



Major Sources of Greenhouse Gas Emissions in Virginia

Governor's Commission on Climate Change

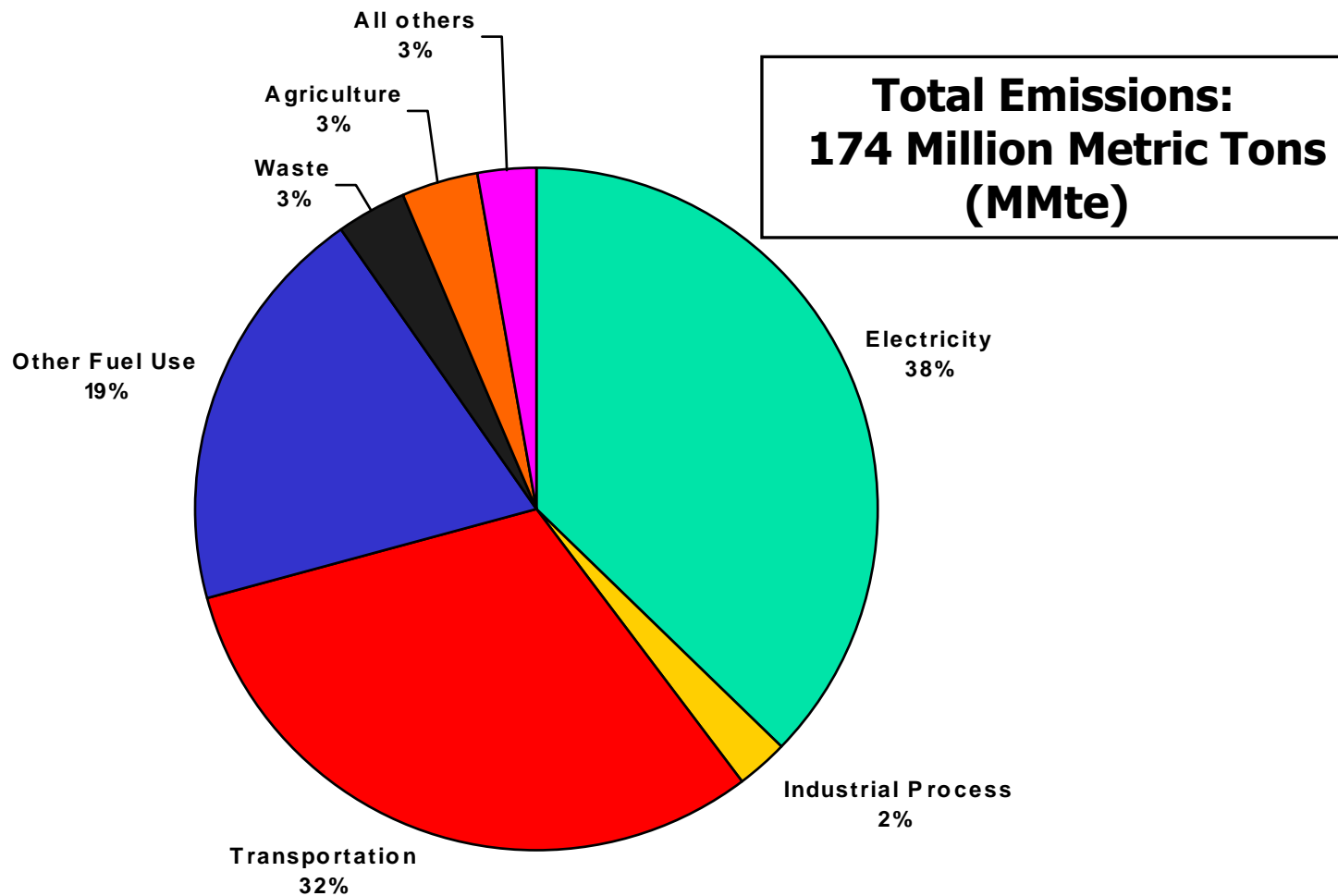
March 27, 2008



GHG Inventory Basics

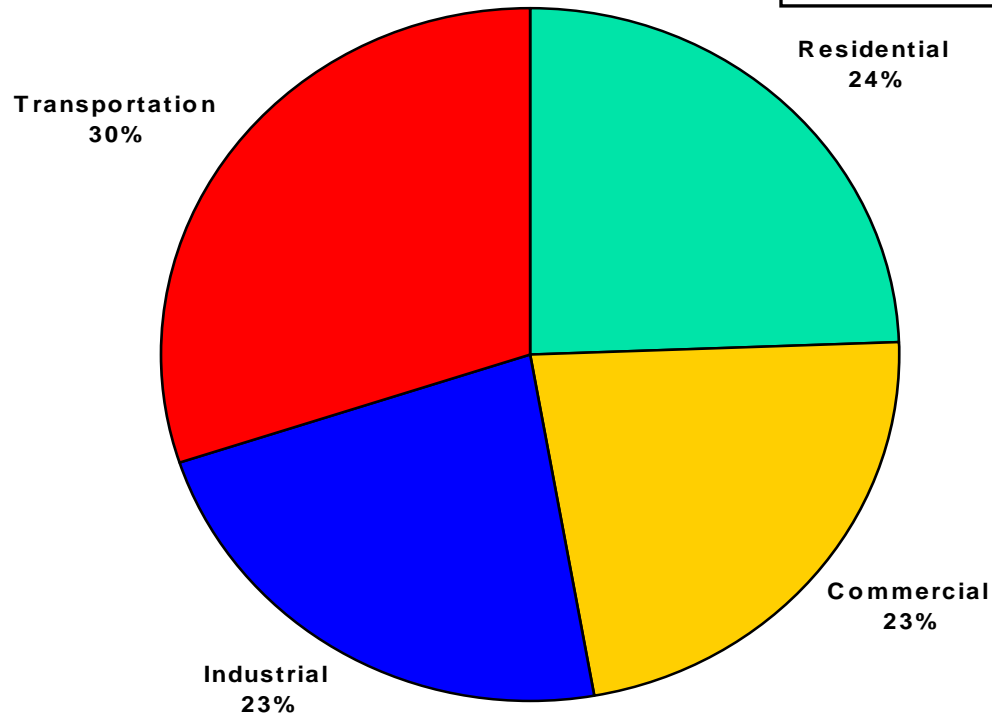
- Statewide estimate of GHG emissions from all sources
- Developed for 2000, 2005, 2006 & 2025
- Covers CO₂, Methane, Nitrous Oxide, & Fluorinated Gases
- Expressed in million metric tons of carbon dioxide equivalence (MMte)

