

## NEXT GENERATION COMPLIANCE: USING ADVANCED MONITORING TECHNOLOGY TO MEET TODAY'S CHALLENGES AND PLAN FOR THE FUTURE

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Protecting air and water and keeping communities safe from pollution is more complex today than ever. Whether it's pollution that is not apparent to the naked eye or large numbers of small sources that collectively have a big impact on the environment, new challenges require us to innovate and improve. EPA and its partners are taking advantage of new tools, technologies and innovative approaches to achieve the intended human health and environmental benefits of federal, tribal and state regulations and permits.

These challenges and opportunities are not limited to environmental protection in the United States. Governments everywhere face similar challenges and opportunities, so it is important to share and learn from each other. This conference series is intended advance that learning process.

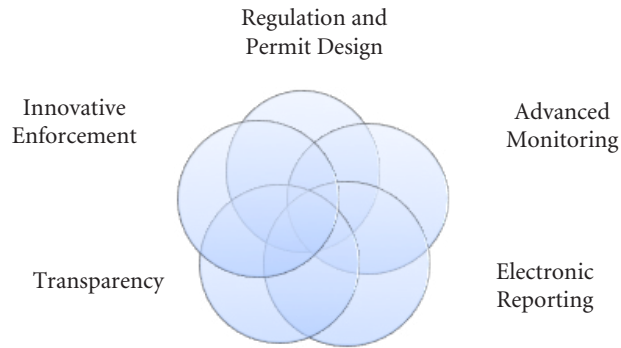
Next Generation Compliance is EPA's integrated strategy to bring together the best thinking from inside and outside EPA on how to structure regulations and permits combined with new monitoring and information technology, expanded transparency, and innovative enforcement to enable us to do our job better in the 21<sup>st</sup> Century.

Led by EPA's Office of Enforcement and Compliance Assurance (OECA), Next Generation Compliance helps us navigate this era of complex challenges. Using existing and emerging monitoring and information technologies, EPA and states, and the regulated facilities themselves, are better able to find and fix pollution problems. The increased transparency and more comprehensive data that result from electronic reporting and advanced monitoring allow us to develop innovative approaches. Next Generation Compliance assists EPA, States, and Tribes to better identify problems presented by large regulated universes and address those problems with approaches that go beyond traditional single facility inspections and enforcement. These approaches collectively help us better protect public health and the environment, assure a level playing field for businesses that play by the rules, engage communities, and reduce regulatory burdens.

Next Generation Compliance does not replace traditional tough enforcement, which continues to be our top priority. However, these new tools and strategies can help increase the effectiveness and reach of traditional enforcement. And budget uncertainties and constrained resources reinforce the imperative to implement Next Generation Compliance now.

Next Generation Compliance consists of five interconnected components, each designed to improve the effectiveness of our compliance program.

- Design regulations and permits that are easier to implement, with a goal of improved compliance and environmental outcomes.
- Use and promote advanced emissions/pollutant detection technology so that regulated entities, the government, and the public can more easily see pollutant discharges, environmental conditions, and noncompliance.
- Shift toward electronic reporting by regulated entities to help make environmental reporting more accurate, complete, and efficient while helping EPA and co-regulators better manage reported information and improve effectiveness.
- Expand transparency by making the information we have today more accessible, and making new information obtained from advanced emissions monitoring and electronic reporting more readily available to the public.
- Develop and use innovative enforcement approaches (e.g., data analytics and targeting) to achieve more widespread compliance.

**Figure 1: Next Generation Compliance Components**

The fast-evolving pace of environmental monitoring technology development makes advanced monitoring one of the most dynamic and promising parts of Next Generation Compliance, and this element will be the focus of our conference series. EPA is now using infrared cameras to find emissions leaks that would otherwise be invisible to the naked eye and difficult to detect. We have several vehicles with mobile mounted equipment that can measure and map pollutants from roadways near facilities. EPA has deployed solar-powered buoys to collect and transmit water quality data every 15 minutes in the Charles River and Mystic Watershed. Companies also find that advanced monitoring technologies can help them improve their operations and stay in compliance, by allowing them to find pollution that was “invisible” and transmit warnings to facility managers so they can fix a problem before a violation occurs. Advanced monitoring technology, especially when connected with Internet or cellphone communications technology, has the power to transform how we are able to see, communicate about, and react to pollution to protect human health and the environment.

