



**MINNESOTA**  
Climate Change  
Advisory Group



# Minnesota Climate Change Advisory Group

Energy Supply  
Technical Work Group Meeting #1  
May 17, 2007

Minnesota Department of Commerce  
Minnesota Pollution Control Agency  
The Center for Climate Strategies

# Welcome and Introductions

- State of Minnesota
- Minnesota Technical Work Group (TWG) Members
- Members of the Public
- Center for Climate Strategies

# Agenda

- Introductions
- Purpose and Goals
- Review of MCCAG and TWG Processes
- Review of Minnesota energy supply  
Emissions Inventory & Forecast
- Agenda, Time and Date for Next Meeting
- Public Input and Announcements

# MCCAG Purpose & Goals

- Purpose
  - Achieve Governor’s “Next Generation Energy Initiative” goal of developing “a comprehensive plan to reduce Minnesota’s emissions of greenhouse gas emissions.”
- Goals (may be changed or added to by pending legislation)
  - Review and approval of a current and comprehensive inventory and forecast of greenhouse gas (GHG) emissions in Minnesota from 1990 to 2020;
  - Development of a comprehensive set of specific policy recommendations and associated analyses to reduce GHG emissions and enhance energy and economic policy in Minnesota by 2020 and beyond;
  - Development and recommendation of a set of recommended statewide GHG reduction goals and targets for implementation of these actions; and
  - Issuance of recommendations in the form of a final report to the Governor by February 1, 2008.

# MCCAG Roles & Responsibilities

- MCCAG Process convened by Governor Pawlenty
- DOC and PCA oversee and coordinate process
- MCCAG makes recommendations to Governor
- **TWGs provide informal guidance to MCCAG**
- Public input and review for stakeholders
- CCS provides facilitation, technical support, final report

# TWVG Roles

- Assist MCCAG
  - Identify potential state actions
  - Identify potential priorities for analysis
  - Suggest straw policy designs
  - Assist with analysis and review of options
  - Assist with development of policy alternatives
  - Assist with input to and review of MCCAG reports
  - Review and assist with the state GHG inventory and forecast

# TWG Composition

- Energy Supply
  - Heat and power generation; typical locus for cap and trade or carbon tax policy
- Commercial, Industrial, and Residential
  - Energy efficiency & conservation, industrial process, waste management
- Transportation and Land-Use
  - Including vehicle efficiency, alternative fuels & demand reduction programs, development patterns
- Agriculture, Forestry and Waste
  - Land protection, forest restoration, sustainable forest management, bioenergy, sustainable wood products, waste reduction, recycling
- Cross-Cutting Issues
  - Reporting, registries, public education

# Ground Rules

- Supportive of the process
- Attendance at meetings
- Equal footing
- Stay current with information
- No backsliding
- Do not represent the MCCAG or TWGs
- Make objective contributions

# Timing

<b>Date</b>	<b>Action</b>
April 20, 2007	1 <sup>st</sup> MCCAG meeting
June 14, 2007	2 <sup>nd</sup> MCCAG meeting
August 2, 2007	3 <sup>rd</sup> MCCAG meeting
September 27, 2007	4 <sup>th</sup> MCCAG meeting
November 8, 2007	5 <sup>th</sup> MCCAG meeting
January 10, 2008	6 <sup>th</sup> MCCAG meeting
February 1, 2008	MCCAG Report Due
Between CCAG Meetings	2 TWG conference calls and or meetings for each TWG between MCCAG meetings

# 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

# Building Consensus

- Comprehensive
- Stepwise
- Fact based
- Transparent
- Inclusive
- Collaborative
- Consensus driven



# Coverage Of Issues



- All GHG's
- All sectors
- All potential implementation mechanisms
- State and multi-state actions
- Short and long term actions

# Decision Criteria

- GHG Reduction Potential (MMTCO<sub>2</sub>e)
- Cost or Cost Saved Per Ton GHG Removed
- Co-benefits
- Feasibility Issues

# Catalog of State Actions

- Over 300 actions taken by US states across all sectors
- Existing, planned and proposed state level actions
- Wide variety of US states
- All sectors
- Wide variety of implementation mechanisms
- Includes key MN actions
- MCCAG will add new potential actions
- Starting place for identification of MCCAG priorities

