Emission Projections

VISTAS Planning Workgroup Meeting
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Raleigh, NC

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Issues for Consideration

- What information is needed to review or generate to develop “base case” emission projections from base year 2002 inventories?
  - Preliminary Version (March 2004)
  - Final Version (September 2004)
- How can we assess, review, and modify “base case” assumptions that allows VISTAS contractors to provide timely files for AQ modeling runs?

Emission Projections

- Extrapolation of Baseline Estimates
  - Future Activity Level Estimates
  - Future Expected Control
- Attempt to Predict and Quantify Unknown
  - Always Some Uncertainty in Projections
  - Goal Is To Minimize the Uncertainty

Emission Projection Basics

- For each source type we need:
  - Base year emissions
  - Base year control assumptions
  - Growth factors
  - Control factors
  - Controlled emission rates

  - Method or model for projection

Key Issues to Resolve

- Method for projection
  - Model or ad hoc calculation
- Available growth & control information
  - Federal, Regional, or Local Regulation
  - Growth Rates
  - Model specific input data
  - Source specific data

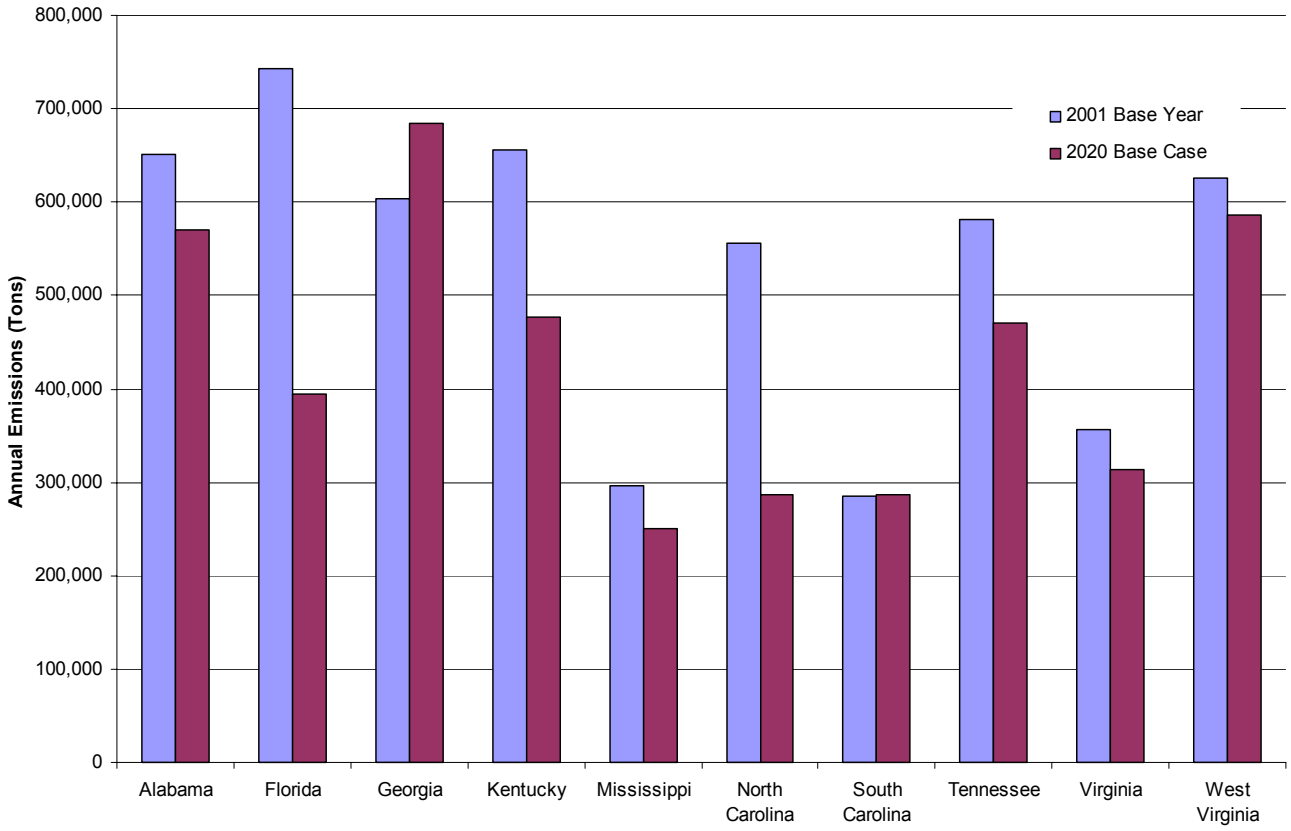
Where Do We Start?

