliance partnership
  - Partnerships with local government
  - Idle Free MD
  - The Port Partnership
  - The VW Mitigation Plan
  - More
- Many will help reduce emissions
  - None used as reduction in the Draft Plan for now.

Core Programs

PROGRAM I.D.	PROGRAM NAME	LEAD AGENCY
4.3.1	**EmPOWER Maryland**	MEA
4.3.1.1	EmPOWER Maryland: Utility Responsibility	MEA
4.3.1.2	EmPOWER Maryland: Combined Heat and Power	MEA/MDE
4.3.1.3	Other Energy Efficiency Efforts	MEA
4.3.2	**The Maryland Renewable Energy Portfolio Standard (RPS)**	MEA
4.3.2.1	Fuel Switching	MDE
4.3.2.2	Incentives and Grant Programs to Support Renewable Energy	MEA
4.3.2.3	Offshore Wind Initiatives to Support Renewable Energy	MEA
4.3.3	**The Regional Greenhouse Gas Initiative (RGGI)**	MDE
4.3.4	**Other Energy Programs**	-
4.3.4.1	GHG Power Plant Emission Reductions from Federal Programs	MDE
4.3.4.1.1	Boiler Maximum Achievable Control Technology (MACT)	MDE
4.3.4.1.2	GHG New Source Performance Standard	MDE
4.3.4.1.3	GHG Prevention of Significant Deterioration Permitting Program	MDE
4.3.4.2	Energy Financing for Housing and Communities (formerly Main Street Initiatives)	DHCD
4.3.4.3	Energy Efficiency for Affordable Housing and Limited Income Families (formerly Energy Efficiency for Affordable Housing)	DHCD
4.3.5	**Transportation Technologies**	MDE/MDOT/MEA

Core Programs - Continued

PROGRAM I.D.	PROGRAM NAME	LEAD AGENCY
4.3.6	**Multimodal Freight**	MDOT
4.3.7	**Public Transportation**	MDOT
4.3.8	**Pricing Initiatives**	MDOT
4.3.9	**Bicycle and Pedestrian Initiatives**	MDOT
4.3.10	**Forestry and Sequestration**	-
4.3.10.1	Managing Forests to Capture Carbon	DNR
4.3.10.2	Planting Forests in Maryland	DNR
4.3.10.3	Creating and Protecting Wetlands and Waterway Borders to Capture Carbon	DNR
4.3.10.4	Biomass for Energy Production	DNR
4.3.10.5	Conservation of Agricultural Land for GHG Benefits	MDA
4.3.10.6	Increasing Urban Trees to Capture Carbon	DNR
4.3.10.7	Geological Opportunities to Store Carbon	DNR
4.3.10.8	The Maryland Healthy Soils Program	MDA
4.3.11	**Ecosystems Markets**	-
4.3.11.1	Creating Ecosystems Markets to Encourage GHG Emission Reductions	DNR
4.3.11.2	Nutrient Trading for GHG Benefits	MDA/MDE
4.3.12	**Building and Trade Codes in Maryland**	Dept. of Labor

Core Programs - Continued

PROGRAM I.D.	PROGRAM NAME	LEAD AGENCY
4.3.13	**Sustainable Materials Management**	MDE
4.3.14	**Maryland's Innovative Initiatives**	-
4.3.14.1	Voluntary Stationary Source Reductions	MDE
4.3.14.2	Buy Local for GHG Benefits	MDA
4.3.14.3	Pay-As-You-Drive® Insurance in Maryland	MIA
4.3.14.4	Job Creating and Economic Development Initiatives Related to Climate Change	COMMERCE
4.3.15	**Land Use Programs**	MDP
4.3.15.1	Reducing Emissions through Smart Growth and Land Use/Location Efficiency	MDP
4.3.15.2	Priority Funding Area (Growth Boundary) Related Benefits	MDP
4.3.16	**Outreach and Public Education**	MDE
4.3.17	**Federal Measures**	MDE

Recommended New Programs

PROGRAM I.D.	PROGRAM NAME	LEAD AGENCY
4.4.1	Maryland Clean and Renewable Energy Standard (CARES) Act of 2020	MDE/MEA
4.4.2	The Transportation and Climate Initiative (TCI) Cap and Invest	MDE/ MDOT/ MEA
4.4.3	In-State Methane Minimization	MDE
4.4.4	RGGI Expansion	MDE
4.4.5	Hydrofluorocarbons (HFCs)	MDE

Voluntary and Non-Traditional Programs

PROGRAM I.D.	PROGRAM NAME	LEAD AGENCY
4.5.1	The United States Climate Alliance	MDE
4.5.2	Zero Emission Vehicle (ZEV) MOU Partnership	MDE
4.5.3	Leadership-By-Example – State of Maryland Initiatives	DGS
4.5.4	Leadership-By-Example – State	MDE/DGS
4.5.5	Leadership-By-Example – Federal	MDE
4.5.6	Leadership-By-Example – Local Government	MDE
4.5.7	Leadership-By-Example – Universities and Colleges	MDE
4.5.8	The Climate Champions Program	MDE
4.5.9	Idle Free Maryland	MDE
4.5.10	The Port Partnership	MDE/MDOT
4.5.11	The Volkswagen Mitigation Fund	MDE
4.5.12	The Metropolitan Washington Council of Government's Climate Energy and Environmental Policy Committee (CEEPC)	MDE

