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Integrating a Community Cumulative Impacts Framework in the Implementation of AB 617 and SB 673

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Glossary of Terms

AIRE – Allies in Reducing Emissions

APCD – Air Pollution Control District

AQMD – Air Quality Management District

CAMN – Community Air Monitoring Network

CAMP- Community Air Monitoring Plan

CAPCOA - California Association of Air Pollution Control Officers Association

CAPP – Community Air Protection Plan

CCEJN – California Environmental Justice Network

CCV – Comité Cívico del Valle

CERP – Community Emissions Reduction Plans

CES - CalEnviroScreen

CSC – Community Steering Committee

DPR- Department of Pesticide Reform

EJ- Environmental Justice

OCAP – Office of Community Air Protection

SEPs – Supplemental Environmental Projects

TAC- Toxic Air Contaminant

TC – Tracking California

WOEIP – West Oakland Environmental Indicators Project

Abstract

In 2015 the California legislature passed SB 673 and in 2017 passed AB 617. Both laws aim to improve environmental regulation to better protect community environmental health by more systematically integrating cumulative impacts into regulatory decision-making, enforcement activities, and programs at the California Air Resources Board—CARB (AB 617) and Department of Toxics Substances Control – DTSC (SB 673). SB 673 specifically requires the Department of Toxics Substances Control to incorporate criteria that address the "vulnerability of, and existing health risks to, nearby populations. Vulnerability and existing health risks shall be assessed using available tools, local and regional health risk assessments, the region's federal Clean Air Act attainment status, and other indicators of community vulnerability, cumulative impact, and potential risks to health and well-being.[1]"

AB 617 requires CARB to develop a monitoring plan for criteria air pollutants and toxic air contaminants that addresses appropriate technologies and "the needs for and benefits of community air monitoring systems." As part of this process, CARB must develop an approach to prioritize locations for the deployment of community monitoring systems.[2] In addition, the law requires CARB to prepare and update, at least once every 5 years, a statewide strategy to reduce emissions of toxic air contaminants and criteria pollutants in communities affected by a high cumulative exposure burden. CARB guidelines in the AB 617 Blueprint also call for the development of Community Emissions Reduction Strategies.

Both AB 617 and SB 673 require developing methods for assessing cumulative impacts and integrated indicators of community vulnerability for the implementation of regulatory programs and community monitoring. This report describes findings from three distinct yet inter-connected project elements: (1) a capacity-building training and technical assistance program to support community-based air quality monitoring under AB 617, (2) a community-engaged evaluation of AB 617 implementation, and (3) leveraging data sources and applying novel methods to derive new geographic indicators of cumulative impact and community vulnerability that can be integrated with or supplement existing spatial tools such as CalEnviroScreen (CES) for the purposes of AB 617 and SB 673 implementation.

Key results for the three elements of this project include: Element 1 (Community-based air quality monitoring trainings)- Topics identified as most helpful among trainees included, planning and designing an air monitoring network, choosing monitor technologies, and ensuring data quality, use of monitoring data and how to sustain a monitoring network. Element 2 (Community engaged evaluation)- Analysis of surveys, key informant interviews, field observations and documents analysis showed that AB 617 has great promise as a pilot program, but more progress is needed for it to effectively transform air quality management in California, particularly at the community-level. Element 3 (Cumulative Impacts Assessment)- Analysis for enhancing cumulative impacts assessments show that while CalEnviroScreen is a robust and very well-regarded spatial screening tool, additional measures could complement and strengthen analytical methods for systematically integrating environmental justice assessments for purposes of AB 617 and SB 673 implementation.

[1] Senate Bill SB 673. (2015). The California State Senate, 2015 – 2016 Legislative Session. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB673

[2] Assembly Bill AB 617. (2017). The California State Assembly, 2017 – 2018 Legislative Session. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB617

Executive Summary

California's Assembly Bill 617 (AB 617, Chapter 136, Statutes of 2017) provides an innovative and potentially transformational approach to improving air quality and reducing health disparities in disadvantaged communities through enhancing public participation, local air monitoring, and air emissions reduction plans. Implementation of AB 617 has been marked by both collaboration and conflict, and there are a range of perspectives about its degree of success as well as the further progress needed to achieve its goals.

Senate Bill 673 (SB 673, Chapter 611, Statutes of 2015) directs DTSC to update its approach and criteria to take into account cumulative impacts, including the social vulnerability and existing hazards and health risks to nearby populations in its decision-making related to issuance of new or modified permits or approval of permit renewals of hazardous waste facilities. SB 673 also authorizes DTSC to consider the use of "minimum setback distances from sensitive receptors" in making a permitting decisions. DTSC has developed a frameworks document that proposes approaches that the department could systematically incorporate in assessments of cumulative impacts and community vulnerability in the hazardous waste facility permitting process.[3] The project team has provided feedback on DTSC's frameworks document as part of this project.

This report describes the results of three projects related to AB 617 and SB673 implementation, which were undertaken by several collaborative partners: University of California, Berkeley and Davis, San Francisco State University, the University of Southern California, and the California Environmental Health Tracking Program (Tracking California). The project included the following main elements: (1) a capacity-building training and technical assistance program to support community-based air quality monitoring under AB 617 (Tracking California), (2) a community-engaged evaluation of AB 617 implementation (UC Davis) and (3) data sources and methods for developing geographic indicators of cumulative impact and community vulnerability that can be integrated with existing spatial tools such as CalEnviroScreen for the purposes of AB 617 and SB 673 implementation (UC Berkeley, San Francisco State University and USC).

ELEMENT 1: CAPACITY BUILDING AND TECHNICAL ASSISTANCE (TRACKING CALIFORNIA) - From April to September 2019, Tracking California (TC) hosted three daylong workshops that provided participants who had limited air monitoring experience with a foundation on how to set up community air monitoring projects. These workshops were hosted in collaboration with Casa Familiar, Central California Environmental Justice Network (CCEJN), and West Oakland Environmental Indicators Project (WOEIP) in Southern, Central, and Northern California, respectively. In total, over 75 participants attended the workshops, along with guest speakers and observers from regulatory agencies including local Air Quality Management Districts (Air Districts) and the California Air Resources Board (CARB). Workshop participants were provided with copies of Tracking California's "Guidebook for Establishing a Community Air Monitoring Network," and the California Air Resources Board's 14 Community Air

[3] Department of Toxic Substance Control. (2018, October). SB 673 Cumulative Impacts and Community Vulnerability Draft Regulatory Framework Concepts. https://dtsc.ca.gov/wp-content/uploads/sites/31/2015/09/DRAFT-CI-Regulatory-Frameworks-Concepts-10-15-2018.pdf

Monitoring Plan elements. In addition, simultaneous translation into Spanish was provided for participants at the workshops in Southern and Central CA. Funds from this contract supported TC staff and local partners in planning and facilitating the workshops, as well as providing participants with stipends to cover travel costs to and from the workshop. Additional funding secured separately from the Energy Foundation was used to purchase food and refreshments for the participants for all three workshops as well as to support some of Tracking California's time in planning and implementing the third workshop. Overall participant evaluations were strongly positive and indicated that the workshops enhanced understanding of how to plan and carry out a community air monitoring project. Topics identified as most helpful included, planning a community air monitoring network, choosing monitor technologies and ensuring data quality, use of monitoring data and how to sustain a monitoring network. Lessons learned for future workshops include providing more resources to support travel and lodging costs for participants needing to travel longer distances to attend regional workshops, expanding the number of regions offering workshops, and providing follow-up trainings, particularly on how to approach and collaborate with monitor hosts.

ELEMENT 2: COMMUNITY ENGAGED EVALUATION (UC DAVIS) - AB 617 includes implementation of a framework called the Community Air Protection Blueprint by CARB to guide the work of regional air districts and Community Steering Committees (CSCs) made up of businesses, local governments, community organizations and residents that lead the development of the community air monitoring and emissions reduction plans. Over the past two years, all levels of California's air quality management system have engaged in a collaboration-building process to implement this framework. Along the way, they have developed successful innovations, encountered challenges, and elucidated key lessons that help improve future implementation of the policy. We documented these successes and challenges with the purpose of helping all stakeholders reflect on their experiences to date and generating constructive suggestions that can enhance the collective work of the diverse stakeholders who have contributed valuable time, knowledge, and passion in implementing the policy for the benefit of the communities disproportionately affected by air pollution. Methods used in our analysis included several on-line surveys, key informant interviews, field observations, and document analysis. The data collection period ran from November 2018 through April 2020.

Based on the analysis of all of the data sources considered in this study, our analysis indicates that thus far, the AB 617 experiment has shown great promise as a pilot program, but whether it can truly catalyze positive transformations of air quality management in California remains to be seen. The major potential transformation is a localization of air quality management from a regional regulatory scale to a community scale. This manifested both in terms of the local focus of its air quality monitoring and management and in its engagement of affected communities as partners, not only as beneficiaries of government actions. It also represents an important step in California's efforts to integrate environmental justice more deeply into the state agencies' culture, structure and function.

Remaining challenges include ensuring that there is improved sharing of power between Air Districts, residents and community organizations (on and beyond the CSCs), that the Community Emission Reduction Plans (CERPs) produce significant, measurable, and enforceable improvements to air quality, and the lessons learned from these pilots be incorporated into future implementation of the policy throughout the state.

Despite a range of conflicts, all 10 of the pilot communities were able to produce Community Air Monitoring Plans (CAMPs) and/or CERPs that represent progress beyond the baseline of current practices. Likewise, while many of the processes did involve great tension between all stakeholders (within the CSCs; between the CSCs and the Air Districts; and between all of these entities and CARB) throughout the process, there was progress made in all 10 communities towards a more collaborative set of relationships.

While it is too early to assess this long-term success of the policy implementation, there are signs of hope that by placing environmental justice values of eliminating racial disparities in air pollution and health disparities and respecting and building community voice and power that AB 617 is on its way to realizing meaningful impacts for achieving environmental justice.

ELEMENT 3: GEOGRAPHIC INDICATORS FOR CUMULATIVE IMPACT ASSESSMENT (UC BERKELEY, SAN FRANCISCO STATE UNIVERSITY, UNIVERSITY OF SOUTHERN CALIFORNIA) – To support CARB and DTSC in their implementation of AB 617 and SB 673, respectively, we collected new data sources, derived novel metrics and conducted spatial analyses, including dasymetric mapping, to improve methodological approaches for cumulative impacts analysis. This work entailed ongoing input from both DTSC and CARB along the way. The objective of this analysis was to characterize communities near currently operating hazardous waste facilities (HWFs) regulated by DTSC with respect to their proximity to multiple environmental hazards and vulnerability to the health impacts of pollution. In addition, the statewide data layers we generated were aimed at informing the work of the Office of Community Air Protection (OCAP). This phase of analysis utilized CalEnviroScreen 3.0 scores and percentiles as relative metrics of cumulative environmental health impact and community disadvantage. It also includes a number of community metrics surrounding each facility that are not currently included in CES. Specifically, this analysis sought to improve upon supplement existing practices and data-collection methods for assessing cumulative impacts near hazardous facilities and for comparative statewide assessments. Based on results of this work, we make specific recommendations for leveraging additional data sources to expand the scope of environmental hazard, social vulnerability and sensitive land use metrics not currently included in CalEnviroScreen (CES). CES has proven to be a well-regarded and methodologically sound spatial screening tool that incorporates a wide array of measures to characterize cumulative environmental burdens and social vulnerabilities facing disadvantaged communities in the state. Nevertheless, additional measures could strengthen environmental justice objectives in AB 617 and SB 673 implementation.

Background

In 2015 the California legislature passed SB 673 and in 2017 passed AB 617. Both laws aim to improve environmental regulation to better protect community environmental health by more systematically integrating cumulative impacts into regulatory decision-making, enforcement activities, and programs at the California Air Resources Board—CARB (AB 617) and Department of Toxics Substances Control – DTSC (SB 673). SB 673 specifically requires the Department of Toxics Substances Control to incorporate criteria that address the "vulnerability of, and existing health risks to, nearby populations. Vulnerability and existing health risks shall be assessed using available tools, local and regional health risk assessments, the region's federal Clean Air Act attainment status, and other indicators of community

vulnerability, cumulative impact, and potential risks to health and well-being.[4]" AB 617 requires CARB to develop a monitoring plan for criteria air pollutants and toxic air contaminants that addresses appropriate technologies and "the needs for and benefits of community air monitoring systems." As part of this process, CARB must develop an approach to prioritize locations for the deployment of community monitoring systems.[5] CARB guidelines in the AB 617 Blueprint also call for the development of Community Emissions Reduction Strategies. In addition, the law requires CARB to prepare and update, at least once every 5 years, a statewide strategy to reduce emissions of toxic air contaminants and criteria pollutants in communities affected by a high cumulative exposure burden. Both AB 617 and SB 673 require developing methods for assessing cumulative impacts and integrated indicators of community vulnerability for the implementation of regulatory programs and community monitoring.

This report describes findings from three elements of this project: (1) a capacity-building training and technical assistance program to support community-based air quality monitoring under AB 617, (2) a community-engaged evaluation of AB 617 implementation, and (3) leveraging data sources and applying novel methods to derive new geographic indicators of cumulative impact and community vulnerability that can be integrated with or supplement existing spatial tools such as CalEnviroScreen for the purposes of AB 617 and SB 673 implementation.

Element 1: Capacity Building & Technical Assistance

1. Background

Tracking California (TC) is a program of the non-profit Public Health Institute, conducted in collaboration with the California Department of Public Health. In 2016, TC worked with Comité Cívico del Valle (CCV), University of Washington, and other partners to engage residents of Imperial County in the development of the first large-scale, community-designed and operated air monitoring network of its kind. TC and partners also developed a Guidebook for Developing a Community Air Monitoring Network: Steps, Lessons, and Recommendations from the Imperial County Community Air Monitoring Project. In October 2018, TC staff co-facilitated a half-day Community Air Monitoring (CAM) workshop with CCV at the Environmental Health Leadership Summit in Imperial County. Based on lessons learned through these experiences, TC was contracted to conduct three day-long, in-person community air monitoring workshops in different regions of California: Southern CA, Central Valley, and Northern CA. To integrate community knowledge and perspectives into the workshops, TC identified local community-based organizations in each region to serve as workshop co-hosts and invited CCV to present their experiences at the workshops as well. Planning for the workshops began in November 2018, and the three workshops were held in April, May, and September 2019.

2. Purpose of the Community Air Monitoring Workshops

The workshops were intended for community members and community-based organizations with an existing interest in developing their own community air monitoring network (CAMN). The workshops

[4] Senate Bill SB 673. (2015). The California State Senate, 2015 – 2016 Legislative Session. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB673
[5] Assembly Bill AB 617. (2017). The California State Assembly, 2017 – 2018 Legislative Session. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB617

aimed to provide participants with a basic but broad foundation in the overall process and considerations for setting up, operating, using data from, and sustaining a CAMN. Because the development of a CAMN is a complex undertaking that requires intensive time and resources as well as personnel with a range of different skillsets, the workshops alone were not expected to provide all of the tools and information needed to develop a CAMN. Rather, the goal was to provide a roadmap that participants could use to decide if a CAMN was the right decision for them and, if so, outline different steps, decisions, and personnel, financial, and technical resources they may need to accomplish their goals. Another workshop aim was to complement and ground this content with real-life experiences, recommendations, and reflections from community groups who have led successful air monitoring projects, as they could better speak to the goals, challenges, benefits of community air monitoring for their own community. Finally, in recognition of regional differences, a portion of each workshop was customized to focus on local issues of concern. For the purpose of these workshops, a CAMN was defined as a collection of air monitors located throughout a community or region that is established and operated by or with a community-based organization, with the aim of conducting long-term, continuous measurement of outdoor air pollution in order to provide data to the public.

3. Community Partner Co-Hosts

Recognizing that many community-based organizations have been leaders in conducting air monitoring and have their own unique expertise, experiences, and perspectives, TC aimed to partner with a local community-based organization in each region to co-host the workshop. Each community partner had experience in air monitoring that we hoped would serve to highlight commonalities and differences from TC and CCV's own community air monitoring experiences, providing participants with a broader view of community air monitoring while demonstrating how the steps for developing a CAMN may be approached in real-life situations. Furthermore, it would be beneficial to partner with a local community organization that was knowledgeable about local air quality issues, had relationships with other community members and community groups that may be interested in air monitoring, and that could assist with local logistics.

In November 2018, community partners were identified to serve as co-hosts for the workshops. These were community organizations with experience in conducting community air monitoring and with whom TC had existing relationships: Casa Familiar for the Southern CA region, Central California Environmental Justice Network (CCEJN) for the Central Valley region, and West Oakland Environmental Indicators Project (WOEIP) for the Northern California region. These organizations and CCV belong to the Allies in Reducing Emissions (AIRE) Collaborative, and their established relationships were helpful for collaborative workshop planning activities. The specific role of the co-hosts included helping to plan and review the workshop curriculum, agenda, and materials; conducting outreach and recruitment; co-facilitating the workshops; coordinating the regional-specific portions of the workshop; and assisting with local logistics such as arranging meeting space, refreshments, and simultaneous interpretation.

4. Participant Identification and Outreach

The community partners were responsible for conducting outreach via their networks to identify and invite organizations and individuals to the workshop. TC also provided assistance with outreach by sharing invitations through our networks. For each workshop, we had a goal of recruiting about 25 participants, limiting attendance to allow for more meaningful discussions and interactions. Outreach occurred via list-serves, email invitations, and one-on-one contacts. TC worked with the partners to

identify potential participants, strategize outreach, and develop outreach materials such as flyers and emails. To encourage participation, travel reimbursements and/or stipends were provided. Because the workshops were intended for community members and community-based organizations with an existing interest in air monitoring, we also contacted organizations that had applied to AB 617 community grants and contacted staff from CARB's Environmental Justice team to help share invitations with those who had recently been funded. While there was an intention to recruit for geographic representation, there was not a specific effort aimed to get race/ethnic or linguistic diversity.

TC provided additional assistance with outreach as needed. For the workshop in Southern CA, Casa Familiar felt limited in their outreach efforts beyond the San Diego/San Ysidro community. As TC also had limited contacts, we requested assistance from CCV in outreaching to tribal communities in the Coachella Valley and to AB 617 community air grant recipients in greater Los Angeles and Riverside County. There were no concerns expressed about recruitment for the Central Valley workshop. CCEJN reached out to their network of San Joaquin Valley leaders who were also part of the AB 617 CSCs, their constituents and residents, and other groups that had also been funded through air grants. For the Northern CA workshop, WOEIP also felt limited in their outreach capabilities beyond the greater Bay Area, but they preferred to focus on participation from Bay Area communities. They sent invitations to email list serves to extend their outreach, resulting in more participants than we originally anticipated. While each partner was provided with a set amount funds to support participant attendance, the allocation of participation or travel stipends was left to each organization's discretion.

Other participants in the meetings were allowed at the discretion of the community partner, who could better gauge whether individuals representing government agencies (the individual person or the represented agency) might alter the dynamics of the workshop, particularly if community participants felt uncomfortable. Local agency staff were included at the request of CARB. Agency staff attended each workshop. Non-community participants were requested to participate as observers to ensure that community participants could have their questions answered. These participants also answered questions directed to them when appropriate. Based on observations, evaluations, and debrief discussion with community partners, agency representatives maintained their roles as observers and their participation did not have negative impacts on the workshops or participant engagement.

5. Workshop Planning, Format, and Materials

Our approach to workshop planning was to present consistent information across the three workshops, while allowing for customization based on regional interests and issues of concern. The planning process began with a survey to community partners (Appendix 1A) to obtain input on the following areas: (1) Target audiences for each regional workshop; (2) Workshop format; (3) Core workshop content; and (4) Break-out sessions and region-specific topics. The survey provided a menu of potential topics that could be included in each workshop based on TC's "Guidebook on Community Air Monitoring," which was the basis for the pilot workshop held in Imperial County in October 2018. Topics of greatest interest to partners included: 1) Introduction to community air monitoring and getting started; 2) Community Steering Committees and community engagement; communicating and displaying data; and 3) Using real-time data. The survey results, as well as evaluation results from TC's previous Imperial County workshop, were shared with the community partners to inform planning of the workshops' content and formats. Monthly joint planning calls were held with the community partners to identify similarities across workshop formats, overlapping topics and lessons learned to share across

the three regions, and opportunities to contribute community insights as co-facilitators. Based on these discussions, TC developed slide deck that would be used for all three workshops, with additional customization based each community partner's recommendations. In the 4-6 weeks prior to each workshop, weekly calls were held with the community partner to coordinate logistics, identify additional guest speakers, and develop tailored agendas and materials for each workshop (Appendix 1B) and materials for each workshop.

Each workshop was held in person and lasted about seven hours, including lunch and breaks. The standardized portions of the workshop were conducted as presentations with some short activities, discussion, and Q&A sessions. The workshops followed the same general agenda:

1. Welcome from the community co-host
2. Agenda review and learning objectives
3. Introduction to community air monitoring
4. Planning a Community Air Monitoring Network
5. Getting started- setting up your team and engaging community
6. Choosing a monitor and ensuring data quality
7. Lunch and air monitor demonstrations
8. Setting up monitors and communicating data
9. Using data and sustaining your network
10. Region-specific panels, presentations, and discussions
11. Wrap up and closing remarks

For the Southern CA and Central Valley workshops, the topic sessions were followed by "community perspectives" by the community partner and CCV about their experiences and reflections related to the specific training topic. For the Northern CA workshop, the standardized content was organized into five sessions, with some followed by panels on related regional activities and participant discussions.

The workshop sessions also aligned with TC's "Guidebook for Establishing a Community Air Monitoring Network," and the California Air Resources Board's 14 Community Air Monitoring Plan elements. These materials were provided to participants, and specific chapters and elements were cited as references for each workshop session. Other materials included a training and panel presentation slides, a worksheet to identify air monitoring goals as part of a workshop activity, a meeting evaluation, and other region-specific materials. Spanish language slides and simultaneous interpretation were provided at the workshops in Southern and Central Valley, based on needs identified by the community partners. Interpretation was not deemed necessary for the Northern CA based on registered participants.

6. Regional Workshops

Southern California On April 22, 2019, we held a workshop in San Ysidro, California with Casa Familiar which also included a panel of speakers who presented on transnational border pollution and air monitoring activities. There were 15 participants in attendance as well as observers from the San Diego Air Pollution Control District and CARB's Monitoring Lab Division. Guest speakers included representatives from San Diego State University, Universidad Autónoma de Baja California, CCV, and a local artist who showcased artwork inspired by air quality concerns in the community.

Central Valley On May 18, 2019, we held a workshop in Fresno, California with CCEJN which also included a panel focused on air quality concerns in the San Joaquin Valley, including presentations about

air pollution sources and health impacts, pesticides, and methane. There were 28 participants in attendance as well as observers from the CARB Environmental Justice team and staff from the Community Air Protection program. Guest speakers included representatives from Central Valley Air Quality Coalition, TC, and Pesticide Action Network.

Northern California On September 13, 2019, we held a workshop in Oakland, California with WOEIP which also highlighted WOEIP's work in developing partnership agreements and using air monitoring data for action/emission reduction planning (Appendix 1B). There were 35 participants in attendance as well as observers from the Bay Area Air Quality Management District and CARB's Environmental Justice team and Monitoring Lab Division. Guest speakers included representatives from Environmental Defense Fund, Bay Area Air Quality Management District, Environmental Protection Agency Region 9, and Aclima, Inc.

7. Post-Workshop Follow-Up

After each workshop, participants received electronic copies of slides that were presented at the workshop (in both English and Spanish), answers to questions that weren't addressed during the workshop, and a resource sheet about TC air monitoring technical assistance services. WOEIP also provided a follow up survey to the participants at the Northern CA workshop. Finally, TC attended the AB 617 Community Reflection Learning and Convening at UC Davis on February 4, 2020 – along with workshop partners CCV, CCEJN, and WOEIP- and provided insights from our workshops during a small group activity. Though not funded under this contract, TC also delivered a version of the workshop to over 30 members of the California Environmental Justice Coalition (CEJC) at their annual gathering in November 2019 in Sacramento CA and to 241 participants at the virtual Air Sensors International Conference (ASIC) in May 2020.

8. Workshop Evaluations

Evaluation forms (Appendix C – Pages 7-11) were distributed to participants and collected at the end of each workshop. Questions on the evaluation forms included both closed-ended questions and open-ended questions to solicit feedback on each section of the workshop. In addition to collecting these forms, we held facilitators debriefs on planning calls with community partners after each workshop to discuss what worked well, what could be improved, and any follow up needed with participants. From the three workshops, we received 46 evaluations from 78 total participants. The table below provides a summary of responses. Of responding participants, most learned new information from the sessions and found the sessions to be helpful.

Evaluation questions to assess uniform content presented across three workshops:

N = 46 evaluation surveys collected across three workshops	**Yes**	**Somewhat**	**No**
Questions relevant to all three workshops			
Session 2: Planning a community air monitoring network/project			

2.1 Did this session provide new information about defining goals, priorities, and vision for air monitoring	38	3	
2.2 Did you find this session helpful?	38	3	
Session 3: Getting Started			
3.1 Did this session provide new information about setting up a project team and engaging other stakeholders?	32	12	1
3.2 Did you find this session helpful?	34	9	
Session 4: Choosing a monitor and ensuring data quality			
4.1 Did this session provide new information about considerations for selecting an air monitor?	39	2	1
4.2 Did this session provide new information about the factors that influence data quality in community air monitoring?	37	5	
4.3 Did you find this session helpful?	40	2	
Lunchtime Demonstration of monitors and data displays			
L.1 Did you visit the demos?	31	4	2
L.2 Did you find the demos helpful?	28	4	2
Session 5: Setting up monitors and communicating data			

5.1 Did this session provide new information about selecting monitor locations and deploying monitors?	33	6	
5.2 Did this session provide new information about communicating community air monitoring data?	30	4	
5.3 Did you find this session helpful?	30	3	
Session 6: Using your data and sustaining your network			
6.1 Did this session provide new information about how real-time and historical community air monitoring network data can be used?	28	8	
6.2 Did this session provide new information about considerations and requirements for sustaining a community air monitoring network?	42	8	
6.3 Did you find this session helpful?	32	6	
Overall Workshop			
Did you find this workshop helpful?	35		

Overall, the responses indicate that the sessions were helpful and that new content was provided. Written comments by the respondents who had selected "somewhat" and "no" indicate that they had already learned the information or had experience in topic area. The region-specific panels that were coordinated by the co-hosts were also evaluated (see Appendix D). Overall, responses from the Southern CA and Central Valley workshops suggest that the panels were informative and helpful.

It is challenging to make specific conclusions about the Northern CA workshop and panel presentations due to the low number of respondents (7 evaluations returned for 35 participants). While speculative, the lack of response may reflect participant fatigue at the end of the workshop due to some challenging

interactions between the co-host and some participants. However, in addition to the evaluation form, the Northern CA workshop facilitators asked participants to share reflections at the end of the day. These responses include reflections on the workshop content and facilitation, as well broader thoughts on air quality issues. They are included in Appendix D.

All respondents who answered the question about overall workshop utility indicated that the workshop was helpful. Respondents also provided written comments, and below are selected comments from the three workshops that reflect the general sentiment of the respondents:

- There was information that I knew but was just explained in more detail, in a sense, it was like review and that just clarified certain things I did not know well. Furthermore, I learned a lot of new information that I wondered about but did not have answers to them and now I do.
- Thanks - this was great. I especially appreciated the examples and reflections from Imperial and San Ysidro projects after each section. Excellent presenters and examples. For a long workshop, could have benefitted from a break in the morning - chance to stretch, regroup, lots of information; challenging to digest it all without a break.
- There was a lot of in-depth explanations, detailed presentations and thorough discussions in regards to who to notify and getting answers from experts
- This was great. I think maybe follow up with what this data can be used for to reduce air pollution would be good, but honestly this was a very full workshop and I learned a lot.
- Full of information I can take back to my neighborhood and lots to think about and motivating statistics

While there were not many critical comments, the majority of these were suggestions to improve the workshop format to include more breaks, interactive or hands-on activities, and panels. More written evaluation comments are provided in Appendix D.

9. Discussion, Lessons Learned, Recommendations

Based on evaluation responses, the workshops were able to accomplish the learning objectives of providing new information and increasing knowledge about the different components in developing a CAMN, and participants found the sessions to be helpful. However, only roughly 60% of all workshop participants completed an evaluation, so our ability to make definitive conclusions from the responses is limited. The positive written responses demonstrated that, for those individuals, the workshop introduced new information or deepened their understanding of an existing topic area. Written responses with critiques or recommendations were generally consistent with challenges that TC and community partners encountered when trying to plan the workshops, particularly with respect to including more interactive sessions, discussions, and breaks while maintaining the same amount of standardized, foundational content. Below are some key reflections on the different components and approaches to the workshops, with considerations and recommendations for future workshops.

Community co-host and workshop customization Overall, engaging a community partner as a co-host and to share experiences along with CCV contributed to the workshop effectiveness for participants, which was reflected in the evaluation responses. Furthermore, because community air monitoring expertise and support is often shared peer-to-peer, the community partner co-host and CCV served as additional resources that participants could connect to after the workshop. As more communities gain

experience in air monitoring, it would be beneficial to invite them to present and integrate their experiences, knowledge, and perspectives in future workshops.

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Workshop participation A major limitation of the workshops was geographic coverage. Because the size of the state, participants in a region may have had to travel several hours to attend the workshop. While limited travel reimbursements and stipends were provided, travel time and logistics were likely a barrier to participation. This also posed a challenge for recruitment, as several community partners had difficulties recruiting participants beyond their own immediate locales. Some ways to address these challenges in the future include offering more workshops throughout the state (e.g., Sacramento, Lost Angeles, Inland Empire, and Central Coast areas), conducting virtual workshops, and budgeting for lodging costs for participants who had to travel far distances to attend the workshop.

Another limitation in participant recruitment was achieving representation across EJ communities, particularly racially and linguistically diverse communities. While geographic location contributed to some of this challenge, other contributing factors may have included a lack of connection to these communities within our community partner networks; limited awareness of, interest in, or prioritization of air monitoring as an issue of concern within those communities; or barriers to access and participation such as language, transportation, or the inability to devote an entire day to attending a workshop due to work or personal responsibilities. Due to limited resources available through this contract to devote to participant outreach and because diversity across EJ communities was not a specific aim for recruitment, community partners focused on outreaching to community residents and groups that they knew to be interested in community air monitoring. Diversifying participation would be an important goal for future workshops, and ongoing efforts by CARB, local air districts, and others to engage these communities will be important to raising awareness and interest in air quality issues.

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accommodating different learning styles and providing opportunities for deeper interactions. Furthermore, it was difficult to anticipate and address the existing knowledge, information needs, and learning interests across all participants. Participant feedback indicated that the following resources or topics, some of which already exist in some form, would be helpful to provide in future workshops:

- Potential funding sources, resource guide on financing air monitoring projects
- List of monitoring technologies to consider, comparisons of low-cost monitors
- Community factsheet on actions an individual can take to protect health
- Spanish-language resource packet to engage residents in air monitoring
- List of current community air monitoring projects, contact information
- Air quality data sources, how to access data

Some participants asked if there would be follow up workshops. Suggested topics included:

- Hands-on workshop on using monitoring equipment or building custom monitors
- Quality assurance and quality control procedures
- Data interpretation and analysis
- How to outreach to monitor hosts, particularly schools
- Youth-led air monitoring projects

With this input in mind, other formats to consider for future workshops could be multi-day in-person workshops or a series of virtual workshop sessions offered over several days or weeks. Both options would allow for deeper engagement with each session topic, the addition of new sessions, and more opportunities for discussion and Q&A. There could also be more opportunities to highlight other community air monitoring efforts and involve additional community groups in sharing about their experiences. While virtual workshops are more limited in terms of hands-on activities and participant interactions, they may be an effective way to reach participants with travel limitations.

Additional training and support needs

The aim of the workshops was to provide a roadmap for the development of a CAMN for participants that were already interested in conducting air monitoring. This effort did not include- but would complement- outreach and education activities to increase awareness or interest in community air monitoring, as well as more in-depth training, technical assistance, technical resources, or funding to support participants that intend to develop a CAMN. On the evaluation form, participants were asked if they were planning to develop a CAMN and what else they would need to get started. Responses mirrored some of the topics mentioned in other parts of the evaluation and included:

- Information on funding sources and guidance for budgeting for air monitoring equipment
- More guidance on which technologies to choose, how to make a custom monitor
- More training on how to approach a host, related rules or restrictions
- Additional workshops, guides, and learning opportunities (generally)
- Continued engagement of their community
- Air district support

Several respondents specifically mentioned that they planned or hoped to initiate community air monitoring activities.

"...we are working on CARB campaign called "clean air for kids" in Fresno. We have canvased and received information from over 200 people. We are planning on involving the schools and kids in monitoring air quality at a kid's level in the areas we are working on. Monitoring is the next phase of developing eventually. This workshop was very exciting."

1. Background

Tracking California (TC) is a program of the non-profit Public Health Institute, conducted in collaboration with the California Department of Public Health. In 2016, TC worked with Comite Civico del Valle (CCV), University of Washington, and other partners to engage residents of Imperial County in the development of the first large-scale, community-designed and operated air monitoring network of its kind. TC and partners also developed a Guidebook for Developing a Community Air Monitoring Network: Steps, Lessons, and Recommendations from the Imperial County Community Air Monitoring Project. In October 2018, TC staff co-facilitated a half-day Community Air Monitoring (CAM) workshop with CCV at the Environmental Health Leadership Summit in Imperial County. Based on lessons learned through these experiences, TC was contracted to conduct three day-long, in-person community air monitoring workshops in different regions of California: Southern CA, Central Valley, and Northern CA. To integrate community knowledge and perspectives into the workshops, TC identified local community-based organizations in each region to serve as workshop co-hosts and invited CCV to present their experiences at the workshops as well. Planning for the workshops began in November 2018, and the three workshops were held in April, May, and September 2019.

2. Purpose of the Community Air Monitoring Workshops

The workshops were intended for community members and community-based organizations with an existing interest in developing their own community air monitoring network (CAMN). The workshops aimed to provide participants with a basic but broad foundation in the overall process and considerations for setting up, operating, using data from, and sustaining a CAMN. Because the development of a CAMN is a complex undertaking that requires intensive time and resources as well as personnel with a range of different skillsets, the workshops alone were not expected to provide all of the tools and information needed to develop a CAMN. Rather, the goal was to provide a roadmap that participants could use to decide if a CAMN was the right decision for them and, if so, outline different steps, decisions, and personnel, financial, and technical resources they may need to accomplish their goals. Another workshop aim was to complement and ground this content with real-life experiences, recommendations, and reflections from community groups who have led successful air monitoring projects, as they could better speak to the goals, challenges, benefits of community air monitoring for their own community. Finally, in recognition of regional differences, a portion of each workshop was customized to focus on local issues of concern. For the purpose of these workshops, a CAMN was defined as a collection of air monitors located throughout a community or region that is established and operated by or with a community-based organization, with the aim of conducting long-term, continuous measurement of outdoor air pollution in order to provide data to the public.

3. Community Partner Co-Hosts

Recognizing that many community-based organizations have been leaders in conducting air monitoring and have their own unique expertise, experiences, and perspectives, TC aimed to partner with a local community-based organization in each region to co-host the workshop. Each community partner had

experience in air monitoring that we hoped would serve to highlight commonalities and differences from TC and CCV's own community air monitoring experiences, providing participants with a broader view of community air monitoring while demonstrating how the steps for developing a CAMN may be approached in real-life situations. Furthermore, it would be beneficial to partner with a local community organization that was knowledgeable about local air quality issues, had relationships with other community members and community groups that may be interested in air monitoring, and that could assist with local logistics.

In November 2018, community partners were identified to serve as co-hosts for the workshops. These were community organizations with experience in conducting community air monitoring and with whom TC had existing relationships: Casa Familiar for the Southern CA region, Central California Environmental Justice Network (CCEJN) for the Central Valley region, and West Oakland Environmental Indicators Project (WOEIP) for the Northern California region. These organizations and CCV belong to the Allies in Reducing Emissions (AIRE) Collaborative, and their established relationships were helpful for collaborative workshop planning activities. The specific role of the co-hosts included helping to plan and review the workshop curriculum, agenda, and materials; conducting outreach and recruitment; co-facilitating the workshops; coordinating the regional-specific portions of the workshop; and assisting with local logistics such as arranging meeting space, refreshments, and simultaneous interpretation.

4. Participant Identification and Outreach

The community partners were responsible for conducting outreach via their networks to identify and invite organizations and individuals to the workshop. TC also provided assistance with outreach by sharing invitations through our networks. For each workshop, we had a goal of recruiting about 25 participants, limiting attendance to allow for more meaningful discussions and interactions. Outreach occurred via list-serves, email invitations, and one-on-one contacts. TC worked with the partners to identify potential participants, strategize outreach, and develop outreach materials such as flyers and emails. To encourage participation, travel reimbursements and/or stipends were provided. Because the workshops were intended for community members and community-based organizations with an existing interest in air monitoring, we also contacted organizations that had applied to AB 617 community grants and contacted staff from CARB's Environmental Justice team to help share invitations with those who had recently been funded. While there was an intention to recruit for geographic representation, there was not a specific effort aimed to get race/ethnic or linguistic diversity.

TC provided additional assistance with outreach as needed. For the workshop in Southern CA, Casa Familiar felt limited in their outreach efforts beyond the San Diego/San Ysidro community. As TC also had limited contacts, we requested assistance from CCV in outreaching to tribal communities in the Coachella Valley and to AB 617 community air grant recipients in greater Los Angeles and Riverside County. There were no concerns expressed about recruitment for the Central Valley workshop. CCEJN reached out to their network of San Joaquin Valley leaders who were also part of the AB 617 CSCs, their constituents and residents, and other groups that had also been funded through air grants. For the Northern CA workshop, WOEIP also felt limited in their outreach capabilities beyond the greater Bay Area, but they preferred to focus on participation from Bay Area communities. They sent invitations to email list serves to extend their outreach, resulting in more participants than we originally anticipated. While each partner was provided with a set amount funds to support participant attendance, the allocation of participation or travel stipends was left to each organization's discretion.

Other participants in the meetings were allowed at the discretion of the community partner, who could better gauge whether individuals representing government agencies (the individual person or the represented agency) might alter the dynamics of the workshop, particularly if community participants felt uncomfortable. Local agency staff were included at the request of CARB. Agency staff attended each workshop. Non-community participants were requested to participate as observers to ensure that community participants could have their questions answered. These participants also answered questions directed to them when appropriate. Based on observations, evaluations, and debrief discussion with community partners, agency representatives maintained their roles as observers and their participation did not have negative impacts on the workshops or participant engagement.

5. Workshop Planning, Format, and Materials

Our approach to workshop planning was to present consistent information across the three workshops, while allowing for customization based on regional interests and issues of concern. The planning process began with a survey to community partners (Appendix A - Pages 1-5) to obtain input on the following areas: (1) Target audiences for each regional workshop; (2) Workshop format; (3) Core workshop content; and (4) Break-out sessions and region-specific topics. The survey provided a menu of potential topics that could be included in each workshop based on TC's "Guidebook on Community Air Monitoring," which was the basis for the pilot workshop held in Imperial County in October 2018. Topics of greatest interest to partners included: 1) Introduction to community air monitoring and getting started; 2) Community Steering Committees and community engagement; communicating and displaying data; and 3) Using real-time data. The survey results, as well as evaluation results from TC's previous Imperial County workshop, were shared with the community partners to inform planning of the workshops' content and formats. Monthly joint planning calls were held with the community partners to identify similarities across workshop formats, overlapping topics and lessons learned to share across the three regions, and opportunities to contribute community insights as co-facilitators. Based on these discussions, TC developed slide deck that would be used for all three workshops, with additional customization based each community partner's recommendations. In the 4-6 weeks prior to each workshop, weekly calls were held with the community partner to coordinate logistics, identify additional guest speakers, and develop tailored agendas and materials for each workshop (Appendix B – Page 6) and materials for each workshop.

