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Vermont



Governor's Commission on Climate Change

Agriculture, Forestry, and Waste Resource Management Technical Work Group Teleconference Meeting #2

November 9, 2006



Today's Agenda

- Roll Call
- Review of previous call summary
- Continued review and discussion of the Catalog of State Actions
- Continued review and discussion of the Vermont emissions inventory & forecast
- Next Steps for TWGs
- Agenda, time, and date for next meeting
- Public input and announcements

Sample Potential Options - Agriculture

Option No.	Climate Mitigation Option	Priority for Analysis	Potential GHG Emissions Reduction	Potential Cost or Cost Savings	Ancillary Impacts, Feasibility Considerations	Notes
AFW-1	AGRICULTURE – PRODUCTION OF FUELS AND ELECTRICITY					
1.1	Manure Digesters/Other Waste Energy Utilization**					
1.2	Biodiesel Production (incentives for feedstocks and production plants)					
1.3	Biomass Feedstocks for Electricity or Steam Production**					
1.4	Ethanol Production					

Decision Criteria

- GHG reduction potential (CO₂e)
- Cost per ton GHG removed
- Additional issues
- Feasibility issues

Categories of Forestry Actions

- Protect forestland (existing carbon stocks) from permanent clearing
- Restore and expand forests (expand carbon stocks)
- Improve forest regeneration and stocking (increase carbon stock densities)
- Sustainable thinning and density management of forests
 - Expand wood products carbon storage
 - Expand renewable biomass energy use
- Recycle wood products biomass waste to energy

Categories of Agriculture Actions

- Protect farmland and existing carbon stocks, biomass supplies
- Expand soil carbon storage and future carbon stocks, biomass supplies
- Expand renewable energy production
- Reduce process/waste emissions
- Increase energy recapture and reuse
- Improve animal feed efficiency
- Reduce food delivery/transportation emissions

Categories of Waste Resource Management Actions

- Expand solid and liquid waste energy recovery
- Expand low emitting waste storage
- Expand source reduction, reuse, recycling
- Expand energy efficient processing of waste

AFW Options Catalog

- Refer to CCS VT AFW Options Catalog

Vermont GHG Emissions

- Inventory and Reference Case Projections
- Initial analysis by CCS for further discussion and final revision
 - Inventory of historical emissions from 1990 to most recent data year (2000-2004, depending on sector)
 - Projection of emissions to 2020

Coverage

- Six gases per USEPA and UNFCCC guidelines
 - Carbon Dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur Hexafluoride (SF₆)
 - Black Carbon considered separately
- All major emitting sectors
 - Electricity
 - Residential, Commercial, Industrial Fuel Use
 - Transportation
 - Agriculture and Forestry
 - Waste Resource Management
 - Industrial Processes and Other Sources

