



Vermont

Governor's Commission on Climate Change



Agriculture, Forestry, and Waste Resource Management Technical Work Group Teleconference Meeting #1

October 19, 2006



Introductions

- Technical Work Group (TWG) members
- VT DEC
- CCS TWG leaders
- Public

Today's Agenda

- Introductions
- Purpose and goals
- Review of the GCCC-PG and TWG process
- Review and discussion of the Vermont emissions inventory & forecast
- Review and discussion of the Catalog of State Actions
- Next Steps for TWGs
- Agenda, time, and date for next meeting
- Public input and announcements

Part 1

- GCCC-PG and TWG Process

Purpose & Goals

- December 5, 2005 Letter from Vermont Governor Jim Douglas
 - Governor's Commission on Climate Change
 - Climate Action Plan by September 1, 2007
 - Vermont greenhouse gas emissions inventory and forecast
 - Policy recommendations

Roles & Responsibilities

- Process convened by Governor Jim Douglas
- VT DEC provides coordination and organization
- State agencies act as advisors
- GCCC to make ultimate recommendations to Governor
- GCCC created Plenary Group (GCCC-PG) to provide broader stakeholder input across Vermont sectors and life
- TWGs advise Plenary Group
- Public input and review
- CCS provides evaluative facilitation, final report

Timing

- GCCC Plenary Group meetings
 - September, November, January, March, May, July
- TWG calls
 - Regularly scheduled
 - Two to three 90-minute calls between each Plenary Group meeting
- Work Products
 - GHG inventory & forecast
 - GCCC report to the Governor: September 2007

Ten Step Work Plan

1. Develop initial GHG inventories and forecasts
2. Identify possible GHG mitigation options
3. Identify initial priorities for evaluation
4. Evaluate supply potential, cost effectiveness; additional and feasibility issues as needed
5. Identify barriers, alternative policy design needs
6. Modify, add or subtract options as needed
7. Evaluate cumulative results of options
8. Iterate to consensus, with votes as needed
9. Aggregate options into implementation scenarios
10. Finalize recommendations and report language

TWG Next Steps

- Review and revision of Vermont greenhouse gas (GHG) inventory and forecast
- Identify “priorities for analysis” from catalog of states’ actions
 - Add existing and new VT options as needed
 - Rank and screen options
 - Suggest initial “priorities for analysis” to the GCCC-PG

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

Policy Template



Policy Description:

Policy Design:

- **Goals:**
- **Timing:**
- **Coverage of Parties:**

Implementation Methods:

Related Policies/Programs in Place:

Estimated GHG Savings and Costs per tCO₂e:

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Key Uncertainties:

Additional Benefits and Costs:

Feasibility Issues:

Status of Group Approval:

Level of Group Support:

Barriers to Consensus:

End Product/Final Report

- Executive Summary
- Background, Purpose and Goals
- Policy Recommendations and Results
 - Agriculture, Forestry & Waste Management
 - Energy Supply
 - Residential, Commercial, Industrial
 - Transportation & Land Use
 - Cross-Cutting Issues
- Appendices

Part 2

- VT Greenhouse Gas Inventory and Forecast review

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 Management
 - Industrial Processes and Other Sources

