



COMMONWEALTH of VIRGINIA  
*Office of the*  
SECRETARY of TRANSPORTATION

## Climate Change and Transportation

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# Climate Change: Background

- **There is widespread agreement from authoritative sources that:**
  - The global climate is becoming warmer
  - Global warming is caused in large part by emissions from cars, power plants and other manmade sources
  - If left unchecked, global warming will cause severe and lasting impacts
- **Intergovernmental Panel on Climate Change (IPCC)**
  - Established in 1988 by United Nations to synthesize the latest research on climate change
  - ***“Fourth Assessment Report: Summary for Policy Makers”*** issued November 2007 concluded global warming **“unequivocal”**
    - Temperatures for 11 or 12 years between 1995 and 2006 warmest since 1850
    - Sea levels have risen
    - Arctic Sea ice has shrunk
  - **The IPCC’s conclusions are widely accepted as consensus opinion of scientific community**

# Climate Change: Background

- **PEW Center on Global Climate Change - A non-profit, nonpartisan, independent organization that conducts research on issues related to climate change**
  - ***“Climate Change 101: Overview”***
    - Temperatures will rise by as much as 10 degrees Fahrenheit by the end of this century
    - To avoid the worst effects of climate change, emissions of green house gases (GHG) need to be reduced 50 to 80 percent by 2050
      - The Group of Eight (G-8) countries recently agreed to adopt 50% goal
- **Transportation Research Board (TRB) - A private, nonprofit institution that is a unit of the National Academies**
  - The greatest impact of climate change will be flooding of transportation facilities because of global rise in sea level coupled with storm surge
  - Transportation professionals should incorporate challenges of climate change into planning, design, etc. of transportation systems
  - Every mode of transportation will be affected

# Climate Change: Background

- **AASTO – 2007 Publication, “A New Vision for the 21<sup>st</sup> Century”**
  - “Global climate change has become a political, economic and environmental fact of life”
  - **Transportation policies are needed to reduce dependence on oil, reduce energy consumption and reduce travel demand**
  - **Actions supported**
    - Reduce oil consumption by 20 percent in 10 years
    - Double fuel efficiency of entire fleet by 2030
    - Double transit rider-ship by 2030
    - Expand market share of passenger and freight moved by rail
    - Reduce percentage of commuters who drive to work to 1980 levels
    - Reduce VMT growth rate by 50%

# Climate Change: Background

- **Mckinsey & Company, December 2007 Report, “Reducing U.S. Green House Emissions: How Much At What Cost”**
  - Acknowledges concerns by scientists, policy makers and business leaders that a concerted effort is needed to address GHG emissions
  - Objective – Develop economically sensible approach to reducing GHG
  - **GHG projected to increase 35% between 2005 and 2030, key drivers:**
    - Expansion of the U.S. economy
    - Rapid growth in buildings-an-appliances and transportation sectors
    - Increased use of coal-fired power plants
  - **Conclusions**
    - U.S. can reduce GHG emissions 7 to 28 percent below 2005 levels by 2030 by using tested approaches and emerging technologies
    - Requires national and economy wide actions

# Climate Change: Background Impacts on the Transportation System

- **Increases in very hot days and heat waves**
  - Compromise pavement integrity
  - Deformation of rail lines, derailments, speed restrictions
  - Thermal expansion of bridge joints
  - Bridge operations and increased maintenance costs
- **Rising sea levels (7 to 23 inches by 2099) coupled with storm surges and land subsidence**
  - Increased flood of coastal roads and rail lines
  - Disruption of coastal waterways systems
- **Increases in intensity of strong hurricanes**

Source: TRB Report in Brief, *Potential Impacts of Climate Change on U.S. Transportation*