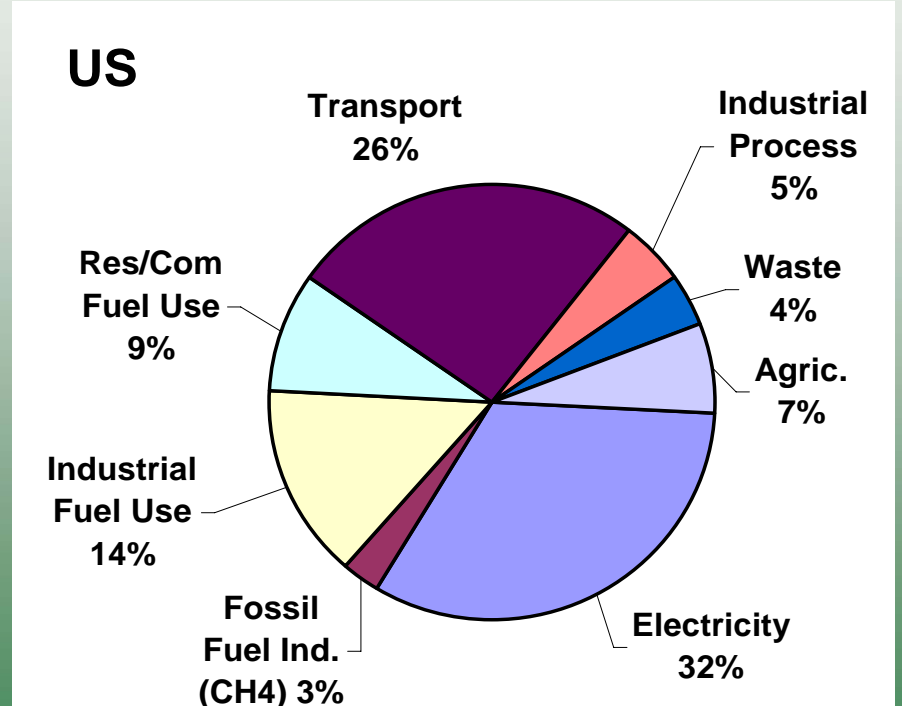
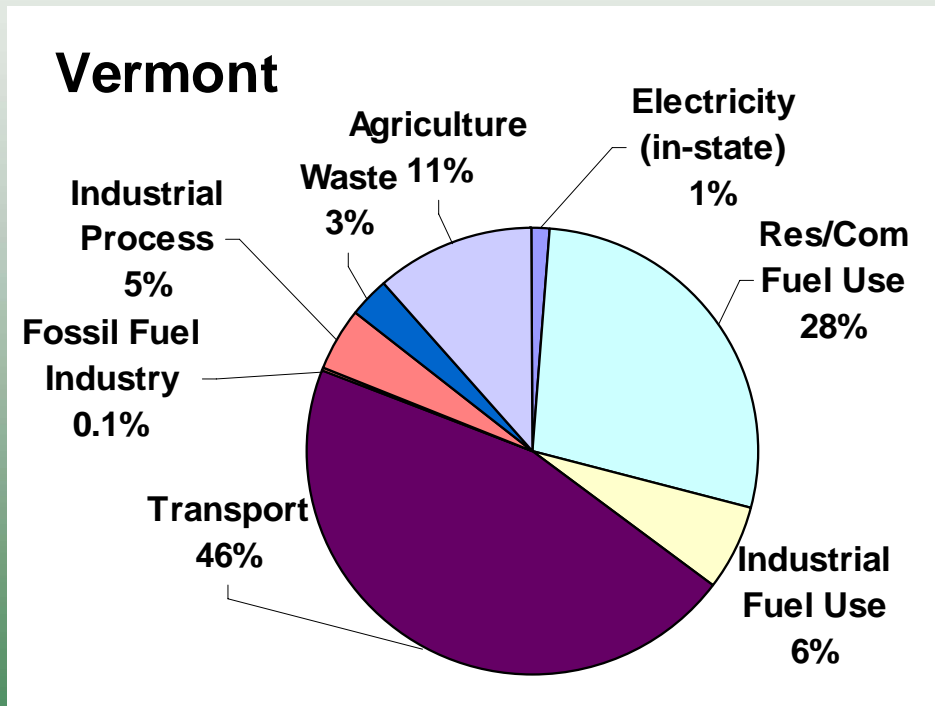
Inventory Approach

- Standard US EPA and UN methodologies, guidelines, and tools
- Emphasis on transparency, consistency, and significance
- Preference for Vermont or regional data, where available
- Consumption and production-basis emissions from electricity generation
 - Very simplified approach used for initial analysis

