<center>**U.S. Environmental Protection Agency**</center>

<center>2013 GTAP Advisory Board Report</center>

The U.S. Environmental Protection Agency (EPA) uses models based on the GTAP data base for analyses of congressional legislation, economic and environmental projections, and other research. EPA offices that are currently using or have used GTAP-based models include the Office of Atmospheric Programs (OAP), the Office of Transportation and Air Quality (OTAQ), and the Office of Policy (OP).

Use of GTAP in EPA analyses of climate legislation:

OAP uses the ADAGE and IGEM CGE models in the analysis of major climate legislation. While IGEM is a U.S. only model, ADAGE is built on the GTAP data base and includes other countries/regions in addition to the U.S. ADAGE is developed and run by RTI International for the EPA. ADAGE has been updated and enhanced to include:

- AEO 2012 forecasts
- Linkage to a wholesale electricity dispatch model for generation, capacity planning, fuel use, and emissions estimates
- Collaboration with the National Renewable Energy Laboratory (NREL) to improve the characterization of wind electricity possibilities
- Explicit representation of a housing capital stock that can be traded off against energy to represent energy efficiency improvements
- Inclusion of new technology options for vehicles
- Representation of policies such as CAFE standards, RPS, and CES
- Addition of ethanol to fuel mix

In the near future, ADAGE will be updated to GTAP 8 and IEA energy data for 2010. OAP is using ADAGE in Energy Modeling Forum (EMF) exercise 24: "Technology Strategies for Achieving Climate Policy Objectives." Further information on the ADAGE model is available at:

   http://www.rti.org/page.cfm?objectid=DDC06637-7973-4B0F-AC46B3C69E09ADA9

Development of the Phoenix model:

Phoenix is a 24 region 26 sector global dynamic CGE model using GTAP 7 data. Phoenix replaced the Second Generation Model (SGM). Development of Phoenix is ongoing at Boston University, Pennsylvania State University, the Joint Global Change Research Institute, and OAP. The model currently includes CO_2 emissions but work is underway to also include non-CO_2 emissions. Other enhancements include border carbon adjustments and calibration of the electric power sector. EPA is using Phoenix in the EMF exercise 27: "Global Model Comparison." Further information on the Phoenix model is available at:

http://www.globalchange.umd.edu/models/phoenix/

Development of GDyn-E-BIO:

OTAQ funded and worked with the GTAP Center and RTI on the development of the GTAP GDyn-E-BIO model. The model, with energy and biofuels detail, is linked to detailed global land use (e.g., AEZ) characterizations. The model was used to assist EPA in the lifecycle assessment of GHG emissions from biofuels.

Other research at EPA using GTAP:

OP's National Center for Environmental Economics (NCEE) is engaged in a project with Resources for the Future (RFF) to examine the competitiveness impacts of carbon dioxide pricing policies on manufacturing in the United States. Two models are being used in the project. An input-output model is used to examine the short-run impacts. A GTAP-based global CGE model (solved in GAMS) is used to examine the longer run. A recent output from this project is: Liwayway Adkins, Richard Garbaccio, Mun Ho, Eric Moore, and Richard Morgenstern "Carbon Pricing with Output-Based Subsidies: Impacts on U.S. Industries over Multiple Time Frames," NCEE Working Paper 12-03, May 2012.

In an earlier project, NCEE's Trade and Environmental Assessment Model (TEAM) was interfaced with the standard GTAP model. TEAM converts aggregate economic results from the GTAP model into changes in the U.S. for approximately 1,200 sectors, and reports environmental outcomes for nine pollutant categories covering 1,100 chemicals in water, air, agriculture, and hazardous waste. Model simulations have looked at the environmental effects of issues such as the worldwide removal of domestic subsidies and global trade liberalization.