EMISSIONS INVENTORY UPDATE

Briefing for OTC Committees and
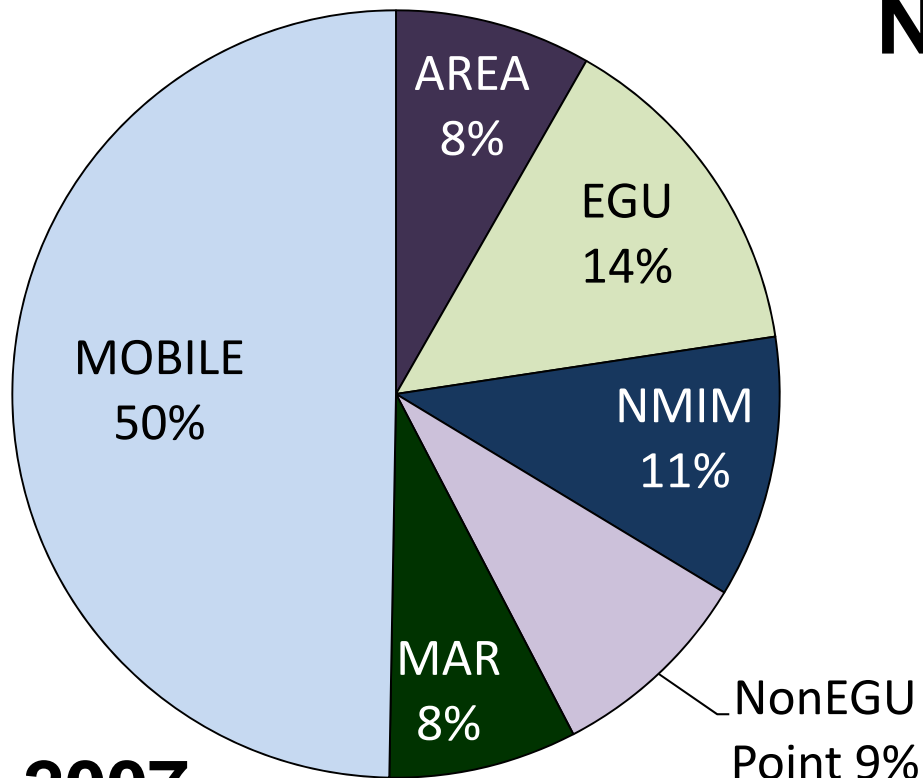Stakeholder Meeting
April 4, 2013
Washington, DC
Julie McDill & Susan Wierman

TOPICS

1. Overview: MARAMA 2007/2020 V3 modeling inventory

2. ERTAC – EGU Forecast
   - What results will be used in modeling?
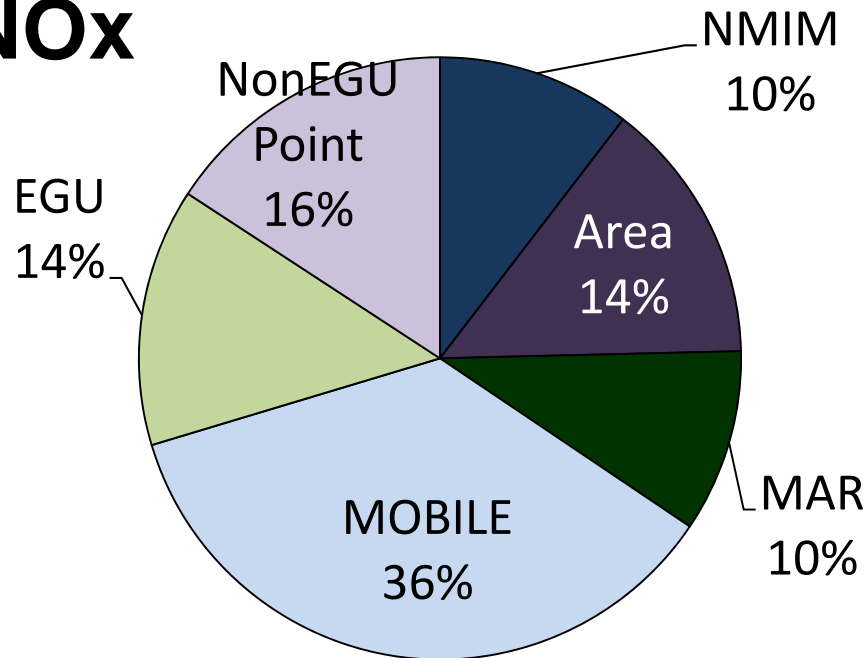   - What issues remain?

3. Modeling inventory

MANEVU and Virginia MARAMA Version 3 NOx
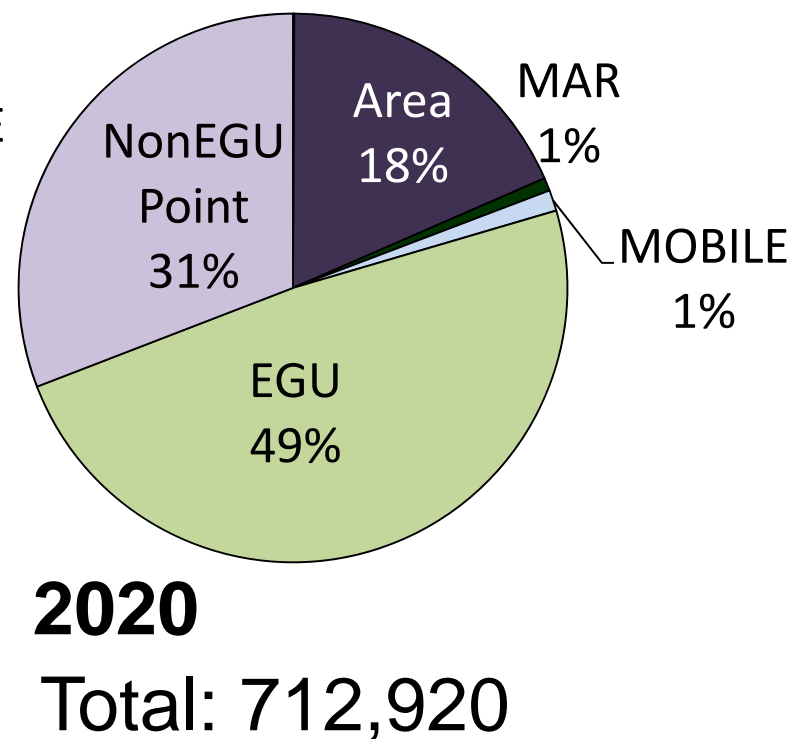

