Maryland Greenhouse Gas and Carbon Mitigation Working Group

Meeting #3
September 28, 2007

Maryland Department of the Environment
Maryland Energy Administration
The Center for Climate Strategies

Welcome and Introductions

- Maryland Department of the Environment
- Maryland Energy Administration
- Other Maryland State Agencies
- Maryland Greenhouse Gas and Carbon Mitigation Working Group (MWG)
- Members of the Public
- Center for Climate Strategies

Agenda

- Introductions and review of agenda
- Review of Process and Timeframe
- MEA State Energy Plan Update
- Review and Approval of TWG Catalogs of State Actions
  - Agriculture, Forestry, and Waste
  - Residential, Commercial, and Industrial
  - Energy Supply
  - Transportation and Land Use
  - Cross-Cutting Issues
- Science & Technical Working Group - Reflections on Goals
- Further Discussion on State Goals
- Next Steps and Agenda, Time and Date for Next Meeting
- Public Input and Announcements

Stepwise Planning Process

1. Develop inventory and forecast of emissions - Ongoing
2. Identify a full range of possible actions - **Sept. 28**

Next MCCC meeting - **Oct. 17**

3. Identify initial priorities for analysis (including 4-5 solid fast-track policy options) - **Oct. 26**

Interim Report to MCCC for approval - **Nov. 14**

4. Develop straw proposals - TBD
5. Quantify GHG reductions and costs/savings - TBD
6. Evaluate externalities, feasibility issues - TBD
7. Develop alternatives to address barriers - TBD
8. Aggregate results - TBD
9. Iterate to final agreements - TBD
10. Finalize and report recommendations - TBD

Recent Developments Update

- MEA State Energy Plan Update

Catalog of States Actions

- 300+ 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
- Starting place for identifying priorities for further consideration by the MWG

Decision Criteria

- GHG Reduction Potential (CO2e) (quantified)
- Cost Per Ton GHG Removed (quantified)
- Additional Issues (may or may not be quantified)
- Feasibility Issues (qualitative)

Policy Option Template

- Policy Description (Concept)
- Policy Design (Goals, Timing, Coverage)
- Implementation Methods
- Related Programs and Policies (BAU)
- Estimated GHG Reductions and Costs/Savings
  - Data Sources, Methods and Assumptions
  - Key Uncertainties
- Additional (non-GHG) Benefits and Costs, as Needed
- Feasibility Issues, if Needed
- Status Of Group Approval
- Level of Group Support
- Barriers to Consensus, if any

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 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 Waste 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

Categories of Residential, Commercial, Industrial Actions

- Increase energy efficiency and conservation
- Switch to lower GHG energy sources and products
- Reduce industrial process-related emissions
- Expand waste recovery and recycling

Categories of Energy Supply Actions

- Expand low-emitting and renewable energy sources
- Improve efficiency of electricity generation and delivery
- Reduce emissions from fossil fuel production activities
- Capture and store carbon (geological sequestration)
- Consider GHG emissions policies

Categories of Transportation and Land Use Actions

- Reduce travel demand for passengers and freight
- 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