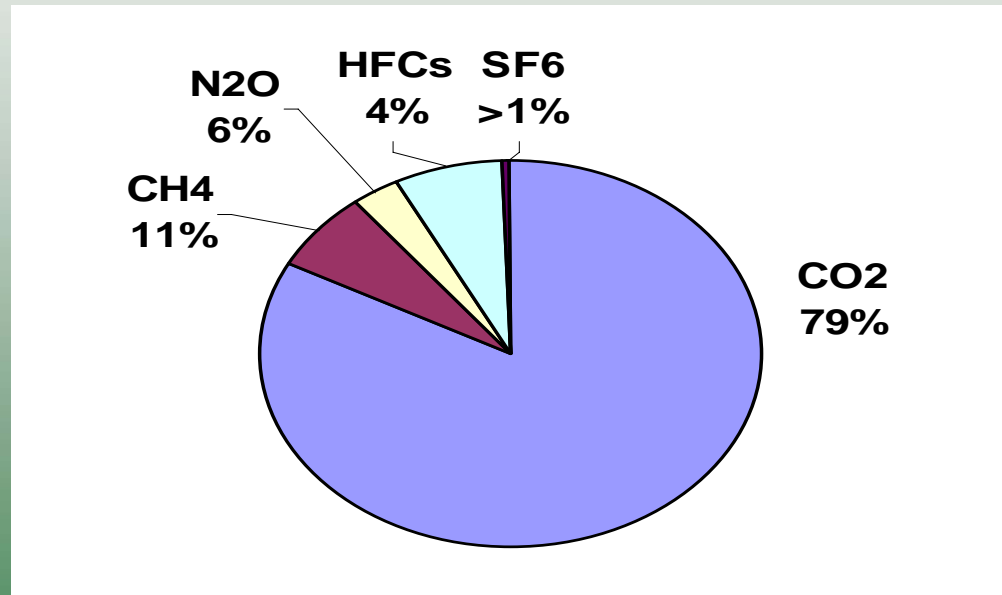
Projection Approach

- Reference case assumes no major changes from business-as-usual
 - Includes approved policies and actions to the extent possible (e.g. Environmental Portfolio Standard)
- Growth assumptions from existing sources