# Climate Change: Background

## Impact on Virginia

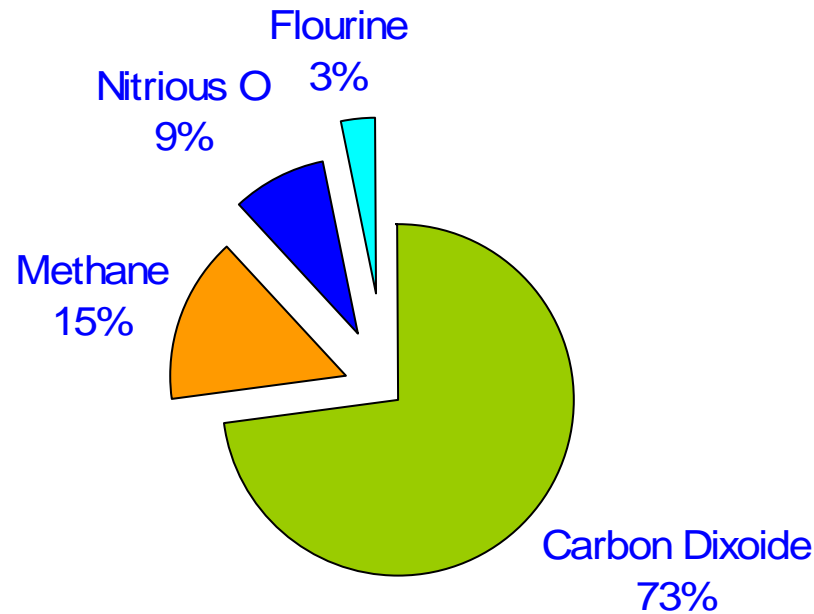
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- Carbon dioxide emissions rose 34 percent between 1990 and 2004
- The Chesapeake Bay is particularly susceptible to damage caused by climate change
- Changing rain and temperature patterns would disrupt agriculture and forestry

Source: Executive Order 59

# Climate Change: Background

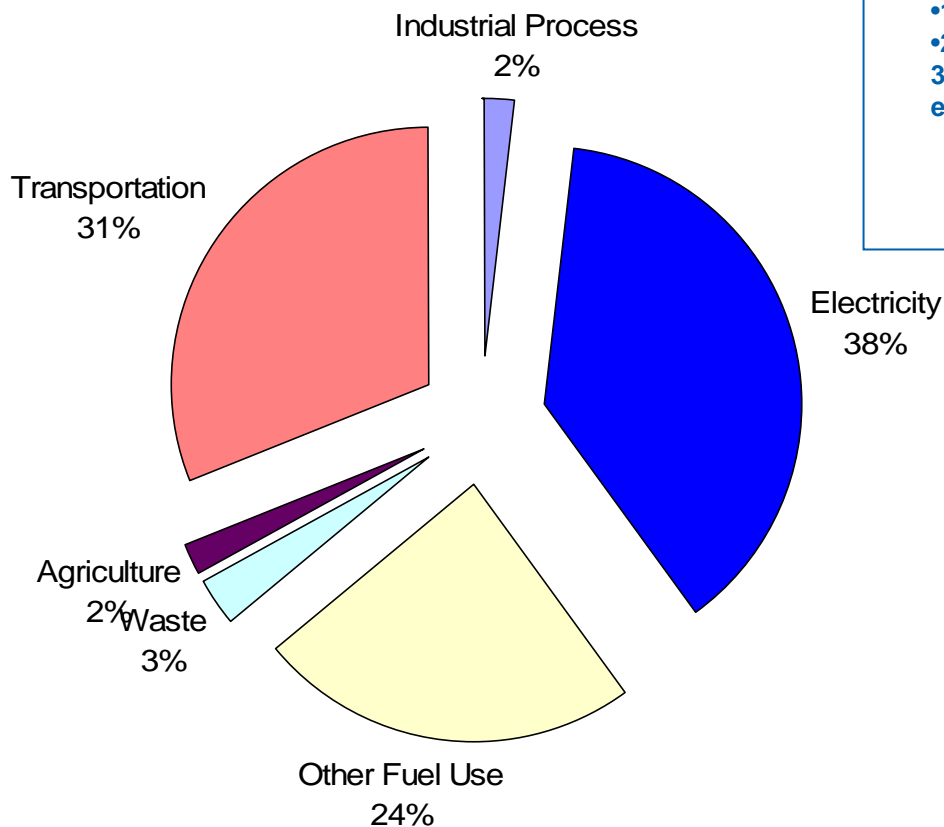
## 2005 GHG Emissions by Gases for Virginia



Source: DEQ, [Emissions Inventory for Green House Gases 2002-2005 \(Draft\)](#).