Cross-Cutting Issues

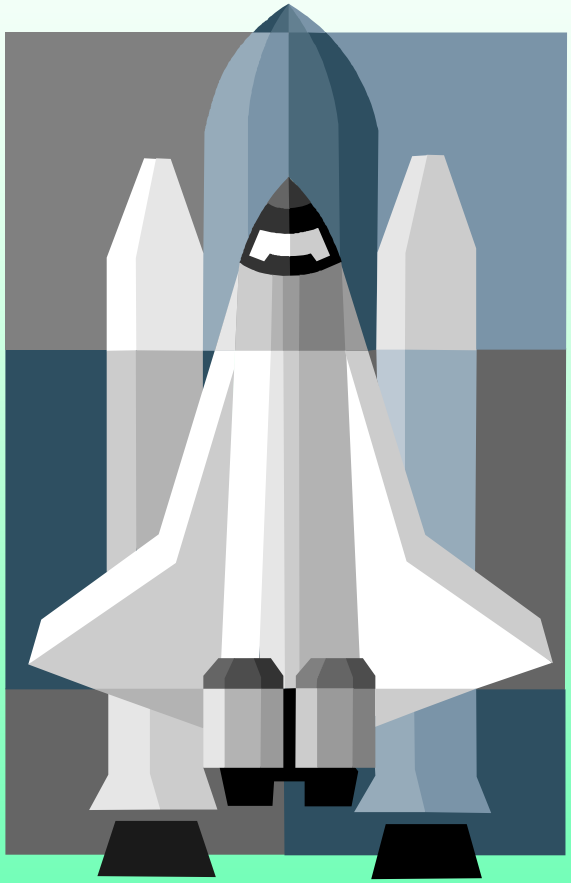
- GHG Inventory and Forecasting
- Reporting of GHG Emissions
- GHG Emission Reduction Registry
- State Goals/Targets
- The State's Own GHG Emissions
- Regional Efforts, Local Governments, Clearinghouses, etc.
- Public Education and Outreach
- Tax and Cap Policies, Market Mechanisms

TWG Next Steps

- Identify “priorities for analysis” from catalog of state actions to recommend for MWG approval
- Review and revision of Maryland GHG inventory and forecast

Break

Goals Discussion: What's Science Say?



- Reductions in the 25-40% range from 2000 levels by 2020 may be needed to avoid IPCC's most catastrophic forecasts.
- Reductions as high as 85% appear to be needed by 2050
- Reductions that are *earlier* and/or *greater* can provide significant additional benefits in avoiding global warming.