 - US Census and Bureau of Labor & Statistics
 - US Energy Information Administration
 - Regional Planning Organizations (e.g. Mid-Atlantic – Northeast Visibility Union or MANE-VU)

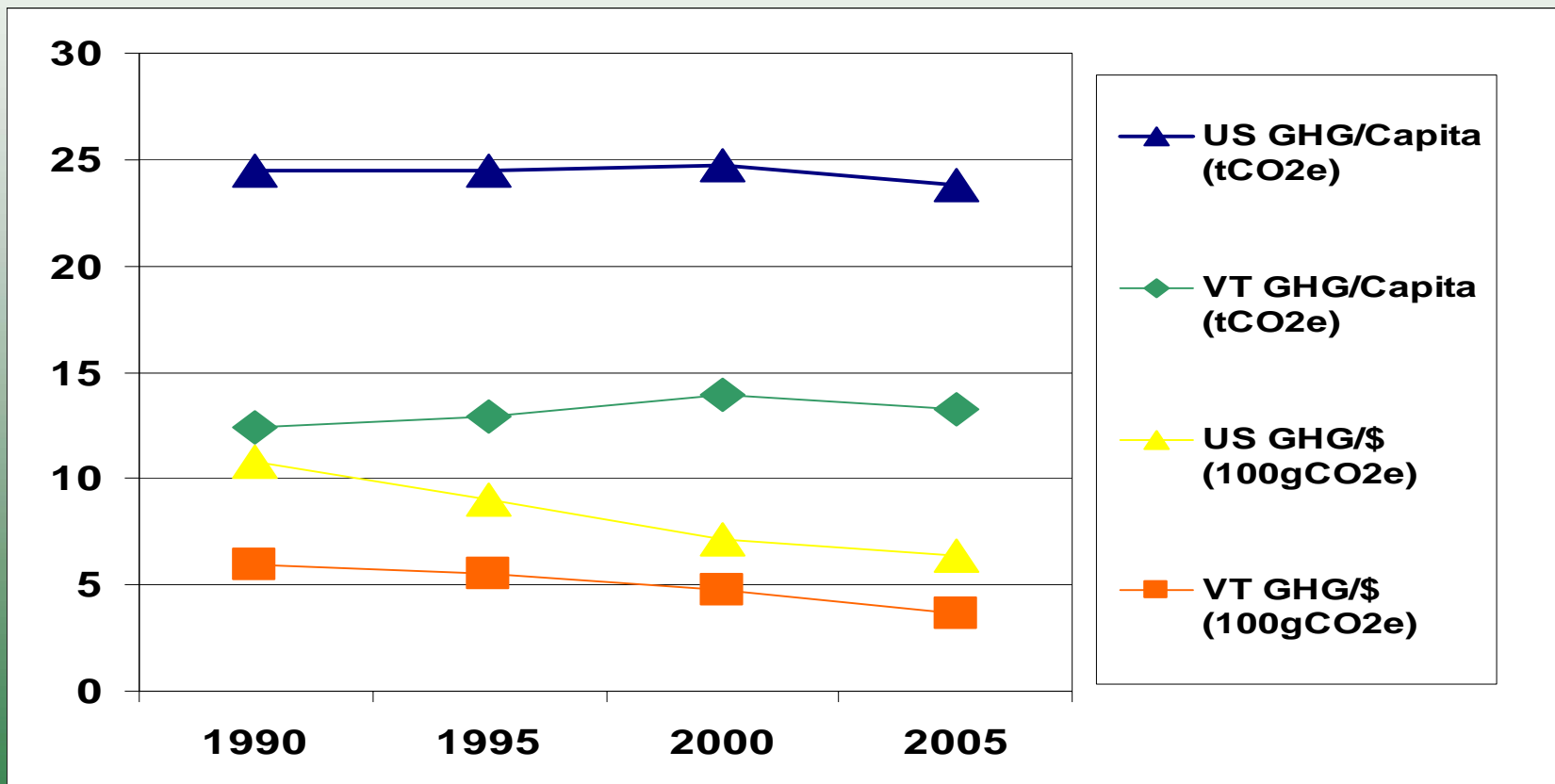
Vermont & US Emissions By Sector, Year 2000



