

Developing Southern Company Emissions and Flue Gas Characteristics for VISTAS Regional Haze Modeling

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Outline

- Background & Objective
- Methodology: Emissions, Flue Gas Characteristics
 - 2002 Base Year
 - 2002 Typical Year
 - 2009, 2018 Future Years
- Emission Summary for Southern Company EGU's
- Conclusion

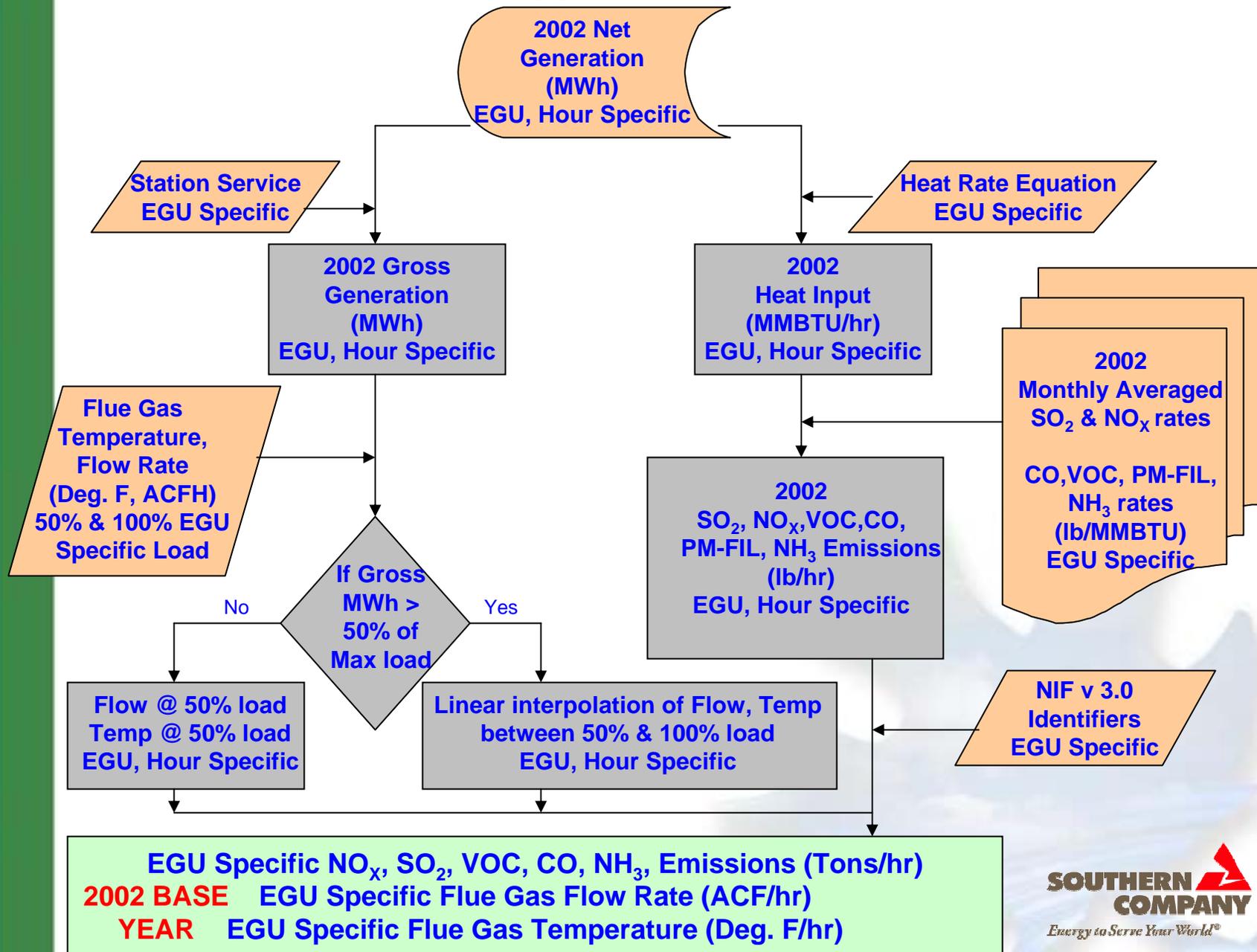
Background

- VISTAS – Visibility Improvement State and Tribal Association of Southeast
- VISTAS is developing common set of emission inventories for regional haze regulatory process in southeast
 - 2002 Base Year
 - 2002 Typical Year
 - 2009, 2018 Projection Years
 - OTB (On-The-Books)
 - OTW (On-The-Way)/CAIR
- Emission inventories developed with input from states and stakeholders
- Southern Company provided hourly, unit specific emissions (SO_2 , NO_x , CO , VOC , PM-FIL , NH_3) and flue gas characteristics (temperature and flow rate) for all its EGU's for VISTAS emission scenarios in NIF v3.0 format

Objective

- Describe the methodology used to create Southern Company emissions and flue gas characteristics for VISTAS scenarios
 - Coal/Oil/Gas fired units
 - Units with and without CEMS
 - Generic future units for projection years
- Caveat:
 - VISTAS decided to use Southern Company developed emissions only for the following scenarios
 - Base year 2002, not including Southern Company units located in Georgia with CEMS
 - Typical year 2002
 - Future year 2009 and 2018 for Southern Company EGU's located in Mississippi