# Policy Design Proposals

- TWGs start with Catalog of states' actions, screen options, and recommend priorities for MN
- MCCAG identifies about 50 draft potential priority options for further development
- TWGs develop initial policy option designs (“straw proposals”)
  - Timing
  - Goals
  - Coverage
- CCS quantifies and presents for review
- MCCAG revisits list of potential priorities, as needed

# Policy Option Template

- Policy Description (Concept)
- Policy Design (Goals, Timing, Coverage)
- Implementation Methods
- Related Programs and Policies (BAU)
- Estimated GHG Savings and Costs Per MMTCO<sub>2e</sub>
  - 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

# Final Report

- Executive Summary
- Background, Purpose And Goals
- MN Emissions Inventory & Forecast
- MCCAG Recommendations & Results
  - Agriculture
  - Forestry
  - Energy Supply
  - Residential, Commercial, Industrial
  - Transportation & Land Use
  - Waste Management
  - Cross Cutting Issues
- Appendices



# Inventory Approach

- Standard US EPA and UN methodologies, guidelines, and tools
- Emphasis on transparency, consistency, and significance
- Used MN inventory for 1990-2004/2005
  - Prepared by Peter Ciborowski, MN PCA
- Consumption and production-based emissions from electricity generation
  - Very simplified approach used for initial analysis

# Projection Approach

- Reference case assumes no major changes from business-as-usual (BAU)
  - Includes assessment of approved policies and actions to the extent possible (e.g., Renewable Energy Standards)
- Growth assumptions from existing sources
  - State population and employment forecasts
  - US Census and Bureau of Labor & Statistics
  - US Energy Information Administration

# Coverage

- Six gases per USEPA and UNFCCC guidelines
  - Carbon Dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Nitrous Oxide (N<sub>2</sub>O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur Hexafluoride (SF<sub>6</sub>)
- All major emitting sectors
  - Electricity Supply & Demand (Consumption Based)
  - Residential, Commercial, Industrial (RCI) Fuel Use and Non-fuel Use Processes
  - Transportation (onroad and nonroad)
  - Natural gas pipeline transmission & distribution
  - Agriculture, Forestry, and Waste
- Emissions expressed as CO<sub>2</sub> equivalent
  - 100-year global warming potentials
    - CO<sub>2</sub> = 1; CH<sub>4</sub> = 22; N<sub>2</sub>O = 310; halogenated gases, up to 25,000

