Distributed Generation
What is it and what are its air quality impacts?

Also this month...

EPA Research Highlights: Keeping Track of Dust Storms

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Distributed Generation
What Is It and What Are Its Air Quality Impacts?

by Ali Farnoud

Distributed generation, also commonly known as on-site generation or decentralized energy, is not a new phenomenon, yet it is no surprise that in the age of decentralization, it is being relied upon as strongly as ever. Distributed generation sources vary considerably in age and emissions profile, and have an unpredictable schedule. And if recent court cases are any indication, the traditional approach to controlling emissions from large industrial sources does not directly apply to these emissions sources. The articles in this issue of EM address these and other concerns associated with distributed generation.

Features

Uncovering the Emissions Benefits of Combined Heat and Power
by Anna Chittum and Meegan Kelly, American Council for an Energy-Efficient Economy

The Extermination of BUGs from the U.S. Electricity Market
by Frank Lacey, Electric Advisors Consulting

Analysis of Historical Emergency Demand–Response Use
by Don C. DiCristofaro, Blue Sky Environmental

Examining the Air Quality Impacts of Behind-the-Meter Generation
by David Healy, New Hampshire Department of Environmental Services; Mark Prettyman, Delaware Department of Natural Resources and Environmental Control; and John Barnes, Winston Hao, and Eric Zalewsky, New York State Department of Environmental Conservation

Estimation Procedure for Following Vapor Pressure Changes through Repeated Blending of Petroleum Stocks from Boiling Point Curves
by Robert E.C. Weaver

The author presents a practical method to estimate the vapor pressures of blended and rebalanced petroleum stocks that ensures air emissions stay within regulatory compliance limits.

Columns

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Being a Maine native, there are a few things that are certainties about my personality. First, I love the outdoors and sunny days are appreciated with a kind of reverence. Second, there is always a way to make something work—never underestimate Yankee ingenuity. Third, money should be spent only when absolutely necessary. Mix in a range of Generation X tendencies and you can likely figure me out.

Moving to Las Vegas, Nevada for work was challenging in a number of ways. Probably the greatest of those was the sun. In case anyone was wondering, summers here are hot. Really hot. It was a simple adjustment, biological adaptation is an impressive thing, and I won’t try to sell you on the “dry heat thing.” even though it is totally true. The biggest challenge related to the sun is that it is always shining—294 days per year. Any outdoor lover knows how challenging it is stay indoors when the sun is out. Holding down a job is a real effort.

Worse still is knowing that even though the sun shines on 80 percent of the days, I pay for my electricity generated from fossil fuels. Five months out of the year, during the cooling season, I use more energy than some of you likely use in a year. Interestingly, the energy I consume comes primarily from a 257-MW coal plant located not far from here, not from the sun overhead.

The New England side of me is very interested in covering my roof with solar panels. My pool is already heated with a rooftop solar system, so I only have half a roof left, but the house is perfectly positioned for solar. Yet, navigating the process of installation, connection, operation, and fees is daunting. On top of that, you have the decision of whether to buy or lease.

For me? I will be seriously investigating the installation of panels, batteries, and the appropriate meter. I will be working to track my energy consumption and determine the impact. I would like to think it would be possible to move off the grid, but I just don’t know if it will be possible. My hope was to beat the 2018 deadline of the decommissioning of the local coal-fired power plant to avoid fees that will be coming to support the construction of new generating facilities, but there are rumors of persisting requirements here to mandate payment into the utility regardless of the source of the energy you consume. The requirement is jointly based on your potential emergency need if your system fails and subsidizing the costs of generation for those who can’t afford to pay more.

I’m a huge fan of distributed generation, and will likely be a participant at some point in 2016. Nonetheless, I’m pretty convinced that our society is going to need to find a way to support the switch. The benefits are numerous and not worth detailing here. But living in one of the sunniest parts of the United States, you would think it would be easier to understand how to make the switch. Or, perhaps because there is so much sun, that’s why the process isn’t simple.
2016 Specialty Conference Call for Abstracts
Submit your ideas by May 2, 2016

**IT3/HWC 35th International Conference on Thermal Treatment Technologies and Hazardous Waste Combustors**
October 4-6, 2016 • Baton Rouge, LA

This conference provides a forum for the discussion of state-of-the-art technical information, regulations, and public policy on thermal treatment technologies and their relationship to air emissions, greenhouse gases, and climate change.

Abstracts are sought on new information on topics including: Thermal Treatment Applications – Municipal and Industrial; Waste-to-Energy, Renewable Energy, and Biomass Applications; Greenhouse Gas Management and Sustainability; Permitting and Regulatory Policy Issues; Plant Level Operational Issues; Pollution Control Technologies; and Combustion Science.

Get details at [http://it3.awma.org](http://it3.awma.org) and submit your abstract by May 2.

**Vapor Intrusion, Remediation, and Site Closure**
Balancing Technical Defensibility, Risk, Sustainability, and Costs
December 7-8, 2016 • San Diego, CA

Building on seven previous events in which the VI pathway was thoroughly in focus, this conference brings together internationally-recognized experts with experience in getting sites to closure in a technically defensible way, while also balancing key elements such as risk, sustainability concerns and cost drivers.

Abstracts are being sought which demonstrate innovative, scientific approaches for site investigation and remediation, including those with a vapor intrusion component.

Find submission requirements at [http://siteclosure.awma.org](http://siteclosure.awma.org) and submit your abstract by May 2.

**Atmospheric Optics: Aerosols, Visibility, and the Radiative Balance**
September 27-30, 2016 • Jackson Hole, WY

Discover advances in the scientific understanding of the effects of aerosols on urban, regional, and global-scale haze and the radiative balance at this international conference.

Presentations are invited on atmospheric optical properties, visibility, radiative forcing, aerosols, and climate and the related air pollutants. Specific topics may include, but are not limited to: Field Studies and Monitoring Networks; Measurement of Secondary Aerosols; Characterizing Visual Air Quality; Global Aerosol Radiative Effects; Particle and Precursor Emissions and Ambient Effects; and Policy, Regulatory, and Economic Issues. Abstracts due by May 2.

For conference and abstract submission information, go to [http://visibility.awma.org](http://visibility.awma.org).
Distributed generation, also commonly known as on-site generation or decentralized energy, refers to power generation at the point of consumption; that is, generating power on-site, rather than centrally, often to eliminate the cost, complexity, interdependencies, and inefficiencies associated with traditional energy transmission and distribution.
Distributed Generation Gaining Ground

Distributed generation is not a new phenomenon, yet it is no surprise that in the age of decentralization, it is being relied upon as strongly as ever. On the renewable energy side, new technology is providing more megawatts from local wind turbines and rooftop photovoltaic cells. On the fossil fuel side, record cheap natural gas prices have resulted in the installation of many small combined heat and power systems (CHPs).

Demand–response engines, mostly diesel-fueled, currently account for a significant portion of U.S. electricity demand, although their future is grim given recent court decisions striking down regulations by the U.S. Environmental Protection Agency (EPA) that were favorable to demand–response participation.

Distributed generation sources vary considerably in age and emissions profile, and have an unpredictable schedule. If the recent court cases are any indication, the traditional approach to controlling emissions from large industrial sources does not directly apply to these emissions sources. Additionally, since distributed generation plays such an important role in electricity markets, the Federal Regulatory Energy Commission (FERC) and Regional Transmission Organizations need to be involved in any discussions.

The articles in this issue of EM address these concerns. The first article by Anna Chittum and Meegan Kelly of the American Council for an Energy-Efficient Economy discusses the ever-growing role of natural gas CHPs and the emission reductions of traditional pollutants natural gas CHPs provide. The authors argue that there are climate change-related regulatory incentives for using CHPs for electricity generation. The recent binding agreement at COP-21 in Paris, and the Clean Power Plan, though recently stayed by the U.S. Supreme Court, suggest a bright future for CHPs.

The other three articles approach the demand–response question from three different angles. Energy consultant Frank Lacey reviews, from the perspective of the electricity market, the recent court decision remanding the emergency demand–response portions of 40 Code of Federal Regulations Part 63, Subpart ZZZZ – Reciprocating Internal Combustion Engines (also known as the “RICE MACT”). The article discusses the basic business models behind the U.S. electricity markets and the potential impacts of the decision on these markets.

Since distributed generation plays such an important role in electricity markets, the Federal Regulatory Energy Commission and Regional Transmission Organizations need to be involved in any discussions.

The third article by Certified Consulting Meteorologist Don DiCristofaro analyzes the dispatch data for all major wholesale capacity markets before and after the finalization of EPA's RICE rule in 2013. DiCristofaro concludes that the EPA regulations have not resulted in an increase in the hours of operation for emergency demand–response generators, and subsequently, have not resulted in an emissions increase.

Lastly, there is an article from state regulators, David Healy with the New Hampshire Department of Environmental Services, Mark Prettyman with the Delaware Natural Resources and Environmental Control, and John Barnes and Eric Zalewsky with the New York State Department of Environmental Conservation, who are members of the Ozone Transport Commission (OTC) workgroup to quantify and model emissions from demand–response emission sources. They have provided their initial estimate of nitrogen oxides emissions and model results in the Pennsylvania–Jersey–Maryland (PJM) Interconnection region. The workgroup continues to refine their study. I would like to recognize David Healy’s efforts to obtain permission from the OTC to share these preliminary results with our readers.

I sincerely appreciate the time and effort that all of the authors put into writing these articles and sharing their perspectives on this complex technical and regulatory issue. em
Combined heat and power (CHP) is a fuel-efficient, distributed generation technology that leads to significant environmental and air quality benefits. According to the U.S. Environmental Protection Agency (EPA), a typical 5-MW CHP system produces about half the annual carbon dioxide emissions of conventional power generation.
Installing CHP systems may help individual facilities achieve internal greenhouse gas reduction goals and meet local air quality requirements. CHP deployment may also help states meet federal air quality compliance obligations, such as those resulting from EPA's Clean Power Plan, while delivering multiple benefits to the overall utility system and society as a whole. Many facilities are already benefiting from investments in CHP, and current trends indicate an increasing interest in new installations. The opportunity to use CHP as an emissions reduction strategy, including examples of real emissions reductions achieved at existing facilities, is described below.

How It Works
CHP is an energy-efficient method of generating both electricity and useful thermal energy in a single, integrated system. It is capable of capturing heat that is normally wasted in conventional electricity generation and using it to meet an onsite thermal energy need such as heating a building or running a steam-based manufacturing process. The average efficiency of a fossil-fueled power plant in the United States is currently about 35 percent, meaning almost two-thirds of the energy contained in the fuel input is lost as wasted heat.1 By contrast, CHP systems regularly achieve combined energy efficiencies of 60–80 percent, resulting in significant fuel savings when compared to conventional generation. Because less fuel is used, fewer greenhouse gases and other air pollutants, such as nitrogen oxides and sulfur dioxide, are emitted.

CHP in the United States
CHP is a well-established technology with a long history of use in the United States. Today, there are installations at more than 4,300 U.S. facilities. The majority of systems are powered by natural gas, but many are fueled by biomass, biogas, or other types of fossil fuels. Approximately 80 percent of the 82.7 GW of current CHP capacity is installed in the industrial sector, mostly within the chemicals, refining, and paper industries.2

Various market uncertainties and volatile gas prices have slowed investment in new CHP in recent years, but there is potential to install many more CHP systems at sites across the country. Estimates indicate an additional 130 GW of capacity is technically feasible at existing industrial, commercial, and institutional facilities.3 Facilities with large or round-the-clock power needs are good candidates, including hospitals, universities, prisons, wastewater treatment plants, hotels, casinos, resorts, nursing homes, and other commercial and multifamily buildings (see Figure 1).

New Trends Encouraging CHP
The recent binding agreement to reduce greenhouse gases solidified at COP-21 in Paris among 195 countries is just the latest sign that the marketplace is ready to prioritize energy resources that reduce emissions. CHP has consistently been identified as one of the most cost-effective ways to reduce the emissions that cause climate change. Additionally, a greater focus on energy reliability has led CHP to become an increasingly attractive option for many businesses and facilities.

A growing number of cities, states, and major corporate entities have voluntarily committed to internal greenhouse gas reduction targets and the federal government has long supported CHP as a strategy to reach such goals. Since EPA’s CHP Partnership was established in 2001, the agency has promoted the use of CHP to reduce air pollution and water usage. Similarly, the U.S. Department of Energy (DOE) provides regional and technical assistance to help achieve a national goal of 40 GW of new CHP capacity by 2020, a target established by President Obama in 2012.

Now, with the issuance of President Obama’s Climate Action Plan and EPA’s Clean Power Plan, the federal government has further emphasized the value of CHP in achieving national emission goals. States are required to reduce carbon emissions from existing power plants, and this will create demand for low-cost and rapidly deployable emissions reduction measures such as CHP. Many states are thus now considering CHP as a valuable compliance strategy.

Another critical driver of new CHP deployment is in applications where high levels of energy reliability are required. For example, buildings that had onsite CHP were able to keep the lights on and the machines running when the grid went down during Superstorm Sandy. Since then, states up and down the Eastern Seaboard have begun encouraging CHP deployment as a resiliency tool to protect against future catastrophic weather events. New York and New

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1. The average efficiency of a fossil-fueled power plant in the United States is currently about 35 percent, meaning almost two-thirds of the energy contained in the fuel input is lost as wasted heat.

2. Approximately 80 percent of the 82.7 GW of current CHP capacity is installed in the industrial sector, mostly within the chemicals, refining, and paper industries.

3. Facilities with large or round-the-clock power needs are good candidates, including hospitals, universities, prisons, wastewater treatment plants, hotels, casinos, resorts, nursing homes, and other commercial and multifamily buildings (see Figure 1).
Jersey have established programs specifically designed to encourage new CHP deployment as a way to strengthen their energy infrastructure and protect critical facilities from losses.

Additionally, Gulf Coast states that face regular hurricane risks, such as Texas and Louisiana, have recently passed legislation requiring state governments to assess CHP as an energy resource when developing or renovating critical facilities. Much of these recent efforts have to do with the fact that CHP systems are able to “island” during a blackout, fully disconnecting from the grid and operating as stand-alone islands of electricity and heat production for their connected facilities.