Inventory Approach

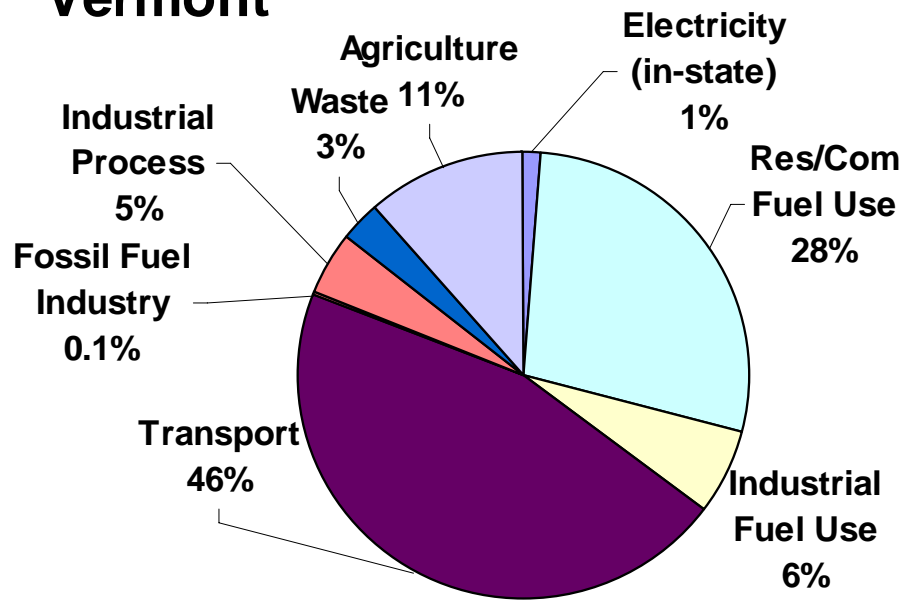
- Standard US EPA and UN methodologies, guidelines, and tools
- Emphasis on transparency, consistency, and significance
- Preference for Vermont or regional data, where available
- Consumption and production-basis emissions from electricity generation
 - Very simplified approach used for initial analysis

Projection Approach

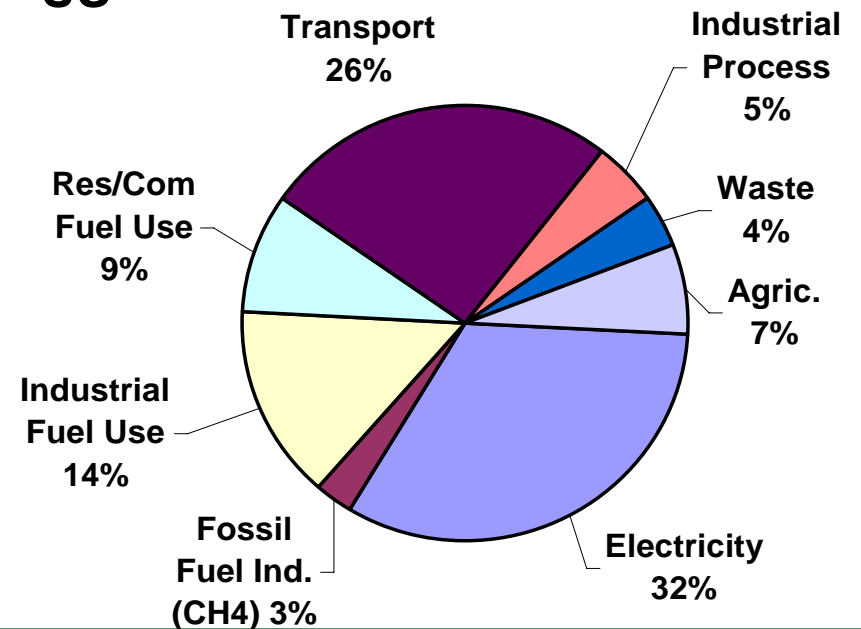
- Reference case assumes no major changes from business-as-usual
 - Includes approved policies and actions to the extent possible (e.g. Environmental Portfolio Standard)
- Growth assumptions from existing sources
 - US Census and Bureau of Labor & Statistics
 - US Energy Information Administration
 -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