- Look at EPA's Clear Skies Base Case
  - Projections to 2020 (Close Enough to 2018)
  - EGU (IPM)
  - Non-EGU Point, Stationary Area (BEA-Based)
  - Nonroad (March 2002 Nonroad Model)
  - Onroad (MOBILE6 Simulated)

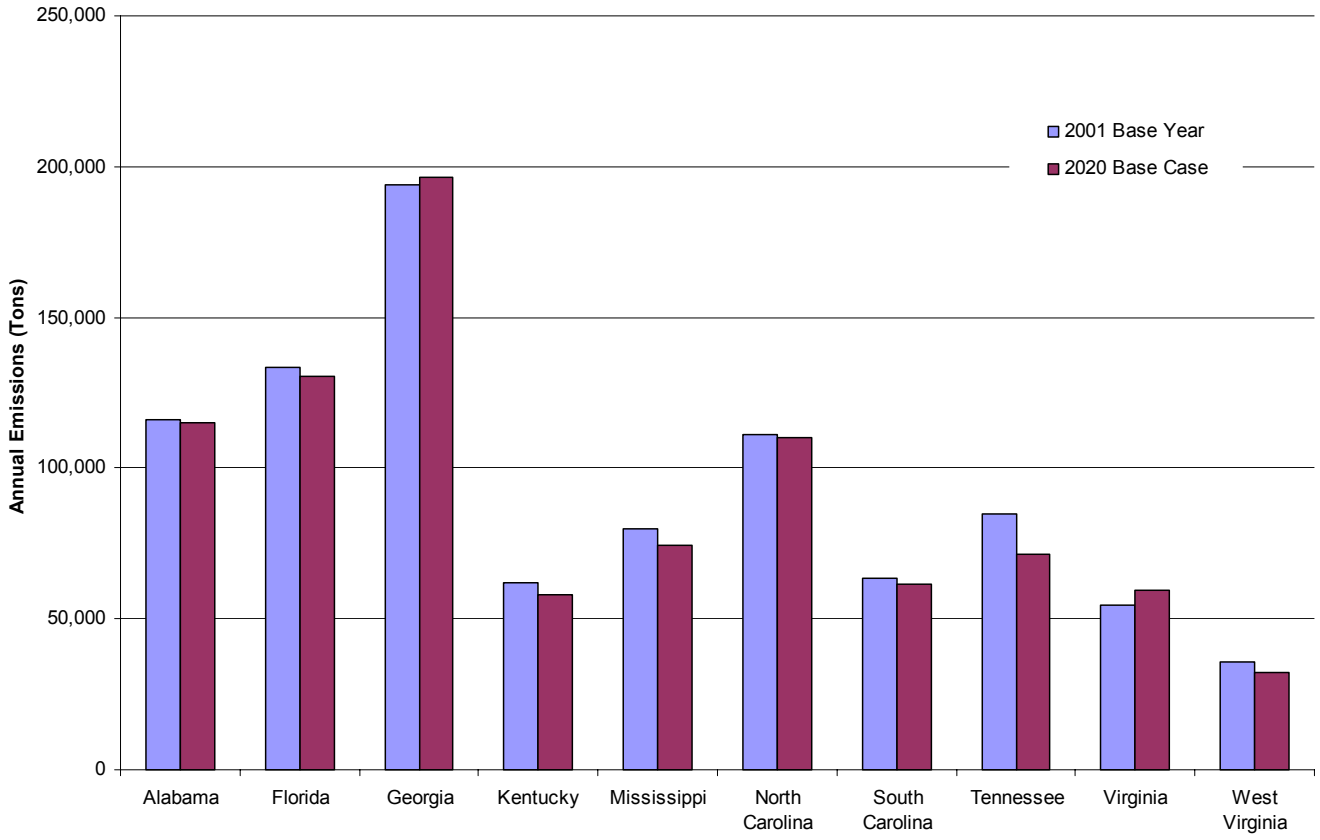
Clear Skies Base Case

- What Does It Include?
  - NOx RACT in 1-hr NAA (Except Waiver Areas)
  - NOx SIP Call (Excluding GA, MO, WI)
  - Tier-2 Tailpipe
  - HDD Engine Standard
  - Transport Fraction for Fugitive Dust
  - Ammonia Adjustment Factor (ORD Modeling)
  - Base Year Prescribed Fires
  - NC Clean Smokestacks (Simulated)