Uncovering the Emissions Benefits

CHP reduces emissions by shifting electric load away from less-efficient conventional power plants to the CHP unit located at an end-user’s site. As a distributed energy technology located at or near the point of use, CHP avoids the 5–8 percent in losses that typically occur when transmitting and distributing energy over long distances. This results in additional emissions reductions and contributes to overall energy savings, which decreases fuel costs for the CHP owner. When compared to traditional generation, a typical 5-MW CHP system produces about half the amount of carbon dioxide-equivalent and nitrogen oxides emissions and entirely avoids sulfur dioxide emissions that would have otherwise occurred (see Table 1).

Many colleges and universities with large campuses have taken advantage of the emissions savings benefits of CHP. For example, the University of Missouri is served by a 66-MW system that provides the campus with electricity and chilled water, among other services. The system has the unique ability to burn a variety of fuels, depending on what is available and economical. Natural gas, coal, and biomass have all been used to run the system and this flexibility has allowed the system to dramatically reduce its consumption of coal, lowering the whole campus’ carbon dioxide emissions by 43 percent since 2008.6

Municipalities have also pursued CHP as an emissions reduction strategy. The City of Philadelphia’s Water Department installed CHP at one of its facilities to help achieve the goals of its sustainability plan, Greenworks Philadelphia. The 5.6-MW system uses biogas to generate electricity and thermal energy for use onsite at the Northeast Water Pollution Control Plant. The CHP system is expected to reduce carbon emissions by 22,000 tons per year, which is equivalent to taking 4,833 cars off the road or planting 5,390 acres of pine forest. The system is also expected to save the Philadelphia Water Department $12 million in energy costs.5

More Than Just an Emissions Reduction Strategy

CHP delivers numerous benefits beyond emissions. Businesses that invest in CHP will gain greater control of their energy use and experience lower operating costs, lower energy bills, and increased reliability in the case of grid outages. CHP has proven to be a highly reliable energy resource during times of grid failure. For example, one of the hospitals that suffered a total blackout during Superstorm Sandy and transferred all of its patients to other area hospitals is now investing in an onsite CHP system, specifically for its reliability benefits. The U.S. Army, Navy, and Air Force have all recognized the ability of CHP to provide highly resilient power to bases across the world, and have deployed CHP at the heart of a variety of their critical energy systems.6

CHP systems also deliver benefits to the electric grid. By immediately serving adjacent facilities with heat and power services, CHP relieves local distribution resources from load. This has dramatic impacts at assets such as substations, which can see significant reductions in peak demand when customers use CHP instead of grid-supplied electricity. These benefits are so pronounced that some electric utilities serving highly congested areas, such as Con Edison in New York City, have actually started identifying constrained areas of the grid that could benefit from CHP deployment. By encouraging new CHP in these areas, they are alleviating stress on substations and mitigating the need to make major capital investments in grid infrastructure.7

<table>
<thead>
<tr>
<th></th>
<th>Total Emissions for Conventional Production (tons/yr)</th>
<th>Total Emissions for CHP system (tons/yr)</th>
<th>Emissions Avoided by CHP (tons/yr)</th>
<th>Percent Reduction</th>
</tr>
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<tbody>
<tr>
<td>Nitrogen oxides</td>
<td>40.96</td>
<td>16.02</td>
<td>24.94</td>
<td>54</td>
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<tr>
<td>Sulfur dioxide</td>
<td>69.17</td>
<td>0.12</td>
<td>68.95</td>
<td>100</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>46.678</td>
<td>24.187</td>
<td>22.491</td>
<td>48</td>
</tr>
</tbody>
</table>

Note: Estimated using EPA’s CHP Emissions Calculator. CHP system inputs assumed a 5-MW natural gas-fueled combustion turbine operating with an 80-percent capacity factor displacing a boiler with 80-percent efficiency. Displaced grid electricity inputs assume U.S. average heat rate and emissions factors using eGRID fossil fuel (2010) data. U.S. average transmission and distribution losses are estimated at 6.18 percent.
Finding New Value for CHP

For years, CHP has been deployed as a cost-effective energy resource by facilities interested in taking more control over their energy costs and enhancing reliability. These systems have been deployed for their many benefits, some of which, like carbon dioxide emission reductions, have only recently been valued in the marketplace. New policy changes at the national and state level will only further incentivize energy-efficient resources such as CHP. In the United States, the emission reduction benefits of CHP will likely increase in value over time, especially as states aim for more aggressive emission reduction targets. For facilities looking to make low-risk and cost-effective investments in their energy future, CHP may be a great fit.

Anna Chittum is a Visiting Fellow at the American Council for an Energy-Efficient Economy and the founder of Gridkraft, a Portland, OR-based consultancy. Meegan Kelly is a Senior Research Analyst at the American Council for an Energy-Efficient Economy. E-mail: achittum@aceee.org; mkelly@aceee.org.

References

Guideline on Air Quality Models: THE NEW PATH
April 12-14, 2016 • Chapel Hill, North Carolina
6th Specialty Conference sponsored by the Atmospheric Modeling and Meteorology Committee (APM) of the A&WMA's Technical Council

Learn the latest on the application and implementation of the EPA’s Guideline on Air Quality Models, plus federal and state permits.

The Air & Waste Management Association’s Specialty Conference Guideline on Air Quality Models: The New Path will provide a technical forum for environmental professionals to discuss the U.S. Environmental Protection Agency’s Guideline on Air Quality Models (40CFR Part 51 Appendix W), which is required for use in the preparation of state implementation plans, federal construction permits, and state permits.

Courses on AERMOD, SCHCHEM, CamX, and Dispersion Model Data will be offered on April 11

Sessions will include:
• AERMOD developments and upgrades
• Long Range Transport Models
• Modeling of Secondary Pollutant Formation, PM2.5, and Ozone
• Background Concentrations
• Meteorological Data Issues
• Wind Tunnel and Computational Fluid Dynamics Modeling Approaches
• Proposed Revisions of the Guideline

Attend the Town Hall Meeting on the Future of Modeling.

Go to http://aqmodels.awma.org for complete details.
Two opinions issued from the DC Circuit Court in a span of less than one year could have major implications for the electricity and environmental communities.
On May 1, 2015, the U.S. Circuit Court of Appeals for the DC Circuit issued an opinion in Del. Dep’t of Natural Res. and Env’t Control vs. EPA (DNREC vs. EPA)\(^1\) that will eliminate the use of backup generators (BUGs) in demand–response programs nationwide. The ruling vacated portions of the U.S. Environmental Protection Agency’s (EPA) National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines rule (RICE/NESHAP) that allowed BUGs to run under certain circumstances for up to 100 hours per year.\(^2\) If the EPA does not act to restore those provisions of the rule in a manner consistent with the DC Circuit opinion, the decision will fundamentally change the way tens of thousands of businesses nationwide manage their plant operations, electricity purchases, and annual electric costs. The net impact on all electricity customers, whether BUG operators or not, will be billions of dollars in increased electricity costs annually.

In its May 2015 order, the DC Circuit held that, “EPA acted arbitrarily and capriciously when it modified the National Emissions Standards and the Performance Standards to allow backup generators to operate without emissions controls for up to 100 hours per year as part of an emergency demand-response program.”\(^3\) Importantly, the DC Circuit described all of the flaws in EPA’s actions as procedural flaws. The court did not question the validity or legality of EPA’s policies or of any of the RICE/NESHAP provisions that were vacated.

This is the second opinion issued from the DC Circuit in a span of less than one year that could have major implications for the electricity and environmental communities. In May 2013, the DC Circuit vacated FERC Order 745, which mandated that if certain conditions are met, electricity market operators in Federal Energy Regulatory Commission (FERC)-regulated markets must pay demand–response resources the locational marginal price (LMP) for their reduced energy consumption. FERC and others have appealed that decision to the U.S. Supreme Court. Oral arguments were held on October 14, 2015. A decision from that court is forthcoming.\(^1\)

Author’s Note:
Subsequent to this article being written, the Supreme Court issued its decision in FERC v. EPA (US S.C. Docket No. 14-840, reported at 577 US ____ (2016)). The Supreme Court reversed the DC Circuit Court’s decision. In doing so, it decreed that demand–response in wholesale energy markets is a FERC-jurisdictional service and upheld FERC’s decision to require that demand–response be compensated at the market clearing price for energy. The decision is available online.

Call for Nominations for the 2016 Exceptional Education Contributor Award

The Deadline for Nominations is April 5, 2016.

Nominations are encouraged for individuals from all backgrounds who have contributed to A&WMA’s educational mission as implemented through its Education Council.

Criteria used to evaluate the nominations are:
- A&WMA leadership positions with educational responsibilities (40%)
- Specific initiatives and/or contributions that have supported A&WMA’s educational mission (60%)

The award recipient will be recognized and given a plaque at A&WMA’s 2016 Annual Conference & Exhibition Student Awards Ceremony in New Orleans, LA.

Please submit electronic nominations that describe the candidate’s contact information, professional background, and contributions pertaining to the two award criteria cited above. Self-nominations are also encouraged. The nomination should be no more than 4 pages long with 11 point font.

Nominations should be submitted to Robin Lebovitz, A&WMA Education Programs Associate, at rlebovitz@awma.org by Tuesday, April 5, 2016.
If either or both cases stand, customers will be more constrained in their options for procuring electricity. Undoubtedly, electricity costs will increase and the markets will rely more heavily on traditional generation resources, most likely increasing emissions from today’s operations.

In the dawn of the Clean Power Plan era, when traditional power plants will be retired or at a minimum, be more constrained operationally, the DC Circuit, by eliminating the use of valuable reliability resources, seems to be at odds with both the business and policy direction of the country. While one of the DC Circuit decisions is on appeal at the U.S. Supreme Court, the DNREC vs. EPA opinion is not. DNREC vs. EPA has been subject to its own set of legal maneuvers. Despite the efforts of those who support the rule, the DC Circuit mandate to remove BUGs from all demand–response programs will issue on May 1, 2016.

**Electricity Markets**
The business side of electricity is complicated. In the United States, we operate our electricity markets under several different business models. The most commonly known is the traditional state-regulated utility model. Large portions of the Pacific Northwest, Southwest, and Southeast operate under this model. State regulators regulate pricing in these regions.

In other parts of the country, the grid is deregulated and in these regions, independent grid operators dispatch power plants across state lines, at least cost to maintain reliability. Texas, California, the entire Northeast region, and large portions of the Mid-Continental region all operate in restructured markets. The multi-state or interstate markets are regulated by FERC. FERC typically regulates business practices and not prices in these markets. The Texas grid is not interconnected with the rest of the country. As a result, it is not subject to FERC jurisdiction, but rather to Texas Public Utility Commission jurisdiction. It operates similarly to the FERC-regulated markets. Interspersed in each of these models are a plethora of municipal utilities, cooperative utilities, competitive retail electric suppliers, demand–response providers, and other energy service companies.

BUGs, of course, are used as demand–response resources for reliability purposes in all of these models. In all cases, someone (likely a regulator) has deemed these resources to be more cost-effective for providing reliability than other resources. In the competitive markets, auctions reveal the most cost-effective clearing prices. The DNREC vs. EPA decision has invalidated all of those decisions made across the country. It should be noted that the RICE/NESHAP rules that were vacated allowed BUGs to operate only under a very narrow set of grid emergencies and for a very limited number of hours each year. That emergency support will soon be gone.

**Cross-Agency Conflict: What Is FERC’s Role?**

How is it that the DC Circuit, while trying to correct EPA’s rule, could have such a profound impact on electricity markets? After all, it is FERC, not EPA, that has primary oversight over electricity markets. EPA has oversight of air emissions, including those from resources overseen by FERC (e.g., power plants). The overarching question then is, which agency should determine whether or not these BUGs can participate in electricity markets and demand–response programs?

FERC has consistently approved BUG resources as just and reasonable emergency capacity resources. EPA, by virtue of the provisions in the RICE/NESHAP rule, recognized FERC’s decisions and further supplemented FERC’s approval of the use of these resources by explicitly allowing their use in electricity market demand–response programs. Recognizing that BUGs are truly “emergency” resources to be used for a minimal number of hours annually, EPA allowed their participation in demand–response programs. Unfortunately, that is not how the DC Circuit interpreted EPA’s actions.
Absent further action from EPA, the use of BUGs in emergency programs will be prohibited after May 1, 2016, regardless of regulatory model or location.

**Economic Impact of DNREC Opinion**

PJM Interconnection, LLC is the multi-state grid operator in the Mid-Atlantic and Midwest regions. It is well documented that demand–response resources in PJM save electricity consumers in that region upwards of $10 billion annually. BUGs support approximately 20 percent of demand–response in PJM (see Figures 1 and 2). Based on an extrapolation of this publicly available data from the PJM market, it is estimated that the rate impact to customers from eliminating BUGs nationwide will be in range of $5 to $10 billion annually.  

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**Figure 1:** PJM Demand Response Customer Load Reduction Methods  

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**Figure 2:** Fuel Types for BUGs in PJM Demand Response  
Regulatory lag may protect customers in regulated electricity market states from price increases in the short-term. Conversely, the price impact will be immediate in the open market (or deregulated) states, where there will be less demand–response offered and these emergency capacity resources will need to be replaced by more expensive resources that didn’t clear prior auctions. Replacement resources for the voided BUGs will be needed as soon as the summer of 2016.

The rate impact will be particularly pronounced on BUG owners who have already made the investment to protect and manage their facilities and operations. This group of customers will no longer be able to use these resources as a hedge to reduce their own capacity and electricity costs and secure reliability for their own facilities.

**Conclusion**

The U.S. electricity markets have been thrown into a state of disarray as a result of recent decisions by the DC Circuit. Electricity markets are complicated and anything but uniform across the United States. FERC and state regulators have ruled many times that BUG participation in energy markets leads to just and reasonable rates and a more reliable grid. EPA has ruled that the emissions limits on BUGs were acceptable if they are used for only a limited number of hours to support grid reliability. Unfortunately, the DC Circuit Court believed that EPA should have worked more closely with FERC in reaching that determination in the RICE/NESHAP docket at EPA. Now, the burden to undo the damage from the court’s decision falls back to EPA, and not the electricity market experts. If the agency does not act, billions of dollars are at risk for consumers.

**Frank Lacey** is the Founding Principal of Electric Advisors Consulting, a firm dedicated to helping electricity market participants find business solutions in the maze of regulations impacting them. He has worked in the energy field at the intersection of regulation and business strategy for more than 20 years.