Each workshop was held in person and lasted about seven hours, including lunch and breaks. The standardized portions of the workshop were conducted as presentations with some short activities, discussion, and Q&A sessions. The workshops followed the same general agenda:

1. Welcome from the community co-host
2. Agenda review and learning objectives
3. Introduction to community air monitoring
4. Planning a Community Air Monitoring Network
5. Getting started- setting up your team and engaging community
6. Choosing a monitor and ensuring data quality
7. Lunch and air monitor demonstrations
8. Setting up monitors and communicating data
9. Using data and sustaining your network
10. Region-specific panels, presentations, and discussions

11. Wrap up and closing remarks

For the Southern CA and Central Valley workshops, the topic sessions were followed by "community perspectives" by the community partner and CCV about their experiences and reflections related to the specific training topic. For the Northern CA workshop, the standardized content was organized into five sessions, with some followed by panels on related regional activities and participant discussions.

The workshop sessions also aligned with TC's "Guidebook for Establishing a Community Air Monitoring Network," and the California Air Resources Board's 14 Community Air Monitoring Plan elements. These materials were provided to participants, and specific chapters and elements were cited as references for each workshop session. Other materials included a training and panel presentation slides, a worksheet to identify air monitoring goals as part of a workshop activity, a meeting evaluation, and other region-specific materials. Spanish language slides and simultaneous interpretation were provided at the workshops in Southern and Central Valley, based on needs identified by the community partners. Interpretation was not deemed necessary for the Northern CA based on registered participants.

6. Regional Workshops

Southern California On April 22, 2019, we held a workshop in San Ysidro, California with Casa Familiar which also included a panel of speakers who presented on transnational border pollution and air monitoring activities. There were 15 participants in attendance as well as observers from the San Diego Air Pollution Control District and CARB's Monitoring Lab Division. Guest speakers included representatives from San Diego State University, Universidad Autonoma de Baja California, CCV, and a local artist who showcased artwork inspired by air quality concerns in the community.

Central Valley On May 18, 2019, we held a workshop in Fresno, California with CCEJN which also included a panel focused on air quality concerns in the San Joaquin Valley, including presentations about air pollution sources and health impacts, pesticides, and methane. There were 28 participants in attendance as well as observers from the CARB Environmental Justice team and staff from the Community Air Protection program. Guest speakers included representatives from Central Valley Air Quality Coalition, TC, and Pesticide Action Network.

Northern California On September 13, 2019, we held a workshop in Oakland, California with WOEIP which also highlighted WOEIP's work in developing partnership agreements and using air monitoring data for action/emission reduction planning (Appendix B, Page 6). There were 35 participants in attendance as well as observers from the Bay Area Air Quality Management District and CARB's Environmental Justice team and Monitoring Lab Division. Guest speakers included representatives from Environmental Defense Fund, Bay Area Air Quality Management District, Environmental Protection Agency Region 9, and Aclima, Inc.

7. Post-Workshop Follow-Up

After each workshop, participants received electronic copies of slides that were presented at the workshop (in both English and Spanish), answers to questions that weren't addressed during the workshop, and a resource sheet about TC air monitoring technical assistance services. WOEIP also provided a follow up survey to the participants at the Northern CA workshop. Finally, TC attended the AB 617 Community Reflection Learning and Convening at UC Davis on February 4, 2020 – along with workshop partners CCV, CCEJN, and WOEIP- and provided insights from our workshops during a small

group activity. Though not funded under this contract, TC also delivered a version of the workshop to over 30 members of the California Environmental Justice Coalition (CEJC) at their annual gathering in November 2019 in Sacramento CA and to 241 participants at the virtual Air Sensors International Conference (ASIC) in May 2020.

8. Workshop Evaluations

Evaluation forms (Appendix C – Pages 7-11) were distributed to participants and collected at the end of each workshop. Questions on the evaluation forms included both closed-ended questions and open-ended questions to solicit feedback on each section of the workshop. In addition to collecting these forms, we held facilitators debriefs on planning calls with community partners after each workshop to discuss what worked well, what could be improved, and any follow up needed with participants. From the three workshops, we received 46 evaluations from 78 total participants. The table below provides a summary of responses. Of responding participants, most learned new information from the sessions and found the sessions to be helpful.

Evaluation questions to assess uniform content presented across three workshops:

N = 46 evaluation surveys collected across three workshops	**Yes**	**Somewhat**	**No**
Questions relevant to all three workshops			
Session 2: Planning a community air monitoring network/project			
2.1 Did this session provide new information about defining goals, priorities, and vision for air monitoring	38	3	
2.2 Did you find this session helpful?	38	3	
Session 3: Getting Started			
3.1 Did this session provide new information about setting up a project team and engaging other stakeholders?	32	12	1
3.2 Did you find this session helpful?	34	9	
Session 4: Choosing a monitor and ensuring data quality			

4.1 Did this session provide new information about considerations for selecting an air monitor?	39	2	1
4.2 Did this session provide new information about the factors that influence data quality in community air monitoring?	37	5	
4.3 Did you find this session helpful?	40	2	
Lunchtime Demonstration of monitors and data displays			
L.1 Did you visit the demos?	31	4	2
L.2 Did you find the demos helpful?	28	4	2
Session 5: Setting up monitors and communicating data			
5.1 Did this session provide new information about selecting monitor locations and deploying monitors?	33	6	
5.2 Did this session provide new information about communicating community air monitoring data?	30	4	
5.3 Did you find this session helpful?	30	3	
Session 6: Using your data and sustaining your network			
6.1 Did this session provide new information about how real-time and historical	28	8	

community air monitoring network data can be used?			
6.2 Did this session provide new information about considerations and requirements for sustaining a community air monitoring network?	42	8	
6.3 Did you find this session helpful?	32	6	
Overall Workshop			
Did you find this workshop helpful?	35		

Overall, the responses indicate that the sessions were helpful and that new content was provided. Written comments by the respondents who had selected "somewhat" and "no" indicate that they had already learned the information or had experience in topic area. The region-specific panels that were coordinated by the co-hosts were also evaluated (see Appendix D). Overall, responses from the Southern CA and Central Valley workshops suggest that the panels were informative and helpful.

It is challenging to make specific conclusions about the Northern CA workshop and panel presentations due to the low number of respondents (7 evaluations returned for 35 participants). While speculative, the lack of response may reflect participant fatigue at the end of the workshop due to some challenging interactions between the co-host and some participants. However, in addition to the evaluation form, the Northern CA workshop facilitators asked participants to share reflections at the end of the day. These responses include reflections on the workshop content and facilitation, as well broader thoughts on air quality issues. They are included in Appendix D.

All respondents who answered the question about overall workshop utility indicated that the workshop was helpful. Respondents also provided written comments, and below are selected comments from the three workshops that reflect the general sentiment of the respondents:

- There was information that I knew but was just explained in more detail, in a sense, it was like review and that just clarified certain things I did not know well. Furthermore, I learned a lot of new information that I wondered about but did not have answers to them and now I do.
- Thanks - this was great. I especially appreciated the examples and reflections from Imperial and San Ysidro projects after each section. Excellent presenters and examples. For a long workshop, could have benefitted from a break in the morning - chance to stretch, regroup, lots of information; challenging to digest it all without a break.
- There was a lot of in-depth explanations, detailed presentations and thorough discussions in regards to who to notify and getting answers from experts
- This was great. I think maybe follow up with what this data can be used for to reduce air pollution would be good, but honestly this was a very full workshop and I learned a lot.

- Full of information I can take back to my neighborhood and lots to think about and motivating statistics

While there were not many critical comments, the majority of these were suggestions to improve the workshop format to include more breaks, interactive or hands-on activities, and panels. More written evaluation comments are provided in Appendix D.

9. Discussion, Lessons Learned, Recommendations

Based on evaluation responses, the workshops were able to accomplish the learning objectives of providing new information and increasing knowledge about the different components in developing a CAMN, and participants found the sessions to be helpful. However, only roughly 60% of all workshop participants completed an evaluation, so our ability to make definitive conclusions from the responses is limited. The positive written responses demonstrated that, for those individuals, the workshop introduced new information or deepened their understanding of an existing topic area. Written responses with critiques or recommendations were generally consistent with challenges that TC and community partners encountered when trying to plan the workshops, particularly with respect to including more interactive sessions, discussions, and breaks while maintaining the same amount of standardized, foundational content. Below are some key reflections on the different components and approaches to the workshops, with considerations and recommendations for future workshops.

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Element 2: Community Engaged Evaluation

Overview

California's Assembly Bill 617 (AB 617) is a bold new approach to cleaning the air in disadvantaged communities through unprecedented public participation, local air monitoring, and comprehensive plans for achieving air emissions reductions – all in an effort to reduce health disparities. It has been called "transformative" by members of the legislature, state, regional and local environmental and health leaders for its potential for reworking how air quality management is organized in California. However, like all significant attempted changes, the implementation of AB 617 has been marked by both collaboration and conflict, and there are a range of perspectives about its degree of success as well as the progress needed to achieve its goals.

The goals of the statute have been incorporated into an implementation framework called the Community Air Protection Blueprint (Blueprint) by the California Air Resources Board (CARB) to guide the work of regional air districts and Community Steering Committees (CSCs). Over the past two years, all levels of California's air quality management system have engaged in a process of building collaboration to implement this ambitious policy. Along the way they have developed successful innovations, encountered numerous challenges, and generated a large number of lessons learned that can be used to improve future implementation of the policy. This report documents these successes and challenges with the purpose of helping all stakeholders reflect on their experiences to date and inform future improvements. It does so with the intention of generating constructive suggestions for enhancing the collective work of the diverse stakeholders who are investing so much of their valuable time, knowledge, and passion in implementing the policy for the benefit of the communities disproportionately affected by air pollution.

AB 617

The methodology used to form the analysis and inform the recommendations of this evaluation study placed a high priority on documenting the voices of those directly involved in the implementation process itself. We sought to collect perspectives from all involved stakeholders in a way that valued everyone's knowledge and experience. Towards this end, we employed a number of primarily qualitative methods, including several on-line surveys, key informant interviews, field observations, and document analysis. The data collection period ran from November 2018 through April 2020.

Research Questions

The analysis sought to answer four major research questions based on the goals of the AB 617 statute and the Blueprint.

1) What changes did AB 617 create in the management of air quality in California, especially in addressing the needs and challenges of disadvantaged communities?
2) How "transformative" were these changes in process and in outcomes?
3) What were the factors that facilitated and/or reduced the effectiveness of these changes?
4) What are ways that all parties can better achieve the goals of AB 617 and the underlying goals of addressing air quality needs and challenges of disadvantaged communities?

Summary of Evaluation Findings

AB 617 Components	Major Successes	Major Challenges
Community Air Protection Blueprint Document developed by CARB to guide Air Districts to implement AB 617	Blueprint lays out a robust framework for the implementation of the legislation.	Blueprint does not provide sufficient guidance on community engagement. Blueprint does not include clear enough requirements for the achievement of measurable, mandatory enforceable emissions reductions beyond Air Districts' existing activities.
AB 617 Consultation Group Multi-stakeholder advisory body to CARB for AB 617 statewide implementation	Consultation Group provided crucial support for the development of the Community Air Protection Blueprint.	There is a lack of clarity about the purpose of the group after the development of the Blueprint. Advocating for funding for AB 617 has been suggested as a potential role.
	Consultation Group's diverse membership was appreciated by the members.	Clarity on advice to CARB was challenging at times due to the wide range of perspectives.
Community Selection Process CARB's process to select the AB 617 implementation committees	The community selection process has included 10 communities with the worst air quality in the state	Communities were set into competition with each other for limited selection spots
	There were innovations in the number of community-driven and community/ Air District collaboration.	Some district-led processes did not achieve potential for community collaboration.
Community Steering Committees Local stakeholders that guide the implementation of AB 617 in selected communities. Consists of residents, community organizations, local businesses, and public officials.	Most CSCs achieved a robust composition of residents, community organizations, businesses, and local governments.	There was a significant degree of conflict within the CSC members, especially between residents/ community organizations and business representatives.
		There were concerns about conflicts of interests in the CSC membership of industry representatives and resident employees.
	Most CSCs improved the level of collaboration throughout the process.	There was a significant degree of unresolved conflict between the CSCs and Air Districts in many sites.
	Addition of outside facilitators helped in many CSCs.	Some facilitators' approaches did not fit the needs and context of the CSCs and in some cases had to be replaced.
	Spanish translation increased —to some degree— participation of mono-lingual Spanish speakers.	Many mono-lingual non-English speaking CSC members were marginalized during the process and a number dropped off from their CSCs.
	Community organizations provided crucial capacity-building for residents in many CSCs.	Many of the presentations by Air Districts, CARB and outside consultants were not accessible to residents. This improved somewhat over time but often with

		significant investments by community organizations. Youth membership was limited in all but two CSCs and in general young people's voices were missing.
		There was some confusion as to what extent meetings outside of the formal CSC meetings were permissible.
		These additional meetings took a great deal of time, energy, and effort from residents and community organizations.
Community Air Monitoring Plans (CAMPs) Plans for air quality monitoring in AB 617 implementation communities	Residents were very engaged in learning about the monitoring devices and processes.	Some of the monitoring presentations were not accessible to residents.
	There was innovation in incorporating district-led monitoring with community-based air monitoring in some communities.	Some of the monitoring areas did not include areas and contaminants of concern from residents.
		Time constraints limited the value of the CAMPs for informing the CERPs.
Community Emissions Reduction Plans (CERPs) Specific actions to improve air quality in AB 617 implementation communities	The CERPs include a range of community-priorities such as mobile sources, land use, pesticides, and community-benefit investments.	These positive results were uncertain until the end of the process and achieved through community pressure, extensive negotiations between the CSCs and Air Districts, often with the support of CARB.
		Most CERPs lack mechanisms to enforce specific mandatory emissions reductions in addition to existing Air District actions.
	There has been unprecedented engagement of other agencies (cities, counties, and the Department of Pesticide Regulation).	This engagement came late in the process and could have been improved by proactive efforts by Air Districts.
	There was some integration of public health as a goal and focus of strategies.	There was a call for a greater focus on public health outcome metrics and strategies within the CERPs.
Community Air Grants (CAGs) CARB funding to community organizations to support AB 617 implementation and community capacity building	The CAGs provided important resources to build capacity in current and potential AB 617 communities.	There were some grants made to larger community organizations that spurred concern in smaller grassroots organizations.
Environmental Justice Values and actions to address disproportionate environmental impacts on people of color and other disadvantaged groups.	There was a strong emphasis on environmental justice and social equity in the legislation, Blueprint and many CSCs.	There was unevenness in the realization of EJ principles, particularly in the ability of Air Districts to share power with CSCs to define their own agendas and action priorities to address environmental injustices.

Table 1: Summary of Evaluation Findings – Successes and Challenges

Summary of Evaluation Recommendations

This analysis generated the following key recommendations to improve the AB 617 implementation process in Year 2 and beyond. Because this is a study of community engagement, it emphasizes recommendations from community organizations and residents, but includes the perspectives of all stakeholders:

1. Sustain the AB 617 Consultation Group with broader charges such as revising the Blueprint and advocating for increased funding.
2. Develop an improved Blueprint focused on community engagement with best practices, resources, and tools as well as clarification about requirements for Air Districts to achieve measurable, enforceable emissions reductions.
3. Improve the community selection process
    a. Avoid or reduce competition between communities
    b. Use community-based nomination and vetting processes
    c. Develop regional, state-wide, and industry sector-based actions to spread the benefits of AB 617 beyond its selected communities.
4. Improve the management of CSC processes
    a. Clarify shared goals (including emphasis on environmental justice)
    b. Adapt leadership structure that equitably shares power and authority between community and Air District representatives
    c. Develop a culturally-responsive framework for use by outside facilitators
    d. Pay CSC members stipends (in particular community residents)
    e. Develop improved and consistent Conflict of Interest policies
    f. Ensure a stronger and more proactive role for CARB in mediating, facilitating and ensuring accountability of all parties to the Blueprint and overall goals of AB 617
5. Improve the development of the Community Air Monitoring Plans (CAMPs)
    a. Continued community education on monitoring technologies
    b. Incorporate air quality monitoring by communities
    c. Better utilization of data to inform Community Emission Reduction Plans (CERPs)
    d. Address problem of insufficient time to develop CAMPs
6. Improve the development of the CERPs
    a. Better incorporation of community action priorities
    b. Development of measurable, enforceable and significant emission reductions beyond those otherwise required.
    c. Expansion actions to include air quality “drivers” (i.e., land use)
    d. Enhance use of health metrics to track health impacts and improvements
    e. Consider use of Civil Rights framework (Title VI) to address racial disparities
    f. Address problem of insufficient time to develop CERPs
7. Improve the Community Air Grants Program
    a. Balance the value of enhancing CAMP and CERPs in selected communities and spreading the resources beyond these communities
8. Support sufficient and sustainable funding for AB 617 at sufficient levels for current and future communities

Introduction

AB 617, authored by Assembly Member Christina Garcia, is a bold new approach to cleaning the air in disadvantaged communities through unprecedented public participation, local air monitoring, and comprehensive plans for achieving air emissions reductions – all in an effort to reduce health disparities.[6] It has been called "transformative" by members of the legislature, state, regional and local environmental and health leaders for its potential for reworking how air quality management is organized in California. However, like all significant transformations, the implementation of AB 617 has been marked by both collaboration and conflict, and there are a range of perspectives about its degree of success as well as the progress needed to achieve its goals. For example, there are many environmental justice organizations who criticize AB 617 for not providing adequate protections for disadvantaged communities and not shifting the power balance more significantly to reflect community voice and priorities.

The statute provides an explicit intention for reducing air quality pollution in disadvantaged communities, provisions for establishing local air monitoring systems by Air Districts, and the development of community emission reduction programs to improve the air quality in these communities. In particular, it has been recognized for its emphasis on the environmental justice motto, "we speak for ourselves," that is, the recognition that the people most affected by an environmental problem must be at the forefront of decisions addressing the issue. The AB 617 Community Air Protection Blueprint (CARB 2018:6) puts it this way.

> *"Community members have intimate familiarity with their neighborhoods and a vision for what they want their communities to become. AB 617 creates a way to incorporate community expertise and direction into the development and implementation of clean air programs in communities."* [7]

To carry out the statute, the CARB developed the AB 617 Blueprint to provide guidance to regional air pollution control districts and Air Districts on how to implement the statute.[8] The Blueprint helps guide the formation and management of the CSCs, made up of businesses, local governments, community organizations and residents that lead the development of the community air monitoring and emissions reduction plans. The Blueprint also provides the process and structure of the CAMPs that establish the location and types of air quality monitoring processes to be used and the CERPs made up of strategies and actions to clean the air in their focus communities. Based on the needs and capacity of the community, some AB 617 communities were selected to develop CAMPs, others to develop CERPs and in most to develop both. CARB also allocated two rounds of funding in Community Air Grants to help build capacity around community air monitoring to community organizations throughout the state.

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[6] Assembly Bill AB 617. (2017). The California State Assembly, 2017 – 2018 Legislative Session. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB617

[7] London, J., Nguyen, P., Dawson, M., Manrique, K. (2020). Community Engagement in AB617. California Air Resources Board

[8] California Air Resource Board. Community Air Protection Blueprint. California's Official State Website. Retrieved April 3, 2020, from https://www.nhgis.org/

Over the past two years, all levels of California's air quality management system, from CARB, to the Air Districts to the CSCs in the ten initially selected disadvantaged communities have engaged in a process of building collaboration to implement this ambitious policy. Along the way they have developed successful innovations, encountered numerous challenges, and generated a large number of lessons learned that can be used to improve future implementation of the policy. These lessons can be applied both to the three newly selected AB 617 communities (Southwest Stockton, Eastern Coachella Valley and Southeast Los Angeles) as well as other community-based air quality management throughout the state and country as a whole.

The structure of AB 617 as articulated in the Blueprint provides both opportunities and challenges for its implementing entities. In particular it calls for all levels of the air quality management system to operate in new ways. Moreover, it requires all entities involved to foster new relationships with each other. For example, to carry out its role in AB 617, CARB is being called on by community stakeholders (especially residents and community organizations focused on environmental justice) to play a more active role in guiding Air Districts' compliance with the Blueprint compared to its more regulatory role in reviewing and taking final action on the activities of the Air Districts. CARB must also balance leading a statewide implementation of multiple processes in communities with very different demographic, political, economic, and environmental characteristics. To carry out the requirements of AB 617, CARB is finding itself needing to become more attuned to place-based variations across California.

The Air Districts are called to work with communities in more intensive and collaborative ways than most have done before. They are also drawn into addressing issues that have historically been outside of their jurisdiction such as mobile sources, land use, and agricultural pesticides. Furthermore, they are being asked to take on these ambitious tasks with what some Air District leaders describe as inadequate resources.

Community residents, many of them without scientific training, are now called to engage in often highly technical issues of air quality monitoring and management. Service on a CSC is a significant time commitment and represents a financial hardship for many residents (especially to those whose Air Districts did not provide honoraria). Many residents, especially people of color, came to the CSCs with a lifetime of experiences of racial discrimination, social injustice, and exclusion from public decision-making over issues affecting their health and well-being. AB 617 has demanded that organizations and residents on CSCs, more accustomed to advocating outside of the system, learn how to work internally with the Air Districts. Additionally, residents and organizations have long experiences working in opposition to industries that contribute to air pollution emissions in their communities and now must find ways to collaborate with them on the CSCs, often with a high degree of conflict. Finally, all parties have had to take on all of these challenges in a very compressed timeline set in the original legislation as they simultaneously had to develop new and improved relationships, construct the structures of the collaboration, and produce a CAMP and/or a CERP.

While these factors may have pushed the limits of all parties in the AB 617 process, they have also opened new opportunities for addressing community-level environmental issues. These opportunities have the potential to truly transform air quality management in the state and serve as a model for the country, as a whole.

This report documents these successes, challenges and lessons learned with the purpose of helping all stakeholders reflect on their experiences to date and inform future improvements. It does so with the intention of generating constructive suggestions for enhancing the collective work of the diverse stakeholders who are investing so much of their valuable time, knowledge, and passion in implementing the policy for the benefit of the communities most affected by air pollution.

Methodology

The methodology used to inform the analysis and recommendations of this evaluation study placed a high priority on documenting the voices of those directly involved in the implementation process itself. We sought to collect perspectives from all involved stakeholders in a way that valued everyone's knowledge and experience. Towards this end, we employed a number of qualitative methods, including several on-line surveys, key informant interviews, field observations, and document analysis. The data collection period ran from November 2018 through March 2020.

Research Questions

The report sought to answer four major research questions based on the goals of the statute and the Blueprint.

1) What changes did AB 617 create in the management of air quality in California, especially in addressing the needs and challenges of disadvantaged communities?
2) How "transformative" were these changes in process and in outcomes?
3) What were the factors that facilitated and/or reduced the effectiveness of these changes?
4) What are ways that all parties can better achieve the goals of AB 617 and the underlying goals of addressing air quality needs and challenges of disadvantaged communities?

Data Sources

Surveys

We designed and administered three types of surveys. The survey was designed based on input from CARB staff, members from several CSCs as well as experts in survey methods. We administered two general surveys to all stakeholders in the AB 617 process, including CSC members, AB 617 Consultation Group members, Air District staff, CARB staff and other interested parties (for example, speakers at CARB board meetings) about the range of issues associated with the policy implementation. The first round collected 102 responses from November 2018 to January of 2019. The second round collected 106 responses from February to March 2020. This accounts for a 21% response rate. This is lower than we would have hoped but still provides a robust sample size and data set. By translating the survey into Spanish, we were able to collect five additional responses. The third survey was specifically for CSC facilitators that examined their roles and responsibilities as well as their perspectives on AB 617 overall and received ten responses from February to March 2020. All surveys were managed through the Qualtrics online software platform. In the Appendix 2, Figures 28-29 illustrate the breakdown of

respondents (by stakeholder group and CSC) in the 2018-2019 survey and Figures 30-31 illustrate the breakdown of respondents (by stakeholder group and CSC) in the 2020 survey.

Key Informant Interviews

We conducted 70 in person key informant interviews based on questions about their perceptions of what was working well with community engagement, what was not working as well, and what changes they would recommend improving the policy's performance. These interviews drew from members of all 10 CSCs and associated Air Districts with 5-6 members per CSC. The general composition of the community interviews included 1-2 residents, 1 business representative, 1 local government leader, 1-2 community organizations, and 1 Air District representative. Three interviews with CSC resident members were conducted in Spanish. These interviews also included CARB 617 Consultation Group members, Air District staff, CARB staff, one CARB board member and Assembly Member Christina Garcia, the author of AB 617. Interviews lasted between 30 minutes to 90 minutes and were digitally recorded with the participants' consent. Participants were offered confidentiality of their identities and the option to not have their quotes included in the report. We use an [X] to avoid disclosing names or other details that might identify a specific interviewee.

Participant Observation

Participant observation field visits were conducted across all 10 CSC meetings between Spring and Fall of 2019. Additionally, participant observations were conducted at other public meetings including CSC Community Summits and Town Hall meetings, Consultation Group meetings, and CARB Board meetings. Observation notes focused on the group dynamics between participants, participation of stakeholder groups, areas of conflict and collaboration, and major topics of discussions.

Videos of CARB board meetings, CERP Approval Meetings, Assembly Member Garcia's March 2019 AB 617 legislative hearing, an AB 617 convening at UC Davis, and several AB 617 panels at environmental justice (EJ) conferences (the Imperial Environmental Health Leadership Summit and the Central California Environmental Justice Network annual conference) were also documented for analysis.

Document Analysis

Key documents, such as CSC meeting minutes from throughout the implementation and the draft CERP comment letters submitted as of March 2020 were collected, thematically coded, and analyzed (see below for coding process).

Data Analysis

All interviews were transcribed. Interview transcripts, together with the CSC field notes and other observation notes, CERP comment letters and survey responses were all coded in the NVivo 11.0 qualitative coding software package. The coding process involved a first read through of a sample of early interview transcripts to develop an initial coding structure. This was then enhanced through a second round of coding to add, change or delete codes. The eventual codes were then established in a

codebook of key themes related to the core questions of the study using 19 main themes and 188 sub-themes. These main themes were selected based on the research questions. These themes included dynamics of CSC meetings, development processes and outcomes of the CAMPs and CERPs, environmental justice and others. We also divided out comments that were supportive and critical of the process. Key quotes were identified from the interviews, surveys, and CERP comment letters that helped illustrate the major successes, challenges, and recommendations for AB 617 implementation. Exemplary quotes were included from all stakeholder groups to highlight the convergence and divergence of perspectives.

Limitations

One of the primary challenging aspects of this study is that there is "formative" vs "summative" meaning that it is tracking and trying to draw conclusions from an on-going process. Indeed, as of this writing, not all of the CERPs have been approved by the CARB board. This has resulted in several challenges. The first-round surveys went out before all CSCs had begun and the second-round surveys went out before all of the CAMPs and/or CERPs had been completed. Likewise, the interviews and participant observations were primarily conducted during the summer and fall of 2019, in the middle of the process, before the adoption of the CAMPs and CERPs. The assessment of the Community Air Grants (CAG) was only based on survey data and not an individual project evaluation; likewise, data on the AB 617 Consultation Group was drawn from the surveys and interviews and not a full organizational analysis. The study analyzed the draft CERP comment letters for evidence of community engagement issues as well as several CARB board meeting videos where CERPs were reviewed for approval, but not the technical elements of the plans themselves. Due to the survey administration method, we are unable to directly compare responses between the two rounds of surveys and instead report them individually.

Finally, because this is an evaluation of the AB 617 community engagement process, it does not provide an independent assessment of the technical elements of the CERPs or how well community input was incorporated into the plans. Instead, it reports on the stakeholders' perceptions of how well the CERPs accomplished this goal based on surveys, interviews, and written documentation. An additional outcome-based evaluation would be necessary to assess the question of how well the community engagement process influenced the final plans. Furthermore, a long-term tracking process to assess the implementation of the CERPs relative to community goals will be needed to judge the success of AB 617. While the AB 617 process is important, the authors of this study highly recommend an outcome-based evaluation, as the measurable improvements to the air quality and thus the health of the residents in the most affected communities is the ultimate goal.

Evaluation Components

AB 617 Consultation Group

The AB 617 Consultation Group has played an important role in the development of the AB 617's implementation. Made up of 24 members, representing a diverse range of stakeholders from environmental justice advocates, industry leaders and Air District officials, the group's major role has been advising the development of the Community Air Protection Blueprint.

Overall, the self-assessment of the group was positive as shown in Table 2 based on responses from Consultation Group members in the 2020 survey. For example, 90% of Consultation Group members are either somewhat satisfied or very satisfied in the composition of the group and 72% are either satisfied or very satisfied in the reflection of perspectives of the different stakeholders. On the other hand, 27% of the group members report being somewhat unsatisfied or very unsatisfied with the quality of collaboration within the group and less than half (45%) of the members are either somewhat satisfied or very satisfied with the outcomes of the group.

		Very Unsatisfied	Somewhat Unsatisfied	Neither Satisfied nor Unsatisfied	Somewhat Satisfied	Very Satisfied	Total
1	The composition of the membership of the Consultation Group	0%	0%	9%	45%	45%	11
2	The quality of collaboration in the Consultation Group	9%	18%	9%	36%	27%	11
3	The reflection of the perspectives of different stakeholders	0%	0%	27%	36%	36%	11
4	The outcomes of the Consultation Group to date	0%	9%	45%	27%	18%	11

Table 2: Level of satisfaction about the AB 617 Consultation Group (2020 Survey of Consultation Group members; n=11).

The group's diversity has been a great strength as noted by one member, representing an environmental justice organization. The fact that this member is often a leader in opposition to the actions of the local air district speaks to the value of this neutral space.

> *"And it was important to us that this composition include the Air Districts. It would include representatives from industry and, of course, advocates as well, justice advocates. They created that and the idea was to advise the implementation, right, or the development of the blueprint. That was the original purpose. And I think it was a very effective place to have that conversation. You had seven members of the environmental justice community statewide, all of whom have, not bragging, but we have a lot of experience in this area. So, I thought it was great that we had that opportunity to sit there with the big three air districts and California Air Pollution Control Officers Association (CAPCOA). And again, having industry at the table, the manufacture association at the table and a couple of other groups, to me, that was critical to have them in that conversation and to be a safe place to have this conversation."*

One member praised the progress that the group has made over its two years of operation.

> *"The meetings were at first exclusionary and got off to a rough start, which has been remedied somewhat. The meetings should have more opportunity for focused comment from every*

participant to best use the time and thoughts of all of the people present. Presentations are often too long, and should invite comment during presentation more….That being said, this is a difficult process and CARB staff have made great efforts and great strides forward and I commend and appreciate them."

A specific recommendation from one group member focuses on its longer-term status.

"CARB needs to recognize the Consultation Group as a formal body with the responsibility of overseeing the AB 617 implementation and with authority to ensure CARB moves forward on various goals in a timely fashion and held accountable for failures."

Given the success of the Consultation Group, this latter recommendation seems well supported by the data.

The Community Air Protection Blueprint

The Blueprint lays out the framework for the implementation of AB 617, with an emphasis on guidance to Air Districts and CSCs. Survey results from all categories of stakeholders and interviews indicate a strong support for the Blueprint. Based on responses to the 2020 survey, 66% of respondents indicated they were either somewhat satisfied or very satisfied with the Blueprint in terms of providing sufficient guidance on community engagement while only 23% reported being somewhat unsatisfied or very unsatisfied. This varied significantly between stakeholder groups, however as shown in Figure 1 below. For example, 50% of Air Districts and 32% of EJ organizations were somewhat unsatisfied or very unsatisfied with the Blueprint. This is far more critical than CARB staff for whom only 10% reported being somewhat unsatisfied or very unsatisfied with the Blueprint.

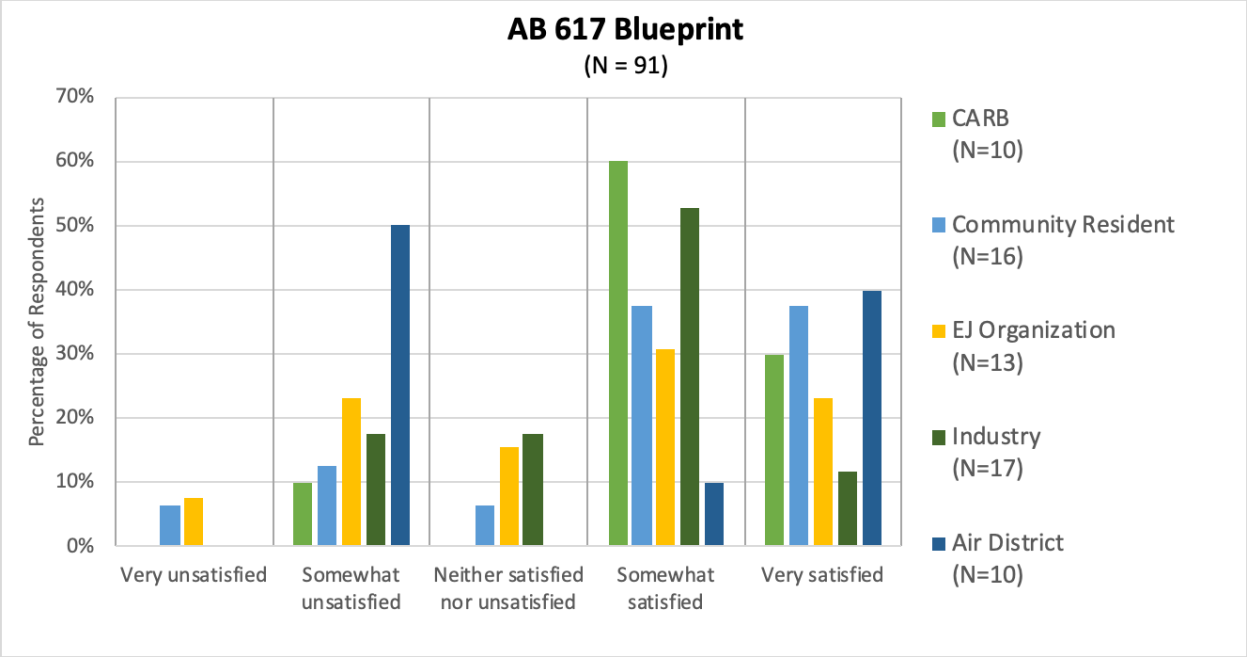

Figure 1: Level of satisfaction with the AB 617 Blueprint in providing sufficient guidance on community engagement by stakeholder group (2020 Survey; n=91).

Despite overall support, there were a number of comments that expressed concern about the Blueprint, from the nearly one quarter of unsatisfied respondents that can provide some useful feedback for CARB as it considers revisions to the documents.

One CARB staff member recommended that the Blueprint needs to address issues such as land use through a more strategic and comprehensive approach. "The Blueprint should be reviewed with an eye toward revisions based on lessons learned with early implementation of the AB 617 process in the first 10 communities. To me, an important lesson learned is because land use decisions are key to many emissions reduction plans, engagement of air districts/community steering committees with local land use decision makers is key." This prioritization on land use is also position taken by a large number of community residents and organizations, suggesting a confluence of interests with potential for progress.

One environmental justice organization CSC member echoed the point about land use and provided further insight on the Blueprint's, seemingly ambiguous, language.

> *"The Blueprint is too vague where it needed to be the most in depth. For example, soft language terms of "to consider" to "guide", did not give the Air Districts enough direction on true robust engagement with community. The language was left up to individual interpretation. Also, there needs to be more clarity and language regarding jurisdictions and land use issues and methods for solutions to get agencies to work together with concrete actions."*

A resident CSC member also commented on the need for more explicit guidance,

> *"It needs to be updated and deliver more specific guidance especially in the area of governance, what are best practices and what is the role of partnering with agencies. Do we advise or do we assist in the development? What are the key elements to discuss and agree to prior to starting a partnership?" The same resident also asked, if guidance is available, where are the best sources to receive it, "This is an area that my community lacked clarity and was not navigated toward who and or where we could get mentorship, best practices or unbiased guidance (or at least have the bias disclosed)."*

This is somewhat in tension with an Air District staff member who made an observation that from an agency perspective the Blueprint can be *too* definitive.

> *"The Blueprint contains some useful suggestions on community engagement, but it is far too rigid and assumes a 'one size fits all' approach. It also has many requirements that are burdensome on air districts with little to no community benefit. It seems that air district efforts would be better applied to other things that actually improve the CERPs or CAMPs and their implementation."*

Overall, from the 2020 survey it should be noted that of the 10 responses from Air District staff, 50% reported being somewhat dissatisfied with the Blueprint's guidance on community engagement, with 50% reporting being somewhat satisfied or very satisfied.

The combination of these two conflicting perspectives points to the difficulty of balancing a statewide and AB 617's place-based approach. Yet this balance is precisely what is needed to both support the resident and community organization members of the CSCs, while still allowing Air Districts to develop a community engagement plan that fits local conditions with some flexibility.

Community Selection

The process of selecting the first 10 pilot communities for AB 617 participation was a contested one, as dozens of communities vied for selection. This represented a structural problem, as there were bound to be many more disappointed communities than those selected for inclusion. Many comments from the interviews and surveys, as well as at the CARB board meeting in which the communities were selected reflected this tension. Many respondents complained that the process led communities to compete with each other for state support, which produced a level of tension that the EJ movement seeks to avoid as much as possible between its members.

Several innovations helped address this problem. In the San Joaquin Valley, for example, fifteen EJ and health organizations came together as part of the San Joaquin Valley AB 617 Environmental Justice Steering Committee to develop consensus-based proposals, first to submit AB 617 Community Air Grant applications (through which they secured $2.2 of the $10 million granted statewide in the first round) and then to submit proposals to become a pilot community. The process considered a range of variables, including the level of community capacity of the community as well as its degree of disadvantage using CalEnviroScreen and other tools that produced the proposal for the two communities – Shafter and South Central Fresno-- which were eventually selected by CARB. The selection of Shafter was notable in that it ended up substituting for the community of North Bakersfield,

which the Air District had originally proposed. One member of Shafter's steering committee described the challenging but successful social process in these collective decisions.

> *"It was it was very hard. I mean, the thing that was interesting and, I think, powerful was, you had groups who had principally advocated for their own areas. And that's their sort of DNA to do that. But yet, they were able to put that to one side. Once they had the data and information, they were working with everybody else from other communities 200 miles away. And as we were talking together about those problems and using a tool with data in it and metrics and deciding on the different variables that were indicators that were the most important."*

In Imperial County, the local EJ organization, Comité Cívico Del Valle (CCV), also played a pro-active role in the development of the AB 617 pilot project. In this case, CCV was developing its own proposal and gaining significant progress and only then did the Air District join its efforts instead of continuing to submit their own proposal. This set the tone for the partnership, in which there would be co-chairs for the CSC from the District and CCV. In contrast, in places like Sacramento, the Air District created their own proposal (for 10 potential sites in the district) and only after one had been selected did they reach out to the community to solicit members to form the CSC. This was partly a factor of the limited presence of EJ and related organizations in Sacramento, but also that those that were present were not connected with the District's process. This precedent has followed throughout the process in which the District played a much stronger role in shaping the work of the CSC than has been the case in other communities. The pattern running through these examples is the relevance of pre-existing community capacity in structuring the selection process, with those such as Imperial County, the San Joaquin Valley, Wilmington/Carson/West Long Beach, Portside EJ Neighborhoods and West Oakland playing a much more proactive role than their counterparts in places like Sacramento and Richmond/San Pablo.