IPCC FAR WGIII – Equilibrium Temperature Rise

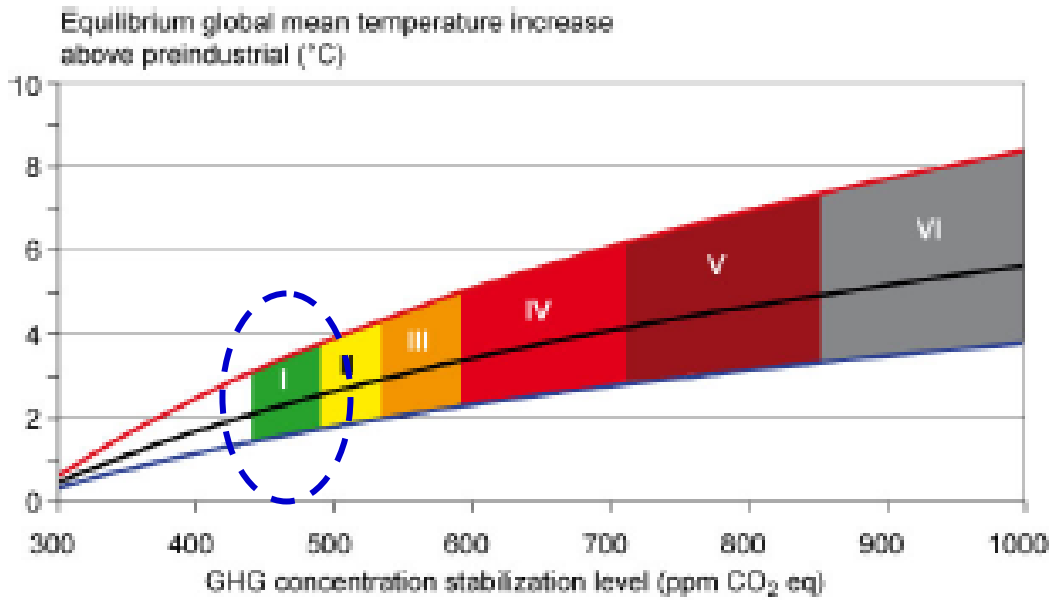


Figure SPM 8: Stabilization scenario categories as reported in Figure SPM.7 (coloured bands) and their relationship to equilibrium global mean temperature change above pre-industrial, using (i) "best estimate" climate sensitivity of 3°C (black line in middle of shaded area), (ii) upper bound of likely range of climate sensitivity of 4.5°C (red line at top of shaded area) (iii) lower bound of likely range of climate sensitivity of 2°C (blue line at bottom of shaded area). Coloured shading shows the concentration bands for stabilization of greenhouse gases in the atmosphere corresponding to the stabilization scenario categories I to VI as indicated in Figure SPM.7. The data are drawn from AR4 WGI, Chapter 10.8.

IPCC FAR - Working Group III

Table SPM.5: Characteristics of post-TAR stabilization scenarios [Table TS 2, 3.10][a)]

Category	Radiative Forcing (W/m^{2})	CO_2 Concentration[c)] (ppm)	CO_2-eq Concentration[c)] (ppm)	Global mean temperature increase above pre-industrial at equilibrium, using "best estimate" climate sensitivity[b), c)] (°C)	Peaking year for CO_2 emissions[d)] (year)	Change in global CO_2 emissions in 2050 (% of 2000 emissions)[d)] (%)	No. of assessed scenarios
I	2.5 – 3.0	350 – 400	445 – 490	2.0 – 2.4	2000 - 2015	-85 to -50	6
II	3.0 – 3.5	400 – 440	490 – 535	2.4 – 2.8	2000 - 2020	-60 to -30	18
III	3.5 – 4.0	440 – 485	535 – 590	2.8 – 3.2	2010 - 2030	-30 to +5	21
IV	4.0 – 5.0	485 – 570	590 – 710	3.2 – 4.0	2020 - 2060	+10 to +60	118
V	5.0 – 6.0	570 – 660	710 – 855	4.0 – 4.9	2050 - 2080	+25 to +85	9
VI	6.0 – 7.5	660 – 790	855 – 1130	4.9 – 6.1	2060 - 2090	+90 to +140	5
						Total	177