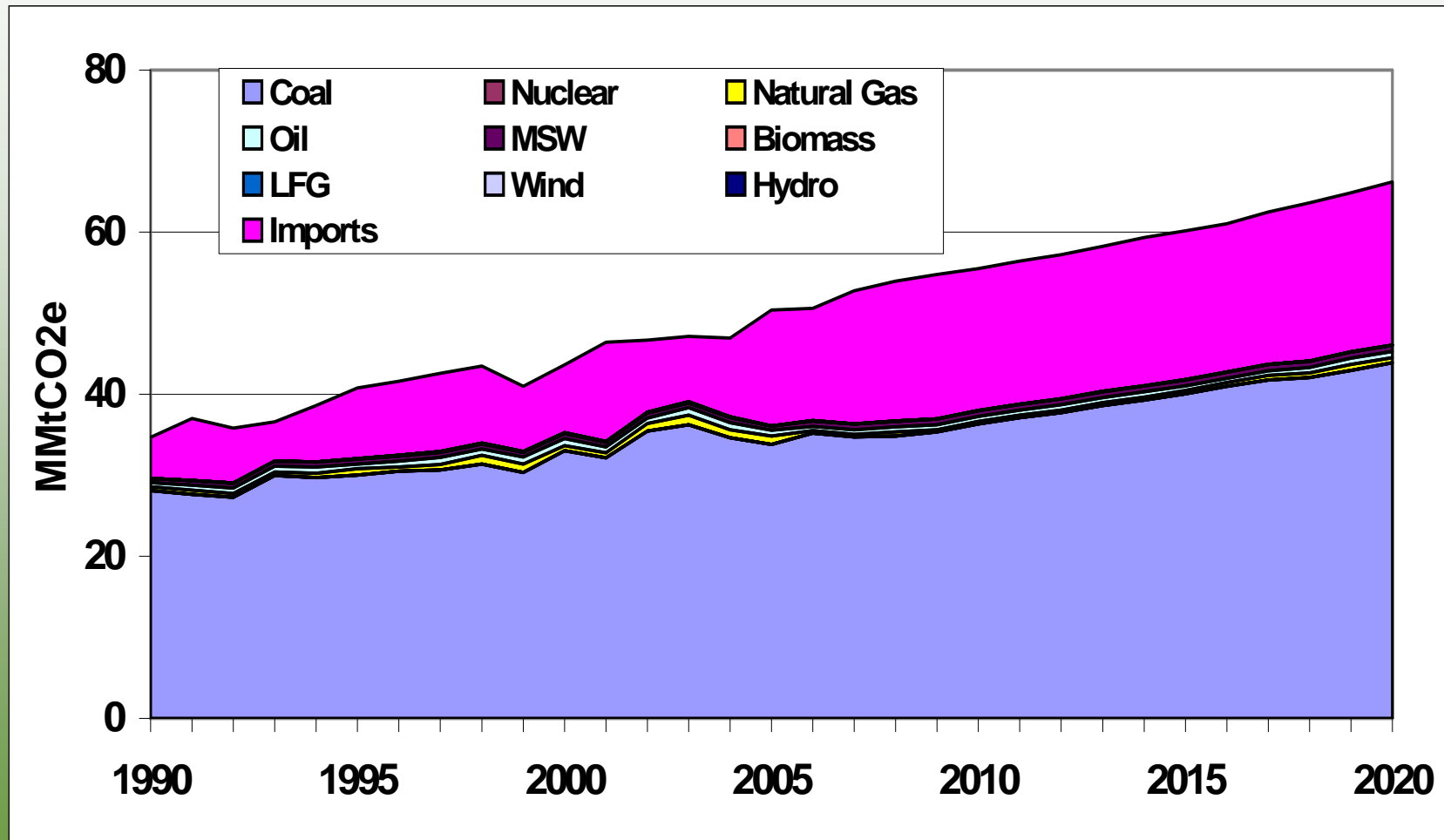
# Key Points

- Preliminary draft for MCCAG and TWG review and revision, as needed
- Helpful for diagnosis of GHG emissions, but not a baseline for modeling or compliance for individual options
- Consumption and Production methods
- Net and Gross methods

# Key Points

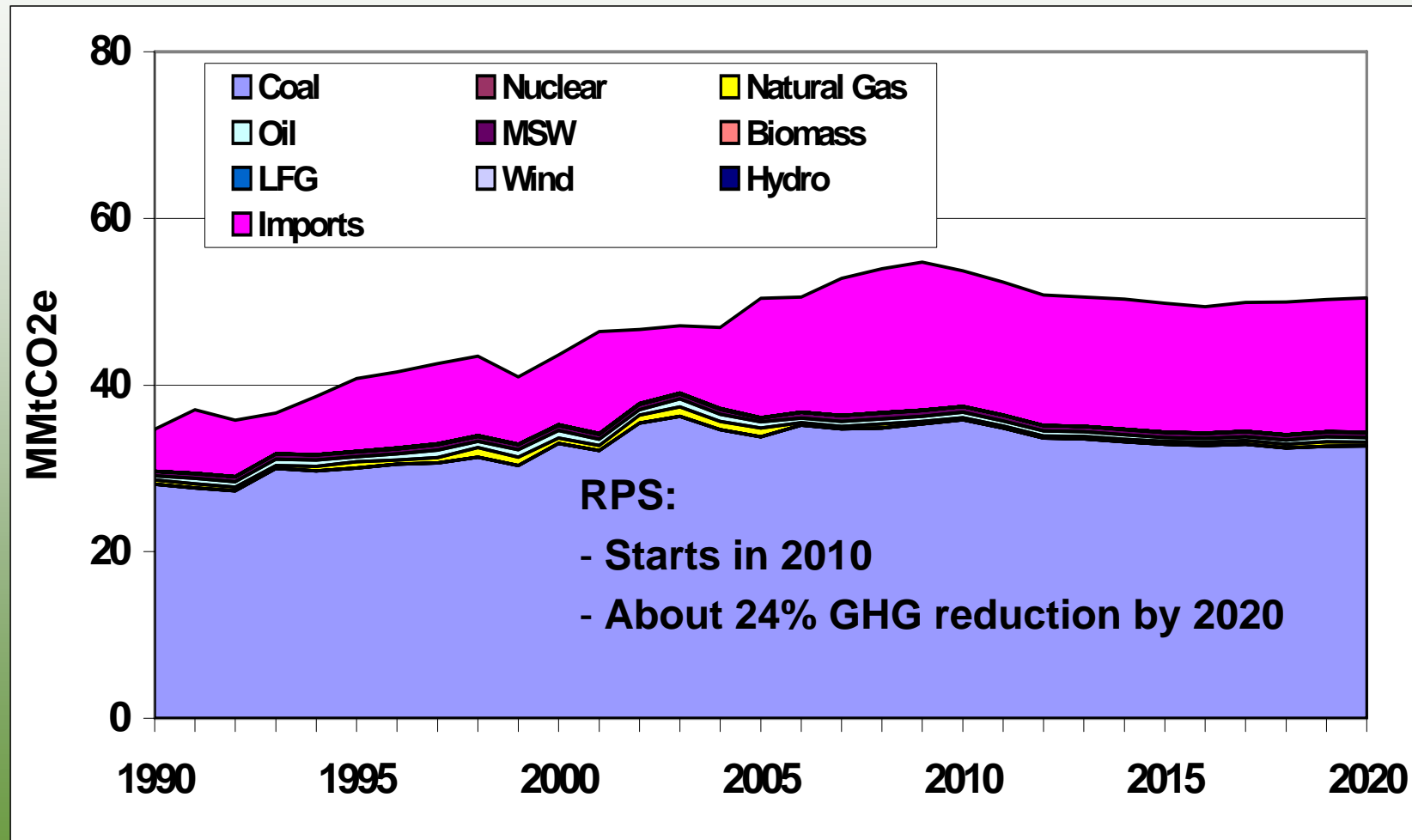
- Other Pollutants
  - MN PCA Inventory includes:
    - Carbon monoxide (CO) from combustion processes
    - CO<sub>2</sub> from biomass combustion
  - IPCC Guidelines –
    - Report CO and biomass CO<sub>2</sub> separately from six GHG pollutants
    - Good to track for multi-pollutant assessment of GHG options
  - CO and biomass CO<sub>2</sub> not included in I&F totals presented today