2005 GHG Emissions Inventory



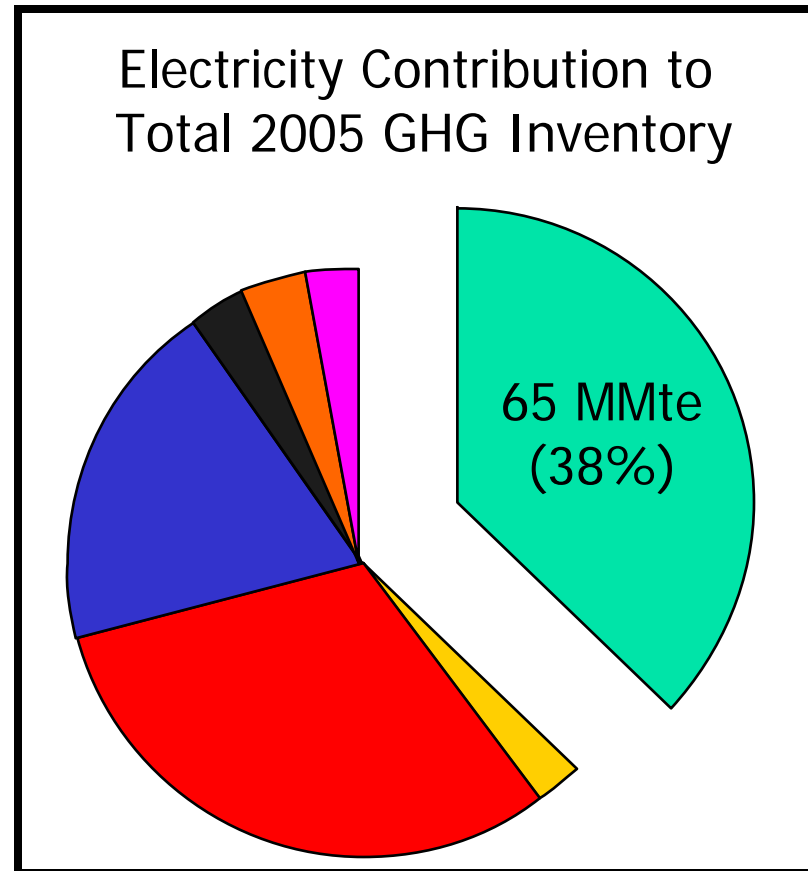
2005 Energy End-Use by Sector

**Total Consumption:
2.6 Quadrillion BTU**

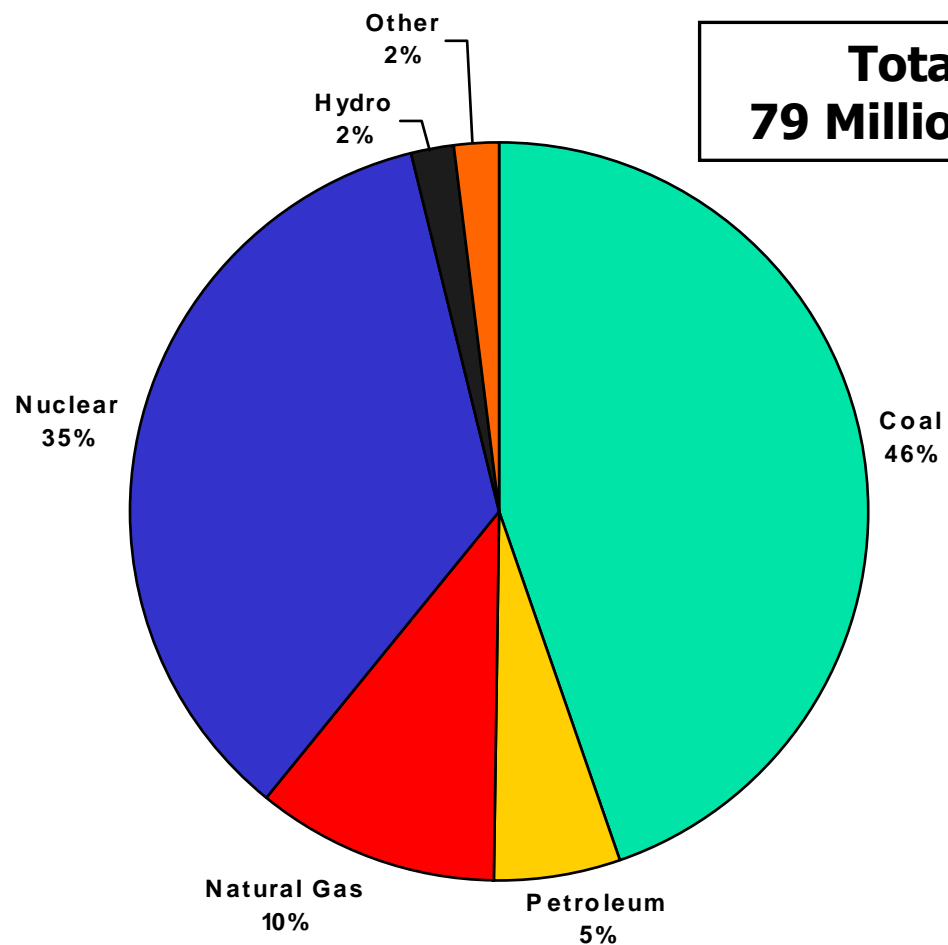


Emissions from Electricity Generation & Imports

- In-state generation
 - 41 MMte (63%)
- Imports
 - 24 MMte (37%)
- Emissions by fuel
(In-state only):
 - Coal – 83%
 - Natural Gas – 9%
 - Oil – 8%