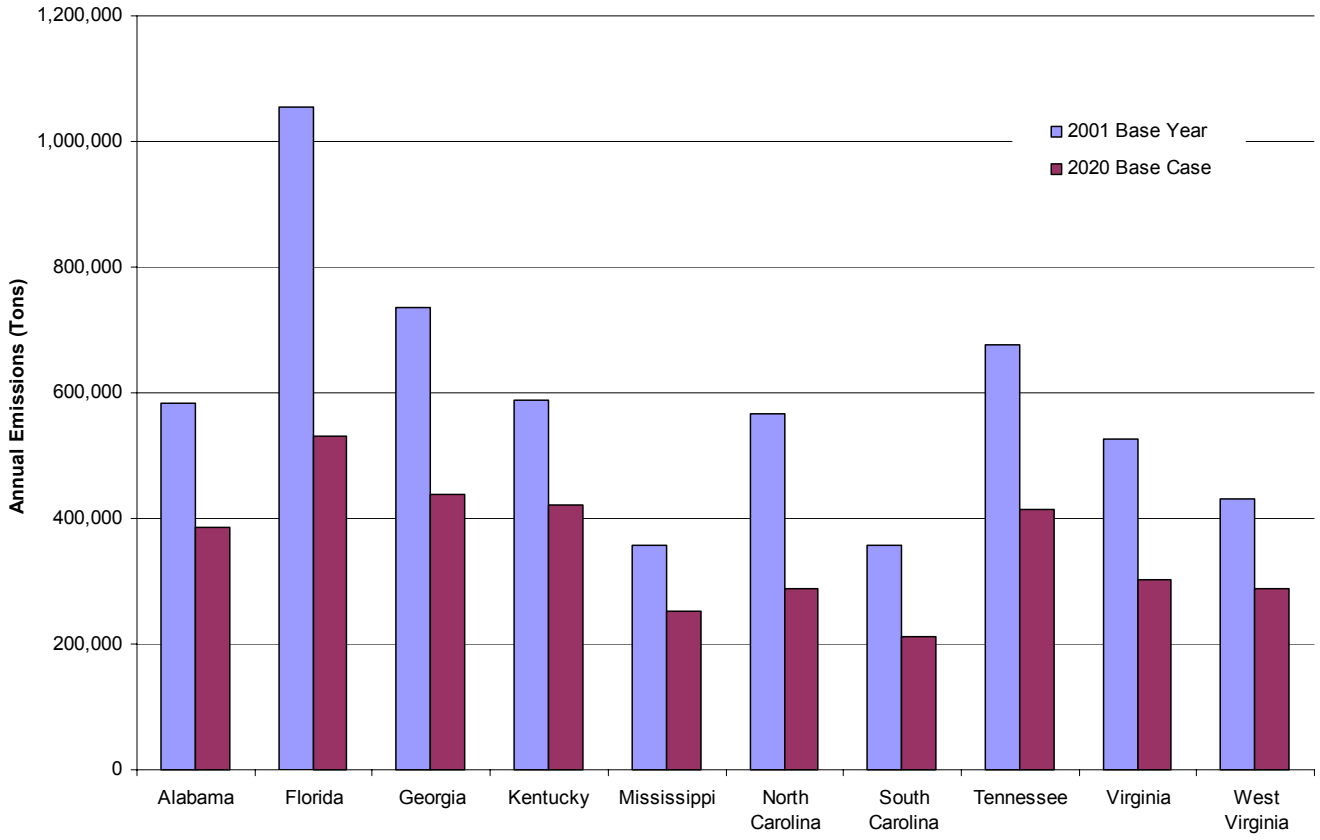
VISTAS Annual Emissions – SO2



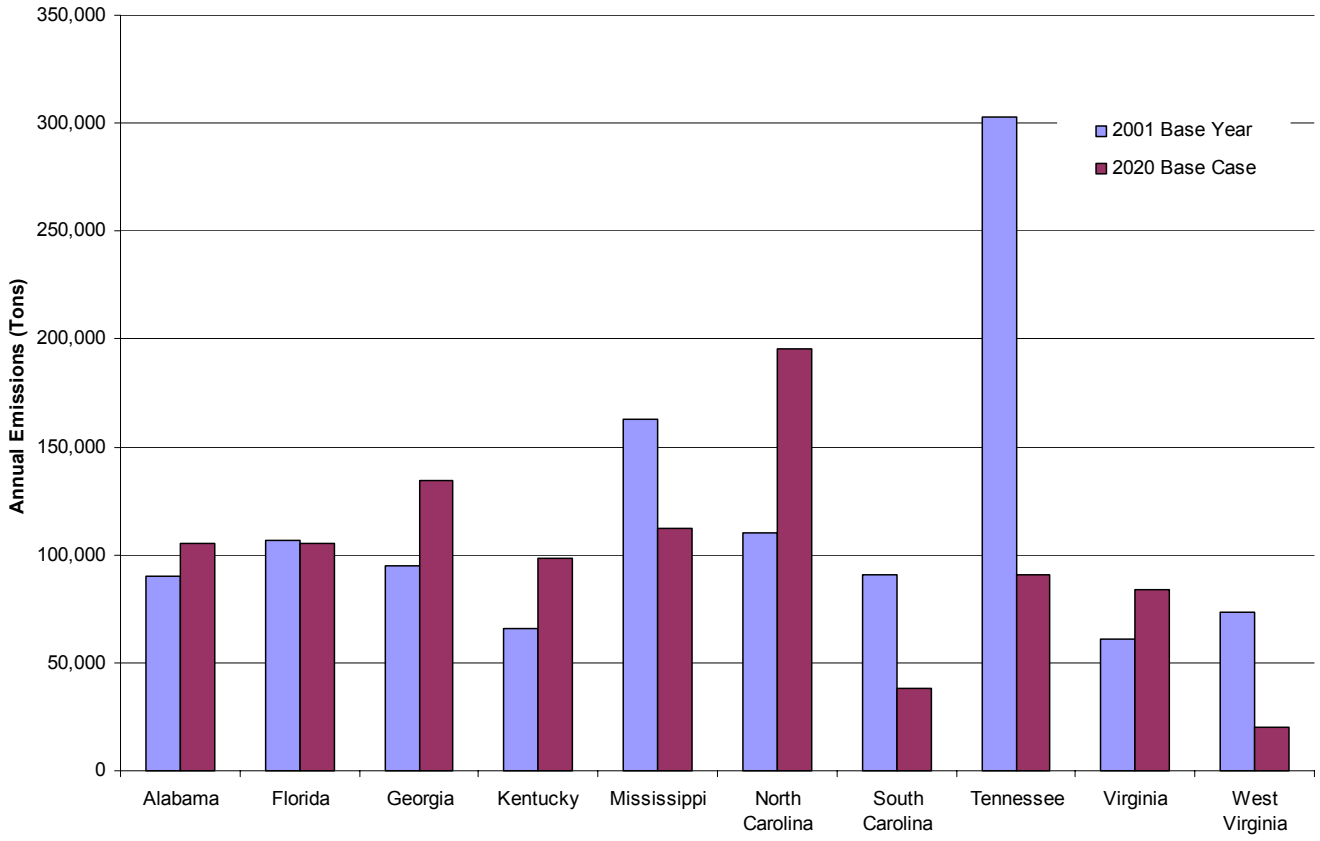
VISTAS Annual Emissions – PM-2.5



VISTAS Annual Emissions – NOx



VISTAS Annual Emissions – NH3



Back To Basics

- What Can We Do To Improve The Estimates Used To Drive Our Modeling?

