Minnesota Climate Change Advisory Group

AFW Technical Work Group Meeting #4

July 19, 2007

Minnesota Department of Commerce

Minnesota Pollution Control Agency

The Center for Climate Strategies

Agenda

- Roll Call
- Review and Approval of Previous Call Summary
- Review of TWG Voting on Priority Options for Analysis
- Discussion of Next Steps for the TWG: Development of Straw Proposals
- Continued Review of Minnesota Emissions Inventory & Forecast
- Agenda, Time and Date for Next Meeting
- Public Input and Announcements

Communication Within TWG Meetings

- TWG meetings are primarily for interaction among MCCAG TWG members;
- Other participants should refrain from intervening during MCCAG discussions, until they are called upon (note new Call-In Service);
- Agendas for each call will leave time for input from State agency staff and members of the public;
- State staff with information requiring urgent input, should consult with the State liaison to the TWG (Dave Richfield), before intervening in TWG discussions.

Stepwise Planning Process

1. Develop inventory and forecast of emissions
2. Identify a full range of possible actions
3. Identify initial priorities for analysis
4. Develop straw proposals
5. Quantify GHG reductions and costs/savings
6. Evaluate externalities, feasibility issues
7. Develop alternatives to address barriers
8. Aggregate results
9. Iterate to final agreements
10. Finalize and report recommendations

Results of TWG Balloting

- Refer to Voting Results distributed via email prior to the call.

Next Steps: Straw Proposals

- Straw Proposals: first two sections of the policy options template
- See Policy Template posted to the web page.