Methodology - 2002 Base Year

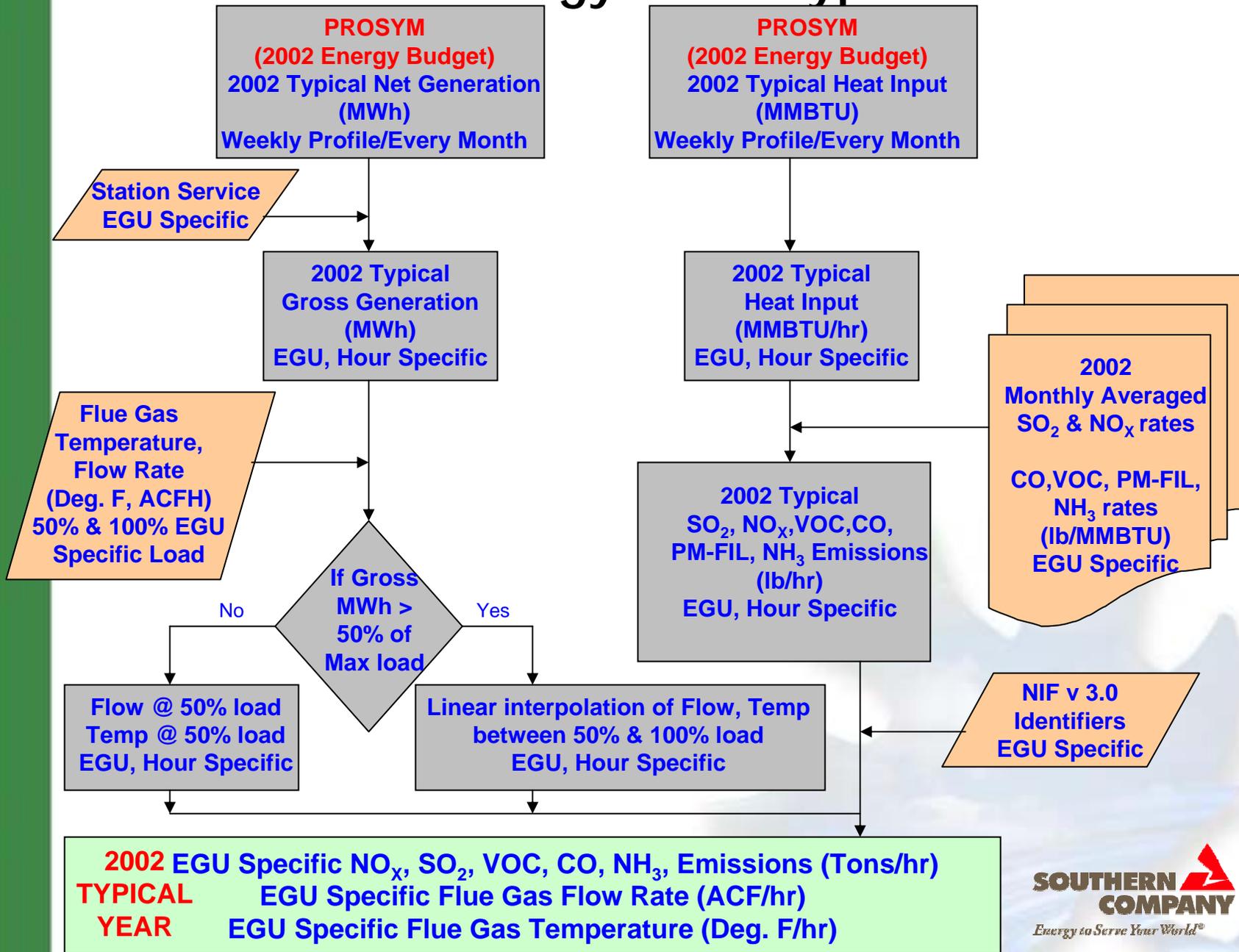


Methodology - 2002 Base Year

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- 2002 net generation obtained from Energy Management Systems (EMS) database
- Station Service, Heat Rate Equation
 - Operational data and plant tests
- Emission Factors
 - NO_x, SO₂: Monthly Averaged CEMS data, Permit limits, AP-42 Factor Handbook
 - VOC, CO: Permit limits, AP-42 Factor
 - PM-FIL: Stack test, Permit limits, AP-42 Factor
 - NH₃: Ammonia slip at units operating an SCR
 - Emission rates checked for reasonableness
- Flue Gas Temperature and Flow rate
 - Equipment manufacturers specification
- This approach provides consistency across all Southern Company units with and without CEMS
- Eliminates biases associated with CEMS regulatory reporting requirements. May not be suitable for modeling.