Overall, there is a pattern of moderate to strong support for the selection process and outcomes as shown in Table 3 and Figure 2 that uses the 2018-2019 survey (because this data collection period followed most closely the community selection process). Here we see that the percentage of those who were somewhat or very satisfied was about two-thirds for the initial recommended communities, the selection process and the final selected communities respectively.

	The process of selecting the initial recommended communities (N=88)	**The process for selecting the final set of communities (N=84)**	**The selected communities (N=84)**
Very Unsatisfied	6%	6%	6%
Somewhat Unsatisfied	5%	7%	8%
Neither Satisfied nor Unsatisfied	26%	26%	15%
Somewhat Satisfied	44%	42%	43%
Very Satisfied	19%	15%	24%

Table 3: Level of satisfaction with the community selection process (2018-2019 Survey).

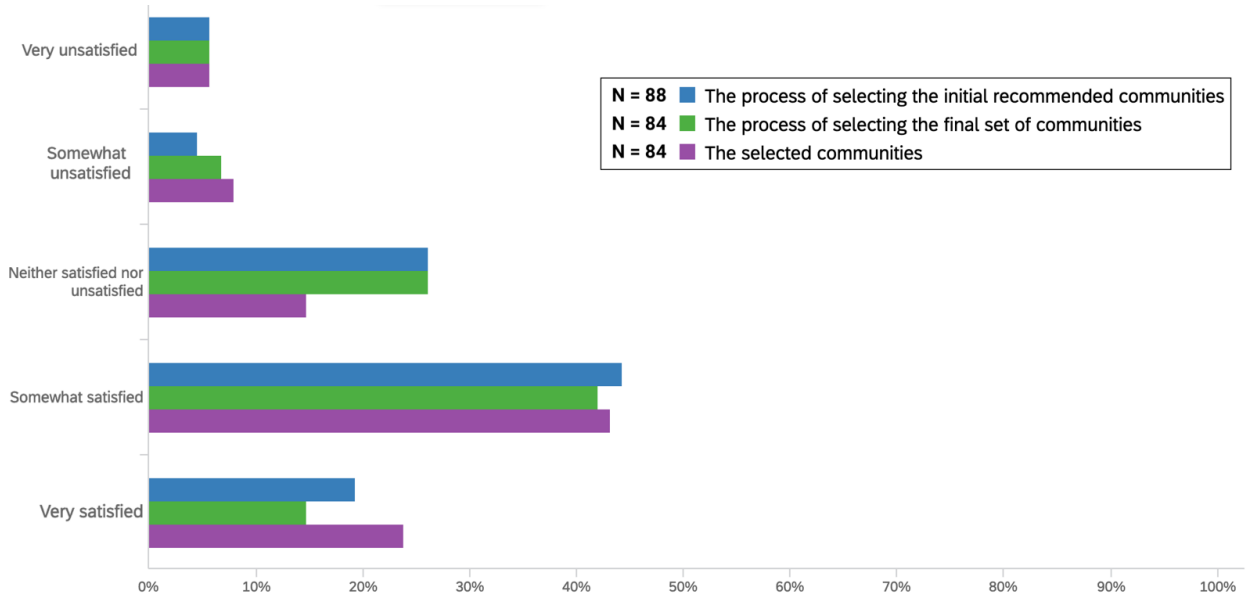

Figure 2: Level of satisfaction regarding the process and selection of communities for air monitoring and/or emissions reductions programs (2018-2019 Survey, n=84-88).

Despite this overall positive reaction, there are some critiques from those who were unsatisfied with the process and outcomes that would be helpful to consider. Many of these comments relate to the issue of organizational capacity and its alignment or misalignment with the needs of the implementation process. Capacity in this case can be understood as a combination of human capital of the knowledge and skills of the participants and the social capital of the strength of relationships.

One industry representative observed a problem with stacking the decks towards communities with high capacity.

> *"Priority does not seem to be given to those communities with the highest localized concentrations of air pollution statewide, and much preference is given to those communities that have existing political and resource capacity. While this may have been satisfactory to jump start first year communities, it now seems to be embedded in the selection process, so communities not highly engaged are not likely to be put forward. …It would be good to select a community with low participation and capacity and high need so that strategies can be tested and developed for these situations — arguable, there are many EJ communities that need help but won't be able to engage at the level that first-year communities do, and these should not be forgotten or put aside until such time as a hero arises to voice their concerns."*

This runs counter to some other observations by CSC and Consultation Group members that highlight how the success of implementation depended on the capacity of community organizations to push their Air Districts to prioritize community input and to hold the districts accountable to the requirements of the AB 617 policy.

One member of the AB 617 Consultation Group commented on their disappointment that the second-round community selection process did not seem to be based on learning from the first round.

"Lessons learned in the first set of communities could have been more quickly applied to the model and a new potential asset allocation and timeline developed based on that. This would have required a new version of the Blueprint be developed and approved by the Consultation Group, ARB staff or both. It was not done."

Like the Community Air Grants, the decision about community selection presents a dilemma for CARB. If it only selects communities with higher capacity (based on the argument that this is necessary for success of the program), communities with lower capacity but high needs are less likely to get the opportunity to benefit from the program. The Year 1 communities can provide somewhat of a natural experiment in this regard, by comparing the experiences of high capacity contexts such as West Oakland and lower capacity contexts such as Sacramento. In the former case, there was significant success--much of this a product of collaborative work that had long preceded AB 617 – and in the latter, there was less of a history of agency-community partnerships, and therefore a greater degree of struggle. One lesson learned from this might be that if CARB is going to select communities with lower capacity, then it must be prepared to provide the needed guidance and support to ensure success in these communities. Limitations on funding has resulted in a selection of a limited number of communities which places them in competition with each other. This competition is a concern expressed by multiple respondents to interviews and surveys as it cuts against solidarity between communities and organizations.

Community Steering Committees

As a community-focused policy, the development of the Community Steering Committees (CSC) is at the heart of the AB 617 implementation process. These CSCs are directed by the Blueprint to include a wide range of community stakeholders, including residents, leaders of EJ and local public health organizations working, as well as representatives of local health, transportation and education agencies, labor, and local businesses. A majority of the members are required to be community residents. The Blueprint specifies that the Air Districts would be the convener of the CSC's public meetings and that each committee should establish a charter to set out their process and structure. However, specific characteristics such as the size of the CSCs, the elements that ought to be in a charter, what the leadership structure would be, how decisions would be made, whether the group would have a facilitator, and whether the members would be compensated are not addressed. While the lack of guidance allowed for a place-based approach that each community could develop for itself, it also left a vacuum that consumed most of the CSCs in months of often conflictual processes to establish their structure.

CSC Member Selection

The first phases of the CSC involved the recruitment of members. Most Air Districts created an on-line nomination process as well as a proactive process to fill the different categories of the committee. In some cases, this was an easy task, with many more applicants than could be accommodated, whereas in others there were fewer applicant and districts had to work harder to find members. In many areas such as the San Joaquin Valley, West Oakland, two of the Los Angeles communities, San Diego, and Imperial there were a number of strong environmental justice and health equity organizations who were already mobilized to work on air quality issues and who brought their leaders into the CSC. In some areas, such

as Sacramento, there were only a small range of environmental justice organizations to draw from and in others, such as Richmond/San Pablo, one of the major EJ organizations working in the region, Communities for a Better Environment, declined to participate in the process. This was based primarily on their opposition to the original legislation and then to the selection of Richmond/San Pablo as a monitoring-only community as well as the lack of action on emissions reductions from oil refinery and related petro-chemical facilities. An unevenness of strength in the equity-oriented organizations across the regions made for a disparity in the capacity of the CSCs to effectively represent EJ issues and populations.

There was great variation in the make-up of CSC membership across the 10 communities. In all cases there was an expectation that there would be a majority of residents and community organizations. However, while in most CSCs this was the case, some had slightly (and some much) lower levels than this. This range in membership can set up disparities in the prominence of resident and community organization voice. Some notable examples of this variation, as seen in Table 4, included those within districts such as Shafter's CSC which has 66% residents compared to Fresno's 32%. On the other hand, both of these sites had an overall strong community voice. As an even more extreme example, West Oakland, which has arguably the strongest community voice, had only 17% of resident members, compared to the case of South Sacramento where even the 70% of residents on the CSC have not resulted in significant community power. In this case, the community power in West Oakland was largely due to the leadership role of the West Oakland Environmental Indicators Project. Nonetheless, this wide variety of membership proportions is issue for CARB and the Air Districts to carefully consider in the recruitment and representation of CSC members in the future.

Community Steering Committee	Resident	Community Organization	Business/Labor Organization	Government/ University/ Hospital
West Oakland	17%	26%	9%	48%
Richmond/San Pablo	31%	34%	17%	17%
South Sacramento – Florin	70%	20%	10%	0%
Shafter	66%	14%	7%	14%
South Central Fresno	32%	21%	32%	15%
Wilmington/Carson/West Long Beach	28%	24%	24%	24%
Boyle Heights/East LA/West Commerce	23%	23%	8%	46%
San Bernardino/Muscoy	21%	25%	8%	46%
Portside EJ Neighborhoods	48%	15%	15%	22%
Imperial Valley	47%	13%	13%	27%

Table 4: Year 1 CSC Membership by Stakeholder Category (Source: CSC Membership Rosters)

One major issue that many CSCs had to address was the ambiguous role of industry-affiliated residents. This was important because, in instances where the rules specified that a majority of resident members was needed to decide, it mattered whether an industry-affiliated member counted as a resident or as an industry representative. This was particularly contentious in communities like Shafter and Richmond/San Pablo, in which some residents also worked for industries (oil, agriculture, and manufacturing) that generate significant air emissions. A policy of disclosure was finally adopted in each community, but not without significant tension. Several residents and community organizations wanted a policy to simply disclose conflicts based on industry affiliation, while others recommended the recusal of industry-affiliated members from decision-making that would affect their firms or sectors and others sought a policy that would bar members with industry affiliations from the CSCs as a whole. These debates were not resolved (with the exception of not using the industry exclusion rule) and remains a key question for future implementation. None of the CSCs allowed industry members to serve in leadership roles, a point that one industry-affiliated CSC member found disturbing.

> "*One of the persons said, 'I don't want the fox in the henhouse,' considering themselves the hens, and anybody in industry being the evil, the dark side. So, then the committee did get formed with people from industry, and I don't know how the decision was made, but it's no one from industry can be a co-lead…. I'm a resident of this community. I work in this community. I moved here because of my job. It seems strange that you would exclude industry from a co-lead."*

Another CSC member in this same community expressed a more optimistic view of what they described as a structure that welcomed and benefited from the diversity of the committee.

> *"The Leadership Team consist of a very large group of individuals from several sectors of our defined area. This group includes not only individual residents, but residents from some of the industries identified as sources of pollution. Also included are individuals from local governing bodies, as well as individuals from environmental justice organizations. This is all by design and was agreed upon by a charter, developed with the help on our facilitating consultant and the Air District's advisory team. This creates a challenge to arriving at a consensus on ideas we want to bring forth, but I think it is what makes our group so powerful."*

In contrast, an EJ organization not involved in a CSC critiqued its leadership team for being too close to industry, "In [X], the outsized presence of [X] and other polluting industries has meant that many so-called community leaders have a historic relationship with those industries." While the CSC members in this community contest this description and point out that by not engaging in the process this organization was not able to make an accurate assessment of the committee, it does show that the role of industry remains contentious and needs additional attention from the Air Districts and CARB in the future.

Community Voice and Decision-Making Power

A major concern shared by residents and community organizations regarding the CSCs involved the level of their decision-making in relation to their Air Districts. To what extent are the CSCs able to make decisions as a committee and to what extent do they merely serve as an advisory group, with no real

power and agency, to the Air District? While AB 617 is not the cause and cannot be expected to solve the issue of power disparities in the participating communities, there is still the possibility that they can reproduce historic systems of racial and ethnic discrimination within the policy's structure and implementation process.[9] Within their core values, AB 617 and environmental justice share a common desire to transform power and social inequities. By approaching AB 617 through an environmental justice framework, it would consider the structural factors that this transformation of power and social inequities are core values of environmental justice and of AB 617 itself. An environmental justice approach to AB 617 would therefore take into consideration the structural factors that shape the inequitable distribution of environmental harms and amenities. It would also recognize the historical exclusion of people of color and low-income people from decision-making roles.

Another issue which affects the influence of residents and community member in the CSC is the members' level of capacity and training. A member of one CSC criticized the lack of preparation given by the Air District and CARB during the early formation of their CSC, "My community is starting from scratch. Inadequate preparation and information to have a clearer understanding of the community as to their power, and role as a partner in the development of the CAMPs and CERPs. Timely training and onboarding within the first 3 months of the process were not provided. Clear training on what the role of CARB is for the community members. Best practices to be rolled out initially and updated regularly." This issue also came up at the UC Davis AB 617 Convening in February 2020 as well with several members of the Sacramento CSC expressing dismay at the lack of on-boarding support for CSC members, many of them without prior knowledge of air quality science and management. One community organization representative of a CSC explained this concern early on in the process as follows.

> *"We residents and community members speak for ourselves. We don't need to be prescribed solutions. We need to find community-based solutions and community-driven solutions. So that was our motto coming in and at the very, very beginning, the very first meeting, it was shut down essentially. They're saying, 'Well, we'll give you the voice that you need. And we'll tell you what you guys need." The residents felt that and they understood that. It was going to be a very tough battle.'"*

Another point of tension was the idea of a community-led versus a community-advised CSC process. This concern was shared by shared through the perspective of an Air District staff member who sought to highlight the limits of the CSC role:

> *"The Steering Committee, at least some, really think that AB 617 in some way provides the Committee with full authority to basically explore, identify, and then implement essentially whatever they would like to do. I think this has evolved over some time with the Blueprint and we are all rowing in the same direction for the most part. The roles are more clearly understood. The air district is, ultimately… we have to take to our board the CERP, they are the ones who*

[9] The pattern of racial and ethnic disparities in the distribution of environmental hazards and exclusion from decision-making is well documented in the environmental justice literature. See, for example, Holifield, R., Chakraborty, J., & Walker, G. (Eds.). (2017). The Routledge Handbook of Environmental Justice. Routledge.

approve the CERP and then CARB ultimately approves the CERP. It's not the CSC. They are more in an advisory role."

An EJ representative felt that there was partial progress regarding the issue of community voice and power by the end of the process in their region. "The process from the beginning was led by the Air District instead of being shared with the Community Steering Committee (CSC). Towards the last two CSC meeting, the CSC members were able to co-host with the Air District, but I think this was a bit too late. Maybe, if we continue this during the implementation phase, it will be more useful and beneficial to what the community members expected to see in terms of outcomes." This role of community voice will be an important issue to track in the longer-term implementation phases of AB 617.

Leadership and Facilitation Models

A major transformation, which occurred over the course of the implementation process, was that CSCs began to use outside facilitators. Only four CSCs used outside facilitators at the beginning of the program, however, by the end all but one CSC (San Bernardino) were using outside facilitators. In general, facilitators worked with the leadership of the CSCs to develop meeting agendas, guide meeting discussions, and lead interactive activities. In some cases, initial facilitation was provided by the Air Districts themselves although in all cases opposition from CSC members based on a perception of lack of independence led to the shift to outside professional facilitators. While outside facilitation was received positively by most CSCs, several other CSCs needed to replace their first facilitator until they found a suitable one. The lack of guidelines for selecting and managing facilitators played a large role in worsening tensions within CSCs.

The CSCs followed a number of different leadership models that varied by how the decision-making authority was distributed between the Air District and the CSC itself. The distribution of decision-making authority was at the heart of many conflicts throughout the AB 617 process. While this tension varied by location, the tension was generally centered on the CSCs seeking more control in the process. The Blueprint states that the Air Districts "convene the CSCs,", however these is no further language which specifies whether the District has decision-making power over CSCs or whether the CSCs retain this authority for itself. This has remained an open and challenging question.

Table 5 lays out the variation in leadership models. The Air District roles have several variations. "District-led" means that the meeting agendas are created by the District itself and its staff manage the meeting, often in tandem with an outside facilitator. "District-driven" means that, while there may one or two CSC members who chair the meetings, it is the District that primarily develops the agenda and drives most of the content of the meetings. "Co-leadership" typically represents a team of Air District staff and a community organization representative or resident that design and direct the meetings together. The community role also have several variations. "Membership" means that CSC members do not have a designated leadership role. "Community co-hosts" facilitate the meetings but do not have decision-making authority over the agenda or CSC decisions. The Richmond/ San Pablo CSC has a group of CSC members that function as a "community co-lead team" to work with Air District staff to develop the agendas and develop proposals for CSC decisions. "Community Co-Chairs" work with an Air District to develop agendas, develop decision proposals, and chair the meeting.

Community Steering Committee (CSC)	Air District	Community Role	Outside Facilitator
Portside EJ Neighborhoods	District-Led	Membership	Yes
Wilmington/Carson/West Long Beach	District-Led	Membership	Yes
Boyle Height/East LA/West Commerce	District-Driven	Community Co-hosts	Yes
South Sacramento – Florin	District-Driven	Co-Chairs	Yes
San Bernardino/Muscoy	District-Driven	Community Co-hosts	No
Fresno	District-Driven	Membership	Yes
Shafter	District-Driven	Membership	Yes
Richmond/San Pablo	Co-Leadership	Community Co-Lead Team	Yes
Imperial Valley	Co-Leadership	Community Co-Chairs	Yes
West Oakland	Co-Leadership	Community Co-Chairs	Yes

Table 5: CSC Leadership Models (Updated as of March 2020)

The level of community leadership across the ten CSCs can be illustrated in the continuum in Figure 3.

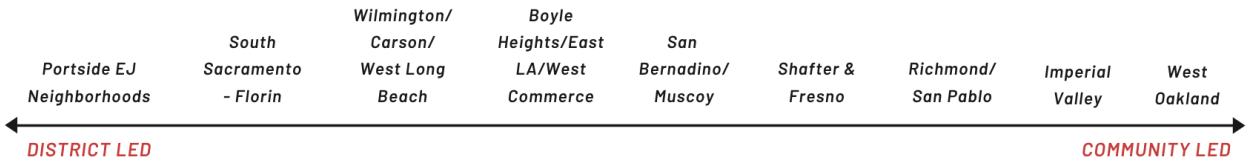

Figure 3: CSC Power Continuum

This continuum runs left to right from most district-led to most community-led. This placement is developed by the authors based on interviews, surveys, and observations of CSC meetings. It is also based on the distribution of authority over who sets the agenda, who leads the meetings, and how decisions are made inside and outside the meetings. CSCs that are solely directed by Air District staff (e.g., Portside EJ Neighborhoods, and Wilmington/Carson/West Long Beach) are considered the most district-led, followed by those with some kinds of community co-chairs with significant Air District influence (e.g., South Sacramento-Florin and Boyle Heights/East LA/West Commerce), followed by those with strong community organizations to influence the process even without co-chairs (e.g., Fresno and Shafter), and then CSCs with co-leads from the Air District and community holding shared power (e.g., Imperial and West Oakland).

This "power continuum" is similar to the "CSC leadership models" but with the difference that it measures not just the form structure, but the ability of the CSC to exert power over the overall direction of the process, including the development of the CAMPs and CERPs. For example, although the Fresno and Shafter CSCs were "Air District-driven" the presence of very strong community organizations resulted in a potent community voice. In the case of other CSC, a district-led process in the meetings still led to a CERP that had significant community priorities such as the Wilmington/Carson/Long Beach. On the other hand, there were some CSC that had a community-chairs structure, such as South Sacramento, that still ended up a product that reflected the Air District more so than community priorities. This was largely due to the lack of strong community organizations on the CSC, and perhaps also the small size of the CSC (approximately ten over the course of the process).

It is important to note that the goal is not necessarily to select that model that is most community led, but instead to adopt and adapt one that is best *aligned* with the needs and capacities of the CSC stakeholders. For example, not all communities have the capacity nor interest in managing the time-intensive co-leadership model as West Oakland's CSC. In addition, this site had the benefit of maintaining a decades-long community-agency collaboration between the primary environmental justice organization, the West Oakland Environmental Indicators Project and the Air District. This collaboration led to the development of a set of formal collaboration agreements (developed in 2005) that served as a foundation for West Oakland's AB 617 work. This same model is difficult, if not impossible, to replicate within AB 617's proposed timeline. With that said, even without a long-history of collaboration, the Imperial CSC came the closest to replicating the same kind of power sharing as West Oakland. This is due to Imperial's strong community organization leadership and an amenable Air District.

Communities with limited interaction between residents, community organizations, and Air Districts such as Sacramento experienced the negative impacts of trying to build trusting relationships while navigating through a rushed CAMP process without a strong community leadership base. Meanwhile, some communities with conflictual relationships between local organizations and Air Districts, such as in the Imperial Valley were able to create a co-leadership model while others—such as in the San Joaquin Valley- had difficulty overcoming long-enduring tensions and were not able to develop such a model. And yet, through strong advocacy and the support of CARB, the San Joaquin Valley CSC as well as others such as the Wilmington/Carson/West Long Beach CSC with limited formal leadership were able to achieve significant victories in strong air protections in their final CERPs.

In some cases, certain Air Districts had staff serving as facilitators, but, this was generally considered not to be an effective approach and in some cases was deemed detrimental to the process. In one instance, a facilitator who was brought in late to the process commented that the CSC had "no neutral facilitation whatsoever, which occurred for [X] months while the group and District spiraled into higher and higher levels of conflict." One facilitator critiqued the process and provided an overview of the negative practices they witnessed:

> *"Top-down decisions (when the Air District make decisions, even minor decisions such as selecting meeting dates, without collecting input), one way informational meetings that do not include interactive activities (over loading participants with information), expecting participants to make decisions without allowing them 1-2 weeks or a full month to digest information (for example, providing information at a meeting and asking participants to make a decision using that information at that same meeting)."*

In contrast, many facilitators recognized the positive impact of outside facilitators. "Third party, neutral facilitation has proved crucial in building trust between the community and government agencies after generations of discrimination, distrust, a lack of opportunity and poor health outcomes." A community organization representative on the Portside EJ Neighborhoods CSC credits real progress being made in the management of the committees, including the use of a facilitator to replace the system in which the Deputy Air Pollution Control Officer facilitated the meetings without a community co-lead.

"San Diego APCD acknowledged that they had difficulty developing a community process in implementing the goals of AB 617. They worked with the local environmental justice nonprofit to help secure a facilitator that can help with the objectives and dialogue of the meetings. Unfortunately, this took a long time but at the very least community members are getting clarity on the purpose of the meetings and we've seen more interaction among them."

Another observation about the positive improvement in the Portside EJ Neighborhoods comes from one community organization representative.

"So, it seemed like they [Air District] want to minimize what they're doing, and they don't want to be engaged with community or with activists in any level. So, we're pretty skeptical going into AB 617. But they've been pretty-- I think trying in pretty good faith to meet the community's needs on this. And [X] was saying from day one, the first thing out of [X]'s mouth was, 'We're a monitoring community. But this really is about getting better air quality. So really it's about emission reductions.' So, he's been there from day one. We went in thinking we were going to have to have a fight with them about that. Because they're comfortable doing air monitoring. They know how to do that. And we thought, 'Okay. That's what they're going to want to do. And we're going to have to really push them to get them to pay any attention to emission reductions.' But it really hasn't been like that. And on the process stuff, I think they're open to improvements."

Other innovations in the CSC process occurred in San Bernardino/Muscoy's CSC, which designated rotating "co-hosts" responsible for making all people feel welcomed and at home in the meetings. This CSC also used techniques like "progressive stack" which prioritized community members in queuing up speakers as well as opening activities. One of the co-hosts described one such ritual-like method, "So we made a motion to start the agenda of every meeting with a testimony and story from the experts of the community about how this is impacting their health and that we will start the meeting with that tone. And we can remember why we're there." This CSC also was very effective in welcoming comments from the general public at the meetings throughout the agenda.

The San Bernardino/Muscoy CSC is also notable for working diligently to create a culturally relevant and welcoming space. Some of this was based on the work mentioned above which prioritized the voice and experience of its community's diverse members. In contrast, members from a number of other CSCs described some interactions with the Air Districts as culturally insensitive. Survey and interview comments of surveys call for an improvement in the Air District's cultural competencies in order to build collaboration across diverse communities. In particular, many study participants called for additional training in issues such as racial justice combined with proactive hiring practices in order to ensure that Air District staff better represent the communities they are intended to serve. The same recommendation on improved training was made for CARB as well.

Decision-making Processes

One of the ways that community power was represented was through a provision which required that the CSCs have a membership with a majority of residents. However, this majority could have been

diluted if the decision-making process used a consensus instead of a majority vote. In some cases, the Air Districts began the CSCs with the consensus model, but community organizations and residents pushed back against the consensus model. In many cases, CSCs prevailed in implementing a majority vote process. One member of the Fresno CSC described the process which led to the implementation of a majority vote model.

> *"So, there's been three separate votes during this period. The first vote was to get a vote. Because the district initially proposed a consensus process where, what they called, robust discussion would happen [laughter]. And at the end of that, should there not be a majority opinion, the district would make the decision. And the community said, 'No. Hell, no!' [laughter]. And at the next meeting, they opened the meeting, the community opened it by voting on a charter that had a majority vote decision making process."*

In other CSCs where voting was used, some members describe their frustration in having their proposals consistently voted down by the committee majority. As noted throughout, getting clarity from the Blueprint on issues such as decision-making processes can help reduce such conflict in developing the CSCs.

CARB's Roles and Responsibilities

A large number of comments about the CSC meetings were related to concerns about CARB's participation, with many survey and interview respondents looking for the agency to play a more pro-active and community-focused role.

One facilitator commented,

> *"CARB staff needs to provide more direct resources and guidance to the Air Districts and CSC members for the development of the CERPs as well as resources to explain basic air pollution information to community residents. We have CARB staff attend our meetings. They usually sit in the audience and rarely engage in a constructive way. We have had them present at two meetings so far, one on SEPs and on the CAPP Blueprint/CERP process and have not found their engagement helpful. They should be doing more and hire more proactive staff with more experience on community engagement. Their guidance should focus on the development of the CERP and providing resources to empower the participation of SC members to provide more direction to the APCD staff."*

By "resources", this facilitator (and a large number of other study respondents) referred to tools and templates that can be used by CARB, Air Districts, and other stakeholders for effective science communication, community engagement, cross-cultural communication, and conflict resolution.

A public agency member in one CSC observed how the Air District and CARB would divert responsibility between each other in some CSC meetings.

"It seemed like there was a huge cohort of AQMD staff in every meeting, but when a question was asked they would all look around at each other to see who could answer the question. And a lot of times the answer would be 'we don't have any jurisdiction over that, that's CARB's jurisdiction.' CARB did have staff in the meetings, but they would also sometimes say 'we don't have jurisdiction over that, that's AQMD's jurisdiction, or that's the County's jurisdiction etc.' So, I think a lot of the participants in the meetings felt that the result of all the time spent in all those meetings wasn't going to amount to much of a tangible result for the community."

A resident from the Boyle Heights/East LA/West Commerce felt that CARB staff continued to play a passive role at the meetings, despite requests for them to be more proactive.

"CARB has the technical expertise…And that's why there were several engineers, after a lot of prompting on my part in asking them to bring in representatives that would help our cause, because they weren't forthcoming. They only had one representative just as an attendant to the meeting for at least the first three meetings. And then, when I was asking specifically for them to come to this meeting, for them to participate in the meeting-- and they still don't participate in the meeting, they just have more people there."

These two quotes are part of a much broader challenge regarding California's air quality management and its complex jurisdictional structure. In general, CARB has jurisdiction over mobile sources, fuels, greenhouse gas emissions and toxic air contaminants while Air Districts have jurisdiction over industrial and commercial stationary sources, area-wide/residential sources and indirect sources (See Figure 27 in Appendix 2). Because AB 617 addresses elements in both CARB and Air District jurisdictions, both levels of government must collaborate in implementing AB 617. In addition, cities and counties with authority over land use, local traffic routes and urban greening and local transportation agencies with responsibility over transportation planning, regional traffic and roadway infrastructure and regional transit must also play active roles. In many cases, the CERPs developed by the CSCs require action and unprecedented coordination across various agencies, thus creating a challenge and opportunity for governance innovation in California.

Community Capacity and Technical Assistance

The structure and process of CSC meetings, alone, were not enough to develop effective community engagement. Extensive meetings outside these formal spaces were often required. In West Oakland, for example, the West Oakland Environmental Indicators Project (WOEIP) and the Bay Area Air Quality Management District (BAAQMD) created an on-going planning process with weekly meetings with the design team and a technical team (in which WOEIP also played an active role). One Bay Area Quality Management District staff described their local process as follows,

"That has been a very deeply collaborative process to really develop all the agendas, all the materials, all the presentations, everything that moves for and to the steering committee is done jointly. We typically have a meeting which lasts two to three hours every Thursday morning in West Oakland, where we discuss most of the materials and then a lot of our technical discussions that we have with the broader technical team here at the Air District."

In the San Joaquin Valley, community-based organizations would meet before and after every CSC meeting with area residents to build their technical capacity, plan strategies for engagement in the meetings, and debrief the experiences to prepare for the following meetings. This involved extensive and unpaid effort on the part of the residents and a significant – but worthwhile – investment of staff time from the community organizations. Similarly, in the Wilmington/Carson/West Long Beach CSC, community organizations and residents would meet outside of the scheduled CSC meetings to touch base and prepare important discussion topics for following meetings, as noted by a resident. "We will oftentimes coordinate on the side to make sure that we're all on the same page, that we don't contradict each other, and address and hash out some of the issues."

One point of tension was the application and implications of the Brown Act's requirements for open public meetings. This is not specified as a requirement in the Blueprint, nor is any other decision-making process, leaving it to the CSCs to decide for themselves. Some of the CSCs (such as in Imperial County) used the Brown Act to structure their deliberations, decision-making, and overall rules of order. For other CSCs, the use of the Brown Act was more controversial. In South Sacramento for example, for some on the Air District and on the CSC itself, the value of the Brown Act was based on the importance of representation of the group being made by the group as whole. For others, it was interpreted to mean that members of the CSC were prohibited from meet outside the formal meetings. This interpretation made it difficult for the Sacramento CSC to benefit from what a number of other CSCs had put in place to gather informally outside of the CSC meetings in order to build capacity, develop collaborative strategies, and prep and debrief meetings. When several members sought to create these outside meetings, they were prevented by the Air District, causing significant conflict in the CSC.

The technical capacity-building process for CSC members was crucial because the CSC meetings—especially early on—involved extensive presentations by the Air District, CARB staff, and sometimes outside experts. These presentations were often critiqued for being too complex with technical language that was not accessible to many of the CSC members (especially the residents.) This critique was described in over half (29 out of 56) of the CSC interviews. The presentations were designed with very little attention to audience engagement and were, therefore, generally not effective in achieving their purpose of educating the members. Several CSCs, notably in Bay Area and Imperial County made extensive efforts to vet and modify the presentations before the meetings with an eye towards making them accessible for all members of the CSC. Most of the Air Districts began to improve their practices over the course of the process but left much to be desired.

The question of whose responsibility it is to provide sufficient technical capacity-building is an important one. In the case of organizations with sufficient internal capacity such as the West Oakland Environmental Indicators Project, the Central California Environmental Justice Network in the San Joaquin Valley, Coalition for a Safe Environment in Wilmington/Long Beach, Environmental Health Coalition in San Diego, Center for Community Action and Environmental Justice in San Bernardino, or Comité Civico del Valle in Imperial County is being provided by the community organizations. However, more assistance is needed in all settings and is in dire need in some.

Language Justice: Spanish-Speaking Participation & Engagement

One issue affecting equitable participation in the CSCs was the participation of members whose primary language is not English. Problems of language justice is much larger than AB 617, and reflects long historical legacies of racial and ethnic discrimination in the broader society. Nonetheless, it is still an important issue for Air Districts to address. While all Air Districts offered Spanish-language interpreters, it was sometimes difficult for the interpreters to provide equitable access to these members. This difficult arose from a combination of factors including the speed and complexity of the presentations coupled with the limited technical knowledge of some of the Spanish-speakers. There was very limited engagement with Spanish speakers during large-group discussions in the meetings based upon our analysis of the participant observations. Some members later described how they did not feel comfortable speaking, even with the aid of an interpreter. This was different in the small group discussions, suggesting that this format may be more successful. To their credit, most of the Air Districts provided their documents in Spanish and this did aid access to the process for Spanish-speaking members. On the other hand, there were some instances in which the Spanish translations of key documents were not provided by Air Districts in a timely manner.

One CSC member described the problem of Latino participation in the committee, "I think as a Latina, -- because I have definitely experienced this myself-- sometimes you just feel embarrassed. Maybe it's the thought of speaking Spanish in general, or knowing that someone is going to have to translate it into English too." While she is bilingual, she noted that the one mono-lingual Spanish speaking CSC member quit because she did not feel comfortable participating in the committee.

One facilitator in the Portside EJ Neighborhoods CSC commented specifically about attending to the needs of Spanish-speaking CSC members.

> *"As the facilitator, we have noted that speaking in Spanish from the microphone during the meetings and asking Spanish speaking members their opinions/input has increased their participation. When we started, we were told that mono-lingual Spanish speakers on the Steering Committee had never spoken up during the meetings to provide input. So, we have made encouraging their engagement a priority."*

It should be noted that several AB 617 communities have significant populations who speak languages other than English and Spanish such as Hmong, Tagalog, or Vietnamese but no CSC had monolingual residents from these groups. To their credit, the Fresno CSC did have Hmong translation available at their first meeting and the Year 2 Stockton CSC has had Spanish and Hmong translation at their kick-off meetings. This is an issue that the Air Districts ought to consider in their recruitment for CSCs and language access for CSC meetings. Ensuring that Air Districts and CARB have staff with relevant language skills will also help address this issue.

Youth Engagement

One important element to community-engagement in the CSCs is the involvement of young people. One of the Spanish-language survey respondents from the Portside EJ Neighborhoods commented on the problems with limited youth participation.

> *"I have seen that some of the younger people have made suggestions, but the administrators simply disregard them. It has gotten to a point where younger people stopped coming to the meetings and witnessing that makes me sad, I would like to see them come back. They had great perspectives to offer."*

Several CSCs, most notably in West Oakland and Richmond/San Pablo, have focused on youth engagement. In Richmond/San Pablo this has included having a youth advocacy organization member on the CSC in charge of coordinating youth engagement who made it a priority to represent youth perspectives in the meetings. In West Oakland there was also a process led by the Air District to engage young people in the CSC meetings. Even in these communities, however, there were often times little to no youth participation in the CSC meeting themselves because they did not perceive that the process was set up appropriately for them, despite the best efforts of their CSC and Air District supporters. One young adult CSC member took it upon herself to bring the CSC into social media, a platform frequently used by young people.

> *"So, I've actually been trying to boost the Instagram page dedicated to the air quality issue in [X] and really breaking down the problem…because if you don't know what's going on, you don't know what to question…But I know that I really want to push that education, kind of incorporate it into the classroom because in this year we're in where activism and youth advocacy is such a big part of life. It's time for people like us, people that look like us, to step up and to step up in our own community."*

The involvement of young people is an area of potential improvement for all CSCs in the future. This can include involvement of youth-oriented community organizations, connecting with area schools, science museums, and scientists who can serve as mentors for youth members of CSCS.

Community Air Monitoring Plans (CAMPs)

The Community Air Monitoring Plans (CAMPs) have been one of the more innovative elements of AB 617, both in terms of their local as compared to regional/regulatory scale and because of their extensive community engagement in informing what is monitored, where, and how. Based on observations of several CSCs, we noticed that CSC members were very excited to view and demo the monitoring devices and to discuss the monitoring process with Air District staff. This appeared to be an excellent example of science communication and translation.

Overall, there was a high degree of satisfaction among stakeholders about the CAMPs. Respondents to the survey reported 63% being somewhat or very satisfied and only 17% being somewhat or very unsatisfied with the CAMP development process. As seen in Table 6 breaking this down by stakeholder

group, several distinctions emerge. CARB staff and EJ organization representatives had a fairly negative view of the CAMP process, both with only 50% reporting being somewhat or very unsatisfied. In contrast, 80% of residents and 70% of Air District respondents reported being somewhat or very satisfied.

	Community Resident (N=10)	EJ Organization (N=10)	Industry (N=16)	Air District (N=10)	CARB (N=4)
Very Unsatisfied	0%	0%	0%	10%	25%
Somewhat Unsatisfied	0%	50%	6%	20%	25%
Neither Satisfied nor Unsatisfied	20%	30%	38%	0%	0%
Somewhat Satisfied	40%	10%	50%	40%	50%
Very Satisfied	40%	10%	6%	30%	0%

Table 6: Level of satisfaction with the development process for the CAMP in your community by stakeholder group (2020 survey; n=50).

There are some clear distinctions in perception between communities. As seen in Figure 4, in general, there was a strong level of satisfaction with the CAMP development process. At the high end, 100% of respondents in the Portside EJ Neighborhoods reported that they were somewhat or very satisfied with the CAMP process. (Note this result should be treated with caution because it is based on only two responses). At the low end, only 33% of respondents in South Sacramento were somewhat or very satisfied.

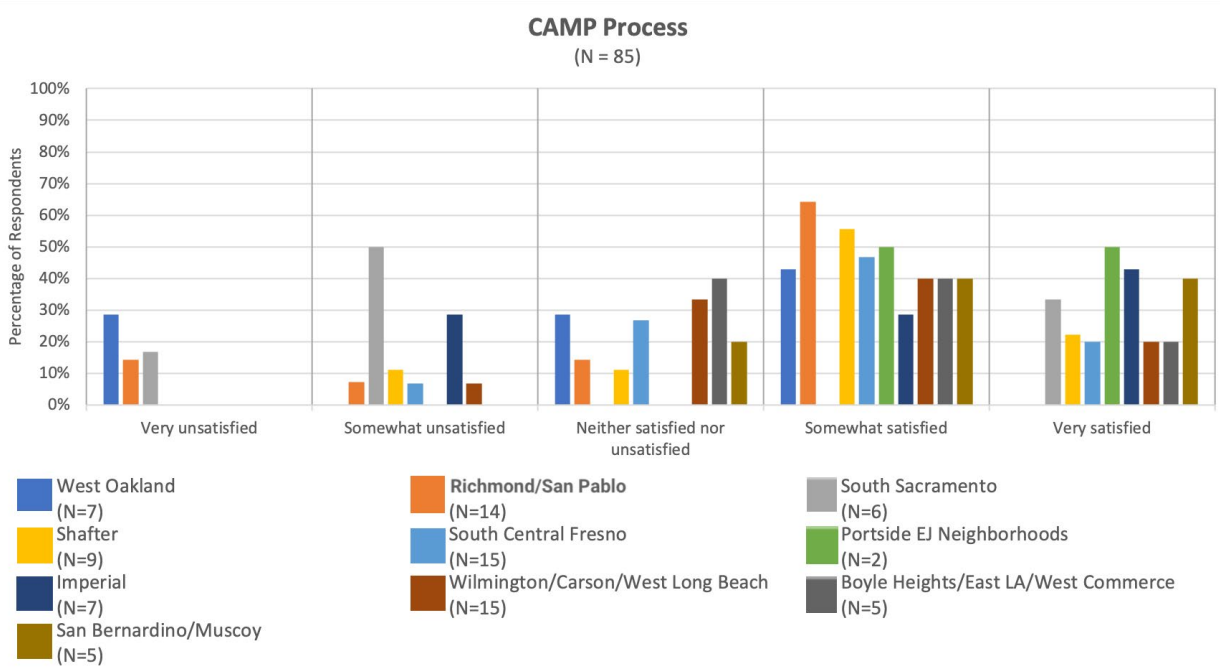

Figure 4: Level of satisfaction with the development process of the CAMP for your community by CSCs (2020 Survey; n=85).

