

Creating a Sound Emissions and Facility Inventory to Support Robust Air Quality and Climate Change Policies

The State of California is implementing multiple efforts to reduce emissions of air pollutants and greenhouse gases, as authorized in many statutes including AB 32 and SB 32. The Air Resources Board (ARB) has recognized policies can be good for both the climate and public health because many sources emit both air pollutants and greenhouse gases. A number of statutes emphasize identifying and reducing emissions to improve conditions in highly impacted or disadvantaged communities.

Recently, the Legislature has acted to provide communities and the public with accurate and understandable information about emissions and potential health effects for communities and to generate solutions (AB 617 ⁱ and AB 197 ⁱⁱ). New initiatives are underway.

Both the ARB and the Legislature have recognized that it is currently difficult or impossible to compare the greenhouse gas, criteria pollutant, and hazardous air pollutant emissions for an area or over time. As the ARB staff points out, it is difficult to reconcile the data for different kinds of sources.

The magnitude and ambition of the policy agenda now in place suggests that the ARB, the public, and Legislature need better ways to see and understand emissions control and climate programs. All need to be able to see what is going on, what needs to be done, and the impact of strategies in place. This can build public understanding and support for air pollution and greenhouse gas reductions and provide public accountability for decisions made by the ARB. A revitalized and more broadly conceived inventory of emissions sources and quantities would also provide a better basis for analyzing health impacts and disproportionate burdens.

In addition, as new initiatives are underway, critical aspects of the existing infrastructure for air pollution control policies need updating or improvement, particularly for hazardous air pollutants.

Now is the time to review methods, fix problems, and renew data systems to provide reliable and timely information to support robust climate and air quality policies. It will be important to take the time and make the effort to help community representatives understand the issues and technical concerns and participate in the selection of solutions.

The Proceedings at Hand

The staff of the ARB has proposed to develop a regulation regarding emissions reporting and inventory and held workshops to discuss possible approaches. The staff invited submission of additional written comments to expand upon the in-person meetings by June 29 via email.

This document outlines eight areas of concern with regard to air pollution and particularly hazardous air pollutants. The topics include the data that would be included in an inventory as well as aspects of an inventory itself. Each has a short description of the topic area and issues. Discussion of the presentation of the ARB staff at the Sacramento workshop follows. ARB has not as yet addressed all of these areas but the workshop represented an important step forward and a basis for improvements.

1. Get all hazardous pollutants in emissions estimates and health assessments.

At present, both the State of California and the federal government focus on hazardous air pollutants (or toxic air contaminants) identified in the early 1990s. There is no reason to believe that the generation and release of hazardous compounds has stayed exactly the same for nearly thirty years. So, this list needs to be updated, and a process to provide for ongoing review at some reasonable interval is needed.

The State of California maintains a list of Toxic Air Contaminants that is mostly the same as the federal list of Hazardous Air Pollutants adopted in the Clean Air Act amendments of 1990. ⁱⁱⁱ No pollutants have been added to the federal list. Only a few pollutants have been added to the California list. Environmental tobacco smoke was added in 2007, but nothing has changed since. The system is basically frozen as it was almost thirty years ago. ^{iv}

Given that the California economy has grown significantly (to the world's fifth largest) and many things have changed in the last 28 years, this list **should be reviewed and updated to ensure that all substances of concern are included, as a matter of basic due diligence.**

Moreover, the Office of Environmental Health Hazard Assessment should be tasked to review and update the list at a reasonable interval as part of the air pollution control program.

It would also be appropriate to assign greater responsibility to emitters to report pollutants of potential concern for review.

ARB Presentation at Emissions Inventory Regulations Workshop

At the workshop in Sacramento in late May, the ARB staff discussed the scope of chemicals to be included. These included the criteria pollutants (other than lead) and toxics pollutants, specifically those consistent with the Air Toxics Hot Spots Program and the California Air Pollution Control Officers Association (CAPCOA) Air Toxics Hot Spots Program Facility Prioritization Guidelines, Appendix B, List of Substances for Emission Quantification. ^v

It is very positive to note that the ARB staff are thinking about the compounds that should be included within the toxics schema. (It is interesting that the list presented does not seem to include the designated TACs for the State of California.)

The workshop did not include a presentation about the process used to construct the CAPCOA list nor the adequacy of this list for the purposes noted in this section. Nor does the document that presents the list provide any discussion of its origins or currency.

Further discussion of this is needed to ensure that the system is capturing emissions of chemicals that may cause harm.

2. Get facilities into the inventory and report on a common time scale

As the ARB recognized the importance of providing better information about emitters and emissions, the staff created a “data visualization tool” to allow the public to see emissions of greenhouses gases and air pollutants from facilities. In general, it seems that a lot of facilities that you would expect to see are missing for various reasons that need to be explored and addressed.