General Projection Equations

- Emission Based

$$E_{fy} = E_{by} * GF * CF$$

E_{fy} = Projection Year Emissions

E_{by} = Base Year Emissions

GF = Growth Factor

CF = Control Factor

General Projection Equations (2)

- Activity Based

$$E_{fy} = A_{by} * GF * EMF_{fy}$$

E_{fy} = Projection Year Emissions

A_{by} = Base Year Activity

GF = Growth Factor

EMF_{fy} = Projection Year Emission Factor

Growth Factors

- Accounts For Changes In Activity
  - Employment, Earnings, Value Added, Output
- Important To Consider
  - Approximation of Surrogate Data to Activity
  - Relation to Base Year Activity Indicator
  - Locality Representation

Growth Rates

- EGAS 4.0
  - EPA already making improvements with more recent data
- Energy efficiency factors
  - EIA based combustion values
- New VMT options to consider
  - EPA, EIA, FHWA
- Local Input Data

Control Factors

$$CF = 1 - [RC * RE * RP]$$

CF = Control Factor

RC = Regulation Control

RE = Rule Effectiveness

RP = Rule Penetration

Control Factors (2)

- Regulation Control
  - Expected Reduction For Control Measure
- Rule Effectiveness
  - Regulatory Program Effectiveness
    - Regulation, Compliance, Performance of Regulation
- Rule Penetration
  - Quantifies Regulation's Coverage of Category

Control Strategy Projections

- Estimates of Future Year Emissions that Include Expected Impact of Modified or Additional Control Regulations
  - Fuel Switching, Fuel Efficiency Improvements
  - Pollution Prevention Programs
  - Greenhouse Gas or Global Warming Initiatives

Control Strategies

- Federal
  - Clear Skies, NOx SIP Call (Phase I & II, GA), Nonroad Diesel, Heavy-Duty Diesel, Large Spark Ignition & Recreational Marine, Industrial Boiler MACT
- Regional
  - Clean Smokestacks, Atlanta / Northern Kentucky 1-hr Ozone SIPs, VEPCO, & TECO
- Local
  - I/M, RFG, burn bans

Emission Projection Methods

- Model Develops Projections
  - Base Year Inventory
  - Growth Factors
  - Control Factors
- Develop Projections Outside Model
  - Input Projected Inventory in Same Format as Base Year Inventory

Emission Projection Issues

- Use Local and Source-Specific Growth When Available
- Beware of “Double Counting” Controls
  - Verify Base Year Technologies
- Note Multi-Pollutant Control Devices
  - “Does Hg MACT Control PM, Too?”
- Special Issues
  - EGU & Fire “Typical Year”

Modeling Considerations

- Spatial
  - Accounting for Geographic Shifts in Activity
- Temporal
  - Seasonal Activity and Control
- Speciation
  - Account for Changes in Fuel or Solvent

Model Specific Data

- IPM
  - Input data, fuel costs, generation demand, existing/upcoming controls
- MOBILE6
  - VMT, I/M, RFP, fleet mix, fuel content
- NONROAD
  - Activity, growth, (new version in summer?)
- CMU-NH3
  - Activity and EMF Updates

Proposed Plan (Preliminary "Base Case")

- Use as much existing information as possible
  - Start with latest available projection documentation and control assumptions
    - EPA's Nonroad Diesel / HDD / Clear Skies or Preview of PM Transport Rule (PMTR)
    - Use growth & control programs as starting point
    - Make VISTAS-specific where local input available
      - EGU, Non-EGU Point, Highway, Nonroad, NH3
  - Coordinate with other RPOs

Proposed Plan (Preliminary "Base Case")

- What about BART?
  - Identify sources by January 2004
    - Opportunity to include rough estimate of sources and controls in preliminary "Base Case"
  - Define BART controls by June 2004
    - Fine tune for final "Base Case"
    - Stakeholder participation in further identification of sources and controls

