Bay Area Air Quality Management District
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Advisory Council Meeting
Thursday, September 19, 2024

APPROVED MINUTES

Note: Audio recordings of the meeting are available on the website of the Bay Area Air Quality Management District at www.baaqmd.gov/bodagendas

CALL TO ORDER

1. **Opening Comments:** Advisory Council (Council) Chairperson Solomon called the meeting to order at 9:33 a.m.

   Roll Call:

   Present: Chairperson Dr. Gina Solomon; Vice Chairperson Dr. Phil Martien; and Members Professor Ann Marie Grover Carlton, Dr. Stephanie Holm, and Professor Michael Kleinman.

   Absent: Members Garima Raheja, Dr. Michael Schmeltz, and Board Liaison Davina Hurt.

CONSENT CALENDAR

2. **APPROVAL OF THE DRAFT MINUTES OF THE ADVISORY COUNCIL MEETING MINUTES OF JULY 29, 2024**

Public Comments

No requests received.

Council Comments

Chair Solomon noted that at the bottom of Page 5 of the Draft Minutes of the Advisory Council Meeting Minutes of July 29, 2024, the acronym "CBAs" is not spelled out.

Note: The Clerk later noticed that the acronym "CBAs" was spelled out as "Community Benefit Agreement" on Page 4 of the Draft Minutes of the Advisory Council Meeting Minutes of July 29, 2024, so there was no need to amend (correct) the minutes.

Council Action

Professor Kleinman made a motion, seconded by Dr. Holm, to **approve** the Draft Minutes of the Advisory Council Meeting Minutes of July 29, 2024; and the motion **carried** by the following vote of the Council:

AYES:	Carlton, Holm, Kleinman, Martien, Solomon.
NOES:	None.
ABSTAIN:	None.
ABSENT:	Hurt, Raheja, Schmeltz.

INFORMATIONAL ITEMS

3. CUMULATIVE IMPACTS ANALYSIS WITHIN AIR DISTRICT POLICY DEVELOPMENT AND PROGRAMS

Greg Nudd, Deputy Executive Officer of Science and Policy, gave the staff presentation *Cumulative Impacts in Air District Policies and Programs*, including: outline; air quality planning: current regional approach and community-focused approach; California Environmental Quality Act (CEQA) guidance; permits for new and modified facilities; and stationary source regulations.

Public Comments

Public comments were given by Ken Szutu, Citizen Air Monitoring Network of Vallejo.

Council Comments

Professor Ann Marie Carlton initiated the discussion by asking about the impact of climate change on air quality planning, particularly in light of projections that San Francisco's average temperature could rise by 3 to 5 degrees by 2050. Mr. Nudd replied that this was not yet something the District had fully thought through, but that there were several issues: first, the impact of higher temperatures on vulnerability; second, how the temperature on the hottest days might affect ambient air quality trends, which staff have considered with respect to ozone. He noted that as winters grow warmer, the Bay Area may see changes in Particulate Matter $(PM)_{2.5}$ patterns as well.

Vice-Chair Dr. Phil Martien commented that Mr. Nudd had described Rule 11-18 as looking at impacts of toxics from whole facilities. Acknowledging that the rollout of Rule 11-18 has been slow, but that the Air District was taking steps to accelerate it, Dr. Martien suggested that Council members would benefit from a future discussion on the rule and its status. Chair Solomon agreed, noting it as a priority for future meetings.

Dr. Stephanie Holm inquired whether there were efforts to incorporate cumulative or synergistic effects into the Office of Environmental Health Hazard Assessment (OEHHA)'s health risk assessment methodology. Mr. Nudd replied that to his knowledge, there were none. He added that any changes in the methodology used by the Air District would need to be coordinated through OEHHA, given the statutory requirements. Dr. Holm wondered if it could be communicated that the issue is being considered by the Council.

The discussion then shifted to CEQA. Chair Solomon asked how the Air District's comments and guidance are weighted when local jurisdictions make decisions about project significance, particularly in the context of balancing air quality concerns with statewide housing efforts. Mr. Nudd explained that while the Air District's comment letters are not typically very influential in CEQA processes, its guidance carries significant weight, as local jurisdictions rely on it heavily. However, he acknowledged that the data is less robust for shorter-term, intermittent PM exposures—such as dust from construction sites—leading to challenges in translating engineering analyses of those into meaningful health impact assessments. Mr. Nudd suggested that developing more sophisticated approaches to evaluate short-term exposures could help the District strike a balance between protecting air quality and not exacerbating the Bay Area's housing shortage, especially when considering infill housing that is crucial for regional air quality and climate goals.