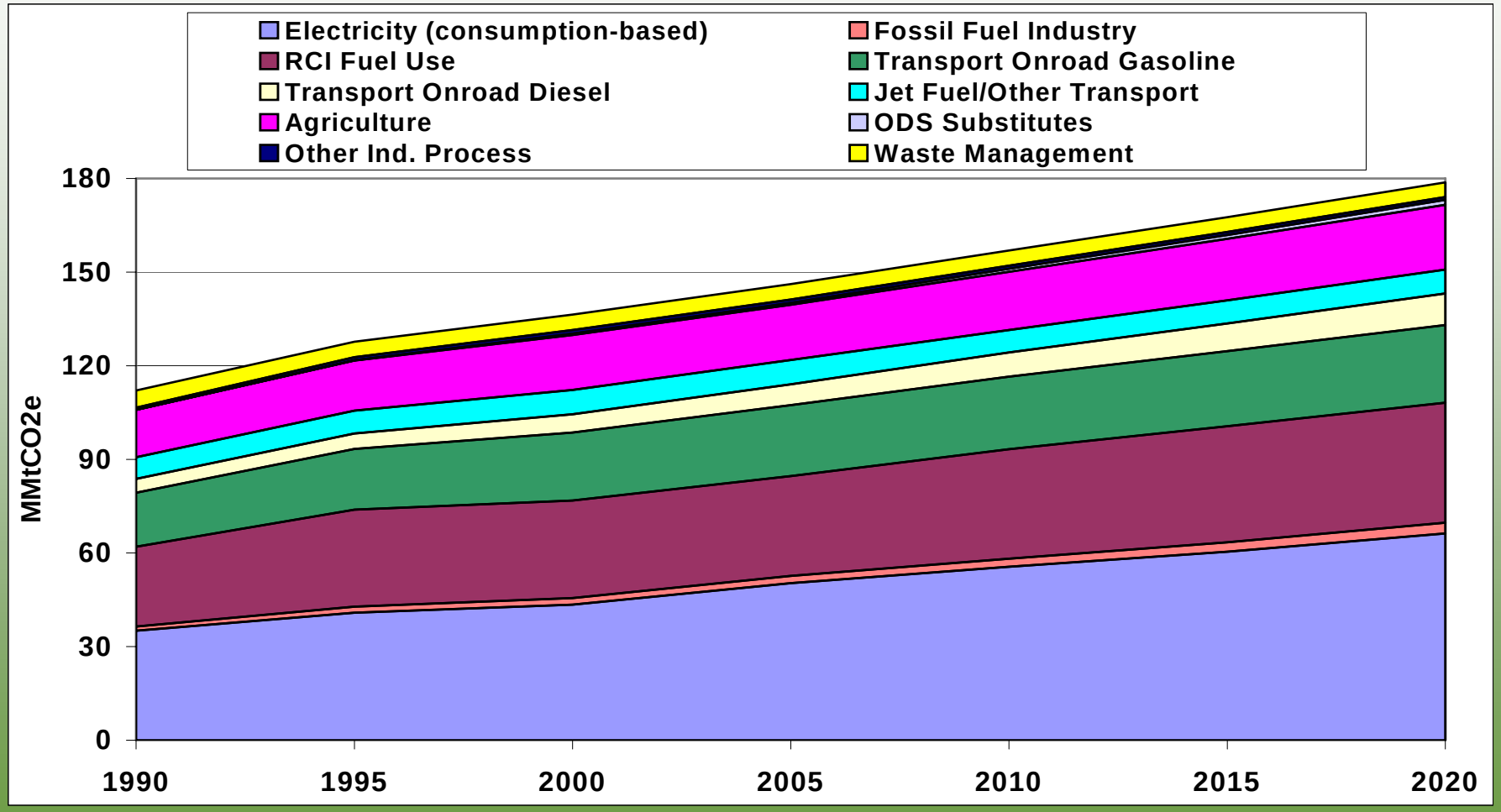
Next Steps: TWG Volunteers

- Need to assign volunteers and a lead for each of the policy options.