Outreach Efforts to Build Public Awareness and Promote Voluntary Action

PROGRAM I.D.	PROGRAM NAME	LEAD AGENCY
4.6.1	Education, Communication, and Outreach Working Group	MDE
4.6.1	DHMH, DNR and MDE Outreach to Overburdened Communities	DHMH, DNR and MDE
4.6.2	Climate Ambassadors	MDE
4.6.3	Climate Champions	MDE

DGS State Building Efficiency Executive Order (EO 01.01.2019.08)

- **Task 1** - Analyze the entire inventory of State-owned buildings in order to identify and prioritize the least energy efficient buildings in the State on an annual basis.

- **Task 2** - Every year, a minimum of **2 million** square feet of the least efficient buildings will undergo a DGS energy audit to identify low cost measures with a five-year or less payback period.

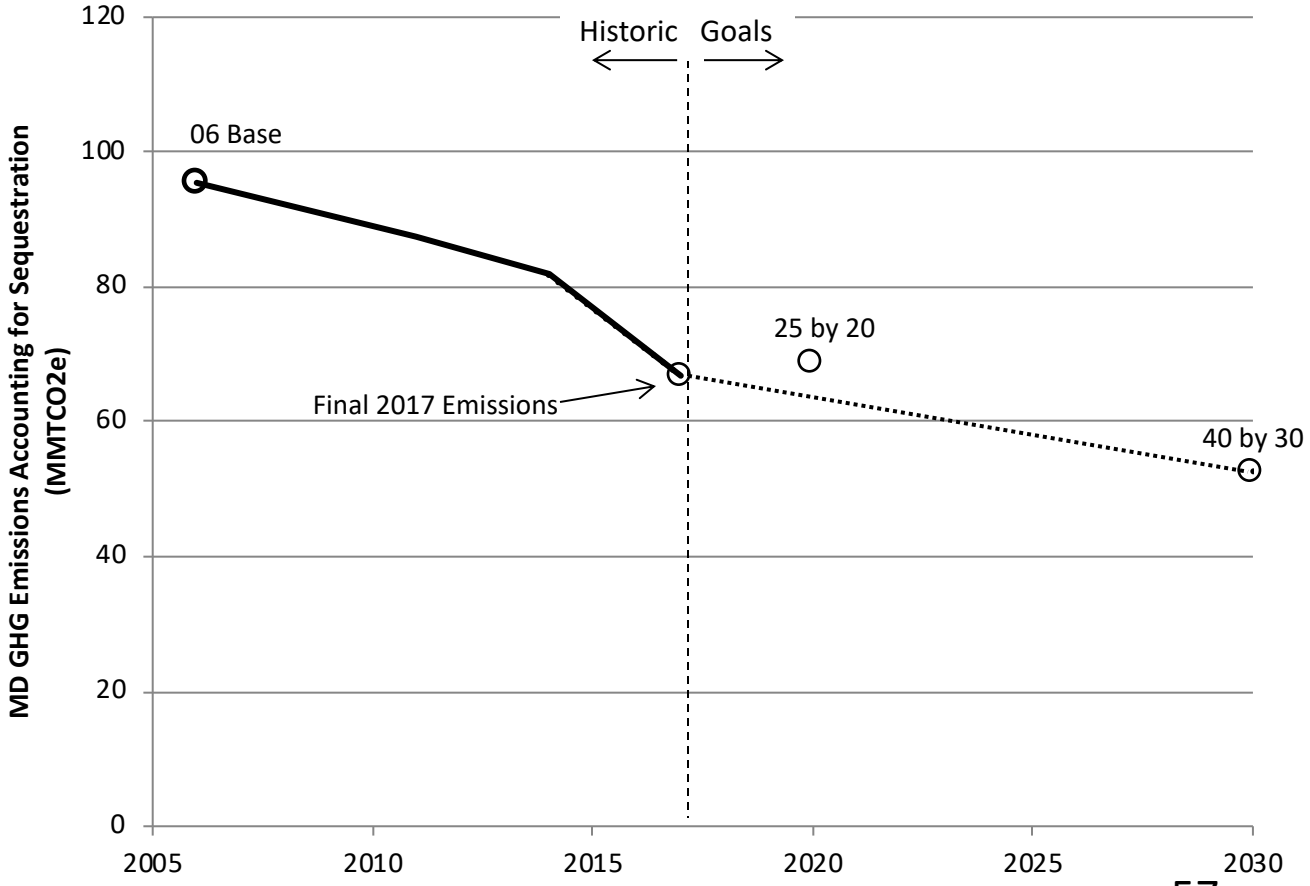
- **Task 3** - Measure post-installation energy use for one year following the installation of these measures.