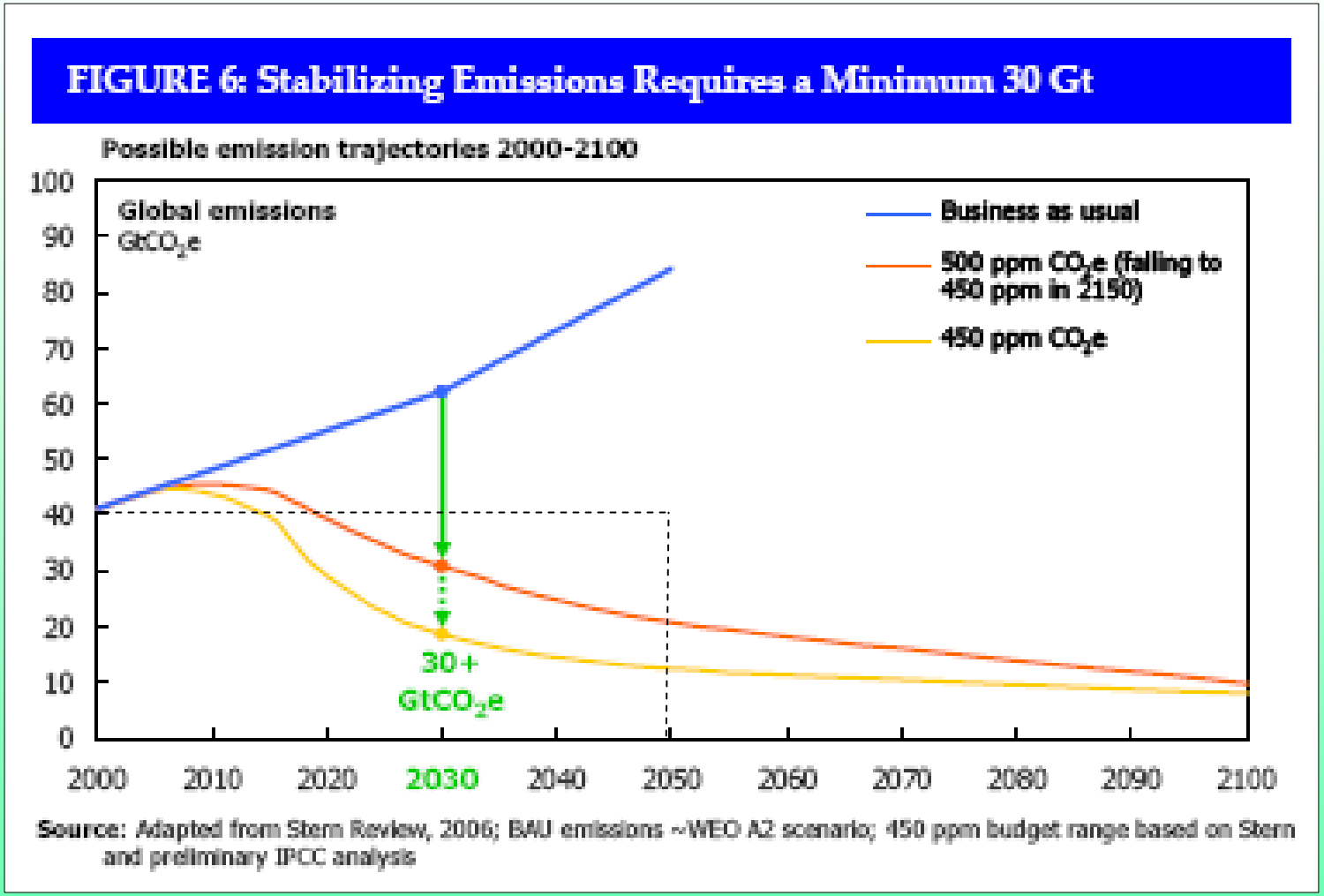
a) The understanding of the climate system response to radiative forcing as well as feedbacks is assessed in detail in the AR4 WGI Report. Feedbacks between the carbon cycle and climate change affect the required mitigation for a particular stabilization level of atmospheric carbon dioxide concentration. These feedbacks are expected to increase the fraction of anthropogenic emissions that remains in the atmosphere as the climate system warms. Therefore, the emission reductions to meet a particular stabilization level reported in the mitigation studies assessed here might be underestimated.

b) The best estimate of climate sensitivity is 3°C [WG 1 SPM].

c) Note that global mean temperature at equilibrium is different from expected global mean temperature at the time of stabilization of GHG concentrations due to the inertia of the climate system. For the majority of scenarios assessed, stabilisation of GHG concentrations occurs between 2100 and 2150.

d) Ranges correspond to the 15th to 85th percentile of the post-TAR scenario distribution. CO_2 emissions are shown so multi-gas scenarios can be compared with CO_2-only scenarios.

As Framed by the Stern Review



Scientific and Technical Working Group: Reflections on Goals

- Dr. Don Boesch, UMD-CES - Chair

Goals or Standards?

- State climate action plans use goals as the basis for developing a plan
  - This is similar to the State Implementation Plan (SIP) concept used for ozone and fine particle nonattainment
  - A plan may contain 50 to 100 individual regulations or programs
- The individual elements of the plan often contain enforceable standards
  - Maryland Clean Cars, RGGI, etc.
  - These rulemakings involve stakeholders and follow State public participation procedures
  - Where the “plan” gets most of its teeth