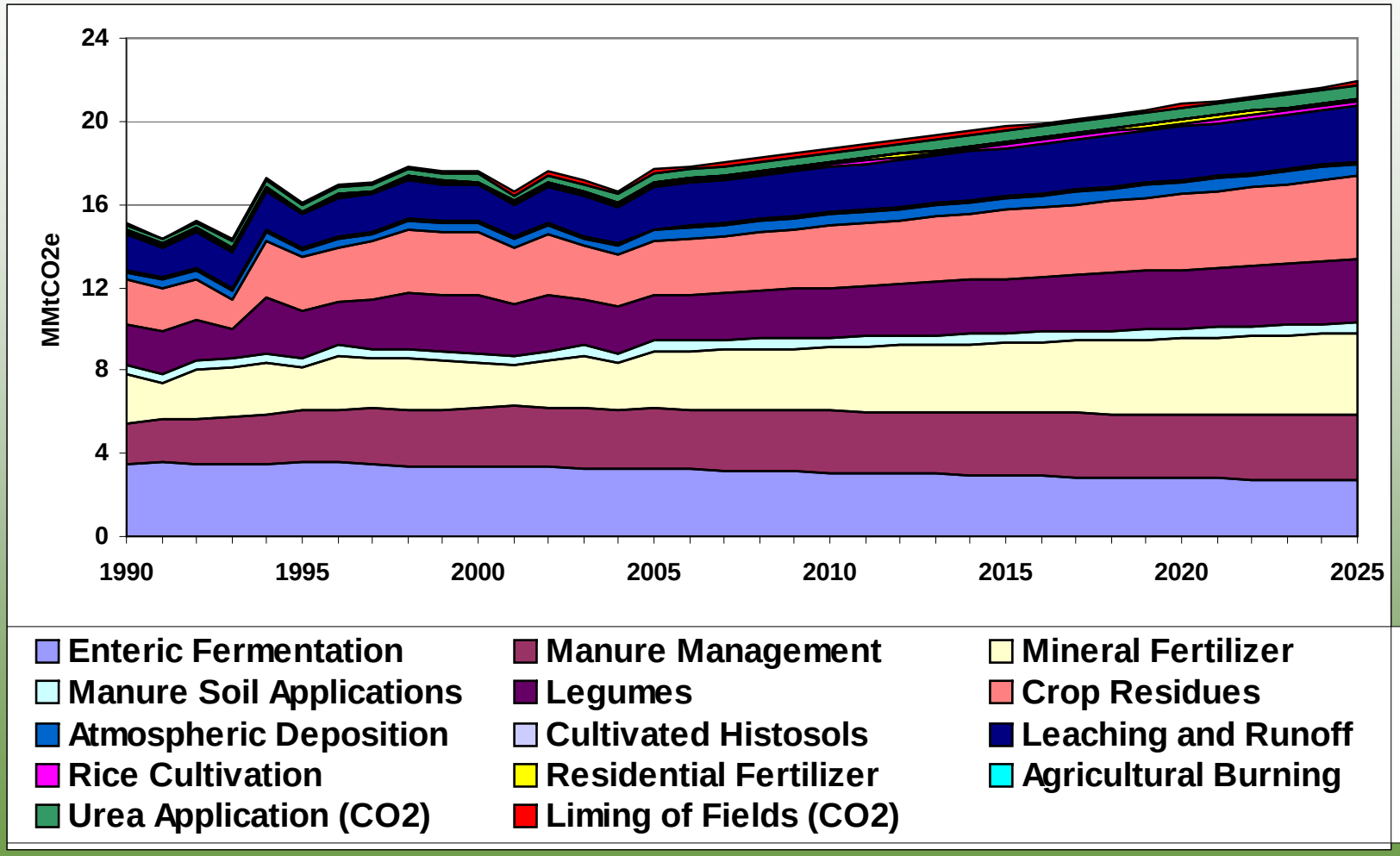
GHG Inventory & Forecast

- All TWGs need to extend forecast to at least 2025
- Matches time horizon of MN Next Generation Energy Act of 2007:
  - Per capita fossil fuel use reduced 15% by 2015
  - Renewable energy provides 25% of all energy consumed by 2025

Gross MN GHG Emissions By Sector, 1990-2020



Agriculture



Agriculture

Year	1990	1995	2000	2005	2010	2015	2020	2025
Enteric Fermentation	3.49	3.61	3.39	3.25	3.08	2.93	2.80	2.68
Manure Management	1.96	2.43	2.80	2.91	2.96	3.02	3.09	3.16
Mineral Fertilizer	2.37	2.07	2.17	2.77	3.07	3.36	3.66	3.95
Manure Soil Application	0.46	0.48	0.49	0.50	0.49	0.49	0.49	0.48
Legumes	1.91	2.24	2.73	2.18	2.40	2.61	2.83	3.05
Crop Residues	2.17	2.60	3.11	2.59	2.94	3.29	3.64	3.99
Atmospheric Deposition	0.38	0.39	0.45	0.53	0.55	0.57	0.59	0.61
Cultivated Histosols	0.10	0.09	0.10	0.10	0.10	0.10	0.11	0.11
Leaching and Runoff	1.76	1.59	1.66	2.02	2.18	2.35	2.52	2.68
Rice Cultivation	0.10	0.09	0.09	0.11	0.14	0.17	0.20	0.24
Residential Fertilizer	0.09	0.09	0.10	0.12	0.13	0.14	0.15	0.16
Agricultural Burning	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Urea Application (CO_2)	0.20	0.32	0.36	0.41	0.47	0.52	0.58	0.64
Liming of Fields (CO_2)	0.09	0.10	0.14	0.18	0.17	0.16	0.15	0.14
Total	**14.8**	**15.7**	**17.1**	**17.1**	**18.0**	**19.0**	**20.1**	**21.1**

Agriculture – Soil Carbon

Changes in Cropland			Changes in Hayland				Other			Total[4]
Plowout of grassland to annual cropland[1]	Cropland manage-ment	Other cropland[2]	Cropland converted to hayland[3]	Hayland manage-ment	Cropland converted to grazing land[3]	Grazing land manage-ment	CRP	Manure application	Cultivation of organic soils	Net soil carbon emissions
4.62	0	-0.04	-3.01	-0.11	-0.55	0.04	-0.95	-1.18	5.24	4.06

Based on USDA 1997 estimates. Negative values indicate net sequestration.

[1] Losses from annual cropping systems due to plow-out of pastures, rangeland, hayland, set-aside lands, and perennial/horticultural cropland (annual cropping systems on mineral soils, e.g., corn, soybean, cotton, and wheat).

[2] Perennial/horticultural cropland and rice cultivation.