At present, the emissions inventory discussion is focused on reporting requirements rather than on facilities. This makes it hard to construct an inventory that makes sense to the public not necessarily fluent in all the details of the pollution control programs. Consequently, it could be helpful to consider reporting separately from what facilities should be included as potential sources.

It would seem valuable for anyone to be able to look up a facility for information about emissions now or in the past and see what its status is or was. This would mean that the facilities list would be stable, and the inventory would allow comparisons over time.

For example, even a facility that has emissions at insignificant levels should be included so that people can see that the facility was identified but found to be an insignificant source. This can allow for ground-truthing to focus on facilities that are missing and on determining what is going on in cases where the State and/or the air district think that a facility is not of concern while a community thinks it is.

Including all facilities in the inventory is also necessary to provide for tracking of emissions over time. It will be important to be able to show what has changed and where emissions reductions (or increases) have occurred. This also allows for re-assessment as things change over time.

The State and others can create layers that present different types or portions of the inventory to make presentations relevant to various audiences and settings. (Of course, some boundaries need to be drawn around “everything,” but it should be done inclusively and in ways that make sense to the people.)

The inventory should be designed to be useful for many purposes, not developed to serve only any one purpose or set of specifications. For example, AB 617 requires reporting of criteria and toxic emissions for facilities that are required to report greenhouse gas emissions under Mandatory Reporting Requirements for greenhouse gases under AB 32, facilities with air district permits to emit 250 or more tons per year of any nonattainment pollutant or its precursors, or facilities that receives an elevated prioritization score based on cancer or non-cancer health impacts under AB 2588 (Connelly 1987).^{vi} The 250 tons per year requirement leaves out many important air pollution sources, especially sources of particulate matter that are not associated with toxics. Currently each air district has its own interpretation of what constitutes an elevated prioritization score under AB 2588. The scale that determines which facilities need to report emissions is not standardized.

These problems can be avoided if the state emission inventory rule requires all sources to be included in the emissions reporting. Since AB 617 also requires community-scale emissions estimates for communities identified for a community emissions reduction plan and since, presumably, these plans will include emissions from all sources, many areas throughout the state will already require complete reporting. In writing a rule for emissions reporting to implement AB 617, the ARB should phase in a requirement to include all sources in the emissions inventory.

There should be a mechanism to add community-identified facilities and data, as is done in national water quality data systems. The inventory should in some sense “belong” to communities and the public as much as it does to the ARB, its staff, air districts, and emitters.

From a broader perspective, the facilities and air emissions inventory should be considered in light of the multimedia environment. There is a need to provide complete information to communities at the facility level about emissions, releases, disposal, and upset conditions that lead to unusual or unpermitted releases. From the community perspective, air emissions are only one aspect of a potential impact along with releases to water or waste facilities or other disposal issues. The State may be remiss in not adopting a registration or similar system to allow linkage of records for a facility. Each facility should have a unique identifier that is used across all State and local systems to allow users to find all records pertinent to an individual facility, to address cross-media impacts and enforcement concerns.

With regard to the timing of reporting, reporting timing should be consistent across the various types of emissions. Annual reporting would seem to be a reasonable starting point, though there may be conditions where real-time reporting may be warranted to allow for more immediate actions to protect health or climate.

ARB Presentation at Emissions Inventory Regulations Workshop

The ARB presentation reflected the value of a complete and consistent inventory, and this is an important step forward. Greater leadership from the ARB and its staff is essential to achieving this.

The proposed principles of statewide methods that increase data accessibility consistency, public access and support program needs are good ones. In addition, accuracy, validity, and timeliness would be important principles. We want data that are consistent but also correct. We want them to be meaningful to communities.

ARB staff proposed annual reporting. This is an important advance from the current reporting regime, which seems to allow reporting over four years, ten years, or never, at least for toxics. It would also be worth considering the circumstances in which real-time reporting would make it possible to acute adverse events and/or reduce excessive cumulative impacts on disadvantaged communities.

The ARB presentation at the workshop included many positive suggestions about improving data reporting, including consideration of the needs for what to report within the facility including such questions as foot print, stack heights, and locations, and similar issues. It is appropriate to allow an initial reporting for such information as suggested by the staff, with updating as needed, as long as there is a way to trigger the necessary updates and ensure that they are provided in a timely way.

It was not entirely clear whether the ARB staff were supporting data verification but this would be important to ensure validity of data.

The discussion of sources was baffling. The limitations on sources to be included, as noted above, made no sense. All of the sources should be in the Inventory of the State. Let’s not outsmart ourselves. Keep it simple so that the people can understand. Do it the same way everywhere. Every community deserves an inventory of sources, not just some communities. Use what you

learn in the AB 617 pilots to fix the system as a whole. A sound inventory should not be a niche product.