Dr. Kleinman inquired whether it might be possible to rank or weight offsets such that reductions in a more impacted area would yield more credit, which might reduce inequities. He also wondered whether offsets retain their value over time. Ms. Leong responded that with regard to location, it was once the case for certain pollutants that offsets were applicable only to projects located where the credits were generated, but that this is no longer the case; however, offsets must still be generated within the Air District's nine-county jurisdiction. Ms. Leong added that offsets are applied on a 1:1.15 basis, not a 1:1 basis, so as to drive down emissions overall; and that staff could look at the possibility of requiring offsets within a certain radius of a source, but a concern is that, since offsets are not necessarily generated near every location, it is possible that applicable offsets might not be available. As to whether offsets retain their value over time, Ms. Leong stated that when they are generated, and when they are used, there is a "reasonably available control technology" (RACT) adjustment, and staff do look at how technology has changed when determining the present value of credits: for example, if credits were generated at some point by not burning fuel oil, then since current rules prohibit that use of fuel oil, those credits' value would today be zero.

Chair Solomon clarified that she understood Dr. Kleinman's comments to be less restrictive, in the sense that they were not about offsets within a certain radius, but about whether offsets within any disadvantaged community might be weighted more heavily. Ms. Leong affirmed that staff could look at the possibility of a higher exchange ratio on that basis. Chair Solomon added that there could be several methods: one could be a higher ratio; another could be a higher value, such that an offset created in a disadvantaged community would be more valuable than an offset created elsewhere. Mr. Nudd stated that if a case could be made for that on a health basis, staff might be freer to be more stringent than federal requirements in this respect, and affirmed that considering creative ideas to incentivize reductions to come from more desirable locations was helpful.

Vice-Chair Martien remarked that the presentation was helpful in focusing what the Council should be considering. Looking forward to the next meeting, Dr. Martien added, it seemed advisable to developed a draft workplan based on the ideas presented so far, and wondered if the Council would be open to creating a subcommittee to develop it. Chair Solomon expressed support for the idea of a workplan, noting that the current meeting's presentations were helping by providing context, but that the purpose of the next two meetings was to turn back to consideration of a broader framework; she added that it could be compatible with the Brown Act, for a subgroup to bring back a draft framework for consideration at the next meeting, and suggested that this idea be tabled until the end of the present meeting.

Chair Solomon returned to the issue, raised earlier by Dr. Holm, of synergistic effects within significance determinations for air toxics. Chair Solomon remarked that it is a big recommendation to make, and seemed a worthy challenge for the Council, to determine whether there was enough science to support it, and whether it would make sense as a path forward. Chair Solomon expressed interest in seeing the Council reviewing literature and digging further into the issue. Prof Carlton added that this was relevant to the temperature issue raised before, insofar as temperature is well documented as having synergistic effects; she agreed that it would be challenging and might be a place to start. Regarding temperature, Chair Solomon recalled that it was mentioned briefly at the last meeting, in the context of a relevant study on $PM_{2.5}$, and agreed that it could be a great place to start.

Council Action

No action taken.

4. CALENVIROSCREEN AT THE AIR DISTRICT

Dr. David Holstius, Senior Advanced Projects Advisor in the Assessment, Inventory, and Modeling Division, gave the staff presentation *CalEnviroScreen in Air District Policy and Practice*, including: outline, geographic information system (GIS)-based approach; design decisions; notable indicators in other tools; CalEnviroScreen (CES) at the Air District; "overburdened community" designation; incentive projects; place-based tools, designations, and programs; and assessment versus designation.

Dr. Holstius began by explaining the fundamental approach of CES: though often thought of as a geographic tool, it is essentially a spreadsheet-based system that ranks census tracts based on a variety of environmental and population-based indicators. Multiple indicators are first transformed to percentiles by the spreadsheet operator; this standardizes data across indicators, but discards quantitative units. The transformation can obscure meaningful differences between tracts, such that data indicating a factor-of-two difference in real indicator values might be reduced to just a 1% difference in terms of percentiles, and this is known to happen for some Bay Area communities. Dr. Holstius stated that the approach can be helpful for prioritizing areas most in need of current attention, but it is no longer obvious how to track long-term progress over time, because nothing remains on an absolute scale.