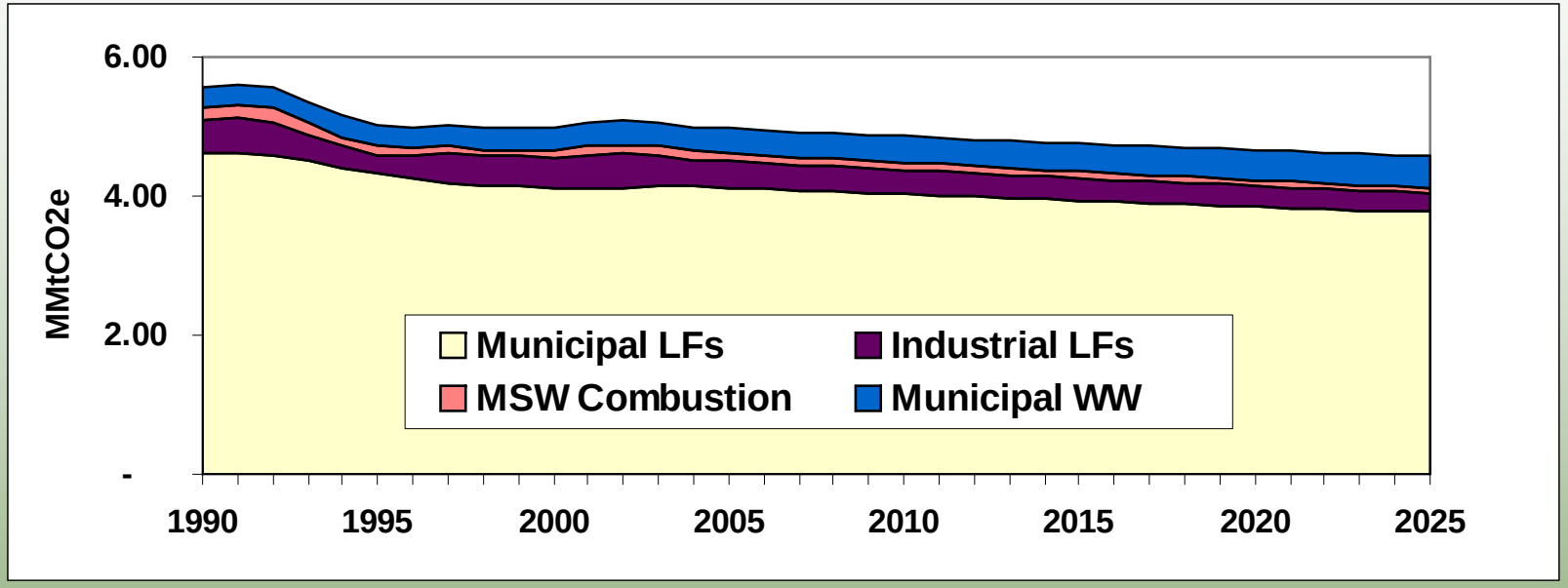
[3] Gains in soil carbon sequestration due to land conversions from annual cropland into hay or grazing land.

[4] Total does not include change in soil organic carbon storage on federal lands, including those that were previously under private ownership, and does not include carbon storage due to sewage sludge applications.

Agriculture

- Data Sources: MN PCA Inventory
- Methods
  - Agricultural Soils: Crop production data and EPA emission factors
  - Enteric Fermentation and Manure Management: livestock populations and EPA emission factors
  - Fertilizer: Fertilizer consumption and EPA emission factors
  - Agricultural Burning: SGIT and crop production data
  - Growth based on historical trends
- Key Assumptions
  - Future growth assumed to follow historical trends
- Key Uncertainties
  - Projection data

Waste Management



Year	1990	1995	2000	2005	2010	2015	2020	2025
Municipal LFs	4.62	4.32	4.10	4.12	4.03	3.94	3.85	3.76
Industrial LFs	0.47	0.28	0.44	0.37	0.34	0.31	0.29	0.27
MSW Combustion	0.18	0.13	0.11	0.12	0.11	0.10	0.09	0.08
Municipal WW	0.28	0.30	0.33	0.35	0.37	0.40	0.43	0.47
Industrial WW	0	0	0	0	0	0	0	0
Total	**5.55**	**5.03**	**4.97**	**4.96**	**4.85**	**4.75**	**4.66**	**4.58**