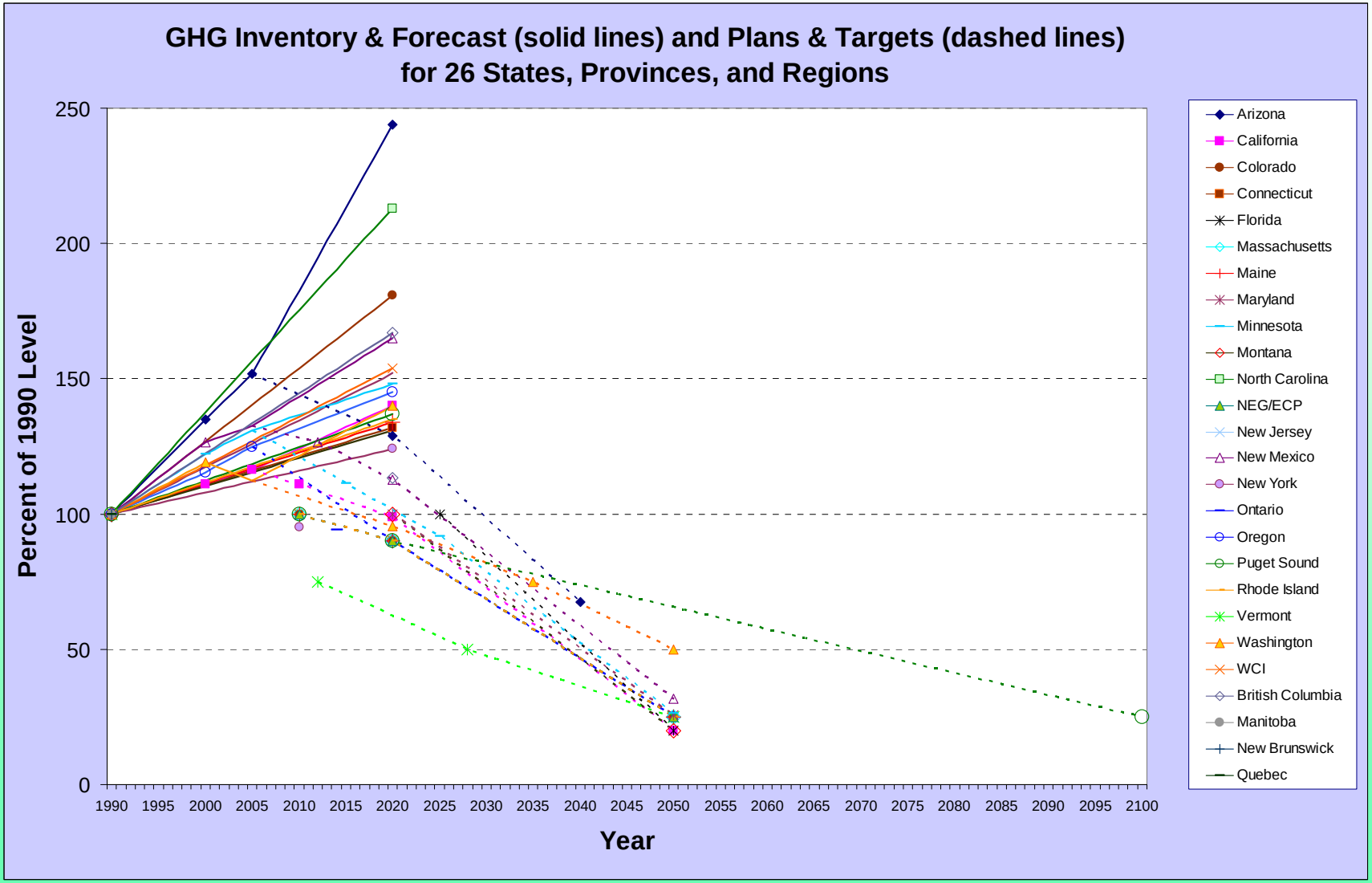
Goals & Trading Programs

- Some states have paired GHG reduction goals with plans for an economy-wide trading program (CA, AZ, NM, OR, WA, UT, etc.)
- The details of how their trading programs will work will be determined as part of regulations to be adopted by the state.
- Cap-and-trade concepts and other market-based, trading mechanisms are being considered

