

*North Carolina*

**Climate Action Plan Advisory Group**

# Residential, Commercial and Industrial Technical Work Group Teleconference Meeting #4

June 29, 2006



# Today's Agenda

- Call to order
- Roll Call of Technical Work Group (TWG) members
- Review and approval of last call summary (TWG Call #3)
- Continue review and discussion of the draft North Carolina greenhouse gas (GHG) emissions inventory and forecast for the Residential, Commercial and Industrial Sectors
- Discussion of Draft Consolidation of Catalog of North Carolina RCI Climate Mitigation Options
- Discussion of results of initial vote on priorities for elaboration and analysis of RCI Options
- Comments from the Public
- Proposed agenda items for next meeting
- Announcements

# NC GHG Emissions

- Inventory and Reference Case Projections 1990-2020 to support mitigation planning
  - Initial estimates by CCS for further discussion and revision
  - Not a baseline for reporting or compliance
  - Provided in transparent, review draft format
  - Uses best available references and assumptions
  - Results may change with modification of data sources, methods, assumptions

# Coverage

- Six gases per U.S. EPA 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>)
  - Black Carbon not included at this time
- All major emitting sectors
  - Electricity Consumption (production + imports)
  - Residential, Commercial, Industrial (RCI) –
    - Fuel Use & Natural Gas Transmission / Distribution Systems
    - Industrial Processes
  - Transportation
  - Agriculture and Forestry
  - Waste Management