Dr. Holstius identified six key design decisions shared by CES and similar place-based tools, including: spatial scale; set of indicators; how indicators are operationalized; numeric transformations, including percentiles; post-transform weighting; and a reduction method, including the handling of missing data. Dr. Holstius recalled that about ten years prior, Air District staff had developed an interactive tool called "CalEnviroScreen Explorer," which allowed experimentation with some of those design decisions. The tool helped the Air District explore how small changes, such as modifying indicator weights or how missing data is handled, could impact outcomes. Dr. Holstius emphasized a significant learning from that project: it was critical to decide on objective measures of difference between outcomes from Option A and Option B, but arriving at consensus on those measures could be challenging.

In response to a request by the Council from the previous meeting, Dr. Holstius next reviewed additional indicators that are not part of CES [version 4.0] but are found in tools and procedures used by other states to create place-based designations related to cumulative impacts. Such tools were reviewed by Dr. Judy Cutino, the Air District's Health Officer, at the previous meeting.

Turning first to health-related indicators, Dr. Holstius added that operationalization decisions can matter: as proxies for heart disease and asthma, CES uses certain incidence-based measures (emergency room visit rates), while other tools use estimated prevalence rates. Dr. Holstius also emphasized that spatial scale is not truly separable from choices about indicators and their operationalizations. He stated that health indicators, in particular, are typically based on small-area population estimates. When dealing with relatively infrequent health events, which can still be important to public health, the smaller the geographic area, the fewer observations will be available, which increases the noise in the data. Dr. Holstius explained this noise can make it difficult to capture meaningful differences between neighborhoods at scales pertinent to the design and application of certain Air District policies and practices, such as in permitting.

In addition to health indicators, Dr. Holstius discussed indicators relating more directly to the Air District's regulatory scope, or its scope as it may be perceived by the public, beginning with indicators that involve air pollution modeling or proximity-based metrics with large sources, including industrial and waste handling sources, traffic and goods movement corridors, and supporting or related facilities. Finally, Dr. Holstius noted the importance of climate-related indicators such as heat and flooding risks, which also have environmental justice implications.

Turning to applications, Dr. Holstius explained how CES influences or contributes to three main areas of work at the Air District: designating areas; characterizing local conditions; and assessing programmatic investments. Using the permitting process as an example, Dr. Holstius explained how staff have designated certain places as "Overburdened Communities." The process involved choosing a specific threshold and then applying a spatial buffer of 1,000 ft to the Census tracts that scored above that threshold. The District now applies stricter cancer risk limits to permits issued to sources located in these designated areas. It also enhances fees and noticing requirements for such projects. As a second example, Dr. Holstius described how CES-based designations shape funding eligibility for incentive programs, as well as prioritization and award amounts. He also indicated that they also influence marketing and outreach, and may be used to set goals by various programs, which may be a requirement for some State programs.

Before closing, Dr. Holstius discussed the complex landscape of place-based designations and tools now relevant to Air District work, explaining that the field is not static and that many are simultaneously in use. To illustrate, he showed a flow chart connecting various place-based programs and designations that influence a dozen example programs.

Noting the persistence of history, Dr. Holstius said that before CES, the Air District used its own place-based designation system under its Community Air Risk Evaluation (CARE) program. While CES has largely replaced CARE in terms of guiding resource allocation and policy focus, legacy CARE communities are still tied to some current incentive programs.

Emphasizing a distinction between tools and designations, Dr. Holstius compared the Air District's "Assembly Bill (AB) 617 Communities" to the "Overburdened Communities." Both are traceable in some way to CES, but the former has been refined with local knowledge and a participatory process. That process involves community-led partnerships that can and do consider CES, but also bring many other considerations to bear. A key tradeoff is that, to date, the AB 617 Communities designation comprises a much smaller number of tracts.

