Florida Draft GHG Emissions Inventory and Forecast

Inventory Approach

- Standard US Environmental Protection Agency (EPA), United Nations, Intergovernmental Panel on Climate Change (IPCC) methodologies, guidelines, and tools
- Emphasis on transparency, consistency, and significance
- Preference for Florida 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 (BAU)
  - Includes approved policies and actions to the extent possible (e.g., Energy Efficiency, Renewable Energy)
- Growth assumptions from existing sources
  - State population
  - US Census
  - US Energy Information Administration

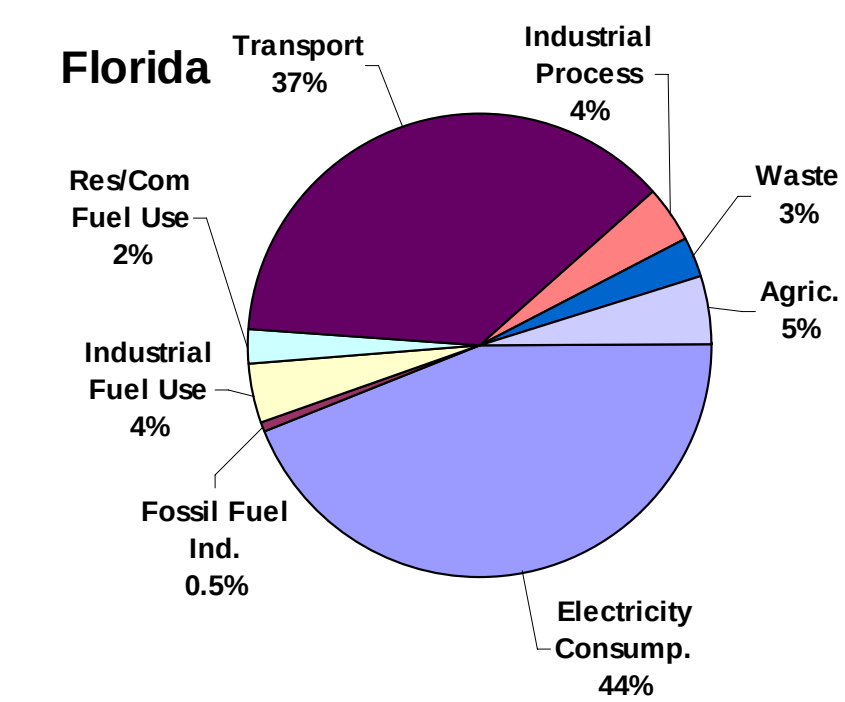
Coverage

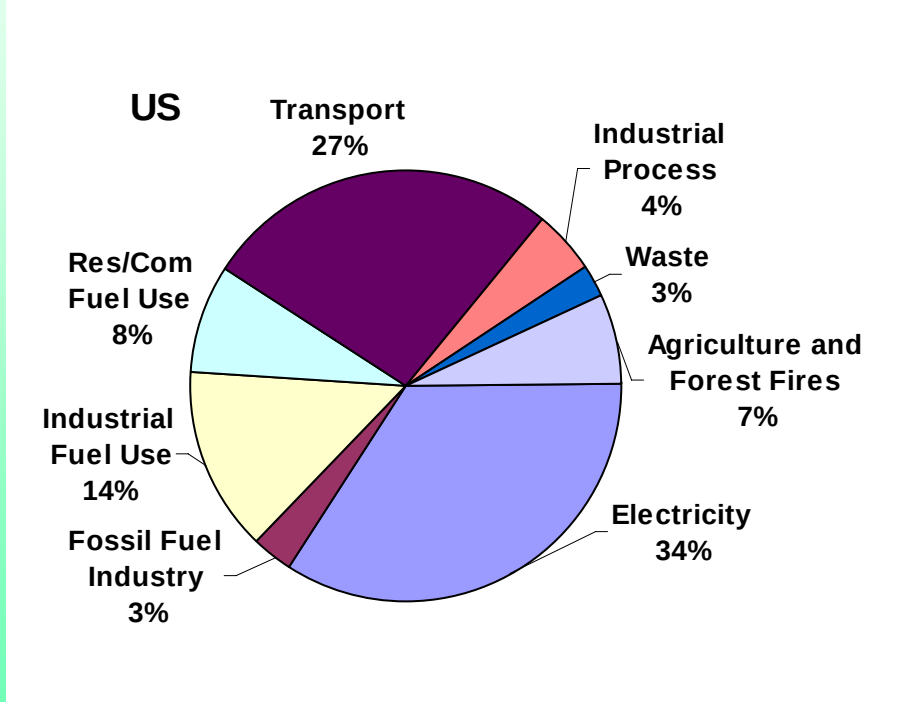
- Six gases per USEPA and UNFCCC guidelines
  - Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6)
- All major emitting sectors
  - Electricity Supply & Demand (Consumption-Based)
  - Residential, Commercial, Industrial (RCI) Fuel Use and Non-fuel Use Processes
  - Transportation (onroad and nonroad)
  - Fossil Fuel Industry
  - Agriculture, Forestry, and Waste Management
- Emissions expressed as CO_2 equivalent
  - 100-year global warming potentials
    - CO_2 = 1; CH_4 = 21; N_2O = 310; HFC-23 = 11,700; SF_6 = 23,900

Key Points

- Preliminary draft for Governor's Action Team on Energy and Climate Change and TWGs; 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
- Gross and Net methods