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**References**

1. Del. Dep’t of Natural Res. and Envt’l Control vs. EPA, 785 F.3d 1 (D.C. Cir. 2015).
3. DNREC v EPA at p.2.
4. The PJM Independent Market Monitor analyzes market behavior and publishes an annual “State of the Market” report. As part of this analysis, the IMM runs simulations to determine what the price of capacity would have been in the absence of demand-side resources. For the past several years, the IMM has shown savings of between $9 billion and $14 billion each year that are attributable to the participation of demand-side resources. These analyses can all be found at http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2015.shtml.
Join 1500 global environmental professionals at the Air & Waste Management Association’s 109th Annual Conference & Exhibition in New Orleans this June for the industry’s most comprehensive event on environmental technology and regulation.

This year’s technical program will focus on meeting the environmental challenges of new and expanding industrial activity that has been, and will continue to be, experienced as a result of increased supply and lower prices of natural gas. These challenges include permitting, ambient air quality, compliance, waste management, and energy needs.

ACE 2016 Highlights include:
- Keynote Presentation by A. Stanley Meiburg, Acting Deputy Administrator, US EPA
- Panels, posters, and presentations covering environmental research, compliance and practical solutions
- 46th Annual Critical Review on Emissions from Oil and Gas Operations
- Ten professional development courses on pollution control, CALPUFF, ISO14001, monitoring, AERMOD, and more
- Many networking events and expanded exhibit hours
Results from a 15-year study of emergency demand–response electricity generator use in the United States.
In 2013, the U.S. Environmental Protection Agency (EPA) revised its engine regulations under Title 40, Part 60, Subparts III and JJJJ of the Code of Federal Regulations (40 CFR 60 Subparts III and JJJJ), and 40 CFR 63 Subpart ZZZZ. These regulations had allowed up to 100 hours per year of engine operation for testing and maintenance purposes. The 2013 revision allowed emergency demand–response (DR) electricity generators to be included in the allocated time for testing and maintenance.

EPA defines emergency DR as when North Electric Reliability Council (NERC) Energy Emergency Alert Level 2 is called or at voltage/frequency reductions. Emergency DR is called when there are no other available sources of electricity, and the next steps are rolling brownouts and blackouts. EPA, and the states that previously changed their definitions of emergency to include emergency DR, believe that it is better to use a subset of generators for a short period of time to prevent a blackout—since a blackout would mean every backup generator, whether properly permitted or not, could be in operation for hours or days until the electric grid is restored.

Emergency DR was not initially included in Subparts III and JJJJ and was changed in Subpart ZZZZ from the initial regulation. For example, when 40 CFR 63 Subpart ZZZZ was finalized in 2010, the regulation allowed participation of up to 15 hours per year in an emergency DR program. After the provision was updated in 2013 and allowed engines to potentially operate up to 100 hours per year, some argued that the change in EPAs engine regulations would cause an increase in emergency DR events.

A 15-year (2001–2015) analysis of emergency DR use under the programs of the major organized wholesale electricity capacity markets has been conducted. These markets include Midcontinent Independent System Operator (MISO), the Electric Reliability Council of Texas (ERCOT), Independent System Operator New England (ISO-NE), Pennsylvania–Jersey–Maryland Interconnection (PJM), and the New York Independent System Operator (NY-ISO). The 2013 changes to EPAs engine regulations regarding emergency DR have not caused a noticeable increase in the hours that have been called.

Study Methodology
This analysis was intended to yield the approximate average number of hours that a participating engine would have operated within an emergency DR program in any given year (i.e., average annual hours). For the purposes of this analysis, each region with a program in a given year has equal weight. For example, in a particular year, if ERCOT had one 20-hr event, but four other markets had no events, the average of all programs for that year would be 4 hr. Each zone within a given program also has equal
weight. Or in a particular year, if one of the 20 zones within PJM had a 20-hr event, but the other 19 zones had no events, the PJM average for that year would be 1 hr.

The event data are divided into summer (June 1 through September 30) and non-summer events due to inherent seasonal differences in the causes of grid strain. Most summer emergency DR occurs when intense air-conditioning usage drives up consumer demand for electricity. In contrast, during the rest of the year, emergency DR events are more likely to occur due to interruptions in supply caused by storms or extremely cold weather, which sometimes interrupts the delivery of natural gas to power plants, as occurred most recently during the winter of 2014.

The overall annual average dispatch time of all DR programs analyzed is 3.5 hr, and the long-term average of all years analyzed is 4.0 hr, meaning that a typical emergency engine of unspecified location that participates in one of these programs could be expected to operate for approximately 4 hours per year.

During the first 12 years studied (2001–2012), the engines that participated did so without an EPA regulatory limit on their hours of operation. During the last three years (2013–2015), the engines were subject to a limit of 100 hours per year under EPA’s 2013 engine emissions rules.

It is important to analyze recent emergency DR use compared to historical use since some have claimed that the changes EPA made to its engine regulations in 2013 would cause an increase in emergency DR events. An examination of data proves this claim is incorrect, as the average number of hours has decreased from 4.2 to 3.2 hr per year since EPA changed its engine regulations. A detailed analysis for each emergency DR program is provided below.

### Emergency DR Programs

#### MISO
As shown in Table 1, the MISO emergency DR program has not been called on since 2007. Prior to that, MISO’s emergency DR program was called on August 1 and 2, 2006, during peak hours. Thus, to date, the program has been called on a total of 16 hr, or an average of 1.6 hr per year over the past 10 years.

#### ERCOT
The ERCOT emergency DR program was initiated in 2008. As shown in Table 2, during its history the emergency DR program has only been called on three times for a total of 31.4 hr (28.2 of those hours were for the severe Texas ice storm that occurred from February 2–3, 2011). The other two events added 2.4 hr on August 4, 2011, and 0.8 hr on January 6, 2014. The January 2014 event was in response to the severely cold weather conditions commonly referred to as the “Polar Vortex.” Thus, on average, the ERCOT emergency DR program has only been called on 3.9 hr per year for the past 8 years. During the summer, the program has been called on an average of 0.3 hr per year.

<table>
<thead>
<tr>
<th>Table 1: MISO Historical Emergency DR.</th>
<th>Table 2: ERCOT Historical Emergency DR.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Summer</strong> (# of hours)</td>
<td><strong>Summer</strong> (# of hours)</td>
</tr>
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<td><strong>8-yr average</strong></td>
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*Note:* Formerly called the Emergency Interruptible Load Service (EILS).

Source: ERCOT.com

Source: Personal communication with MISO.
ISO-NE

As shown in Table 3, the ISO-NE emergency DR program has rarely been called on: the only event in the New England region as a whole was for 3.75 hr on August 2, 2006, when record electrical power demands were set. The highest cumulative total emergency DR use in any single zone of ISO-NE since the program started in 2001 is 26.2 hr, in the zone that formerly encompassed Connecticut. Cumulative totals from the other zones ranged from 3.8 to 9.8 hr. The last time any zone of ISO-NE had an emergency DR event was in 2007. In 2011, ISO-NE increased the number of dispatch zones from 8 to 19 in order to pinpoint the dispatch of emergency DR resources more precisely, with the result that only the specific areas experiencing problems with the electric grid will be called upon for emergency DR.

PJM

The PJM emergency DR program, or Emergency Load Response Program (ELRP), has been in existence since 1991. This analysis begins with 2003, as few backup generators were used prior to that year. Table 4 presents the ELRP events for each of the past 13 years by each of the 20 zones in PJM. All of the events in 2014 coincided with the extreme cold in January and March, when PJM requested emergency DR assistance. Although it was not mandatory under the program’s rules and operating commitments (i.e., these were voluntary events), many participating emergency engines operated as requested to maintain the grid.

With these 2014 voluntary events included in the analysis, the total cumulative hours since 2003 range from 11.8 hr in four zones (ComEd, Dayton, DEOK, and EKPC) to 83.4 hr in the Pepco zone (with averages of 1.0 to 6.5 hr per zone per year). Excluding the 2014 voluntary events, four zones of PJM have never been called for emergency DR (ComEd, Dayton, DEOK, and EKPC) and the maximum cumulative number of operating hours for any zone over all years is 55.2 hr (in Pepco). Excluding the 2014 events, PJM’s emergency DR program has been called on an average of 2.0 hr per zone per year since 2003.

### Table 3: ISO-NE Historical Emergency DR by Zone.

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<th>NEMA</th>
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**Notes:**

a. In 2011, the dispatch zones changed from 8 to 19. Since there were no emergency DR events from 2011 to the present, this table presents the original zones.
b. This figure represents one event (on August 20, 2004) in the Boston area only.
c. This figure represents one event (on July 27, 2005) in Southwest Connecticut only.
d. An additional emergency DR event was called on June 19, 2006, for 3.2 hr in the Boston area only, but no emergency engines were used.
e. The December 1, 2007, emergency DR event was due to a gas supply outage and was voluntary (i.e., it was not required under the program’s rules that applied at that time).

Source: www.iso-ne.com
A summary of the annual ELRP events averaged by zone during the summer and non-summer is presented in Table 5. Since 2003, the ELRP has been called on average 2.1 hr per year in the summer and 1.6 hr per year in the non-summer, for a total average over all zones of 3.75 hr per year.

Some have claimed that there was an increase in emergency DR events in 2014. There were five days of emergency DR in January and March 2014 in response to record-breaking cold weather conditions, totaling 28.2 hr in the worst-case zone. All of these events were called on outside of the summer period. The interruptions did not result from a lack of power plants, but instead from the forced outages of power plants due to the effects of extreme cold and snowstorms on the natural gas supply. The emergency engine operators that participated in these emergency DR events were not obligated to respond, but did so voluntarily to save the electric grid from failing. There were zero hours of emergency DR in 2014 during the summer period.

These data demonstrate that emergency DR events in PJM are not increasing, particularly during the summer months. There are a few zones or subzones (e.g., ATSI and the Washington, DC portion of Pepco) that have shown increased activity in certain years; how-
Table 4: PJM Historical Emergency DR by Zone (continued)

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f Represents average over all zones. Source: www.pjm.com

NY-ISO

The NY-ISO Special Case Resources (SCR) emergency DR program has been in existence since 2001. The NY-ISO program is called over eleven zones: A through K. Table 6 presents the annual emergency DR hours called on by zone and the average over all 11 zones. Since 2001, the total cumulative emergency DR hours vary from 74.0 hr in Zone D (the northeast corner of New York) to 184.5 hr in Zone J (New York City), for zonal averages of 4.9 to 12.3 hr per year through 2015. The average over all zones is 7.6 hr per year.

The annual hours SCR was called in any zone, range from zero in many zones in many years to a high of 35 hr in Zone J in 2006. In 2012, the year prior to EPA’s change to its engine regulations for emergency DR, there were six events ranging from 10 to 25 hr in any single zone. In 2013, there were five events ranging from 10 to 27 hr in any single zone. In 2014, there was one event only in January for 6 hr over all zones and 0 hr in 2015.

Table 7 summarizes the annual average emergency DR over all NY-ISO zones by summer and non-summer periods. From 2001 to 2015, when assessed over all 11 zones, the cumulative totals of hours called were 97.9 during the summer and 16.5 during the non-summer, for annual averages of 6.5 hr during the summer and 1.1 hr during the non-summer.

ever, those individual zonal issues appear to have been resolved, as indicated by the lack of events in subsequent years. Taking away the singular case of the extreme winter events of 2014, which were due to aberrant conditions and were not obligatory, emergency DR events in PJM are not increasing.

Over the past few years, PJM has implemented the following programmatic changes, which are expected to reduce the frequency of emergency dispatches:

- The dispatch time for most resources was reduced from 2 hr to 30 min.
- Creation of “pre-emergency” and “emergency” categories.
- Pre-emergency DR is dispatched first to avoid the need for emergency DR (this is how the ISO-NE program has been called for many years).
- Emergency DR is triggered at Emergency Energy Alert Level 2.

NY-ISO

The NY-ISO Special Case Resources (SCR) emergency DR program has been in existence since 2001. The NY-ISO program is called over eleven zones: A through K. Table 6 presents the annual emergency DR hours called on by zone and the average over all 11 zones. Since 2001, the total cumulative emergency DR hours vary from 74.0 hr in Zone D (the northeast corner of New York) to 184.5 hr in Zone J (New York City), for zonal averages of 4.9 to 12.3 hr per year through 2015. The average over all zones is 7.6 hr per year.

The annual hours SCR was called in any zone, range from zero in many zones in many years to a high of 35 hr in Zone J in 2006. In 2012, the year prior to EPA’s change to its engine regulations for emergency DR, there were six events ranging from 10 to 25 hr in any single zone. In 2013, there were five events ranging from 10 to 27 hr in any single zone. In 2014, there was one event only in January for 6 hr over all zones and 0 hr in 2015.

Table 7 summarizes the annual average emergency DR over all NY-ISO zones by summer and non-summer periods. From 2001 to 2015, when assessed over all 11 zones, the cumulative totals of hours called were 97.9 during the summer and 16.5 during the non-summer, for annual averages of 6.5 hr during the summer and 1.1 hr during the non-summer.
Table 5: Average PJM Historical Emergency DR.

<table>
<thead>
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<th>Year</th>
<th>Summer (# of hours)</th>
<th>Non-Summer (# of hours)</th>
<th>Total (# of hours)</th>
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Source: www.nyiso.com

Table 6: NY-ISO Historical Emergency DR by Zone.

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<th>Year</th>
<th>A (# of hours)</th>
<th>B (# of hours)</th>
<th>C (# of hours)</th>
<th>D (# of hours)</th>
<th>E (# of hours)</th>
<th>F (# of hours)</th>
<th>G (# of hours)</th>
<th>H (# of hours)</th>
<th>I (# of hours)</th>
<th>J (# of hours)</th>
<th>K (# of hours)</th>
<th>Average (# of hours)</th>
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</table>

Source: www.nyiso.com

Conclusion

This analysis involved a detailed examination of emergency DR events for five major organized market programs across the United States. EPA, and many states, believe that the use of a subset of emergency backup generators for a short period of time to avoid a blackout, rather than waiting for a blackout when every backup generator could be on for hours or days until the electric grid is restored, is overall better for the environment. Blackouts can be seriously detrimental to public health and safety and to the environment. For example, during the long blackout of 2003, millions of untreated sewage poured into New York City’s rivers.