The assessment of the CAMP outcomes was also largely positive but with some variation by community. At the high end, 100% of respondents from Imperial expressed that they were somewhat or very satisfied by the outcomes of the CAMP. Shafter followed close behind with 90% of the respondents reporting being somewhat or very satisfied. Conversely, only 34% of respondents from South Sacramento and 36% from Richmond/San Pablo were somewhat or very satisfied. In both of these latter cases, since the CAMPs are still in process, these should be taken as only preliminary results.

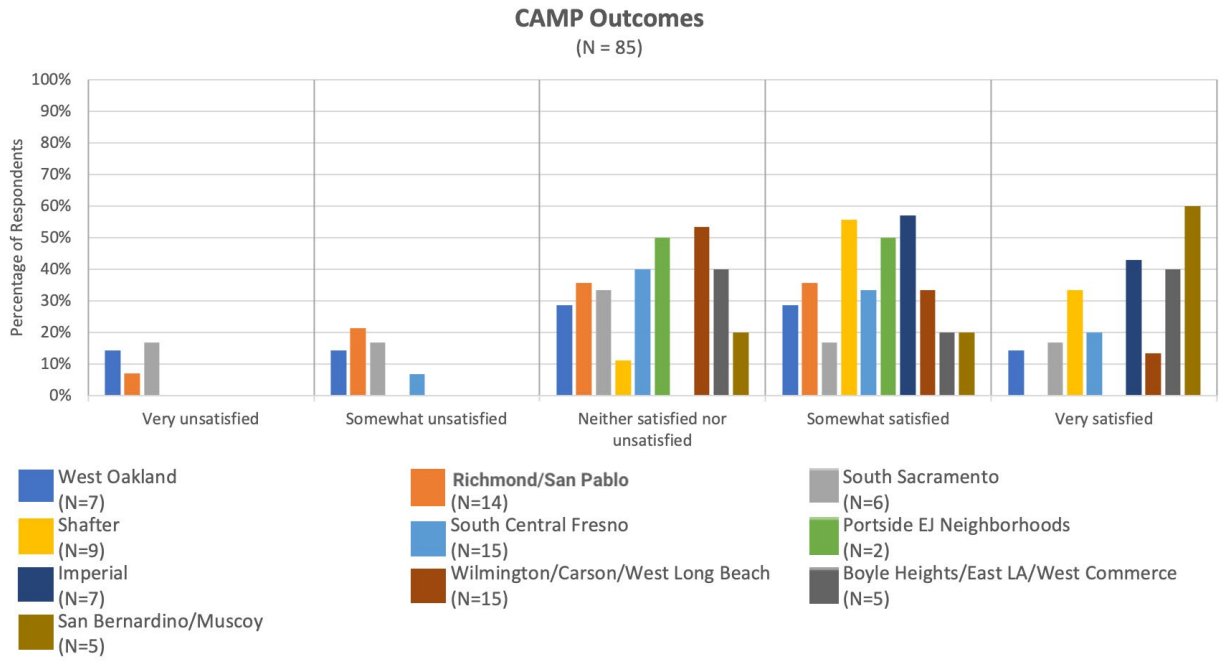

Figure 5: Level of satisfaction with the outcomes from the final CAMP for your community by CSCs (2020 Survey; n=85).

Based on survey and interview data, the negative perception about CAMP outcomes is to a large degree because the CAMP data were not well used by the CERPs due to timing challenges. One CARB staff member commented on this issue as well as the problems in the effectiveness of community engagement in the CAMP.

> *"The development process of the CAMP left much to be desired. Committee members often appeared confused about the process or where they were in the process. As new members joined, they did not undergo an onboarding training and were left to learn by themselves. There appeared to be a lot of confusion regarding the roles of the District and CARB, and often committee members did not even know that CARB staff were in attendance and could support them."*

One resident from the Wilmington/Carson/West Long Beach CSC commented along the same lines. "I think what a lot of the community organizations that have been involved in this process were hoping for is to be directly involved in the monitoring plan, either by selecting the vendors or doing the monitoring itself." Much of this community engagement in monitoring has not come to fruition yet. However, in one significant accomplishment, the final CAMP in this community has integrated the use of low-cost sensors as well as public education to use them along with Air District support for data quality assurance. Likewise, Imperial, West Oakland, Shafter, Fresno, and Richmond/San Pablo have all made use of community-based air monitoring.

In several CSCs, there was controversy over where the monitoring should occur. Residents and community organizations often recommended implementing a wider monitoring area while the Air Districts pushed back to maintain what they felt was a more manageable scope. This was upsetting to a

number of CSC members who felt like their local expertise in identifying important neighborhood sources was being disregarded. One CSC member described this as follows,

> *"I could tell you I was a little disappointed with our air monitoring rollout. Well, one is we couldn't get enough monitors. So, there's a backlog because, I guess, everybody's ordered monitors, so we were only able to receive four. So, we put out four in the community. The Air Quality Management District had come up with a different plan, and we kind of rolled with their plan rather than our plan. And so that's where the disappointment was…. Well, there's sort of a little bit of a struggle with that through the whole process and in my opinion. And part of it started with the community map itself...I know I wanted to include the train tracks along [X] Boulevard…that's only a half a mile down from the boundary. I just happen to know that area is an industrial area all the way through the train tracks. And so, including that would've been, in my opinion, an easy thing to do; and so, we chose not to go beyond [X] Boulevard."*

A number of comments expressed challenges between the timing of the CAMPs and the timing of the CERPs. Since there was little time between the CAMPs' development and the CERPs' development, there was often little monitoring data that could be used to inform the CERP. One EJ organization member on a CSC commented, "Development of the CAMP was heated in that there was a deadline set by CARB which required educating and asking for input from the CSC in an expedited fashion. The CSC did not feel fully confident by the final approval as there were questions still lingering regarding some aspects of the plan. It should be noted that, contrary to this quote, the deadline for monitoring deployment was set in the statute and not by CARB. While dissatisfied by the process this respondent commented that the "final CAMP is satisfactory in that it will fill data gaps in the community selected, tracks progress for the CERPS, and builds capacity within the air district to continue the work beginning with the program." It should be noted that CAMP data can be used to provide feedback on the progress of CERP implementation over time.

Additionally, there were disagreements regarding the usage of non-regulatory monitors in the CAMPs. In some CSCs low-cost and often mobile monitors were viewed as a useful complement to the fixed and more expensive Air District monitors. These are also often deployed by community organizations (such as those in West Oakland, Richmond/San Pablo, the San Joaquin Valley, Wilmington/Carson/West Long Beach, and Imperial County) that may provide important data for the CAMPs. However, there were some who criticized the reliance of these non-regulatory monitors. This was expressed in an email message delivered by an organization represented on a CSC which called for "advanced air monitoring for poor neighborhoods … no toy monitors please. Honor AB 617 GHG [greenhouse gas] reduction." Some have also critiqued the role of private companies with the perception that they are seeking to cash in on the AB 617 process in ways that are not beneficial to the communities involved. Questions of what kinds of monitors to use, by whom, and in what combination remain unresolved and continue to cause confusion in the development and implementation of the CAMPs.

Community Emissions Reduction Plans (CERPs)

The element of the AB 617 process that has attracted the greatest attention and generated the greatest controversy is the development of the Community Emissions Reduction Plans (CERPs) because they are

the means by which the policy can meet its intended goal of improving air quality in disadvantaged communities. While there are some very positive and promising achievements with the CERPs, there have also been many critiques – especially from residents and EJ-oriented community organizations – regarding how well the CERPs will achieve meaningful air emissions reductions and subsequent health improvements.

It is important to recognize that the data for this section of the report has a timing challenge in that some of the CERPs are still in the approval process as of this writing and even the most recent survey that closed in March 2020 came before some of the recently approved CERPs. Nonetheless, it is still valuable to track the progress along the way to better understand the patterns and implications of the community engagement process in the plan's development. Data in this section is drawn only from the CSCs that have CERPs. These data are not broken out by stakeholder groups or CSCs since the responses (n=54) don't allow for this disaggregation.

There is a moderately positive assessment of the CERP process in the surveys with only 57% of respondents reporting that that they were either somewhat satisfied or very satisfied. Still there were 24% reporting that they were somewhat or very unsatisfied, indicating some degree of concerns and 19% who were neither satisfied nor unsatisfied. As illustrated by the quotes below, this negative review is based largely in critiques about how well the Air Districts reflected the perspectives and proposals of the CSCs.

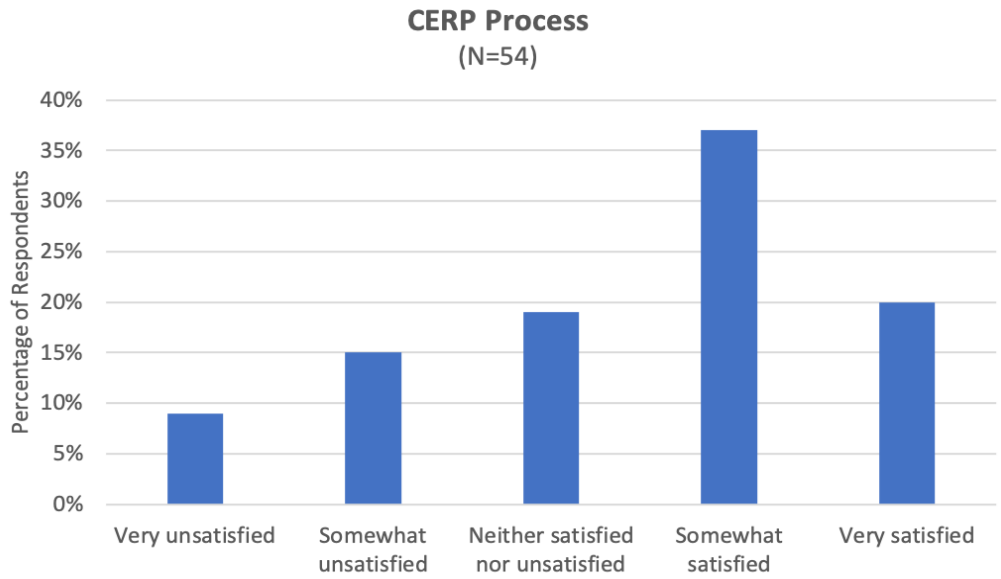

Figure 6: Level of Satisfaction with CERP process (2020 Survey; n=54).

This moderate support view is reflected in the assessment of the outcomes of the CERP with only 53% reporting being somewhat or very satisfied and 16% reporting being somewhat unsatisfied or very unsatisfied. This leaves a fairly high level (30%) of those who were neither satisfied nor unsatisfied, indicating a less than ringing endorsement of the CERPs.

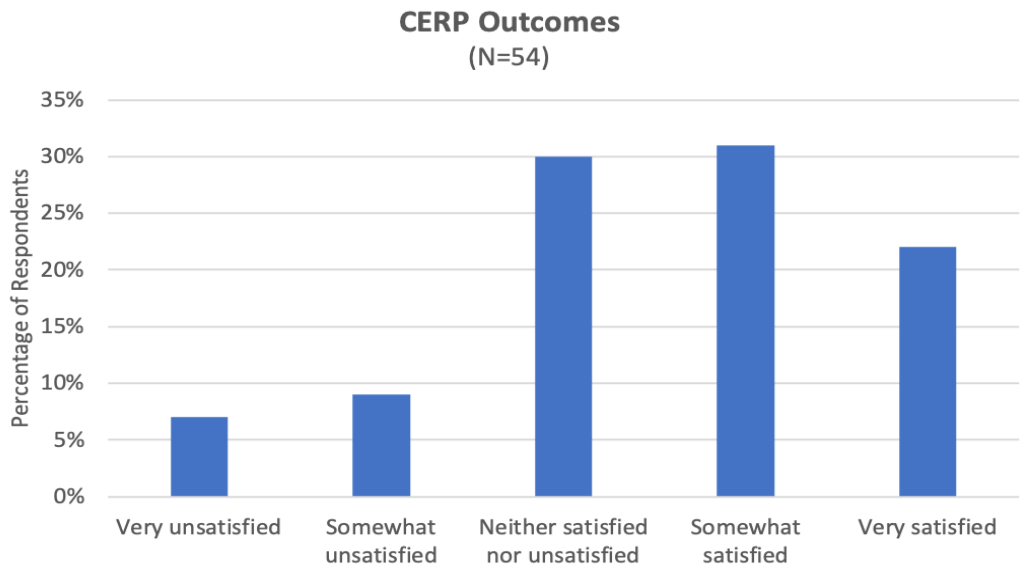

Figure 7: Level of Satisfaction with CERP outcomes (2020 Survey; n=54).

There is also a moderate overall level of satisfaction across the different elements of the plans with between 52% to 60% of respondent reporting being satisfied or very satisfied with the different aspects of the CERPs. Still it is important to acknowledge that between 18% to 24% of respondents reported that they were somewhat or very unsatisfied with the CERP components and between 22% and 24% who were neither satisfied nor unsatisfied.

		Very Unsatisfied	Unsatisfied	Neither Unsatisfied nor Satisfied	Satisfied	Very Satisfied	Total
1	Community Identified Actions	4%	14%	22%	29%	31%	51
2	Extent to which it includes an appropriate mix of incentives relative to rules, regulations, and enforcement	6%	18%	24%	25%	27%	51
3	Extent to which it goes above and beyond Air District commitments	4%	16%	22%	39%	20%	51
4	Extent to which it is sufficient to make significant efforts in improving air quality	6%	16%	24%	33%	22%	51

Table 7: Level of satisfaction with the CERP for your community (2020 Survey; n=51).

Positive comments about the CERPs focused both on their participatory process of development and on the activities set forth in the plan. West Oakland's plan was generally recognized as an exemplar of success. The fact that the plan is titled 'Owning Our Air: The West Oakland Community Action Plan'

speaks to its strong emphasis on community empowerment. According to one Bay Area Air Quality Management District staff member,

> *"West Oakland is really a model. It was truly community-driven, the technical work is groundbreaking and unmatched in California. As we move into implementation, the community's ownership of the plan is doing wonders in bringing key players to the table like the Port of Oakland, City of Oakland, Alameda County Transportation Commission and Caltrans. This is key, since land use and transportation are driving exposure there."*

The draft CERPs in the San Joaquin Valley were met with significant criticism in their draft forms. A CERP comment letter submitted by a coalition of organizations in the San Joaquin Valley noted the lack of reflection of community input within the Air District's draft plan for South Central Fresno.

> *"Members of the Community Steering Committee created and submitted a list of 40 strategies for incorporation into the Draft CERP to address these concerns. The proposed strategies focus and accelerate actions to provide direct emission reductions within the community to maximize reductions in exposure to applicable toxic air contaminants, area wide sources and direct PM2.5… The Air District incorporated only 1 of the 40 recommended strategies drafted by community residents into the draft CERP."*

In a letter to CARB, members of the California Environmental Justice Alliance (which includes several of the prominent EJ organizations in the San Joaquin Valley) expressed their concern that the South Central Fresno CERP does not "include clear quantifiable emissions reduction targets for several emission sources including heavy duty mobile sources, older/high polluting cars, residential burning, agricultural open burning, industrial sources, land use and urban sources, exposure reduction measures, and health protective targets."

In contrast with the negative review of the draft CERPs in the San Joaquin Valley and elsewhere in the state, some CSC members credited the active engagement of CARB in encouraging the Air District to adopt more of the community-led proposals. At the CARB board meeting to consider approval of the Fresno CERP, for example, there was very constructive dialogue between the CARB board, the Air District and the CSC. This led to the Air District agreeing to establish a Memorandum of Understanding (MOU) between themselves and other local jurisdictions to address key issues such as land use, diesel truck routes, measures to ensure the protection of school sites. These were some of the major requests that CSC members wanted but were not in the initial CERP. This shows CARB's ability to support the Air District to be more responsive to community needs. This pro-active role of CARB is one of the major transformations involved in the AB 617 process.[10] One community organization member involved in the Shafter CSC commented positively on the outcomes of the CERP but also voiced concern on the extensive process to arrive at the final outcome.

[10] California Air Resources Board. Board Resolutions 2021. California's Official State Website. Retrieved April 3, 2020, from https://ww2.arb.ca.gov/board-resolutions-2020

> *"We are very pleased that pesticide TACs [Toxics Air Contaminant programs] have been incorporated into the Shafter AB 617 CERP. We're also pleased that CARB, the Air District and DPR [Department of Pesticide Regulation] recognized multi-jurisdictional authority over pesticide The wins described above are great improvements, but the Shafter Steering Committee had to expend an EXTRAORDINARY [all caps in original] and unrealistic amount of effort to make sure pesticide TACs were included in the process and that the actions above were taken. Hopefully it will mean that future communities won't have such a big lift with respect to pesticide TACs."*

This represents a major shift in the development of the CERP, as the Air District originally resisted the inclusion of pesticides in their document because of their position that pesticides were outside of their purview. It was only through the advocacy of the residents and EJ organizations on the CSC and the willingness of the Department of Pesticide Regulation (DPR) to provide monitoring and take other regulatory action, and support by CARB that this provision was included in the final CERP.

Residents and advocates on the Wilmington/Carson/West Long Beach CSC were gratified by several key provisions in the final CERP. Initially, a majority of residents and community organizations on the CSC rejected the first draft of the CERP, prepared by the Air District, because they felt it contained insufficient reduction targets for emissions reductions from mobile sources. They were also unsatisfied with the minimal attention placed on stationary sources. In the end, they took great satisfaction in their advocacy and the hard work of the Air District that led to a provision for a 50% reduction in refinery nitrous oxides (NOx), sulfur oxides (SOx) and volatile organic compounds (VOCs) emissions in the next 10 years. The final CERP also added specific regulations with reduction targets for refinery boilers and heaters, flares, storage tanks, and other VOC leaks. Additionally, they appreciated that despite earlier resistance of the Air District, the final CERP was the only one in the state to include a public health assessment as well as actions on operating and abandoning oil well sites. Along with these positive comments, there were a number that point to the plan's shortcomings. (Because some of these quotes come from the comment letters on the draft CERPs, they should be considered not as a final judgement, but to provide insights into the process.) A resident CSC member from Boyle Heights/East LA/West Commerce commented in an interview that, due to the CERP's tight timeline, the plan was unable to fully incorporate important community priorities within the CERP.

> *"It's been rushed. It really has been rushed. There hasn't been really a lot of-- well, there has been a lot of discussion, but it seems like there is drawing on-- of course, they have to appease many people. But the community came together as a group, early on in the plan, and identified priorities. But I don't feel that the top two priorities have really been addressed, which is the bulk of the-- which has been the bulk of our issues for generations."*

The issues in this case were truck traffic and freeways. Overall, the issue of including mobile sources challenge as such emissions are in the jurisdiction of CARB, not the Air Districts. However, the Blueprint is clear that mobile sources must be included in the CERPs.
A community organization on the San Bernardino/Muscoy CSC critiqued the mix of emission reduction measures and the lack of measurable targets or metrics. "Currently, the CERP overwhelmingly focuses on education, outreach and enforcement - strategies that are necessary and important parts of the plan. However, they must be matched with subsequent emission reduction goals and health outcome targets.

A community health assessment must be required to measure the existing health standards baseline in order to have quantifiable goals and targets." A letter to CARB from CEJA on the final CERP expands upon this criticism, "The San Bernardino, Muscoy CERP does not include direct actions or emission reduction requirements for major sources in the community including the concrete batch, asphalt batch, and rock/aggregate plants."

A number of comments focused on how the CERPs were limited in addressing health outcomes, including this statement from a community organization interviewee in Boyle Heights/East LA/West Commerce. "The various members of the CSC have been very clear in their request to see specific emission reduction targets that include a nexus with community health outcomes. Yet, the draft CERP continues to lack specific emissions reduction targets, let alone targets based on health outcomes." One community resident in Wilmington/Carson/West Long Beach recognized the challenges of linking emissions reductions to health outcomes, but still urged the Air District to help improve community health outcomes even if there are challenges in measuring or tracking such progress.

> *"There is a big community push on having a health nexus to emissions reduction plan. Basically, something in there that shows how the CERP will improve community health. Now I get where AQMD is coming from, and their staff is coming from. It's like we don't-- to do a one to one ratio of okay, we've reduced pollution by this much. We expect this much reduction in asthma cases. I know that it's very hard to do that. I think that particular issue has been more difficult to get traction off from staff."*

The role of public health in the AB 617 statute and Blueprint is complex. Both the statute and the Blueprint call for the development of strategies to reduce criteria pollutants and toxic air contaminants that will have positive health effects. While there is strong evidence that emissions reductions improve health conditions, it is difficult to correlate emissions reductions to specific health impacts. Furthermore, in a resource-limited context, allocating funding for health tracking projects can reduce available funds for emissions reduction activities. Nonetheless, building and implementing a public health framework for AB 617 can help the Air Districts and CARB respond to community interests in addressing health disparities in disadvantaged communities.

The range of illustrative comments here suggests that the CERP process and outcomes have achieved some notable success, but with room for improvement. It also demonstrates that there was substantial progress in the latter stages of the CERP process, speaking well of the CSC members' success in advocating for their envisioned plans, the willingness of the Air Districts to address at least some of the CSCs' demands, and the crucial role of CARB acting as a backstop to ensure that the community voice was integrated into the final plans.

Community Air Grants

The AB 617 Community Air Grants have allocated over $15 million in two rounds of funding to 57 recipients. In the first round of funding in 2018, 10 of 28 air grants were awarded to organizations associated with the selected CSCs. In the second round of funding in 2019, 15 of 29 air grants were awarded to organizations associated with the selected CSCs. According to CARB's grant guidelines the

purpose of the grants is "to provide community-based organizations in California an additional opportunity to participate in the implementation of AB 617 and the means to acquire some logistical and technical assistance to support those participation efforts. The Community Air Grants Program also aims to foster strong collaborative relationships between communities, air districts, CARB, and other stakeholders.[11]" Based on the surveys and interviews from the period of the first and second round of grant funding, there a moderate level of support for the Community Air Grants but this varied widely among stakeholders and over the two years of the program.[12]

In the 2017/2018 round of grants (shown in Table 8 below), there were mixed stakeholder responses, with Air Districts having the lowest ratings of satisfaction on both the grant making process (45% expressed that they were somewhat or very unsatisfied with the grant making process and 50% were somewhat or very unsatisfied about the selected grantees). In contrast, 0% of residents and 0% of CARB staff reported being somewhat or very unsatisfied about either the process or the selected grantees (There were only 3 CARB respondents so this finding should be taken with a note of caution).

		Community Resident (N=10)	EJ Organization (N=10)	Industry (N=10)	Air District (N=11)	CARB (N=3)
The Grant Making Process	**Very Unsatisfied**	0%	0%	10%	9%	0%
	Somewhat Unsatisfied	0%	10%	10%	36%	0%
	Neither Satisfied nor Unsatisfied	50%	50%	50%	36%	50%
	Somewhat Satisfied	30%	30%	30%	18%	30%
	Very Satisfied	20%	10%	0%	0%	20%
The Selected Grantees	**Very Unsatisfied**	0%	10%	10%	9%	0%
	Somewhat Unsatisfied	0%	0%	30%	18%	0%
	Neither Satisfied nor Unsatisfied	50%	10%	30%	55%	33%
	Somewhat Satisfied	30%	60%	30%	9%	67%
	Very Satisfied	20%	20%	0%	9%	0%

Table 8: Level of satisfaction with the Community Air Grants program by stakeholder groups (2018-2019 Survey; n=44).

There was some variation in the second round of the community air grants (Table 9). At the low end of support, again 50% of Air Districts were somewhat unsatisfied or very unsatisfied with the grant making process and 10% were very unsatisfied with the selected grantees. This low rating contrasts with CARB for which 0% were somewhat unsatisfied or very unsatisfied by the grant making process and 0% were

[11] California Air Resources Board. Community Air Grants 2017 – 2018 Guidelines. California's Official State Website. Retrieved April 4, 2020, from https://ww2.arb.ca.gov/resources/documents/community-air-grants-2017-2018-guidelines.

[12] The respondent sample between the 2018 – 2019 and the 2020 surveys are significantly different so these results should be taken independently, not as a measure of change in the same population.

somewhat unsatisfied or very unsatisfied by the selected grantees. Environmental justice organizations also had a relatively high rating with only 9% being very unsatisfied and 64% being somewhat or very satisfied with the grant making process and with the selected grantees. The fact that 8 of the 11 respondents were Community Air Grant recipients may account for some of this positive response.

		Community Resident (N=10)	EJ Organization (N=11)	Industry (N=12)	Air District (N=10)	CARB (N=9)
The Grant Making Process	**Very Unsatisfied**	18%	9%	0%	10%	0%
	Somewhat Unsatisfied	0%	0%	0%	40%	0%
	Neither Satisfied nor Unsatisfied	46%	27%	62%	20%	44%
	Somewhat Satisfied	18%	55%	39%	10%	56%
	Very Satisfied	18%	9%	0%	20%	0%
The Selected Grantees	**Very Unsatisfied**	10%	9%	0%	10%	0%
	Somewhat Unsatisfied	0%	9%	8%	0%	0%
	Neither Satisfied nor Unsatisfied	30%	18%	58%	60%	44%
	Somewhat Satisfied	40%	55%	33%	20%	56%
	Very Satisfied	20%	9%	0%	10%	0%

Table 9: Level of satisfaction regarding the Community Air Grants by stakeholder groups (2020 Survey; n=52).

There was some variation in opinion about the use of the grants with many comments recommending that the grants be directly tied to the AB 617 implementation communities, and in particular, to improve the CERP process. One Air District staff member recommended a targeted approach. “Air Grants should also be a mechanism to support participation in implementing the CERPs; this should be a high priority category within the Request for Proposal (RFP), as this is the kind of work that would enhance community participation in making the CERPs successful.”

However, there were some comments that pushed for a more expansive approach. One industry representative, for example, observed that a broader approach would be needed. “Currently, air grants are limited to the designated AB 617 community. In many cases, the air emissions affecting these communities are generated by facilities outside the AB 617 community and those facilities should be eligible for the air grants program.” It should be noted that this is not correct, as the air grants are not restricted to AB 617 communities and there are grantees outside these communities.

Like the community selection process, there is some tension about how widely or focused the Community Air Grants should be distributed, a decision that CARB will need to make in the next round of grants. A separate evaluation that reviewed the each of the air grants individually would be needed to

assess the effectiveness of the implementation of these grants: a step that would be beneficial to CARB as it develops its future plans for the grants.

Environmental Justice

Environmental justice (EJ), as a specific term, is not mentioned in the AB 617 statute and has only a basic definition in an Appendix of the Blueprint.[13] This is unfortunate as EJ is arguably a value that informs the policy as a whole. Therefore, the lack of more extensive treatment of EJ presents a challenge in assessing how well the implementation meets a standard of addressing environmental justice. According to EJ activists and scholars, EJ is often defined as having three components. First, there is a process component, in which communities confronting environmental pollution should be at the center about decisions that affect their lives. Secondly, there is an outcomes component which ensures that no community is subjected to disproportionate impacts. Lastly, there is a respect for diverse forms of knowledge including local knowledge about people's own experiences and bodies.[14] The AB 617 process, as captured in the responses below, has touched on all of these aspects of environmental justice with generally positive results.

As seen in Figure 8, it is notable that in the 2020 survey 85% of the EJ organization respondents reported that they were somewhat satisfied or very satisfied with the incorporation of EJ into AB 617. This was the highest level of satisfaction compared to other stakeholder groups. The stakeholder group with the lowest level reporting being somewhat or very satisfied was industry (39%). One industry representative commented on their survey, "Do not agree with a lot of their principles, it is known that they are anti oil/ farming/dairy." Several industry representative members commented in their interviews that they were concerned that restrictions placed on their and other firms would hurt the economies of the communities. This was contested by many residents and community organizations who sought a win/win solution of a green transition to sustainable industries such as solar, electrification, and other sectors.

[13] The Blueprint's Appendix I defines EJ as "The fair treatment of people of all races and incomes with respect to development, implementation and enforcement of environmental laws, regulations, and policies" following California Government Code Section 65040.12 and California Public Resources Code Section 72000).
[14] Schlosberg, D. (2009). Defining Environmental Justice: Theories, Movements, and Nature. Oxford University Press.

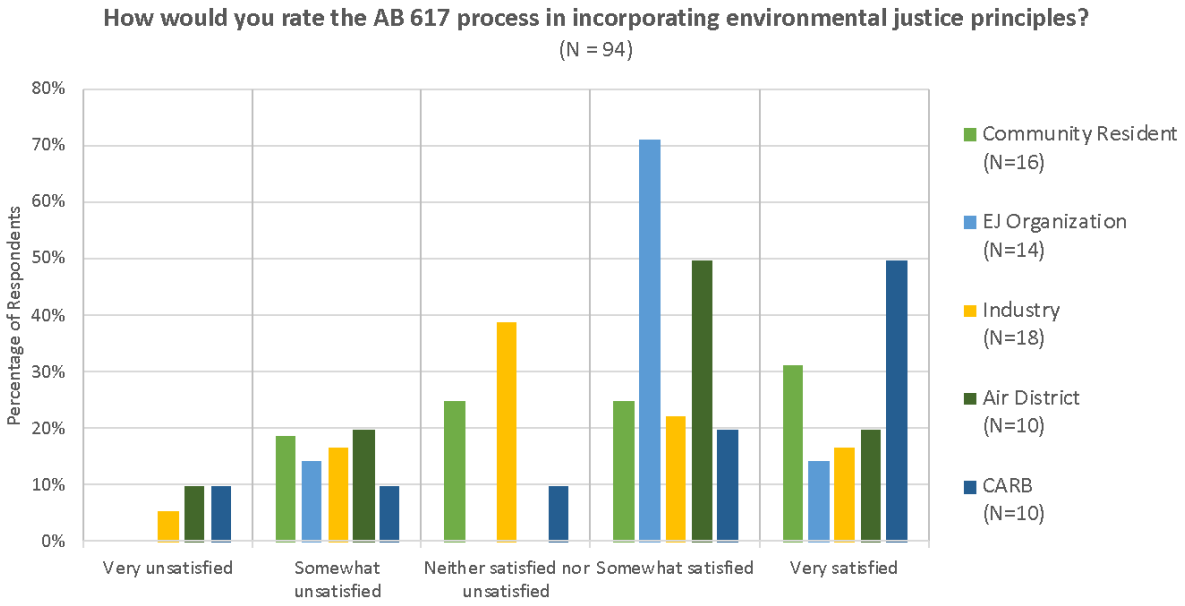

Figure 8: "How would you rate the AB 617 process in incorporating environmental justice principles?" by stakeholder groups (2020 Survey; n=94).

There were a number of critical comments about the integration of environmental justice from the surveys and interviews across of the stakeholders that would be valuable to consider to improve the future implementation of AB 617. One EJ advocate on a CSC expressed mixed reviews in their 2018-2019 survey response for the implementation of EJ by the Air District,

> *"As far as bureaucrats go, it is difficult to discern their concern for environmental justice issues. They pay lip service but continue to perpetuate the same systemic issues, despite the incorporation of environmental justice issues into the AB 617 process. Despite this, I chose "somewhat satisfactory" because the inclusion of EJ principles, in of itself, is a big step in the right direction."*

A number of respondents sought to expand the understanding of environmental justice, including one advocate who placed the concept in a larger historical perspective.

> *"And the other principle is understanding structural and historical obstacles that these people--that have led for them to become environment justice communities and that comes with a form of understanding equity and understanding like, okay, we're going to have to invest more in the communities in this area and in this region both in their capacity and in education and understanding where they're coming from."*

One resident in a rural community described her and other residents' efforts to represent their unique lived experiences of EJ compared to others on their CSC. A critical part to achieving environmental justice involves recognizing and honoring the experiential knowledge and histories of people facing environmental justice.

"And we're going to keep working because people…they have never really lived in the community like us out here. They haven't lived where we have lived, and be sheltered in town. I mean, they don't have the direct dust coming all over us, clouding us with all those contaminants and stuff. So, to me, it's like they were coming from a place where-- I mean, they have paved streets, they have curb and gutter, they have light, they have this, they have that. I mean, they're shielded and we're right in the middle of it."

One Air District staff provided some context for the challenges that their agency experienced on attempting to implement an EJ approach in their survey response.

"There is not enough guidance from the State as to what is considered environmental justice principles and how that relates to current law for decision making process. Many community members and agency staff have different interpretations of what that may mean to them or their agencies. There needs to be clear expectations so that agency staff can fulfill the expectations of community, legislation, and CARB."

Another Air District staff member commented in an interview on the challenge of balancing the interests of groups involved in the AB 617 process and noting a new commitment to EJ.

"If we're too soft there, then we draw the ire of the environmental justice groups for good reason, for not doing our job. If we go too far, we draw the ire of the public and the elected Board of Supervisors, hurting the economy. So, in that spirit, truly they take that kind of spirit and apply it to now working shoulder to shoulder with the environmental justice community."

An industry representative expressed interest in getting greater clarity for Air Districts on how to implement EJ.

"The AB 617 law can have stronger language on what it means for the Air Pollution Control District to meet the principles of environmental justice. The importance of meeting these principles will help the port, industry and other businesses understand the need to achieve environmental justice and how these resources can help us achieve those goals."

One population that is not frequently included in the AB 617 discussion are tribal communities.[15] One tribal government representative stated in their survey response that,

"The program could develop understanding of Tribal Nation specifics. There are 109 federally recognized tribal nations within California, tribal lands are not well represented in the data sets that drives focused air pollution attention. Developing a mechanism for understanding how tribal communities (often disadvantaged, low income, and vulnerable) are impacted by

[15] It should be noted that CARB has conducted a number of tribal outreach activities with both federally recognized and not recognized tribes across the state. CalEPA's tribal protocol lists 80 tribes that are currently not federally recognized.

stationary and mobile sources (toxic hotspots, legacy diesel energy use, tailpipe emissions, other) would improve the program for tribes and by extension, the state."

Finally, some CARB staff recognize the uneven quality of EJ's integration in the program. As one staff member put it, "Onboarding of CSC members should include training on environmental justice principles. Staff at CARB and Air Districts should also receive training on those principles. Given that these trainings did not occur, the inclusion of EJ principles varied widely by CSC. There was no 'backstop' at CARB when it became clear that some CSCs were going ahead without meaningful EJ engagement/leadership structures."

One observation from the surveys and interviews is that respondents rarely explicitly brought up the intersection of race, racism and environmental justice. This may be because race is assumed to be part of the concept of EJ as many of the CSC residents and community organizations operate from an explicit racial justice framework. However, without this laid out in specific terms in the AB 617 policy and Blueprint, there is a lack of attention placed on identifying the causes and remedying the impacts of racial disparities. More broadly, the lack of specific language and guidance in the Blueprint on EJ there was a difficulty in communication between CSCs and Air Districts over how to address issues of race and racism in the CSC process and outcomes in the CAMPs and CERPs.

In an effort to address this issue, some AB 617 stakeholders (particularly from the West Oakland CSC) reference Title VI of the Civil Rights Act and associated California State law (Government code section 11135, which requires due diligence in avoiding disparate racial impacts of policies. They recommend that AB 617 be framed through a civil rights lens. This would require that CARB and the Air Districts commit to embedding these standards into the Blueprint, CSC partnering agreements, and metrics for assessing the success and impact of the CERPs.

According to stakeholder surveys and interviews, this could be accomplished by emphasizing that compliance with Title VI is a legal requirement applicable to CARB, the Air Districts and any stakeholders who are recipients of federal or state funds. As described by a member of the West Oakland CSC,

"The AB 617 program needs to incorporate concepts and tools from the past several decades of implementation of the federal Clean Air Act and Civil Rights Act of 1964. There is also an unnecessary vagueness around 'partnering' and 'collaboration', both of which, if left undefined and supported by detailed guidance, will continue to AB 617 program's suffering from unrealistic and unmet expectations as experienced by EJ communities."

In summary, there is a level of moderate satisfaction with the way that AB 617 has integrated EJ into its process and outcomes but with clear room for improvement. A clear pattern is that respondents are seeking greater clarity from CARB about the definitions and associated standards of environmental and racial justice as well as clear metrics to ensure that they are being met.

Overall AB 617 Assessment

AB 617 is a work in progress, given that it has just finished its production of the first round of CERPs in its 10 pilot communities and is launching on its second round of 3 communities (of this writing in June 2020). It is, therefore, too early to provide a definitive and comprehensive statement of its success. However, there were a large number of responses in the surveys and interviews that speak to a conclusion that AB 617 has been a qualified success in its pilot stage but with many remaining questions and concerns about how well it will meet its potential to truly improve conditions in the state's most polluted communities.

In the 2020 survey, the majority of respondents (59%) reported being somewhat satisfied or very satisfied with the achievement of AB 617 in meeting their goals with 16% reporting being somewhat or very unsatisfied. The remainder of 25% reported that the progress has been neither satisfied nor unsatisfied. On the summative survey question, "Please rate your level of agreement or disagreement with the following statement: Participating in the AB 617 process has provided benefits to my community," 73% reported agreeing or strongly agreeing and only 9% reported disagreeing or strongly disagreeing.

Breaking this down by stakeholder group shows some significant variation. For example, while only 45% of industry representatives reported being somewhat or very satisfied with the achievement of their goals 72% of CARB staff and 60% of EJ organization representatives reported this high level of satisfaction. All of the other stakeholder groups reported more than a 50% level being somewhat or very satisfied. And yet, nearly 12% of residents (followed closely by Air Districts) reported being very unsatisfied in the achievement of their goals, the highest of all stakeholder groups.

	Community Resident (N=17)	**EJ Organization (N=15)**	**Industry (N=22)**	**Air District (N=9)**	**CARB (N=11)**
Very Unsatisfied	12%	0%	5%	11%	0%
Somewhat Unsatisfied	0%	7%	27%	11%	0%
Neither Satisfied nor Unsatisfied	29%	33%	23%	11%	27%
Somewhat Satisfied	29%	53%	36%	33%	46%
Very Satisfied	29%	7%	9%	33%	27%

Table 10: Level of satisfaction of meeting your goals to date by stakeholder groups. (Survey 2020; n=74).