- **Task 4** - Report Progress toward the **10 percent** savings goal to the Governor annually each fiscal year.

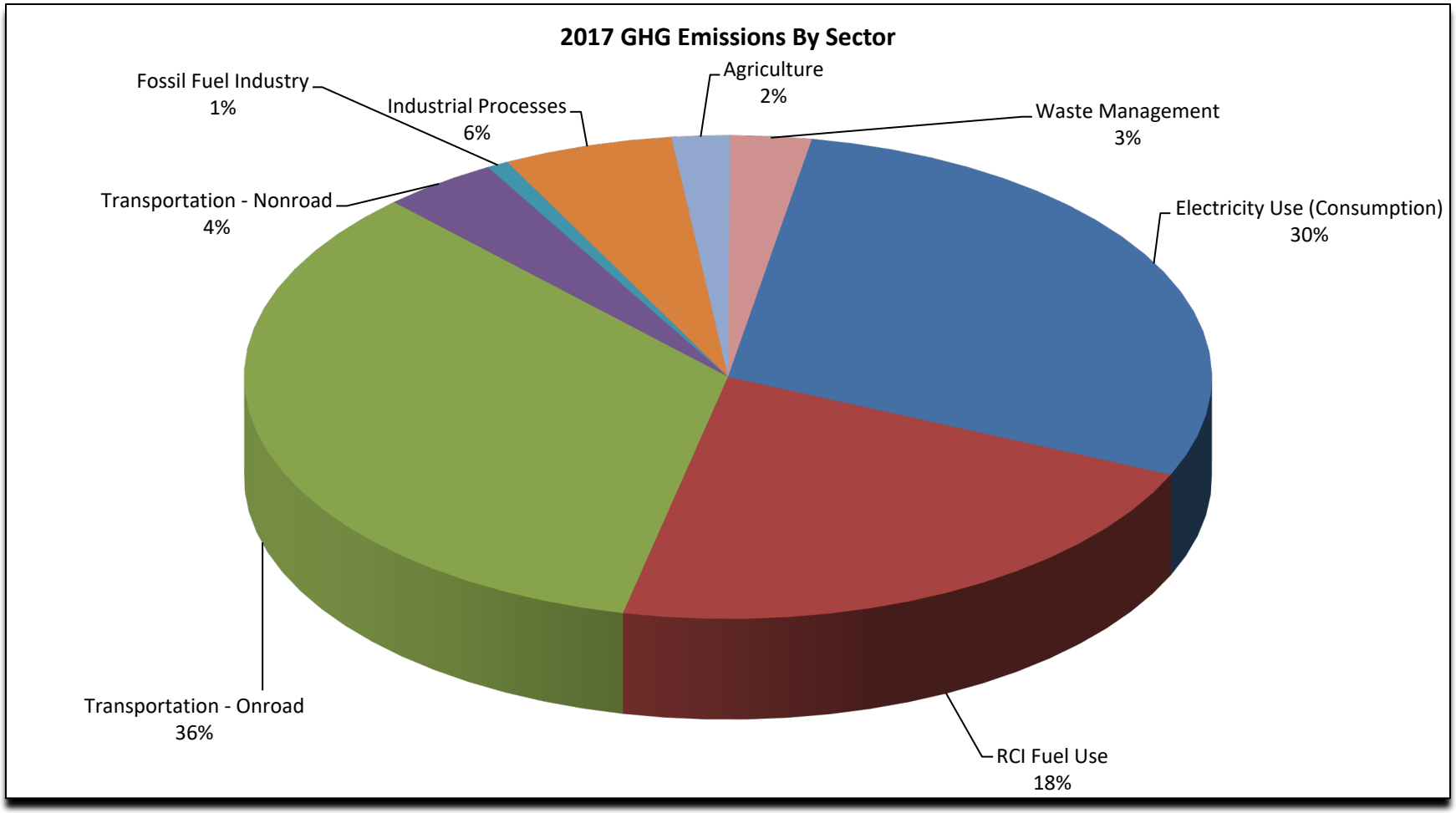
- **Task 5** - DGS, MEA, DBM, and DoIT shall collaborate on designing and implementing additional cost-effective and -efficient energy saving programs that may include any combination of technology adoption, management protocols, information technology solutions, and staff education and engagement.

2017 GHG Emissions Inventory

The 2017 inventory shows emissions below the 2020 goal.
BUT: We had favorable weather, so need to keep making progress to ensure we meet it in 2020.



2017 GHG Emissions Inventory



Maryland's 2017 Gross GHG Emissions by Sector.

Largest Contributing Emission Sectors

- The principal sources of GHG emissions in Maryland are:
  - Electricity consumption
    - **30 percent** of Maryland's gross GHG emissions in 2017;
  - Transportation
    - **40 percent** of Maryland's gross GHG emissions in 2017;
  - Residential, commercial, and industrial (RCI) fossil fuel use
    - **18 percent** of Maryland's gross GHG emissions in 2017.