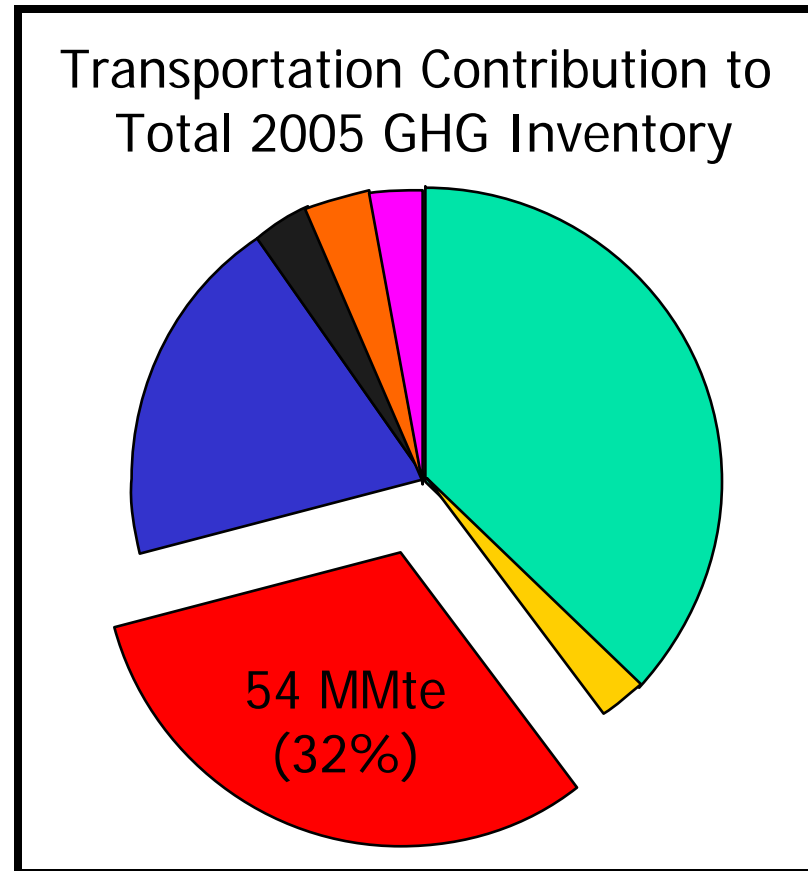


2005 Electricity Generation Mix by Source



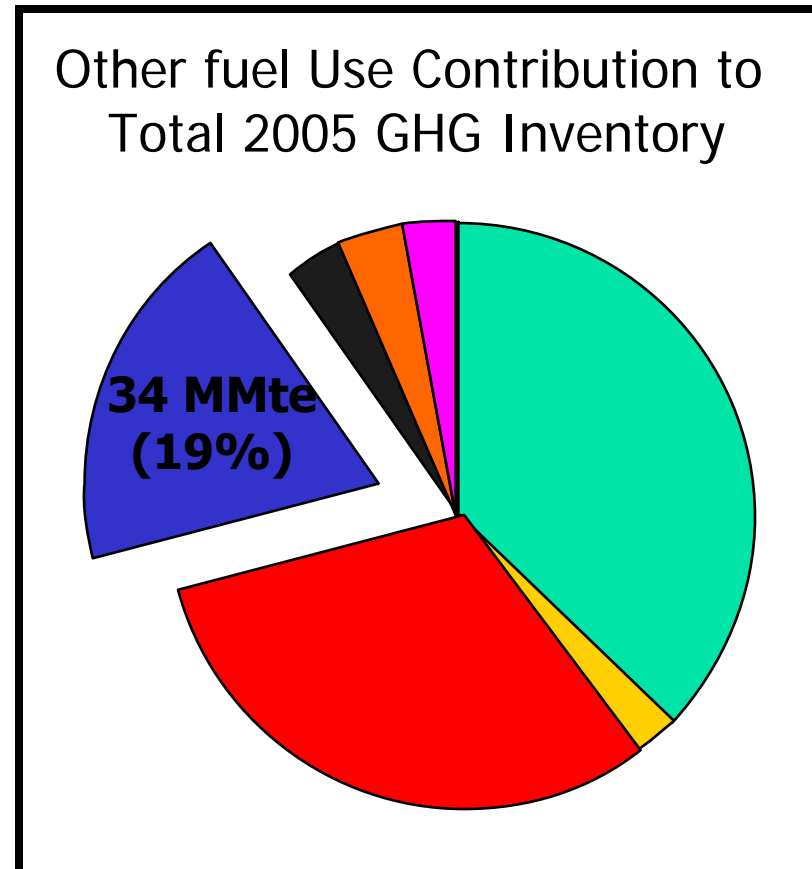
Emissions from Transportation

- Highway Vehicles
 - 42 MMte (78%)
 - All Others
 - 12 MMte (22%)
 - Emissions by fuel:
 - Gasoline – 64%
 - Diesel – 19%