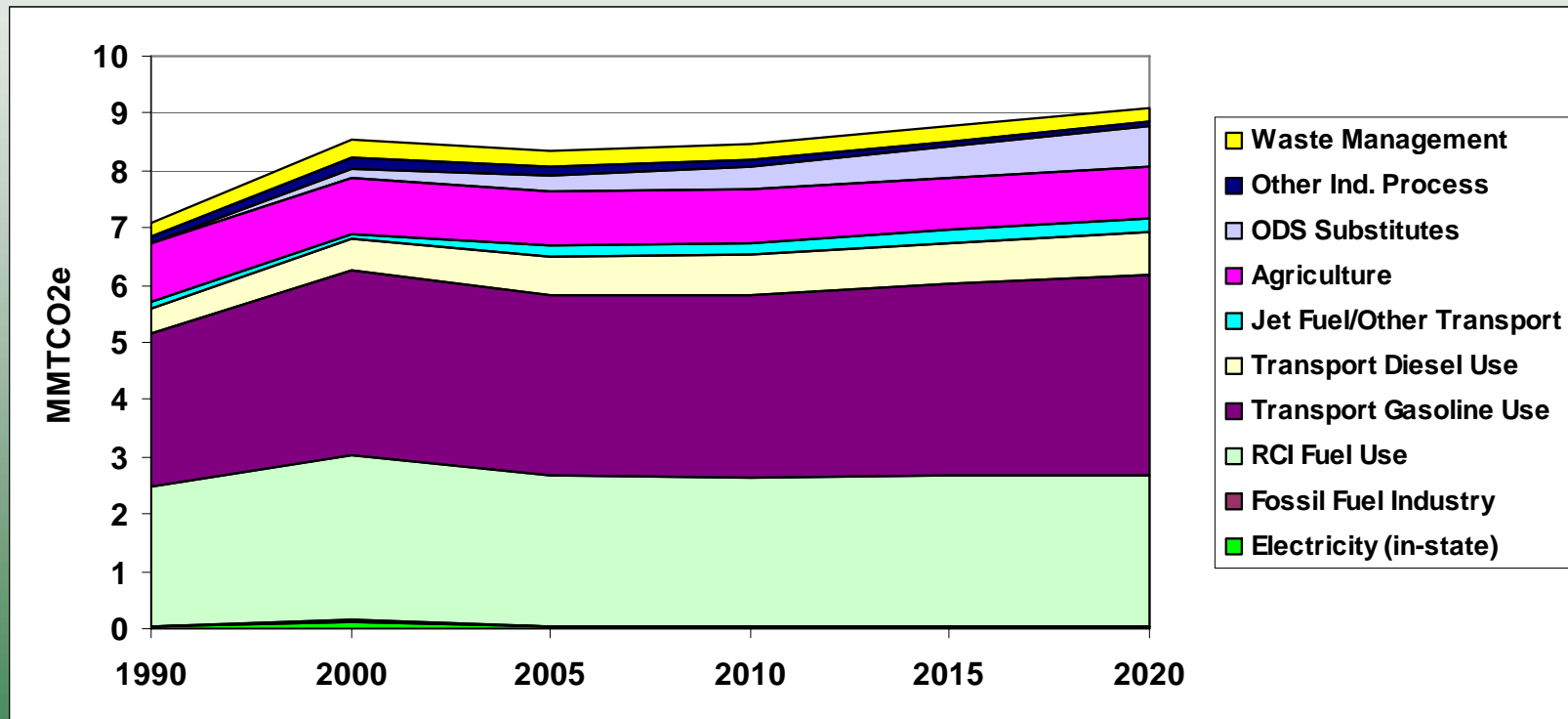
Vermont Emissions By GHG, Year 2000