Waste Management

- Data sources
  - Landfills: EPA LandGEM Model with MN PCA inputs
  - Waste combustion: MN PCA
  - Wastewater: State population
- Methods
  - LandGEM Model estimates emissions
  - Waste combustion and Wastewater: EPA emission factors with data sources above

Waste Management

- Key Assumptions
  - Growth Rates: based on historical emissions trends
- Key Uncertainties
  - Future controls applied to uncontrolled landfills
  - Assumption that future growth will follow historical trends
  - Industrial WW –lack of data for meat/poultry, pulp/paper, and food/vegetable processing

Forestry

USFS - 1990-2003 Carbon Stocks

Forest Pool	**1990 (MMtC)**	**2003 (MMtC)**
Live Tree – Above Ground	292	282
Live Tree – Below Ground	58.1	56.2
Understory	12.8	12.5
Standing Dead	29.3	27.4
Down Dead	27.5	26.4
Forest Floor	120	117
Soil Carbon	1,180	1,110
Totals	**1,719**	**1,629**
Forest Area	**1990 (10^3 acres)**	**2003 (10^3 acres)**
All Forests	16,682	16,230
Timberland	14,722	14,759

Positive numbers indicate net emission. Totals may not sum exactly due to independent rounding.
Data source: Jim Smith, USFS, personal communications with S. Roe, CCS, October 2006 and May 2007.

Forestry

USFS – Carbon Flux 1990-2003

Forest Pool	1990-2003 Flux (MMtC/yr)	1990-2003 Flux ($MMtCO_2$/yr)
Forest Carbon Pools	7.4	27.1
Harvested Wood Products	-1.3	-4.6
Totals	**6.1**	**22.5**
Totals (excluding soil carbon)	**0.25**	**0.92**

Positive numbers indicate net emission. Totals may not sum exactly due to independent rounding.

Data source: Jim Smith, USFS, personal communications with S. Roe, CCS, October 2006 and May 2007.

Forestry

- Data Sources
  - USFS carbon stock for 2 inventories (1990-2003) based on FORCARB2 model
  - USFS also provides modeled estimates for harvested wood products
- Methods
  - Forestry: USFS FORCARB2 carbon stock change model provides carbon pools for each inventory cycle
  - Flux calculated for each pool based on difference in time between inventory cycles
  - Carbon pool data for the 1990-2003 time-period used to quantify flux.

Forestry

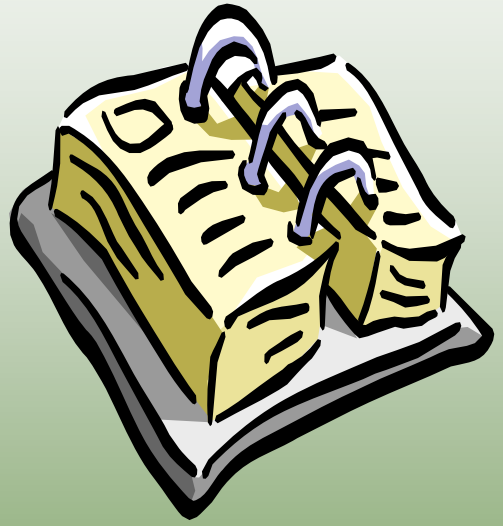
- Key Assumptions
  - 1990-2003 carbon stock trends representative of current conditions
  - No significant change in sequestration trends from 2006-2020
- Key Uncertainties
  - Effects of future development on forested acreage
  - Effects of near-term climate change on forest sequestration levels

Next Steps

- Next Call: Review MCCAG input on list of priorities
- Discuss details on framing straw proposals
- Continued review and revision of GHG Inventory & Forecast

Next TWG Meeting

- Agenda:
  - Review results of TWG voting on priorities for analysis
  - Continue review/revision of Minnesota emissions inventory and projections
- Time and Date (tentative): August 16, 3:00-5:00 pm or time change?
- Remaining TWG meetings (time?): September 6, October 4, October 25, November 29, December 20.



Public Input, Announcements