Years of research, conferences and seminars have helped determine the factors that influence compliance and inform the technology development and program strategies that help improve it. We looked at the experience of regulatory agencies at EPA, States, and in other countries, to see how advances in information and monitoring technology are changing environmental programs, and how to measure improvements in compliance. This has helped forge and strengthen new partnerships to work together to use technology and advanced monitoring most effectively.

EPA has learned that measuring pollution provides a more accurate view than estimations. In two recent Clean Air Act cases, the facilities had used a set of calculations to estimate controls needed to achieve a 98% flare combustion efficiency, and based on those calculations, reported low volatile organic compound emissions. When EPA checked their actual emissions using flare monitors, we found that the emissions were in fact 10 to 25 times higher, meaning that communities were exposed to far more pollution than had been assumed. A few other promising uses of advanced monitoring include:

- The placement of “Village Green” solar-powered air pollution and meteorological monitoring stations in communities, providing real-time air pollution measurements on the web and smartphone app. <http://villagegreen.epa.gov/>
- Geospatial Measurements (GMAP) of air pollution data in real time using vehicle-mounted equipment. Data is displayed on a laptop, overlaid on Google Earth, to show the concentrations of pollutants near a given facility or in any given community. [http://www.epa.gov/nrmrl/appcd/emissions/sec\\_gmap.html](http://www.epa.gov/nrmrl/appcd/emissions/sec_gmap.html)
- Water quality measurements from a solar-powered buoy every 15 minutes, providing information on temperature, conductivity, pH, dissolved oxygen, turbidity, chlorophyll, florescent dissolved organic matter, and phycocyanin, thereby allowing EPA to estimate the level of cyanobacteria, a harmful algal bloom. The data is reported via cell phone technology to a secure web site. [https://www.neiwpcc.org/neiwpcc\\_docs/10Faber-MonitoringCharles&Mystic.pdf](https://www.neiwpcc.org/neiwpcc_docs/10Faber-MonitoringCharles&Mystic.pdf)
- Lights installed on the bank of a river that glow red when there is a combined sewer overflow of raw sewage into the river, and yellow for 24 hours after the discharge, to warn swimmers and boaters to avoid contact with the water.
- The Environmental Defense Fund teamed with Google Earth Outreach to attach sensors to Google Street View cars to measure natural gas levels and thereby create detailed maps of natural gas leaks from utility pipes under city streets. They then worked with natural gas utilities to fix the leaks. <http://www.edf.org/climate/methanemaps/partnership>
- China is using RFID tracking devices, similar to those used for retail inventory control, to track shipments of medical waste.

Where we go in the future depends on what we learn. This is why EPA is collaborating with INECE, The George Washington University Law School (GW Law), the Environmental Law Institute (ELI), and the Netherlands Human Environment

and Transport Inspectorate (ILT) on this new conference series. Only when we reach out broadly, consider different perspectives, and learn from others' thoughts and experience can we craft the best approaches to take now and in the future.

The series will start off with a GW Law conference in March 2015, focusing on the legal aspects of using advanced monitoring in compliance and enforcement programs. Erasmus University, the Netherlands Environmental Inspectorate, and Dutch Association of Supervisors, Enforcers and Regulators (VIDE) will hold the next event in April 2015 to focus on how advanced monitoring can be combined with social and cultural influences to improve environmental performance. EPA plans to lead an event in late 2015 or early 2016 to explore the practical aspects of using advanced monitoring technologies to improve facilities' environmental performance and compliance, monitor compliance and ambient conditions, and when enforcement actions are necessary, to move the regulated entity back into compliance in a way that demonstrates to the agency and the community the facility's path to responsible environmental stewardship.

The EPA event will focus on using advanced monitoring for the practitioner — including testing the performance of advanced monitoring in the lab, gauging its accuracy and ability for replicable measurements, and examining issues that arise from using such equipment in the field. We would like to hear about new opportunities for using advanced monitoring, challenges and possible solutions, and how information from advanced monitoring equipment is being used to improve performance and compliance. We hope to hear from government agencies, industry, and others.

We expect that this event – and the entire conference series – will help EPA, other regulators, industry, academics, and communities:

- Learn what promising new technologies are available now and on the horizon,
- How they can best be used,
- How their value can be multiplied through connections with information and communication technologies, and
- What will be needed of technology users to be able to benefit their programs and the environment most while avoiding pitfalls.

We are looking forward to these exciting new learning opportunities and invite other governments, academics, industries, and communities to learn as well.

Excerpt from INECE's *Special Report on Next Generation Compliance*.

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Please visit <http://inece.org/resource/next-gen-report/> for the full text of the *Special Report on Next Generation Compliance*.

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