Vermont & US Emissions By Sector, Year 2000

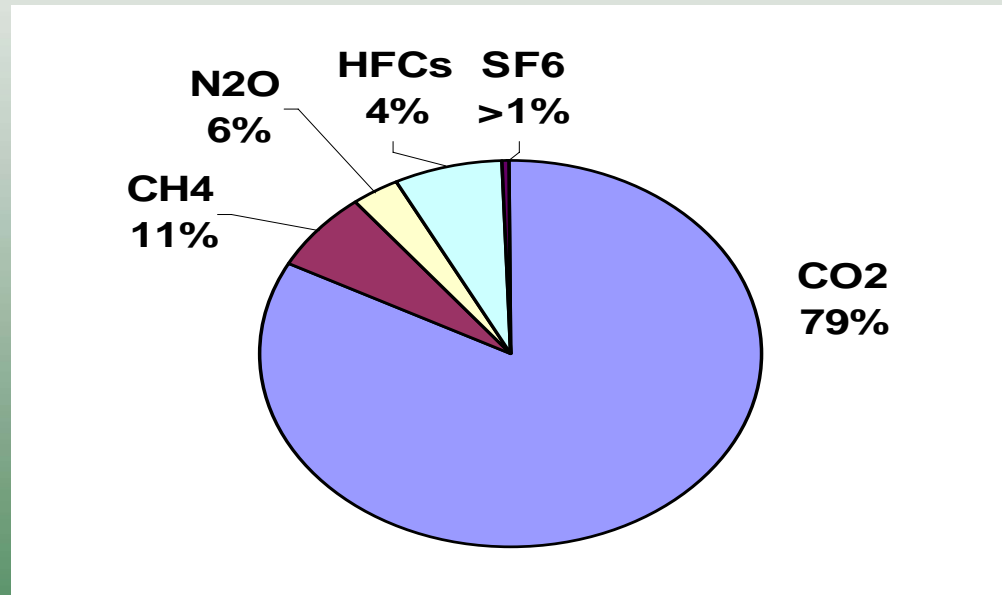
Vermont