2007
Total: 2,764,323

2020
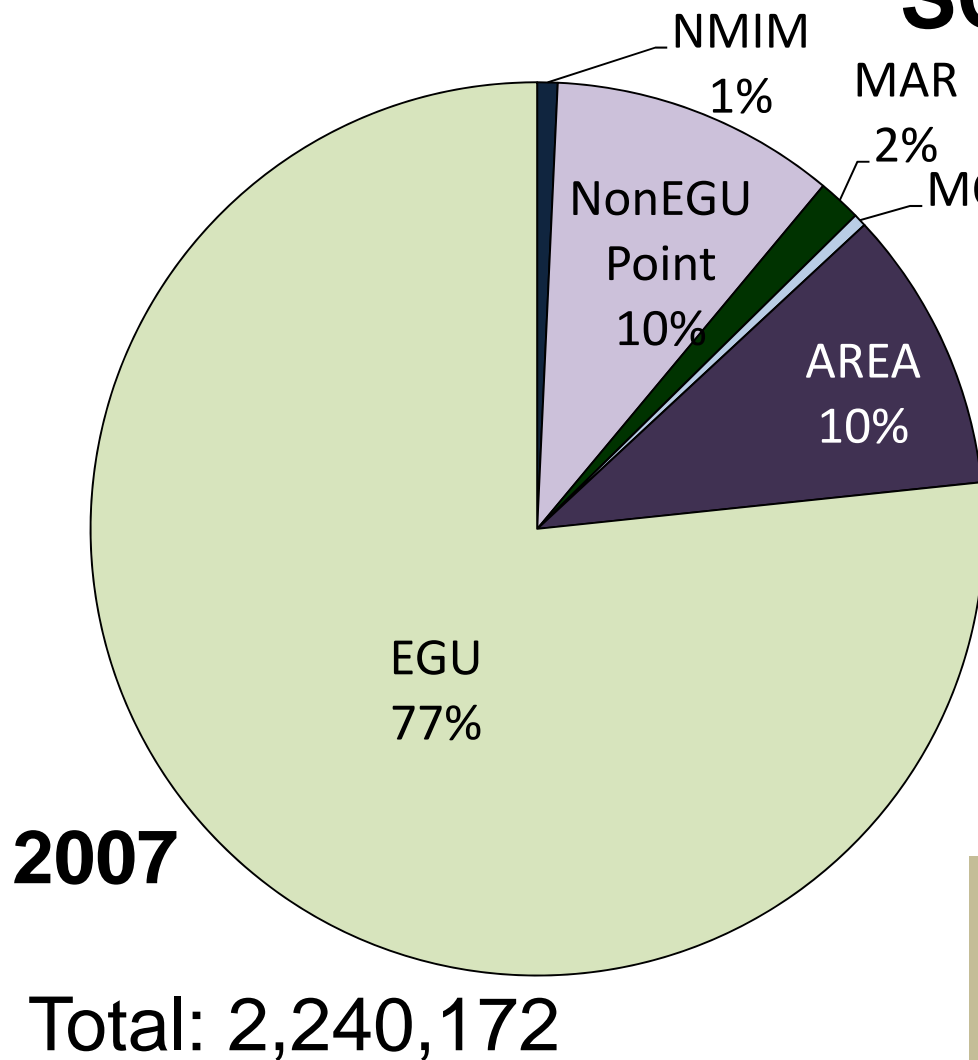Total: 1,501,742

Overall NOx reduction from 2007 to 2020 Expected to be 45%

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MANEVU and Virginia
MARAMA Version 3
SO2

2007

Total: 2,240,172

2020

Total: 712,920

Overall SO2 reduction from 2007 to 2020
Expected to be 70%

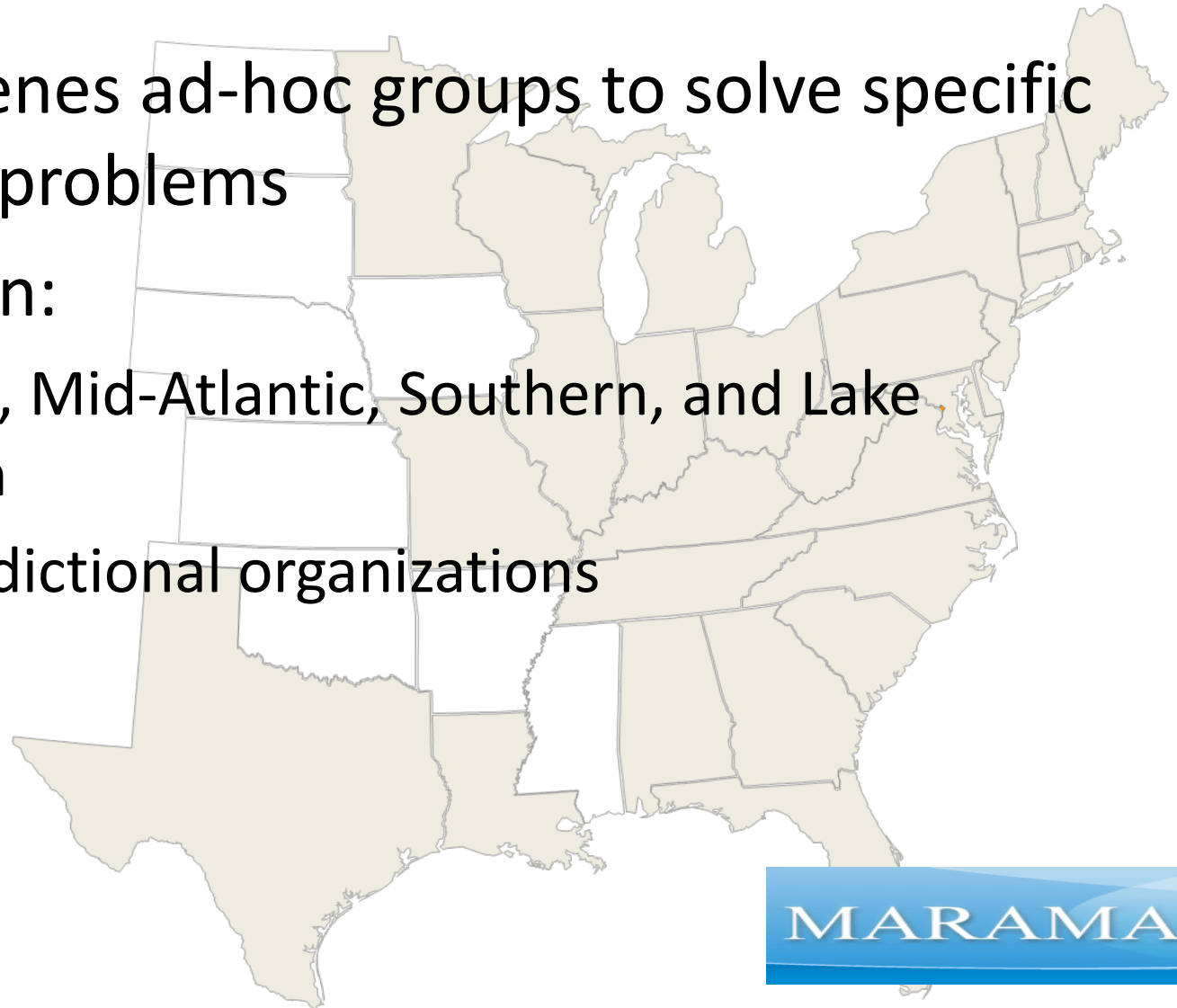# Eastern Regional Technical Advisory Committee (ERTAC)

ERTAC convenes ad-hoc groups to solve specific inventory problems

Collaboration:

  States - NE, Mid-Atlantic, Southern, and Lake Michigan

  Multi-jurisdictional organizations

  Industry

MARAMA

ERTAC Timeline

September - December, 2012

- "East of the Mississippi" test runs Using AEO2010 Growth Rates
- Goal: Demonstrate a "Proof of Concept"
- Present results to states for comment
- Presented model and "Proof of Concept" results to USEPA technical staff

Spring 2013

- Goal: Improve inputs and model based on "Proof of Concept"
- Develop AEO 2013 growth factors which reflect new fuel mix paradigm
- Present results to full ERTAC Committee
- Stakeholder review
- Air Quality modeling using ERTAC EGU projections

Anticipated Future tasks

- Develop new base year

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How does ERTAC EGU work?