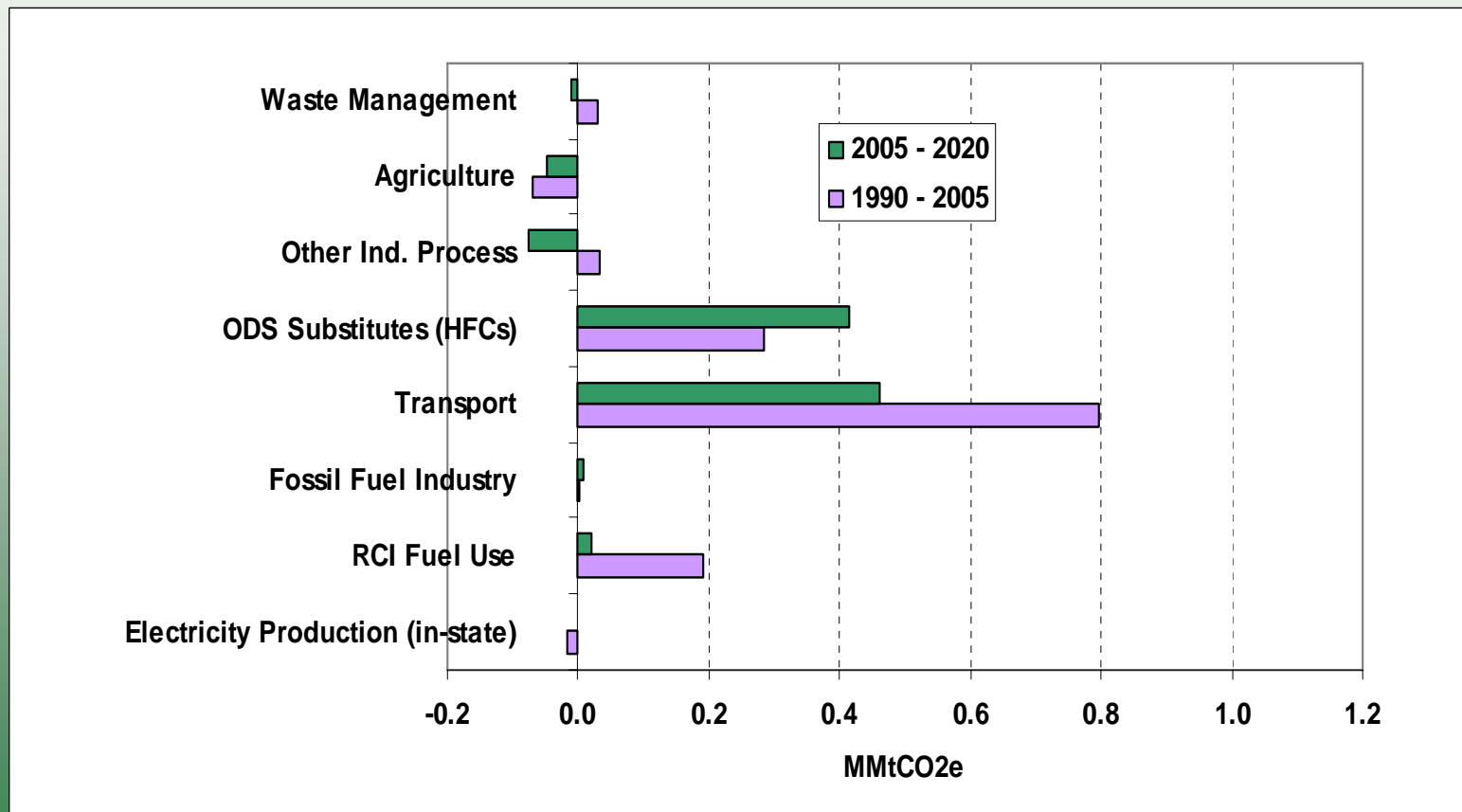
Per Capita and GSP/GDP GHG Emissions, 1990-2002