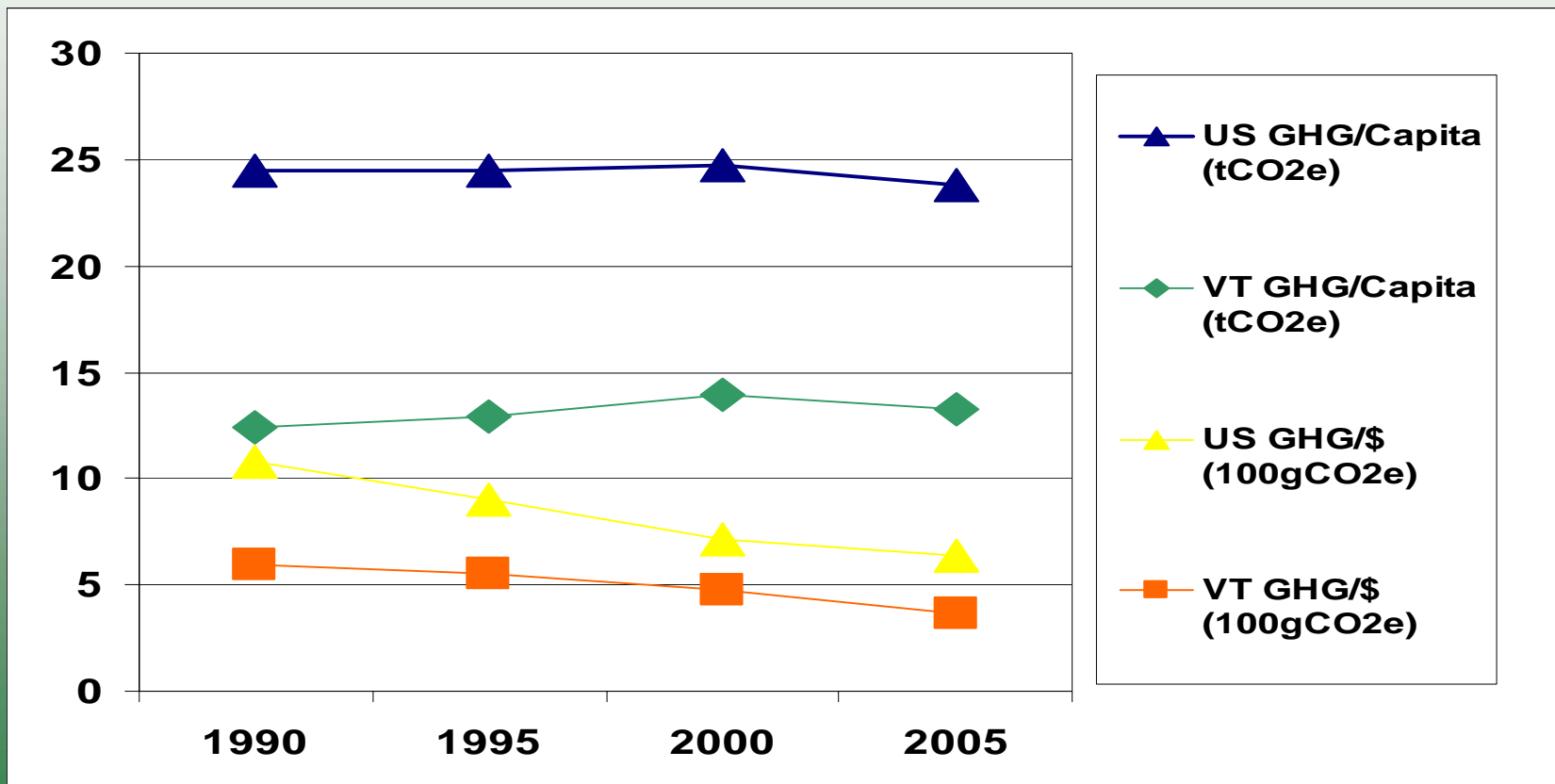
US



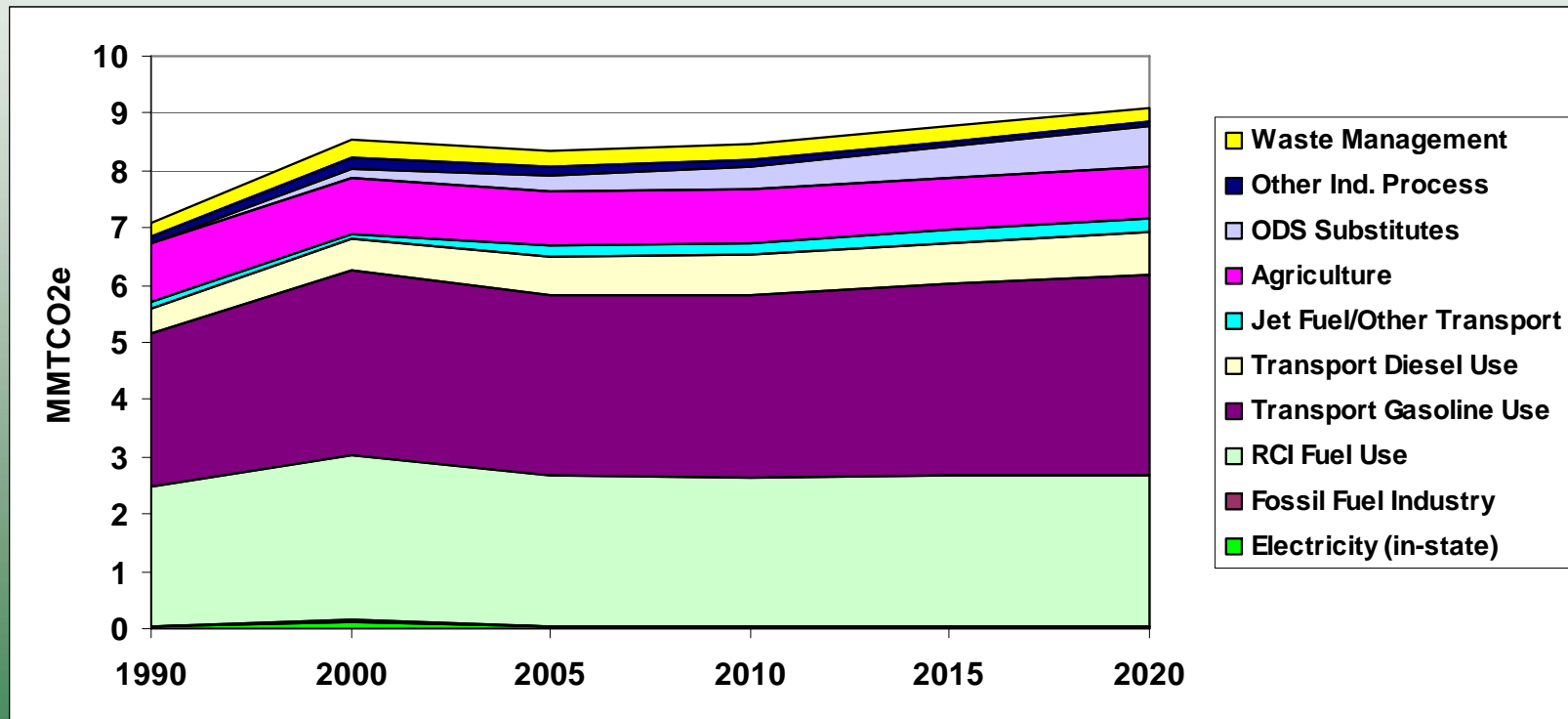
Vermont Emissions By GHG, Year 2000