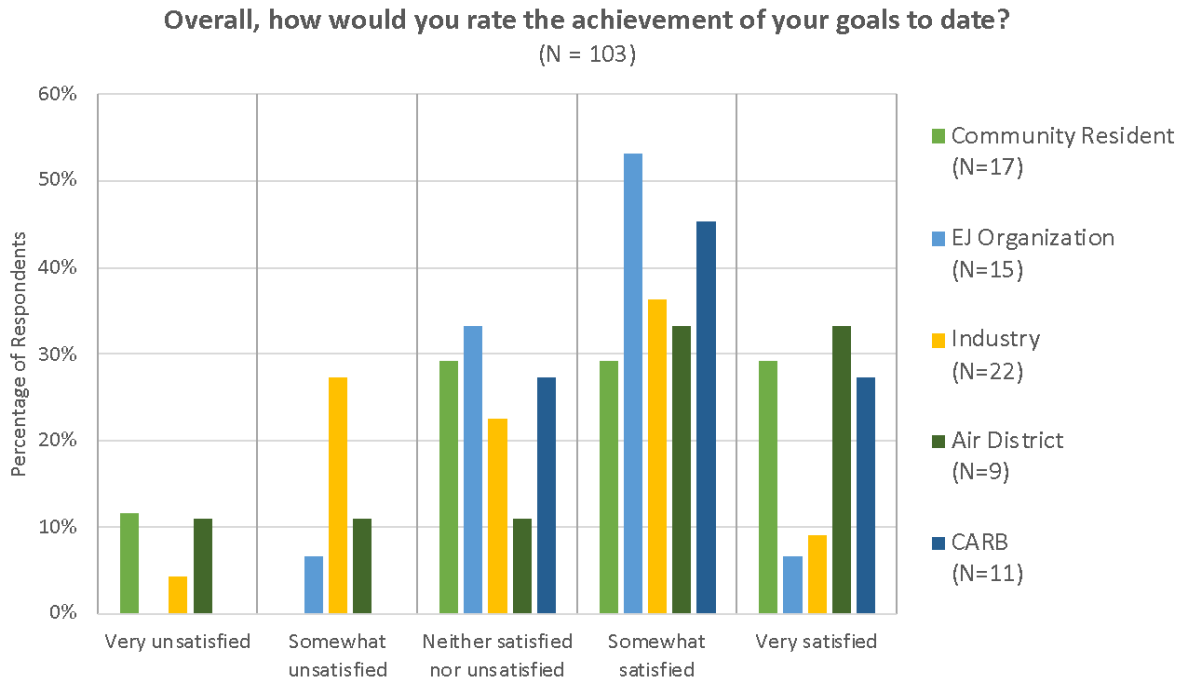

Figure 9: Level of satisfaction in meeting your goals to date by stakeholder groups (Survey 2020; n=103).

On the question of level of agreement or disagreement that participating in the AB 617 process has provided benefits to their community, there is also a generally positive response with some variation by community.[16] More than 60% of respondents in all 10 communities reported either agreeing or strongly agreeing that the process has provided benefits to their community. The most positive communities being Shafter and Portside EJ Neighborhoods (100% agreeing or strongly agreeing) and the lowest two being Wilmington/Carson/West Long Beach (69%) and Richmond/San Pablo (62%) agreeing or strongly agreeing. This is seen in Table 11.

	West Oakland (N=12)	Richmond / San Pablo (N=13)	South Sacramento (N=8)	Shafter (N=10)	South Central Fresno (N=19)	Portside EJ Neighborhoods (N=7)	Imperial (N=9)	Wilmington/ Carson/West Long Beach (N=16)	Boyle Heights/ East LA/West Commerce (N=8)	San Bernardino/ Muscoy (N=6)
Strongly Disagree	0%	0%	0%	0%	0%	0%	11%	0%	0%	0%
Disagree	17%	8%	13%	0%	5%	0%	0%	6%	13%	0%
Neither	8%	31%	13%	0%	5%	0%	0%	25%	0%	17%
Agree	42%	31%	50%	60%	53%	71%	56%	25%	13%	33%
Strongly Agree	33%	31%	25%	40%	37%	29%	33%	44%	75%	50%

Table 11: Level of agreement that participating in the AB 617 process has provided benefits to my community by CSCs (Survey 2020; n=108).

[16] Some respondents to the question of how strongly they agreed or disagreed with "Participating in the AB 617 process has provided benefits to my community" indicated association with multiple communities making the total responses higher than the number of respondents. These were primarily Air District and CARB staff.

Overall, community engagement in AB 617 implementation has achieved an impressive range of successes while experiencing some significant challenges. In some cases, the challenge represents a success that is only partially realized. Many comments from the survey and interviews report hard-won – although not complete—progress.

A comment from a CARB staff member observed a positive trend in the agency's engagement in AB 617. "CARB has benefited greatly through this process, even though it was painful at times. I believe that the agency is better equipped to serve the public by having to work through AB 617 implementation."

One Bay Area Air District staff member reported on the transformative impact of AB 617, "We've learned so much from this program. Working closely with the community has been very rewarding and has changed how we think about everything we do. BAAQMD is dedicated to racial equity and this lets us put our skills and resources directly toward addressing environmental injustice in our region."

A resident in Richmond/San Pablo expressed appreciation for the process even through the outcomes are not yet clear. "It is too soon to know how much the community may benefit from the AB 617 process. At the very least, I feel if is bringing many parts of the community together in seeing they have more power / ability to direct than many previously thought."

Finally, an EJ organization representative who was not on a CSC but closely observed the process as a Community Air Grant recipient provided a broad overview of the mixed positive and negative record of the policy implementation.

> *"The process has finally formed a table for advancing community emissions reductions and burdens placed on disadvantaged communities. Some of the success has been that there are now active community air monitoring programs in communities identifying local pollution data. Other success has been that communities are becoming more engaged and present in the development of strategies and becoming more aware of the issues surrounding them. Some shortcomings of the program are: that there are interpretations made by some air districts where the administration of the program is still not understood and badly misinterpreted to not take community into account; also, there were no overall metrics included in AB 617 and some early CERPs have not been able to develop the metrics in more detail for goal setting. The accountability factor is still not clear and communities are feeling like there will be no enforcement of CERP goals."*

In short, AB 617 has initiated—but not yet achieved—a significant transformation in the governance of air quality in California, with a special focus on the health and well-being of the state's most vulnerable communities through the empowered roles of their residents in partnerships with Air Districts and CARB. Significant challenges remain to be addressed before the goals of AB 617 can be achieved. These successes and challenges are summarized in Table 12 below.

1

AB 617 Components	Major Successes	Major Challenges
Community Air Protection Blueprint Document developed by CARB to guide Air Districts to implement AB 617	The Blueprint lays out a robust framework for the implementation of the legislation.	The Blueprint does not provide sufficient guidance on community engagement. The Blueprint does not include clear enough requirements for the achievement of measurable, mandatory enforceable emissions reductions beyond Air Districts' existing activities.
AB 617 Consultation Group Multi-stakeholder advisory body to CARB for AB 617 statewide implementation	The Consultation Group provided crucial support for the development of the Community Air Protection Blueprint.	There is a lack of clarity about the purpose of the group after the development of the Blueprint. Advocating for funding for AB 617 has been suggested as a potential role.
	The Consultation Group's diverse membership was appreciated by the members.	Clarity on advice to CARB was challenging at times due to the wide range of perspectives.
Community Selection Process CARB's process to select the AB 617 implementation committees	The community selection process has included 10 communities with the worst air quality in the state	Communities were set into competition with each other for limited selection spots
	There were innovations in the number of community-driven and community/ Air District collaboration.	Some district-led processes did not achieve potential for community collaboration.
Community Steering Committees (CSCs) Local stakeholders that guide the implementation of AB 617 in selected communities. Consists of residents, community organizations, local businesses, and public officials.	Most CSCs achieved a robust composition of residents, community organizations, businesses, and local governments.	There was a significant degree of conflict within the CSC members, especially between residents/ community organizations and business representatives.
		There were concerns about conflicts of interests in the CSC membership of industry representatives and resident employees.
	Most CSCs improved the level of collaboration throughout the process.	There was a significant degree of unresolved conflict between the CSCs and Air Districts in many sites.
	The addition of outside facilitators helped in many CSCs.	Some facilitators' approaches did not fit the needs and context of the CSCs and in some cases had to be replaced.
	Spanish translation increased —to some degree— participation of mono-lingual Spanish speakers.	Many mono-lingual non-English speaking CSC members were marginalized during the process and a number dropped off from their CSCs.
	Community organizations provided crucial capacity-building for residents in many CSCs.	Many of the presentations by Air Districts, CARB and outside consultants were not accessible to residents. This improved somewhat over time but often with significant investments by community organizations. Youth membership was limited in all but two CSCs and in general young people's voices were missing.
		There was some confusion to what extent meeting outside of the formal CSC meetings were permissible.
		These additional meetings took a great deal of time, energy, and effort from residents and community organizations.
Community Air Monitoring Plans (CAMPs)	Residents were very engaged in learning about the monitoring devices and processes.	Some of the monitoring presentations were not accessible to residents.

Plans for air quality monitoring in AB 617 implementation communities	There was innovation in incorporating district-led monitoring with community-based air monitoring in some communities.	Some of the monitoring areas did not include areas and contaminants of concern from residents.
		Time constraints limited the value of the CAMPs for informing the CERPs.
Community Emissions Reduction Plans (CERPs) Specific actions to improve air quality in AB 617 implementation communities	The CERPs include a range of community-priorities such as mobile sources, land use, pesticides, community-benefit investments.	These positive results were uncertain until the end of the process and achieved through community pressure, extensive negotiations between the CSCs and Air Districts, often with the support of CARB.
		Most CERPs lack mechanisms to enforce specific mandatory emissions reductions in addition to existing Air District actions.
	There has been unprecedented engagement of other agencies (cities, counties, and the Department of Pesticide Regulation).	This engagement came late in the process and could have been improved by proactive efforts by Air Districts.
	There was some integration of public health as a goal and focus of strategies.	There was a call for a greater focus on public health outcome metrics and strategies within the CERPs.
Community Air Grants (CAGs) CARB funding to community organizations to support AB 617 implementation and community capacity building	The CAGs provided important resources to build capacity in current and potential AB 617 communities.	There were some grants made to larger community organizations that spurred concern in smaller grassroots organizations.
Environmental Justice Values and actions to address disproportionate environmental impacts on people of color and other disadvantaged groups.	There was a strong emphasis on environmental justice and social equity in the legislation, Blueprint and many CSCs.	There was unevenness in the realization of EJ principles, particularly in the ability of Air Districts to share power with CSCs to define their own agendas and action priorities to address environmental injustices.

Table 12: Summary of Evaluation Findings: Successes and Challenges

Recommendations

The following recommendations are derived from the analysis of the findings above. Because the study participants expressed a wide – and sometimes contradictory -- range of perspectives, we do not merely repeat all suggestions they provided. Instead we synthesize these recommendations based on the preponderance of evidence and based on our own professional judgement as policy analysts of what kinds of interventions will be most helpful to address the major challenges uncovered in our study and to enhance the implementation of AB 617 going forward. We worked to incorporate as many perspectives as possible from the broad set of stakeholders. However, as this is a study of community engagement, we did foreground the suggestions we received from community residents and organizations to build these recommendations. These recommendations follow the flow of the AB 617 process, starting with the development of the AB 617 Consultation Group and ending with the prospects for program sustainability.

1. Sustain the AB 617 Consultation Group with broader charges

There is generally a positive assessment of the Consultation Group. This is based primarily on the collaborative climate it has developed bringing together entities that are often at odds with each other in a positive and productive manner. The group receives high praise for its success in helping guide CARB in the development of the Blueprint. This success can be built upon by making the group a standing committee charged throughout the AB 617 process. This will also require on-going funding for member stipends and facilitation services. Second, the group can be a forum to develop the improved Blueprint that incorporates enhanced community engagement guidelines and also to develop a Civil Rights/racial justice element to AB 617. As noted above, the group has formed a sub-committee to lead the drafting process. Third, it can work on advocating for increased and sustained funding for AB 617 implementation.

2. Develop an improved Blueprint focused on community engagement.

There was generally high praise for the Blueprint as representing a forward-looking document to match the broad and bold goals of the enabling legislation. It was also praised as a positive example of collaborative action on the part of the AB 617 Consultation Group in a relatively short amount of time. However, its significant shortcomings in providing sufficient guidance in the area of community engagement was also a common observation by study participants. In the next version of the Blueprint, a more explicit set of expectations for Air Districts to collaborate with their CSCs and the broader public can be helpful both to provide improved guidance in what is often a new way of operating for many districts and as a basis for communities to hold the districts accountable to meet these standards. This is important to allow for a place-based approach that allows the Air Districts and the CSCs to develop structures and processes that match the local conditions. However, without a foundation of minimum requirements from the Blueprint, this can result in confusion for the implementing partners, conflicts over how to interpret the basic Blueprint guidelines, and a set of individual systems that cannot live up to the statewide goals of CARB or the legislature. At the same time, there must be appropriate support from CARB to assist Air Districts and CSCs with their ranges of technical and community engagement

capacity to meet these minimum standards and flexibility to devise place-based ways to best accomplish them.

Towards this end, a revised Blueprint can lay out the allocations of decision-making power of the CSCs relative to the Air Districts, provide a framework for the role of outside facilitators, offer case studies of successful community engagement approaches, suggestions for training resources on key issues such as cultural competence, anti-racism, civic science and environmental justice, and provisions for conflict resolution between stakeholders. This can also be a place for consideration of the application of Title VI of the Civil Rights Act and other legal frameworks to guide an environmental justice-oriented approach to AB 617. This will require a process to determine how much of this can be addressed by CARB through a revision to the Blueprint and how much will require action by the legislature. Legislative roles can include sustaining and increasing funding for the implementation of AB 617, developing a "clean up bill" that can rectify gaps in the Blueprint and provide clearer guidance to CARB, the Air Districts and the CSCs.

In any case, the revision of the Blueprint should be accompanied by training for all parties (CARB, Air Districts, CSCs) in how to apply its principles, including an environmental and racial justice framework. This training must take into account that the capacity for community engagement varies widely between Air Districts. The Blueprint can therefore provide a set of principles, values and minimum standards that the Air Districts would need to meet, but that these could be accomplished in a manner that reflects the unique conditions in each area. This revision or augmentation can be directed by the AB 617 Consultation Group, perhaps with the assistance of other experts on community engagement. (As of September 2021, the Consultation Committee is drafting a new version of the Blueprint.)

3. Improve the Community Selection Process

The criticisms of the community selection process highlighted a number of challenges that any new process must address. First, the process must reduce the sense of competition between communities as many advocates felt that they were vying to present themselves as the worst of the worst to obtain designation as an AB 617 community. This will become much more pressing as the pool of funds continue to shrink for new AB 617 communities. Some of this can be alleviated by providing other types of funding, possibly including a prioritization for Community Air Grants to those communities not selected for full inclusion. This can also be addressed by spreading the innovations developed in the first round of communities to others throughout the state, such as the creation of lower-resource versions of CAMPs and CERPs.

There was a great variation in the methodologies used in the different Air District proposals with some being quite rigorous and data-based and others having a less robust approach. One response to this would be to develop a consistent assessment methodology that can be used across the state to create a predictable and easy to understand basis for making the case and assessing proposals. In addition to considering environmental exposures and social vulnerability factors (using CalEnviroScreen and adaptations currently under development by a team led by UC Berkeley) that focus more specifically on air-related issues, including pesticides, the methodology should also consider community capacity to

engage in a meaningful way in the process as a key selection criteria. Some Air Districts may need additional assistance to adopt these methodologies.

One significant innovation to the selection process was represented to the greatest degree in the San Joaquin Valley was a community-driven proposal development process, through which community organizations applied a rigorous data-based methodology combined with a collective prioritization of communities to propose to the Air District. Once CARB has enhanced its selection criteria, the community-driven process can apply this in their deliberations. This process would require a substantial amount of capacity for community groups, but this could be built with the support of the San Joaquin Valley AB 617 Environmental Justice Steering Committee.

More broadly, the competition between communities can be lessened by CARB and the Air Districts committing to extending the benefits of AB 617 implementation beyond the confines of the individual selected AB 617 communities. This can be done through the adoption of a regional approach. In this structure, areas near selected AB 617 communities would have a role in commenting on CAMPs and CERPs to ensure that their interests and concerns are seriously considered and that air emissions reductions benefit their residents. For example, while South-Central LA was not selected for the second round of communities, it could be engaged with the new Southeast LA community efforts. It is important to note that this would be very resource-intensive and could potentially overwhelm air Districts struggling to implement their existing responsibilities, especially in dense areas in the Bay Area and Los Angeles.

Secondly, CARB could work with Air Districts across the state to coordinate with each other to incorporate promising practices within CSC processes and regulatory strategies. This can an important role for the California Association of Pollution Control Officers. Third, and most broadly, many of the components of AB 617, such as CSCs, inclusion of upstream drivers of air pollution such as land use, public health metrics and assessments, and a shift towards new emissions reduction strategies can be integrated in Air District actions throughout the state. Some of this could be accomplished by Air Districts collaborating with cities and counties in their implementation of SB 1000, which requires local governments to develop environmental justice elements in their general plans. Of course, obtaining additional funding from the legislature will be necessary to support many of these activities. This is a crucial issue for many of the recommendations throughout the report and therefore a strategy for matching funding with proposals for new activity will be necessary.

4. Improve Management of CSC Processes

The greatest degree of conflict in the AB 617 process occurred in the CSCs. This was mostly in the relationships between the Air Districts and CSC members over the degree of decision-making authority that the community residents and organizations sought and for which the Air Districts were uneven in their delivery. Unfortunately, the structure of some of the CSCs did not resolve, and sometimes exacerbated this tension. At the same time, there were a number of approaches that could be considered models for future implementation.

As noted above, a number of the most successful CSCs in terms of collaboration, such as in West Oakland, were the product of decades of development and collaboration thus, no current CSC should be expected to exhibit this level of high function in the 1-2 year timeline of the CSCs. Conversely, a number of the most conflictual settings, such as in Wilmington/Carson/West Long Beach and the San Joaquin Valley communities were the product of decades-long tensions between Air Districts and community organizations, and it is unrealistic to expect these to be resolved in the AB 617 pilot timeline. However, there are a number of design principles that can be adapted for future implementation.

First, the leadership and decision-making models need to be established in a participatory and democratic way. While, as described above, there are a wide range of models that the first round of CSCs have adopted, it is important that all CSCs prioritize the building of community power. In most if not all cases, this will involve a change of the status quo from the ways that Air Districts currently engage with their local communities and require a ceding of some level of control from the agency towards the community. Whether this is done through a formal co-chair structure or some other means, the positioning of the community voices in the center of decision-making is critical. Furthermore, the model of leadership structure and decision-making authority should prioritize empowering the CSC itself and limiting the ability of the Air Districts to control the process. This may require CARB to provide legal clarification on this allocation of authority between the CSCs and the Air Districts. Revisions to the Blueprint, underway in early 2021, seek to better define the authority on leadership models and decision-making by CSCs relative to the Air Districts.

One key decision point is whether the CSC will be managed under the Brown Act (Gov. Code 54950 et. Seq) which structures public meetings and associated formal committees and if so, how this will be applied. This would influence the selection of decision-making processes, informal meetings, and overall authority of the CSCs. As noted above, this has been a source of significant conflict in some communities and should be clarified going forward.

Second, develop a set of collaborative or partnering agreements, not merely a CSC charter. These would spell out roles, responsibilities, decision-making and conflict resolution processes. They would lay out explicit values of the group (for example, racial, environmental and social justice and inclusion). It would also lay out a clear leadership structure. Based on the experiences of the first round of communities, a co-lead as in West Oakland, co-chair as in Imperial or a co-host as in San Bernardino, consisting of a community representative and a district representative, appears to work best. These decisions must be made by the CSC itself – not CARB or the Air Districts - and can be codified in the CSC charter. Including a phase of collective goal setting (over and above the guidelines in the Blueprint) that lay out specific elements that the CSC wants to achieve and through what processes will be helpful.

Third, CSCs should make additional efforts to include typically marginalized populations, including non-English speakers, youth and tribal governments and communities. While a number of CSCs have made youth and non-English speakers a priority (and CARB has conducted tribal outreach) there is a long way to go to ensure that the CSCs truly reflect the breadth of the community. Strong considerations of engaging mono-lingual speakers of other languages besides Spanish (such as Hmong, Tagalog, Vietnamese, etc.) that are prevalent in CSC locations will also be critically important as this was lacking

in most if not all CSCs. Designating staff from CARB, the Air Districts, and community organizations (the latter with additional compensation) to play this outreach and engagement function will be helpful.

Fourth, improving the science communication capacities of the Air Districts and other presenters at CSC meetings will help make the meetings more accessible and the participation more meaningful for all members. Vetting presentations with community organizations before each meeting for assistance in making the language appropriate could be helpful. The development of independent Technical Advisory Groups consisting of scientific experts who could help interpret Air District and CARB materials for CSC members, develop scientifically-sound proposals with the CSC has been seen as a promising practice. A version of this has been developed in the South Coast Air District and is under development in Richmond/San Pablo and Sacramento: expanding this to other areas bears careful consideration as AB 617 implementation moves ahead.

Fifth, make the use of an external facilitator standard for all CSCs. In some cases, such as Sacramento, where there was not an external facilitator until late in the process, there was significant tension between the Air District and the CSC. At the same time, there was some variation in effectiveness of the facilitators across the CSCs, so ensuring that they have the cultural competence, conflict resolution and experience with public policy will be beneficial. There should be, at the minimum, input, and ideally shared decision-making by the Air District and the CSC in the selection process. One CSC facilitator laid out their set of recommendations for promising practices.

> *"Supporting a team of community leaders in co-designing and co-leading the process has also proved crucial for similar reasons; incorporating transparency at every stage of the process (explaining decisions upfront, providing as many opportunities as possible for participants to ask questions and provide input, conducting live polling and displaying the results and counts in real time, acknowledging mistakes and learning curves for all parties including those made by government agencies and the community co-lead team, etc.), paid stipends (members of the community are busy and they appreciate the acknowledgement that their time and work is valuable.)"*

However, even with an external facilitator, the Air Districts must ultimately be accountable to ensure that key elements of the process including the timely distribution of meeting materials (in all relevant local languages), ensuring that there is sufficient time in meetings for the participatory activities (e.g., CSC member ranking of CERP actions) to be done in a meaningful way, and a proactive commitment to integrate this input into the plans.

Sixth, the conflicts between Air Districts and CSCs in most areas of the state suggests a number of needed improvements. This should include making sure that the Air Districts do not play facilitator roles or try to control the process. Instead they should embrace the new mode of relationships with community residents and organizations that is not based on defending against local engagement but viewing it as a valuable component to ensuring that they meet their mission. To support this, they must improve their staff capacities in cultural competence in working with diverse communities and build environmental justice into their organizational values. Finally, they can increase their coordination with other agencies and governments (e.g., cities and counties, transportation agencies, pesticide regulation agencies and others) to address broader drivers of air quality disparities.

Seventh, develop an explicit and consistent policy on conflicts of interest within CSC membership. There were a number of CSC proposed conflict of interest policies that can be considered. At the most limited extent were proposals to simply disclose potential conflicts. A more substantial policy would be to make industry representatives and resident employees recuse themselves from decisions affecting their industries and at the most restrictive, CSC membership would not be allowed for these parties. In the face of such divergent positions by CSC members, the selection of an appropriate model is beyond the scope of this evaluation and instead we strongly recommend that CARB consider this and come out with a standard policy for all CSCs to follow. However, there are a number of models that can be drawn upon, including the California Public Utilities Commission and the California Energy Commission mandate their Disadvantaged Community Advisory Group that requires a statement of economic interest (Form 700) for all members.

Eighth and finally, as noted in the CSC findings above, there was great concern about the "back of the room" role for CARB at the CSC meetings. While the CARB staff may have – quite appropriately -- been trying not to overstep their bounds with the Air Districts, this approach was often perceived as insufficient by CSC members. Instead, numerous respondents called for a more active role in communicating the requirements of the Blueprint for community engagement, explaining the expectations of the agency in terms of the key elements of the policy (i.e., CAMPs, CERPs) and backing up the community representatives when needed. While CARB staff did provide backup in urgent situations, this was often too ad-hoc and reactive and could have been less needed if a more upfront process and active role was followed in the first place. This critique was expressed by some CARB staff themselves, speaking to their frustration at the restrictions on their roles, suggesting that measures need to be taken by CARB leadership to better support their staff. Part of this support can come in the form of improved training in community engagement and cultural competency and could also benefit from a hiring practice for new staff with these capacities if this is going to be an on-going and more significant role for CARB. As noted above, having access to a Blueprint that provides explicit guidance to Air Districts for community engagement and that can also inform CARB's interactions with the CSC and Air Districts would greatly improve CARB's effectiveness.

5. Improve Development of the CAMPs

The development of the CAMPs had some important successes, principally in the ways in which they provided community members with education and awareness in monitoring technology. This was greatly appreciated by many respondents. In addition, the tensions between community members and Air Districts over the monitoring boundaries was largely resolved in most of the communities.

However, most CAMPs did not succeed one of the major goals of the AB 617 legislation, which was to provide data to inform the CERPs. This was primarily a function of the timeline laid out in the statute by the legislature with a very limited period between submission of the CAMP and development of the CERP. This is a difficult challenge to address, but clearly, increasing the monitoring time to allow for application to the CERP will be needed. However, CAMP data can be used to monitor the progress and guide implementation of the CERPs over time.

Another potential, yet partial solution, is the increased use of community-generated air quality monitoring as is available in several locations (Wilmington/Carson/West Long Beach, Imperial County, West Oakland, San Joaquin Valley and Richmond/San Pablo). Air Districts and community organizations with expertise in community air monitoring can collaborate to apply some of this monitoring data into the CAMPs themselves. Capacity-building and technical assistance from Tracking California for a number of CSCs has been valuable and should be extended and expanded. Using the community air grants to further support this kind of civic science as well as partnerships with technical support from universities and consultant can provide additional benefits. At the same time, such low-cost monitors should be used to supplement, not substitute for regulatory monitors as both types provide complementary data. Likewise, consistency of monitoring reporting protocols needs to be assured if different monitoring systems are used.

6. Improved Development of CERPs

The production of the CERPs that could effectively improve air quality on disadvantaged populations was the clear central goal of AB 617. While there was general satisfaction in CERPs by the end of the process in most areas of the state, this was the result of significant struggle between the CSCs and the Air Districts and in a number of cases strong intervention by the CARB board itself in the final approval process. There are a number of improvements to the CERP process that could assist in both reducing the conflict and effectiveness of its outcomes.

First, one of the most significant critiques from residents and community organizations of the CERPs is that they lack "teeth." This means that they rely too heavily on monitoring, enforcement, and incentives, which while valuable, may not by themselves ensure substantial air emissions reductions. Instead, the CERPs should include aggressive emission reductions quantities and deadlines, with specific new regulations to meet these targets over and above existing Air District actions. Furthermore, these emissions goals must be mandatory and enforceable, and CARB should set a high bar for the initial approval of the CERPs and certification on an annual basis based on these mandatory standards. Without this backstop based on outcomes, community engagement alone will not ensure that the goals of the AB 617 legislation and Blueprint will be met.

Second, the CERP process should start earlier by identifying community priorities for investments that make a direct difference in the health and well-being of the residents of the focus communities instead of having the Air Districts' come up with their list and having the community respond. These can include items like including funding for electric vehicles and solar panel subsidies; urban greening (tree planting, green walls); complete streets in many of the urban CERPs; port and other industrial facility equipment electrification; and diesel truck rerouting among others. At the same time, it is important that developing the emissions reduction strategies are not the sole responsibility of CSC members who may not have the necessary technical expertise and capacities. In these cases, having the residents and community organizations identify overall goals and then the Air Districts (with CARB staff support as appropriate) develop the technical bases for achieving these goals would be more effective. This was the case in South Coast AQMD's work to develop the 50% reduction in refinery strategy in the Wilmington/Carson/West Long Beach CSC. The Air Districts should also document how they are

addressing community recommendations as well as disclose how they are integrating them into the CERPs.

The criteria of direct exposure and health impact benefits for area residents, as a priority over general area-wide strategies can help demonstrate that this is truly a *community* air protection program. This is not to say that the area-wide strategies are not also valuable, but that community-scale actions and impacts must be highly prioritized. Likewise, CARB ought to require Air Districts to follow the Blueprint guidelines to emphasize new actions over and above their current actions (which was uneven in its application in some of the CERPs in their draft forms.) Similarly, CARB ought to encourage Air Districts to emphasize permitting and enforcement actions to hold industry accountable and not only to provide industry incentives. Legislation that prohibits permitting of polluting facilities that would violate a CERP could address this issue.

Third, the CERPs should address "up-stream" drivers of air quality, principally land use that locate hazardous facilities (e.g., Air Toxics "Hot Spots", TRI air emitters, ports, rail-yards, and other inter-modal transportation hubs, oil refineries) in and near disadvantaged communities. This will require active engagement with city and county government which have land use power. Integrating AB 617 with the implementation of SB 1000 (requiring the integration of EJ elements into city and county General Plans) can assist in this process. This will require that Air Districts and CARB become more engaged with land use planning: an arena that they have not addressed in a significant way, tending to defer to the cities and counties for whom this is a primary jurisdiction. Therefore, developing more active and robust partnerships with cities and counties on land use issues will be important.

Fourth, the CERPs should include specific health improvement metrics as a basis for assessing the success of their actions.. As noted above, CARB places a high priority in protecting public health as part of their mission and the reduction of health-harming emissions can be considered a public health improvement strategy. Some CSCs have called for specific health metrics (such as reductions in asthma ER visits and hospitalizations) to be included in the CERPs. The leadership in the Wilmington/Carson/West Long Beach CSC has been insistent on promoting this public health orientation to AB 617 and did achieve inclusion of a health condition analysis in their CERP. Tracking these impacts are complex – and often expensive – so will need to be considered carefully. In particular, there are many parameters besides outdoor air quality that contribute to health conditions. This strategy will benefit from more active partnerships with state and local public health agencies as well as health researchers at universities who may already be pursuing relevant studies.

Fifth and finally, CARB and the Air Districts should strongly consider recent proposals by some CSC members (primarily from West Oakland) to use Title VI of the Civil Rights Act as well as provisions in the Clean Air Act that enable and require agencies to put forward all best efforts towards eliminating racial disparities in impacts due to exposure to air pollution. This would create a much higher standard for CARB and the Air Districts than the current Blueprint provides that only calls to address these disparities without an explicit standard or legal requirement to meet it. It would also make important steps to upholding the values of EJ, including the strong racial justice component that underlie the origins of the environmental justice movement. One way for this to proceed would be to charge a committee to develop a strategy for this kind of policy integration. This could be the AB 617 Consultation Group (or a

subcommittee of the Group) and perhaps including ad-hoc members with appropriate policy and legal expertise. California policies prohibiting the use of race in the distribution of funds will also need to be addressed in these strategies.

7. Improve the Community Air Grants Program

There were mixed recommendations from the study participants on whether the Community Air Grants should be focused on the AB 617 communities to enhance the development of the CAMPs and CERPs or whether they should be spread beyond these communities. Both have strong justifications. On the one hand, focusing them on the AB 617 communities will help ensure that these communities have the capacity to create the highest quality planning documents – an argument for effectiveness. On the other hand, spreading the funds outside of these core communities would produce a more equitable outcome across the state. One way to address this dilemma would be to split the difference and provide one portion of funds for the designated AB 617 communities with the specific goal of improving the CAMPs and CERPs and the other portion to build capacity in other communities to help them get into a pipeline to be able to adopt effective CAMPs and CERPs in the future. This would require a capacity-building function to create a pipeline to future selection as AB 617 communities. This would also require the grants to not be provided for other uses (e.g., general community education on air quality). To ensure that the grants are being used most effectively, there should be a program evaluation of the first rounds of the program.

8. Secure long-term funding to support AB 617 Implementation

For AB 617 to fulfill its goal of being a transformative intervention in air quality management, it needs steady funding to match the degree of demands placed on all parties, including CARB and the Air Districts. Unfortunately to date, the funding from the legislature and governor for these efforts has been unpredictable and inconsistent. It is therefore recommended that an assessment be done on the funding model being used to implement AB 617 to determine what level of funds are necessary for the Air Districts to perform their needed functions and for CARB's legislative affairs office, perhaps in collaboration with the AB 617 Consultation Group to work with the legislature and Governor's Office to secure sufficient funds for a sustainable implementation of the policy.

Longer-term Evaluation Questions

AB 617 is a bold new approach that is attempting to transform air quality governance in California. This is based on a number of hypotheses that need to be empirically assessed over time. These include the hypothesis that a community-engaged approach will create improved air quality plans and that, if implemented, will in fact improve air in these communities. This, in turn, raises a number of questions that should be assessed to measure the actual transformations achieved. These include the following.

1. How are CAMPs and CERPs being integrated into Air District plans and planning processes?
2. How are CAMP and CERP implementation being integrated into other entities (e.g., cities, counties, tribal governments)?
3. How has the 617 process changed the relationships between community organizations with Air Districts?

4. How has the 617 process changed the relationships between CARB and Air Districts?
5. How have the CERPs improved air quality in disadvantaged communities?
6. How well are lessons learned from Year 1 being integrated into Year 2 communities and beyond?
7. How well has community voice and power been sustained through the process?

These questions can form the basis of subsequent evaluations of the AB 617 process, whether by another outside evaluator and/or by critical reflection by CARB and the stakeholders themselves.

Conclusion

Some have hailed AB 617 a transformative policy for air quality management in California. These potential transformations include a localization of air quality management from a regional regulatory scale to a community scale. This has been manifested both in terms of the local focus of its air quality monitoring and management and in its engagement of affected communities as partners, not only as beneficiaries of government actions. It also represents an important step in California's efforts to integrate environmental justice more deeply into the state agencies' culture, structure and function. However, to many critics in the environmental justice community and others, AB 617 has not yet met its potential. They point to a lack of follow through by Air Districts on the priorities developed by CSCs for the CERPs, a limited degree of measurable and enforceable strategies in the CERPs, relatively low level of funding going to CERP implementation relative to community needs, and problems in shifting decision-making authority about the management and outcomes of the CSCs from the Air Districts to the CSCs.

Despite a range of conflicts, all 10 of the pilot communities were able to produce CAMPs and/or CERPs that represent progress beyond the baseline of current practices. Likewise, while many of the processes did involve great tension between all stakeholders (within the CSCs; between the CSCs and the Air Districts; and between all of these entities and CARB) throughout the process, there was progress made in all 10 communities towards a more collaborative set of relationships.

Based on the analysis of all of the data sources considered in this study, we find it appropriate to consider the AB 617 experiment a qualified success as a pilot program but with many questions and concerns about its ability to achieve its ambitious goals. Remaining challenges include ensuring that there is improved sharing of power between Air Districts, residents and community organizations (on and beyond the CSCs), that the CERPs produce significant, measurable, and enforceable improvements to air quality, and the lessons learned from these pilots be incorporated into future implementation of the policy throughout the state. While it is too early to assess this long-term success of the policy implementation, there are signs of hope that by placing environmental justice values of eliminating racial disparities in air pollution and health disparities and respecting and building community voice and power that AB 617 is on its way to realizing meaningful impacts for achieving environmental justice.

Element 3: Development and Application of Geographic Indicators for Cumulative Impact Assessment

Scope of Analysis

Senate Bill 673 (SB 673, Chapter 611, Stats. 2015) directs DTSC to update its approach and criteria to take into account cumulative impacts, including the social vulnerability and existing hazards and health risks to nearby populations in its decision-making related to issuance of new or modified permits or approval of permit renewals of hazardous waste facilities. SB 673 also authorizes the Department of Toxic Substances Control (DTSC) to consider the use of "minimum setback distances from sensitive receptors" in making a permitting decisions.[1] In addition, California Air Resource Board's (CARB) Office of Community Air Protection (OCAP), utilizes spatial metrics of cumulative impacts to inform decision-making regarding allocation of resources through Community Air Grants that enhance community capacity to develop Community Air Monitoring Programs (CAMPs) and Community Emissions Reduction Programs (CERPs).

The objective of this third contract element was twofold: 1) to conduct spatial analysis to characterize communities near currently operating hazardous waste facilities regulated by DTSC with respect to their proximity to multiple environmental hazards and vulnerability to the health impacts of pollution; 2) generate statewide data layers of supplemental metrics not currently included in CalEnviroScreen (CES) for CARB's OCAP and DTSC.

This phase of analysis utilized CalEnviroScreen 3.0 scores and percentiles as relative metrics of cumulative environmental health impact and community disadvantage in relation to DTSC facilities. The analysis also included a number of community metrics that are not currently included in CES. All of this work was conducted with data, input and guidance from the DTSC, the California Air Resources Board as well as other agencies that provided feedback during progress presentations, including the Office of Environmental Health Hazard Assessment and the Department of Public Health Environmental Health Investigations Branch.

Below is the list **of metrics analyzed** for the hazardous waste facility assessment as well as for the statewide data layer. These metrics were chosen in consultation with DTSC and CARB staff:

- Mean CalEnviroScreen 3.0 Score & Percentile (See Appendix 3 for Distinction Between CES Score and Percentile)
- Max CalEnviroScreen 3.0 Score & Percentile
- Racial/ethnic composition (% people of color)
- Domestic drinking water well count
- Active oil and gas well count
- Average voter turnout in the 2012 and 2016 general elections (% of registered voters casting votes)
- Sensitive Land Use (SLU) Count – Parks
- SLU Count – Prisons

- SLU Count – Healthcare Facilities
- SLU Count – Senior Care Facilities
- SLU Count – Schools
- SLU Count – Childcare & Daycare Facilities
- SLU Count (All) – Parks, Prisons, Healthcare Facilities, Senior Care Facilities, Public Schools, Childcare and Daycare Facilities

For the DTSC portion of the analysis, we sought to improve upon existing practices for assessing cumulative impacts near hazardous waste facilities in the following ways (details follow below):

- ***Polygon boundaries:*** HWFs were defined spatially using polygons instead of a single point.
- ***Entire-facility and waste-specific boundary polygons***: HWF polygons were delineated in two ways: 1) around the entire property boundary, and 2) around the area within property boundaries that is permitted to process or store hazardous waste. The results using both methods were provided to DTSC in separate spreadsheets.
- ***High-resolution population distribution data****:* We applied novel dasymetric mapping techniques to improve community-level cumulative impact metrics. Populated areas were defined by combining information on the location of residential parcels (data provided by CARB) with block-level population estimates derived from the 2010 decennial US census and block-group-level estimates from the 2013 - 2017 American Community Survey, and building footprint data from a remotely-sensed national dataset produced by Microsoft in 2018. This approach better estimates conditions where people live by omitting places that are unlikely to be inhabited, improving upon standard methods that assume a spatially uniform distribution of the population across the block group's entire area. This technique is particularly useful for refining locational accuracy of populations in rural areas, where census geographic units tend to be larger and populations more dispersed within them.
- ***Population-weighted metrics:*** After applying our dasymetric mapping method, community metrics (e.g. mean CES score/percentile, % people of color) were calculated using population-weighting rather than area-weighting to better reflect cumulative impacts experienced by populations living near HWFs.

Data Sources

Hazardous Waste Facility Locations

The names and locations of HWFs currently permitted to operate in California were supplied by DTSC in the form of a geospatial point shapefile, with single points representing the approximate location of each HWF. This original shapefile contained coordinates for 82 sites. Five facilities that are no longer operating or are undergoing closure were omitted from the analysis after consultation with DTSC, leaving a final list of 77 active HWFs across the state (Figure 10).