Gross Vermont GHG Emissions By Sector, 1990-2020



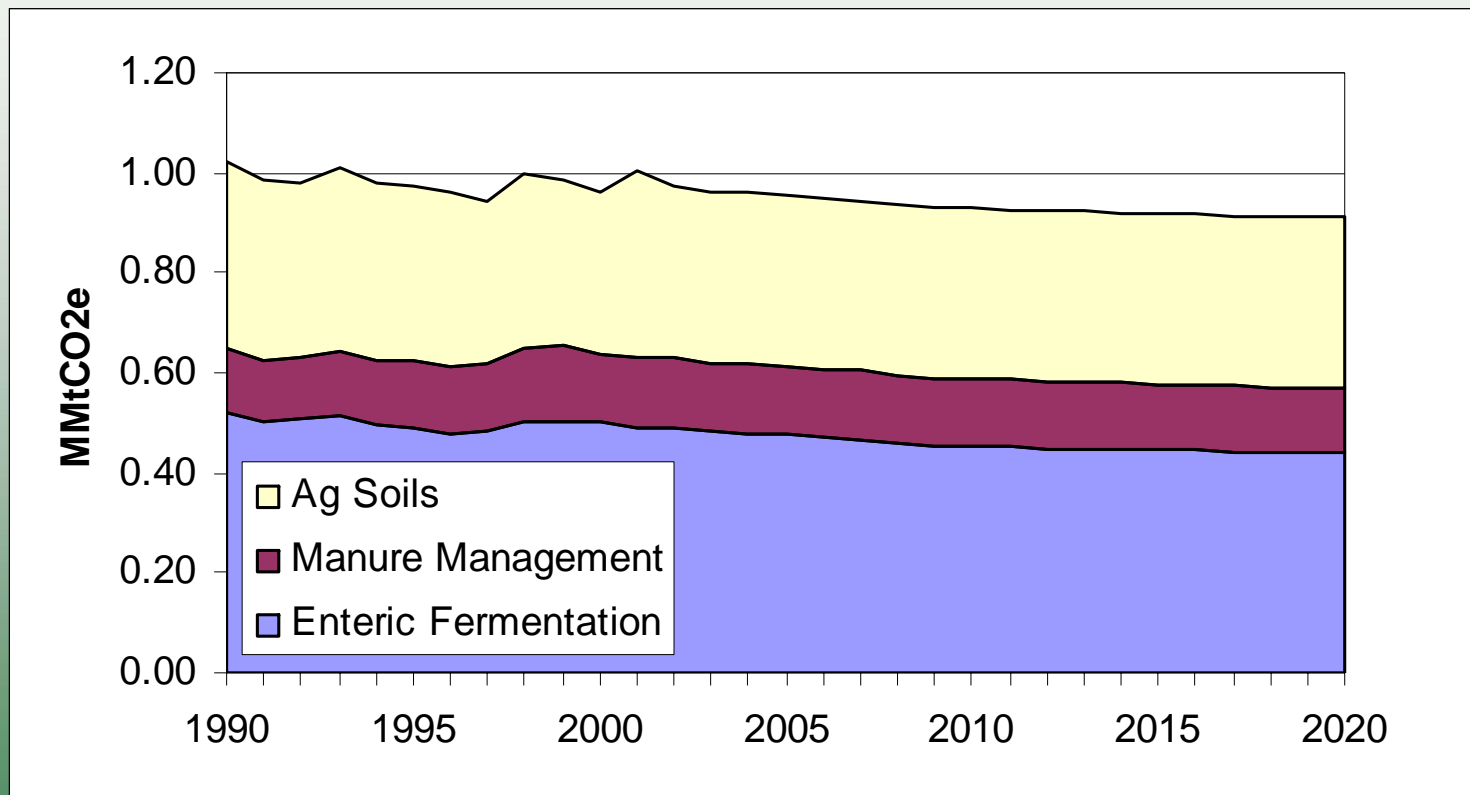
Vermont Emissions Growth



Key Points

- Preliminary draft for TWG review and revision, as needed
- Helpful for diagnosis of GHG emissions, but not a compliance baseline
- Consumption v. production methods
- Role of carbon storage

Agriculture



Agriculture

- Data Sources
 - Crop acreage: USDA
 - Livestock: USDA
 - Livestock Projections: USDA
 - CCS to add USDA carbon sink estimates for agricultural soils (-0.19 MMtCO₂e based on 1997 data).
- Methods
 - Crops: SGIT emission factors and crop acreage, SGIT fertilizer consumption
 - Livestock: SGIT emission factors and livestock populations
 - Dairy cattle projections adjusted to account for projected populations in Cow Power program
 - No growth assumed for Ag Soils emissions

Agriculture

- Key Assumptions
 - No growth or significant change in crop production for the future
 - USDA national livestock projections
- Key Uncertainties
 - Projection data

Forestry

Carbon Pool	MMtCO₂e/yr
Live Trees	-6.3
Standing Dead Trees	-0.3
Live Understory	-0.03
Down and Dead Trees	-0.4
Forest Floor	-0.5
Soils	-0.7
Harvested Wood Products	-1.4
Total	-9.7