Finally, Dr. Holstius drew attention to the various manners in which additional designations can be layered on top of designations traceable to CES, creating new composite designations. He offered the "California Climate Investment Priority Populations" designation scheme as a good example: this designation also references a map of tribal lands, as well as a third map based on an operationalization of poverty different from the one that is represented as a layer in CES. Dr. Holstius noted that these maps of tribal lands and poverty were not inserted as additional layers into CES; that would not have has much of an effect, and would have been less predictable than the approach taken, which was simply to union the CES-based product with the other two.

Dr. Holstius concluded by suggesting that, over time, as additional layers of data, priorities, and policies have been incorporated, the system shows evidence of becoming more nuanced and more complicated; and that the Council could consider balancing the need for specificity in targeting areas for intervention with the overall complexity that results from tailoring tools like CES, or place-based designations that depend on those tools, for specific policy goals.

Public Comments

Public comments were given by Ken Szutu, Citizen Air Monitoring Network of Vallejo.

Council Comments

Dr. Holm requested clarification regarding the consistency of the use of CES across the Air District, for example whether it was being used more or less frequently by different programs. Mr. Nudd responded that it varies by program but is largely consistent. In the case of permits, it is used all the time, at the time of permit applications. In the case of incentive programs, there is a bit of analysis after the fact, in terms of analyzing where funds have gone, and how much has fallen into communities of concern, but it is used consistently in terms of outreach and looking for opportunities in those communities. Dr. Holm clarified that she was wondering whether one could identify programmatic areas where CES was not yet being used, as a way to increase consideration of cumulative impacts.

Prof. Kleinman inquired whether anyone had tested the sensitivity of the results of CES to the various "degrees of freedom" discussed in the presentation, in particular which might have the greatest effect, or whether adding another degree of freedom might improve the discrimination factor. Dr. Holstius responded that there have been a handful of papers limited to a few of those questions: for example, adding a race/ethnicity layer to CES and then assessing the change. He was unaware of anything that had systematically compared multiple degrees of freedom. He remarked that it is necessary to decide on a summary measure of difference—is it just the number of tracts that agree with the previous option, or is there a measure of "better" or "worse"? Chair Solomon added that, while OEHHA was developing CES, a fair amount of that was done internally; CES 1.0 originally included race/ethnicity, which was removed in version 1.1; indicators for "old" and "young" were originally separate but later combined, then jettisoned in v3.0; most recently lead [Pb], and other indicators, have been added; and that one can compare the resulting maps, but that there are not large changes, or high sensitivity to adding or removing an indicator.

Chair Solomon added that a key issue was identified in the presentation: namely, that percentile transforms matter; the 98th and 99th percentile tracts can be quite different, in terms of the absolute burdens, than those in the 70th percentile.

Prof. Carlton commented that while a Census tract represents where people live, exposure can be different when there is substantial mobility (e.g., where people work differs a lot), and that statewide, the worst $PM_{2.5}$ is typically found where farmers or dockworkers labor outside; at the same time, adding an indicator to represent that specifically may not particularly help, if, as remarked earlier, the tool's output is not particularly sensitive to small changes in the set of indicators.

Chair Solomon opened the discussion by remarking that there had been discussions about a "regional CalEnviroScreen"—same structure, same spreadsheet and indicators, but doing the scoring within a specific region alone—and wondered if the Air District had explored that for the Bay Area. Mr. Nudd replied that staff have not looked at that specifically, but that it is interesting to consider what adjustments to CES would look like. Further, he stated, if staff should expand the use of CES, it seemed that it could be appropriate for the map to look different, and that could be appropriate to discuss not only with the Advisory Council but with community partners as well. Chair Solomon ventured that a Bay Area edition of CES might sort out essentially in the same way that the tracts already do. Mr. Nudd remarked that, as Dr. Holstius said, there is a question about how many tracts should be designated, and in addition, community representatives should be looking at the map in order to flag any places that might not be included but should be.

Vice-Chair Martien reflected on two things he had struggled with, not only in terms of CES but in terms of any similar screening tool: it is challenging to define what exactly is to be identified (e.g., outside worker exposures), but more broadly, it is also challenging to define the reference or "touchstone" by which one can tell that the tool has improved. The closest thing that there is, Dr. Martien reflected, was what Mr. Nudd had remarked on: namely, vetting by community groups. Still, he reflected, this is an imperfect measure, since some communities are relatively more vocal. Dr. Martien stated that he found comfort in the fact that many tools appear to identify essential similar sets of Census tracts, and therefore, whether the set of indicators is scoped narrowly to air quality, or much broader, there is expected to be a great deal of overlap; still, there are many edge cases where there is uncertainty, and it is not clear how to tell what map is an improvement over another, but that it is important to have a way of doing so.