# GHGs from Electricity (No Renewable Energy Standards)



# GHGs from Electricity

(With Renewable Energy Standards)



# Electricity

- Data Sources

- Historical –

- In-state generation from MN PCA Inventory (1990-2004)
    - 2005 generation and fuel consumption - 906/920 Monthly Time Series data (*EIA*)
    - Monthly Cost and Quality of Fuels for Electric Plants (*EIA*) – coal-type data

- Forecast -

- MN *Certificate of Need* applications (*MNPUC*)
    - Regional outputs for the Annual Energy Outlook 2007 for Mid-Continent Area Power Pool (MAPP) region (*EIA*)

# Electricity – Key Assumptions

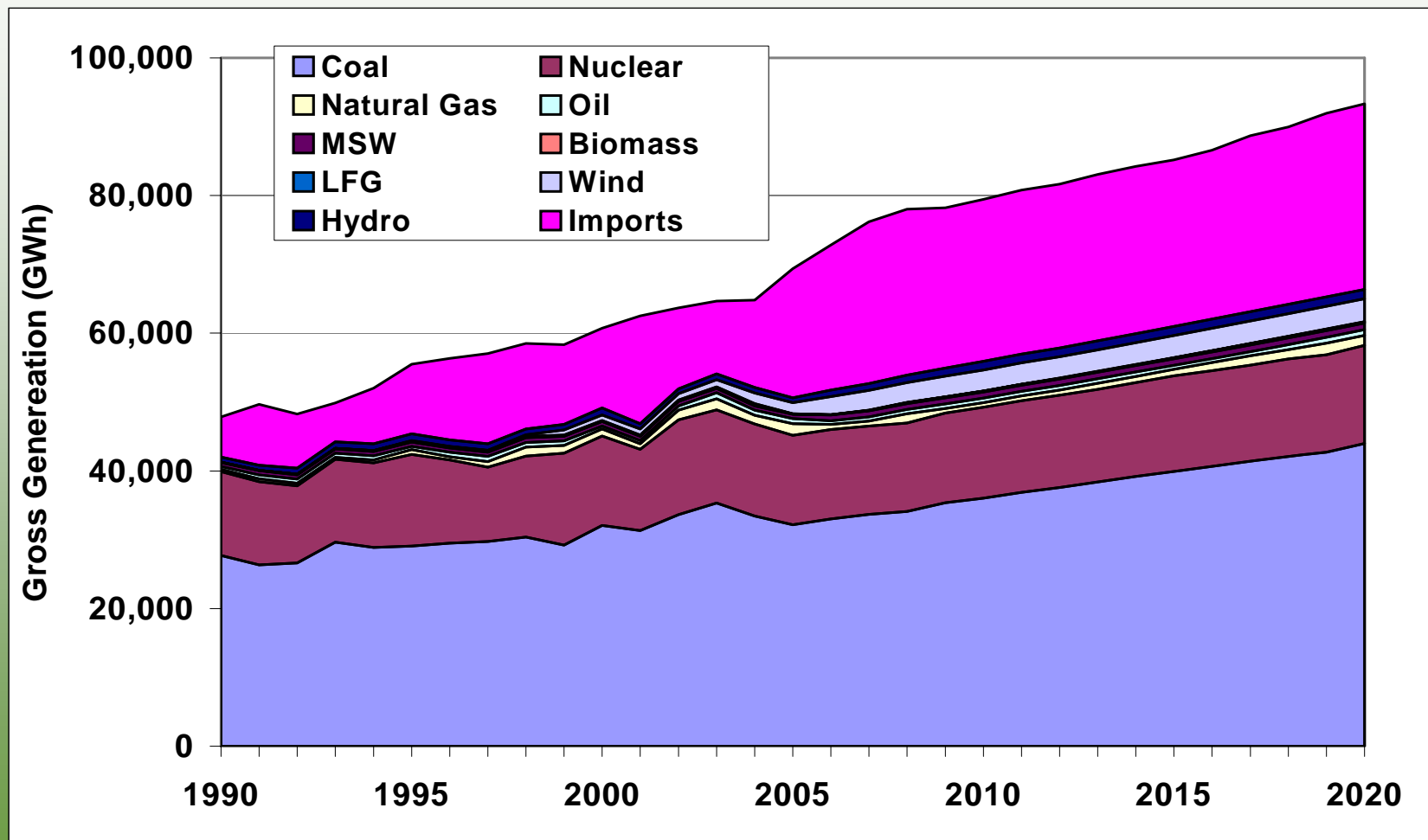
<b>Key Assumptions</b>	<b>2005</b>	<b>2020</b>	<b>Average Annual Growth / Change (%)</b>
MN electricity demand (G W h)	66,019	85,206	1.72%
MN Gross generation (G W h)	50,625	66,372	1.82%
MN utility sales to meet MN demand (G W h)	48,164	60,613	1.54%
Import sales from MAPP region (G W h)	17,855	24,593	2.16%
Gross generation from MAPP imports (G W h)	18,767	26,930	2.44%
Power plant heat rate (btu/kW h)			
<i>Coal</i>	10,942	10,348	-0.37%
<i>Nuclear</i>	10,351	10,351	0.00%
<i>Natural Gas</i>	11,190	7,487	-2.64%
<i>Oil</i>	10,379	9,743	-0.42%
<i>MSW</i>	18,505	18,505	0.00%
<i>Biomass</i>	17,763	20,715	1.03%
<i>LFG</i>	11,928	7,981	-2.64%
<i>Wind</i>	9,916	9,916	0.00%
<i>Hydro</i>	9,916	9,916	0.00%
Losses (%)			
From on-site usage	0.83%	0.29%	-6.88%
From T&D and on-site usage	4.86%	8.68%	3.94%

# Electricity

- Key Uncertainties
  - Top-down approach
    - Assumes MN electric systems evolve consistently with the surrounding Mid-Continent Area Power Pool (MAPP) region
    - Does not capture all state-specific system characteristics
  - Source of electricity imports and exports
  - Coal quality over time
    - Coal quality for 2005 assumed for forecast period