Methodology -2002 Typical

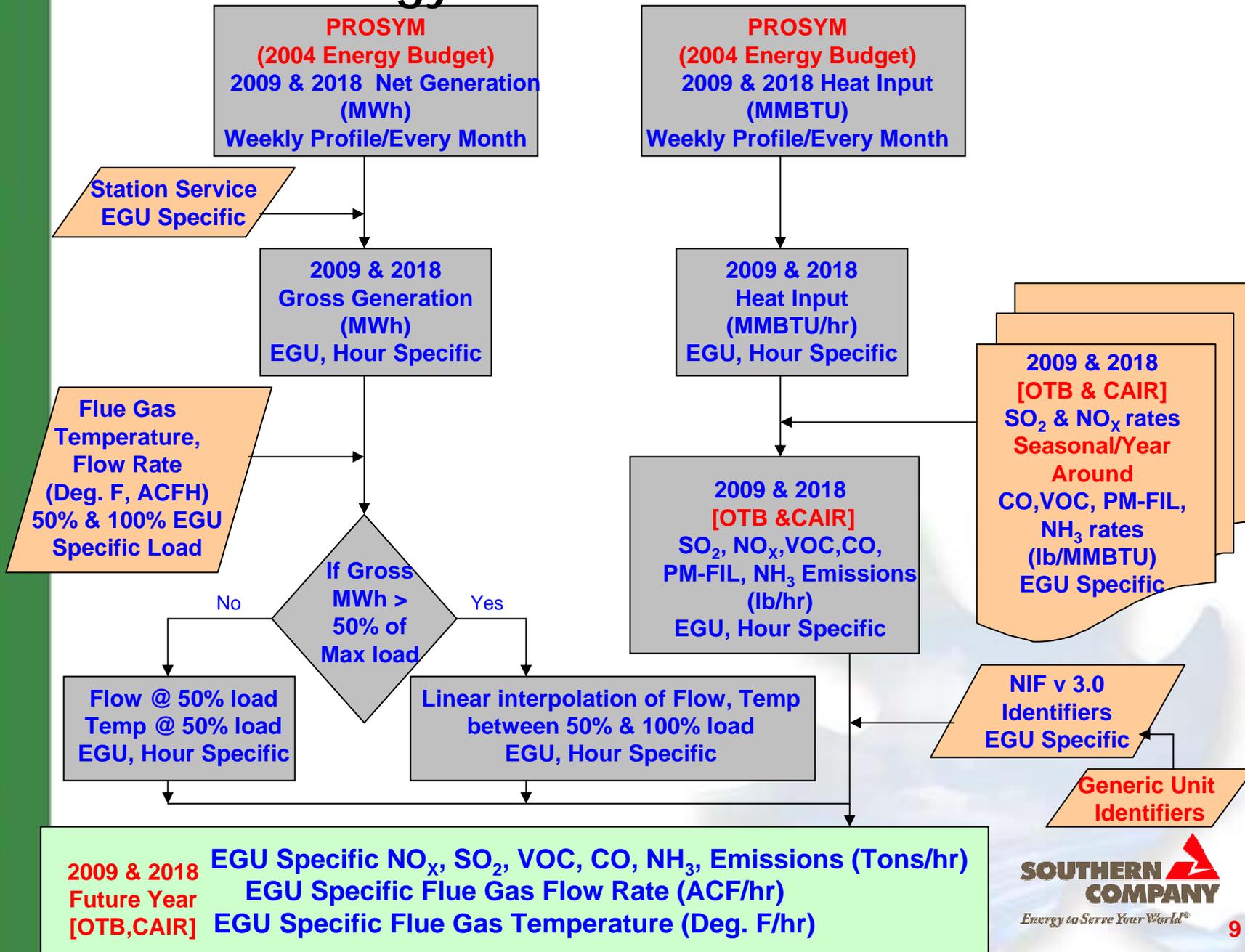


Methodology -2002 Typical Year

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- PROSYM: Chronological Production Modeling System
 - **2002 Energy Budget** load forecasts, plant efficiency, off-system sale, and fuel costs
 - Weekly profile of Generation and Heat Input for each existing and planned “generic” units – Operation of an EGU at “Typical Conditions”
 - Forced outages (EFOR), Planned outages (PO) and retirements.
 - Obtained from System Planning
- Emission Factors
 - Same as in 2002 Base Year
- Flue Gas Temperature and Flow rate
 - Equipment manufacturer’s specification
- EFOR’s and PO’s are part of EGU’s “typical” operation and it would be unrealistic force “no outages” for an entire year in the PROSYM model.