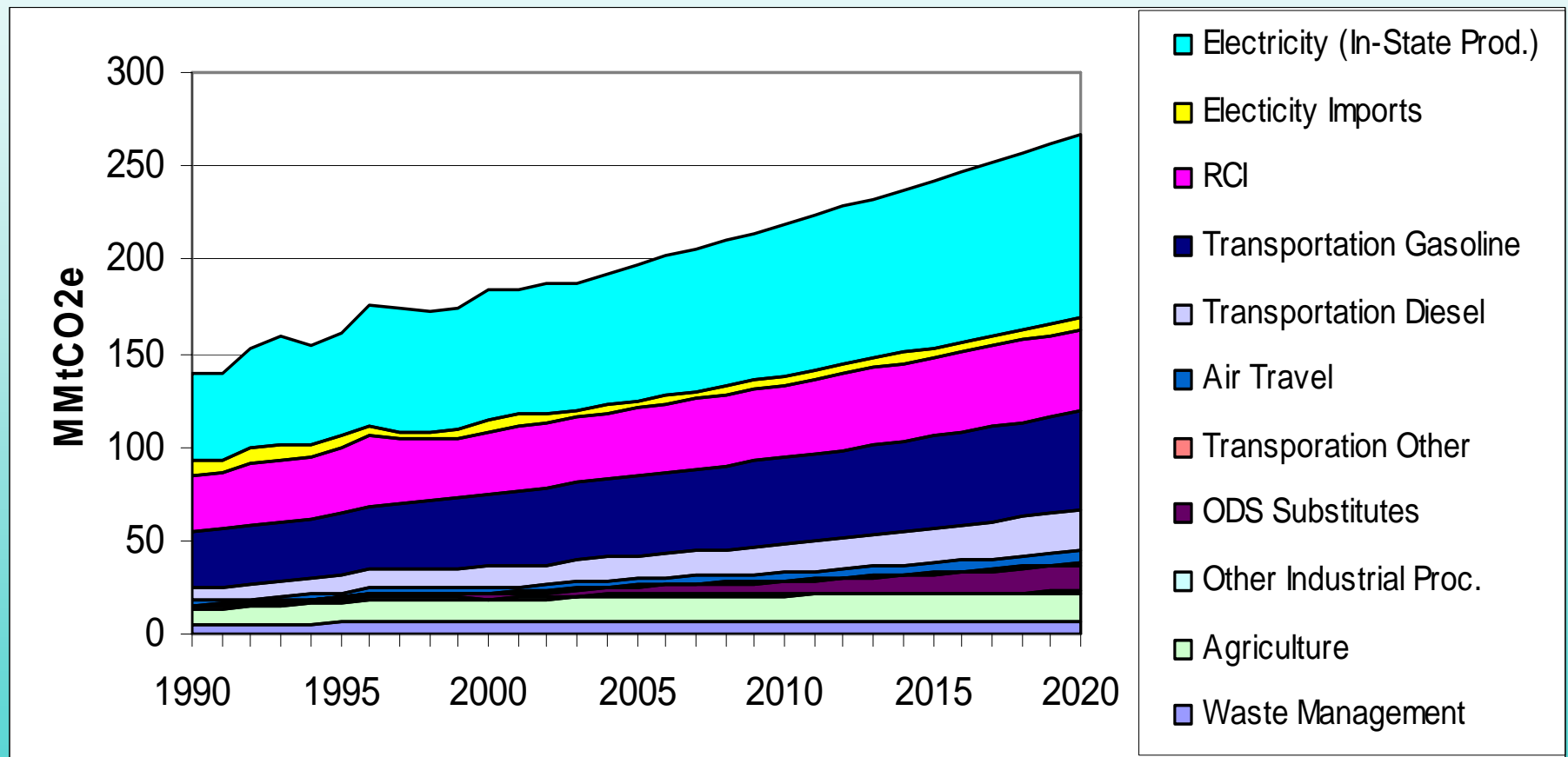
# Inventory Approach

- Historical estimates from 1990-2000 or the most recent year possible
- Standard U.S. EPA and UN methodologies, guidelines, and tools, augmented as needed for North Carolina
- Emphasis on transparency, consistency, and significance
- Preference for North Carolina or regional data, where available
- Consumption and production-basis emissions from electricity and heat generation
- Simplified approach used for initial analysis to support general planning needs
- All units expressed as million metric tons carbon dioxide equivalent (MMtCO<sub>2</sub>e)

# Projection Approach

- Forecast of emissions from most recent year to years 2010 and 2020
- Reference case assumes no major changes from business-as-usual
  - Includes approved policies and actions
  - Typically assumes constant technology and market choices
  - Uses extrapolation where modeling is not available
- Emissions growth driven by many factors

# NC GHG Emissions 1990-2020



# RCI – Fuel Use

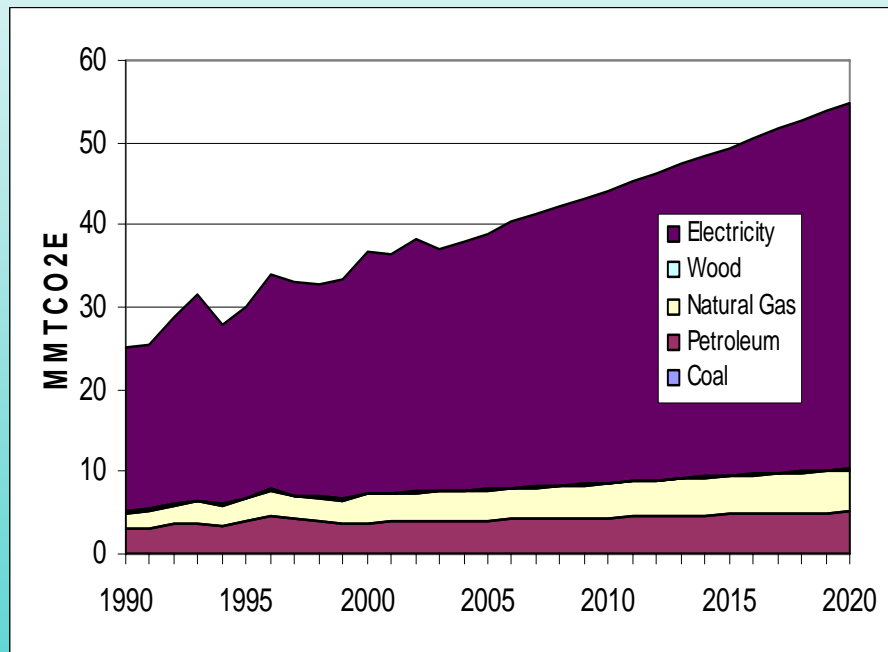
- Emission Sources:
  - Combustion of fuels
    - Coal, petroleum, natural gas, wood
  - Equipment
    - Residential – water heaters, stoves, fireplaces, furnaces
    - Comm./Ind. – boilers, furnaces, water or process heaters