Vice-Chair Martien additionally remarked on the issue of complexity, represented by the flowchart slide. As the Council considers what to do, he urged, it would be well for members understand how things are being used now, and ask whether things can be simplified, or at least not made more complicated.

Chair Solomon turned to the consideration of indicators, especially those that are not currently included in CES. Some, she remarked, were previously included but removed; others are covered indirectly—for example, prevalence versus incidence of coronary heart disease or asthma, as alluded to by Dr. Holstius. Therefore, it seemed unlikely to Chair Solomon that small changes to the set of indicators would yield a remarkably different result. With regard to air toxics and emission sources, Chair Solomon added that air quality is weighted fairly heavily by CES, which happens to be good for present purposes, and while it would be possible to add more air quality indicators, or indicators for certain source types, it would be surprising to see much change, as the relevant communities (places) already seem to be included. Chair Solomon concluded that the presentation had given her comfort, in terms of not missing anything of major importance. Dr. Solomon added that the multiplicative operation used to summarize results was appealing, insofar as it represents an expert understanding of synergistic effects, and embeds, in the model itself, the understanding of OEHHA that the overall data suggest that

interactions between pollution burden and population characteristics are multiplicative, rather than additive.

Dr. Fine praised the discussion, and then clarified that in CES the multiplication step multiplies rankings, rather than risks, so there may be an opportunity for improvement in that detail. Dr. Fine added that implementing a "Bay Area CalEnviroScreen" might actually reorder some tracts in the Bay Area, given that the percentiles of different indicators might change; yet, to Dr. Martien's point, there seems to be nothing that can be done that would change the map drastically. Therefore, there are some applications where it seems mapping is an appropriate approach; for others, it may be possible to go beyond dichotomous designations, having for example some gradient or tiers, or some more case-by-case dives into health indicators of concern, and cumulative effects of other factors. Dr. Fine summarized his questions as "Is mapping as far as we go? Has mapping gone as far as it can go? And is there anything beyond that?"

Prof. Kleinman remarked that cancer risk is mainly reflected by the diesel PM indicator, and yet there are many other substances that would not be captured by that, that might affect certain communities differentially. Therefore, he asked, is there any merit to adding weight to some other carcinogens, that might have localized effects? Dr. Fine responded that this is one way in which drilling down in certain parts of the Bay Area could be helpful; while CES needs statewide-consistent data, the South Coast Air Quality Management District (SCAQMD), San Joaquin Valley Air Pollution Control District (SJVAPCD) and Bay Area Air Quality Management District (BAAQMD) have done more work than other Air Districts on characterizing toxic air contaminants (TACs), which are not accounted for to that level of detail in CES. Dr. Fine elaborated that while diesel is still driving [cancer risk], it is also true that because of some changes in risk numbers around ethylene oxide, hexavalent chromium, and even benzene, it is known that there are areas where the risk from other localized TACs can exceed that from diesel PM.

Dr. Fine pointed out that this recalled one of Mr. Nudd's original points around air quality planning and modeling, namely that staff can do some air toxics modeling and consider how it might relate to the CES mapping. Dr. Holm invited Dr. Fine to elaborate on how that might differ from the "toxic release" indicator layer featured in CES, acknowledging that the latter is relatively crude. Dr. Fine clarified that the CES layer is multi-media, which is good for cumulative impacts, but that he was referring to modeling air pollution. Dr. Fine added that the Air District's emission inventory data is expected to be more refined than that found in that layer, which is based on US Environmental Protection Agency's (EPA's) data. Dr. Fine again asked how much it would change the map, but that it might be worth doing the exercise. Chair Solomon suggested that it might not be much to work to swap out the air toxics layer and re-run the tool for Bay Area tracts alone; but, though the result might be interesting to see, wondered what kind of action should follow from that, given some of the issues raised in the slide that depicted the multiple tools, designations, and programs in whether it might be advantageous simply to remain with CES, to keep things from getting vastly more complicated; but for the Advisory Council, doing that sensitivity analysis could still be useful. Dr. Holm expressed support for this, especially if the expectation is that staff's air toxics data are not well aligned with the corresponding information in CES.