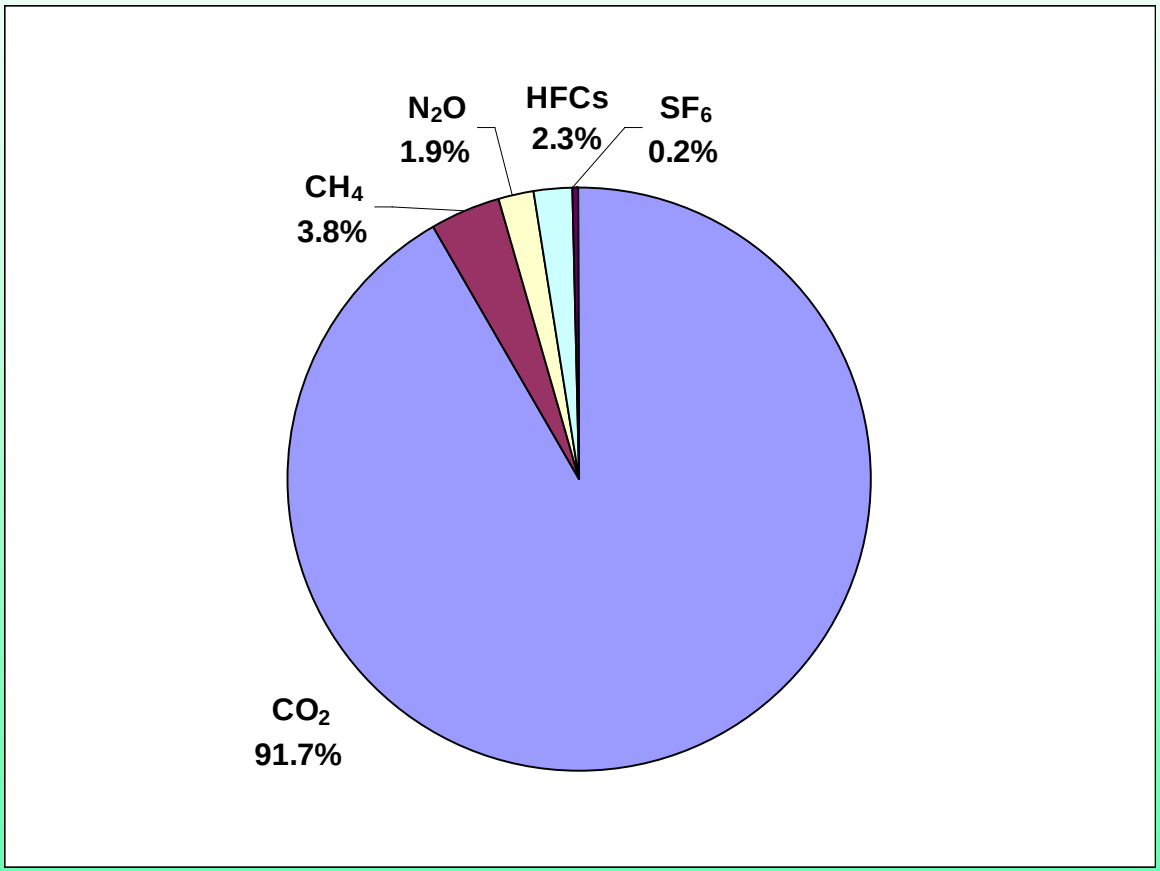
Florida & US Gross Emissions By Sector, 2005
(Consumption Based)



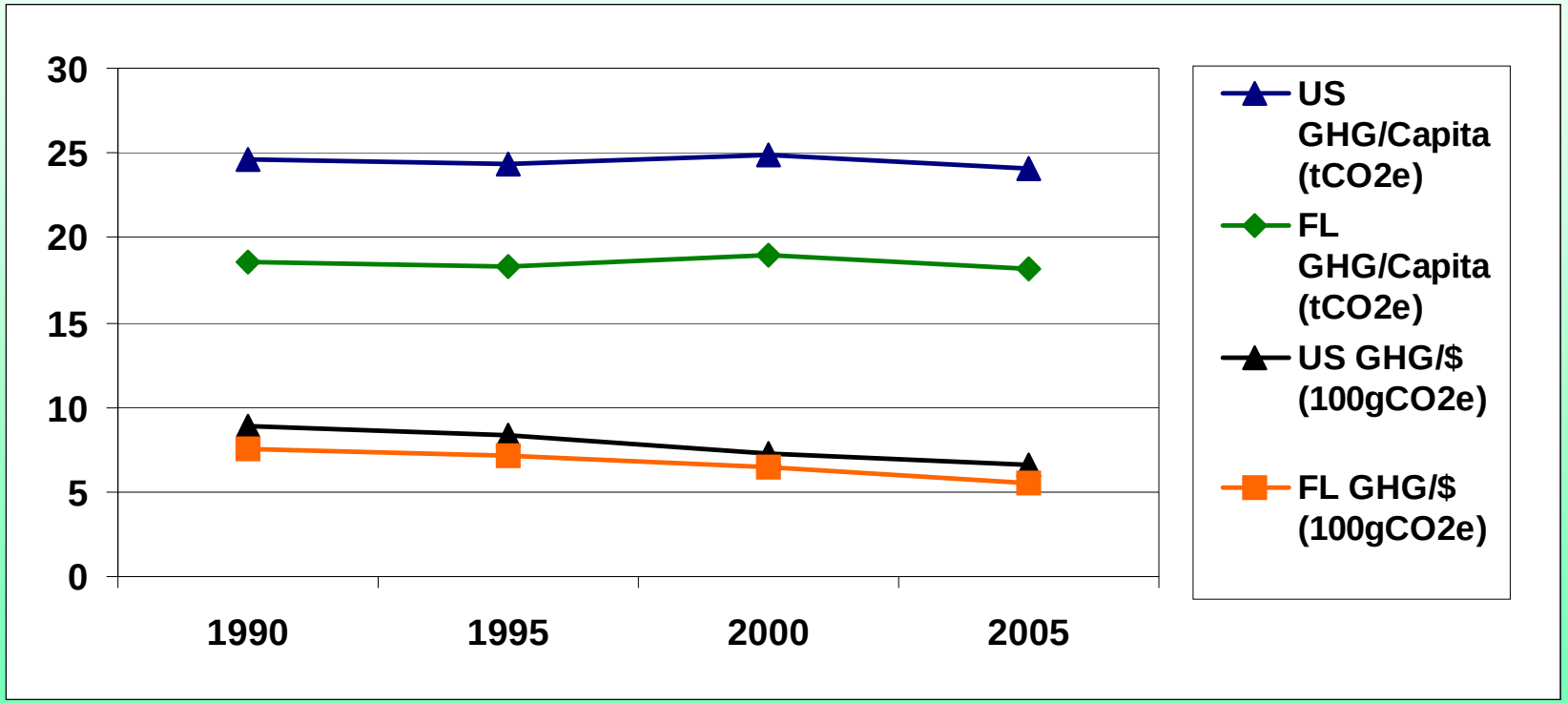


Florida Gross Emissions By GHG, 2005

(Consumption Based)