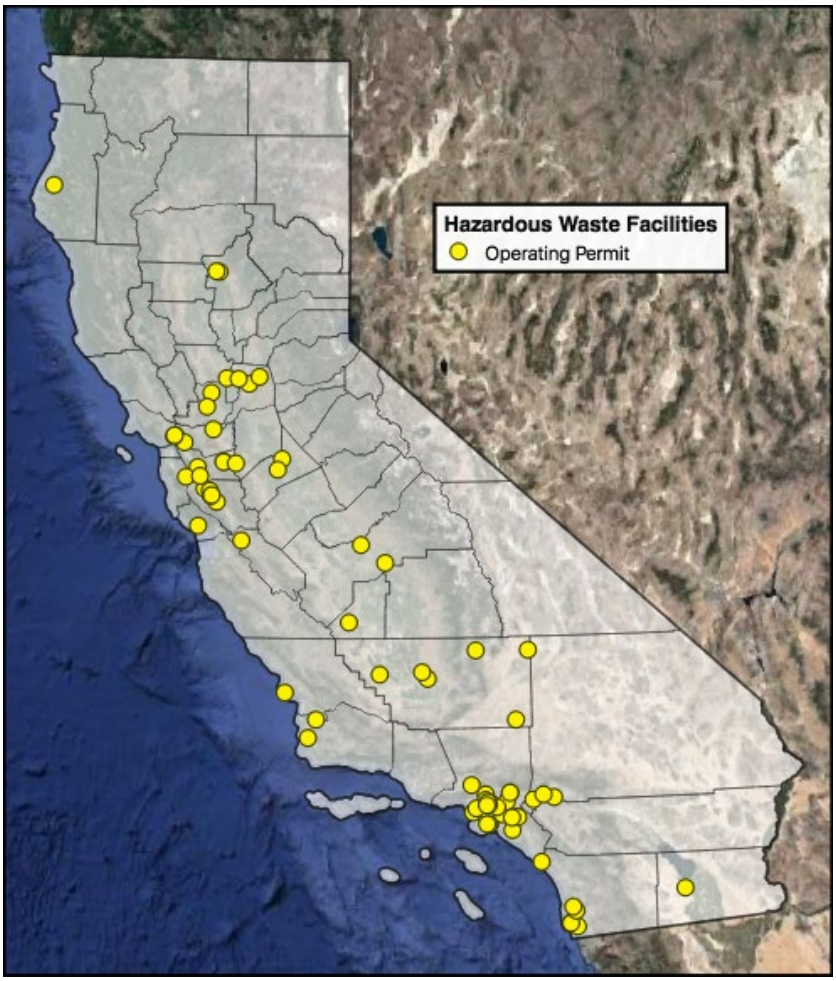

Figure 10: Location of active HWFs regulated by DTSC

CA Statewide Parcel Data

We utilized a comprehensive, statewide shapefile of all California parcels obtained from CARB in order to: 1) construct facility polygons around the HWF point locations provided by DTSC, and 2) classify residential regions within census block groups for the purpose of calculating population-weighted metrics of cumulative impact. Each parcel in this dataset has a number of attributes pertaining to various use code classifications (Appendix 3, Residential Parcel Classifications) which were used to distinguish between residential and non-residential parcels (Figure 11).

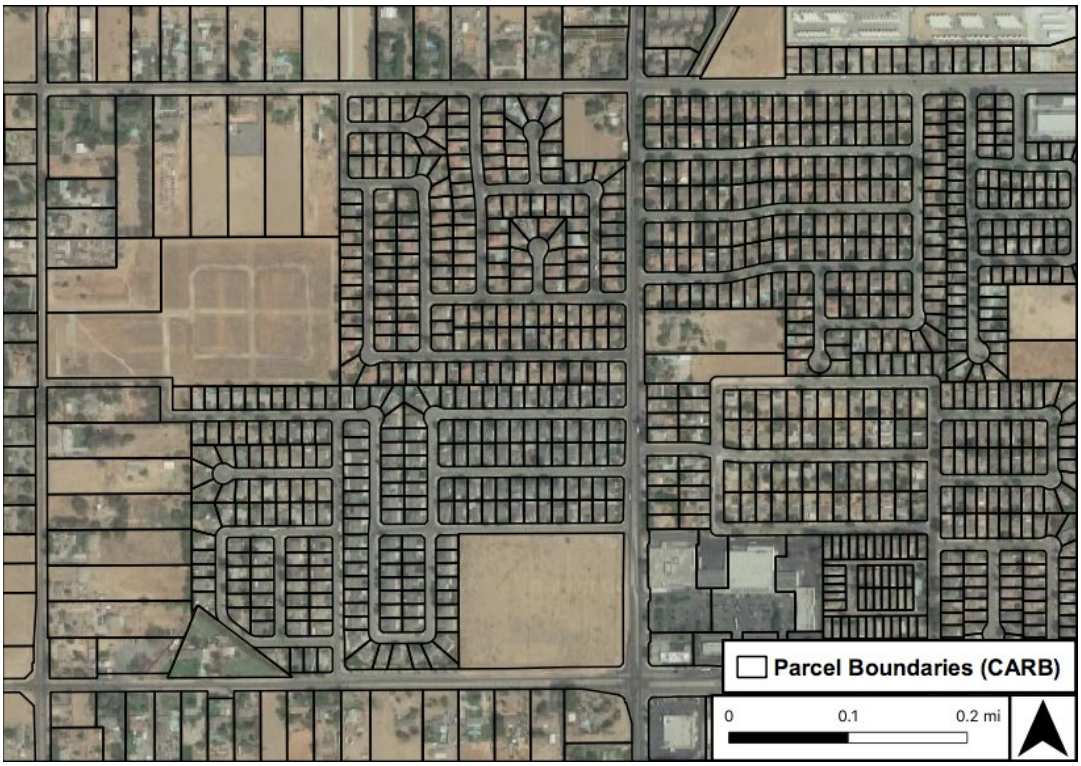

Figure 11: Example parcel boundaries near Fresno, CA.

Population Data

Block-level estimates of population – the highest spatial-resolution of analysis recorded by the US Census Bureau (USCB) – were utilized. However, estimates at the block-level were only last enumerated as part of the 2010 decennial census. Estimates of population at coarser units of analysis, however, are updated continuously as part of the ongoing 5-year American Community Survey (ACS) projects by the USCB. Therefore, population estimates at the block group-level – the finest spatial unit of analysis available in ACS datasets – were taken from the 2013 – 2017 ACS dataset in order to utilize more contemporary estimates of population. This was done by utilizing the block-level population distribution patterns within block groups represented in the 2010 decennial census and applying these same distributional patterns with the updated population totals from the 2013 – 2017 ACS. These population estimates were then disaggregated to the block level using the block-level distributional patterns of population within each individual block-group seen during the 2010 decennial census.

As an example, say a block group is comprised of two blocks (Block 1 & Block 2), and, according to the 2010 census, there are 40 people living in one block 1 and 60 people living in Block 2. This means that 40% of the block group's total population lives in Block 1 and 60% in Block 2. Perhaps the new population total for that same block group according to 2013 – 2017 ACS estimates has increased to 120 people. In order to roughly approximate how these 120 people are distributed between Block 1 & Block 2, it was assumed that the relative distributions of people is equal to those observed in 2010 (40%, 60%). Therefore, the new block-level population estimates for the 2013 – 2017 period was assumed to be 40% of 120, or 48 people for Block 1, and 60% of 120, or 72 people for Block 2. This assumption is

obviously not valid in all cases, but is based on the belief that relative population distributions within block groups likely does not dramatically change over a ~5-year timeframe. For block groups with non-zero populations in the 2013 – 2017 ACS that had no population in the 2010 census, the ACS population was assumed to be uniformly distributed across all blocks in that block group given the lack of antecedent knowledge.

Tabulated decennial census and ACS data were downloaded from the National Historical Geographic Information System (NHGIS) data server for the state of California along with geospatial polygon shapefiles of the 2010 block and 2017 block group boundaries (Figure 12).[17] The percentage of residents of color was defined as the percentage of residents who identified as Hispanic or as being of any non-White race (including multiracial) and was estimated using ACS data from 2013 – 2017. These values were assumed to be uniformly distributed across the populated areas (as identified using parcels, block populations and building footprints – see Methods) within each block group.

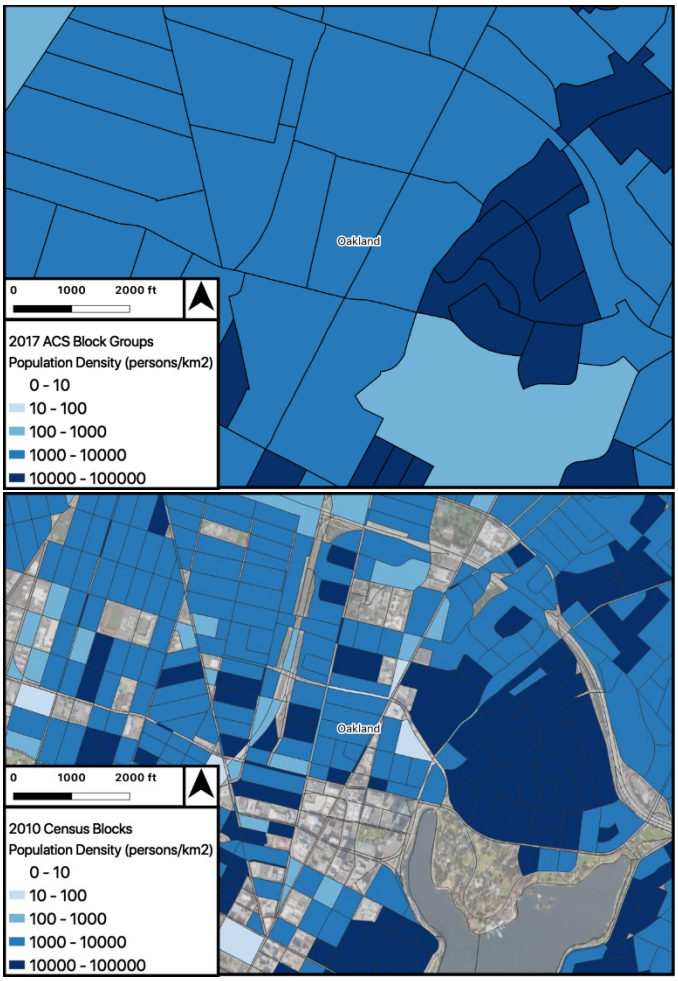

Figure 12: Example block group (top) and block-level (bottom) population data in Oakland.

[17] National Historical Geographic Information System. IPUMS NHGIS. Retrieved 2020, from https://www.nhgis.org/

Building Footprint Data

In some cases, distinguishing between open space and potentially populated areas within blocks was done with the help of a dataset of remotely-sensed building extents, or footprints, produced by Microsoft for the entire country in 2018 (Figure 13). This dataset used publicly-available satellite imagery of the US and employed a series of machine learning classification algorithms to identify likely building rooftops, converting these footprints to a polygon shapefile for each state. More information on the production of this dataset can be found on its download page.[18] Further explanation as to how these data were used for this analysis is provided in Methods.

Figure 13: Example of building footprint data in Oakland.

Facility Operating Permits

We used the final operating permit documents for each HWF in combination with the parcel data to better delineate facility boundaries and to determine the specific locations of waste stored within each

[18] Github. Retrieved 2020, from https://github.com/Microsoft/USBuildingFootprints/

facility boundary. Permits were reviewed for each facility both by DTSC staff and the UC Berkeley project team in order to identify property lines and waste locations from maps and figures in the permitting documentation. The permits for operating facilities can be found on DTSC's EnviroStor web platform, or directly using this link.[19]

CalEnviroScreen 3.0

The third version of the California Communities Environmental Health Screening Tool (CalEnviroScreen 3.0, or CES 3.0) was downloaded from the Office of Environmental Health Hazard Assessment website and used to assess cumulative impacts surrounding each HWF. [20] CES 3.0 is an aggregate index combining 20 indicators of pollution burden and population vulnerability into a relative cumulative impact score for each census tract in the state. The final scores are also expressed on a percentile scale from 1 to 100, with higher scores/percentile indicating higher levels of cumulative impact. Both raw CES scores and percentiles were calculated and included in the results.

Domestic Well Data

The location of domestic drinking water wells was estimated using the Online System for Well Completion Reports (OSWCR) maintained by the California Department of Water Resources (DWR) and downloaded September 1, 2018.[21] This dynamic dataset includes information on the approximate location of domestic drinking water wells across the state. Exact locations (<50 feet of precision error) are known for some wells but the vast majority of wells are currently represented as part of a generalized well count for ~2-3 km^2 "well sections." These sections form a somewhat uniform grid of rectangular land areas across the state with each section containing a certain number of active drinking water wells whose precise location within the section is unknown (Figure 14).

[19] Department of Toxic Substances Control. EnviroStor. California's Official State Website. Retrieved 2020, from https://tinyurl.com/y2md3mrw

[20] California Office of Environmental Health Hazard Assessment. (2018, June 25). CalEnviroScreen 3.0. California's Official State Website. Retrieved 2020, from https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30

[21] California Department of Water Resources. Well Completion Reports. California's Official State Website. Retrieved 2020, from https://water.ca.gov/Programs/Groundwater-Management/Wells/Well-Completion-Reports

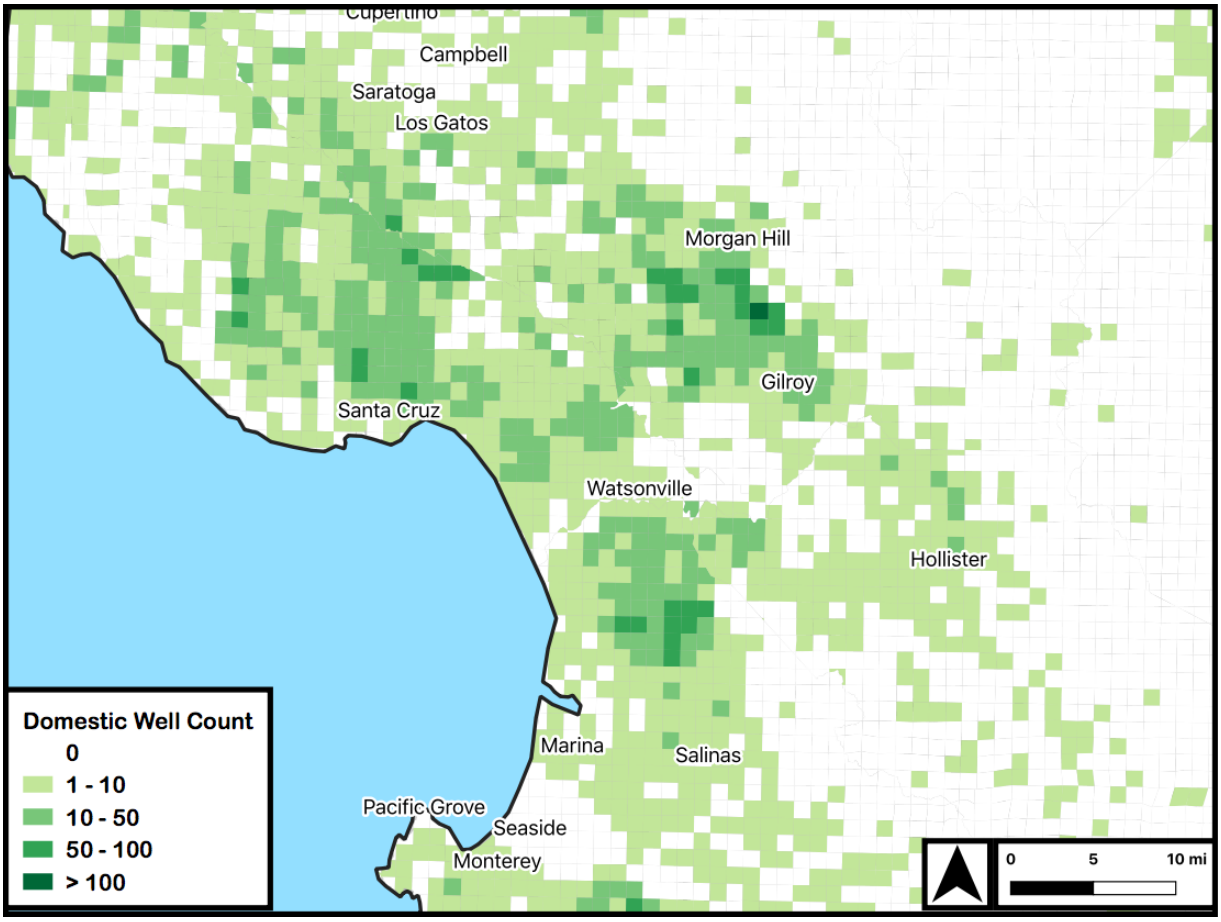

Figure 14: Domestic drinking water well counts by section in the Monterey Bay area of California.

Oil and Gas Well Data

A dynamic database of the location and characteristics of oil and gas wells across the state is maintained by the Division of Oil, Gas, and Geothermal Resources (DOGGR).[22] We utilized the "All Wells" shapefile for this study, which contains point locations of oil and gas wells throughout the state as well as their current operating status (Table 13). Only wells that were classified as "New" or "Active" were included in the analysis (69,531 total wells –Figure 15). The vintage of the dataset used is July 10, 2019.

[22] California Department of Conservation. Well Finder. California's Official State Website. Retrieved 2020, from https://www.conservation.ca.gov/calgem/Pages/WellFinder.aspx

Well Operating Status	Count
Abeyance	2
Active	**65,450**
Buried	2
Canceled	7,453
Idle	36,185
New	**4,081**
Plugged	122,851
Unknown	1,966

Table 13: Oil and gas well counts by operation status

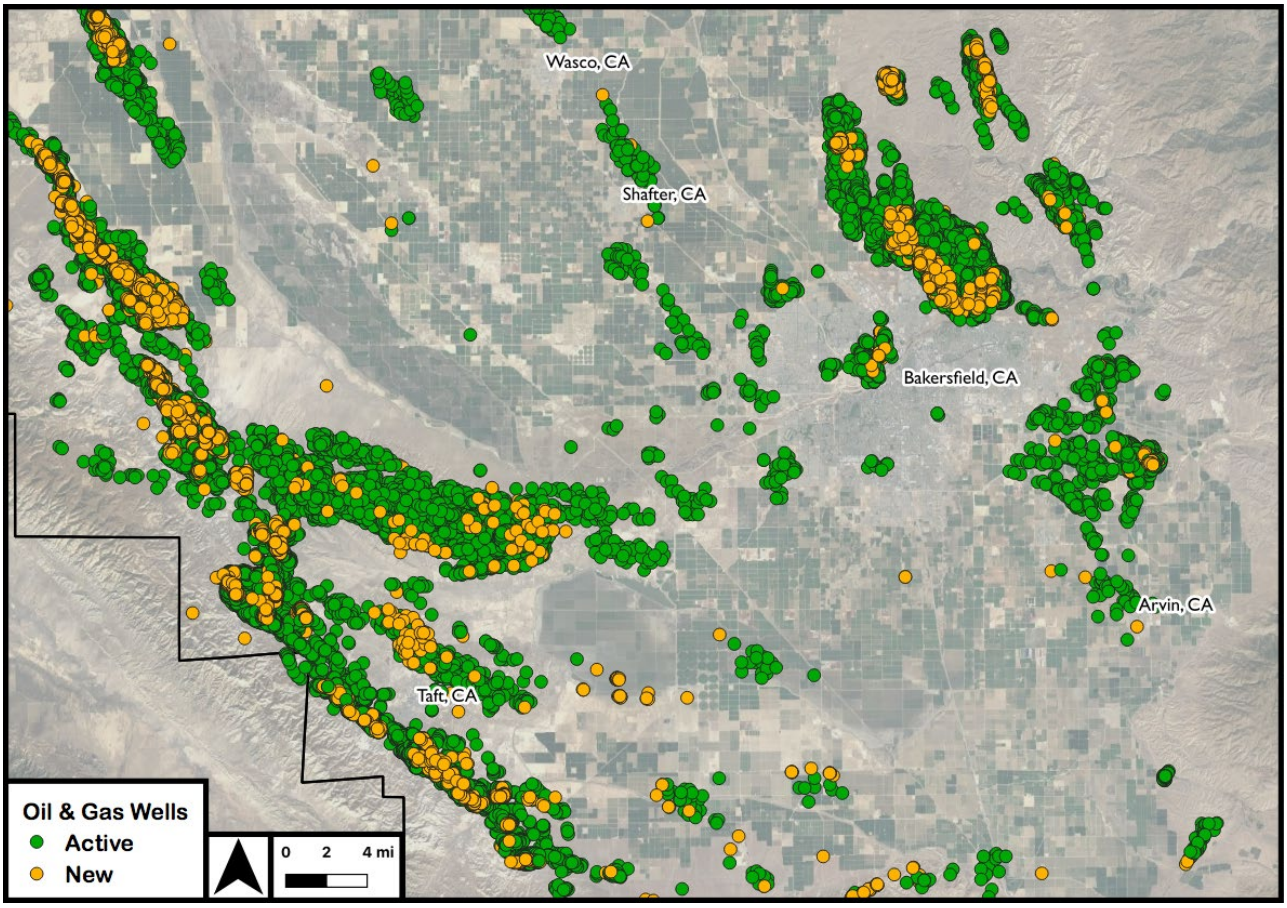

Figure 15: Active or new oil and gas well locations in Kern County, CA.

Voter Turnout Data

The number of people who vote in elections provides an important measure of civic engagement capacity and the degree to which communities are involved in local decision-making, which may have implications for community engagement in permitting and regulatory decisions. We utilized voter data from the UC Berkeley Statewide Database 2016 and 2012 General Election Precinct Data at the registration precinct level (RGPREC) to derive the average (mean) percent of registered voters who participated in the 2012 and 2016 elections (Figure 16). [23]

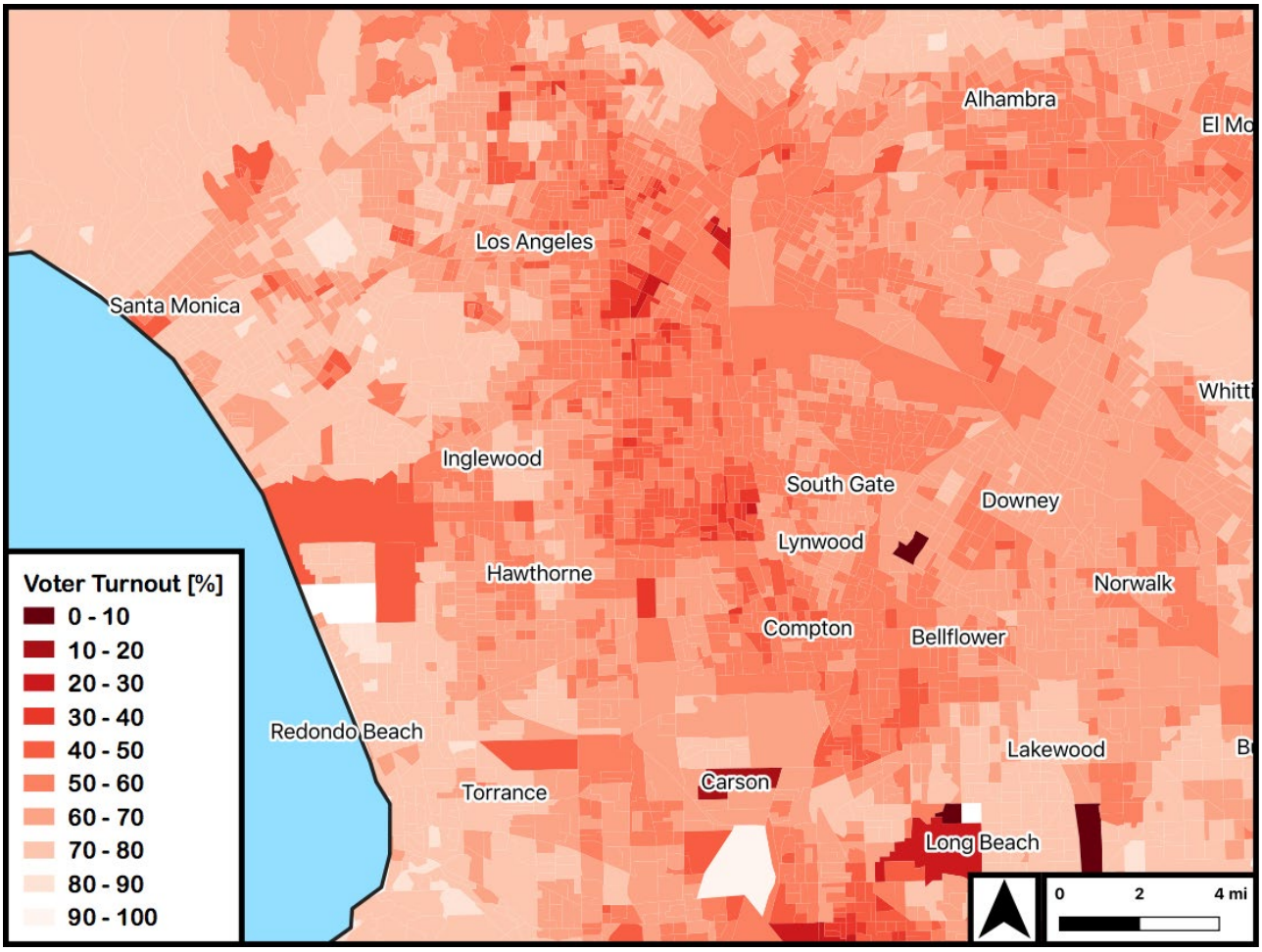

Figure 16: Average registered voter turnout by census block group in the 2012 and 2016 general elections in the Los Angeles metro area.

[23] Statewide Database. 2016 General Election Precinct Data. Retrieved 2020, from https://statewidedatabase.org/d10/g16.html

Sensitive Land Use Data

Locational data for six different types of sensitive land uses (SLUs) were included in this analysis to assess the proximity of such land uses to the HWFs studied. SLUs were defined in this context as areas in which vulnerable populations (e.g. children, the elderly, people with respiratory illness) either reside or spend a substantial amount of time. The six SLU classes were chosen to be consistent with the "sensitive uses" used by CARB in its Air Quality and Land Use Handbook, and are defined for this project as: parks and playgrounds, pre-college level schools, childcare/daycare facilities, healthcare facilities of the type that house vulnerable populations, senior care and residential facilities, and prisons/correctional facilities.[24] The shapefiles used in our analysis were built using the most recent geospatial information available for each use that is consistent statewide, combining data (and removing duplicates) when more than one data source is available. We also compared these locations to earlier versions of this type of data used in our research as a means of validating locations and understanding changes in the location and number of these uses statewide. These locations were located either as geocoded points (healthcare facilities, senior care facilities) or polygons (parks, prisons, schools).

The statewide parcel data provided by CARB was of limited utility in this process because of the poor match between the parcel use codes and the land use designation of most sensitive land use parcels. Queries using use codes to identify sensitive land uses returned far fewer locations than other data sources that also identify these uses. Parcels identified in this way were included in the final datasets for each sensitive use. However, the parcel dataset cannot be used alone to comprehensively identify any of the sensitive uses recognized in this project, and use of the parcel data generally should be cautious as it is primarily constructed to reflect land ownership for tax purposes.

Where appropriate, geocoding was performed using two different address locater street data layers.[25,26] A minimum geocoding score of 0.8 was be required for each location, and features located by the two street layers had to agree with 10 meters. Geocoded locations were validated when appropriate using comparison with aerial imagery in Google Earth Pro. These point location shapefiles were also cross-checked with older datasets of each facility type, and with the parcels identified using use codes to ensure consistency.

Healthcare Facilities: This point shapefile was generated using the 2019 "Licenses and Certified Health Facility Listing" from the California Department of Public Health, which lists descriptive information, including addresses, for over 30 types of healthcare facilities.[27] We selected the subset of these facilities that are consistent with the SLU definition for this analysis, and geocoded the addresses. The final shapefile consisted of 2375 point-locations.

[24] California Environmental Protection Agency and California Air Resources Board. (2005, April). Air Quality and Land Use Handbook: A community health perspective. https://ww3.arb.ca.gov/ch/handbook.pdf
[25] OpenStreetMap. Retrieved 2020, from https://www.openstreetmap.org/#map=5/38.007/-95.844
[26] TomTom. Retrieved 2020, from https://www.tomtommaps.com/mapdata/
[27] HealthData. U.S. Department of Health & Human Services. Retrieved 2020, from https://healthdata.gov/State/Licensed-and-Certified-Healthcare-Facility-Listing/qp9z-cjxt

Senior Care Facilities: This point shapefile was generated using the 2019 "Community Care Licensing for Residential Eldercare" data from California Department of Social Services.[28] Similar to the healthcare listings, there were duplicate names, addresses, and addresses that limited the records that could be geocoded. The final shapefile consisted of 7470 point-locations.

Childcare/Daycare: The most recent data available was the list of "community care facilities" licensed as of November 2018 by the California Department of Social Services.[29] This includes both facility locations and "family daycare" homes with capacity of 8 or more. There are nearly 20,000 licensed facilities, but once duplicate locations, head-start preschools, closed or inactive facilities and addresses that could not be geocoded were removed, the final shapefile became 7952 point-locations. We compared these locations with a dataset from 2015 Dun & Bradstreet showing businesses describing themselves as childcare or daycare.[30] Unfortunately, the parcel data from CARB was very incomplete for this SLU category and contained only 248 parcels statewide that are listed as a childcare use.

Schools: We have high confidence in this dataset as there are several high-quality datasets available. We relied on the two most authoritative sources available. The California Department of Education online data portal ("Schools and Districts Datafiles") provides school addresses of both public and private schools, which we geocoded to produce point locations.[31] These were combined with school polygons from the recently-updated 'California School Campus Database' from GreenInfo Network, which comes from an ongoing project with the Stanford Prevention Research Center.[32] The final shapefiles were comprised of 8688 public schools as polygons, and 3076 private schools as points.

Parks and Playgrounds: The parks SLU layer was derived by combining land use polygons from four different statewide datasets:

- Real estate tax parcels provided by CARB for this project; park parcels were identified by "use code"
- The California Protected Areas Database a dataset maintained and updated by the Greeninfo Network that captures open space lands, parks, conservation easements, and preserves statewide, mapped using assessor ownership parcels with more extensive attribute information than the parcel data provided by CARB.[33]

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[28] California Health & Human Services Agency. Community Care Licensing – Residential Elder Care Facility Locations. CHHS Open Data. Retrieved 2020, from https://data.chhs.ca.gov/dataset/community-care-licensing-residential-elder-care-facility-locations

[29] California Health & Human Services Agency. Community Care Licensing – Child Care Center Locations. CHHS Open Data. Retrieved 2020, from https://data.chhs.ca.gov/dataset/community-care-licensing-child-care-center-locations

[30] Dun&Bradstreet. Retrieved 2020, from https://www.dnb.com/products/marketing-sales/dnb-hoovers.html

[31] California Department of Education. Public Schools and Districts Data Files. California Department of Education. Retrieved 2020, from https://www.cde.ca.gov/ds/si/ds/pubschls.asp

[32] GreenInfoNetwork. California School Campus Database. GreenInfoNetwork. Retrieved 2020, from https://www.greeninfo.org/work/project/cscd

[33] GreenInfoNetwork. CPAD – the California Protected Areas Database. GreenInfoNetwork. Retrieved 2020, from https://www.greeninfo.org/work/project/cpad-the-california-protected-areas-database

- USA Parks – a geospatial dataset produced by ESRI in partnership with TomTom, a private company specializing in location technologies and digital geodatabase products and services. This layer, which ESRI considers its "authoritative" data on parks, gardens and forests, combined with boundary information for national, state and local parks.[34]

When compared to current (2018) aerial imagery it is apparent that some parks are represented by polygons in two or more of these data layers. It is also apparent that no one dataset is sufficiently comprehensive to be used alone to represent parks and sensitive land uses for this project. Because each of these data layers contains some of the uses that fit our criteria, features from these three datasets were combined to produce the final SLU layer for parks and playgrounds used in this project. From these three data layers, a single composite and validated dataset was produced by using aerial imagery to identify each candidate SLU – e.g. "parks and playgrounds" -- as defined by CARB in their Air Quality and Land Use Handbook and selecting from each layer the polygon(s) that best represent that SLU visible in the aerial imagery.[35] The aerial imagery was also used to determine which of these parks qualify as an SLU, using the presence of improvements such as athletic facilities, play structures and other park amenities.

Prisons: The polygon data of prison boundaries statewide were collected via ESRI's OpenData site. The 'Prison Boundaries' layer was constructed by the Homeland Infrastructure Foundation - an "online community" of the federal Department of Homeland Security.[36] This is part of the Homeland Infrastructure Foundation-Level Data (HIFLD) Subcommittee, which is responsible for improvements in data collection, processing, sharing and protection of National geospatial information across multiple levels of the federal government to provide common data sources to multiple agencies.

DTSC Community Vulnerability Metrics Explanations and Justifications for Inclusion

CalEnviroScreen 3.0 (CES 3.0)

This statewide tool provides information regarding environmental health indicators at the census-tract levels across the entire state. Commissioned and maintained by California Environmental Protection Agency's (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA), this database serves as a tool for cumulative impact screening at the community level. The newest iteration of this product, version 3.0, incorporates a wide array of pollution, demographic and socioeconomic metrics to estimate cumulative environmental burdens and social vulnerability factors facing communities. This product is

[34] Esri. (2019, June 18). USA Parks. ArcGIS. Retrieved 2020, from https://www.arcgis.com/home/item.html?id=578968f975774d3fab79fe56c8c90941

[35] California Air Resources Board. (2017, May 2). Air Quality and Land Use Handbook. California's Official State Website. Retrieved 2020, from https://ww3.arb.ca.gov/ch/landuse.htm - see pages 2 and G-4

[36] Department of Homeland Security. (2020, July 7). Prison Boundaries. Homeland Infrastructure Foundation-Level Data. Retrieve 2020, from https://hifld-geoplatform.opendata.arcgis.com/datasets/2d6109d4127d458eaf0958e4c5296b67_0

widely used both by policy-makers, practitioners, academics and community organizations in order to identify and implement policies that are sensitive and responsive to environmental inequities.[37,38,39,40]

Cumulative burdens are reported in terms of raw scores (ranging from roughly 0 to 95.0), which are calculated via a multi-step algorithm that incorporates the multiple factors considered, as well as in statewide percentile terms (ranging from 0 - 100), which provides a relative measure of burden experienced by a given community compared to the rest of the state. Both the raw scores and percentiles were provided in this analysis, and may each be appropriate for use in assessing community vulnerability, depending on the context of the research being done or questions being asked. Using the raw scores will provide a true reflection of the absolute cumulative burden experienced by each census tract, while using percentiles will provide a relative measure.

Using a simplified example, suppose there are only ten census tracts in the state, three of which have a raw score of 30.0, one of which has a raw score of 80.0, and the remaining six with scores of 95.0. Analyzing these raw scores will tell the observer that most of the tracts have a very high level of burden, with 7 out of 10 experiencing a score of 80 or higher. However, using the percentile analysis, could distort this understanding to some extent. In our simple example above, given the high proportion of scores equal to 95.0, the tract with the score of 80.0 would be placed in the 40th percentile. In other words, the percentile value of 40% for the tract with a score of 80.0 would indicate that 60% of the state has a higher score than this tract, which may make it seem like the tract has a low level of burden, but in reality is only saying that its level of burden is lower *relative* to the remainder of the state's tracts. However, if the analysis at hand is specifically oriented towards identifying the *relative* level of burden experienced by each tract relative to the rest of the state, then using percentiles would be appropriate. It is up to the investigator to decide the most appropriate metric to utilize.

For assessing cumulative impact for communities near HWFs, especially when using the CES 3.0 scores and percentile values to assess the level of environmental health burden in a given area of analysis (AoA) that encompasses multiple tracts, it is also prudent to consider whether the tract-averaged values are the best metric to consider, or simply the maximum score or percentile present within the AoA. Using a simple maximum will highlight the *most* burdened tract in the AoA, a value that is probabilistically expected to increase if the AoA grows in size and more tracts are included. This is

[37] Padula, A.M., Huang, H., Baer, R.J., August, L.M., Jankowska, M.M., Jellife-Pawlowski, L.L., Sirota, M, & Woodruff, T.J. (2018, August 29). Environmental pollution and social factors as contributors to preterm birth in Fresno County. Environmental Health, 17(70). doi:10.1186/s12940-018-0414-x

[38] Cushing, L., Faust, J., August, L. M., Cendak, R., Wieland, W., & Alexeeff, G. (2015, November). Racial/ethnic Disparities in Cumulative Environmental Health Impacts in California: Evidence from a Statewide Environmental Justice Screening Tool (CalEnviroScreen 1.1). American Journal of Public Health, 105(11), 2341-2348. doi: 10.2105/AJPH.2015.302643.

[39] Meehan August, L., Faust, J. B., Cushing, L., Zeise, L., & Alexeeff, G. V. (2012, August 24). Methodological Considerations in Screening for Cumulative Environmental Health Impacts: Lessons learned from a Pilot Study in California. International Journal of Environmental Research and Public Health, 9(9), 3069-3084. doi: 10.3390/ijerph9093069

[40] Mataka, A., & Galaviz, V. (2016, October). CalEnviroScreen: A Pathway to Address Environmental Justice Issues in California. APHA 2016 Annual Meeting & Expo (Oct. 29-Nov. 2, 2016). American Public Health Association.

valuable if the analysis at hand is aimed at identifying the presence of *any* particularly high-burdened tracts rather than assessing the average level of burden across the AoA. However, if multiple AoAs are being assessed and compared, using a simple maximum score/percentile metric could be inadequate to truly assess the relative differences in burdens experienced between different AoAs as a whole.

For example, it is possible that one AoA could have a low-level of burden overall, with most of its tracts having low CES scores, but perhaps has one small tract with a high CES score. Perhaps a neighboring AoA has a much higher level of burden overall, with all of its tracts with higher CES scores. However, suppose that none of the tracts in the more-burdened AoA individually have a score equal to or higher than that of the single high-score tract in the first AoA. Using a simple maximum CES score as the metric of analysis would identify the first AoA as being more highly-burdened as compared to the second AoA, even though on average, the level of burden across the second AoA as a whole is much higher than in the first. Using instead an average CES score or percentile metric would identify the second AoA as more burdened than the first, though it would mask the presence of the single high value in the first. Therefore, it is likely always appropriate to consider both the mean and maximum metrics when conducting analyses of multiple AoAs and is again up to the investigator to choose the priorities of their analysis in order to inform the way in which they interpret these metrics.

Racial Composition

Analysis of racial and ethnicity-based metrics is commonly done when assessing issues of community vulnerability and environmental equity/justice more broadly. Given the legacy of segregation, structural racism, race-based wealth inequality and marginalization of communities of color in the United States, they are often disproportionately exposed to hazards, environmental and otherwise. There is a very strong precedent for including such metrics in environmental health and community vulnerability studies, especially in the last three to four decades.[41,42,43,44,45]

Healthcare & Senior Care Facilities

Senior centers and medical facilities such as hospitals, health clinics, and nursing homes, are all considered sensitive land uses, as individuals within these types of facilities are the most vulnerable to health risks from exposure to poor air quality. Individuals older than 65 years of age are more susceptible to air pollution-related illnesses such as stroke, asthma, heart disease, lung cancer, and other respiratory diseases. Similarly, those individuals with pre-existing medical conditions, such as

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[41] Bullard, R. D. (1993). Race and Environmental Justice in the United States. Yale Journal of International Law 18 (1), 319-335. Retrieved 2020, from https://digitalcommons.law.yale.edu/yjil/vol18/iss1/12/

[42] Maantay, J., & Maroko, A. (2009, Janurary 1). Mapping Urban Risk: Flood hazards, Race, & Environmental Justice in New York. Applied Geography, 29(1), 111-124. doi: 10.1016/j.apgeog.2008.08.002

[43] Bullard, R. D., Mohai, P., Saha, R., & Wright, B. (2008, Spring). Toxic Wastes and Race at Twenty: Why Race Still Matters After All of These Years. Environmental Law, 38(2), 371-411. Retrieved 2020, from https://www.jstor.org/stable/43267204

[44] Morello-Frosch, R., Pastor, M., & Sadd, J. (2001, March 1). Environmental Justice and Southern California's "Riskscape": The Distribution of Air Toxics Exposures and Health Risks among Diverse Communities. Urban Affairs Review, 36(4), 551-578. doi: 10.1177/10780870122184993

[45] Pastor, M., Sadd, J., & Hipp, J. (2001). Which Came First? Toxic Facilities, Minority Move-In, and Environmental Justice. Journal of Urban Affairs, 23(1), 1-21. doi: 10.1111/0735-2166.00072

those people admitted in hospitals and other healthcare facilities, are more prone to developing air pollution-related illnesses.[46]

Parks

Parks are a sensitive land use where populations uniquely susceptible to environmental hazard exposures, including children and older adults, are likely to spend time.[47] Because parks bring health benefits through facilitating outdoor physical activities, performing physical activities in polluted environments also has adverse health effects.[48] Therefore, reducing potentially hazardous exposures to pollution to parks can ensure their net health benefits.