# RCI – Fuel Use

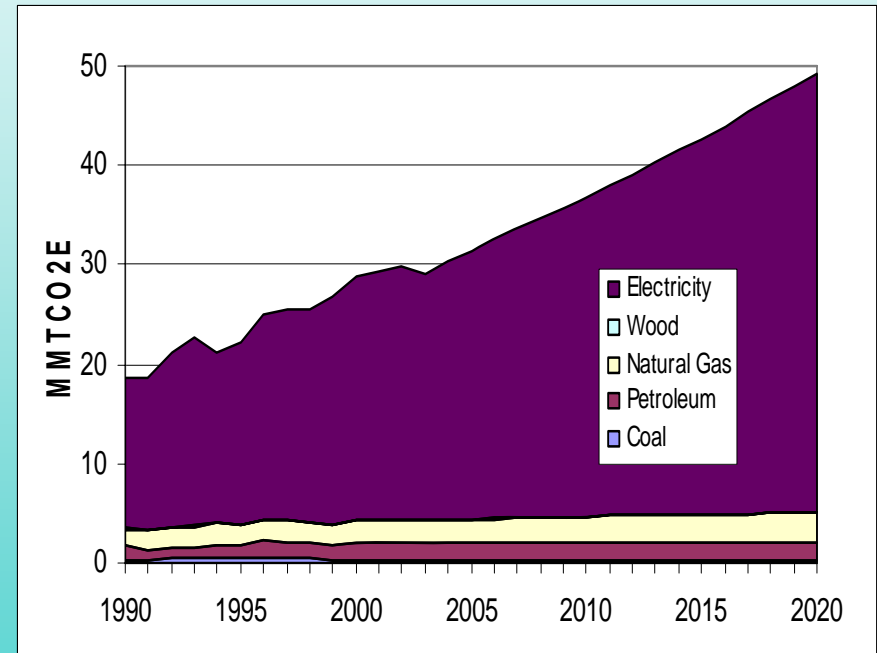
- Emission Sources:
  - Excludes industrial non-energy fuel use
    - Feedstocks for chemical manufacturing processes
- Emissions from Electricity Generation
  - Attributed to RCI sectors in proportion to the fraction of total statewide electricity use consumed by RCI