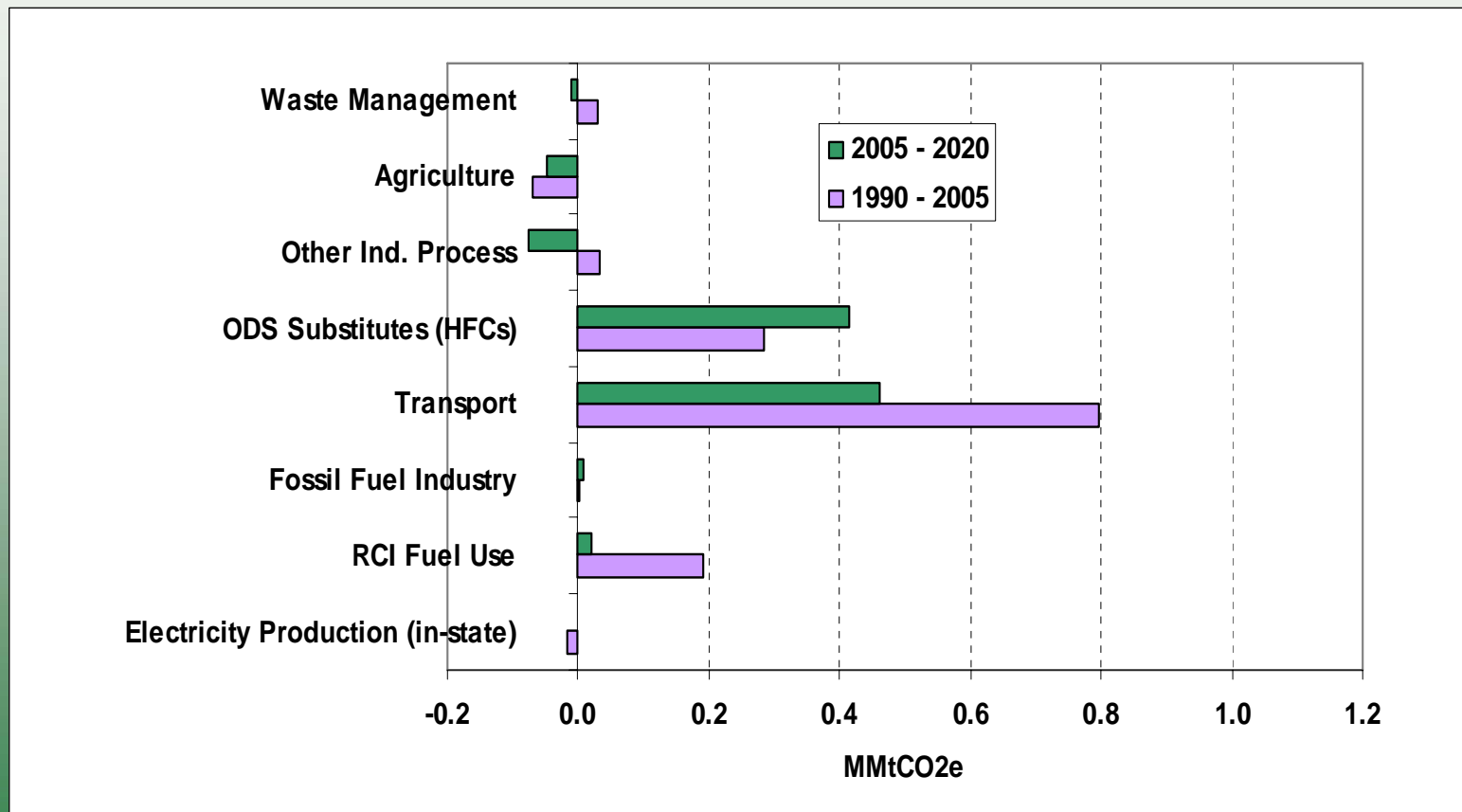
Per Capita and GSP/GDP GHG Emissions, 1990-2002