# Transportation's Role: 2005 GHG Emissions by Sector for Virginia



## Total Emissions

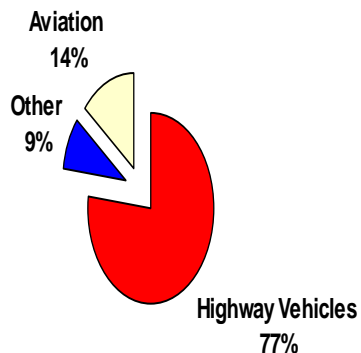
- 175 million metric tons, 2005
- 230 million metric tons by 2025;
- 35% transportation, 40% electricity

Source: DEQ, [Emissions Inventory for Green House Gases 2002-2005 \(Draft\)](#).

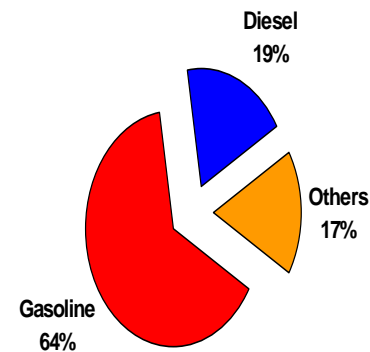
# Transportation's Role:

## Emissions by Vehicle and Fuel Types for Virginia

Vehicle Type



Fuel Type



# Notable Regional Initiatives

- **Midwestern Regional Greenhouse Gas Reduction Accord (November 2007)**
  - Illinois, Iowa, Kansas, Michigan, Minnesota, Wisconsin, Canadian Province of Manitoba
  - Established targets, including 60 to 80 percent below current levels by 2050
- **Western Climate Initiative (February 2007)**
  - Arizona, California, New Mexico, Oregon, Washington, Utah, Montana, several Canadian provinces
  - Established regional target of 15 percent reduction below 2005 by 2020
- **Regional Green House Gas Initiative (December 2005)**
  - Delaware, Connecticut, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont
  - Cap emissions at current levels in 2009, reduce 10 percent by 2019
- **The Climate Registry (May 2007)**
  - 39 member states including Virginia
  - Develop common system for reporting emissions

Source: *Learning from State Action on Climate Change*, December 2007 Update, Pew Center for Climate Change

# Notable State Initiatives

- **Thirty-seven states have climate action plans completed or in development**
- **Seventeen have state-wide emission targets, including:<sup>1</sup>**
  - California, Global Warming Solutions Act, caps emissions at 1990 levels by 2020
  - Washington, SB 6001, 1990 levels by 2020
  - New Mexico, Executive Order, 2000 emissions by 2012, 10% below 2002 by 2020
  - Oregon, HB 3543, 10% below 1990 by 2020
  - Minnesota's Next Generation Energy Act, 15% reduction below by 2015, 30% by 2025, and 80% by 2050, based on 2005 levels
  - Florida, Executive Order, 2000 levels by 2017, 1990 levels by 2025
- **Transportation specific initiatives limited**
  - California has adopted emissions standards stricter than federal CAFE standards, several other states have adopted same, EPA has not granted required waiver
  - California has also adopted low-carbon fuel standards

<sup>1</sup> - Source: *Learning from State Action on Climate Change*, December 2007 Update, Pew Center for Climate Change

# Virginia's Initiatives

- **Executive Order 48 (2007)**
  - Establishes goal for state agencies to reduce energy costs by 20% below 2006 levels by 2010
  - Requires progress reports through Management Scorecard
- **SJR 385 (2007) – Fuel Efficient Vehicles and Transportation Funding**
  - Charge:
    - Study long-term solutions to transportation funding
    - Consider ways to promote the use of hybrid and fuel efficient vehicles
  - Conclusions:
    - Current funding methods will not keep pace with new energy technologies used in vehicles
    - The Commonwealth will see a decrease in motor fuel tax revenues

