Economic Growth Analysis System (EGAS) Version 4.0

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Overview

- EGAS 4.0 Update Objectives
- Description of EGAS Version 3.0
- Development of EGAS Version 4.0
- Model Strengths, Limitations, and Potential Future Enhancements

Project Objectives

- Project Objectives
  - Incorporate Current Information
    - Economic Data/Models
    - Forecasting Procedures
    - Source Category Lists
  - New Model Environment
    - Windows 95/98/NT
    - Improve User Friendliness

EGAS Version 3.0

- DOS-Based Software Model
- Three-Tiered Approach
  - 1: National Economic Tier
  - 2: Regional Economic Tier
  - 3: Growth Factor Tier
- Each Tier Follows Sequentially from Preceding Tier Run

EGAS Version 3.0 (cont'd.)

- National Economic Tier
  - Bureau of Labor Statistics (BLS) or Wharton Econometric Forecasting Associates (WEFA) Projection
    - Final Demand Forecasts from Above Used to Drive Input-Output Models to Yield Forecasted Intermediate Demand for and Output by Industries

EGAS Version 3.0 (cont'd.)

- Regional Economic Tier
  - Regional Economic Models, Inc. (REMI)
  - Modeling Regions for:
    - Each Serious and Above Ozone Nonattainment Area
    - All Multi-State Moderate Nonattainment Areas
    - All Attainment Portions of States
  - Nonattainment Areas as Defined at Time of EGAS Development

EGAS Version 3.0 (cont'd.)

- Growth Factor Tier
  - Translates Economic Activity Projections from Regional Tier into Growth Factors by SCC
    - Physical Output Module
    - Household Model of Energy by State (HOMES) Module
    - Commercial Sector Energy Model by State (CSEMS) Module
    - Industrial Regional Activity and Energy Demand (INRAD) Module
    - Neural Network Electric Utility Model (NEUMOD) Module
    - Vehicle Miles Traveled (VMT) Module
    - Crosswalk Module

EGAS Version 3.0 (cont'd.)

- Physical Output Module
  - Output and Value Added from REMI Models
    - Regression Approach for 11 Major VOC Source Categories
- HOMES Module
  - Uses Projected Housing Starts and Household Income Data to Project Residential Energy Use

EGAS Version 3.0 (cont'd.)

- CSEMS Module
  - Uses Forecasts of Fuel Prices, Disposable Personal Income, and Population to Project Energy Consumption in Commercial Sector
- INRAD Module
  - Uses Forecasts of Capital, Labor, Energy, and Materials Costs and Capacity Utilization to Project Industrial Fuel Consumption

EGAS Version 3.0 (cont'd.)

- Neural Network Electric Utility Model (NEUMOD) Module
  - Artificial Intelligence to Learn How Utilities Generate Electricity
  - Uses Data Describing Generating Capacity, Climate, Peak Loads, Fuel Prices, and Power Pool Effects
  - Projects Annual Electricity Generation from Combustion of Coal, Oil, and Natural Gas

EGAS Version 3.0 (cont'd)

- Vehicle Miles Traveled (VMT) Module
  - Two Projection Methods
    - Linear Regression of 1985-1990 Highway Performance Monitoring System (HPMS) VMT Data
      - Used for 1991-1996 Projections
    - Allocation of National VMT Projections from EPA's MOBILE4.1 Highway Fuel Consumption Model Based on Population Growth
      - Used for Post-1996 Projections

EGAS Version 3.0 (cont'd.)

- Crosswalk Module
  - Assigns Growth Factors from Other Modules to SCCs
    - Determined by Information in SCC Description (e.g., Residential Fuel Combustion, Natural Gas)
    - SCCs Assigned Default Growth Factor of 1.0 if Not Specifically Projected by EGAS Module

EGAS Version 3.0 (cont'd.)

- BEAFAC Utility
  - Develops Growth Factors from Bureau of Economic Analysis (BEA) Projections Data
    - Projections Represent Earnings Data
    - Standard Industrial Classification (SIC) Code-Basis
    - State-Level
  - Developed for Use in the Emissions Preprocessor System (EPS) of the Urban Airshed Model

EGAS Version 4.0

- Base Year of 1996
- Projections Capability Through 2020
- Version 3.0 Modeling Regions Except Addition of 3 North Carolina Areas
  - Charlotte
  - Greensboro-Winston Salem
  - Raleigh-Durham

EGAS Version 4.0 (cont'd.)

- Physical Output Module
  - Incorporation of Latest REMI Models
  - Elimination of Some Sector Detail by BLS
  - Elimination of Policy Simulation Capabilities
  - New Regression Analyses Relating REMI Socioeconomic Variables to Emissions Activities
  - Incorporation of NONROAD Model Growth Rates

EGAS Version 4.0 (cont'd.)

- HOMES, CSEMS, INRAD, NEUMOD
  - Outdated Model Parameters/Modeling Approach
  - Incorporated Department of Energy Forecasts from "Annual Energy Outlook"
    - Additional Fuels
    - Less Geographic Detail

EGAS Version 4.0 (cont'd.)

- VMT Module
  - Phase I (1997-2002) Forecasting
    - HPMS VMT Data for 1984-1997 Used in Area-Specific Time-Series Regressions
  - Phase II (2003-2020) Forecasting
    - Updated REMI Population Data
    - Correction of EGAS 3.0 Disconnect with Phase I Growth Factors

EGAS Version 4.0 (cont'd.)

- Crosswalk Module
  - Approximately 2,600 New SCCs
  - Reviewed/Revised Previous SCC Assignments (e.g., reduction in BLS sector detail)
- BEAFAC Utility
  - Most Recent (and Last) Set of BEA Projections
    - Value Added (Gross State Product) Data

EGAS Version 4.0 (cont'd.)

- Windows 95/98/NT and Revised User Interface
  - Model Selections More Intuitive
    - User Settings Summary Screen
    - Previous Model Run Settings Saved
    - User-Specified Output Directory
  - Processing Status Screen

EGAS Strengths and Limitations

- Strengths
  - Comprehensiveness
    - Geographic
    - Source Category
  - User Friendly
- Limitations
  - Some Generic Forecasting Approaches
    - Geographic Detail
    - Source Category Detail

Potential Future EGAS Enhancements

- Updates to Model Input Data
- Re-specification of Modeling Regions
  - Revisions/Additions to Nonattainment Areas
- North American Industry Classification System (NAICS) Output Capability
- Review of Tier 3 Growth Factor Algorithms