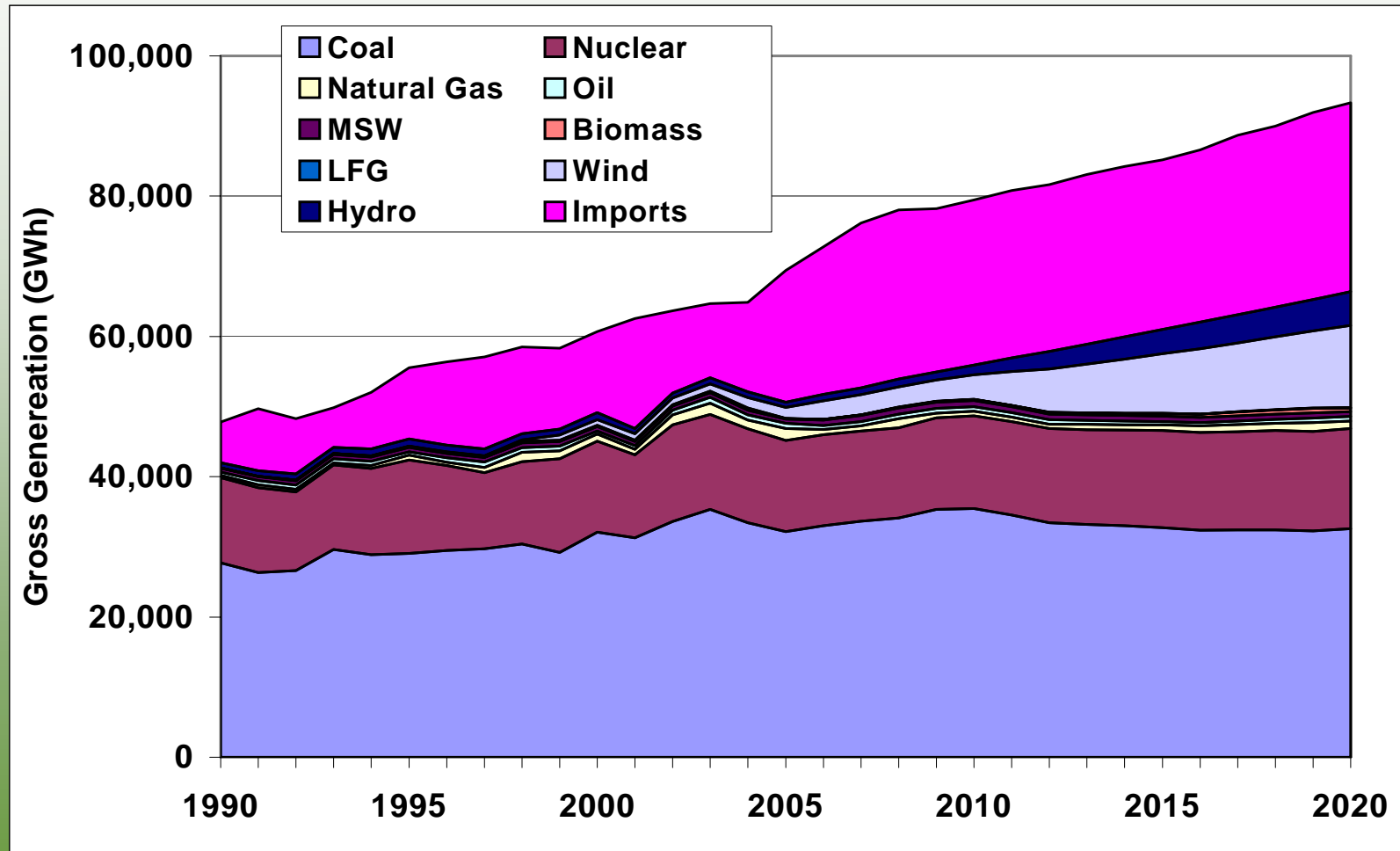
# Electric Generation

(No Renewable Energy Standard)



# Electric Generation

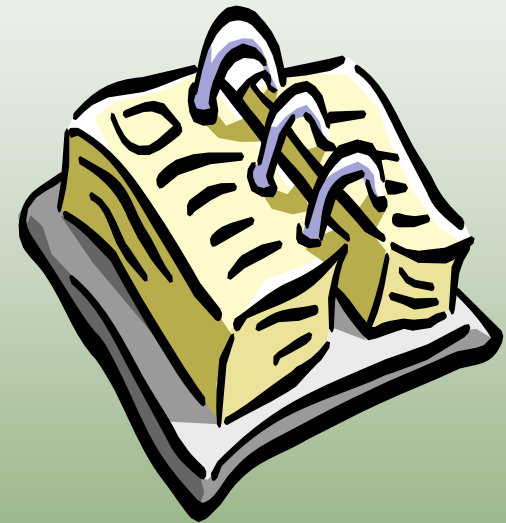
(With Renewable Energy Standard)



# Next Steps

# Next TWG Meeting

- Agenda:
  - Add missing actions to catalog
  - Complete review of Minnesota emissions inventory and projections
- Time and Date TBD
  - June 11, 9:00 AM to 10:30 AM



# Public Input, Announcements