In 2013, EPAs engine regulations were updated to allow up to 100 hours per year of maintenance, testing, and emergency DR. Some argued that this regulatory change would allow emergency electricity generators to participate in emergency DR and that, in turn, would lead to an increase in emergency DR events. Table 8 summarizes the average annual DR over all zones averaged over the number of emergency DR programs analyzed. In 2001, for example, two emergency DR programs were examined: ISO-NE and NY-ISO. DR events averaged 18.5 hr over all zones for the summer period in NY-ISO and there were no winter
Table 7: Average NY-ISO Historical Emergency DR.

<table>
<thead>
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<th></th>
<th>Summer (# of hours)</th>
<th>Non-Summer (# of hours)</th>
<th>Total</th>
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</thead>
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<td>2002</td>
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<tr>
<td>2015</td>
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<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>97.9</td>
<td>16.5</td>
<td>114.4</td>
</tr>
<tr>
<td>Average</td>
<td>6.5</td>
<td>1.1</td>
<td>7.6</td>
</tr>
</tbody>
</table>

Source: www.nyiso.com

An events. For ISO-NE, there were no events. Thus, the average use of DR for these two programs is 18.5 divided by the 2 programs or 9.25 hr total.

The changes to EPA’s engine regulations regarding emergency DR have not caused an increase in the hours that have been called. The average number of hours of emergency DR before the issuance of the 100-hr limit was 4.2 hr; and since its promulgation in 2013, the average has been 3.2 hr per year, a decrease of 24 percent. According to the analysis shown here, the 2013 changes to EPA’s engine regulations regarding emergency DR use have not seen an increase in this use of electricity generation. em

Author’s Note:
1. These two averages differ because some programs did not operate in all years, which leads to a differential weight of some data depending on how they are summed. The long-term annual averages for each program are: MISO: 1.6 hr; ERCOT: 3.9 hr; ISO-NE: 0.5 hr; PJM: 3.75 hr; and NYISO: 7.6 hr for an average of 3.5 hr. For the derivation of the average over all of the years analyzed, 4.0 hr, see Table 8.

Don C. DiCristofaro is a Certified Consulting Meteorologist with Blue Sky Environmental LLC. E-mail: don@blueskyenviro.com.

Table 8: Average Annual Emergency DR Hours across All Programs.

<table>
<thead>
<tr>
<th>Year</th>
<th>Summer MISO</th>
<th>Summer ERCOT</th>
<th>Summer ISONE</th>
<th>Summer NYISO</th>
<th>Summer PJM</th>
<th>AVG</th>
<th>Non Summer MISO</th>
<th>Non Summer ERCOT</th>
<th>Non Summer ISONE</th>
<th>Non Summer NYISO</th>
<th>Non Summer PJM</th>
<th>AVG</th>
<th>Average Total</th>
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</table>
The Ozone Transport Commission’s High Electric Demand Days (HEDD) Workgroup was formed to examine the less-understood behaviors of behind-the-meter generators on HEDDs. Preliminary results from the workgroup’s findings are presented here.
It is well understood that air pollutants such as nitrogen oxides and volatile organic compounds react in the presence of heat and sunlight to form ground-level ozone, a respiratory irritant that can reduce lung function, aggravate asthma, and inflame and damage the lining of the lungs.\(^1\) The currently effective National Ambient Air Quality Standard (NAAQS) for ozone is 70 parts per billion (ppb) averaged over an 8-hr period (the NAAQS is met when the 3-yr average of the fourth-highest daily maximum monitored 8-hr ozone concentrations is at or below 70 ppb).\(^2\)

It is also well understood that ozone precursors like nitrogen oxides and volatile organic compounds are emitted from anthropogenic sources such as power plants, motor vehicles, and solvent-containing products. Great strides have been made to reduce these emissions using a wide range of regulatory mechanisms. Despite these emissions reductions, further improvements are needed. For example, many counties in the United States do not meet the newly strengthened ozone standard of 70 ppb based on 2012–2014 monitoring data (note, however, that areas will not be designated for the new standard until 2017).\(^3\) In addition, some states are currently updating their State Implementation Plans (SIPs) and continuing to implement measures for meeting the 2008 75-ppb standard.\(^4\)

As sources such as power plants and mobile sources become more heavily controlled, air quality regulators must target new opportunities for emissions reductions so that the more stringent ozone standards can be met. To this end, a topic that has received considerable attention from the air quality community is the concept of High Electric Demand Days (HEDDs). Hot summer days can lead to a higher demand for electricity relative to other days, and these same hot sunny days can be the most conducive to ozone formation.\(^5\)

In March 2007, a Memorandum of Understanding (MOU) was signed by a set of Ozone Transport Commission (OTC) member states. In this MOU, states committed to further evaluate the HEDD issue.\(^6\) Building on this MOU, an OTC HEDD Workgroup was formed to examine the less-understood behaviors of behind-the-meter generators on HEDDs.

**BUG Emissions Analysis**

The OTC HEDD Workgroup performed an analysis to estimate nitrogen oxides emissions from back-up emergency generators (BUGs) participating in demand–response (DR) programs. These units, which are also commonly referred to as behind-the-meter (BTM) units, do not directly feed the electrical grid. They are typically diesel-fired reciprocating internal combustion engines (RICE) that were originally installed to provide power to a facility to maintain essential functions in the event of an interruption of power from the electrical grid.

However, there has been an increased focus on the use of BUGs as part of DR programs. According to the Federal Energy Regulatory Commission (FERC), DR is the reduction of energy consumption by customers in response to the increased price of electricity or in response to financial incentives to reduce electric demand.\(^7\) DR may consist of curtailment, namely the practice of shutting down certain operations to reduce electricity consumption during times of peak demand. DR may also involve generation, which reduces demand on the electrical grid by using BTM resources such as BUGs to generate electrical power.

The goal of this study was to develop a first approximation estimate of nitrogen oxides emissions from BUGs responding to a DR event in the Mid-Atlantic and Northeast United States and to evaluate the effect of those emissions on air quality modeling results. Emissions from this first approximation estimate were added into a 2011 Base Case model run performed with the Sparse Matrix Operator Kernel (SMOKE) emissions model and the Community Multi-Scale Air Quality (CMAQ) modeling system.

The first step in the analysis was to develop an independent estimate of the megawatts (MW) associated with BUGs responding to a “typical” DR event, focusing on the regions covered by the Independent System Operators (ISOs) in the Northeast and Mid-Atlantic: Independent System Operator New England (ISO-NE), New York Independent System Operator (NY-ISO), and Pennsylvania–Jersey–Maryland Interconnection (PJM).

For ISO-NE, it was assumed that approximately 270 MW of BTM resources would respond during a typical event, based on the enrolled MW of Real-Time Emergency Generation Resources (RTEG) in ISO-NE in 2014.\(^8\) This is a conservative estimate because there were likely somewhat fewer of these assets available in 2011 than in 2014.

For NY-ISO, it was assumed that 247 MW of BTM resources would respond during a typical event, based on the generating resources enrolled in NY-ISO DR programs as of May 2011.\(^9\) In addition, 29.5 MW of reduction was achieved on July 22, 2011, through Consolidated Edison’s Commercial System Relief Program (CSRIP).\(^10\) It was assumed that 20 percent of this reduction was achieved with the use of BTM resources. Therefore, the total MW associated with BUGs for the NY-ISO region was assumed to be 253 MW.
For PJM, 10,600 MW of DR resources were committed for 2016 with 14 percent, or approximately 1,500 MW, being attributable to RICE. Data from PJM showed a ten-fold increase in registered DR resources between 2011 and 2015. Accounting for the fact that DR resources were approximately ten times lower in 2011 than in 2015, and assuming that the 14 percent of generation attributable to RICE is an underestimate, it was determined that 250 MW was a conservative first approximation assumption for the MW associated with BUGs in PJM in 2011.

Using the MW assumptions described above, low- and high-bound nitrogen oxides emission factors were applied to obtain a range of nitrogen oxides emissions estimates. A low-bound factor of 4 g/kW-hr was used, corresponding to the Tier 3 standard for non-road diesel engines. A high-bound factor of 16 g/kW-hr was taken from Zhang & Zhang.

For this analysis, it was assumed that a typical DR “event” would occur between the hours of noon and 6:00 p.m. It was also assumed that an average RICE generator would be 90 percent efficient at turning mechanical energy into electricity. The resulting low-bound estimates ranged from 7 to 8 tons of nitrogen oxides per event. High-bound estimates ranged from 29 to 32 tons per event. These results compare well with those of Zhang & Zhang and NESCAUM (see Table 1). For this analysis, events were assumed to occur on two consecutive days (to be discussed further below).

Next, the emissions estimates were prepared for input into the air quality model. Only the high-bound estimate was used in the modeling. In order for the BUG emissions to be used in air quality modeling, the emissions needed to be chemically speciated from lumped to model species (i.e., nitrogen oxides to nitric oxide, nitrogen dioxide, and nitrous acid), temporally allocated to the hourly time scale, and spatially allocated to the model grid cells. This was accomplished using the SMOKE emissions modeling system. Due to the large number of BUG sources and the lack of detailed emission parameters for each (i.e., exact location, stack parameters, etc.), these sources were modeled as area sources. The SMOKE emissions model requires input emissions to be specified at the county level for area sources. Therefore, the total estimate for each ISO region was apportioned to the county level using the number of employment establishments from the 2011 U.S. Census County Business Patterns.

For this first approximation estimate, only states that are wholly enclosed by the PJM region were considered in the apportioning (the PJM region includes only portions of some states). The wholly-enclosed PJM states included Delaware, the District of Columbia, Maryland, New Jersey, Ohio, Pennsylvania, Virginia, and West Virginia (although noting that a very small part of far western Virginia is not in PJM). The SMOKE emissions model then apportioned the county-level estimates to the model grid cell level using appropriate spatial surrogates (note: Spatial surrogates are used by the emissions model to spatially allocate county-level emissions to the model grid cells; examples, to name a few, include population, housing, rural land area, and roadway miles. Two specific spatial surrogates were used for this exercise, “Industrial Land” and “Commercial plus Institutional Land.”).

The SMOKE model also temporally allocates annual emissions to hourly using source classification code (SCC)-based temporal profiles. As mentioned earlier, it was assumed that the BUG emissions would occur between the hours of noon and 6:00 p.m. on two consecutive episode days, hence the annual emissions were apportioned equally to these specific hours on both days (in this case, “annual” emissions represents the total two-day estimate). Therefore, the county-level annual inventory file was further manipulated to create a county-level hourly inventory file. This procedure allowed the placement of emissions on the exact hours of each episode day and facilitated temporal processing of these emissions. Figure 1 shows the “per event” BUG nitrogen oxides emissions estimates apportioned to the county level. This figure also shows the emissions as apportioned to the model grid cells for a single modeled hour.

### Table 1. Low- and high-bound nitrogen oxides estimates for BTM BUGs responding during a typical DR “event” in tons per event.

<table>
<thead>
<tr>
<th>OTC Workgroup</th>
<th>Zhang &amp; Zhang</th>
<th>NESCAUM</th>
</tr>
</thead>
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<tr>
<td><strong>Low-Bound Estimates</strong></td>
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<td>ISO-NE</td>
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<td>NY-ISO</td>
<td>7</td>
<td>1.6 – 8.1</td>
</tr>
<tr>
<td>PJM</td>
<td>7</td>
<td>-</td>
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<tr>
<td><strong>High-Bound Estimates</strong></td>
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<tr>
<td>ISO-NE</td>
<td>32</td>
<td>-</td>
</tr>
<tr>
<td>NY-ISO</td>
<td>30</td>
<td>12.1 – 60.3</td>
</tr>
<tr>
<td>PJM</td>
<td>29</td>
<td>33 – 110</td>
</tr>
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</table>

**Notes:**
- Zhang & Zhang examined a range of emission factor and generation penetration scenarios.
- NESCAUM examined a range of generator penetration scenarios for the PJM region.
Modeling the Emissions

After the emissions were processed as described above, the CMAQ air quality model was run using 2011 meteorology and 2011 Base Case emissions inputs. The model was run for the July 21 and July 22, 2011, episode days (note that the July 20 episode day was also run for model spin-up purposes). These episode days were chosen because DR events were known to have occurred on these days in NY-ISO, PJM, and ISO-NE. Further, July 22 was known to be a day with elevated ozone levels in parts of the eastern United States (see Figure 2).

It should be noted that this first approximation analysis included some very conservative assumptions (for the purposes of this study, “conservative” is defined as having the intention of generating an upper bound estimate of the effect of BUG emissions on air quality modeling results.). First, it was assumed that a DR “event” was called in all three ISO regions simultaneously on both July 21 and July 22. According to historical data, events were called by NY-ISO on July 21 and 22 and by PJM on July 22; DR resources were called by ISO-NE on July 22, although backup generators were not directly dispatched.

Second, no attempt was made to account for state rules that restrict the participation of emergency generators in DR programs.
Many states in the analysis region, including Delaware, New Jersey, and most of the New England states, have rules that preclude emergency generators from participating in incentive-based and/or emergency-based DR programs. Some rules require those generators that do participate in such programs to meet strict emissions limits and/or permitting requirements.

Figure 3 shows the maximum modeled 8-hr ozone concentrations for July 21 and July 22, 2011. The results in the figure represent the difference in maximum modeled 8-hr ozone concentrations between the 2011 Base Case (i.e., all 2011 biogenic and anthropogenic emissions) and the 2011 Base Case plus BUG emissions scenario (i.e., all 2011 emissions with the additional BUG emissions estimates added in). The difference between the two cases is the portion attributable to the BUG emissions estimates from this exercise. The phenomenon of nitrogen oxides dis-benefit can be clearly seen in the figure, particularly in the Boston and New York City areas. This occurs when ozone is scavenged, and thereby reduced, by excess nitrogen oxides emissions. The dis-benefit most often occurs in urban areas, which is evident in the figure.

For the July 21 episode day (left side of figure), modeled 8-hr ozone increases of 0.5- to 1-ppb can be seen in parts of southeastern Massachusetts. For the July 22 episode day (right side of figure), modeled 8-hr ozone increases of 1-ppb can be seen in parts of southeastern Massachusetts. All of these areas have been known to experience elevated levels of monitored ozone during the summer months. Further, for the July 22 episode day, modeled 8-hr ozone increases of 1-ppb or more were predicted for over-water model grid cells east of Massachusetts. Overwater ozone plumes can affect ozone concentrations over land if they are carried back to shore by sea breezes. These model results were derived using the conservative assumptions outlined above, and therefore, are not intended to be a realistic representation of what actually occurred on July 21 and 22, 2011, but rather a conservative first approximation estimate of what the impact from diesel back-up emergency generators could be if they responded in an unlimited matter to a widespread DR event.