Methodology -2009 & 2018 Future Years



Methodology -2009 & 2018 Future Years

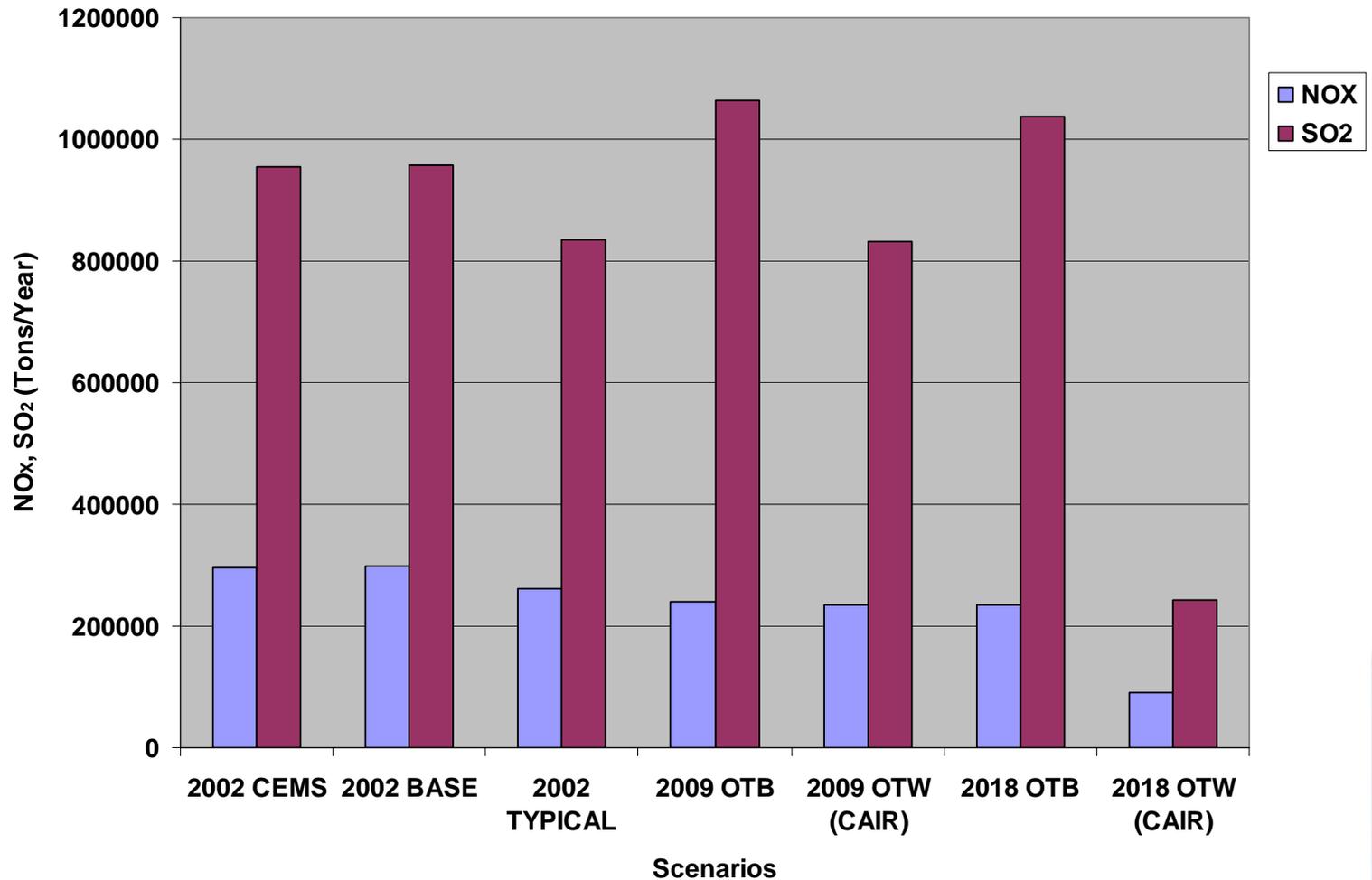
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- PROSYM: Chronological Production Modeling System
 - **2004 Energy Budget**
 - Enforced outage (EFOR), Planned outage (PO) from **2002 Typical** were applied to 2009 and 2018 projections to maintain consistency and remove operational discrepancies.
- Emission Factors
 - Southern Company compliance strategy (2003 version)
 - OTB & Anticipated controls to be in compliance with CAIR
 - Future generic unit emission rates based on existing similar units or latest equipment vendor specifications
 - Seasonal and year around controls considered
- Flue Gas Temperature and Flow rate
 - Equipment manufacturer's specification
- Future generic units
 - Proximity to existing similar units, load centers of availability of transmission and fuel supply infrastructure
 - Unique identifiers used for easy incorporation in to the SMOKE model