Starting point: 2007 CEM data by region

States provide info: new units, controls & other changes

Regional growth rates

   Base – Dept. of Energy (EIA) Annual Energy Outlook (AEO)

   Peak – North American Electric Reliability Corporation (NERC)

Future hourly estimates based on base year activity

   Temporal profile matches meteorology

Unit demand beyond capacity moved to other units using 2007 ordering

Growth beyond regional capacity results in "Generic Units"

Test hourly reserve capacity

State Involvement

- **<u>Regional lead</u>** - coordinate state review of model and inputs

- **<u>State Lead</u>** - QA the input files and review the output to provide guidance

- If Future Year (FY) emission goals are not met with known controls, states will indicate what additional strategies must be applied to meet the goal

Regional and Fuel Modularity

Units assigned to a region/fuel

Growth rates by region/fuel

Growth rates account for:

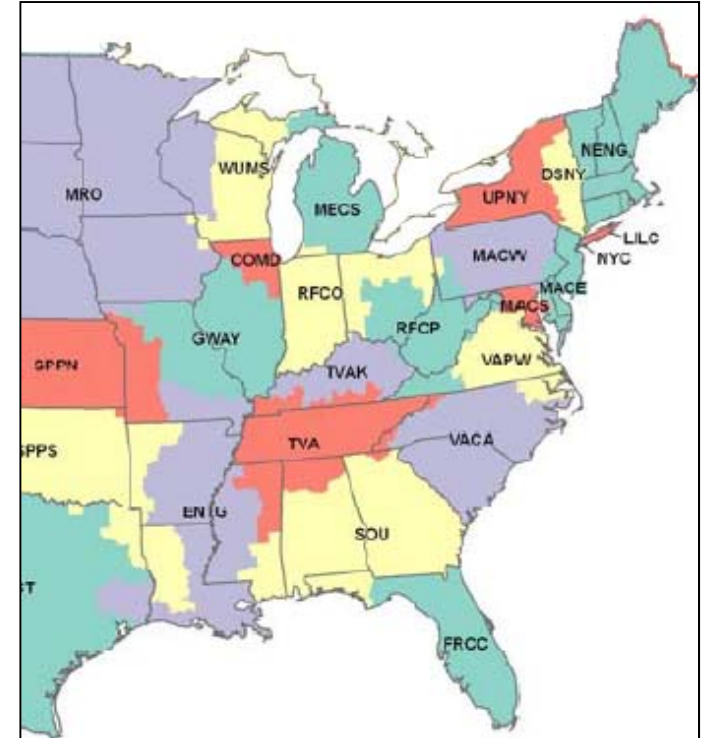Regional generation transfer

Changes in fuel mix

Allows modular operation
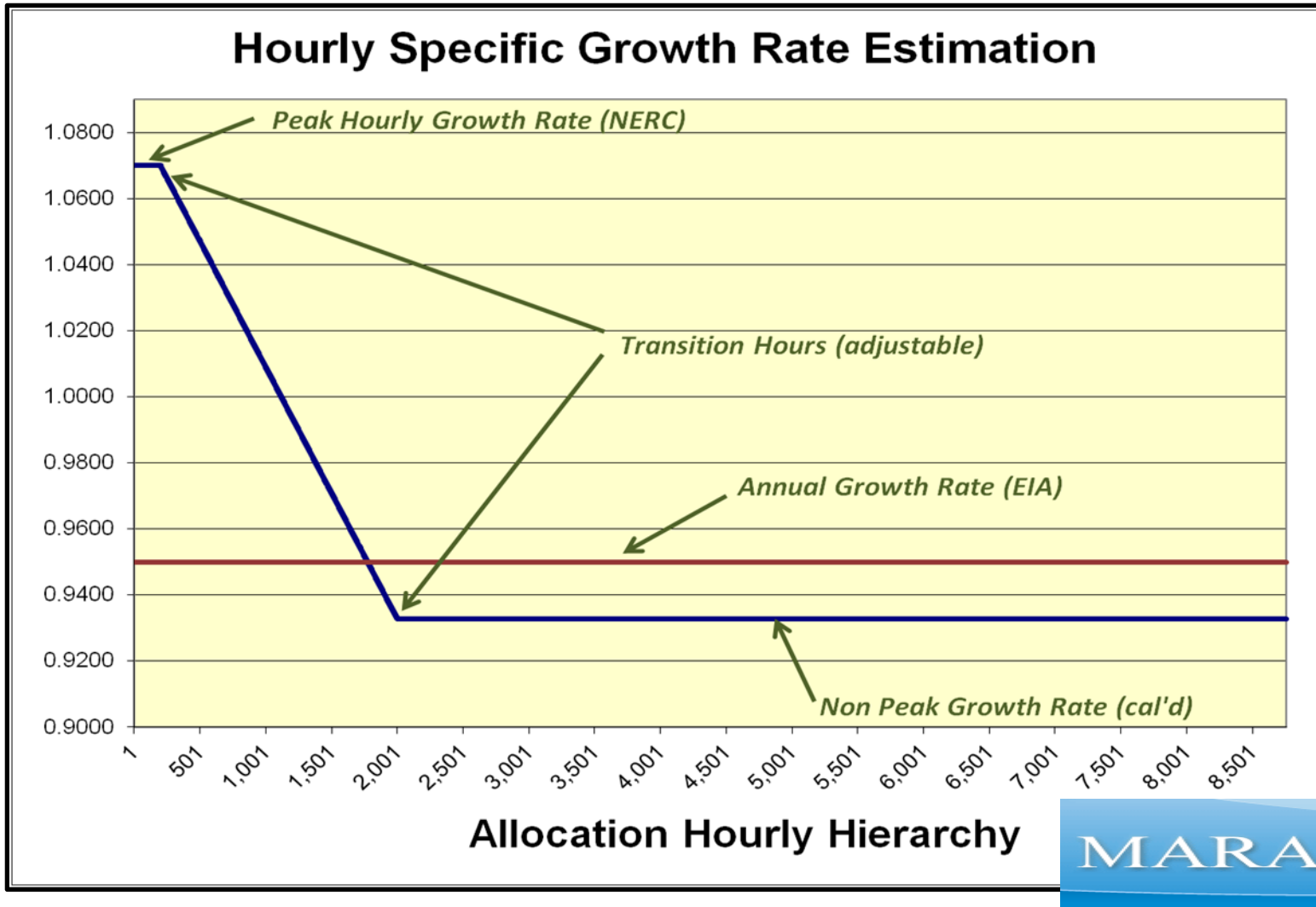
With unrealistic growth rates:

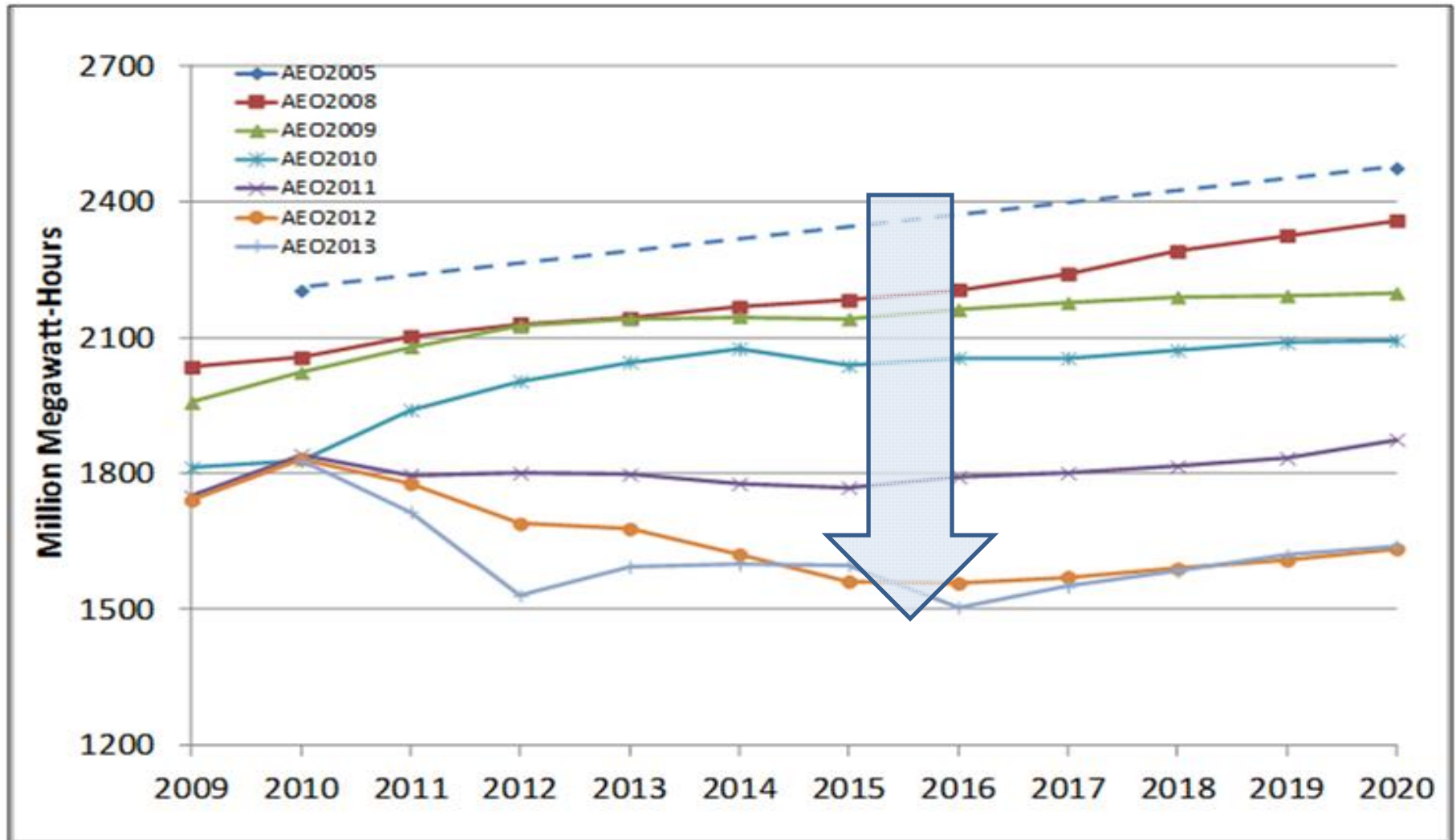Results will also be unrealistic

May need to manually balance between fuels

Growth Rates (GR)

- Peak GR = 1.07
- Annual GR = 0.95
- Transition hours of 200 & 2,000
- Non Peak GR = 0.9328 (calculated)

Hourly Specific Growth Rate Estimation

Peak Hourly Growth Rate (NERC)

Transition Hours (adjustable)

Annual Growth Rate (EIA)

Non Peak Growth Rate (cal'd)

Allocation Hourly Hierarchy

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EIA's AEO Projection of Coal Consumption for Electricity Generation

