EPA Air, Climate, and Energy Research News

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Climate Change

Estimating costs of climate change

How do you conduct an economic analysis of climate change? Researchers explore and discuss the challenges in developing benefit-cost analyses (BCA) and other economic analyses of climate change.

Challenges in Applying the Paradigm of Welfare Economics to Climate Change, published in a special issue of the *Journal of Benefit-Cost Analysis.*

Two studies outline co-benefits of climate change policies

- EPA grant recipients examine the air quality co-benefits of climate change policies by linking economic, atmospheric chemistry, and health effects models in detail. All of the policies studied, including a clean energy standard, a transportation policy, and a cap-and-trade system, produced the same reductions in carbon emissions. All three policies also resulted in health co-benefits that offset 26 to 1,050 percent of policy costs.

A Systems Approach to Evaluating the Air Quality Co-Benefits of U.S. Carbon Policies, published in the journal *Nature Climate.*

- Air quality co-benefits can potentially reduce the costs of greenhouse gas mitigation. However, costs and co-benefits are often estimated with different methods, or by different studies. Research grantees adopted a more holistic approach and used one modeling framework to estimate costs and benefits. The method provides more consistent results and puts health benefits from pollution reductions in context of the rest of economy.

A self-consistent method to assess air quality co-benefits from US climate change policies, published in *Journal of the Air & Waste Management Association (in press).*

Emissions and Monitoring

Method tested to inspect methane emissions

A new mobile method called OTM 33A, developed by EPA, was applied to inspect methane emissions from oil and gas well pads during a study conducted by EPA in Texas, Colorado, and Wyoming from 2010-2013. The results indicate that across the wells studied, there seem to be lower emissions at oil and gas well pads over time, and the larger emissions observed with OTM-33A are likely episodic and result from malfunctioning equipment and leaks.

Assessment of Methane Emissions from Oil and Gas production Pads using Mobile Measurements in the journal *Environmental Science & Technology.*

What is contributing to secondary organic aerosols in the Southeast?

Research by EPA STAR grantees at Georgia Tech provides direct evidence on the magnitude of man-made influence on secondary organic aerosol (SOA) formation in southeastern United States. The study found that sulfur dioxide and nitrogen oxides emitted from motor vehicles and coal-fired power plants directly and substantially mediate the transformation of naturally occurring emissions from trees into SOA. Together, sulfur dioxide and nitrogen oxide can create 43-70% of total SOA in the Southeast during summertime. The research implies that future reduction of sulfur dioxide and nitrogen oxide pollution can considerably reduce the SOA burden in this part of the country.

Effects of anthropogenic emissions on aerosol formation from isoprene and monoterpenes in the southeastern United States, published in the *Proceedings of the National Academy of Science.*

Georgia Tech Press Release

Modeling/Decision Support Tools

New models tested for impacts of emission reductions

Using EPA's Community Multiscale Air Quality (CMAQ) modeling system as a starting point, researchers tested two new models for relating changes in emissions to their impacts on air quality. These reduced form models (RFM) make it easier to consider multiple emission reduction scenarios over wider time scales and geographic ranges. Improved air pollution models can help narrow down which pollutants to target for emission reductions going forward. Future research hopes to refine the model to assess impacts of changes in single source emissions (ex. emissions from a single power plant) for use in permitting.

Two reduced form air quality modeling techniques for rapidly calculating pollutant mitigation potential across many sources, locations and precursor emission types, published in the journal *Atmospheric Environment.*

Passive samplers for monitoring ambient ammonia compared

Two different ammonia (NH3) air monitoring technologies, which measure NH3 levels biweekly, were compared to one that measures NH3 levels weekly. One of these newer, more cost-effective sampling technologies produced data comparable to weekly monitors in its accuracy. Employing this technology would provide more information on long-term trends, seasonal variation, and geographic variation of NH3 pollution to complement the higher-resolution data collected over more time points.

A statistical comparison of active and passive ammonia measurements collected at Clean Air Status and Trends Network (CASTNET) sites, published in the journal *Environmental Science: Processes & Impacts.*

Health Effects and Multipollutants

Co-exposures of PM and ozone impact heart

Few studies have examined the co-exposures from different sizes of particulate matter (PM) and ozone and the related health effects on the heart. A recent study co-authored by an EPA researcher did just that in animal models. The study indicates that exposure to fine or ultrafine particle pollution in the presence of ozone produces different negative effects in the heart a day after exposure, and the combination of particulate and gaseous pollutants does not always produce a simple additive or synergistic response. The most significant effect on heart function was found to occur when ultrafines were combined with ozone. The research also found that by itself, ozone, which is often thought of as a respiratory system irritant, causes mechanical function effects in the heart.

Ozone co-exposure modifies cardiac responses to fine and ultrafine ambient particulate matter in mice: concordance of electrocardiogram and mechanical responses, published in the journal *Particle and Fibre Toxicology.*

Animal study finds no lung cancer risk from clean diesel

A two-year animal inhalation exposure study focused on new diesel emissions technology was completed at the Lovelace Inhalation Respiratory Research Institute. The study was sponsored and coordinated by the Health Effects Institute (HEI), with funding from private and public organizations, including EPA. Researchers used a heavy-duty highway diesel engine that meets EPA's new emissions control standards for all models built in 2007 or later. The study design had many components, but the core study found that rats did not develop cancer and had few other health problems over a lifetime of exposure to clean diesel exhaust. These results help EPA to assess the health benefits of EPA's emission standards developed by EPA's Office of Transportation and Air Quality.

Click here for HEI Report

Click here for the HEI News Release

Sustainable Energy Evaluation

The MARKAL energy system optimization model is being used by EPA researchers to peer 30 to 40 years into the future at possible scenarios and study different options for the nation's energy system. Learn more about the research in a recent feature story published in EM magazine, a publication of the Air & Waste Management Association.

MARKAL Model Helps Identify Environmentally Friendly Energy Strategies,
published in *EM Magazine.*

Other News

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Resources

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