 - Others* – 17%
- *(Jet fuel, NG)



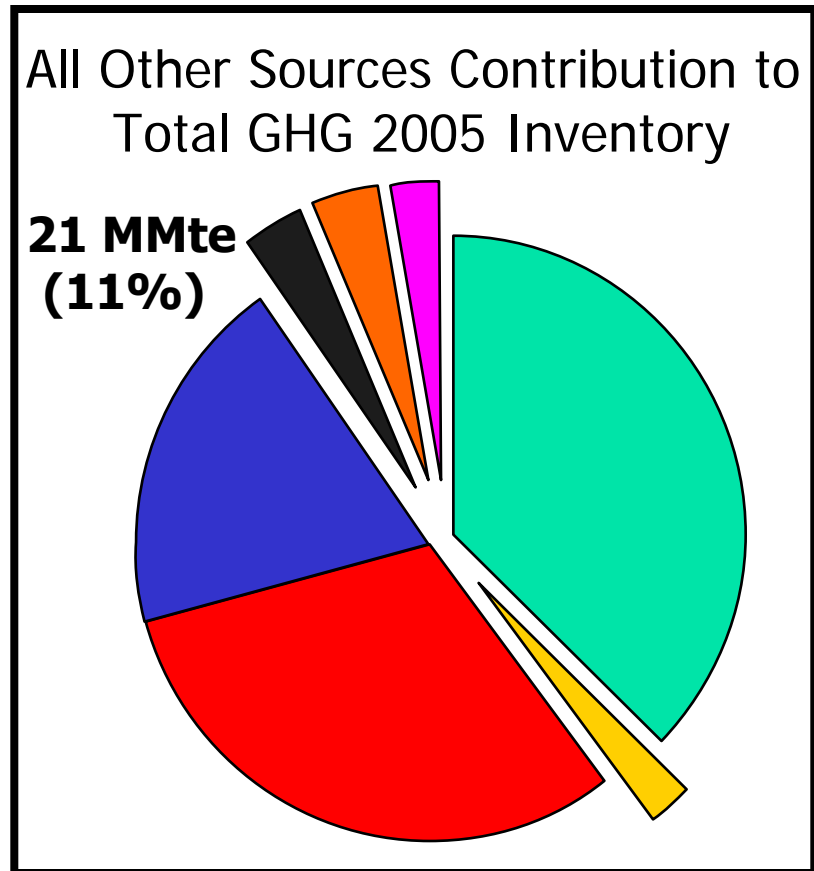
Emissions from Other Fuel Use

- Industrial
 - 19 MMte (56%)
- Residential
 - 9 MMte (26%)
- Commercial
 - 6 MMte (18%)
- Emissions by fuel:
 - Oil – 41%
 - Natural Gas – 35%
 - Coal – 24%