Gross Vermont GHG Emissions By Sector, 1990-2020



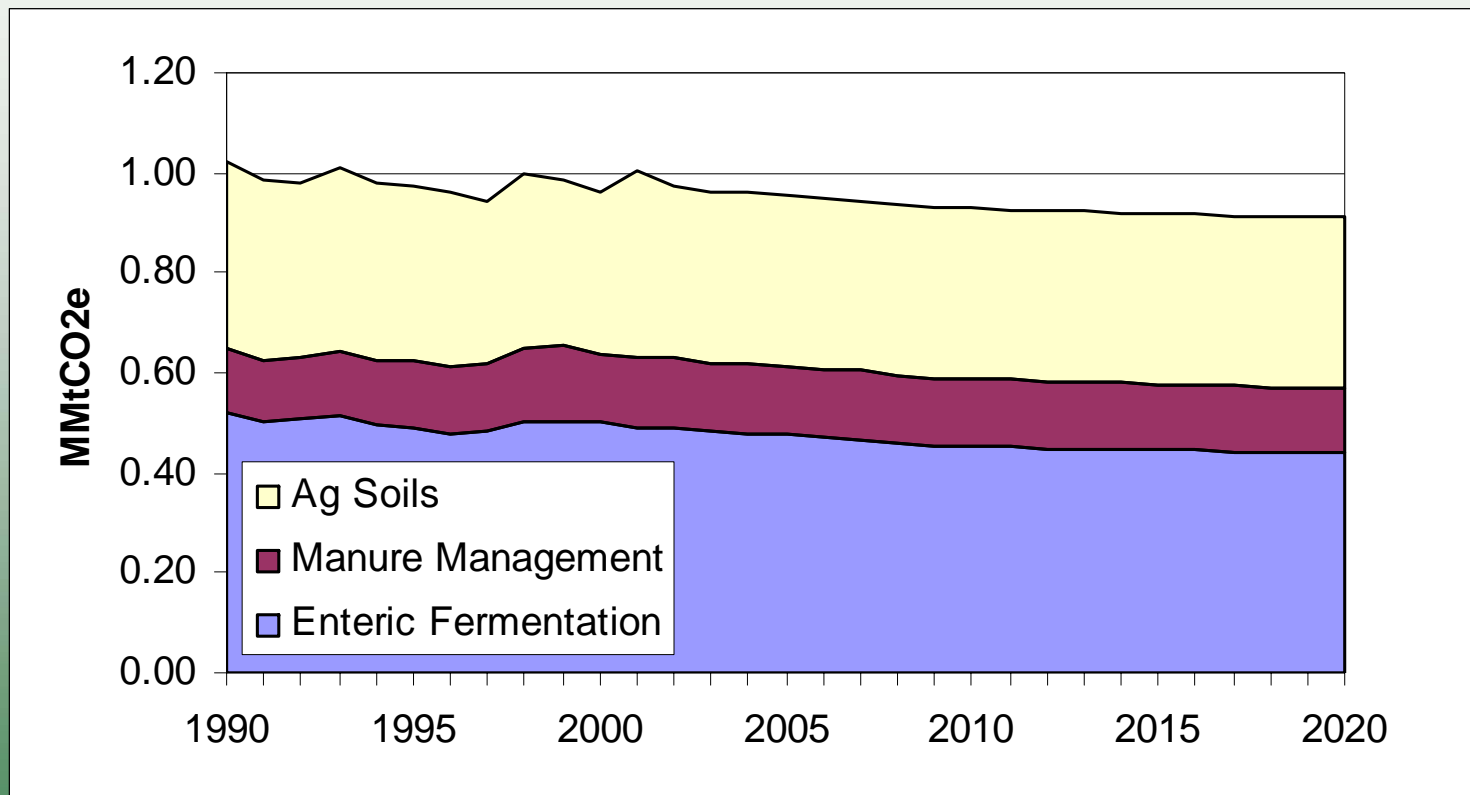
Vermont Emissions Growth



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
- 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