Mr. Nudd recommended the approach of, as part of staff's more community-focused air quality planning, that staff update their air toxics monitoring and modeling beyond the AB 617 communities of West Oakland, Richmond, and East Oakland. Regionally this work has not been done for a few years. Mr. Nudd added that it would be a good idea to address ethylene oxide, insofar as that could overturn

a lot of understandings about what is driving toxic risk. However, Mr. Nudd clarified, all told this would be several years' worth of work, so he would not recommend putting that work on the critical path, so as to be able to move forward on policy changes that are supported by the current evidence, and not become mired in "analysis paralysis," while staff continue to refine tools and approaches over time. Dr. Fine expanded on this, remarking that the Advisory Council does not necessarily need to see results from a methodology to weigh in on the types of methodologies that staff ought to consider; if, for instance, CES is one layer, plus improved regional air toxics modeling as an overlay on top of that, then that is an approach for the Council to consider, which staff can consider in planning, and will likely pursue in any case as part of planning; that is, to bring in toxics risk and toxics exposure along with traditional $PM_{2.5}$ exposure and ozone exposure.

Council Action

No action taken.

5. ENVIRONMENTAL BENEFITS MAPPING AND ANALYSIS PROGRAM – COMMUNITY EDITION (BENMAP - CE) IN AIR DISTRICT POLICY AND PRACTICE

Dr. Holstius gave the staff presentation *BenMAP-CE in Air District Policy and Practice,* including: outline; extreme application; simulation-based approach; BenMAP-CE at the Air District; multi-pollutant BenMAP-CE; multi-pollutant versus single-pollutant; multi-pollutant caveats; and non-chemical stressors.

Dr. Holstius recalled a key statement by Dr. Fine from a previous meeting: that the Air District aims to be able to assess the health benefits of actions to reduce emissions and exposures, and that this requires consideration of cumulative impacts. The Air District currently uses the Environmental Benefits Mapping and Analysis Platform, Community Edition (BenMAP-CE), an open-source computer program developed by US EPA to estimate the number and economic value of air pollution-related deaths and illnesses.

Dr. Holstius provided an example from the Air District's recent work on Regulation 6, Rule 5, which addresses PM emissions from fluid catalytic cracking units at Bay Area refineries. BenMAP was used to model air quality impacts, estimating health outcomes like premature mortality and asthma exacerbations based on exposure to $PM_{2.5}$. Staff also analyzed racial and ethnic disparities in long-term $PM_{2.5}$ exposure attributed to these modeled sources.

Dr. Holstius identified five key design decisions in applications of BenMAP-CE: spatial scale; extent of study area / population coverage; set of health impact functions (HIFs); economic valuation approaches; and levels and dimensions of analyses of variation. Regarding spatial scale, Dr. Holstius explained that BenMAP performs intermediate calculations at a very fine spatial scale, from modeled air quality impacts at a kilometer scale or less, and population at a Census block level (roughly 100 residents per block), where each block typically contains around 100 residents. He noted that this helped to capture correlations at fine spatial scales. However, Dr. Holstius emphasized that aggregation before reporting was warranted to mitigate against noise and uncertainty inherent in small-area health and demographic data. Dr. Holstius mentioned that while it may be difficult to determine a bright line for a "large enough" scale of aggregation, staff had consulted with BenMAP experts and developers at US

EPA, and that the total study area population in this case, which was approximately 1 million residents, was deemed sufficiently large.

Dr. Holstius explained that BenMAP employs HIFs, derived from well-regarded epidemiological studies, to estimate health impacts from modeled population exposures. Dr. Holstius noted that the Air District supplements EPA's default HIFs with a California-specific HIF for mortality and an HIF for mortality based on a meta-review, but acknowledged that not all health outcomes of local concern are well-represented in the literature, limiting their inclusion.