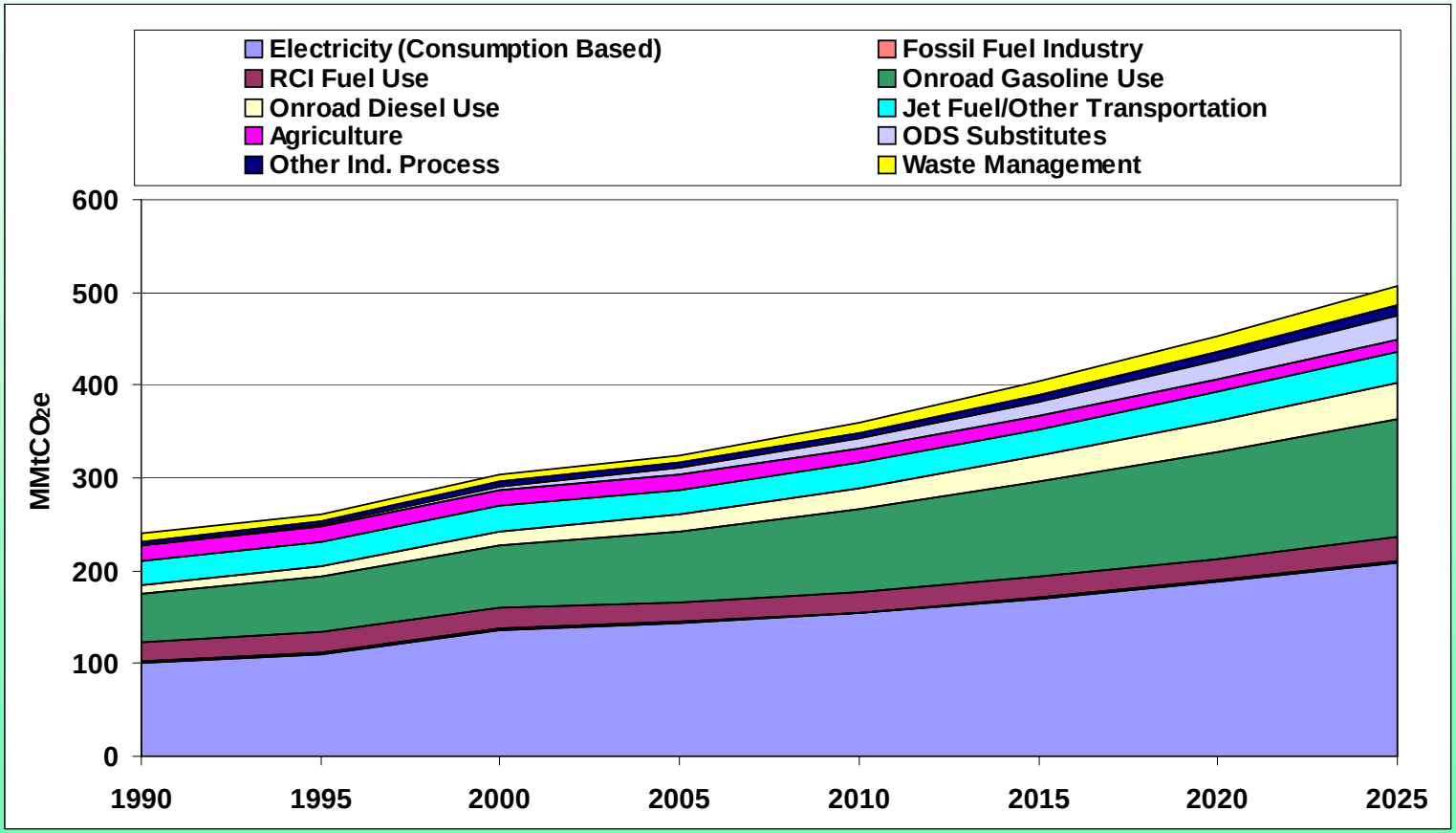


Per Capita and GSP/GDP Gross GHG Emissions, 1990-2005

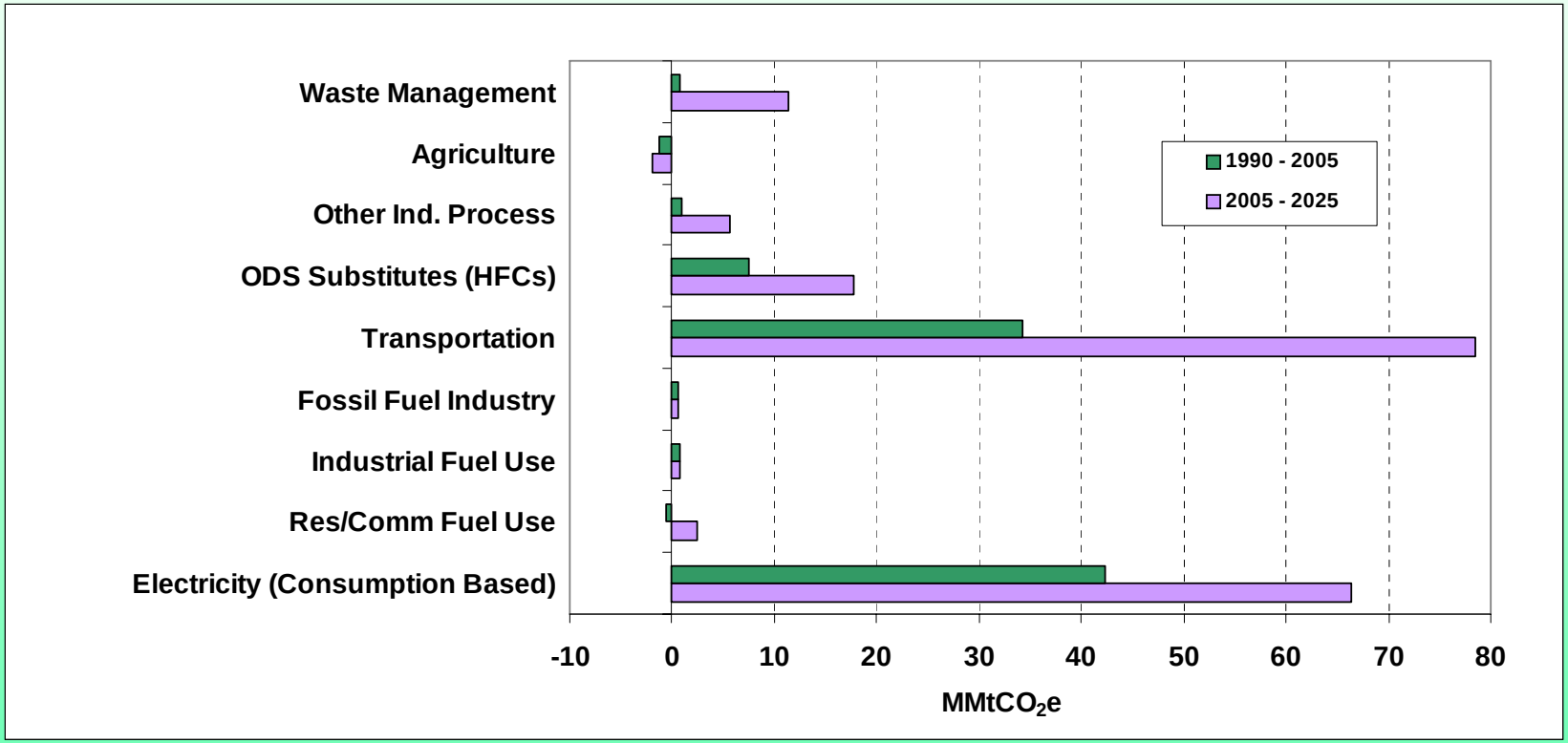


Florida Gross GHG Emissions By Sector, 1990-2025