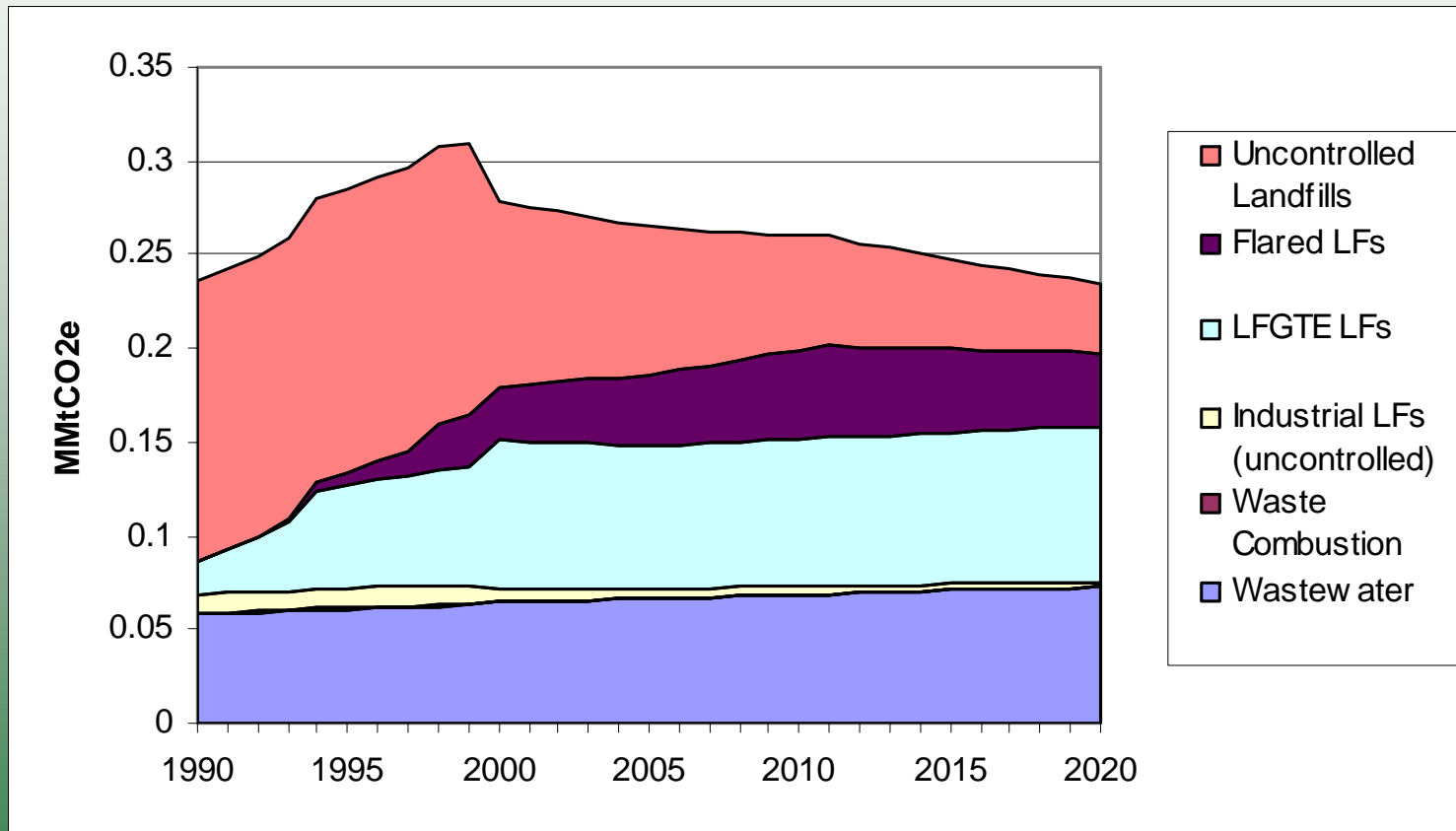
Forestry

- 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.

Part 3

- Draft Potential GHG Mitigation Options

CCS Catalog of State Actions

- Actions undertaken or considered by a wide variety of US states
- Many actions provide GHG reductions coincidentally or as a co-benefit
- Cover all economic sectors
- Cover many implementation mechanisms

Categories of Transportation Actions

- Reduce travel demand for passengers and freight (location efficiency, community design, mode choice)
- Reduce vehicle emissions for cars and trucks
- Expand use of low emitting (renewable) fuels
- Remove fine particulates (black carbon or soot)
- Reduce emissions from service equipment

Categories of Electricity Generation Actions

- Expand low emitting and renewable sources
- Reduce fuel extraction and process emissions
- Reduce delivery related emissions
- Capture and store carbon (sequestration)
- Remove particulates (black carbon)