As note above, it is important to separate “reporting” from having a facility in the inventory. Facilities may be required to report different things for different purposes and reporting may change. However, that should be reflected within the inventory and not be a reason to take something out. A facility that ceases to emit should remain in the inventory as inactive and not emitting. Then anybody who wants to know about that facility can see that and the reductions can be calculated over time. All the stuff on slide 13 should be excised.

If you have annual reporting, data should be available no later than 60 days after the end of the reporting year. Fix the system so that it doesn’t take months to get the data in.

The clustering concept seems important and should be further developed.

3. Update methods to estimate emissions for accuracy and applicability

Over time, a number of **questions have arisen about the accuracy and validity of data reported for hazardous air pollutants, for a variety of reasons, some of which are included here. The larger point is that this topic needs a thorough audit and review to ensure that the data coming into a unified inventory system is not bogus.**

Historically, much of the reporting on emissions of hazardous air pollutants has been based on estimates derived from process-based metrics rather than from actual measurements of emissions such as stack tests, though stack tests are also done in many cases. There can be good reasons to use both types of metrics. Stack tests are typically short-lived, for example, while estimates modeled from process throughput can provide more continuous coverage. However, many of the “factors” used to estimate emissions are not well substantiated, and some or many appear to be outdated. The methods used to quantify air toxics emissions should be based on or validated through actual emissions measurements. Approaches to using data and conducting analyses seem to be entirely idiosyncratic among the various air districts with every district doing it a different way.

It is important to recognize that recent findings have created doubt about whether reported values are anywhere close to actual emissions. New methods to “find” emission plumes seem to be finding sources and levels of emissions far higher than previously reported that include unacknowledged but significant “fugitive” sources. This needs to be considered.

These findings raise the question of whether fundamentally better approaches are needed. We need focused attention on how to use various approaches including validated emissions factors, stack measurements, fence line monitoring, and remote sensing to ensure the accuracy of the emissions estimates and the conclusions drawn about impacts on communities. The emissions inventory should incorporate data generated in a consistent way using validated methods based on scientific principles and current knowledge.

ARB Presentation at Emissions Inventory Regulations Workshop

The workshop presentation did not address this issue directly though the lack of consistency among the air districts is obviously a concern for all.

4. Reduce the long lag between emitting and reporting

Emissions data is most useful when it is both accurate and current. Data about hazardous pollutant emissions are reported literally years after emissions occur. A lot of reporting is four years later; some appears to be ten years later; some appears to be reported never. In this day and age, it is difficult to imagine how this can be justified or why it would be. **Steps should be taken to minimize the lag and bring it down to standards appropriate to the 21st century.**

For emitters of highest concern, real-time monitoring and data reporting systems should be considered so that actions can be taken when needed to protect health.

ARB Presentation at Emissions Inventory Regulations Workshop

At the workshop, ARB staff discussing requiring annual reporting for all types of emissions, as noted above. Annual reporting will do a lot to reduce the long lag. That is very important and the ARB staff are to be commended for moving in this direction.

It would also be worth considering the circumstances in which real-time reporting would be useful to allow management to reduce impacts on disadvantaged communities or to avoid acute effects.

5. Adopt electronic reporting and data availability for air toxics

Reporting of emissions data occurs in several phases for air toxics. Sources report to the dozens of air districts around the state; districts report to the ARB; and ARB provides reports to the public. It appears that in at least some districts, reporting from sources is still done in paper format. This is outdated. Paper reporting makes it difficult for the public (or the ARB) to access or audit data or even determine what data have been reported. It also makes it difficult to analyze the data, largely eliminating its value.

It is past time to implement standardized electronic reporting into a system that is available to the public. If the districts cannot do this, then the ARB should take this on.

At the same time, air district employees have expertise about sources and data being reported that would not exist at the state level at least at this time. Finding ways to capture this knowledge and expertise along with the reporting of data would be valuable. Expertise and knowledge are valuable but much less so if never shared.

ARB Presentation at Emissions Inventory Regulations Workshop

The ARB staff presentation outlined a role for the ARB in developing a standardized electronic reporting system. This seems necessary for many or most districts and is an important step forward.

There may be some cases where an existing effective system might be preserved and made interoperable with any new ARB system. If the South Coast AQMD already has an effective system, for example, perhaps arrangements could be made to make it interoperable with the ARB system. Workable systems do not necessarily have to be changed; they need to be able to communicate and interact with the standardized system.