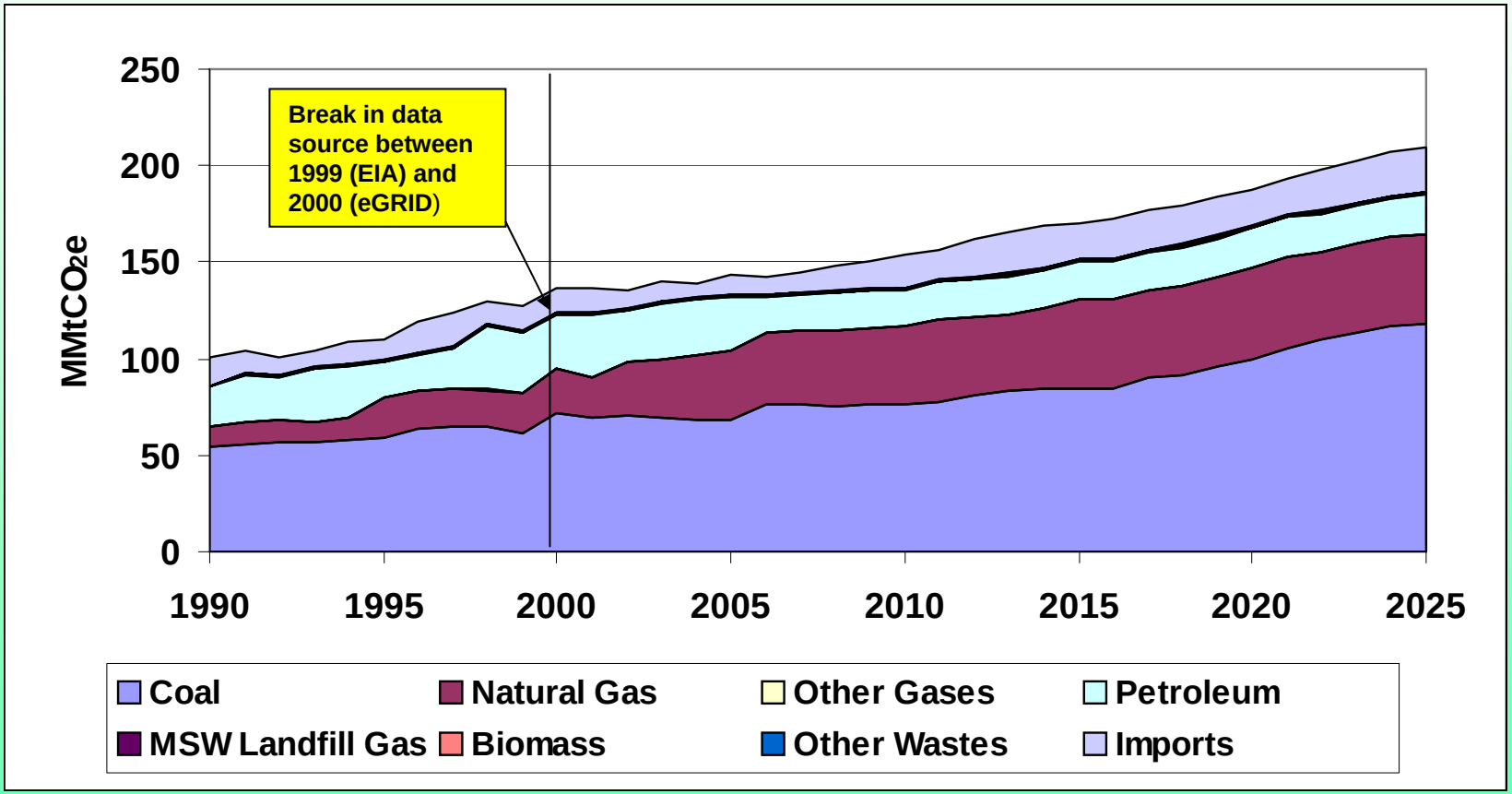
(Consumption Based)



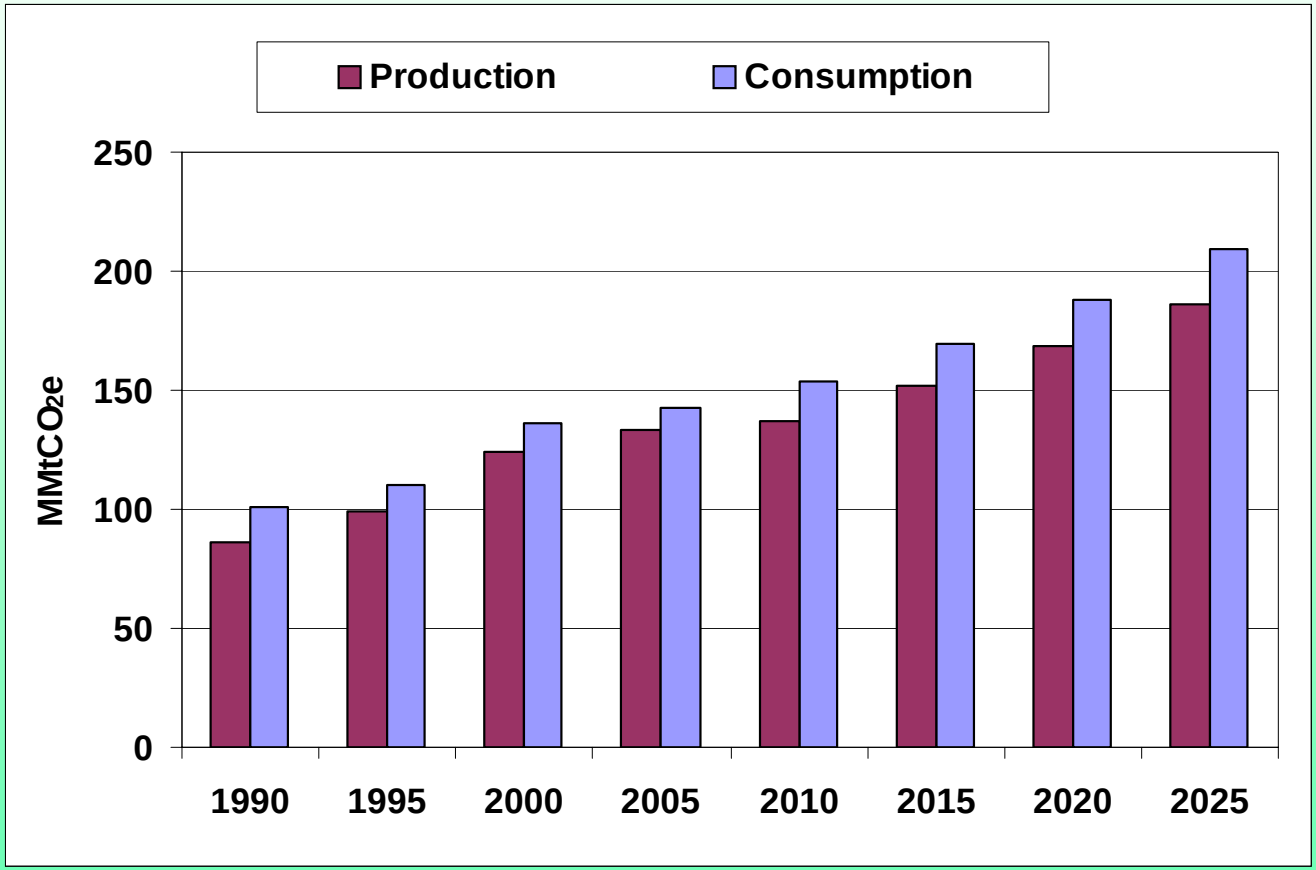
Florida Gross Emissions Growth
($MMtCO_2e$, Consumption Based)