Categories of Residential, Commercial, Industrial Actions

- Increase energy efficiency and conservation
- Reduce industrial process related emissions
- Expand waste recovery and recycling
- Expand low embedded energy products
- Shift to low emitting product inputs

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

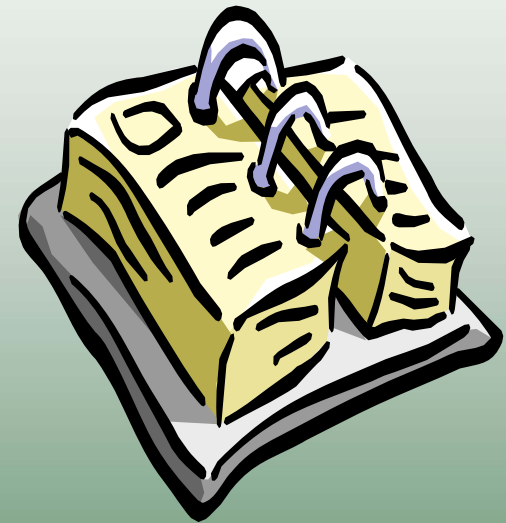
- Protect farmland and existing carbon stocks, biomass supplies
- Expand soil carbon storage and future carbon stocks, biomass supplies
- Expand renewable energy production
- Reduce process/waste emissions
- Increase energy recapture and reuse
- Improve animal feed efficiency
- Reduce food delivery/transportation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

Next TWG Call

- Agenda:
 - Discuss potential priorities for analysis of policy options
 - Review the Vermont emissions inventory and projection
 - Tentative: Thursday, November 9, 2006 from 1:00 3:00 p.m.



Public Input, Announcements