Proposed Plan (Final "Base Case")

- Build on preliminary "Base Case"
  - Develop "interest groups" by source sector
  - Use groups to review, assess, and modify
    - Methods, models, and factors for projection
- Establish process to allow everyone to be heard
  - Timing needs to allow for final "Base Case" production
  - Final decisions to be made in time for contractor prepared projections to commence

Proposed Plan (To Work)

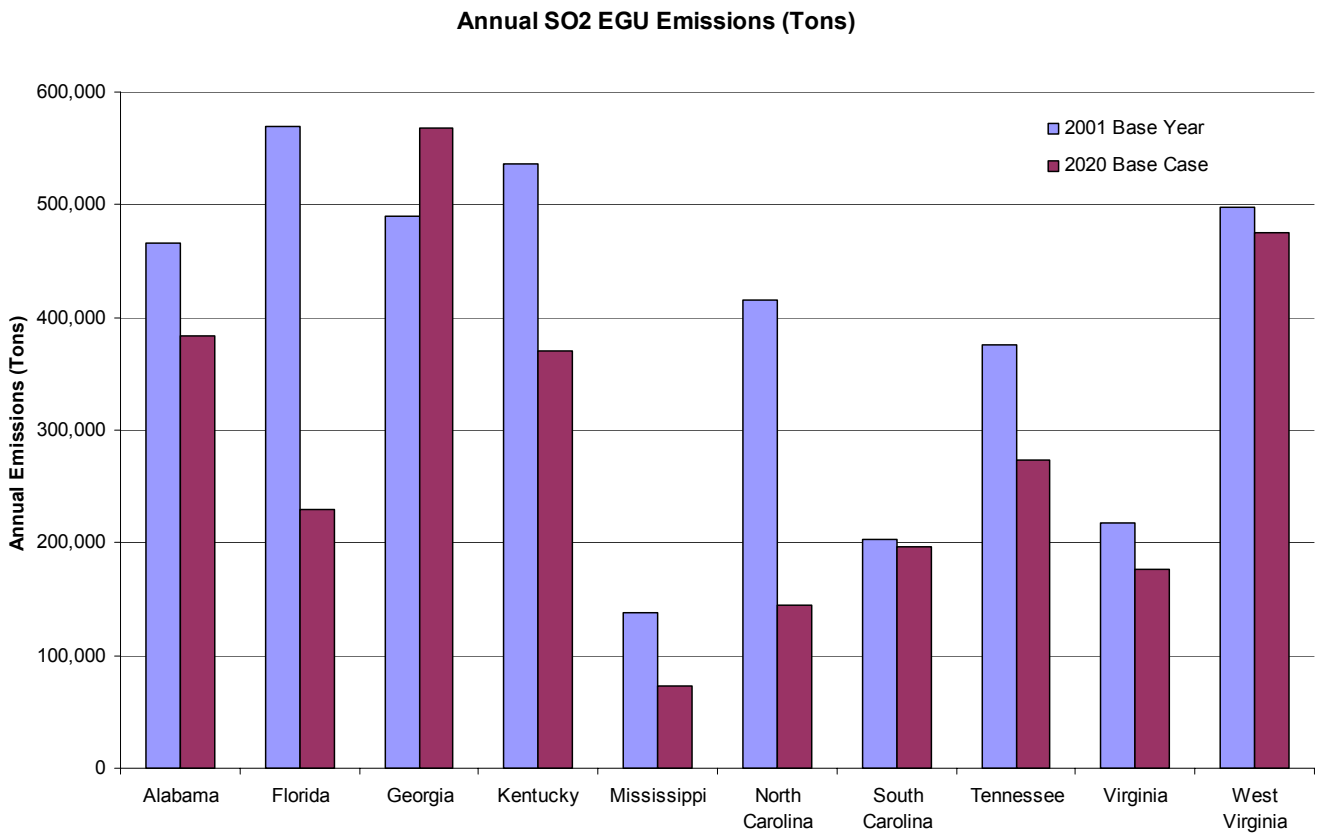
- Your participation a must!
  - Nothing is better than local specific data
- We must stay on time!
  - Requires timely responses to review requests
  - Schedule will be presented in advance
    - No modifications if we are to meet deadlines