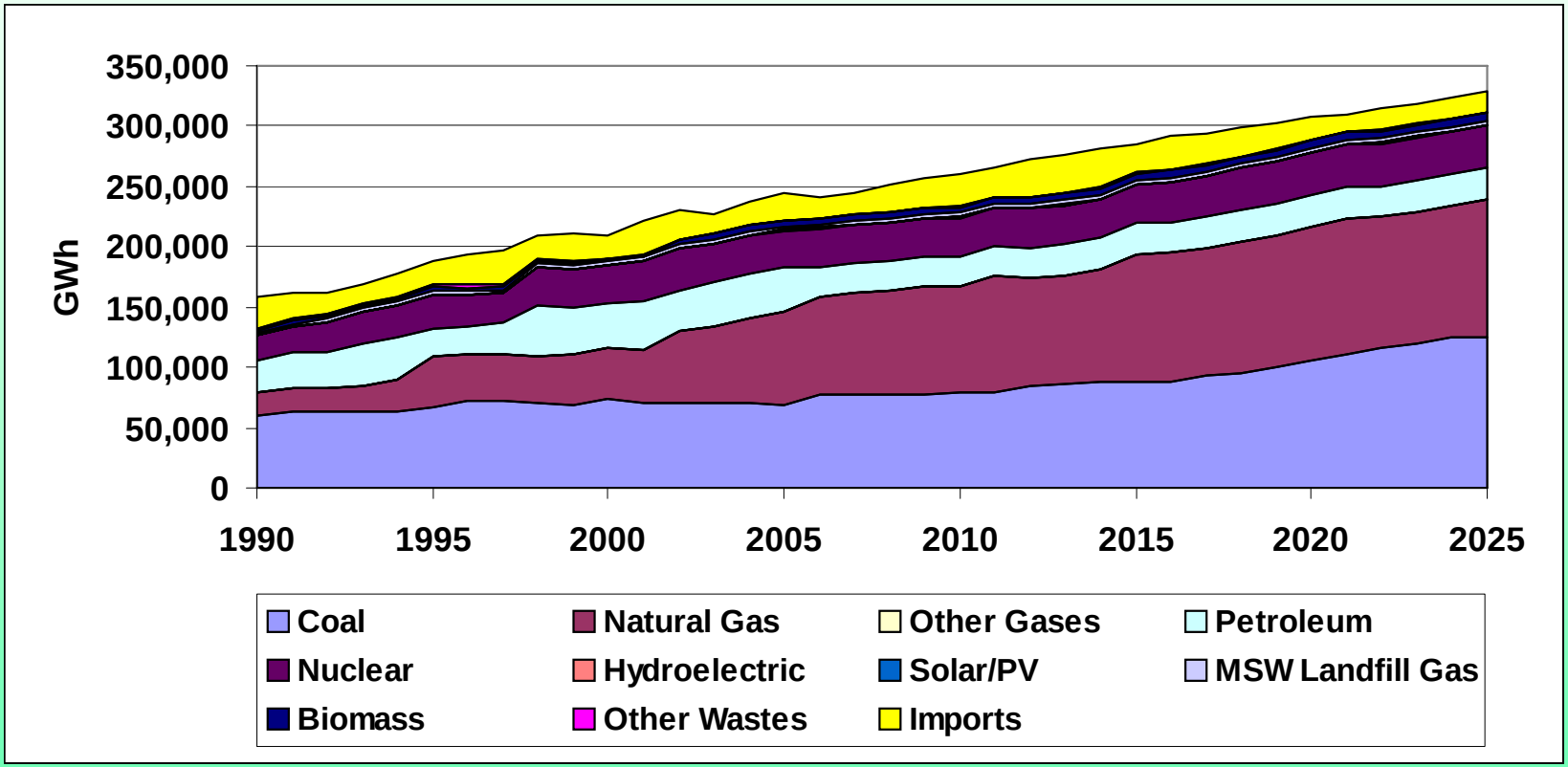
Electricity –Emissions



Electricity - Emissions



Electricity – Gross Generation



Electricity

- Data Sources
  - Historical
    - Generation and fuel consumption for 1990-1999
      - 906/920 Monthly Time Series data (EIA)
    - Monthly Cost and Quality of Fuels for Electric Plants (EIA) – coal-type data
    - State Electricity Profile (EIA) – sales of electricity
  - Base Year 2000
    - eGRID—EPA database of CO_2e emissions from Florida power plants
  - Forecast
    - EIA/Annual Energy Outlook 2007 for Southeastern Reliability Council (SERC) and SERC/FL regions
      - Projected electricity sales and generation for 2001-2025
      - Projected trends in combustion efficiency improvement and transmission & distribution losses for 2001–2025

Electricity

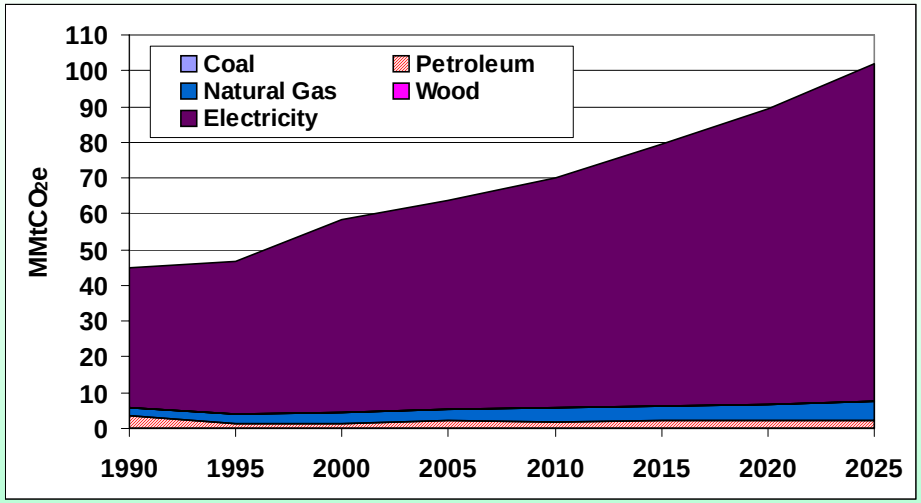
- Methodology
  - Key Inputs
    - Coal quality used in FL power stations
    - Gross annual primary energy consumption by FL power stations by fuel type
    - Gross annual generation to meet FL demand
  - Multiply gross annual primary energy consumption by FL power stations by CO_2e emission factors
  - Difference between primary energy required to meet FL demand and energy generated from FL power stations assumed to be met with imports
    - Assumed to be imported from SERC region