Prisons

Compared with the general population, prisoners tend to have higher rates of underlying health conditions, including higher odds of chronic (e.g. asthma, cardiovascular disease, arthritis, and cancer) and infectious diseases (e.g. HIV , hepatitis, and tuberculosis), and mental disorders.[49,50] By virtue of being incarcerated, prisoners have little to no control over their living conditions and are also likely to have inadequate access to health care.[51] Furthermore, prisoners are faced with worse living conditions such as overcrowding, which in turn leads to the prevalence of infectious diseases and mental disorders.[52] These conditions can make this community uniquely susceptible to the adverse health effects of environmental hazard exposures.

Schools and daycare centers

Children are sensitive to pollution given their small size, high metabolic rates, and developing lung structure and immune systems. In addition to health consequences, air pollution may cause some students to be absent from school, leading to other social cost (e.g. school dropout, parents missing work, and cut in attendance-based school funding). For children with respiratory issues, not going to school on a heavily polluted day is either a result of respiratory problems triggered by air pollution or a

[46] California Environmental Protection Agency and California Air Resources Board. (2005, April). Air Quality and Land Use Handbook: A community health perspective. https://ww3.arb.ca.gov/ch/handbook.pdf
[47] California Environmental Protection Agency and California Air Resources Board. (2005, April).
[48] Li, F.; Liu, Y.; Lü, J.; Liang, L.; & Harmer, P. (2015). Ambient Air Pollution in China Poses a Multifaceted Health Threat to Outdoor Physical Activity. Journal Epidemiology & Community Health, 69 (3), 201–204. https://doi.org/10.1136/jech-2014-203892
[49] Binswanger, I. A.; Krueger, P. M.; & Steiner, J. F. (2009, November). Prevalence of Chronic Medical Conditions among Jail and Prison Inmates in the USA Compared with the General Population. Journal of Epidemiology & Community Health , 63 (11), 912–919. https://doi.org/10.1136/jech.2009.090662
[50] Fazel, S. & Baillargeon, J. (2011, March). The Health of Prisoners. The Lancet, 377 (9769), 956–965. https://doi.org/10.1016/S0140-6736(10)61053-7
[51] Wilper, A. P.; Woolhandler, S.; Boyd, J. W.; Lasser, K. E.; McCormick, D.; Bor, D. H.; & Himmelstein, D. U. (2009, April). The Health and Health Care of US Prisoners: Results of a Nationwide Survey. American Journal of Public Health, 99 (4), 666–672. doi: 10.2105/AJPH.2008.144279
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preventive measure. Since children spend more time indoors, their exposures are strongly correlated with pollution concentration in schools and home environments and during transportation.[53,54]

Oil and Gas Wells

Oil and gas well development (OGD) involves the development of oil/gas sites and wells (production and injection for enhanced recovery), transport of materials to and from well sites, drilling, operation of equipment to recover oil/gas, and collection and disposal of chemicals and waste separated from the raw oil and gas.[55,56] These activities are associated with diverse environmental hazards including air and water pollutants, noise, odors, excessive and inappropriate lighting, and undesired land use changes.[57,58] As of 2017, California (CA) was one of the top five producers of crude oil in the country[59,60]. Four of the ten largest US oil fields are in CA's San Joaquin and Los Angeles Basins and unlike newer shale gas plays, most of CA's natural gas is extracted from reservoirs also producing oil.[61,62] Stimulation techniques, such as water and steam injection and hydraulic fracturing, are used at established sites rather than newly drilled wells. Oil recovered via water flooding and steam injection (conventional enhanced oil recovery methods) accounted for 76% of the state's oil production in 2009 while hydraulic Fracking accounted for 20% of CA's oil production in the last decade.[63,64] The application of unconventional techniques can

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[53] Currie, J.; Hanushek, E. A.; Kahn, E. M.; Neidell, M.; & Rivkin, S. G. (2009). Does Pollution Increase School Absences?. The Review of Economics and Statistics, 91 (4), 682–694. https://doi.org/10.1162/rest.91.4.682.

[54] Ashmore, M. R. & Dimitroulopoulou, C. (2009). Personal Exposure of Children to Air Pollution. Atmospheric Environment, 43 (1), 128–141. https://doi.org/10.1016/j.atmosenv.2008.09.024.

[55] Long, J., Feinstein, L., Bachmann, C., Birkholzer, J., Camarillo, M., Domen, J., et al. (2015). An Independent Scientific Assessment of Well Stimulation in California Volume II: Potential Environmental Impacts of Hydraulic Fracturing and Acid Stimulations. Lawrence Berkeley National Laboratory. Retrieved from https://escholarship.org/uc/item/6mp4080p

[56] Jane, L., Laura, F., Jens, B., Preston, J., James, H., Patrick, D., et al. (2015). An Independent Scientific Assessment of Well Stimulation in California Volume I: Well Stimulation Technologies and their Past, Present, and Potential Future Use in California. Lawrence Berkeley National Laboratory. Retrieved from https://escholarship.org/uc/item/97n1f389

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[58] Meehan August, L., Faust, J. B., Cushing, L., Zeise, L., & Alexeeff, G. V. (2012, August 24). Methodological Considerations in Screening for Cumulative Environmental Health Impacts: Lessons learned from a Pilot Study in California. International Journal of Environmental Research and Public Health, 9(9), 3069-3084. doi: 10.3390/ijerph9093069

[59] U.S. Energy Information Administration. (2018). CA State Profile and Energy Profile. State Profile and Energy Estimates. Retrieved 2020, from https://www.eia.gov/state/analysis.cfm?sid=CA.

[60] US Energy Information Administration. (2018). U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Proved Reserves. State Profile and Energy Estimates. Retrieved 2020, from http://www.eia.gov/naturalgas/crudeoilreserves/

[61] Padula, A.M., Huang, H., Baer, R.J., August, L.M., Jankowska, M.M., Jellife-Pawlowski, L.L., Sirota, M, & Woodruff, T.J. (2018, August 29).

[62] Cushing, L., Faust, J., August, L. M., Cendak, R., Wieland, W., & Alexeeff, G. (2015, November).

[63] Padula, A.M., Huang, H., Baer, R.J., August, L.M., Jankowska, M.M., Jellife-Pawlowski, L.L., Sirota, M, & Woodruff, T.J. (2018, August 29).

[64] Cushing, L., Faust, J., August, L. M., Cendak, R., Wieland, W., & Alexeeff, G. (2015, November).

enhance environmental burdens as additional toxic chemicals are used that can potentially be released into air, water, and soil.[65,66,67,68,69,70]

Air pollutants associated with OGD include particulate matter with an aerodynamic diameter of < 2.5µm (PM2.5), diesel PM, nitrogen oxides (NOx), secondary ozone formation, mercury, and volatile organic compounds (VOCs) like benzene, toluene, ethylbenzene and xylene (BTEX) from truck traffic, drilling,

[65] Meehan August, L., Faust, J. B., Cushing, L., Zeise, L., & Alexeeff, G. V. (2012, August 24).
[66] Padula, A.M., Huang, H., Baer, R.J., August, L.M., Jankowska, M.M., Jellife-Pawlowski, L.L., Sirota, M, & Woodruff, T.J. (2018, August 29).
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hydraulic fracturing, production and flaring.[71,72,73,74,75,76,77,78,79,80,81,82,83,84,85] Additionally, fugitive toxic air contaminants can escape at the wellhead[86,87] that might impact health of communities living near

[71] Allshouse, W.B., McKenzie, L.M., Barton, K., Brindley, S., & Adgate, J.L. (2019). Community Noise and Air Pollution Exposure During the Development of a Multi-Well Oil and Gas Pad. Environment Science & Technology, 53(12), 7126–7135. doi:10.1021/acs.est.9b00052.

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[84] Bullard, R. D. (1993). Race and Environmental Justice in the United States. Yale Journal of International Law 18 (1), 319-335. Retrieved 2020, from https://digitalcommons.law.yale.edu/yjil/vol18/iss1/12/

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points of release. Water contaminants associated with OGD include gas-phase hydrocarbons, chemicals mixed in drilling fluids, and naturally occurring salts, and metals and radioactive elements within shale that surface with wastewater along with recovered oil and gas and can contaminate potable water via leaks and spills or evaporation.[88,89,90,91] Noise pollution is associated with well pad construction, truck traffic, drilling, pumps, flaring of gases, and other processes.[92,93] Drilling and production activities occur both during the daytime and nighttime, and light pollution has been previously reported as a nuisance in communities undergoing OGD, suggesting OGD may impact the health of nearby communities via increased psychosocial stress.[94,95]

To date, most epidemiological studies on the impacts of OGD have focused on populations in Pennsylvania, Colorado, and Texas. For example, several recent studies have found associations between OGD and various adverse birth outcomes, including reductions in term birth weight[96,97] and

Upstream Oil and Natural Gas Development: A Critical Synthesis of Current Peer-Reviewed Literature. Annual Review of Public Health, 40, 283–304. doi:10.1146/annurev-publhealth-040218-043715.

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increased odds or incidence of low birth weight[98,99], preterm birth[100,101,102] and small for gestational age birth.[103,104,105,106] One study indicates that asthma exacerbation is also of concern in relation to OGD.[107] More recently two studies in California have shown increased risk of adverse birth outcomes associated with residential proximity during pregnancy to active oil and gas well, and increased production volume from active wells.[108,109]

Drinking Water Wells

Communities served by water with elevated contaminant levels are disproportionately poor and Latino, raising environmental justice concerns.[110,111] In 2012, California passed Assembly Bill (AB) 685[112], known as the Human Right to Water law, which recognizes the universal right to clean, safe, affordable water among all Californians including disadvantaged communities in rural and urban areas served by community water systems (CWS -- with at least 15 service connections or serving at least 25 year-round residents), small water systems (i.e. <15 service connections) and private domestic wells. Several state

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and regional agencies tasked with implementing California's Human Right to Water law include the State Regional Water Boards, the Department of Water Resources, and Cal EPA's Office of Environmental Health Hazard Assessment. A major barrier to achieving universal access to clean drinking water is a lack of regulatory oversight and data on untreated drinking water sources, including small water systems and private wells. Little water quality information about these water sources exists because they fall outside the purview of state and federal drinking water regulations. Nevertheless, it is estimated that as many as 1.5 – 2.5 million Californians[113,114] rely on small water systems or private wells (referred to herein as "domestic wells"), which may face even more significant water quality challenges compared to regulated community water system. Previous studies have sought to characterize the extent to which Californians rely on domestic wells and estimate their water quality and suggest that domestic well users are uniquely vulnerable to potential contamination from diverse agricultural, industrial and other sources with significant EJ concerns.[115,116,117,118,119,120]

Voter Turnout

Studies in the economic, social science and environmental health literature suggest key linkages between voter turnout, as an indicator of community and local civic engagement capacity and environmental quality indicators.[121,122] Boyce et al. examined variations among states using a composite index of environmental stress that incorporated 167 indicators of air and water pollution, toxic chemical releases, pesticide use, and other measures, as well as an index of state-level environmental policy related to these aspects of environmental quality.[123,124] Utilizing a cross-sectional study design, the

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authors found that an index of power equality that combined voter turnout, educational attainment, tax fairness, and access to Medicaid was associated with stronger environmental policies, which were, in turn, associated with less environmental stress. In separate models, greater environmental stress and power inequality were also associated with a higher infant mortality rate and a premature death rate.

Methods

Defining Facility Boundaries

Entire Hazardous Waste Facility Boundaries

We created a set of polygons delineating each facility's property boundary using the following process:

- **Step 1** – We reviewed the current operating permit document for the HWF for relevant maps and figures showing the facility location and boundary.
- **Step 2** – We validated the coordinates of DTSC's point location for the site based on the facility address and the permitting documents. For points that appeared to be incorrectly located, we adjusted the location using the permit and provided site address information. For a number of sites, the existing DTSC point appeared to be located at a different address than that listed for the facility. These locations on Google Maps were cross-checked with the permit documents before correcting the point location.
- **Step 3** – We intersected the resulting HWF point locations with the statewide parcel dataset in order to identify the parcels within which each point is located. If this parcel looked to agree with the facility boundaries depicted in the permit, we used this parcel as the final site boundary polygon.
- **Step 4** – When parcel boundaries identified in Step 3 did not appear to match facility boundaries depicted in the permit, we selected different or additional parcels to match the facility boundaries depicted in the permit.
- **Step 5** – If there was no clear depiction of the facility's property boundary in the permit document, we conducted additional online searches regarding the facility and reviewed satellite imagery from Google Earth, visually estimated its approximate property boundaries, and manually drew the final boundary polygon.

Roughly a third of the site boundaries agreed nearly perfectly with a single intersected parcel and only required Steps 1-3. The majority of the sites required some form of manual alteration described in Step 4. An example of one of each type of site is given in Figure 17. Four sites (Edwards, Travis and Vandenberg Air Force Bases and Naval Air Weapons Station China Lake) required rough estimation of facility boundaries described in Step 5 due to their large areas, irregular borders, and lack of access to official property boundary maps or shapefiles.

health: a state-level analysis. Ecological Economics, 29(1), 127–40. https://doi.org/10.1016/S0921-8009(98)00056-1

Additionally, there were four sites for which the entire-facility boundaries were limited to the specific region of waste within them due to their unusual size and the fact that their exact boundaries would be difficult to construct. These sites included the Lawrence Berkeley National Lab, whose facility boundaries are dispersed across the eastern Berkeley hills, and three sites within the San Diego Naval Station/Naval Air Station, which is a massive facility the stretches across islands up the coastline of downtown San Diego. For these four sites, we felt a single polygon for the entire boundary would be large and potentially misleading. Therefore, the "entire-facility" polygons for these four sites either exactly correspond to the "waste-specific" polygons or represent the sub-region of the facility which encompasses the waste storage area.

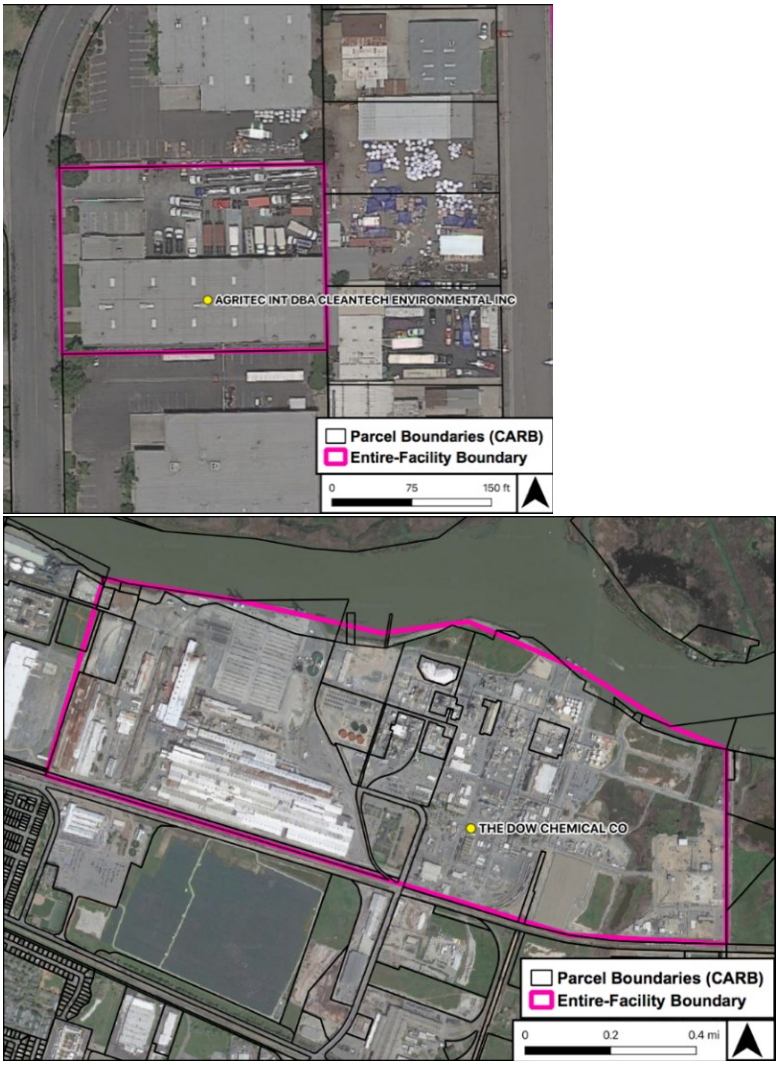

Figure 17: Example of a site whose facility boundary exactly matches a single parcel (top). Example of a site whose facility boundaries spans multiple parcels and required manual drawing of its boundary (bottom).

Waste-Specific Boundaries

A second set of polygons representing the specific locations permitted to process or store hazardous waste within each facility was constructed via additional manual processing. We constructed each of these polygons site by site following a two-step process:

- **Step 1** – We reviewed the current operating permit document for the 77 HWFs for relevant maps and figures showing the specific permitted location of waste within the facility.
- **Step 2** – We manually drew polygons around the waste sites within the facility. This frequently entailed delineating single buildings, tank arrays or storage facilities within the greater property boundary according to permit maps and figures in conjunction with Google Earth satellite imagery. These locations were available in all 77 operating permits.

It's important to note that there are hazardous waste facilities that have identified the entire facility as being authorized to handle hazardous waste. A few sites are very large and have permits limiting the handling of hazardous waste operations to specific boundaries within the entire site. Therefore, there may be some sites where the "entire-facility" boundaries differ from "waste-specific" area boundaries designated for hazardous waste treatment, storage, transfer, and disposal. (Figure 18).

Figure 18: Entire-facility and waste-specific polygon boundaries for sites within the Chevron refinery complex in Richmond, CA.

Estimating Community Characteristics Near Facilities

Areas of Analysis

In order to assess the characteristics of communities surrounding each HWF, we considered 13 different buffer distances from 0.1 to 7 miles: 0.1, 0.3, 0.5, 0.75, 1, 1.5, 2, 2.5, 3, 4, 5, 6, 7 miles. The areas delineated by these various buffer distances are referred to as "Areas of Analysis (AoAs)". Each of the 13 AoAs were constructed using both sets of HWF polygon boundaries discussed above (Figure 19).

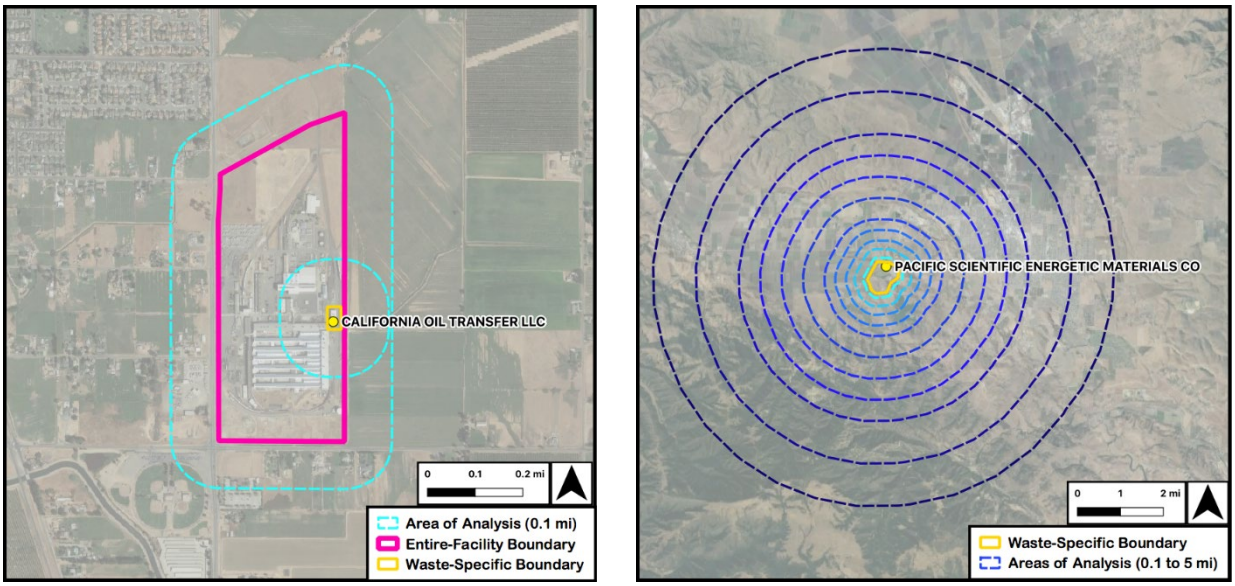

Figure 19: Example of an AoA (0.1 mi) around both the entire-facility boundary and the waste-specific boundary at a facility in Stanislaus County (left). Example of AoAs from 0.1 to 5 mi drawn around a site's waste-specific boundary in San Benito County (right).

Populated Areas

Using the census block-level population estimates from the 2013 - 2017 ACS provides a fairly high-resolution map of population characteristics across the state. However, block groups contain a lot of land area that is non-residential, such as open space, water, vacant land, retail, industrial, agricultural or other non-residentially-zoned areas. As a result, it is inaccurate to assume that the population of a given block group is evenly distributed across its land area. Filtering out non-residential areas from each block group yields a more spatially accurate representation of where people live.

To characterize populations living close to HWF in California, we constructed a high-resolution statewide spatial layer representing populated areas at sub-block granularity throughout the state using novel dasymetric mapping methods. Dasymetric mapping refers to the process of disaggregating spatial data – in this case census block boundaries – to a finer spatial unit of analysis using ancillary data. It has been

used in prior environmental justice analyses[125] and can be particularly helpful for accurately identifying residences in rural settings where census blocks (the smallest census geographic unit) can be large (i.e., > 50 km^2) and sparsely populated. Two ancillary data sources were used along with census block population estimates (from ACS 2013-2017 and Census 2010, respectively) to construct this layer: 1) a statewide database of tax parcel boundaries provided by CARB (smaller than census blocks) from DMP LightBox[126] ; and 2) a publicly available layer of building footprints for nearly 11 million buildings in California, part of a nationwide layer developed by Microsoft using satellite imagery and machine learning classification techniques.[127]

The final map of population using these data was made in the following steps and illustrated graphically in Appendix 3.

1. **Extrapolate block-level populations** from the 2010 decennial census forward in time using population estimates from the 2013-2017 ACS for parent block-groups. Proportional distribution of population amongst the blocks within each block group was kept constant according to patterns observed in 2010, but with their totals updated to reflect values in the ACS dataset.
2. **Identify residential parcels** from the CARB parcel data using the "USE_CODE_2" classification, which has some 278 unique land use types, of which 30 were identified (see Appendix 3) as being residential (e.g. 'Single Family Residential', 'Apartment House (5+ units)'). We also included "planned residential unit developments" because many of these parcels have already been developed, as evidenced by recent satellite imagery.
3. Create a spatial polygon **layer of only residential parcels.**
4. Of this parcel subset**, identify those residential parcels that likely contain a large amount of open, unpopulated space**. This was defined as individual parcels with an area of more than 1-acre for low-density residential classes (e.g. 'single-family residential') or with more than 50-acres for high-density residence classes (e.g. 'apartment house (100+ units)'). The distinction in thresholds between low and high-density residence types was made due to the observation that for most low-density uses, parcels may be large but only contain a small portion where a home is located and for which people likely are present, leading to the 1-acre cutoff. However, in densely-populated regions, it is common to see single parcels encompass large apartment or condominium developments that can span large areas of urban space, leading to the 50-acre area cutoff for these parcels.
5. Assume that all parcels not excluded in step 4 (< 1-acre or < 50-acre areas), are populated areas, with population distribution assumed to be uniform within each individual parcel. These parcel areas account for roughly 91.8% of the state's total population.
6. For those parcels excluded in step 4 (> 1-acre or > 50-acres), identify the buildings within these parcels using the Microsoft US buildings layer, and make the assumption that the population

[125] Clough, E., & Bell, D. (2016, Feburary). Just fracking: a distributive environmental justice analysis of unconventional gas development in Pennsylvania, USA. Environmental Research Letters, 11(2). doi.org/10.1088/1748-9326/11/2/025001

[126] Digital Map Products. Nationwide Parcel Data & Property Level Geocodes - SmartParcels. Retrieved July 1, 2020, from https://www.digmap.com/platform/smartparcels/

[127] Github. Retrieved July 1 2020, from https://github.com/Microsoft/USBuildingFootprints/

within these large parcels is distributed only amongst the building areas within it. These areas account for roughly 4.9% of the population.

7. For any blocks with a non-zero population but containing no residential parcels, identify buildings within them and assume population is distributed in these buildings. These areas represent roughly 3.0% of the population.
8. Finally, for any blocks with non-zero population but which contain neither residential parcels nor buildings, simply assume that its population is uniformly distributed across the entire block area. This pertains to blocks containing only roughly 0.3% of the population.
9. Using a combination of these four polygon geometries, (i) small residential parcels, ii) buildings within large residential parcels, iii) buildings within populated blocks with no residential parcels, and iv) boundaries of populated blocks with no residential parcels or buildings), create a polygon layer representing the union of all of them and assign the block-level population totals only to these areas within each block, assuming uniform population density throughout the block.

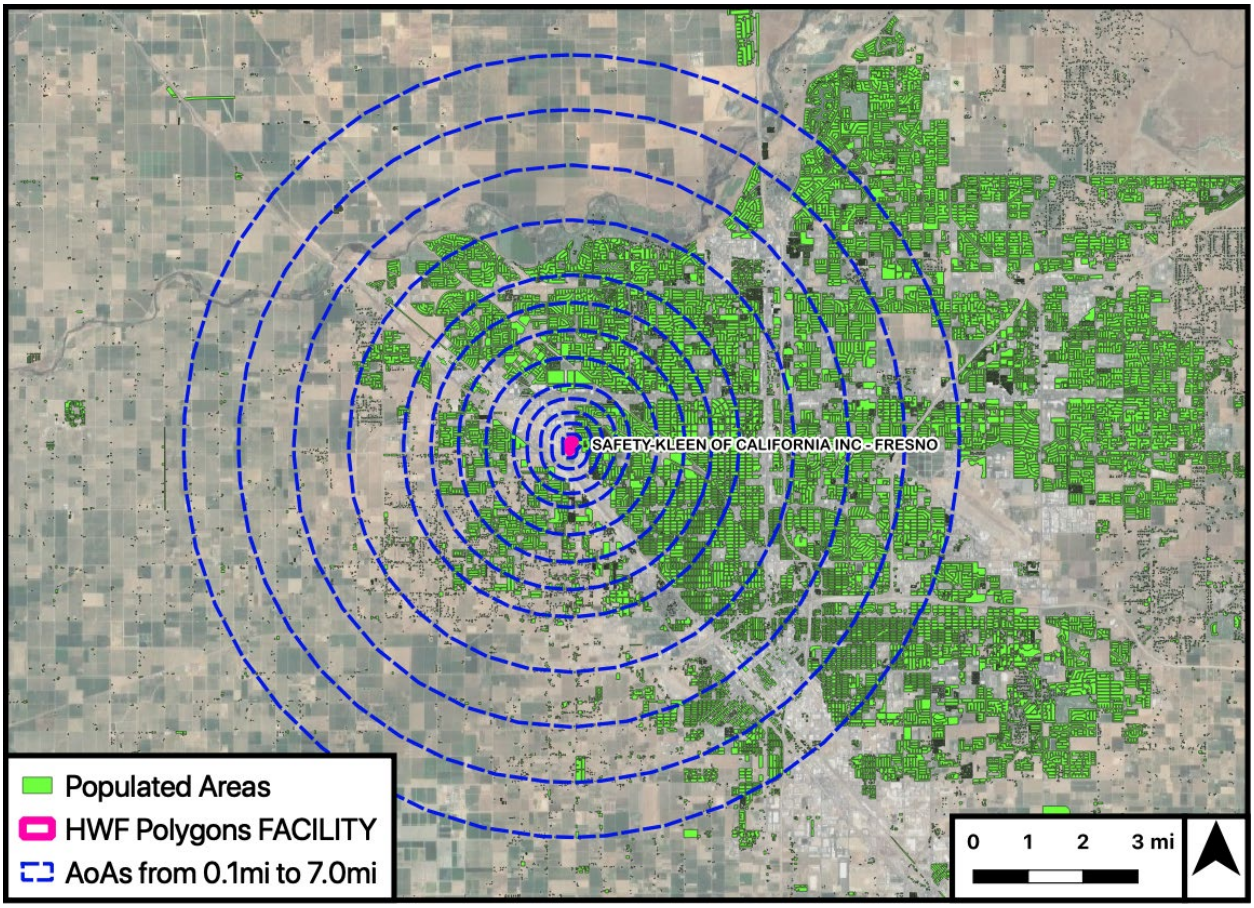

Figure 20: Example of AoAs from 0.1 to 7mi drawn around the waste-specific polygon at a facility in Fresno. Only the green area represents populated areas were included in the analysis.

Unweighted Metrics: Minimum and Maximum CES 3.0 Values, Oil & Gas Wells, Sensitive Land Use (SLU) Counts

The **minimum and maximum CES values (scores and percentiles)** were calculated by simply identifying the smallest or largest CES 3.0 value amongst the populated areas encountered within the given AoA. For example, in Figure 21, the maximum raw CES 3.0 score for the 0.5 mi AoA is determined by the populated area encountered in the eastern half of the AoA (value between 40-60). For the 1 and 2-mile AoAs, the maximum score is found in more southern populated areas and is between 60-80.

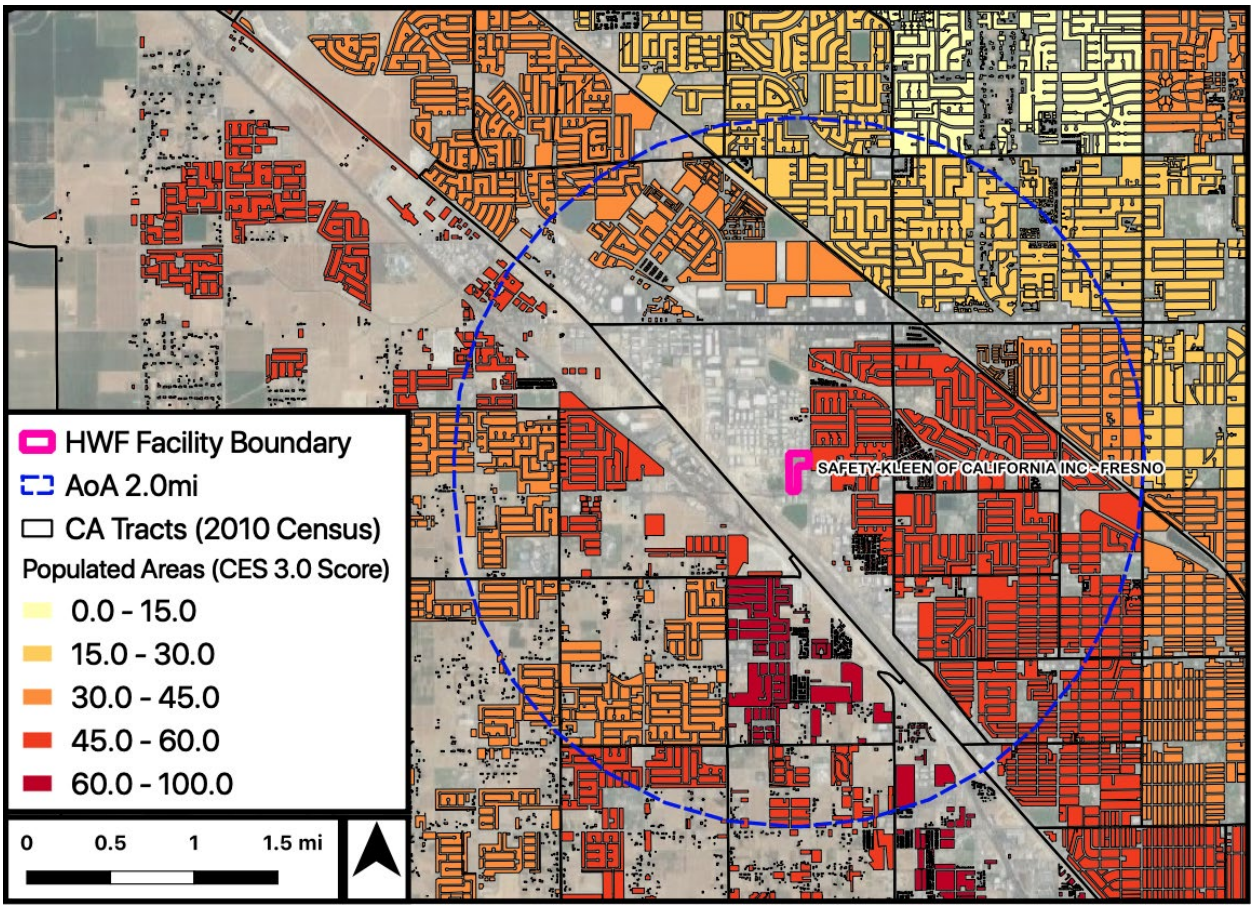

Figure 21: Map of tract-level CES 3.0 scores near the Fresno Safety-Kleen facility. Populated areas were assigned the CES 3.0 score of the tract that contained them.

Counts of sensitive land use (SLU) zones within each AoA were estimated using the point or polygon geometries of each SLU type. If a point or *any part* of a SLU boundary polygon intersected with an AoA, it was counted as being in the AoA. Therefore, all SLUs are each summarized as simple counts, with a total count for all six SLU types reported as well.

Counts of new or active oil and gas wells in each AoA surrounding HWFs were calculated using the point-location data of the wells from the DOGGR[128] dataset, with the final counts representing the total number of well points (active or new) that fall within a given AoA.

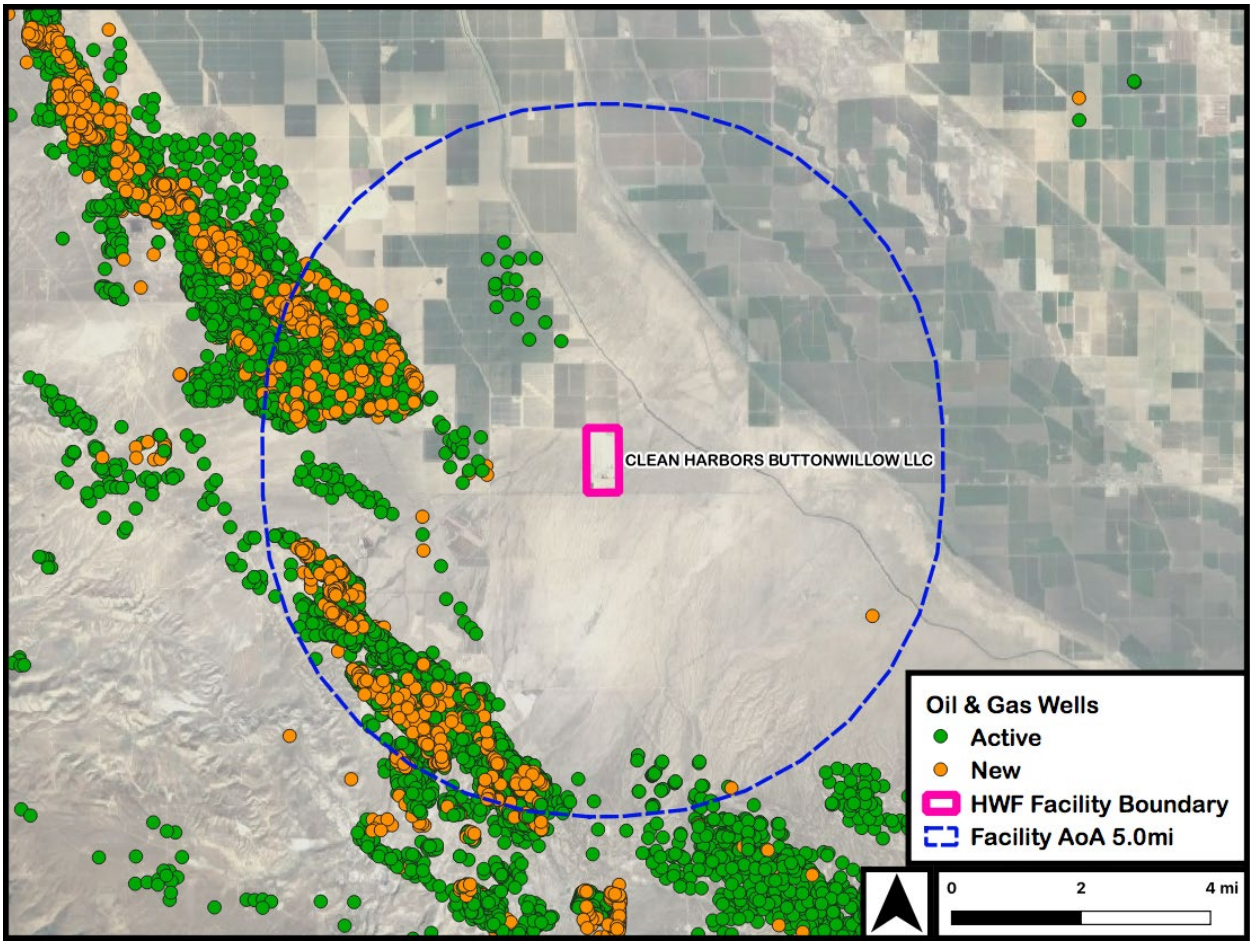

Figure 22: There are 5174 active or new oil and gas wells within the 5.0mi AoA surrounding the Clean Harbors facility in Buttonwillow.

Area-Weighted Metrics: Domestic Drinking Water Wells

In order to estimate the number of domestic drinking water wells within AoAs of each HWF, we utilized a simple area-weighted averaging approach using the sectional well totals provided from the Department of Water Resources' Online System for Well Completion Reports (OSWCR) dataset. This was done in the following steps:

- **Step 1** – We filtered out all well section geometries that have a well count of 0.
- **Step 2** – Assuming that domestic drinking water wells predominantly occur within populated areas, we intersected the well section geometries with the populated area geometries and assigned the well totals for each section to the populated areas within each section, excluding

[128] Division of Oil, Gas, and Geothermal Resources (DOGGR) has since changed its name to Cal-GEM.

non-populated areas from analysis. For sections containing wells that did not intersect with any populated areas, we assumed that their wells are uniformly distributed across the section area. Roughly 5.4% of all registered domestic drinking water wells fell into this category, suggesting that some domestic wells may no longer be used, and/or that the populated area data being used may not fully capture all residences.