VISTAS Assessment

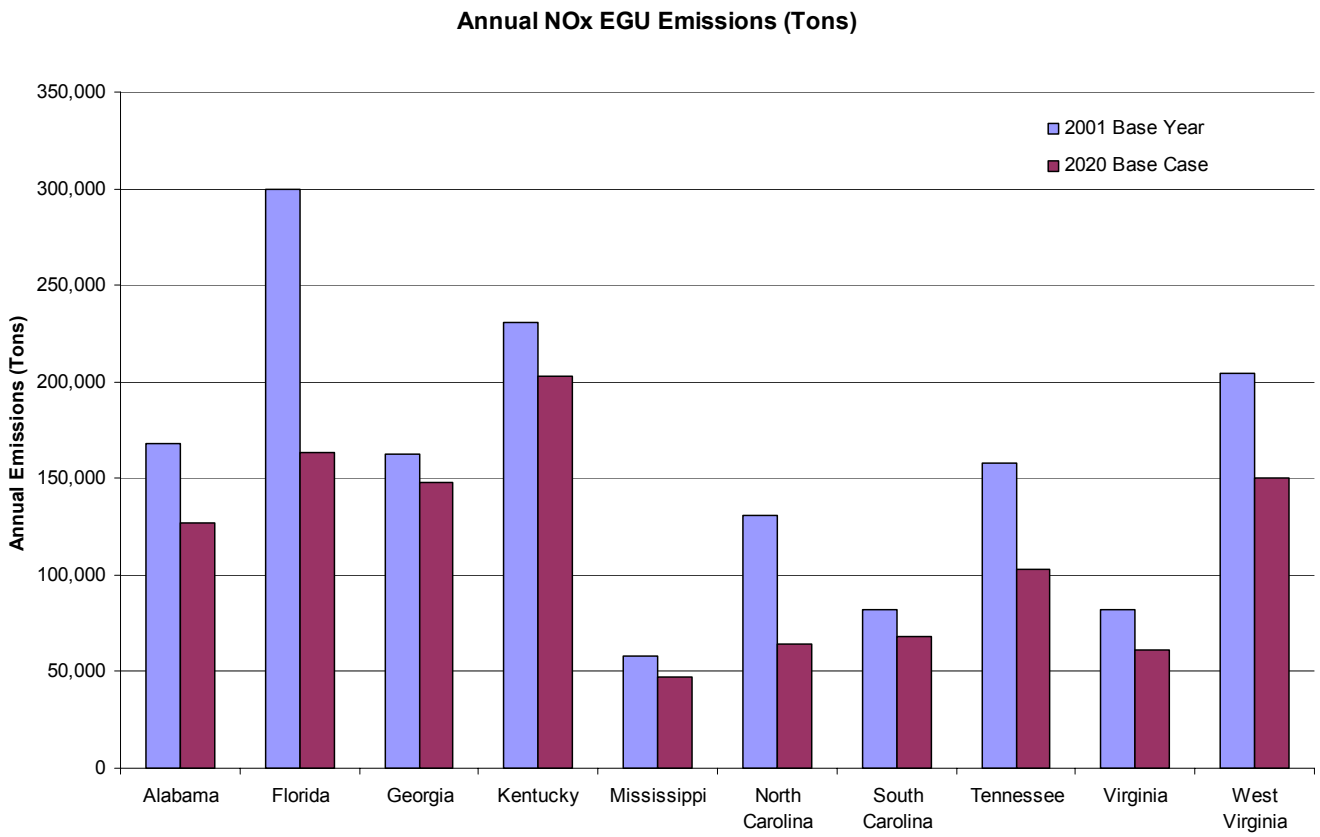
- What do you want to focus on?
- What data do you want to see?
- What data do you have?
- What data can you get?
- What can be defaulted?

Now let’s hear from you …..

VISTAS Annual Emissions – SO2 EGU Sources



VISTAS Annual Emissions – NOx EGU Sources



VISTAS Annual Emissions – PM-2.5 EGU Sources