Electricity

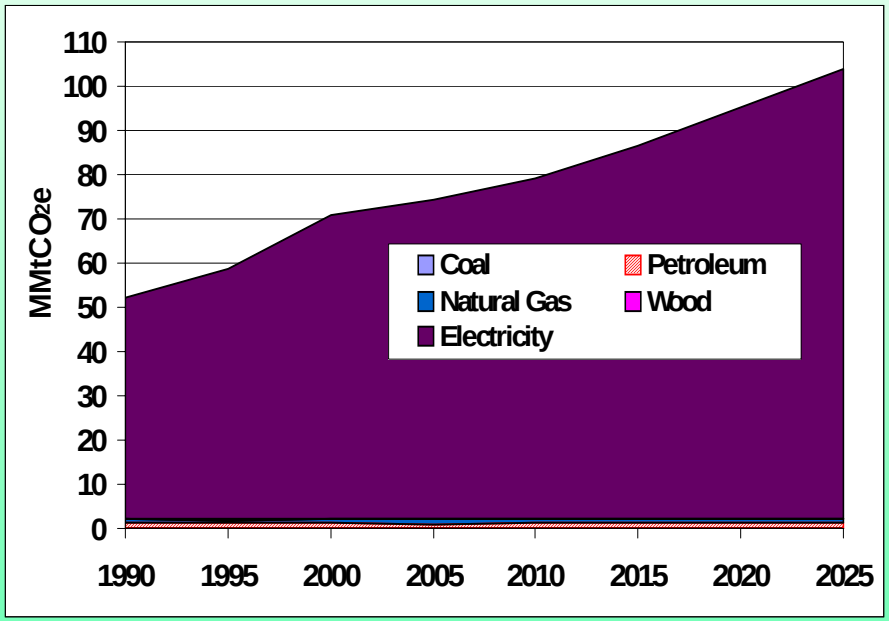
- Key Uncertainties
  - Top-down approach
    - Assumes FL electric systems evolve consistently with the surrounding SERC/FL and SERC regions
    - Does not capture all state-specific system characteristics
  - Differences in primary data sources by time period
    - eGRID data for 2000 base year; EIA data for 1990-1999
  - Source of electricity imports
    - All imports assumed to come from SERC region
  - Coal quality over time
    - Coal quality for 2000 assumed for forecast period