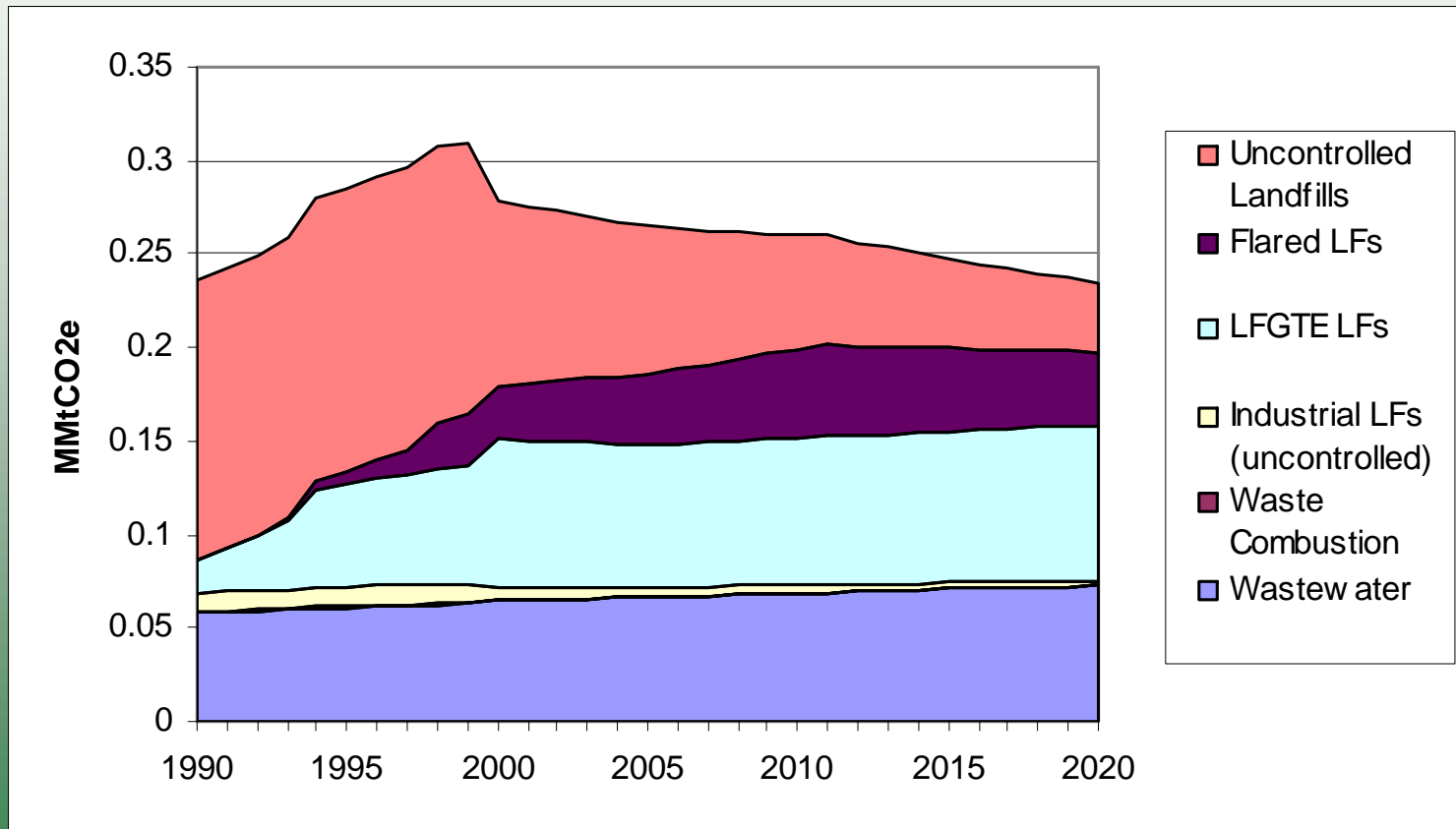
Forestry

- Data Sources
 - USFS carbon stock change data for 3 FIA cycles (1983, 1997, 2004) based on FORCARB model
 - 2004 FIA surveys not yet complete
 - USFS also provides modeled estimates for harvested wood products
- Methods
 - Forestry: USFS FORCARB2 carbon stock change model provides carbon pools for each FIA cycle
 - Flux calculated for each pool based on difference in time between FIA cycles
 - Carbon pool data for the 1983-1997 time-period used to quantify flux.

Forestry

- Key Assumptions
 - 1983-1997 carbon stock change representative of current conditions
 - No significant change in sequestration from 2007-2020
- Key Uncertainties
 - Effects of future development on forested acreage
 - Effects of near term climate change on forest sequestration levels

Waste Management



Waste Management

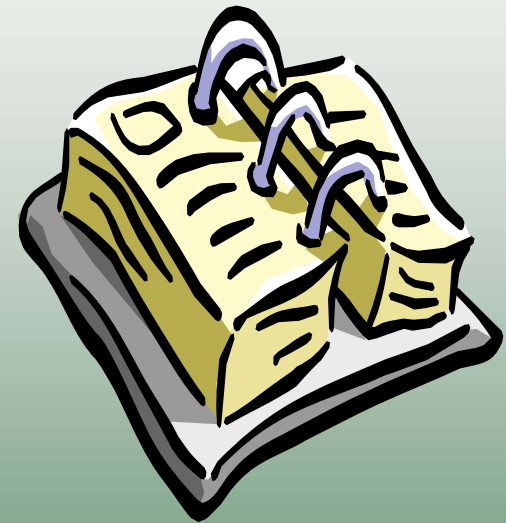
- Data sources
 - EPA Landfill Methane Outreach Program (LMOP)
 - VTDEC
- Methods
 - EPA SGIT to estimate CH₄ generation
 - Post-processing to account for LFG collection and control efficiencies

Waste Management

- Key Assumptions
 - Solid Waste: future growth occurs at LFGTE sites only
 - Solid Waste: growth rate = population growth
 - Liquid Waste: no current control of CH₄ at any site.
- Key Uncertainties
 - See assumptions above.

Next TWG Call

- Agenda:
 - Discuss potential priorities for analysis of policy options
 - Review the Vermont emissions inventory and projection
 - Date and Time: TBD



Public Input, Announcements