Methodology: General

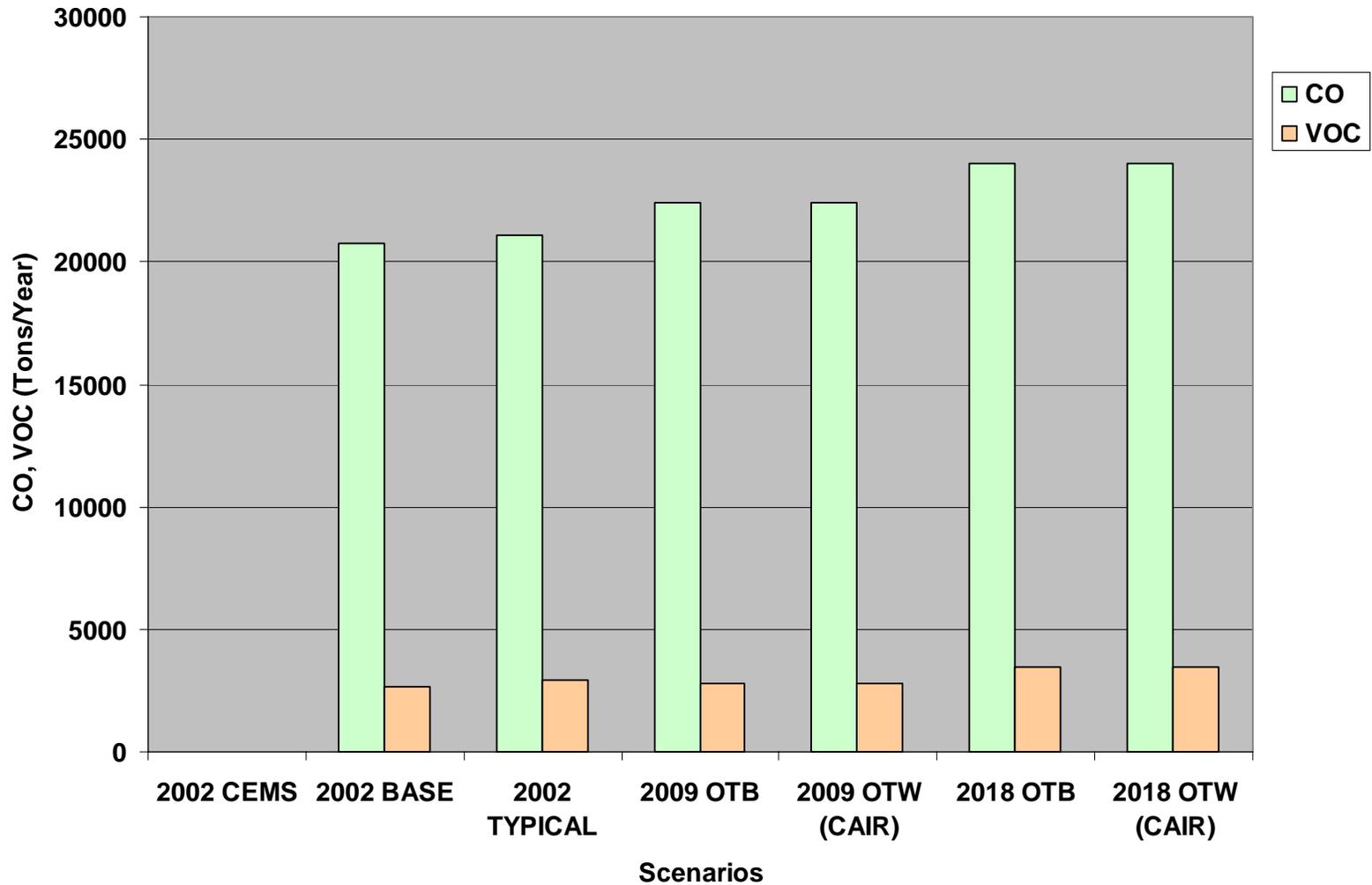
- QA/QC at every step
- Unit specific information used
- Consistent methodology used to generate 2002 Base Year, 2002 Typical and 2009 & 2018 OTB, OTW/CAIR
- Emissions and flue gas characteristics processed using perl scripts.