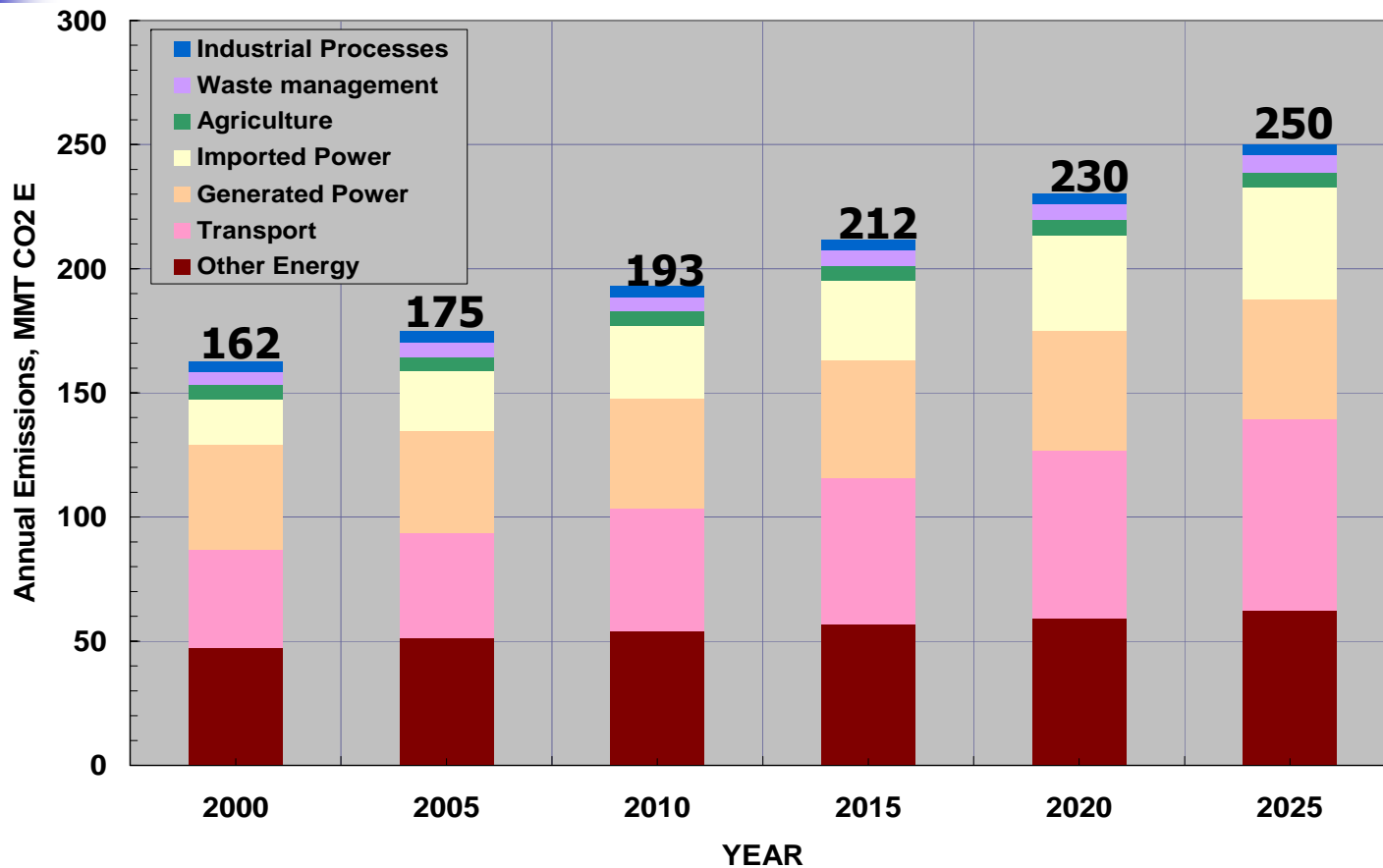


Emissions from All Other Sources

- Industrial Processes
 - 4 MMte (19%)
- Waste Management
 - 6 MMte (29%)
- Agriculture
 - 6 MMte (29%)
- Others
 - 5 MMte (23%)