# RCI - Residential, Commercial

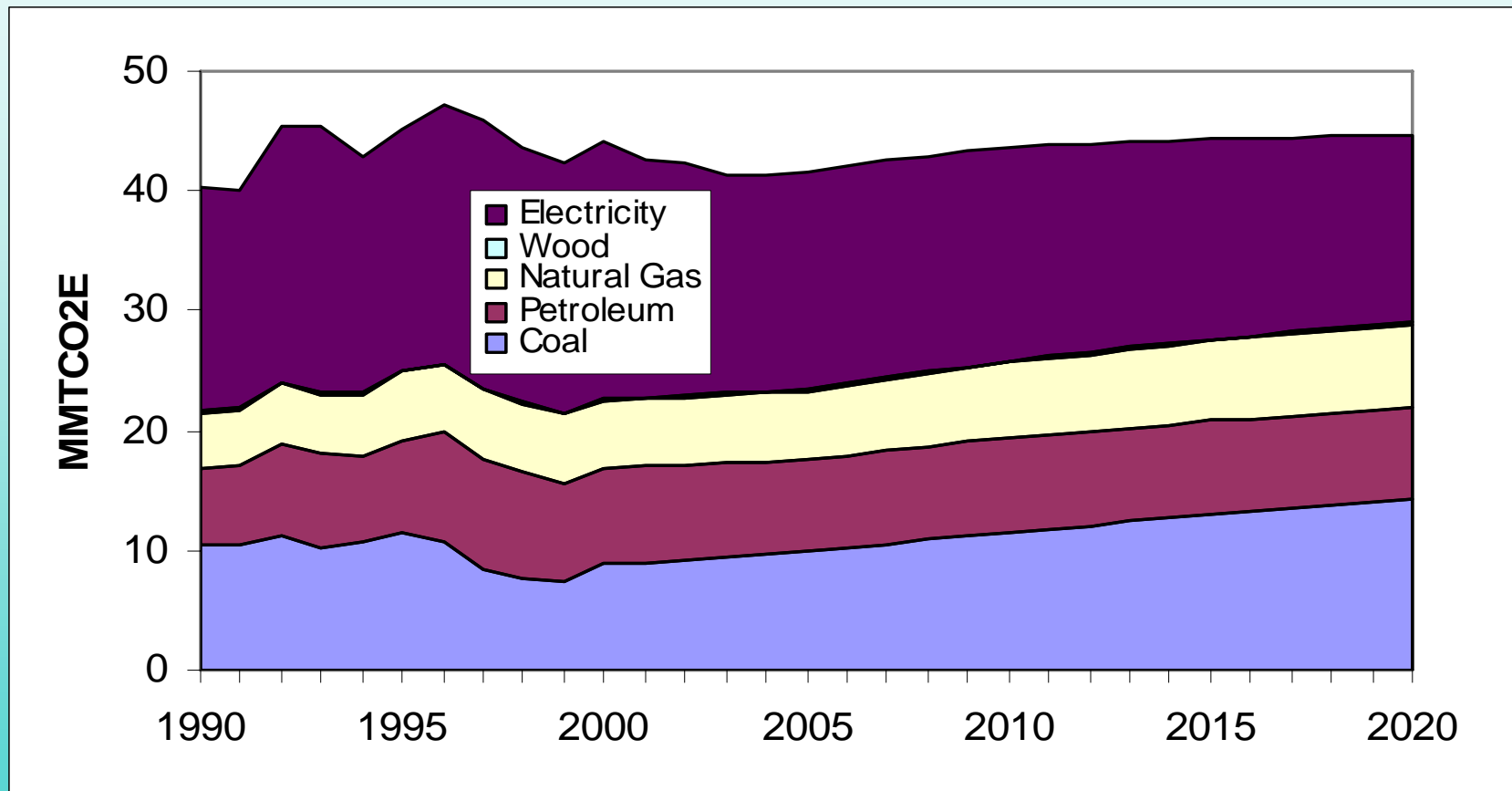
## Residential Sector



## Commercial Sector



# RCI - Industrial



# RCI – Fuel Use

- Inventory (1990–2000):
  - Data Sources
    - Total annual NC fuel use by sector & fuel type
      - Energy Information Administration (EIA) / State Energy Data (SED), 2001
      - Replaced 2000 EIA/SED fuel use in EPA’s State GHG Inventory Tool (SGIT)
    - Industrial non-fuel use adjustments to total fuel use:
      - National non-fuel use from EIA/SED, 2001
      - Value of shipments from U.S. Bureau of Census’ Annual Survey of Manufacturers for NC and U.S.

# RCI – Fuel Use

- Inventory (1990–2000):
  - Methods
    - Amount Emitted = Activity Level × Emission Factor (EF) × Global Warming Potential (GWP)
    - Industrial / Chemical Manufacturing:
      - Non-fuel use subtracted from total fuel use for:
        - » Distillate & residual oil, petroleum coke, & natural gas
      - NC non-fuel use = ratio of NC-to-national value of shipments × national non-fuel use
      - Value of shipments not available for 1990/1991; used 1992 data as surrogate

# RCI – Fuel Use

- Ref. Case Projections (2001–2020):
  - Data Sources
    - Fuel consumption forecasts by sector and fuel type:
      - North Carolina Energy Outlook (NCEO), 2003
  - Methods
    - NCEO provides fuel use in 5-year increments
      - (e.g., 2005, 2010, 2015, & 2020)
    - Growth factors:
      - Calculated for each 5-year increment relative to 2000
      - Interpolated for other years (e.g., 2001 – 2004)
      - Projection year emissions = Year-specific factor x 2000 emissions

# RCI – Fuel Use

- Key Assumptions and Uncertainties
  - Inventory
    - SGIT average emission factors do not capture differences in emissions from different combustion technologies
    - State Energy Data for North Carolina – allocation of fuel consumption to end-use sectors
    - Non-energy fuel consumption based on national consumption estimates adjusted for North Carolina
  - Reference Case Projections
    - Does NCEO provide accurate forecasts through 2020?

# RCI – Natural Gas Transmission & Distribution

- Emission Sources:
  - Transmission pipelines
    - Large diameter, high-pressure pipelines
    - Move gas from source
    - CH<sub>4</sub> emissions from chronic leaks from pipeline fittings, compressor stations, vents
  - Distribution pipelines
    - Generally small diameter, low-pressure pipelines
    - Move gas from transmission lines to RCI customers
    - CH<sub>4</sub> emissions from chronic leaks from pipeline fittings, meters, regulators, and mishaps

# RCI – Natural Gas Transmission & Distribution

- Inventory (2000):
  - Data Sources
    - Transmission
      - North Carolina Utilities Commission (NCUC)
    - Distribution
      - U.S. Office of Pipeline Safety (OPS)
  - Methods
    - Amount Emitted = Activity Level × EF × GWP
    - Emissions not estimated for 1990 – 1999
      - Emissions for 2000 < 1 MMTCO<sub>2</sub>e
      - Focused resources on preparing emissions for categories with higher emissions