# Virginia's Initiatives

- **Virginia Energy Plan (September 2007)**
  - Covers all aspects of energy demand supply, infrastructure, etc.
  - Acknowledges that climate change will affect Virginia, population, wildlife and economy
  - **Goals**
    - Reduce energy growth by 40%
    - Reduce greenhouse gases by 30% by 2025, back to 2000 levels
    - Increase energy production by 20%
  - **Recommended establishment of a Climate Change Commission**
- **Governor's Climate Change Commission (December 2007)**
  - Comprised of representatives from the General Assembly, state government, local government and private sector

# Virginia's Initiatives

- **Governor's Climate Change Commission (December 2007)**
  - Goals
    - Inventory amount and contributors to Virginia's greenhouse gases
    - Evaluate impacts on citizens, natural resources and economy
    - Identify what Virginia needs to do to prepare for likely consequences
    - Identify climate change approaches being pursued by other states, regions and the federal government
    - Identify actions needed to meet 30 percent reduction goal
  - Commission has met on five occasions and heard testimony from numerous federal, state, local, private sector experts and the public
  - Commission has been divided into four workgroups, including Transportation and Land-Use
  - Final Report due December 2008

# Virginia's Initiatives

- **VTrans2035**
  - Identify the most cost-effective transportation strategies to reduce GHG
  - Recommend strategies to reduce the carbon footprint of the department and its activities
  - Climate Change Performance Goals and Measures
    - Environmental Stewardship - Tons of transportation emissions, Fuel Usage Per Capita
    - Coordination of Land Use and Transportation - VMT Per Capita
- **VDOT Internal Team**
  - Other state actions on transportation and climate change
  - Reduce energy use in activities, e.g. lighting standards
  - Greening of VDOT facilities, e.g. rest areas, building, reshaping of fleet
  - Change in design standards for coastal areas and concern
  - Workforce and Transportation issues
  - Land use and transportation



# Virginia's Initiatives

- **National Capital Region Climate Change Report (July 2008 Review Draft)**
  - Initiated in 2007 by the Metropolitan Washington Council of Government (COG) with goals to:
    - Develop a greenhouse gas inventory
    - Set regional goals and identify best practices for reducing emissions,
    - Make recommendations on regional climate change policy, and governance structure to guide COG's efforts
    - Identify the most cost-effective transportation strategies to reduce GHG
  - Report presented to COG Board on July 9, 2008, currently under review
  - Recommendations include:
    - GHG reduction goals of 80% below 2005 levels by 2050
    - 30% reduction in transportation emissions by reducing VMT, increasing fuel efficiency, and reducing the carbon content of fuel

# Carbon Emission Reduction Strategies

## Transportation

- **Increase fuel economy**
  - 2007 CAFÉ standards require new vehicles to achieve 35 mpg by 2020
  - Average today for entire fleet is 20 mpg (Europe averages 40 mpg)
- **Promote use of hybrid and alternative fuel vehicles**
  - Gas/electric, plug-in hybrids, biofuels, hydrogen fuel-cell
- **Reduce growth in VMT**
  - Expand use of transit
  - Promote alternatives to single vehicle travel including: walking, biking, ridesharing, telecommuting
  - Promote transit-oriented, compact development

# Concluding Observations

- **The Commonwealth Has Made Good Progress in Cleaning the Air**
  - Since 1990, transportation related emissions (VOX, NOx and CO) have decreased
  - In 2007, 17 days exceeded the ozone standards, down from 45 in 2002
- **Most of the GHG Reduction Goals are Aspirational**
- **Transportation Policy Makers Need to Understand and Assess the Risks to Transportation Systems of Climate Change**

# Concluding Observations

- **Rising Sea Levels Most Often Cited as Major Concern by Governor's Climate Change Commission Members**
- **The Commission's Recommendations Will Likely Include Strategies to Reduce Fuel Use and VMT**
- **Tensions Exist Between GHG Reduction Strategies and Other Goals**
  - Stable and reliable revenues
  - Economic Vitality

# Climate Change and Transportation

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**QUESTIONS?**