**Conclusions and Next Steps**

It is important to understand the air quality impact of back-up type diesel reciprocating generators participating in DR programs. With ever-tightening air quality standards, even ozone concentration changes of as little as 1-ppb could make a difference in whether a jurisdiction attains the standard or not. In addition to health-based considerations, jurisdictions could be faced with the additional regulatory and economic burdens associated with non-attainment of the standards.
With ever-tightening air quality standards, even ozone concentration changes of as little as 1-ppb could make a difference in whether a jurisdiction attains the standard or not.

For future iterations of this study, the OTC HEDD Workgroup will refine its estimates of the MW associated with behind-the-meter generators participating in demand response programs. It will also more accurately characterize the locations of these types of units rather than rely on external data to apportion the emissions estimates to the counties. For example, it can be seen in Figure 1 that the county-level emissions estimates are relatively high for counties in eastern Massachusetts and in the New York City/Long Island area, but less so for the Washington, D.C. metropolitan area, Philadelphia, and other large cities in the PJM region. It is felt by the Workgroup that the sheer number of counties for states in the PJM region may have artificially diluted the county-level emissions estimates when using a county-level data set to apportion the emissions. In addition, the Workgroup will use historical data to more realistically model DR events (as described earlier, it was hypothetically assumed that an “event” was called in all three ISO regions simultaneously on two consecutive days). Future iterations of this study will also account for the state rules that are already in place that restrict the use of diesel generators in DR programs.

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7. NESCAUM. Air Quality, Electricity, and Back-up Stationary Diesel Engines in the Northeast; Northeast States for Coordinated Air Use Management: Boston, MA, 2014.
16. PJM. Summary of PJM-Initiated Load Management Events; PJM: Valley Forge, PA.
A practical method to estimate the vapor pressures of blended and reblended petroleum stocks that ensures air emissions stay within regulatory compliance limits.
In the business of managing heavy oil stocks, various safety and operational objectives, such as managing sulfur content or reducing viscosity, call for blending lighter products into the heavier oils. These “cutters” will commonly have higher volatilities than the base oil stock and this will impact the vapor pressure of the blend.

Products are commonly stored in large tanks and accommodate repeated deliveries of smaller quantities; the frequent restocking of the tank with different additional products is not uncommon. Consequently, determining the applicable vapor pressure and the resulting emission losses from a tank on an ongoing basis would be a dynamic process.

Heavier stocks do not normally need to be stored with extensive vapor emission controls such as floating roofs or emission treatment devices (e.g., absorption, condensation, incineration). These products are often heated to promote easier flow. Thus, knowledge of the blend vapor pressure at higher temperatures would allow a greater understanding of any additional allowable emissions.

The blending of petroleum products to meet changing ultimate use specifications when the properties of both the source and constituent stocks are also changing calls for a flexible method of following the vapor pressures that result from the various blend recipes. To ensure that air emissions for the tank stay within regulatory compliance limits, it would be beneficial if there were a practical method to estimate the vapor pressures of blended and rebleded stocks before the blend is executed.

Speciation of all in-bound products of petroleum products particularly heavy oils is not easily accomplished and boiling point curves have historically been the most straight-forward vehicle to effectively accomplish product volatility characterization. These curves are developed following the ASTM D86 and ASTM 1160 protocols and a handful of laboratories in the United States have recently confirmed an ability to perform these protocols (along with ASTM 2887 and 7169 for heavier products) for less than $1,000 per sample.

A procedure is presented here for the calculation of the anticipated vapor pressure for heavy oil–cutter blends using such a boiling point characterization for each constituent component. The theoretical basis for this vapor pressure calculation of blends using historic petroleum refining engineering correlations is presented here along with a specific illustrative example for a 20-percent blend of the diesel into vacuum gas oil (VGO) for two temperatures (150 and 250 degrees Fahrenheit).

![Figure 1: Speciating with boiling point curves for diesel and virgin gas oil (VGO).](image-url)
Estimation Procedure

The elements (and assumptions) of this calculation are as follows:

1. The boiling point curves for the two constituents of the blend are characterized into quasi-component fractions (identified as fractions A–L), as illustrated in Figure 1.

2. Since Raoult’s Law treats the vapor pressure as a function of molar (rather than volumetric) concentrations, a molecular weight correlation with boiling point for what might normally be an intractable determination for these complex mixtures has been drawn from Nelson’s Petroleum Refinery Engineering.¹ The API gravity of the respective blend stocks is a parameter used in this correlation. (API gravity is an inverse measure of a petroleum liquid’s density relative to that of water, also known as specific gravity, and is used to compare densities of petroleum liquids.) Using the molecular weights, the volume fractions from the boiling point curves can then be converted to mole fractions (with the reasonable assumption of a uniform liquid density for all fractions).

3. Vapor pressures have been well-characterized as a function of boiling points¹ and the nomograph in Meyer² is a generally accepted source for determining them for each of the separate fractions. When these are determined at various temperatures (e.g., 150 and 250 degrees Fahrenheit, as illustrated here), they can then be used to develop simplified Antoine equation correlations.

<table>
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<tr>
<th>Diesel D</th>
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<th>B</th>
<th>C</th>
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<th>E</th>
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<td>Mol%</td>
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</table>

16 Antoine:

\[ \ln p^* = \frac{A}{oF + 460} + \frac{B}{(oF + 460)^2} + \frac{C}{(oF + 460)^3} \]

B

\[ B = 2082.746 \]

A

\[ A = 3.270 \]

16 BLENDS:

21 Mix of 20% D with 80% V at 250oF:

\[ p_i = p_i^* x_i \]

D

\[ 0.180878553 \]

V

\[ 0.089138387 \]

Aggregate vp

\[ 0.005854247 \]

psi

\[ (4.4084 \times 0.2 + 0.001213 \times 0.8) \]

26 Mix of 20% D with 80% V at 150oF:

D

\[ 0.014857881 \]

V

\[ 0.005854247 \]

Aggregate vp

\[ 0.005854247 \]

psi

\[ (0.028479 \times 0.2 + 0.000198 \times 0.8) \]

Figure 2: Vapor pressure blend calculation at various temperatures for VGO cut with diesel.

Notes:

Line 1: Boiling points for component segments for diesel (columns A–F) and VGO (columns G–L) in Figure 1.

Line 2: API gravity from laboratory.

Line 3: Molecular weights.¹

Lines 5 and 6: Vapor pressures for segments tested at 150 and 250 degrees Fahrenheit.²
for the vapor pressure contributions of the respective fractions at other temperatures (i.e., using the parameters A and B in Antoine’s equation: $ln p^* = A + B/T$).

4. Raoult’s Law can then be used to determine the aggregate vapor pressure of the blend for the 20-percent blend of diesel into VGO at 150 and 250 degrees Fahrenheit, respectively, as shown in Figure 2.

This procedure can be followed before the blend is actually performed and the resulting aggregate boiling point curve for that blend can be used as a constituent in further blending with other stocks. A calibration of this use of the boiling point curves to provide the basis of determining the vapor pressure can be accomplished by comparison with the results from the more protracted laboratory vapor pressure determinations (currently outlined in the ASTM D2879 protocol).

**Representative Scenario**

Figure 2 illustrates this representative scenario: Consider two tanks involved in the blending process. Tank A1 contains some 60,000 barrels of the heavier VGO. Tank B contains 30,000 barrels of the lighter diesel cutter stock. When 12,000 barrels of cutter are blended into A1, the resulting blend of 72,000 barrels (now called A2) is the 20-percent blend for which the vapor pressure is calculated in the spreadsheet. The projected vapor

<table>
<thead>
<tr>
<th>VGO V</th>
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<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
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<td>0.00019809</td>
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**Figure 2:** Vapor pressure blend calculation at various temperatures for VGO cut with diesel. (continued)
pressure in A2 would thus be some 0.0058 psi at 150 degrees Fahrenheit (the presumed temperature of A and A1 at the outset). Were this blended A2 be heated to 250 degrees Fahrenheit, the resulting vapor pressure is projected to become 0.2 x 0.441 + 0.8 x 0.0012 or 0.0891 psi.

Clearly, the volatility of the cutter stock determines the blend vapor pressure. This vapor pressure (0.0058 psi) can then be the basis for determining the petroleum contaminant (VOC) level in the displaced air resulting from the addition of 12,000 barrels when blending occurs in A1. The vapor pressure of the pre-blended VGO (0.0002 psi) is thus meaningfully increased through the addition of the cutter. This post-blend vapor pressure is also relevant to the emissions when the tank is breathing in “tank” A2.

Should additional stock then be added to A2 (e.g., from a putative Tank C or from newly imported product), the above calculation can be repeated with this stock being added to the last characterization of Tank A2.

**Summary**
The tasks facing the engineer responsible for accounting for emissions from movements in heavy oil storage tanks are these:

1. Determining the temperature of liquid and vapor spaces in the tank.
2. A reasonable assessment of the air volume displaced when product is added to a tank.
3. Determining the changing vapor pressures after the blends are conducted. This vapor pressure can either come from (a) tracking product concentrations through the discussed boiling point characterization obtained at the entry of each product into the blender’s custody; (b) the generally formidable analytical speciation for these heavier petroleum blends; or (c) the continuing ex-post-facto sampling and laboratory vapor pressure determination.
4. A corollary comment is that when regulatory requirements include determination of the emission of particular hazardous air pollutants, these can be entered into the calculation as a parallel constituent to the pseudo-components derived from segmenting the boiling point curves for the petroleum constituents.

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**Bibliography**

Are North American Dust Storms A Threat to Public Health?

EPA researchers are using historical data to find if there is a correlation between dust storms and mortality.
We’ve all seen images of massive dust storms in places like Australia, Africa, or the Middle East. Giant clouds of choking sand and other particles that blanket homes, buildings, roads, and schools, make breathing and driving nearly impossible. Climate researchers predict that extreme weather events like dust storms will become more frequent as the planet’s atmosphere continues to warm and precipitation patterns change throughout this century.

“We found increases in non-accidental mortality on the second and third day after a dust storm.”

— Researcher James L. Crooks

While the effects of dust storms have been studied in other nations, there has been little epidemiological research on dust storms in North America until now. U.S. Environmental Protection Agency (EPA) scientists are rising to the task of finding out how dangerous the impacts of these dust storms are to public health in North America.

EPA researcher James L. Crooks, who has since left the agency, and his team of investigators explored the correlations between dust storms and death in North America. To do this, they reviewed a National Weather Service (NWS) database of historic storms and cross-referenced it with mortality data from 1993 to 2005 from the National Center for Health Statistics.

“We are comparing mortality counts on the days following dust storms to comparison days in the same month,” Crooks explains. “For example, if a storm happens on Wednesday in Maricopa County, Arizona, we look at the mortalities on Thursday in Maricopa County. Then we compare this data to mortalities on other Thursdays in the same month to see if there is a significant difference.”

One challenge Crooks has found is that the NWS database did not record the severity of the dust storm event, but only that it took place during a certain time and place. But even this limited information has provided very important insights.

“We found increases in non-accidental mortality on the second and third day after a dust storm,” Crooks says. “This may be because dust storm events are associated with higher levels of coarse particulates in the air. Coarse particles are not thought to be as harmful as fine particles, but in high enough concentrations they can be dangerous.”

As for the storms, it’s not clear yet if their frequency is increasing, despite changes in the long-term climate.

Crooks projects, “The Southwest is drying up, so it’s plausible that these storms will be more frequent.”

The study will lay the groundwork for future research and will help health professionals and community officials make decisions to protect lives.
Last time, we discussed how today’s rapidly changing business environment is changing how we measure project success (see PM File: Redefining Project Success, EM December 2015, p. 28). We are moving from measuring project success in terms of the triple constraints of budget, schedule, and scope to measuring project success in terms of the business value the project creates. This is an important shift that requires environmental, health, and safety (EH&S) project managers to think beyond the technical aspects of the project, being ready to change direction as factors that drive the business value of the project change.

As EH&S professionals, we are “knowledge workers,” relying on our science, engineering, and information technology backgrounds to address project requirements. For more than four decades, we have achieved significant progress in the environmental area by relying on the depth of our technical knowledge and by operating within a framework that defines project value in terms of budget, schedule, and scope.
To recognize and respond to the factors that shape the business value of the project, we must understand more than our technical expertise. We must understand the other technical and nontechnical disciplines required by the project, we must appreciate and understand the business models that govern the project, and we must be able to relate to and communicate effectively with the full range of people we are likely to encounter on the project. While technical expertise will always be respected, those project managers who maintain a technical skill set, develop a broad knowledge base, and cultivate the interpersonal skills that are associated with emotional intelligence will enjoy career growth.

Those project managers who maintain a technical skill set, develop a broad knowledge base, and cultivate the interpersonal skills that are associated with emotional intelligence will enjoy career growth.

**T versus I**

In 1991, David Guest introduced the concept of a “T-shaped” person with respect to solving the emerging challenges in information technology (IT). According to the concept, the vertical axis of the T represents the depth of the technical skill set of the IT professional. The horizontal axis represents a breadth of knowledge that includes other disciplines, allowing the IT professional to understand project requirements that extend beyond the technical requirements of the project. Accordingly, a T-shaped person has significant depth and expertise in a particular technical discipline, yet also possesses diverse interests, a broad understanding of other disciplines, the ability to interact effectively with others, and perhaps most important, the ability to tap these skills to provide an integrated response to the needs of the project.

Removing the horizontal axis from the “T” leaves an “I.” An “I-shaped” person, therefore, possesses deep technical skills, but has limited breadth of knowledge in other areas. While these individuals may be technically solid, their inability to recognize and constructively address other perspectives can limit the quality of their work, particularly when we view project quality in terms of fitness for use, a property that changes as business value changes. In short, an I-shaped person may deliver the perfect solution in terms of budget, schedule, and scope requirements, yet deliver a project that yields limited business value.

Interestingly, the success of the popular Technology, Entertainment, and Design (TED) conference series reflects a T-shaped approach. In an article in *Intelligent Life*, Samantha Weinberg quotes Chris Anderson, curator of TED, to illustrate the value of understanding other subjects beyond those for which we are technical experts:

“Normally, you go to a conference to learn about your industry. Here, you were learning about things that were from different fields…What I realized is that we don’t spend time in the space where things connect—we go deep into our own thing. But that space of connectedness between different subjects is catalytic. That’s how ideas come out, from unexpected connections. All of knowledge is somehow connected and one of the problems of the real world is that we’re not talking to each other.”