Turning to equity, Dr. Holstius explained that BenMAP focuses on estimating net impacts for the overall population within a study area. However, the Air District also analyzes variation in modeled annual average exposure levels by race and ethnicity. He stated that the Air District is seeking guidance on how best to assess patterns of inequity, noting that findings can vary according to the spatial scale of the analysis, and may even indicate a different "most exposed" group depending on whether the analysis is at a regional level or a county level. This poses a significant challenge in communicating and addressing environmental justice concerns analytically.

Dr. Holstius mentioned BenMAP's role in past efforts like the CARE program, which was mentioned in the previous agenda item. He emphasized that BenMAP is now primarily used for large-scale public health assessments, supplementing the Air District's broader rule development and environmental justice efforts with additional information.

Dr. Holstius recalled a remark by Board Chair Hurt at the previous meeting, to the effect that the relationship between science and environmental justice may sometimes be perceived, or cast, as oppositional. Dr. Holstius suggested that the Council might wish to consider the dual values of reducing uncertainty and increasing representation of disadvantaged groups. He explained that these values bear on several degrees of freedom in the approach, including the spatial scale, the minimum extent of a study area or population, and the scope of HIFs considered appropriate for modeling.

The discussion then shifted to BenMAP's potential for analyzing multi-pollutant impacts. Dr. Holstius summarized results from a proof-of-concept study recommended by the Council, which used a customized version of BenMAP to model the effects of criteria pollutant mixtures. The study was scoped to a 15-year rollback of historical levels in the Atlanta area, and used asthma emergency department visit rates as the outcome measure. For most of the mixtures and seasons that it considered, summing the health impacts of pollutants modeled individually resulted in higher net estimates of health impacts. Modeling pollutants jointly also produced wider confidence intervals, reflecting greater statistical uncertainty.

Dr. Holstius closed by mentioning two key caveats documented by the study authors: first, that such analyses require detailed input data not commonly reported in epidemiological studies; and second, that in addition to introducing greater statistical uncertainty, an element of scientific uncertainty is also introduced, insofar as the conclusions about the strength of causal relationships involving mixtures of stressors may not yet be as well substantiated as those for causal relationships involving single pollutants. As such, Dr. Holstius explained, the study authors emphasized a need for policymakers to consider the value of information gained, given the extra effort required.

Public Comments

No requests received.

Council Comments

Vice-Chair Martien requested confirmation that the figure on slide 7 indicated that the "sum of single pollutants" results were generally as large or larger than the "joint effects" results. Dr. Holstius confirmed this.

Prof Kleinman remarked that BenMAP essentially assumes a linear dose-response, and does not take into account nonlinearities, such as cases where a time-varying dose rate (lower, then higher) has more of an impact than a constant dose rate, holding the total dose constant. He suggested that multiple pollutants acting on the same receptors or health endpoint might have such an effect. Prof Kleinman continued that some other extrinsic factors, such as stress or temperature, may alter metabolism or total response to some inhaled pollutant, which would be important to factor in.

Vice-Chair Martien reflected on the study's usefulness but wondered whether its findings warranted incorporating multi-pollutant modeling into the Air District's work process, and posed the question to staff. Dr. Holstius responded that for this particular scope, it did not seem like it would add much, given the level of effort required. Dr. Holstius offered that there were aspects of BenMAP applications where additional effort might be more helpful. He recalled Prof. Kleinman's comments, and pointed out that although the relative risk yields a nearly linear dose-response for small effect sizes, the baseline rate matters a great deal to BenMAP's calculations. As an example, Dr. Holstius stated, the all-cause mortality rate for African-Americans in San Francisco is essentially double that of the regional average for all groups; there are many causes of that, and to use that rate is to reflect those causes, not explicitly, but implicitly. Dr. Holstius emphasized that the tradeoffs imposed by a finite data budget make it important to consider priorities in terms of seeking additional spatial resolution versus disaggregating by race/ethnicity. Vice-Chair Martien agreed that disaggregated data might be helpful not only for BenMAP applications, but for understanding the variability that is seen in terms of health impacts by race and ethnicity, in the context of broader applications, and that further exploration of that could be interesting.

Dr. Holm returned to the issue of long-term versus short-term exposure patterns, emphasizing the lack of information concerning the situation that Prof Kleinman had noted, where the total exposure may be the same but the temporal profile differs. Dr. Holm wondered whether the relatively dense deployment of low-cost sensors in the Bay Area might offer ways to observe "spikes" in exposures, or a general pattern of higher short-term temporal variability, within more-impacted areas such as neighborhoods large industrial facilities.