EIA's AEO Projection of Oil Consumption for Electricity Generation
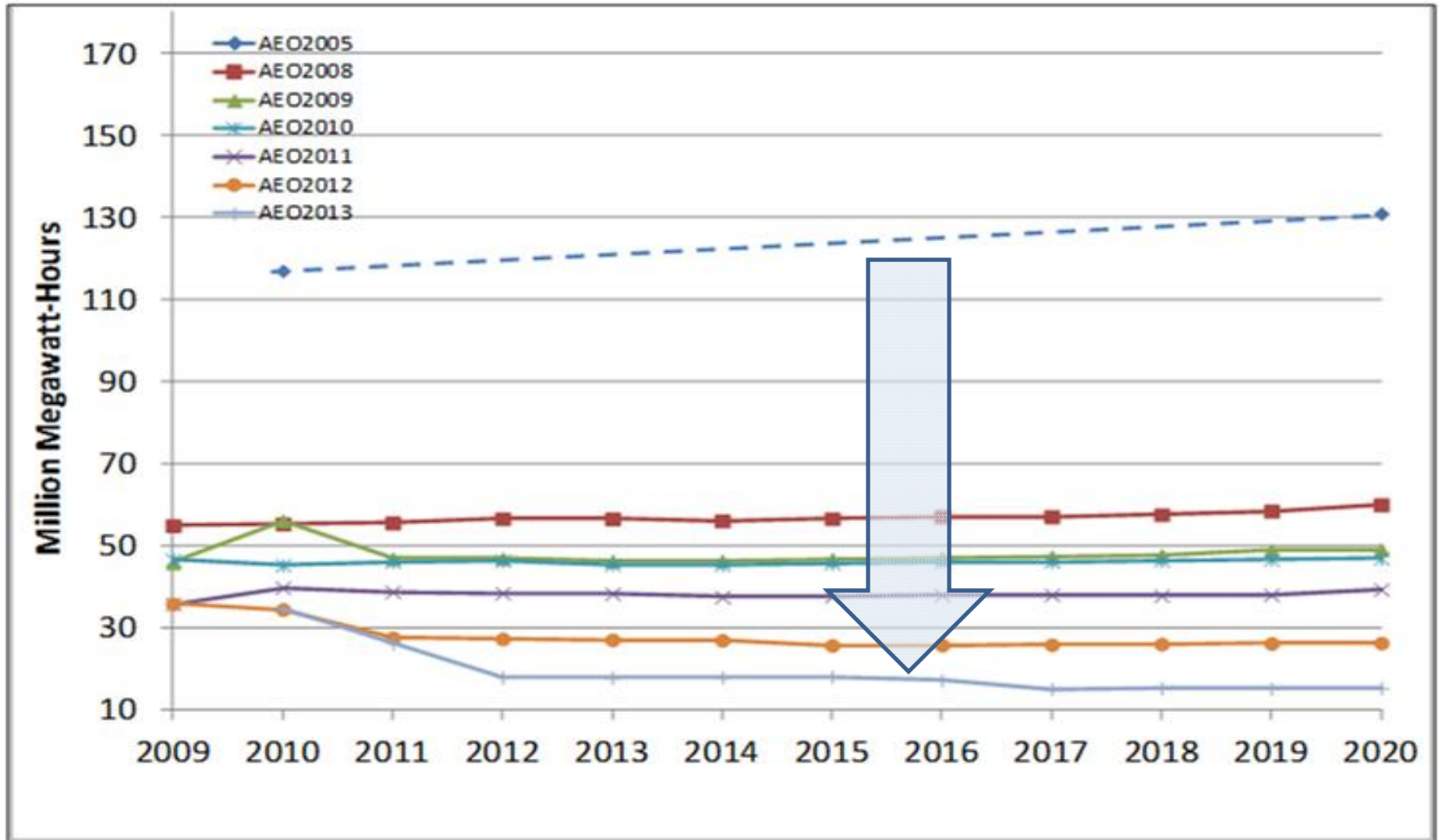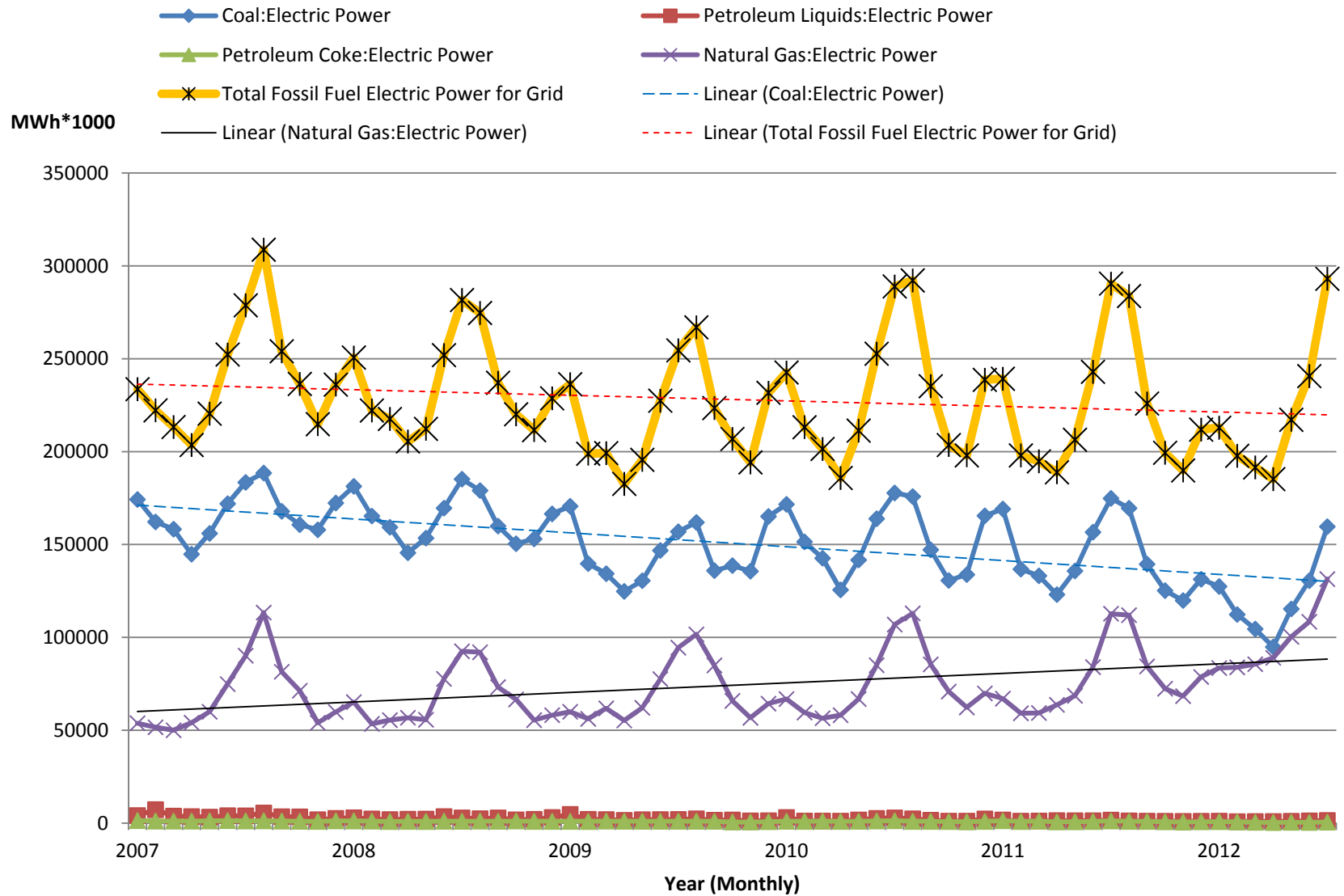
EIA's AEO Projection of Gas Consumption for Electricity Generation
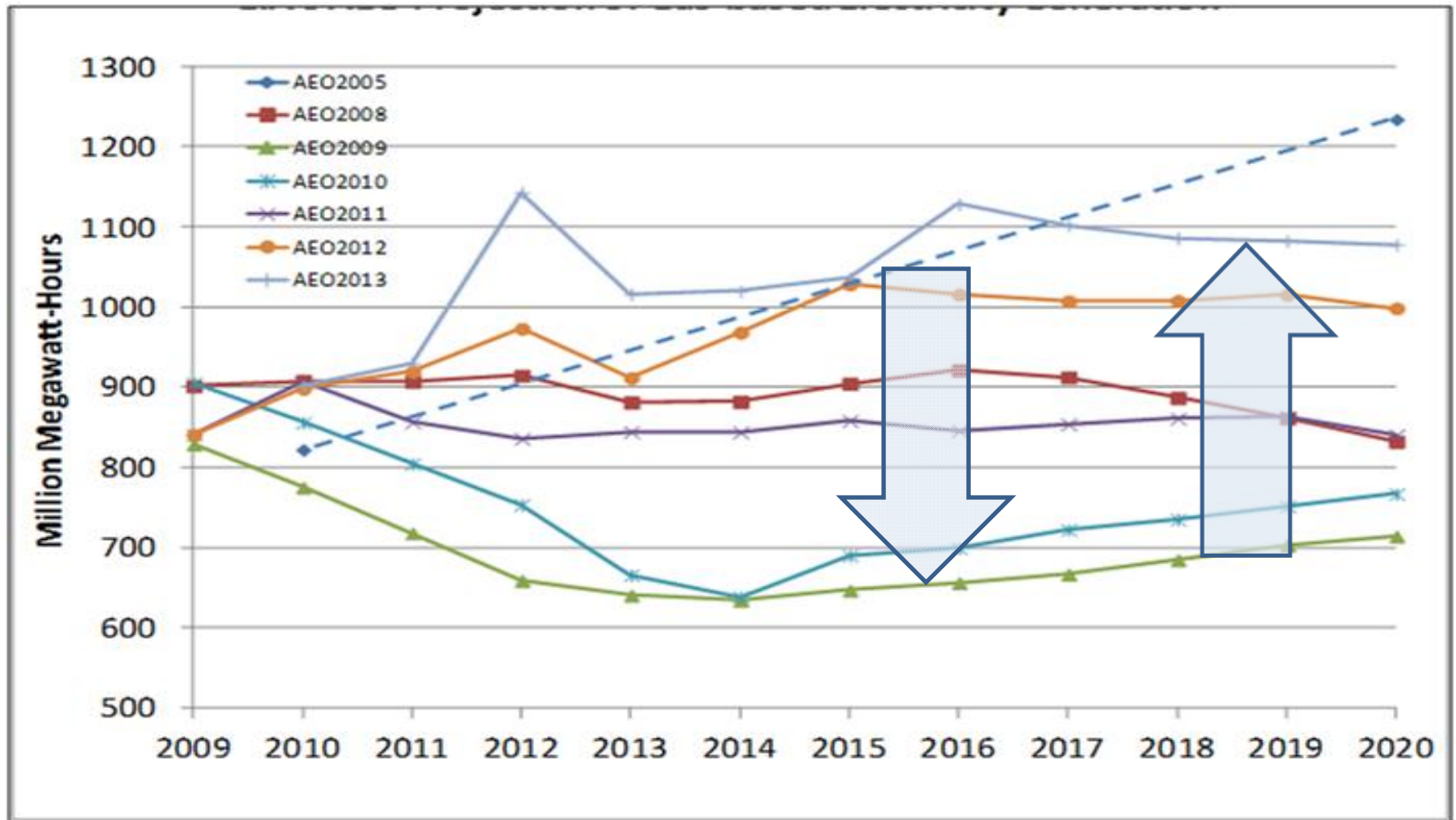
Fossil Fuel Electric Power-to-Grid Generation Trends
Monthly Totals by Fuel Type - EIA Data - US Aggregate