RCI

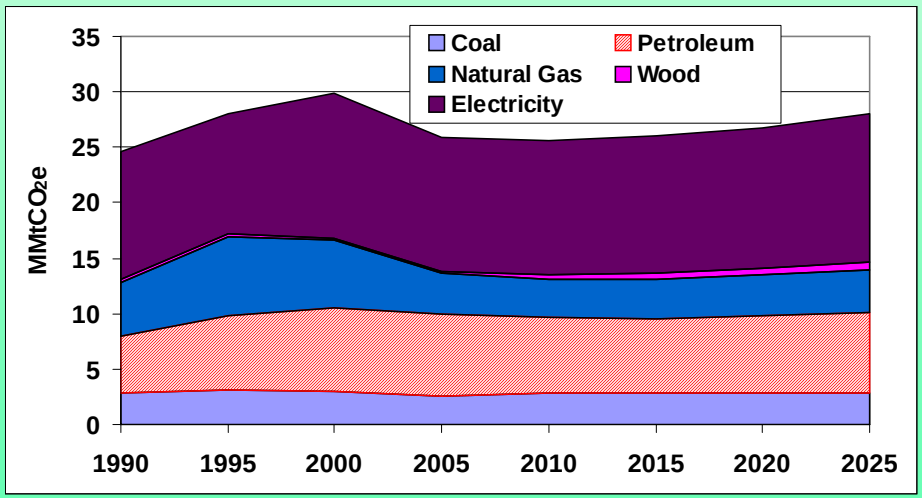
Commercial Sector



Residential Sector



Industrial Sector



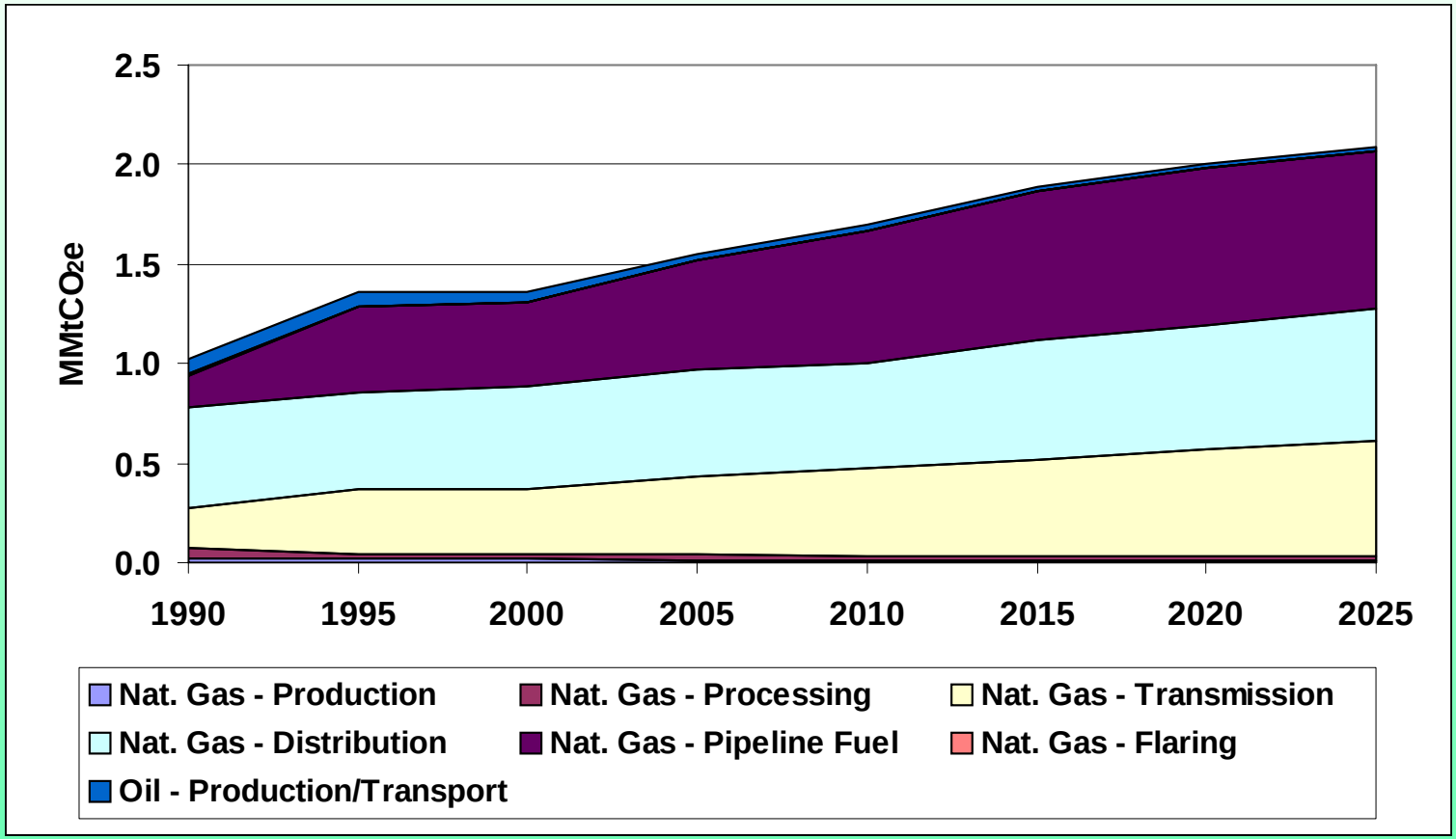
RCI

- Data Sources
  - Historical
    - EIA State Energy Data (SED)
  - Forecasts
    - Residential – FL population annual growth rate (2005-2025)
    - Comm/industrial – EIA Annual Energy Outlook 2007 (AEO2007)
      - Projected fuel consumption by fuel type for EIA South Atlantic region
- Methods
  - Historic
    - US EPA State Greenhouse Gas Inventory Tool (SIT)
    - Energy consumption multiplied by emission factors
  - Forecast
    - Fossil fuels and wood – annual growth rate applied to latest year of emissions
    - Electricity emissions attribution – Forecast for SERC/FL and SERC from AEO2007

RCI

- Key Assumptions
  - Residential sector
    - Projections based on normalized regional AEO2007 growth projections of fuel use scaled for FL population
  - Commercial/Industrial
    - Projections based on regional AEO2007 growth projections of fuel use
- Key Uncertainties
  - Regional projections
  - Industrial sector growth and mix

Fossil Fuel Industry



Fossil Fuel Industry

- Data Sources
  - Historic Natural Gas (1990-2005)
    - Production – number of FL gas wells from FL DEP database
    - Processing
      - Number of gas processing plants in FL from *Oil and Gas Journal*
      - Volume of gas flared in FL computed from volume of gas flared/vented in FL from EIA and EIIP percentage flared assumption
    - Miles of gathering pipeline
      - FL DEP data
      - Back-cast to 1990 using FL natural gas production from EIA
    - Miles of transmission/distribution pipeline and number of services
      - Office of Pipeline Safety data for gas transmission pipeline mileage
      - FL DEP data for distribution pipeline mileage and number of services
    - Compressor stations – FL Public Service Commission
    - Pipeline fuel use – EIA volume of natural gas consumed in FL pipelines