T-shaped persons have the ability to see the connections and the communication skills to leverage those connections.
Developing T-Shaped Skills
As EH&S professionals, we’ve been recognized and rewarded for developing technical expertise and the associated I-shaped personality traits. If we are content to spend the balance of our careers providing the information that others want, we don’t need to do anything more than focus on the technical and regulatory issues that are directly related to our projects. Someone else will determine if our effort offers business value. If, on the other hand, we want to use our technical expertise to drive business value, we’ll have to cultivate the skill set that supports a T-shaped approach. Fortunately, we can make significant advances by developing skills in the following five areas:

**Cultivate emotional intelligence.** Emotionally intelligent people are in tune to the feelings of others. They approach a dialog or problem by first attempting to understand the needs and concerns of the person they are working with. Undoubtedly, they understand their own needs, but they give careful thought to the needs of others when developing a solution to a problem. Although Daniel Goleman[^3] may be best recognized for his work with emotional intelligence, a simple Google search will turn up the work of many who have contributed to this body of knowledge.

**Improve communication skills.** Effective communications are essential to the success of the T-shaped project manager. T-shaped persons communicate clearly, concisely, and empathetically using communication modes and channels that are appropriate. Effective communication skills derive from emotional intelligence.

**Develop business management and analytical skills.** If we are to deliver projects that yield business value, we must understand various business management models and the metrics associated with them. Fortunately, business management and analytical skills can be learned the same way we learned our technical skills. The challenge that EH&S project managers face is framing technical projects within the context of the business model that applies to the problem or project. A technical solution that is out of line with business realities simply won’t be adopted.

**Expand our knowledge base.** If we are going to be able to communicate more effectively with others and better understand the business implications of technical approaches, we are going to have to broaden our knowledge base. This means not only developing business management and analytical skills, but also learning about subjects that may be tangential to our project work but essential to the project.

**Advance technical expertise.** The shift to a T-shaped project management approach does not mean that we acquire new skills and knowledge by resting on our acquired knowledge in our chosen field of expertise. We must constantly build technical skills. The T-shaped project management model requires that we deploy those technical skills within the context of a broader view of project needs.

Business value will continue to shape our approach to EH&S project management. The project managers who are best able to recognize and advance business value will be those who bring more than technical expertise to the project. The T-shape concept provides the framework that allows a project manager to continue to develop the technical skills that he or she enjoys, while acquiring other skills and knowledge that support business value-based project management. 

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**References**
Boards of directors or governors are an essential part of daily business for nonprofit organizations and private companies alike. They support an organization’s or company’s mission and provide support for top executives. Some of the greatest changes and challenges start with a Board discussion and/or decision. A Board may be comprised of 15 to 20 unique individuals with diverse and individual experiences that bring different points of view on how to meet the objectives of an organization. It is in the common interest of the Board to call on all the diversity, challenges, and differences of opinion to come to a common ground—the organization’s mission.

For the past three years, I had the pleasure of representing A&WMA’s young professional (YP) membership on the Association’s Board of Directors. Admittedly, in the beginning, I was nervous, did not know what to expect, and a little intimidated by the vast experience of my fellow Board members. It was a diverse group that was very passionate about their roles and had strong opinions of how to get things done. Then there was me, one of the new Board members, one of the younger Board members; and I sat at that table with the same purpose they all had—the betterment of the Association. I had a reason for being there; I had been elected by my peers to take on this role. I was there to represent the YPs in the Association and make sure their needs were met. It was up to me to serve my role professionally and effectively.

During my three years on the Board, I learned about the organization, the processes, and the necessity of Board actions. There were differences of opinion on some items and there were unanimous votes on others. Managing emotions and making decisions were essential to navigating my way through my three years during some of the Association’s most challenging times.

On December 31, my service as a Board member came to an end, but only a few months earlier, a Past President of the Association mentioned to me that he had observed me in a Board meeting earlier that day and noticed I was not the same, quiet, shy person I was months before starting my service to this Board. There had been a lot of professional and personal growth during those three years and I owe it all to the Board members and everyone that had sat around the table during my three years. The skill set this opportunity
provided applied to so much more than the skills necessary to be a good a Board member. The skills I developed applied to everyday life; working with diverse people, understanding and respecting a difference of opinion, being open minded to possibilities, and working through difficult decisions.

“During my three years on the Board,
I learned about the organization, the processes, and
the necessity of Board actions.”

Learn From My Experience
For several years, the Association has invested tremendous resources in YPs as “the future of our organization” and many companies are investing similar resources in YPs for the same reason. YPs are beginning to fill board rooms both at private companies and nonprofit organizations. As you pull your chair up to the table, let me offer a few words of advice:

• You are there for a reason and as diverse as the group may be, you all share a common interest, which is to support the organization’s mission.

• Do not dismiss your opinions, thoughts, or questions. Someone (or a group) knows the value in those opinions, thoughts, and questions. You are there to participate in the Board meetings, not just be an attendee.

• There are invaluable lessons to be learned. History often repeats itself, learn from other's historical knowledge of what to expect. A senior peer’s experience is sometimes gained through hard lessons, learn from them.

• Always have respect for every member of the Board. Respect comes in so many forms and something as simple as allowing others the opportunity to talk and share their thoughts encourages more balanced discussions and better outcomes. Also, keep in mind the way you say something may affect the temperament of the discussion.

• Sometimes agreeing to disagree is the best solution. Don’t take disagreements personally. As everyone has walked in that room all, “self-motivations” have to be checked at the door. As such, disagreements are not personal and only represent a difference of opinion, not a personal attack.

• Be open-minded and listen to everything. As a discussion starts, listen to all sides and don’t be so strong in your conviction that you ignore information that does not support your initial thoughts. Be open-minded and willing to change course.

• Make decisions based on all of the information; the information you’ve learned from others, past experiences, the data presented, and the scope of discussion. A Board may be tasked with making a decision for a short-term solution while more information is gathered on a long-term solution. Do not let the long-term problem overshadow the possibility of a short-term solution.

Being a Board member is a great responsibility and an opportunity that allows you the chance to make a difference. Sometimes making a decision is difficult but necessary. Have confidence in your involvement, the need for your opinions, and the decisions you make. em
Bienvenue à Nouvelle-Orléans!

This June, the Air & Waste Management Association’s (A&WMA) Annual Conference and Exhibition returns to New Orleans for the first time since 2006. From exclusive galleries, shops, and restaurants to distinctive music, museums, and attractions, New Orleans has a style all its own.
Situated on a crescent-shaped bend of the Mississippi River 100 miles from its mouth, the so-called “Crescent City” is the largest city in Louisiana. Named for the Duke of Orleans, who served as Regent for Louis XV for eight years, New Orleans has a unique and varied history. It was founded by the French, governed for 40 years by the Spanish, and bought by the United States in the 1803 Louisiana Purchase.

Contemporary New Orleans works as hard as it plays, and is rapidly becoming one of the best places to do business in the South. Home to one of the world’s largest ports, a thriving central business district, and a diverse economy (which includes the oil and gas industry, shipbuilding, tourism, and aerospace manufacturing), more and more companies are making New Orleans their home.

In 2005, Hurricane Katrina unsuccessfully attempted to deliver a knock-out punch to the city. Those who attended A&WMA’s 99th Annual Conference and Exhibition in June 2006 were witness to the early stages of a monumental comeback from that near-disaster. When you attend this year’s conference, you will truly be amazed at the renaissance that has occurred over the past 10 years.

Unmasking the Industrial Renaissance

Taking its cue from the city’s recent resurgence, this year’s technical program focuses on the theme of “Unmasking the Industrial Renaissance.” Of special note is a mini-symposium on “Industrial Growth and Environmental Stewardship” that will feature sessions and panels geared toward helping industry maintain environmental progress while accommodating industrial growth. Other sessions will focus on current U.S. Environmental Protection Agency priorities, new source review updates, and permitting, and panels on risk management plans and trends in citizen air quality measurements will also be held.

To complement the presentation of the 46th Annual A&WMA Critical Review—“Emissions from Oil and Gas Operations in the United States and Their Air Quality Implications” by Dr. David T. Allen, University of Texas—several oil and gas sessions will cover onshore and offshore oil and gas multimedia environmental issues in the United States. Concurrent panels will discuss air quality programs, air quality testing and measurements, waste and water management, midstream issues, hydraulic fracturing, operations in wetlands, and litigation.

New tracks on timely topics and a more specialized focus for our most popular sessions on air quality will offer the opportunity to bring environmental professionals together to share ideas and solve problems. Topics include: air quality emissions, measurements, modeling, and control technology; climate change; health and environmental effects; heavy industry and manufacturing; power generation; sustainability and resource conservation; waste management; nanoparticles; and regulatory and public sectors. With dedicated exhibit hours and multiple networking events, there will be plenty of time to meet new colleagues, share ideas, and build relationships for the future.

Unmasking the Industrial Renaissance
June 20-23, 2016
Hyatt Regency New Orleans
New Orleans, LA

Sampling the Entertainment

And once the business of the day is done, if it’s entertainment you are looking for, look no further. In addition to strolling around the French Quarter and sampling all it has to offer, be sure to check out the National World War II Museum (formerly known as the National D-Day Museum), which is the number one attraction in the city. Other “must see” attractions include the Aquarium of the Americas and the Audubon Zoological Gardens of the Audubon Nature Institute.

Finally, no discussion of New Orleans would be complete without mentioning food. The restaurants in New Orleans are world-renowned for quality, service, and excellence. Whether you elect to visit one of the “old-line” favorites that date back to the 1800s, one of the many newly-established boutique eateries, or one of the unique neighborhood cafes, you are in store for an experience that is hard to duplicate anywhere else in the world. And don’t miss A&WMA’s Grand Reception, which will offer a selection of the best Cajun cuisine that is sure to delight all tastes.
Professional Development Courses Offered at the 2016 A&WMA Annual Conference

Conveniently scheduled to coincide with A&WMA’s 109th Annual Conference & Exhibition in New Orleans, the following list of professional development courses will be offered on Sunday, June 19 and Monday, June 20. Don’t miss out on this unique opportunity to enhance your professional skills!

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Half-Day Course</th>
<th>Full-Day Course</th>
<th>Scheduled Time</th>
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<tbody>
<tr>
<td><strong>Sunday, June 19</strong></td>
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<tr>
<td><strong>EMGM-130: Introduction to Environmental Forensics</strong></td>
<td>Laurie Benton and Brenton Cox, Exponent Inc.</td>
<td></td>
<td>✔</td>
<td>8:00 a.m. – 12:00 p.m.</td>
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<td><strong>AIR-173: CALPUFF Version 7 Introductory Course</strong></td>
<td>Irene Lee and Christopher DesAutels, Exponent Inc.</td>
<td></td>
<td>✔</td>
<td>8:00 a.m. – 5:00 p.m.</td>
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<tr>
<td><strong>AIR-240: Air Pollution Control and Compliance for Industrial Applications</strong></td>
<td>Thomas McGowan, TMTS Associates Inc.</td>
<td></td>
<td>✔</td>
<td>8:00 a.m. – 5:00 p.m.</td>
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<tr>
<td><strong>EMGM-345: ISO 14001: 2015 Environmental Management System - Understanding the New Requirements and Transition to the New Standard</strong></td>
<td>Yogendra Chaudhry, ECO Canada</td>
<td>✔</td>
<td></td>
<td>8:00 a.m. – 5:00 p.m.</td>
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<tr>
<td><strong>AIR-135: Fundamentals of Air Pollution Meteorology and Dispersion Modeling</strong></td>
<td>Anthony Sadar, Allegheny County Health Department</td>
<td></td>
<td>✔</td>
<td>1:00 p.m. – 5:00 p.m.</td>
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<td><strong>Monday, June 20</strong></td>
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<td><strong>AIR-186: Introduction to Open-Path Monitoring for Fenceline Monitoring and Flux Measurement</strong></td>
<td>Curtis Laush and Steve Ramsey, Geosyntec Consultants Inc.</td>
<td>✔</td>
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<td>8:00 a.m. – 12:00 p.m.</td>
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<tr>
<td><strong>AIR-205: Fabric Filter Baghouse 101 - Including Baghouse Fundamentals, Design, QA/QC, Troubleshooting, Fine Particle Emission Control, Filter Media Selection, and Nano-Particle Filtration</strong></td>
<td>John McKenna, ETS Inc.</td>
<td></td>
<td>✔</td>
<td>8:00 a.m. – 5:00 p.m.</td>
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<tr>
<td><strong>AIR-291: Consideration and Remediation of Air Pollutants in Municipal Solid Waste Landfilling and Incineration</strong></td>
<td>Amirhossein Malakamad, Universiti Teknologi Petronas (UTP), Malaysia</td>
<td></td>
<td>✔</td>
<td>8:00 a.m. – 5:00 p.m.</td>
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<tr>
<td><strong>AIR-299: AERMOD Air Dispersion Modeling</strong></td>
<td>Jesse Thé and Michael Hammer, Lakes Environmental Software Inc.</td>
<td></td>
<td>✔</td>
<td>8:00 a.m. – 5:00 p.m.</td>
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<tr>
<td><strong>EMGM-348: ISO 14001: 2015 Environmental Management System - Auditing the New Requirements of the EMS Standard</strong></td>
<td>Yogendra Chaudhry, ECO Canada</td>
<td>✔</td>
<td></td>
<td>8:00 a.m. – 5:00 p.m.</td>
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*For complete course details and updates, additional instructor bios, prerequisite information, and to register, visit the conference Web site.
Spotlight on Instructors

Laurie Benton and Brenton Cox, Exponent Inc., will present the half-day course, *Introduction to Environmental Forensics*, on Sunday, June 19.

Environmental forensics provides a scientific basis for determining quantitative liability allocation among Potentially Responsible Parties (PRPs) at contaminated sites, as well as for identifying contaminant sources in toxic tort cases. The need for environmental forensics frequently occurs when there are successive owners of a contaminated property, when there are commingled groundwater plumes, or when air-borne contaminants have been distributed in a community. In addition to identifying the origin of contaminating material, it is often necessary, particularly in insurance coverage cases, to determine how and when contaminating events occurred. Finally, after determining the timeframe for the contamination event, it may also be necessary to perform quantitative or semi-quantitative modeling to determine the extent and impact of a contamination event or release scenario.