# RCI – Natural Gas Transmission & Distribution

- Ref. Case Projections (2001–2020):
  - Data Sources
    - Natural gas consumption forecasts for RCI sector
      - North Carolina Energy Outlook (NCEO), 2003
  - Methods
    - NCEO provides fuel use in 5-year increments
      - (e.g., 2005, 2010, 2015, & 2020)
    - Growth factors:
      - Calculated for each 5-year increment relative to 2000
      - Interpolated for other years (e.g., 2001 – 2004)
      - Projection year emissions = Year-specific factor x 2000 emissions

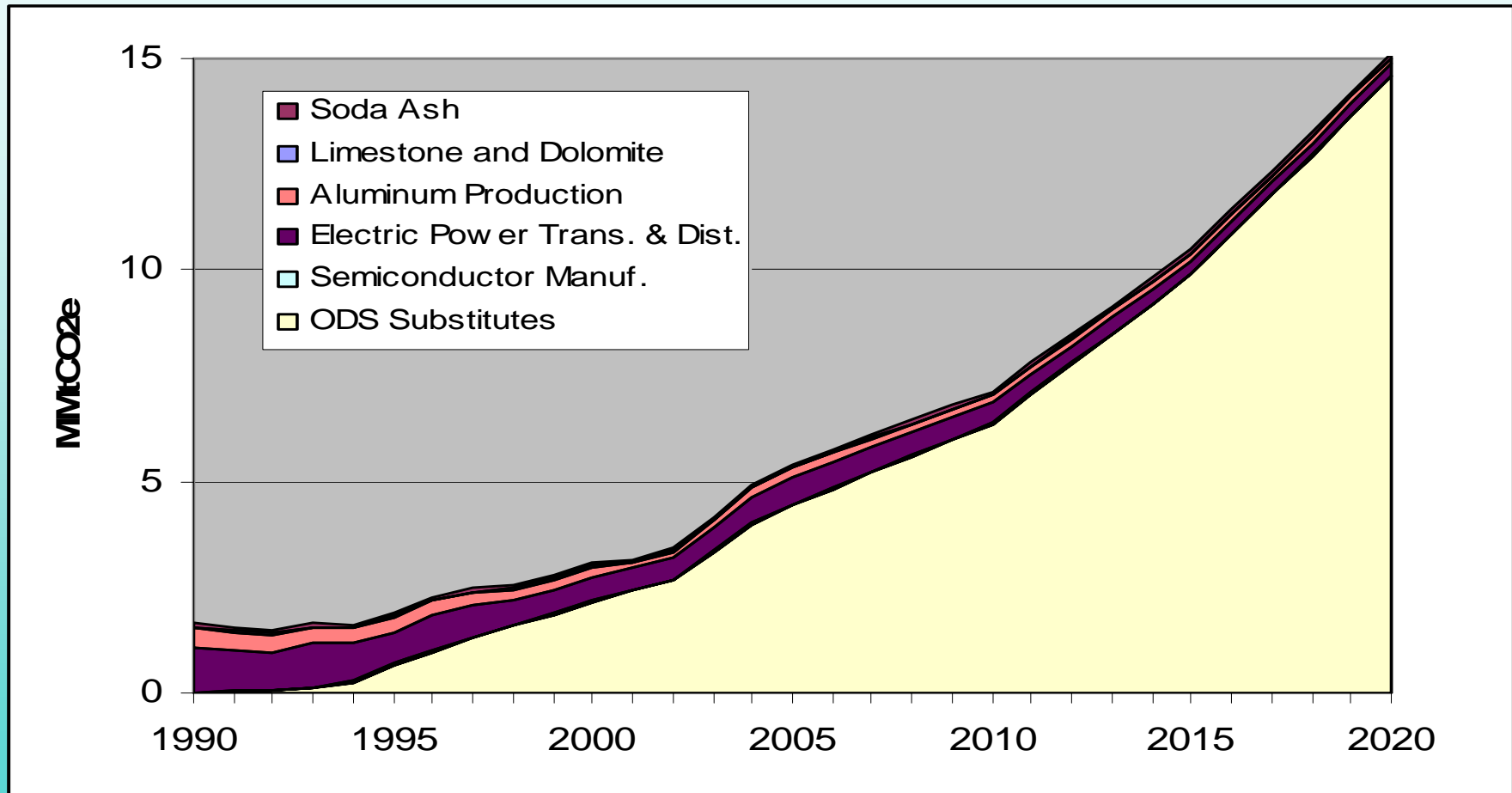
# RCI – Natural Gas Transmission & Distribution