Legend:
- Coal:Electric Power
- Petroleum Liquids:Electric Power
- Petroleum Coke:Electric Power
- Natural Gas:Electric Power
- Total Fossil Fuel Electric Power for Grid
- Linear (Coal:Electric Power)
- Linear (Natural Gas:Electric Power)
- Linear (Total Fossil Fuel Electric Power for Grid)

MWh*1000

Year (Monthly)

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Growth Beyond Existing Capacity

If unit growth exceeds capacity

Unit is limited to capacity

Demand beyond capacity is distributed to other units

MARAMA

New Generic Units

- Added to meet demand
- Utilization determined on a fuel/unit type basis (like new state supplied units)
- Receive unmet demand
- Size/location of generic units adjustable
- Future temporal profile assigned by region and fuel/unit type
- If a generic unit is added, the allocation hierarchy is recalculated and the loop begins at the first hour

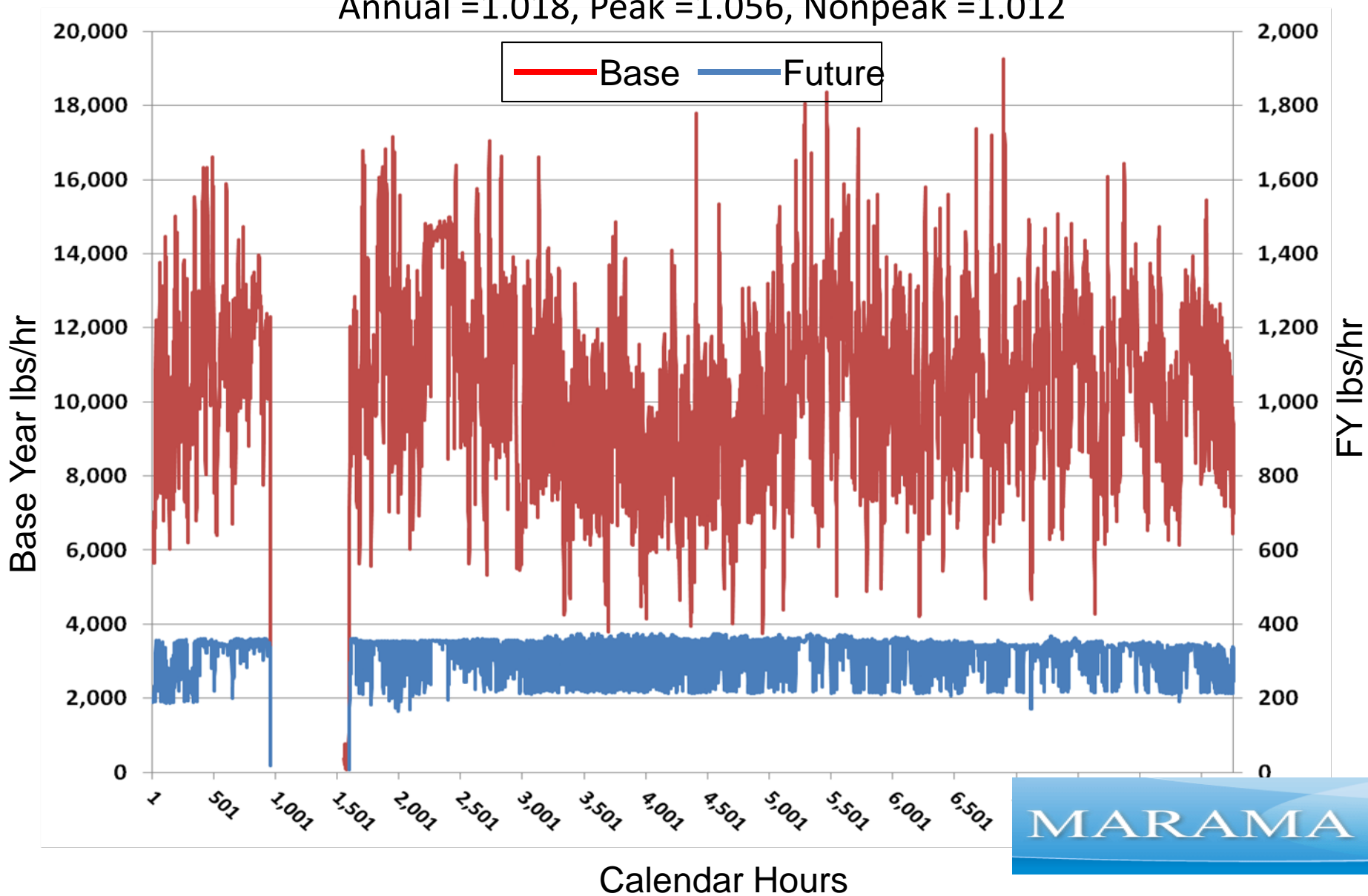# Unit Level Example: Coal Fired Existing Unit, 800 MW
Growth Rates:
Annual =1.018, Peak =1.056, Nonpeak =1.012
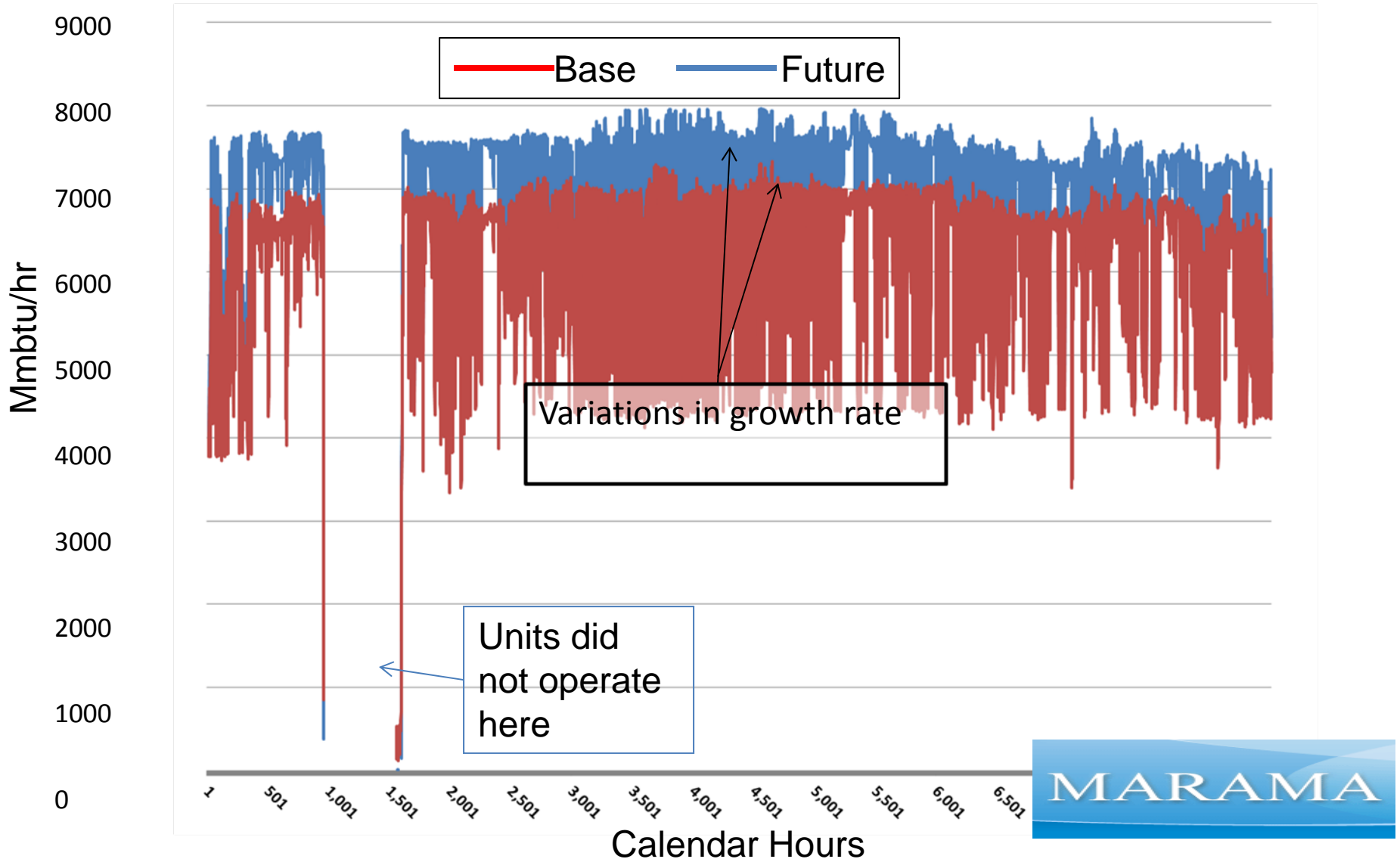
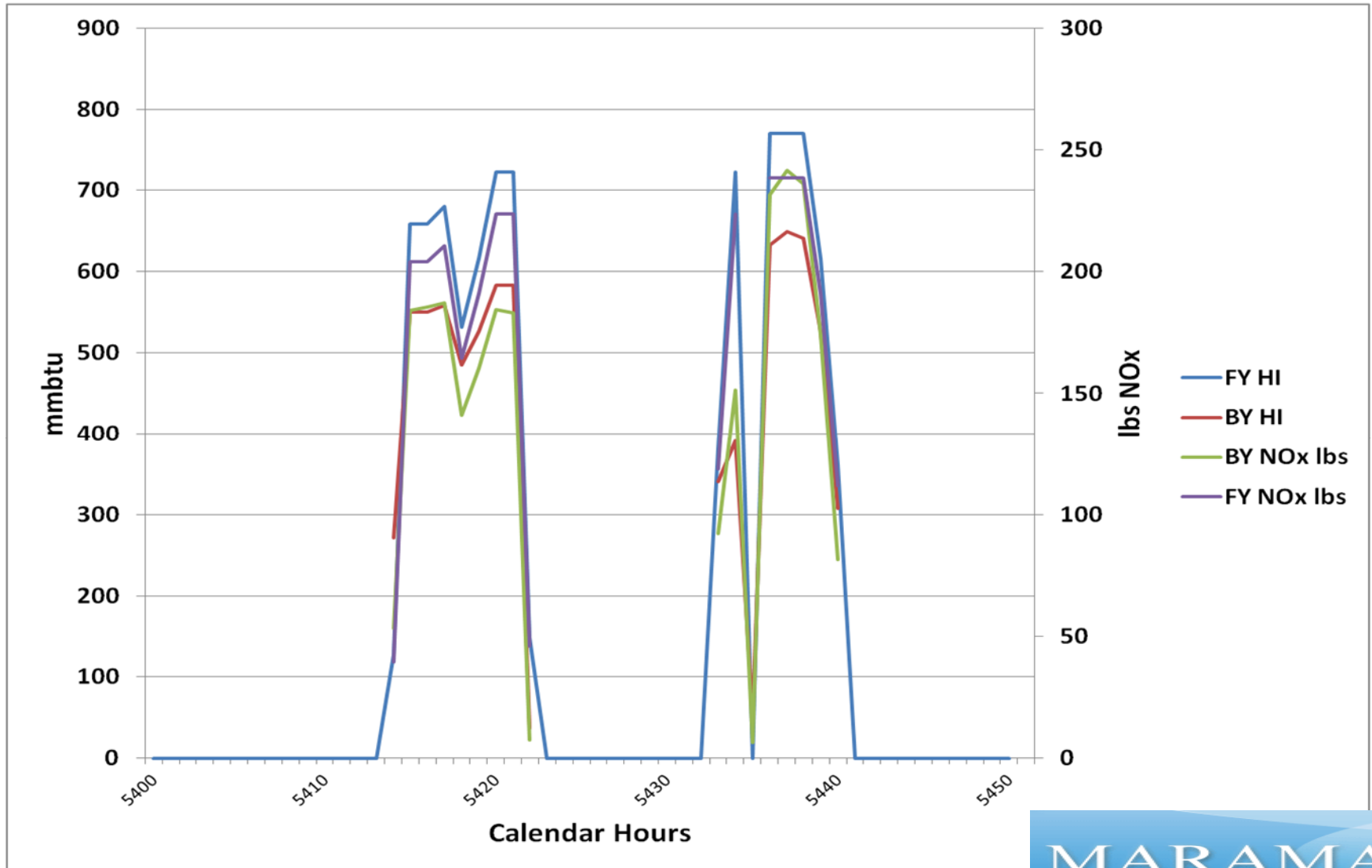Unit Level Example: Coal Fired Existing Unit, 800 MW – SO2 Control
Growth Rates:
Annual =1.018, Peak =1.056, Nonpeak =1.012