Setting GHG Goals and Targets

- Typically a climate action plan cornerstone
- Executive Order direction:
  - Evaluate and recommend goals that include but not be limited to the reduction of Maryland's greenhouse gas emissions to *1990 levels by 2020* and *80% of 2006 levels by 2050*
  - Recommendations go to the Governor and the General Assembly
- Experience from other states and regions
- Key issues in setting statewide GHG reduction goals or targets

Various Growth Rates & Goals



Key Issues in Setting Statewide GHG Reduction Goals or Targets

- Growth Rate
- Baseline
- Level(s) of Reduction
- Target Date(s) – Short-term? Long-term?
- Consumption vs. Production Approach
- Gross Emissions vs. Net Emissions
- Aspirational vs. “Ground-Up” Approach

Question: Short or Long Term Goals?

- Most states have set both short and long term goals
  - Short term
    - 2010-2015
  - Mid term goals
    - 2020-2025
  - Long term goals
    - 2050 and beyond
- Early goals are generally more “concrete”
- Later goals are often more “visionary” and aspirational

Question: Periodic Goal Updates?

- Many state plans recognize the need to update action plans and goals if necessary
- Again, reflective that:
  - Earlier goals are typically more certain
  - Later goals are likely to need "tweaking" or "course corrections" as programs are actually implemented and available data improves

Aspirational or Cautious?

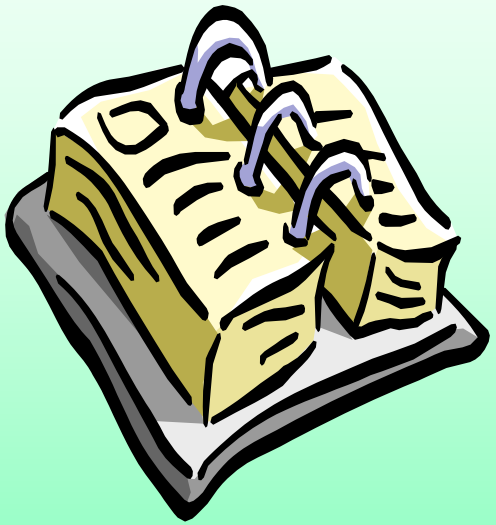
- Clearly want to set targets that meet or beat the reductions science says are needed
- But need to balance with appreciation of how the goals would be achieved
  - Especially for earlier deadlines that are more regulatory in nature
- Is there a way to build *both* the aspirational component *and* the realities of implementation into the goal setting process?

A Straw Proposal

- 2015
  - 15% below 2006 levels
  - Initial target for the State Action Plan
- 2020
  - 25-50% below 2006 levels by 2020
  - 25% = “the minimum” driving an AB32-like trading program
  - 50% = an aspirational goal for 2020 time-frame
    - Trading program could reward over-controllers
- 2050
  - 90% below 2006 levels
  - Used as an aspirational target for the State Action Plan
- 2100
  - Zero emission or carbon-neutral
  - Use as a visionary goal to push research and innovation
- Mid-Course Review every 5 years

Next MWG Meeting

- Date, Time, Location
  - October 26, 2007
  - Time: TBD
  - Location: MDE
- Agenda:
  - Review and approve a “fast-track” recommendation from each TWG
  - Review and approve TWG priority policy options for further analysis
  - Review TWGs’ suggested updates to the Maryland GHG emissions inventory and forecast



Public Input, Announcements

Break

Question: What End in Mind?

- Why have climate goals?
  - One Extreme:
    - Set minimum targets we know we can reach with current technologies and programs?
    - Sometimes enforceable
  - The Other:
    - Push the envelope on technologies and programs and strive to reach it?
    - Usually aspirational