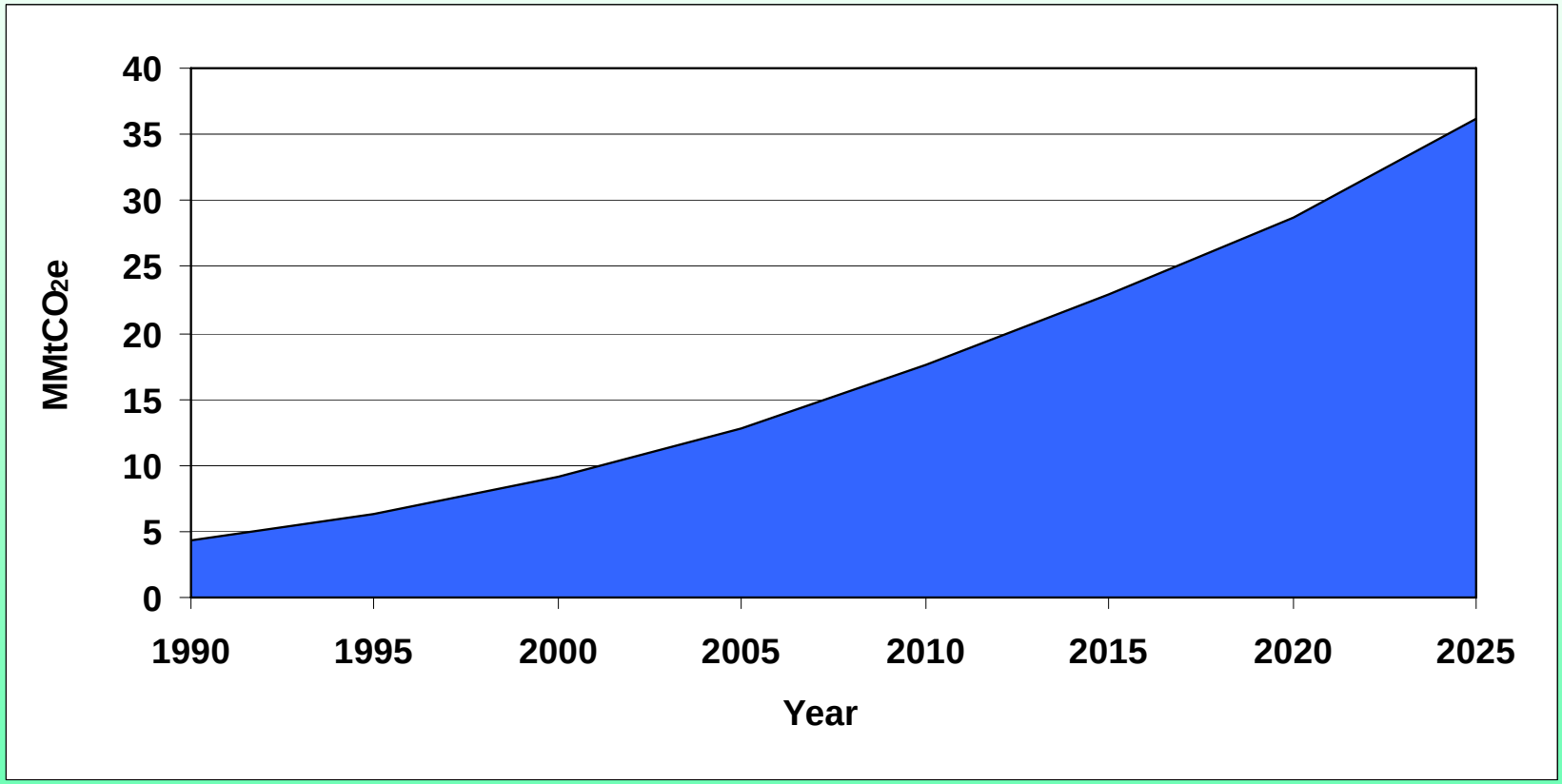
Fossil Fuel Industry

- Data Sources
  - Historic Oil (1990-2005)
    - Production – FL DEP data
    - Transport – EIIP default assumption (volume produced = volume transported)
  - — Forecast (2006-2025)
    - Growth rates based on state historical emissions trends and regional *Annual Energy Outlook 2007* projections
- Methods
  - Based on EPA State Greenhouse Gas Inventory Tool (SIT)
  - Activity multiplied by emission factors

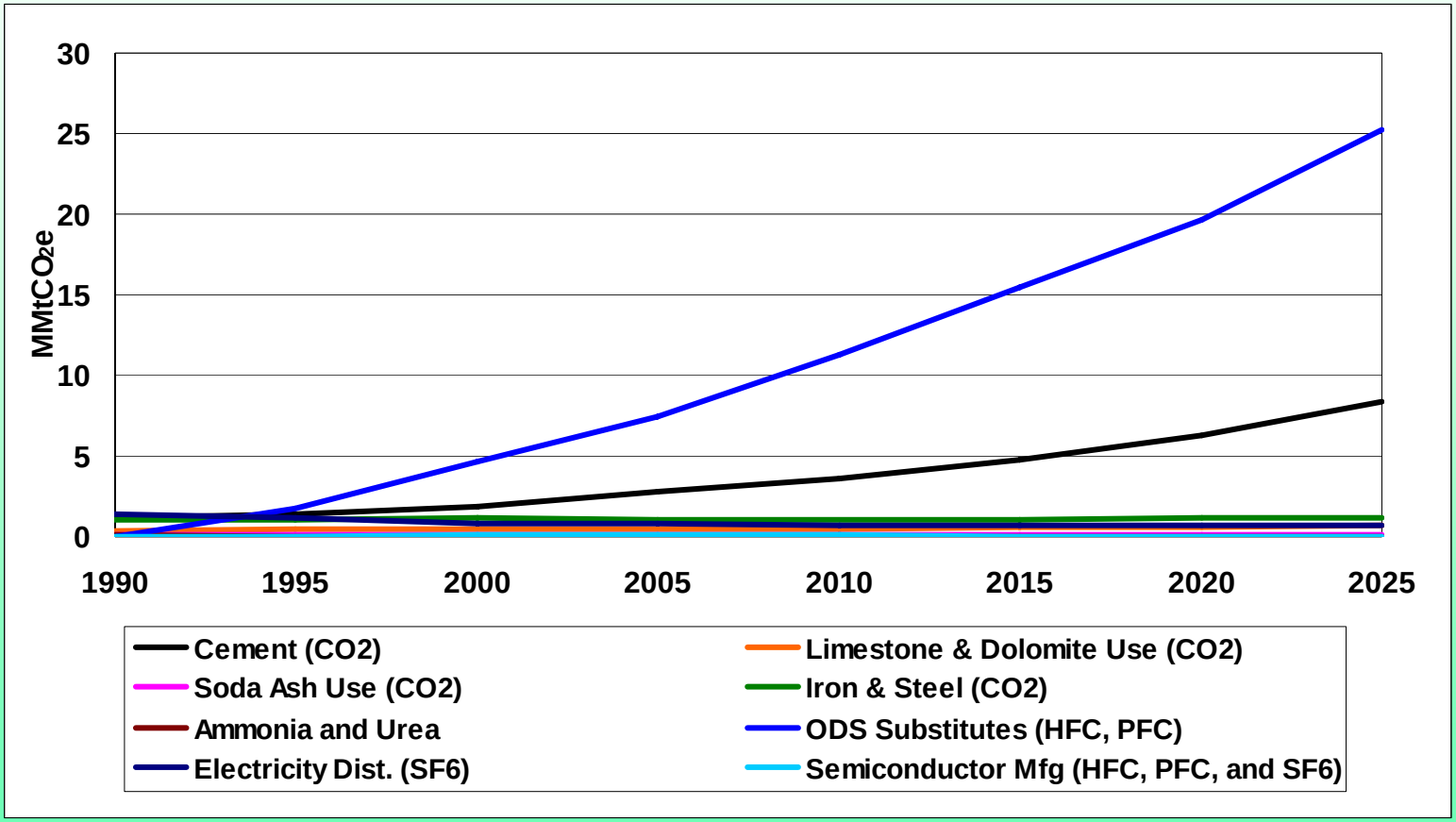
Fossil Fuel Industry

- Key Assumptions
  - For natural gas gathering/transmission/distribution pipelines—surrogates trend with emissions activity
  - Growth rates are process-specific, vary by activity
    - Used state historical trend unless Annual Energy Outlook regional forecast was in-line with historical state trend
- Key Uncertainties
  - Current levels of fugitive emissions
    - Based on industry-wide averages
  - Data limitations associated with early years of OPS pipeline data
  - Projections of future production of fossil fuels

Industrial Process



Industrial Process



Industrial Process

- Data Sources
  - Historic
    - US EPA National GHG Inventory
      - Substitutes ozone-depleting substances (ODSs), electricity transmission and distribution systems, semiconductor manufacture
    - USGS
      - Cement and clinker production, limestone and dolomite consumption, national soda ash consumption, ammonia production, urea consumption
    - Annual Statistics Report of American Iron and Steel Institute
      - Iron and steel production data
  - Forecast (annual growth rates from 2005 to 2025)
    - Historic trends
      - Cement manufacture, soda ash consumption, ammonia production, urea consumption,
    - FL employment projections
      - Limestone/dolomite use, iron and steel production
    - US EPA national emissions projections
      - ODS substitutes, electric distribution, semiconductor manufacture

Industrial Process

- Methods
  - Based on EPA SIT
- Key Uncertainties
  - Actual production data for estimating historical emissions (instead of EPA default data)
  - Growth rates used to forecast emissions
    - Many processes based on historic trends
    - EPA forecast for large increase in use of HFCs/PFCs in cooling applications
  - Industry activities to reduce GHG emissions