- Key Assumptions and Uncertainties
  - Natural gas consumption forecasts

# Industrial Processes

<b>Emission Category</b>	<b>CO<sub>2</sub></b>	<b>PFC</b>	<b>HFC</b>	<b>SF<sub>6</sub></b>
Soda Ash Consumption	x			
Limestone and Dolomite Consumption	x			
Aluminum Production		x		
Consumption of Substitutes for Ozone Depleting Substances (ODS)		x	x	
Semiconductor Manufacture		x	x	x
Electric Power Transmission & Distribution Systems				x

# Industrial Processes



# Industrial Processes

<b>Emissions Category</b>	<b>Inventory Data Sources</b>
Soda Ash Consumption	USGS, <i>Minerals Yearbook: Soda Ash</i>
Limestone and Dolomite Consumption	USGS, <i>Minerals Yearbook: The Mineral Industry of North Carolina</i>
Aluminum Production	USGS, <i>Minerals Yearbook: Aluminum</i>
Consumption of Substitutes for Ozone Depleting Substances (ODS)	National emissions – <i>Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2000</i> (EPA, 2002)
Semiconductor Manufacture	National emissions – (EPA, 2002) Value of shipments (NC and U.S.) - <i>1997 Economic Census</i> (U.S. Census Bureau)
Electric Power Transmission & Distribution Systems	National emissions – (EPA, 2002) Electricity Sales (NC and U.S.) – <i>Electric Power Annual 2000 Vol. 1</i> (EIA, 2000)

# Industrial Processes

<b>Emissions Category</b>	<b>Inventory Methods</b>
Soda Ash Consumption	Consumption x Emission Factor
Limestone and Dolomite Consumption	Consumption x Emission Factor
Aluminum Production	Amount produced x Emission Factor
Consumption of Substitutes for Ozone Depleting Substances (ODS)	National Emissions x ratio of NC to U.S. population
Semiconductor Manufacture	National Emissions x ratio of NC to U.S. value of semiconductor shipments
Electric Power Transmission & Distribution Systems	National Emissions x ratio of NC to U.S. electricity sales

# Industrial Processes

- Ref. Case Projections (2003–2020):
  - Data Sources
    - National Emissions Projections
      - U.S. Climate Action Report (U.S. Dept. of State)
    - NC Population Projections
      - North Carolina Energy Outlook (NCEO), 2003

# Industrial Processes

- Ref. Case Projections (2003–2020):
  - Methods
    - Growth factors based on national growth rates:
      - Aluminum Production
      - ODS Substitute Consumption
      - Semiconductor Production
      - Electric Power Transmission and Distribution Systems
    - Growth factors based on NC population projections:
      - Soda Ash Consumption
    - No growth assumed (held constant at 2002 level)
      - Limestone and Dolomite Consumption

# Industrial Processes

- Key assumptions and uncertainties
  - Inventory
    - Emission factors
    - Allocation of national emissions to state
      - ODS Substitute Consumption
      - Semiconductor Manufacture
      - Electric Power Transmission and Distribution Systems
  - Reference case projections
    - Growth rates
      - National growth rates
      - NC population projections
      - No growth

# Black Carbon

- One of two carbonaceous aerosol species
  - BC and Organic Carbon (OC)
- Also known as light absorbing carbon (LAC), and elemental carbon (EC)
- Absorbs solar energy and warms the troposphere (like GHG's)

# Sources of Black Carbon

- Fossil Fuel Combustion
- Biomass Combustion
- Other (Minor) Sources

# Catalog of State Actions: Consolidation

- Refer to handout of revised “Long” Catalog
  - Note updates based on TWG input during 6/6 meeting
  - Will continue to be used as source of information for consolidated options
- “Consolidation of Catalog of North Carolina RCI Options” document
  - Prepared with input from TWG
  - Consolidates previous catalog into 24 options, but includes all options from previous catalog either as single options or as parts of more comprehensive options
  - Additional TWG input on consolidation (changes in existing consolidation, further consolidation) welcome

# Catalog of State Actions: Priorities

- Consideration of Priorities for Further Elaboration/Analysis of RCI Options
  - Results of e-mail ballot will be sent out by CCS to TWG members (One vote per person per option, 10 votes total per person)
  - Comments on consolidation received with ballots
  - Discussion of results, and group decisions on options to recommend to CAPAG as “High Priority”

# Public Input, Announcements

- Public Input?
- Announcements?

# Next TWG Call

- Agenda
  - Review of results of CAPAG meeting relevant to RCI
  - Further review of inventory and forecast (if needed)
  - Further work on setting priorities, consolidation/reorganization if appropriate
- Time and date?