Southern Company SO₂ & NO_x Emissions

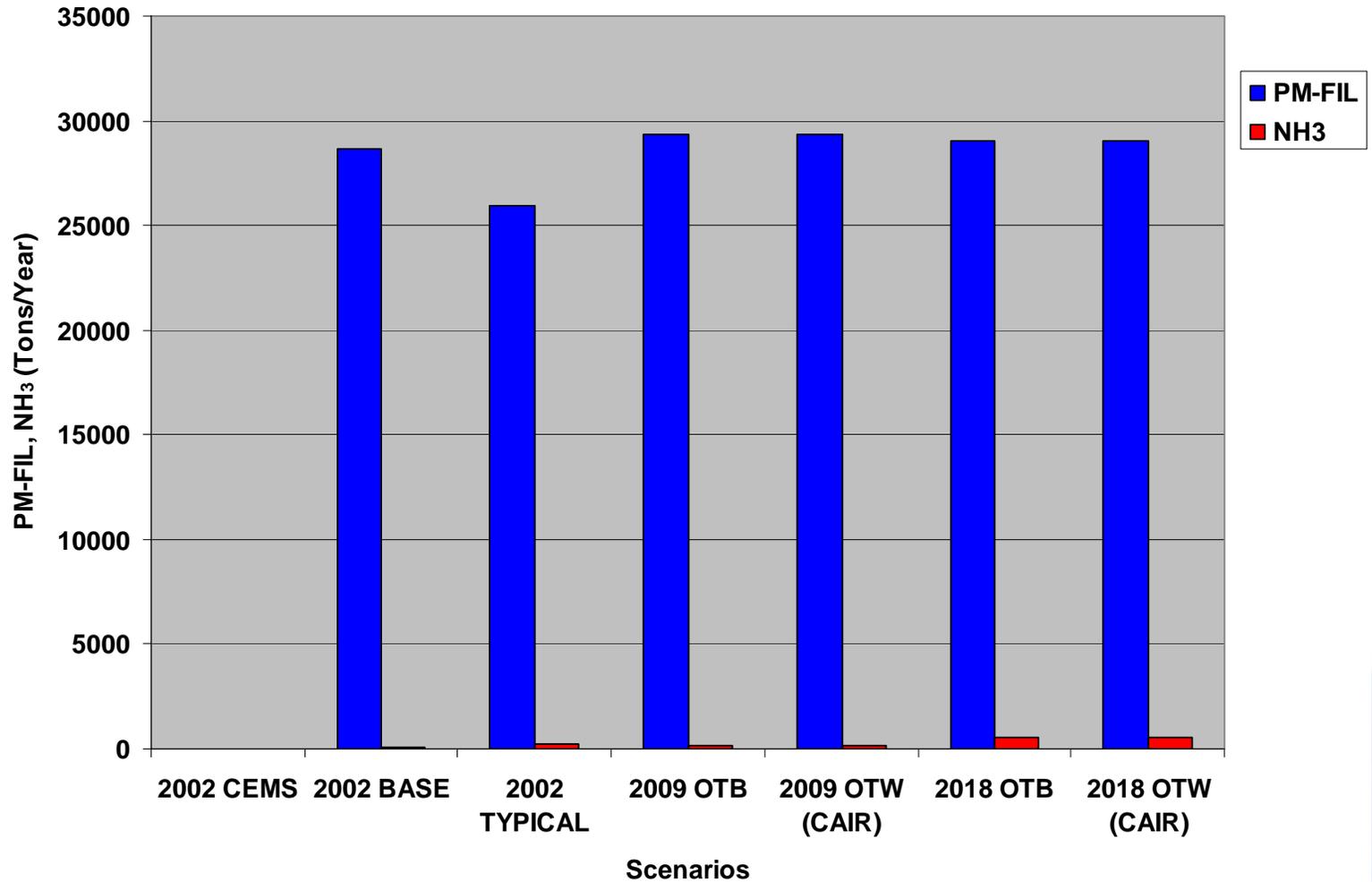


~ 70 % reduction in NO_x from 2002 to the 2018 CAIR case
~ 75 % reduction in SO₂ from 2002 to the 2018 CAIR case

Southern Company CO & VOC Emissions



Southern Company PM-FIL & NH₃ Emissions



Conclusion

- Hourly unit specific emissions and flue gas characteristics developed for all Southern Company EGU's under VISTAS scenarios.
- Consistent and realistic methodology used across the VISTAS scenarios incorporating
 - EGU specific data: Emission factors, Operational, Stack test
 - Region specific energy forecast (It's our business, areas we know the best)
- Such consistency in emission development methodology is highly desired when air quality modeling results are used in a relative sense



Thanks!

Questions ?