6. Seek and adopt technologies to reduce emissions

From what we can tell, capacity to adopt new technologies to reduce air pollution emissions is limited. The state needs to regain its ability to assess and deploy advanced air pollution control technology. The ARB conceptual plan for AB 617 included an element to return to technology assessment. This is an important step to take and should also be done in conjunction with entities that have expertise in this area. It would be useful to include consideration of process changes that can reduce pollution at the source rather than simply to control emissions and promote green technologies.

ARB Presentation at Emissions Inventory Regulations Workshop

The workshop did not discuss technology. It is a separate initiative from the emissions inventory. inventory regulation as conceptualized. However, some consideration for how to show the status of technology review and development for facilities from within the inventory would be warranted. **We want to move forward with better technologies to control or eliminate emissions that impact disadvantaged communities or are accumulate in the State. It would be helpful if they could see the status of any available technologies or review for facilities within the inventory, possibly through a cross-linking structure.**

7. Move to zero releases for persistent or bioaccumulative pollutants

One issue that seemed to be missing from the discussions at the AB 617 Technical Summit in February was a recognition of the special challenges posed by persistent and bioaccumulative pollutants. Such pollutants are highly persistent in the environment and once released to air will deposit to the land and perhaps leach into water or attached to sediments and be part of the environment for decades or centuries or millennia to come. These are often referred to as PBT (persistent, bioaccumulative, toxic) pollutants.

The most expensive way to control such materials is to let them to go up a stack and be distributed into the air and then try to clean them up later. This is expensive in both human health and remediation dollar terms.

Examples of persistent pollutants are lead, mercury, chromium, and metals in general. Halogenated compounds including chlorinated, brominated, and fluorinated compounds can also be highly persistent. For example, we still see DDT and its breakdown product DDE or lead in environmental samples and human biospecimens from uses that occurred decades ago.

The PBT compounds warrant controls to keep them from getting out into the environment where they will remain. It is time to adopt zero release strategies for these compounds.

The status of PBT pollutants should be flagged throughout the data infrastructure.

ARB Presentation at Emissions Inventory Regulations Workshop

This issue does not seem to be on the radar of the ARB but should be. It is also relevant to other Cal EPA boards, departments, and offices.

8. Design systems approaches that include continuous improvement

We can expect that things will continue to change over time. Systems are in motion, and things change. Research generates new understanding. Technologies and practices evolve, new behaviors emerge, new materials replace older ones, and environmental impacts increase, decrease, or shift. As ARB and others consider the emissions inventory and data infrastructure, it makes sense to design for continuous improvement and plan for updates and change.

An important example of planning for change is to make provisions for evolving methods of estimating emissions. As knowledge advances, as measurement and quality assurance methods improve, and as pollutants of concern change, agencies should allow for updates by versioning and documenting to clearly indicate when and why new estimates of emissions have replaced older versions. To track emission trends in a meaningful way, corrections and method changes need to be applied retroactively, with versioning, so that actual emission changes can be distinguished from fixes to past errors and method changes.

ARB Presentation at Emissions Inventory Regulations Workshop

This issue does not seem to be on the radar of the ARB either but is consistent with current practice in systems design. **Please consider how to create a system that will remain up to date by building in due diligence, surveillance of relevant trends, checking on what has changed, and updating system inputs and defaults on a regular basis as part of the core design.**

This analysis was developed by Amy D Kyle and incorporates insights from a number of knowledgeable individuals. June 29, 2018 version 4.3 as submitted to the Air Resources Board

Endnotes

ⁱ AB-617 Nonvehicular air pollution: criteria air pollutants and toxic air contaminants. Accessed May 31, 2018. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB617

ⁱⁱ AB-197 State Air Resources Board: greenhouse gases: regulations. Accessed May 31, 2018. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160AB197

ⁱⁱⁱ US Environmental Protection Agency. Initial List of Hazardous Air Pollutants with modifications. Accessed June 28, 2018. <https://www.epa.gov/haps/initial-list-hazardous-air-pollutants-modifications>

^{iv} The list of “criteria” pollutants is also largely unchanged, though the size of particulate matter subject to monitoring and regulation has changed and greenhouse gases are now considered to be criteria pollutants in certain ways.

^v California Air Pollution Control Officers Association (CAPCOA). Air Toxics “Hot Spots” Program. Facility Prioritization Guidelines. Prepared by the CAPCOA Air Toxics and Risk Managers Committee. August 2016. Accessed June 26, 2018. <http://capcoa.org/wp-content/uploads/2016/08/CAPCOA%20Prioritization%20Guidelines%20-%20August%202016%20FINAL.pdf>

^{vi} AB 2588 Air Toxics "Hot Spots" Regulatory Documents. Accessed June 1, 2018. <https://www.arb.ca.gov/ab2588/ab2588-regdocs.htm>