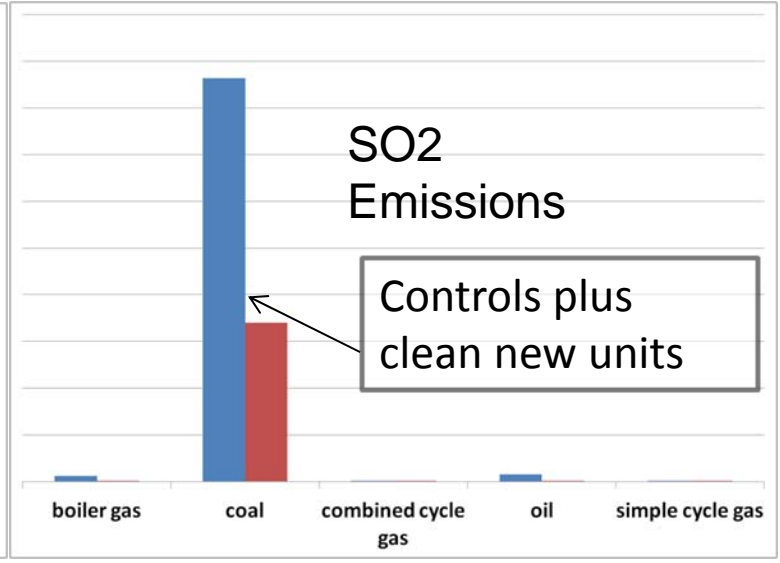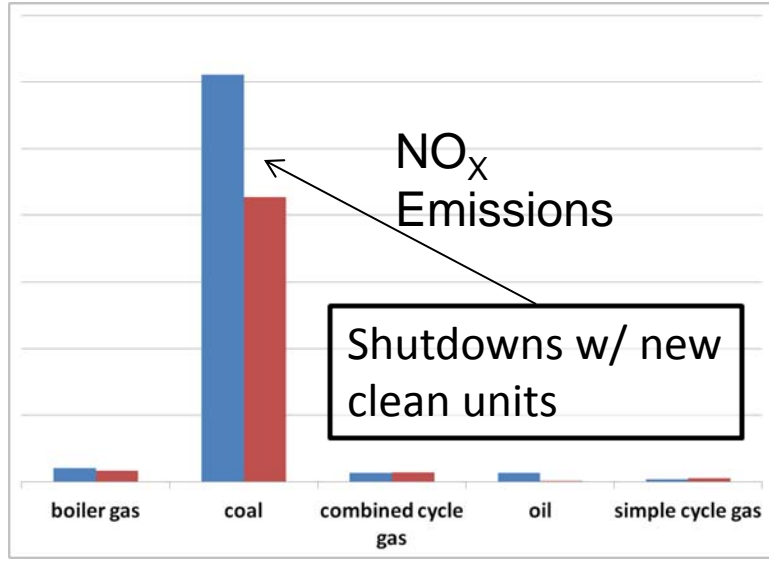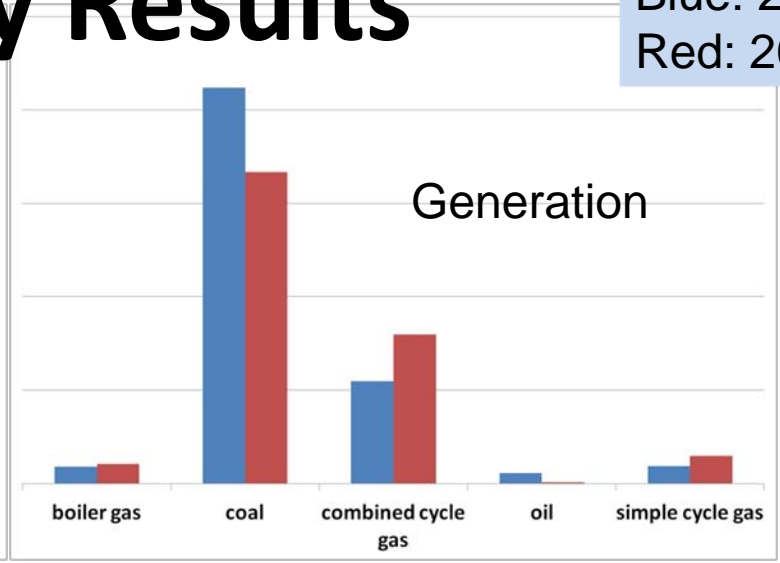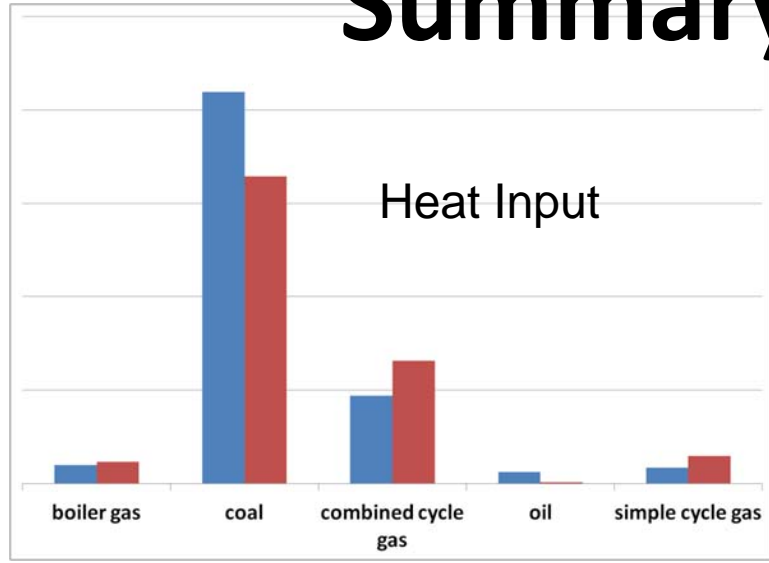# Peaking Unit Example: Simple Cycle, 53 MW
Growth rates
Annual =1.39, Peak =1.549, Nonpeak =1.377

AEO2013 Run – V1.6
Summary Results

Blue: 2007
Red: 2017

Heat Input

Generation

NO$_X$ Emissions

Shutdowns w/ new clean units

SO2 Emissions

Controls plus clean new units

What You Can Expect the Model to Deliver

- **Growth estimates for**
  - CAMD reporting units
  - Coal, oil, natural gas
- **Regional boundaries delineate NYC**
  - Flexibility in growth rates
  - No unit retired w/o state input
- **Future year hourly temporal profiles for**
  - NOx, SO2, activity data
  - New units that didn't operate in the base year

In summary

- The model has been built
- Northeast EGU inputs in good shape
- Output using AEO2013 has been generated
- Next steps:
    - Other regions improve EGU inputs
    - New run with revised inputs (V1.7)
    - Stakeholder outreach
    - Scenarios built to evaluate policy
    - New Base Year inputs

Key Points

- MOVES 2007 & 2020 complete but anomalies remain

- ERTAC EGU emissions projection using AEO2013 will be used in modeling

Documentation

- I:\Emissions Inventory\2007 Modeling Emissions Inventory\Summaries
  - Complete MANEVU Piecharts.xlsx