An environmental forensics consulting assignment may combine historical documentation, such as aerial photographs, historical maps, facility engineering, and other company records, with fact-witness accounts, and with recent environmental monitoring data. Many tools are available, including chemical fingerprinting and isotope analysis, as well as mathematical techniques, for both statistical analysis and modeling chemical transport and behavior in groundwater, sediments, air, and other media.

This course will provide attendees with an introduction to various environmental forensic tools with an emphasis on case studies.

Dr. Laurie Benton specializes in environmental forensic studies of contamination from mining and smelting sites, oil spills, wood treatment facilities, and chemical plants. These investigations typically include both historical research and data analysis/interpretation focusing on the transport and fate of organic compounds and metals in the environment. Frequently, these analyses have been used in legal proceedings to evaluate cost allocation, insurance coverage, property damage, and personal injury claims. Dr. Benton holds a master’s degree in geochemistry and a Ph.D. in geosciences, has more than 20 years of experience in the earth sciences, and is a licensed geologist in the State of Washington.

Dr. Brenton Cox specializes in the investigation and analysis of incidents involving fires, explosions, and chemical releases. These investigations have involved reactive chemicals, agricultural commodities, hazardous waste, and consumer products. He also consults on issues of process safety, including process hazard assessments, quantitative risk assessment, and consequence modeling. Dr. Cox holds a bachelor’s degree and a Ph.D. in chemical engineering, is a licensed professional engineer in the state of Illinois, and a certified fire and explosion investigator.

Curtis Laush and Steve Ramsey, Geosyntec Consultants Inc., will present the half-day course, *Introduction to Open-Path Monitoring for Fenceline Monitoring and Flux Measurement*, on Monday, June 20.

Open-path monitoring technologies use light in various portions of the electromagnetic spectrum to “see” air pollutants. Often referred to as optical remote sensing (ORS), these technologies, when properly used, can significantly enhance the understanding of the sources and magnitude of air pollutants from non-point emission sources. This course will provide an introduction to open-path measurement technologies and how they can, and have, been used for perimeter monitoring, for enhanced leak detection, and for conducting emission surveys.

Use of ORS technologies will be discussed in the context of the new Petroleum Refinery Sector Residual Risk and Technology Review rules, as well as the anticipated Bay Area Air Quality Management District rules. Case studies will be used to present and differentiate the capabilities of various ORS technologies. Cost information will be presented. Return on investment will be discussed as part of the case studies.

Dr. Curtis Laush has more than 20 years’ experience in the development of remote-sensing quantitative measurement methods and instrumentation. He has conducted worldwide field measurement services, instrumentation installation and maintenance services, training and chemistry consultation, data interpretation/reporting, and applied technology development throughout this time. He is trained and has extensive field experience as a gas phase chemist and his project experience regarding fence-line and ambient air monitoring networks encompass the design, development, multi-year operation, maintenance, and program management of continuous and real-time remote-sensing technologies for the Houston Regional Monitoring network and other community monitoring stations and petrochemical plants.

Steve Ramsey has been involved in a number of projects with application of open-path monitoring systems for emission inventory improvement purposes, including the use of differential absorption LIDAR to survey emissions from petroleum refineries and from a coke oven battery; use of solar occultation flux to survey emissions from multiple facilities owned and operated by a state oil company; and use of open-path Fourier transform infrared and tunable diode lasers in vertical radial plume mapping configurations to measure emissions from a delayed coker, landfills, and from a phosphate fertilizer manufacturing facility.
Call for IPEP Annual Award Nominations

With over 1000 members around the world, the total professional contributions of IPEP members in 2015 were substantial. Our members are leaders that push boundaries, expand their knowledge of practice, and develop new techniques.

In order to properly recognize individuals that have made exceptional contributions to environmental practice or society, IPEP developed our Annual Awards program in 2006, offering an opportunity for members to celebrate the achievements of fellow QEPs.

Categories include:

- Professional Standards and Ethics
- Professional Development and Mentoring
- International Collaboration and Cooperation
- Interdisciplinary Management Approach
- Multimedia Technological Solutions
- Lifetime Achievement in Environmental Practice

A maximum of one award in each category may be given per year. A committee of QEP volunteers will determine the winner of each category.

Nomination forms can be downloaded at ipep.org, and nominations are due April 30, 2016. Nomination requires the attachment of a short essay, and the nomination packet can also include up to six pages of supporting documents, testimonials, media, and references. Contact IPEP staff with questions at i+1-412-396-1703.

The Institute of Professional Environmental Practice
www.ipep.org

Accredited by
www.cesb.org

A proud supporter of IPEP and the Qualified Environmental Professional (QEP) and Environmental Professional Intern (EPI) certifications, A&WMA congratulates the newest* QEPs and EPIs for their outstanding achievements!

QEPs
David Greffenius
Benjamin Schmidt
Michael Schofield

EPIs
Kevin Betz
Matthew Watson

*QEPs and EPIs certified after January 15, 2016, will be acknowledged in the June 2016 edition of IPEP Quarterly.
The U.S. Environmental Protection Agency (EPA) is proposing changes to how power plants, refineries, chemical plants, underground coal mines, and other large facilities report their greenhouse gas emissions in what the agency described as the latest effort to improve the implementation and efficiency of the program.

The proposed rule would also create new or revised confidentiality determinations for various pieces of data required to be submitted under the program. The agency would phase in the changes between the 2016 and 2018 reporting years at a cost of $1,081,830 per year for all the combined facilities affected, once fully implemented.

The proposed action, which would amend the reporting requirements at 40 C.F.R. Part 98, will be subject to 45 days of public comment following its publication in the Federal Register. No public hearings are planned, and EPA said it intends to finalize the revisions in 2016.

According to EPA, the proposed rule is a “continuation of the effort” to improve implementation of the greenhouse gas reporting program, which first came into existence in 2009.

EPA’s Clean Energy Incentive Program Draws Mixed Reviews

The U.S. Environmental Protection Agency’s (EPA) Clean Energy Incentive Program, encouraging states to act early to develop renewable energy and efficiency, garnered broad support from energy efficiency groups and environmental justice groups, but drew criticism from solar and wind trade associations.

The Clean Energy Incentive Program is part of EPA’s Clean Power Plan. The program gives incentives to states to make early investment in wind and solar power generation and demand-side energy efficiency measures in low-income communities. State participation in the program is optional. In the program, EPA will make additional allowances or emission rate credits available to states that make early investments in wind and solar power projects and energy efficiency programs.

More than 150 stakeholders submitted comments to EPA’s docket on the program. Energy efficiency groups and environmental justice groups were largely supportive of the Clean Energy Incentive Program. But solar and wind trade associations expressed concerns that the delay in the compliance deadline for the Clean Power Plan, from 2020 to 2022, would postpone the development of renewable energy projects. Instead, the groups asked EPA to change the eligibility requirements to allow more time for project completion.

The Clean Power Plan, issued under Section 111(d) of the U.S. Clean Air Act, requires states to submit implementation plans to EPA by 2018 on how they plan to reduce carbon dioxide emissions to meet a reduction target of 32 percent below 2005 levels by 2030.
Energy Sector Not Ready for Paris Deal’s Carbon Cuts

Energy companies are the least prepared to meet carbon-cutting targets recently agreed upon in Paris by nearly 200 nations, according to an analysis by index provider MSCI Inc.

Only 16 out of 146 members of the high-emitting energy sector in MSCI’s All Country World Index have carbon targets that are in line with national commitments made under the deal. Another 112 energy companies lack reduction targets altogether. Other laggards include two more top emitters: the materials and utilities sectors.

MSCI warned that if companies continue to lag behind government policies, they could face higher costs of compliance in the form of carbon taxes, fines, and increased capital expenditures to switch to low-carbon technologies.

The analysis looked at how prepared the world’s companies are for the level of carbon reduction implied by the new climate change agreement, by comparing their existing carbon mitigation efforts against proposed country reduction targets and against an overarching goal to limit global warming to 2 degrees Celsius (3.6 degrees Fahrenheit) above pre-industrial levels.

EPA Moves to Drop Requirement to Publish Air Permits

The U.S. Environmental Protection Agency (EPA) is proposing to remove requirements for local regulators to publish notices of draft air permits in newspapers, extending a media-neutral policy it adopted for minor new source review permits in 2012.

EPA’s proposed rule would allow the agency, as well as state and local air regulators, to provide public notice of draft new source review, Title V, and outer continental shelf permits electronically, eliminating a mandatory requirement to publish the notices in newspapers. The proposed rule would require draft major source permits that are issued by EPA or delegated air agencies implementing federal rules to be published electronically.

States would have the option of continuing to publish notices in newspapers for draft major source permits issued under their own rules that have been approved by EPA. However, the proposal would require states to adopt a consistent approach, meaning all draft permits must either be published electronically or in newspapers. Posting draft permits online is a more effective method of public engagement than notices that appear in a newspaper for a single day, EPA said. “EPA believes that having the notice of availability and the draft permit remain electronically available on an agency’s website for an extended period of time, as compared to a one-time publication in an area newspaper that directs the public to a reading room at the permitting agency, or at a library or other location near the source, results in a significant increase in public awareness of the proposed permitting action and access to the draft permit,” the agency said.
The U.S. Department of Energy’s large commercial air conditioner and furnace efficiency standard over 30 years could save the equivalent of 75 percent of the annual energy consumption of U.S. households, making it the largest energy-saving standard in history, the agency said.

The standard would save 15 quads, compared to the 20 quads of energy that U.S. households consume annually, the agency estimated. It’s also equivalent to the amount of energy produced by all coal-fired power plants in one year.

“This would save more energy than any regulation created,” said Andrew deLaski, executive director of the Appliance Standards Awareness Project, which promotes energy efficiency standards. The efficiency standard also would lead to $167 billion in utility bill savings for businesses that use these large rooftop air conditioner and furnace units, the agency said in a statement.

The standard, issued as a direct final rule December 17, was developed by a working group made up of numerous stakeholders, including the agency, the heating and air conditioning industry, environmental groups, and energy efficiency advocates. The agency’s direct final rule largely adopted the working group’s recommendations, which were issued in June.

The Air-Conditioning, Heating and Refrigeration Institute, which was part of the working group and represents the air conditioning and heat equipment industry, is still reviewing the 417-page rule, but said it was pleased with the success of the stakeholder work on a standard.
Industry Coalition Plans to Side with EPA against Stronger Ozone Rule

A coalition of 14 industry associations wants to intervene in support of the U.S. Environmental Protection Agency (EPA) in litigation brought by environmental groups who want even stronger national ozone standards (Murray Energy Corp. vs. EPA, D.C. Cir., No. 15-1385, motion filed 1/22/16).

Many members of the industry coalition, which includes the U.S. Chamber of Commerce, the American Petroleum Institute, the American Chemistry Council, and the National Association of Manufacturers, are challenging EPA’s decision to revise the ozone standards from 75 parts per billion (ppb) to 70 ppb, a level that the industry groups argue is unattainable for parts of the United States. However, the business coalition said it’s in its interest to also defend the EPA from litigation brought by the Sierra Club and others that are expected to allege that the U.S. Clean Air Act required the agency to set even stronger standards.

The ozone rule (RIN 2060-AP38), released in October, is projected by EPA to cost as much as $1.4 billion annually to implement.

William Kovacs, senior vice president for environment, technology, and regulatory affairs at the U.S. Chamber of Commerce, said in a Jan. 22 statement that the agency’s 70 ppb standards would “stifle economic expansion” across the United States.

“The even more stringent standard sought by these special interest groups would force a far greater number of cities and counties into EPA’s economic ‘penalty box,’ and would be devastating to American business,” Kovacs said.

The business groups filed a Jan. 22 motion with the U.S. Court of Appeals for the District of Columbia Circuit asking for leave to intervene on behalf of the EPA in litigation brought by environmental and public health groups. Several of those organizations, including the American Lung Association, the Sierra Club, and the Natural Resources Defense Council, have already sought to intervene on behalf of the EPA in the challenges brought by industry groups and states that oppose the 70-ppb standards.

Louisiana, which opposes the stronger ozone standards, also requested intervenor status in the ozone litigation. If granted, Louisiana would join Arizona, Arkansas, Kentucky, New Mexico, North Dakota, Oklahoma, Texas, Utah, and Wisconsin in challenging the EPA rule.

Attainability Questioned

Several of the industry groups that were seeking to intervene Jan. 22 also filed their statement of issues with the D.C. Circuit, which highlights the legal questions they intend to raise in their lawsuit against the ozone rule.

The industry groups said they intend to question whether EPA’s decision to tighten the ozone standards is illegal because the agency failed to adequately consider the attainability of the regulation. The business coalition highlighted the challenge posed by high levels of background ozone—uncontrollable sources of ozone-forming pollution that may cause an area to fall into nonattainment of the ozone rule.

Several western states raised concerns that elevated background levels caused by naturally-forming ozone, pollution from outside the United States and pollution resulting from wildfires and other uncontrollable events could make it very difficult to meet the 70-ppb standard. The issue of attainability was previously highlighted by Murray Energy Corp. and a coalition of five state governments in November filings with the D.C. Circuit.

The other legal issues highlighted by the U.S. Chamber of Commerce and the other industry petitioners are:

• whether EPA’s decision to rely on alternative regulatory mechanisms, such as the exceptional events policy that allows for data caused by uncontrollable events to be excluded from consideration in determining compliance, fails to “cure the unlawfulness” of setting unattainable standards;
• if EPA violated the U.S. Clean Air Act by failing to take into account all relevant contextual factors, including possible adverse economic and energy effects of setting more stringent ozone standards; and
• whether EPA provided a reasonable explanation for an altered interpretation of relevant scientific evidence.

For More Information

The industry coalition’s motion to intervene against the environmental petitioners in Murray Energy Corp. vs. EPA is available online.

The industry coalition’s statement of issues in Murray Energy Corp. vs. EPA is available online. —By Patrick Ambrosio, Bloomberg BNA
Opponents of the U.S. Environmental Protection Agency’s (EPA) mercury standards for power plants alleged that an agency proposal intended to respond to a 2015 U.S. Supreme Court decision is legally flawed and identified several issues that could be raised in the next round of litigation over the standards.

The opponents, who include members of the power and coal industries and several states, used their comments to identify potential legal challenges that could be raised once EPA issues its final rulemaking to address the Supreme Court’s remand of the mercury and air toxics standards. The legal flaws alleged by those groups include the agency’s failure to conduct a new cost-benefit analysis and the agency’s reliance on co-benefits to justify the regulation of power plants.