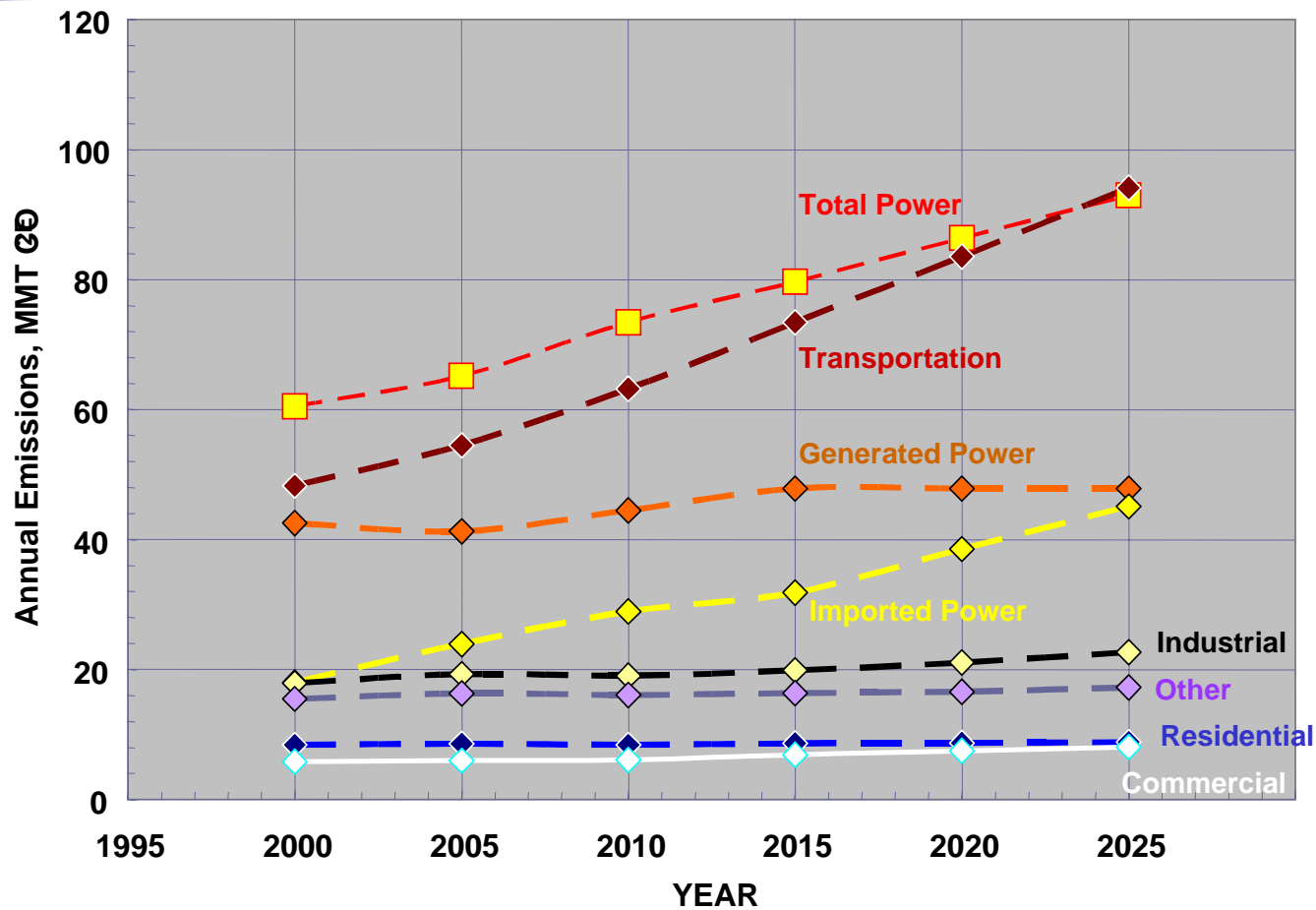


Projected Emissions Growth from 2000 to 2025



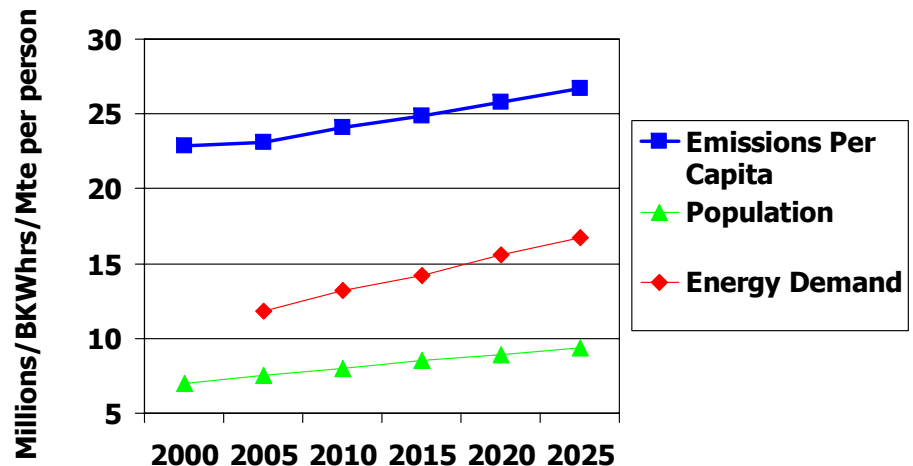


Projected Growth by Sector from 2000 to 2025



Per Capita Emission Trends

- Estimates:
 - 23.0 Mte in 2000
 - 23.1 Mte in 2005
- Upward trend is projected but uncertain
- Future demand partially offset by cleaner technology



A decorative graphic consisting of overlapping yellow, red, and blue squares with a black crosshair.

Electricity Sector – Potential Control Measures

- Energy Efficiency & Conservation
 - Reduce Electricity use & growth
 - Mandatory or voluntary reduction programs
- Use lower emitting fuels
 - Oil, natural gas, biomass, others
- Use non-emitting energy sources
 - Solar, wind, nuclear
- Carbon Capture and Sequestration
 - Still under development



Transportation Sector – Potential Control Measures

- Fuel efficiency and conservation
 - Better fuel efficiency, vehicle maintenance, anti-idling programs
- Lower emitting vehicles and fuels
 - Hybrids, natural gas, ethanol, other bio-fuels
- Non-emitting vehicles
 - electric, hydrogen
- Reduce vehicle travel
 - Smart growth, mass transit, ridesharing, telecommuting

Other Fuel Use Sector – Potential Control Measures

A decorative graphic consisting of overlapping colored squares (yellow, red, blue) and a black crosshair.

- Energy Efficiency and Conservation
 - Reduce consumption & demand growth
- Use lower emitting fuels
 - Oil, natural gas, biomass
- Use of non-emitting energy sources
 - Solar, wind, nuclear
- Building Standards
 - New and existing structures (LEED)
 - Clean onsite power generation

All Other Sources – Potential Control Measures

- Industrial processes
 - Lower emitting substitute materials
- Waste management
 - Landfill gas recovery and use
 - Increased resource recovery (*trash to energy*)
- Agriculture
 - “No-till” farming practices, Less fertilizer use
 - More renewable biomass resources
- Other
 - Develop new in-state energy resources



Conclusions

- Energy consumption and generation dominate the VA GHG inventory
- To reduce GHG emissions:
 - A number of reduction measures will be needed (*The Wedge Approach*)
 - Consumption must be addressed
 - Technology can also be part of the solution