Chair Solomon suggested that while the BenMAP study did not find much, there were still advantages to thinking further about that approach. She indicated that something might be found by examining a different location, or a different set of stressors, and if it were, BenMAP represented a well-accepted foundation for regulatory applications. Recognizing the time and effort needed, Chair Solomon suggested developing a Bay Area case study examining interactions between non-chemical stressors and $PM_{2.5}$.

Prof. Carlton recalled an earlier comment on temperature, and wondered to what extent there was a responsibility to assess the effectiveness of current policy or past policy, versus forecasting to protect human health in the future. Prof. Carlton elaborated that to understand the response to an engineering intervention is fairly straightforward, but changes in human activity, and second-order changes, are harder to forecast. She agreed that the study proposed by Dr. Solomon had value, but that it could be advisable to first consider to what degree the goal involves forecasting the future.

Vice-Chair Martien pointed out that a suitable epidemiologic study would be needed, to support such a [Bay Area] case study. Chair Solomon clarified that there was a question about whether such an epidemiologic study would need to be geographically specific to the Bay Area, and if so, that would be a significant challenge; but there was a possibility of identifying an epidemiologic study that had observed a population elsewhere, that was otherwise scoped to the issues with which the Council and/or staff were concerned. Dr. Solomon indicated there would be a need to review a set of studies, and ascertain whether they met suitable criteria in terms of reliability, outcome measures, and exposure measures; that there are in fact studies that have looked at heat, socioeconomic factors, and race/ethnicity, etc.; and that a next step would be to have a closer look at several such studies, followed by a discussion to weigh the pros and cons of selecting any in particular.

Summarizing the interests expressed by Council members, Chair Solomon stated that the Council had expressed interest in a presentation at a future meeting on Rule 11-18, as well as a much longer-term project that the Air District might pursue regarding TACs, including the generation of a map layer for TACs, incorporating the newest cancer risk factors, including for ethylene oxide. Chair Solomon added that the Council was also interested in advancing the potential of a BenMAP-CE analysis involving interactive effects, that would be in some ways a replication of the Atlanta study, but scoped to the Bay Area, and addressing cumulative impacts from social and economic stressors, or potentially heat, rather than from only air pollutants. Finally, Chair Solomon recalled Vice-Chair Martien's suggestion to have a subgroup of Council members work between Council meetings to come back with concrete proposals for the entire Council to discuss. Vice-Chair Martien volunteered to lead such a subgroup. Chair Solomon looked to other Council members to express any interest they had in participating, noting that several members were not present and would need to be made aware. Chair Solomon looked for clarification as to the maximum number of participants that could meet without Brown Act concerns. Staff clarified that four would be a sub-quorum, but that three would be more customary for a small group, and advised the Council not to form that group at the present meeting.

Council Action

No action taken.

OTHER BUSINESS

6. REPORT OF THE EXECUTIVE OFFICER/AIR POLLUTION CONTROL OFFICER (APCO)

Dr. Philip M. Fine, Executive Officer/APCO announced the following:

— On September 4, 2024, the Air District's Board of Directors approved the 2024-2029 Strategic Plan for implementation.

— The Air District will arrange for the Advisory Council and Community Advisory Council to have a joint meeting or interaction, as the Advisory Council seeks the input of the Community Advisory Council regarding cumulative impacts.

7. **PUBLIC COMMENT ON NON-AGENDA MATTERS**

No requests received.

8. **COUNCIL MEMBER COMMENTS**

None.

9. **TIME AND PLACE OF NEXT MEETING**

Thursday, October 30, 2024, at 9:30 a.m. at 375 Beale Street, San Francisco, CA 94105. The meeting will be in-person for the Advisory Council members and members of the public will be able to either join in-person or via webcast.

10. **ADJOURNMENT**

The meeting adjourned at 11:46 a.m.

/S/ Marcy Hiratzka
Marcy Hiratzka
Clerk of the Boards
Executive Office

&

/S/ Dr. David Holstius
Dr. David Holstius
Sr. Advanced Projects Advisor
Assessment, Inventory, and Modeling