The mercury and air toxics standards, commonly referred to as the MATS rule, are still in place while the agency works to address a June ruling by the U.S. Supreme Court that found the agency was required to consider cost in its determination that it was “appropriate and necessary” to regulate power plant emissions of hazardous air pollutants, including mercury (Michigan vs. EPA, 135 S. Ct. 2699, 80 ERC 1577, 2015 BL 207163 (2015)).

In November, EPA proposed (RIN 2060-AS76) a supplemental finding that cost consideration doesn’t alter the appropriate and necessary finding, a decision that would reaffirm the MATS rule.

EPA’s Intentions Challenged

The groups that commented on the proposed supplemental finding included many of the states and industry groups that challenged the legality of the MATS rule up to the Supreme Court.

Ohio Attorney General Mike DeWine (R) argued in comments that EPA’s proposal would violate the plain language of the U.S. Clean Air Act and the Supreme Court’s directive in Michigan vs. EPA because the agency is not considering the possibility of issuing a different rule to regulate power plant emissions.

DeWine cited a June 30 blog post by Janet McCabe, EPA’s acting assistant administrator for air and radiation, as evidence that the agency has taken a “conclusions first, study to follow” approach to assessing cost. In that blog post, McCabe said the agency was “committed to ensuring that the mercury standards remained in place despite the Supreme Court’s decision.

“Everything about the proposed supplemental finding bespeaks its status as a conclusion preordained by regulators bent on achieving a particular regulatory regime,” DeWine said.

DeWine and other opponents of the MATS rule, including the Utility Air Regulatory Group and Southern Co., also criticized the agency’s use of its regulatory impact analysis that was prepared in conjunction with the MATS rule as the basis for its cost analysis.
DeWine said EPA needs to conduct a new, thorough analysis using all current, available data, rather than going back to “fix” the old appropriate and necessary finding, which was based on data from 2011.

Southern Co. argued that EPA cannot rely on its old regulatory impact analysis, which the utility said included “vastly underestimated” costs on the power industry. That analysis projected $9.6 billion in annual costs on the industry as a result of the MATS rule, an estimate the agency used in its proposed supplemental finding to compare the cost of the regulation to the power sector’s total revenue.

Co-Benefit Issue Returns
Several commenters, including the Utility Air Regulatory Group and a coalition of 11 states led by Michigan, also alleged EPA’s analysis illegally relied on indirect benefits of regulating power plant emissions of mercury.

EPA’s cost-benefit analysis for MATS (RIN 2060–AP52, RIN 2060-AR31) only included between $4 million and $6 million in quantified benefits that could be directly attributed to reducing emissions of hazardous air pollutants. While the agency said there were other direct benefits that could not be quantified, the rest of the up to $90 billion in annual benefits attributed to the rule were “co-benefits” associated with reducing fine particulate matter and other criteria pollutants.

The Supreme Court’s Michigan vs. EPA opinion did not address the legality of using co-benefits, though Chief Justice John Roberts did raise concerns about the agency practice during oral arguments in that case. Judge Brett Kavanaugh of the U.S. Court of Appeals for the District of Columbia Circuit said during December arguments on remand that the co-benefits issue will likely be a “key battleground” in future litigation against EPA.

The state coalition argued in their comments that the co-benefits are irrelevant to EPA’s decision of whether it is “appropriate and necessary” to regulate power plant emissions under Section 112 of the Clean Air Act. The states said the plain language of the Clean Air Act established that the EPA’s finding must be based on the costs and benefits of regulating hazardous air pollutants, not other pollutants like fine particulate matter, which are regulated under other sections of the Clean Air Act.

“When the legally irrelevant co-benefit associated with fine particulate matter is eliminated from EPA’s benefit-cost analysis, the quantified net benefits are overwhelmingly negative,” the states said. “That analysis establishes it is not appropriate to regulate hazardous air pollutants from power plants.”

The Utility Air Regulatory Group advanced a similar argument in its comments that EPA may only rely on benefits from reducing emissions of air toxics in making its appropriate and necessary finding. The power plant trade group also argued that the co-benefits attributed to MATS are primarily associated with reductions in fine particulate matter concentrations at levels below the current National Ambient Air Quality Standards (NAAQS) for that pollutant. The group echoed Chief Justice Roberts’ comments that the use of co-benefits is an “end-run” around regulating particulate matter under the NAAQS program.

Arkansas Attorney General Leslie Rutledge and three Texas state agencies also filed comments objecting to EPA’s use of co-benefits.

State Regulators Offer Support
While several states and industry groups objected to EPA’s proposal, an association of eight state air pollution control agencies in New England and the mid-Atlantic defended the agency’s use of co-benefits.

The Northeast States for Coordinated Air Use Management (NESCAUM) said in comments that the consideration of co-benefits is a “commonly accepted practice” that many states used in adopting power plant standards for mercury that predated the MATS rule. Many states took a “multi-pollutant approach” to power plants that allowed for the use of a suite of control measures that addressed both mercury and criteria pollutants.
The other approaches used by EPA to assess cost, including the effect of regulations on retail electricity prices, are similar to the factors considered by New York, New Jersey, Massachusetts, and other states when they adopted their own mercury emissions limits, NESCAUM said.

NESCAUM also argued that the actual costs imposed by the MATS rule have been even less than the agency’s own estimates of $9.6 billion annually. The association of air regulators said actual costs on the power sector are now estimated to be $2 billion annually, substantially lower than the compliance costs projected by EPA.

New York University’s Institute for Policy Integrity, which filed an amicus brief in support of the agency in Michigan vs. EPA, also filed comments in support of the agency’s proposal.

The institute argued that EPA properly relied on cost projections made prior to promulgation of the MATS rule because updating those cost estimates would effectively be a “retrospective review” of costs that have already been incurred by the agency.

“Such an exercise in hindsight is clearly not required by Section 112, which contemplates that the ‘appropriate and necessary’ finding will be made before emission standards are promulgated and thus before any compliance costs are incurred,” the institute said.

The institute also defended EPA’s cost analysis methodology, including the agency’s decision to factor in consideration of ancillary benefits from the reduction of pollutants not directly regulated by the MATS rule. The consideration of co-benefits is consistent with executive guidance, case law, the legislative history of the Clean Air Act and longstanding EPA policy, the institute said.

**Coal Industry: Retirements Must Be Considered**

In addition to the co-benefits issue, industry groups raised several additional arguments against the EPA’s proposal, including a failure to adequately consider the effect of the MATS rule on the coal industry.

The National Mining Association argued in its comments that EPA’s proposal maintains that the mercury and air toxics standards have a limited effect on coal, even though about 60 gigawatts of coal-fired electric generation has either shut down or announced retirement since the standards were promulgated in 2012. The utilities that announced those retirements have stated that the shuttering of coal-fired plants is either fully or partially attributable to EPA regulations, including the mercury standards, the association said.

The association said EPA’s new proposal relied on its regulatory impact analysis prepared for the 2012 MATS rule, which projected the rule would result in the retirement of less than 5 GW of coal generation. It is “unreasonable” for EPA to continue relying on data that have been proved wrong based on the real-world experience of the coal industry since the MATS rule was promulgated, the mining association said.

“By limiting its cost consideration in this fashion, the agency believes it can erase the actual experience of the last four years and the hardship the agency has wrought on our nation’s coal communities and ratepayers who were previously the beneficiaries of affordable, reliable coal-based electricity,” the association said.

Both the mining association and Murray Energy Corp., the largest privately owned coal company in the United States, argued that EPA’s cost consideration fails to adequately consider regional and industry-specific effects of the mercury rule.

Murray Energy said the decision to assess costs at a national level hides “significantly higher” costs that are imposed on particular regions and communities, including the effect on regions that produce coal and regions that rely on coal-powered electric generation. The coal company said EPA’s cost estimates are “meaningless” without identifying who will be burdened with those costs.

“Your initial refusal to consider costs and your subsequent wholly inadequate attempt to consider costs both strongly suggest that you are making an indefensible, irrational, arbitrary and capricious decision that you can only justify by entirely ignoring reality,” Murray Energy said.

**For More Information**

All comments on EPA’s proposed supplemental finding are available online. —By Patrick Ambrosio, Bloomberg BNA

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**News Focus** is compiled from the current edition of Environment Reporter, published by the Bureau of National Affairs Inc. (Bloomberg BNA). For more information, visit www.bna.com.
Green Refinery Project Begins Quest for Environmental Approval

On January 14, 2016, Pacific Future Energy submitted its project description—a proposal for a C$15-billion bitumen-to-fuels refinery to be built in northwestern British Columbia—to the Canadian Environmental Assessment Agency for approval.

According to the company, feedstock will arrive not by pipeline but by rail. It won’t be diluted bitumen (dilbit), which is flammable and challenging to clean up if spilled, but undiluted bitumen (neatbit), which Pacific Future Energy says is stable and exempt from the federal Transportation of Dangerous Goods Regulations (SOR/2001-286).

Pacific Future Energy’s refinery will also be the world’s greenest, according to the company, powered by natural gas and clean sources, such as wood waste from the local forest industry. Using wood waste will have the added advantage of providing a new waste disposal solution for the local forest industry.

The refinery will produce fully refined products such as diesel, gasoline, and jet fuel for domestic and export markets. Because the products are refined, they will not be affected by the federal moratorium on oil tankers off the northern British Columbia coast.

If the project eventually goes ahead, it will be the first new refinery commissioned in Canada since 1984.
—By Mark Sabourin, EcoLog

Nova Scotia Okays Next Phase of Underground Natural Gas Storage Facility

Permits for the next phase in construction of the first underground natural gas storage facility in Atlantic Canada have been approved by the Nova Scotia government.

The facility will be built by Alton Natural Gas Storage LP near Alton, Nova Scotia. The first natural gas storage facility connected to the Maritimes and Northeast Pipeline, it will include three caverns carved into the Stewiacke Salt Formation. The approval process, including aboriginal consultations, for the pipeline connecting the storage facility and the natural gas pipeline is on-going.

The permits include:

- industrial approval from the Department of Environment to operate the brine storage pond;
- lease from the Department of Natural Resources of submerged Crown land to complete the dispersion channel; and
- an agreement from the Department of Agriculture to construct a dyke on Crown lands.

Alton Natural Gas Storage LP began exploratory work on the project in 2002. Construction began in 2008.—
By Dave de Jong, EcoLog
Federal Scientists Back Revised LNG Bridge Proposal for Lelu Island

Opponents of Pacific NorthWest LNG’s proposed C$11-billion liquefied natural gas (LNG) plant and export terminal on Lelu Island near Prince Rupert faced their own inconvenient truth recently when scientists from Fisheries and Oceans Canada lauded proposed design changes to a bridge, saying the new design has a “low potential of resulting in significant adverse effects” on fish habitat in Flora Bank. Flora Bank, near the mouth of the Skeena River, is a sensitive area where juvenile salmon adapt to saltwater.

The bridge will carry an LNG pipeline from the plant to the deep-water jetty at the export terminal. Pacific NorthWest LNG had originally proposed a trestle bridge structure over Flora Bank. Construction of the trestle would have required sinking pilings into Flora Bank, potentially disrupting fish habitat.

Pacific NorthWest responded to concerns with a new design that includes a 1.5-km suspension bridge over Flora Bank and a 1.3-km trestle. It then supplied a 3D model and simulation of the structure to assess impacts. As part of the Canadian Environmental Assessment Agency review of the project, Fisheries and Oceans Canada was asked to review the modelling and simulation.

Opponents aren’t giving up, though. On its website, the T. Buck Suzuki Environmental Foundation cites ongoing research by geologist Dr. Patrick McLaren that continues to raise concerns about Pacific NorthWest’s revised plan.—By Mark Sabourin, EcoLog

British Columbia Government Not in Support of Trans Mountain Extension, Yet

British Columbia (BC) has told the National Energy Board (NEB) that it is unable to support Kinder Morgan’s proposed Trans Mountain Pipeline expansion. But it has not slammed shut the door on the project.

During a telephone news conference held shortly after BC presented its 140-page brief to the NEB, Environment Minister Mary Polak repeated that BC’s position was dictated in large measure by the NEB process.

Five conditions were set by the BC government on July 23, 2012, and must be met for the province to approve a heavy-oil pipeline through its territory. They are:

1. successful completion of the environmental review process;
2. world-leading marine oil spill response, prevention, and recovery systems for BC’s coastline and ocean to manage and mitigate the risks and costs of heavy-oil pipelines and shipments;
3. world-leading practices for land oil spill prevention, response, and recovery systems to manage and mitigate the risks and costs of heavy-oil pipelines;
4. legal requirements regarding Aboriginal and treaty rights are addressed, and First Nations are provided with the opportunities, information, and resources necessary to participate in and benefit from a heavy-oil project; and
5. BC receives a fair share of the fiscal and economic benefits of a proposed heavy-oil project that reflect the level, degree, and nature of the risk borne by the province, the environment and taxpayers.—By Mark Sabourin, EcoLog
2016 Calendar of Events

MARCH
15–17 Air Quality Measurement Methods and Technology
Chapel Hill, NC

APRIL
12–14 Guideline on Air Quality Models: The New Path
Raleigh, NC

15–17 Leadership Training Academy
Pittsburgh, PA

MAY
15–18 Strive for Sustainability Federation of New York Solid Waste Associations meeting
Bolton Landing, NY

JUNE
20–23 2016 A&WMA Annual Conference & Exhibition
New Orleans, LA

AUGUST
16–19 Power Plant Pollutant Control “MEGA” Symposium
Baltimore, MD

SEPTEMBER
27–30 Atmospheric Optics: Aerosols, Visibility, and the Radiative Balance
Jackson Hole, WY

DECEMBER
7–8 Vapor Intrusion, Remediation, and Site Closure
San Diego, CA

Events sponsored and cosponsored by the Air & Waste Management Association (A&WMA) are highlighted in bold. For more information, call A&WMA Member Services at 1-800-270-3444 or visit the A&WMA Events Web site. To add your events to this calendar, send to: Calendar Listings, Air & Waste Management Association, One Gateway Center, 3rd Floor, 420 Fort Duquesne Blvd., Pittsburgh, PA 15222-1435. Calendar listings are published on a space-available basis and should be received by A&WMA’s editorial offices at least three months in advance of publication.
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