- **Step 3** – We then intersected these populated-area-only well sections with the AoAs and, assuming that each section's wells are uniformly distributed across its populated area, calculated an area-weighted well count for each AoA. For example, if an AoA intersects two sections, encompassing 50% of each section's populated areas, and the well counts of the sections are 6 and 10, respectively, then the estimated total number of wells within the AoA will be: (0.5*6) + (0.5*10) = 8 domestic drinking water wells in AoA

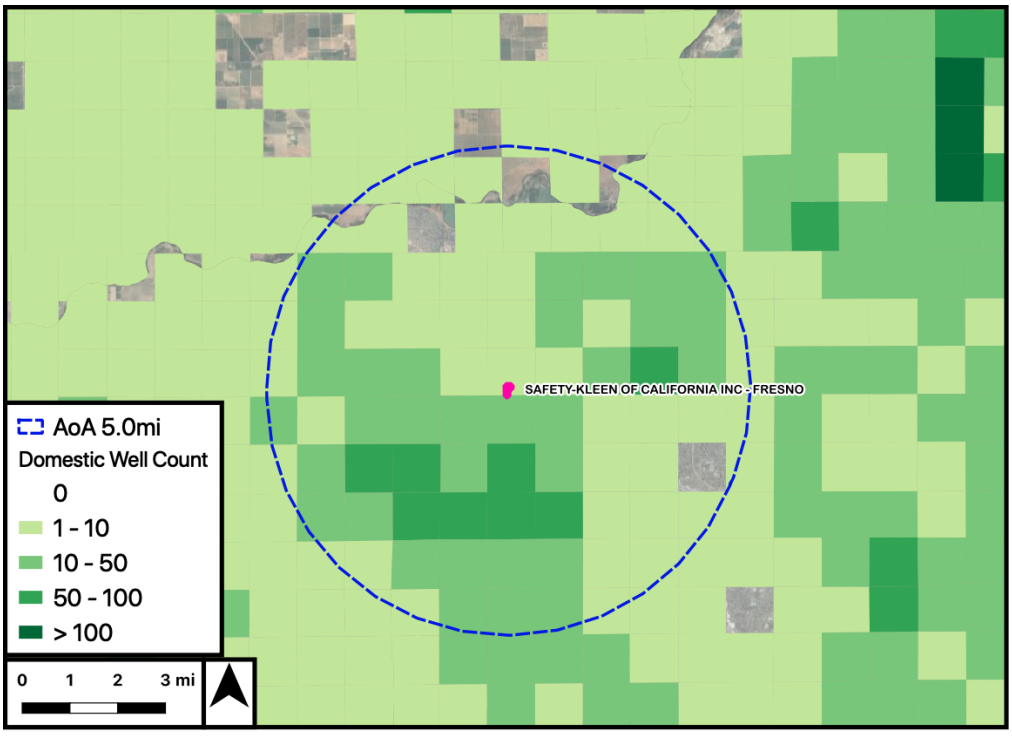

Figure 23a: Domestic drinking water well sections surrounding the Safety-Kleen facility in Fresno with well sections with 0 wells removed

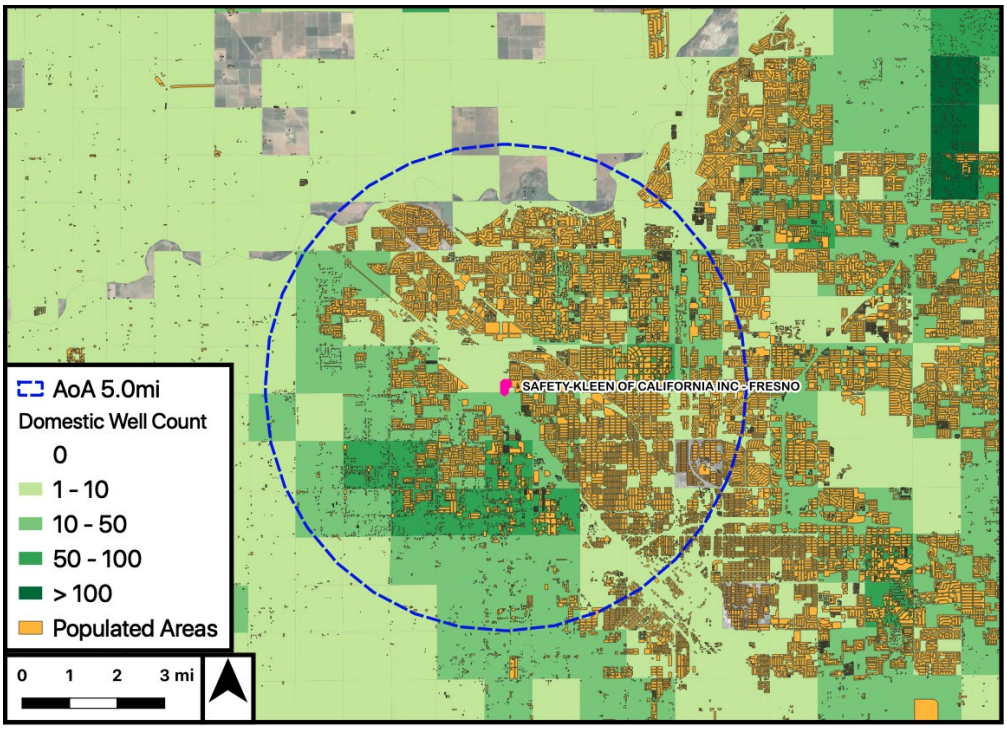

Figure 24b: Populated areas intersected with well sections

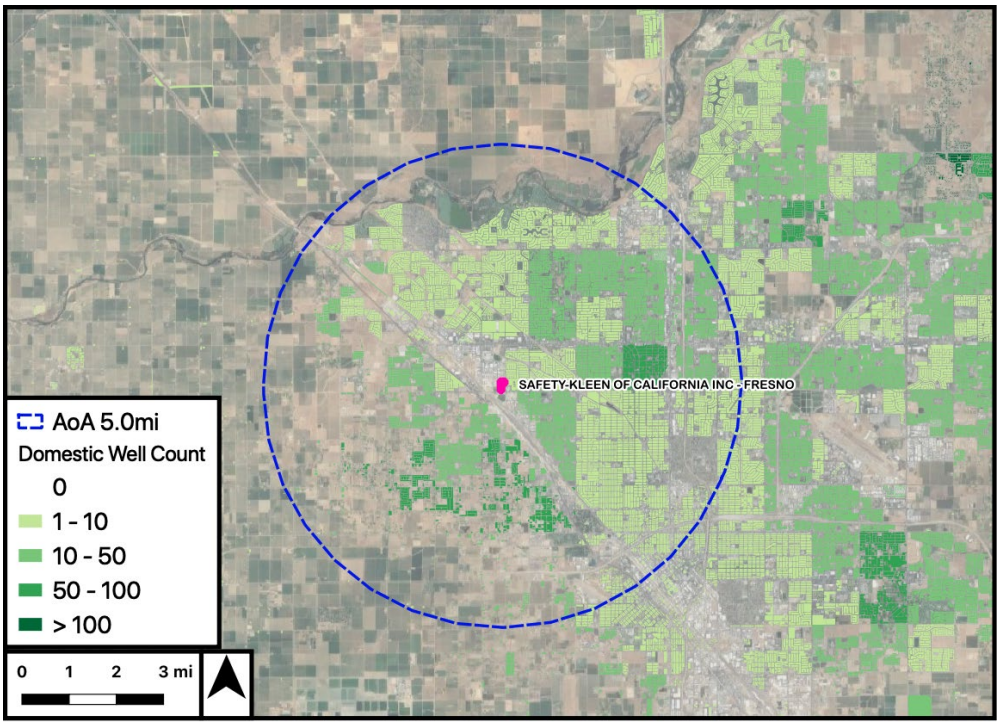

Figure 25c: Well counts assigned to populated areas within sections and intersected with the AoA to find the area-weighted mean well count. Sections with non-zero well counts and no intersecting populated areas are left intact.

Population-Weighted Metrics: Mean CES 3.0 Values, Racial Composition, Voter Turnout

Mean CES 3.0 scores and percentiles, racial composition, and average voter turnout are all metrics that were weighted by population and then averaged to generate a population-weighted mean as follows:

- **Step 1** – We assigned the populations of each block group to the populated area polygons within it assuming a uniform population distribution across the populated areas in each block group.
- **Step 2** – We intersected these populated-area-only block group geometries with each AoA and calculated the percentages of each area that fell within the AoA, and in turn the percentage of their populations within the AoA. This provided an estimation of the total number of people living in each populated area polygon or portion of a populated area polygon in the AoA.
- **Step 3** – Using the population estimates derived in Step 2 as weights, the average metric was calculated by summing the product of the weights and metric values (e.g. CES 3.0 score) from each populated area polygon or portion of a polygon within the AoA. We repeated steps 1-3 for each facility AoA to calculate population-weighted CES scores, percentiles, racial composition and average voter turnout.

Voter turnout data from the UC Berkeley Statewide Database (UCBSD) was downloaded for the 2012 and 2016 general elections at the level of voter registration precinct (RGPREC), which was then re-mapped to populated areas within the 2017 census block groups using the RGPREC to census blocks crosswalk protocol available in the same UCBSD data repository. This average percentage voter turnout by block group was the metric used in the population weighting scheme described above.

Results

All results are tabulated in two excel workbooks, one for community characteristics within AoAs based upon the entire-facility polygons and one for those based upon the waste-specific polygons. Separate sheets are included for each metric (11 sheets total: *Mean CES 3.0 Score, Min CES 3.0 Score, Max CES 3.0 Score, Mean CES 3.0 Percentile, Min CES 3.0 Percentile, Max CES 3.0 Percentile, Non-White %, Domestic Drinking Wells Count, Oil & Gas Wells Count, Sensitive Land Use Counts, Voter Turnout %*). The facilities are presented as separate rows in alphabetical order. The "ID" column represents a unique identifier for each facility that can be used to merge data between sheets or workbooks. These identifiers were originally created when working with the original set of 82 HWFs, which is why some of the IDs are higher than 77.

Metric values by AoA are presented in separate columns for each HWF and may contain NA values. NA values entail that the given AoA did not intersect any populated areas and therefore has no values of cumulative impact to evaluate. These data are available from DTSC upon request.

Summary

SB 673 and AB 617 have both been hailed as transformational pieces of legislation with the potential to improve environmental regulation in ways that better protect community environmental health by more systematically integrating cumulative impacts into regulatory decision-making, enforcement activities, and programs at the California Air Resources Board—CARB (AB 617) and the Department of Toxics Substances Control – DTSC (SB 673). The goal of our analysis was to: 1) provide CARB's OCAP with additional statewide cumulative impact metrics that could be used to supplement information provided by CalEnviroScreen, and 2) provide DTSC with analysis related to the HWFs under its regulatory purview that could inform its approach to assessments of community-level cumulative impacts and vulnerability in its permitting process. This work was also aimed at informing DTSC's frameworks document that proposes approaches for systematically incorporating cumulative impacts in its hazardous waste facility permitting process.[129]

Based on the results of this work, we provide the following recommendations for each agency in terms of enhancing analytical approaches to cumulative impacts analysis and integrating additional data sources and metrics to more holistically characterize communities facing significant pollution burdens and vulnerability factors that could amplify environmental health risks. In particular, we recommend leveraging additional data sources to expand the scope of environmental hazard, social vulnerability and sensitive land use metrics not currently included in CalEnviroScreen (CES). CES has proven to be a well-regarded and methodologically sound spatial screening tool that incorporates a wide array of measures to characterize cumulative environmental burdens and social vulnerabilities facing disadvantaged communities in the state. Nevertheless, additional environmental hazard, vulnerability and sensitive land use metrics could supplement those within CES to strengthen environmental justice objectives in AB 617 and SB 673 implementation.

Recommendations for CARB and DTSC to Enhance Cumulative Impacts Analysis to Guide Decision-making

1. DTSC and CARB: **Include data related to oil and gas production to supplement cumulative impact metrics in CalEnviroScreen.**

We suggest that data on the location of active and new oil and gas wells be used to supplement CES environmental hazard metrics. Exposure assessment studies show present potentially significant air

[129] Department of Toxic Substance Control. (2018, October). SB 673 Cumulative Impacts and Community Vulnerability Draft Regulatory Framework Concepts. https://dtsc.ca.gov/wp-content/uploads/sites/31/2015/09/DRAFT-CI-Regulatory-Frameworks-Concepts-10-15-2018.pdf

pollution and drinking water threats[130,131,132,133] and adverse health outcomes.[134,135] Much of CA's oil and gas extraction activities are located in the Central, San Joaquin and Imperial Valleys as well as in urban areas, including Los Angeles. Given the ubiquity of oil and gas extraction activities particularly in disadvantaged communities, we recommend adding an indicator for this hazard as a supplement to CES. Metrics could include well counts, which we derived for this project, and future work could also integrate information on production volume of active wells, as well as the location of other oil and gas extraction sites, including lined and unlined percolation pits and injection wells.

2. DTSC and CARB: **Enhance information on sensitive land uses that incorporates spatial information on the number and density of domestic drinking water wells.**

Approximately 2 million Californians rely on either small water systems (i.e., <15 service connections) or private wells for which little water quality information exists because these sources fall outside the purview of drinking water regulations.[136] CA's Human Right to Water law[137] recognizes the universal right to clean, safe, affordable water among all Californians, including disadvantaged communities in rural and urban areas served not only by regulated community water systems but also by private domestic wells. Intensive agricultural production and other activities result in elevated levels of hazardous chemicals in groundwater, including arsenic, a carcinogen, nitrate, a likely endocrine-disrupting compound (EDC), pesticide constituents such as 1,2,3-trichloropropane (1,2,3-TCP), a potential mammary carcinogen, and per- and polyfluoroalkyl substance (PFAS) contamination from

[130] Allshouse, W.B., McKenzie, L.M., Barton, K., Brindley, S., & Adgate, J.L. (2019). Community Noise and Air Pollution Exposure During the Development of a Multi-Well Oil and Gas Pad. Environment Science & Technology, 53(12), 7126–7135. doi:10.1021/acs.est.9b00052.

[131] Brantley, H.L., Thoma, E.D., & Eisele AP. (2015). Assessment of volatile organic compound and hazardous air pollutant emissions from oil and natural gas well pads using mobile remote and on-site direct measurements. Journal of the Air & Waste Management Association, 65(9), 1072–1082. http://dx.doi.org/10.1080/10962247.2015.1056888

[132] Garcia-Gonzales, D.A., Shonkoff, S.B.C., Hays, J., & Jerrett, M. (2019). Hazardous Air Pollutants Associated with Upstream Oil and Natural Gas Development: A Critical Synthesis of Current Peer-Reviewed Literature. Annual Review of Public Health, 40, 283–304. doi:10.1146/annurev-publhealth-040218-043715.

[133] Vengosh A., Jackson R.B., Warner N., Darrah T.H., & Kondash A. (2014). A Critical Review of the Risks to Water Resources from Unconventional Shale Gas Development and Hydraulic Fracturing in the United States. Environmental Science & Technology, 48 (15), 8334–8348. doi:10.1021/es405118y.

[134] Tran, K.V., Casey, J.A., Cushing, L.J., & Morello-Frosch, R. (2020). Residential proximity to oil and gas development and birth outcomes in California: a retrospective cohort study of 2006-2015 births. Environmental Health Perspectives, 128(6). DOI: 10.1289/EHP5842

[135] Gonzalez, D.J.X., Sherris, A.R., Yang, W., Stevenson, D.K., Padula, A.M., Baiocchi, M., Burke, M., Cullen, M.R., & Shaw, G.M. (2020). Oil and gas production and spontaneous preterm birth in the San Joaquin Valley, CA, Environmental Epidemiology, 4(4). doi: 10.1097/EE9.0000000000000099.

[136] California Water Boards. (2013, January). Communities That Rely on a Contaminated Groundwater Source for Drinking [Report to the Legislature]. California State Water Resources Control Board. https://www.waterboards.ca.gov/water_issues/programs/gama/ab2222/docs/ab2222.pdf

[137] California State Water Resources Control Board. Human Right to Water Portal. California's Official State Website. Retrieved January 6, 2019, from https://www.waterboards.ca.gov/water_issues/programs/hr2w/

waste landfills, airports, and military training sites.[138,139,140] Lack of resources to treat contamination undermines efforts to reduce exposures and potential health threats in disadvantaged communities that are disproportionately Latino, raising environmental justice concerns. Communities relying on domestic wells are a uniquely vulnerable group, and the data layers we have provided showing locations where communities are relying on domestic wells for drinking water can provide additional information for decision-making for permitting of facilities by DTSC. For CARB, this information can provide important information on communities that may be vulnerable to potential drinking water threats in addition to poor air quality as documented by CES and other data sources. While CES provides water quality data mostly from community water systems and townships, it does not integrate spatial data to determine where communities are that rely on domestic wells for their drinking water.

3. DTSC and CARB: **Supplement CES with sensitive land use (SLU) indicators that include locations that are inhabited or frequented by populations likely to be susceptible to the adverse effects of environmental hazards.**

CARB's Air Quality and Land Use Handbook[141] states that community health risk assessments and regulatory programs have produced important air quality information for facilities that may be in close proximity to residences, schools, day care centers, playgrounds, and medical facilities (i.e., sensitive land uses). Sensitive land uses deserve special attention because they are often frequented or inhabited vulnerable populations, including children, pregnant women, the elderly, and those with underlying chronic health conditions that may make then especially susceptible to the adverse health effects of air and water pollution and other sources of exposure. We have provided SLU data layers with different indicators on the locations of parks, schools, childcare facilities, health and senior care facilities, and prisons to facilitate the integration of these indicators for purposes of AB 617 and SB 673 implementation. We note that the addition of prisons acknowledges the need to protect incarcerated populations that are known to have higher rates of underlying health conditions, which makes them susceptible to environmental hazard exposures.[142,143] In addition, the fact that prisoners have virtually no control over their living conditions, undermines their capacity to reduce their exposures to air pollution or drinking water contaminants.

4. DTSC and CARB: **Integrate indicators of civic engagement capacity and racial/ethnic composition.**

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[138] Poulsen, R., Cedergreen, N., Hayes, T., & Hansen, M. (2018). Nitrate: An Environmental Endocrine Disruptor? A Review of Evidence and Research Needs. Environmental Science & Technology, 52 (7), 3869–3887. https://doi.org/10.1021/acs.est.7b06419

[139] Agency for Toxic Substance and Disease Registry. (2019, July 15). Toxicological Profile: 1,2,3 Trichloropropane. Retrieved on August 23, 2020, from https://www.atsdr.cdc.gov/ToxProfiles/tp.asp?id=912&tid=186

[140] Hurley, S., Houtz, E., Goldberg, D., Wang, M., Park, J., Nelson, D.O., Reynolds, P., Bernstein, L., Anton-Culver, H., Horn-Ross, P., & Petreas, M. (2016). Preliminary Associations between the Detection of Perfluoroalkyl Acids (PFAAs) in Drinking Water and Serum Concentrations in a Sample of California Women. Environmental Science & Technology Letters, 3 (7), 264-269. DOI: 10.1021/acs.estlett.6b00154

[141] California Environmental Protection Agency and California Air Resources Board. (2005, April). Air Quality and Land Use Handbook: A community health perspective. https://ww3.arb.ca.gov/ch/handbook.pdf

[142] Fazel, S. & Baillargeon, J. (2011, March). The Health of Prisoners. The Lancet, 377 (9769), 956–965. https://doi.org/10.1016/S0140-6736(10)61053-7.

[143] Bernd, C., Lotfus-Farren, Z., & Nandini Mitra, M. (n.d.) America's Toxic Prisons: Rhe Environmental Injustices of Mass Incarceration. Earth Island Journal. Retrieved https://earthisland.org/journal/americas-toxic-prisons/

Although race/ethnicity indicators are not included in CES, there are stark racial/ethnic disparities in cumulative CES scores that persist across age groups.[144] Analysis of racial and ethnicity-based metrics is commonly done when assessing issues of community vulnerability and environmental equity/justice more broadly. Given the legacy of segregation, structural racism, race-based wealth inequality and marginalization of communities of color in the United States, they are often disproportionately exposed to hazards, environmental and otherwise.[145,146,147,148,149] These racial disparities are important to consider for implementation of SB 673 for the facilities under DTSC's regulatory purview, and also to guide CARB's work to address disparities in air pollution burdens, and evaluate the impact and effectiveness of AB 617, specifically whether and how Community Emission Reduction Plans are reducing pollutant emissions in disadvantaged communities as well as reducing regional/statewide racial/ethnic disparities in pollution burdens and health risk.

Similarly, adding an indicator of community voter turnout would provide CARB and DTSC with valuable information on community civic engagement capacity. Indeed, studies indicate linkages between voter turnout, as a measure local civic engagement capacity and environmental quality indicators.[150,151] These measures would enable DTSC to assess the extent to which fenceline communities near those facilities subject to permit decisions are able to make their voices heard in public deliberations, and whether additional resources are needed to bolster community capacity to participate in the decision-making process. For CARB, measures of civic engagement capacity can likewise inform implementation of AB 617 elements, including integration of CAMPs, and CERPS into air district plans and overall efforts to ensure that community voice and power are sustained throughout the implementation process.

5. DTSC and CARB: **Improve locational accuracy of rural populations, using dasymetric mapping techniques.**

[144] Office of Environmental Health and Hazard Assessment California & Environmental Protection Agency. 2018, June). Analysis of Race/Ethnicity, Age, and CalEnviroScreen 3.0 Scores. Retrieved 2020, from https://oehha.ca.gov/media/downloads/calenviroscreen/document-calenviroscreen/raceageces3analysis.pdf

[145] Bullard, R. D. (1993). Race and Environmental Justice in the United States. Yale Journal of International Law 1 (18), 319-335. Retrieved 2020, from https://digitalcommons.law.yale.edu/yjil/vol18/iss1/12/

[146] Maantay, J., & Maroko, A. (2009, Janurary 1). Mapping Urban Risk: Flood hazards, Race, & Environmental Justice in New York. Applied Geography, 29(1), 111-124. doi: 10.1016/j.apgeog.2008.08.002

[147] Bullard, R. D., Mohai, P., Saha, R., & Wright, B. (2008, Spring). Toxic Wastes and Race at Twenty: Why Race Still Matters After All of These Years. Environmental Law, 2(38) 371-411. Retrieved 2020, from https://www.jstor.org/stable/43267204

[148] Morello-Frosch, R., Pastor, M., & Sadd, J. (2001, March 1). Environmental Justice and Southern California's "Riskscape": The Distribution of Air Toxics Exposures and Health Risks among Diverse Communities. Urban Affairs Review, 36(4), 551-578. doi: 10.1177/10780870122184993

[149] Pastor, M., Sadd, J., & Hipp, J. (2001). Which Came First? Toxic Facilities, Minority Move-In, and Environmental Justice. Journal of Urban Affairs, 23(1), 1-21. doi: 10.1111/0735-2166.00072

[150] Cushing L., Morello-Frosch, R., Wander, M., & Pastor, M. (2015, March). The Haves, the Have-Nots, and the Health of Everyone: The Relationship Between Social Inequality and Environmental Quality. Annual Review of Public Health, 36, 193–209. https://doi.org/10.1146/annurev-publhealth-031914-122646

[151] Press, D. (1998). Local environmental policy capacity: framework for research. National Resources Journal, 38(1), 29-52. Retrieved from https://www.jstor.org/stable/24888443

A significant challenge for spatial tools that characterize cumulative impacts is accurately locating residential populations in rural areas, where population numbers are small and geographic units, such as census tracts tend to be large. In this situation, spatial tools often assume a uniform distribution of populations within a given geographic unit, which is not likely to be accurate. In our analysis, we demonstrated how to improve the locational accuracy of rural populations and in turn community cumulative impact metrics, by applying novel dasymetric mapping techniques. Populated areas were defined by integrating residential parcel data, block-level population estimates derived from the 2010 decennial US census and block-group-level estimates from the 2013 - 2017 American Community Survey, and building footprint data from a remotely-sensed national dataset produced by Microsoft in 2018. This approach better estimates where people live by omitting places that are unlikely to be inhabited. We have provided these data layers to CARB and DTSC and believe that this technique can be replicated and updated as new population data from the 2020 census data become available. Dasymetric mapping approaches can significantly enhance the accuracy of cumulative impact analysis, particularly for potentially hazardous facilities and other pollution emission sources located in rural communities.

6. DTSC: **Improve locational accuracy of HWF sites in public use data sets, and enhance precision of where waste processing activities occur on large sites.**

When processing facility point locations provided by DTSC, several were located at a different address than that listed for the actual HWF. We corrected these after cross-checking all locations with permit documents. In addition, we sought to identify the facility parcels within which each point is located to have a more accurate assessment of the site boundary polygon, using parcel data, and as a secondary step satellite imagery from Google Earth. For very large sites, including military bases, using a single polygon for the entire boundary is potentially misleading, and therefore we provided "waste-specific" polygons to characterize the sub-region of a facility site which encompasses a waste processing and/or storage area. Utilizing more accurate spatial characterizations of HWFs is likely to improve efforts to assess potential cumulative impacts of facility activities on nearby communities. Our step-by-step approach to improving locational accuracy and spatial extent of facility sites can easily be replicated, given that the number of facilities regulated by DTSC is relatively small (N<80) and future work can update the locational information we have provided on currently regulated facilities.

7. DTSC: **Conduct sensitivity analyses when assessing cumulative impacts associated with HWFs and nearby environmental hazards, vulnerable populations, and sensitive land uses.**

In order to holistically characterize communities surrounding HWFs, we encourage multiple sensitivity analyses that account for different buffer distances when assessing cumulative impacts and community vulnerability for HWF permitting decisions. Several studies have found evidence of adverse health effects associated with residence within various distances of hazardous waste sites. For example, several studies have found evidence of adverse health effects associated with residence within a ZIP code containing a hazardous waste site. ZIP codes vary widely in size but on average cover about 90 square

miles, equivalent to a roughly 5 mile radius.[152,153,154,155,156,157] Other studies have found evidence of elevated risks of birth defects within 2km[158,159] and 5 miles[160] of hazardous waste sites. In California, DTSC data show evidence of soil contamination with lead more than 1.7 miles from the Exide site in Los Angeles.[161] In addition, recent studies of the health benefits associated with power plant retirements in California showed reductions in preterm birth rates and increases in fertility rates at a radius of 5-10 km.[162,163] Given the variability of potential health effects of facilities at different buffer distances, we believe that providing a holistic analysis that examines cumulative impacts at various distance ranges is warranted.

Conclusion

With encouragement from scientists, policy makers, environmental justice groups, and communities, regulatory agencies in California are working to more systematically address cumulative impacts in

[152] Kouznetsova, M., Huang, X., Ma, J., Lessner, L., & Carpenter, D.O. (2007). Increased Rate of Hospitalization for Diabetes and Residential Proximity of Hazardous Waste Sites. Environmental Health Perspectives, 115(1), 75-79. doi: 10.1289/ehp.9223

[153] Sergeev, A.V., & Carpenter, D.O. (2005). Hospitalization rates for coronary heart disease in relation to residence near areas contaminated with persistent organic pollutants and other pollutants. Environmental Health Perspectives, 113(6), 756-61. doi: 10.1289/ehp.7595.

[154] Lu, X., Lessner, L., Carpenter, D.O. (2014). Association between hospital discharge rate for female breast cancer and residence in a zip code containing hazardous waste sites. Environmental Research, 134, 375-381. doi: 10.1016/j.envres.2014.07.005

[155] Huang, H., Wang, A., Morello-Frosch, R., Lam, J., Sirota, M., Padula, A., & Woodruff, T. (2018). Cumulative Risk and Impacts Modeling on Environmental Chemical and Social Stressors. Current Environmental Health Reports, 5, 88-99. doi: 10.1007/s40572-018-0180-5

[156] Boberg, E., Lessner, L., Carpenter, D.O. (2011). The role of residence near hazardous waste sites containing benzene in the development of hematologic cancers in upstate New York. International Journal of Occupational Medicine and Environmental Health, 24(4), 327–338. doi: 10.2478/s13382-011-0037-8

[157] Carpenter, D.O., Ma, J., & Lessner, L. (2008). Asthma and infectious respiratory disease in relation to residence near hazardous waste sites. Annals of the New York Academy of Science, 1140 (1), 201-208. doi: 10.1196/annals.1454.000.

[158] Elliott, P., Briggs, D., Morris, S., de Hoogh, C., Hurt, C., Jensen, T.K., Maitland, I., Richardson, S., Wakefield, J., & Jarup, L. (2001). Risk of adverse birth outcomes in populations living near landfill sites. BMJ, 323(7309), 363–368. https://doi.org/10.1136/bmj.323.7309.363

[159] Elliott, P., Richardson, S.S., Abellan, J.J., Thomson, A., de Hoogh, C., Jarup, L., & Briggs, D.J. (2009). Geographic density of landfill sites and risk of congenital anomalies in England. Occupational and Environmental Medicine, 66(2), 81–89. doi:10.1136/oem.2007.038497

[160] Kuehn, C.M., Mueller, B.A., Checkoway, H., & Williams, M. (2007). Risk of malformations associated with residential proximity to hazardous waste sites in Washington State. Environmental Research, 103(3), 405-412. https://doi.org/10.1016/j.envres.2006.08.008

[161] Department of Toxics and Substances Control. https://www.dtsc.ca.gov/HazardousWaste/Projects/pia-sampling-data.cfm

[162] Casey, J.A., Karasek, D., Ogburn, E.K., Goin D., Dang K., Braveman, P.A., & Morello-Frosch, R. (2018). Retirements of Coal and Oil Power Plants in California: Association with Reduced Preterm Birth among Populations Nearby. American Journal of Epidemiology, 187(8), 1586-1594. doi: 10.1093/aje/kwy110

[163] Casey, J.A., Karasek, D., Gemmill, A., Ogburn, E.K., Goin, D., & Morello-Frosch, R. (2018). Increase in fertility following coal and oil power plant retirements in California. Environmental Health, 17(44). doi: 10.1186/s12940-018-0388-8

science and decision making.[164,165,166] In particular, diverse stakeholders have called for rigorous, robust and transparent methods to consider and include cumulative impacts in developing regulatory and enforcement priorities. Spatial screening methods such as CalEnviroScreen have become important tools that enable decision-makers to advance environmental justice goals by more efficiently targeting efforts and resources to remediate cumulative impacts, environmental inequities, and focus regulatory action at the neighborhood level. Ideally, effective implementation of AB 617 and SB 673 can help alleviate the historical burdens that have been placed on communities to demonstrate the cumulative impacts of environmental and social stressors and push for action. The three project elements of this contract sought to advance this overarching goal through: (1) a capacity-building training and technical assistance program to support community-based air quality monitoring under AB 617, (2) a community-engaged evaluation of AB 617 implementation, and (3) leveraging data sources and applying novel methods to derive new geographic indicators of cumulative impact and community vulnerability that can be integrated with and supplement existing spatial tools such as CalEnviroScreen for the purposes of AB 617 and SB 673 implementation. During this contract period, all members of our research team have collaborated in different ways with CARB and DTSC staff and scientists with data exchanges, bi-directional feedback on our work, and evaluation of agency efforts to implement mandates under AB 617 and SB 673. Our hope is that the work provided here will serve as a foundation that strengthens the impact of both laws in ways that improve environmental quality, protect community environmental health, and advance environmental justice.

[164] National Research Council Committee. (2009. Improving Risk Analysis Approaches Used by the U.S. EPA . Science and Decisions: Advancing Risk Assessment. Washington, DC: The National Academies Press. https://doi.org/10.17226/12209.

[165] U.S. Environmental Protection Agency. (2003). Framework for Cumulative Risk Assessment. U.S. Environmental Protection Agency, Office of Research and Development, Center for Public Health and Environmental Assessment. Retrieved https://www.epa.gov/risk/framework-cumulative-risk-assessment

[166] National Environmental Justice Advisory Council. (2004, December). Ensuring risk reduction in communities with multiple stressors: environmental justice and cumulative risks/impacts. U.S. Environmental Protection Agency. Retrieved https://www.epa.gov/environmentaljustice/ensuring-risk-reduction-communities-multiple-stressors-environmental-justice

APPENDIX 1 – Element 1: Capacity Building and Technical Assistance (Tracking California)

Appendix 1A: Initial Survey for Community Air Monitoring Workshop Partners

Internal Survey for Workshop Planning – Community Partners
Please complete the survey and return it to David (david.chang@trackingcalifornia.org) by **January 15th**. There are 4 parts to this survey. The estimated time to complete the survey is 30-45 minutes.

Background: The purpose of this survey is to better understand each partners' goals and priorities for a community air monitoring workshop in their region. As a reminder, as outlined in the proposal for these workshops, there are certain limitations we must comply with for funding purposes:

- Goal: Develop an approach, agenda, facilitator guide, presentations, and materials for a day-long workshop on community based air quality monitoring for three workshops that will be held throughout the state (one in Central Valley, one in Southern CA, and one in Northern CA).

- Target Audiences: The workshops will be targeted toward community audiences that are interested in community air monitoring but have *limited* experience in conducting their own projects. These audiences may include, but are not limited to, communities selected for AB 617 air monitoring and emission reduction funded programs. Stipends and travel will be provided for 25 participants to attend each workshop.

- Topics may include: types of community air monitoring, forming advisory groups, involving communities in monitor siting, air monitoring science, data quality assurance/control, integration and display of data with reporting networks such as IVAN, data interpretation and analysis, and engagement with youth researchers from local schools.

- Timeline for planning and hosting workshops: January – June 2019

Your name/org: _____

Part 1 of 4: About the target audiences for your regional workshop

While the attendees won't be restricted to specific workshops based on where they live, we anticipate that participants for the workshops may come from the following parts of the state.

- **Northern California region (for example, but not limited to)**: Alameda, Contra Costa, Marin, Mendocino, Monterey, Napa, Sacramento, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma Counties
- **Central Valley region (for example, but not limited to)**: San Joaquin, Kings, Stanislaus, Merced, Madera, Fresno, Tulare, Kern Counties
- **Southern California region (for example, but not limited to)**: Inland Empire, Imperial, Santa Barbara, Ventura, Los Angeles, Orange, Riverside Counties

1) ***Please list the counties or region(s) where you define your organization's work:***
Your answer…

2) ***For the counties or region(s) you've identified, please list specific organizations that you think would be target audiences. As a reminder, these organizations represent communities with an interest in air monitoring, but have limited experience conducting their own projects.***
Your answer…

3) ***Are there communities whose residents would also be target audiences for the workshop (i.e., residents not affiliated with an organization you listed above in question 2)? If so, please list those communities.***
Your answer…

4) ***Are there staff in your organization who would qualify as target audiences for the workshop?*** Your answer…

5) ***Are there counties or region(s) outside your area of work that you are less familiar with/have fewer contacts in you think would benefit from this workshop? If so, please list here.***
Your answer…

6) ***Do you have additional comments or questions about the target audiences for your workshop?***
Your answer…

Part 2 of 4: Workshop format

Due to time allotted, the workshop we conducted at the EJ Summit in Imperial consisted mainly of panel presentations with limited Q&A.

Because the upcoming workshops will be full-day, there is an opportunity to integrate additional workshop formats. For example, we already plan to integrate break-out sessions (see Part 4).

7) ***Please rank the following workshop formats in terms of importance for enhancing participant learning and engagement in your regional workshop (1= most important, 8 = least important)***

___ small group discussions

___ large group discussions

___ panels/Q&A with local experts

___ presentations by local experts

___ demonstrations of monitoring

___ hands on learning activities

___ 1 on 1 support/individual consultations

___ Other (please specify): _____

8) Do you have additional comments or questions about the workshop format?

Your answer…

Part 3 of 4: Core workshop content

Below are the core topic areas that we intend to cover during the plenary session (similar to the Imperial EJ Summit last October). The content generally corresponds to the guidebook that we developed. Based on your knowledge of the target audiences in your region, please provide additional feedback about each topic area.

9) For each topic area, please put an "x" to indicate topics where the target audiences in your region would really benefit from additional engagement.

	How should content be shared?		
Topic Area	Standard plenary session is fine	Plenary session that includes group discussion or activity	Plenary session, plus break-out session for more details
Introduction to Community air monitoring and how to get started			
Community steering committee and other community engagement processes			
Selecting a monitor: considerations, monitoring technology, data storage			
Quality assurance and control, data accuracy			
Selecting communities and monitor sites			
Recruiting sites and installing monitors			
Monitor maintenance and upkeep			
Communicating and displaying data			
Using the real-time and historical data			
Sustaining the network over time			

9) Are there other topics of interest related to community air monitoring, but not listed above AND not region-specific (this is addressed in Part 4 of the survey) that would be useful for the target audiences?

Your answer…

10) In addition to your participation in the planning process, we would like to integrate your organization's knowledge and experience in community air monitoring throughout the workshop. Please indicate with an "x" any topics for which you have additional knowledge, insights, or examples that you'd like to share during the workshop.

	Would you like to share your organization's knowledge, insights, or examples during the workshop?		
Topic Area	During plenary session (as a presenter or co-facilitator)	During a break-out session (as a presenter or co-facilitator)	I don't prefer to have an active role in presenting this info at the workshop
Introduction to Community air monitoring and how to get started			
Community steering committee and other community engagement processes			
Selecting a monitor: considerations, monitoring technology, data storage			
Quality assurance and control, data accuracy			
Selecting communities and monitor sites			
Recruiting sites and installing monitors			
Monitor maintenance and upkeep			
Communicating and displaying data			
Using the real-time and historical data			
Sustaining the network over time			

11) Are there other topics related to community air monitoring (not listed above), where you would like to share your organization's knowledge, insights, or examples during the workshop?

Your answer…

12) Do you have additional comments or questions about the core workshop content?

Your answer…

Part 4: Break-out sessions and region-specific topics

The break-out sessions are a good opportunity to highlight region-specific community air monitoring topics at the workshop while ensuring that participants from all 3 workshops receive the same core information. Other formats, such as large group discussions, may also be possible depending on the agenda, logistics, timing, and planning resources.

13) In the table below, please list any region-specific topics (related to community air monitoring) that your target audiences would likely wish to learn about.

What topic? Note: feel free to provide an explanation of why this topic is important or any goals related to its discussion	**What format?** Note: break-out sessions are ideal for the reasons listed above, but there may be topics where this may not be suitable	**Who could present or facilitate?** Note: Tracking California staff would likely NOT be appropriate to present information or facilitate discussions
i.e. transnational effects of air pollution	i.e. panel/Q&A of local experts	i.e. Casa Familiar

14) Are there other experts (both community and non-community experts) from your region that should be invited as a speaker or presenter in the workshops or otherwise serve as a resource?

Your answer…

15) Do you have additional comments or questions about the region-specific topics?

Your answer…

Thank you for completing the survey!

Appendix 1B: Agenda for Community Air Monitoring Workshop

Friday, September 13, 2019
9 AM - 4 PM
1515 Clay Street, Room 10 & 11 - Oakland, CA

Time	Agenda Item
9:05	**Welcome, Framing, and Introductions**
9:40	**Session 1: Introduction to community air monitoring**
9:50	**Session 1 Panel and Tabletop Discussion:** **Identifying and addressing data gaps: Why was community air monitoring right for you?** • Ms. Margaret Gordon and Brian Beveridge, West Oakland Environmental Indicators Project • Luis Olmedo, Comite Civico del Valle
10:50	**Break**
11:00	**Session 2: Getting started- Planning a community air monitoring project, establishing partnerships, and community engagement**
11:25	**Session 2 Panel and Tabletop Discussion:** **Community engagement and partnership agreements in West Oakland** • Richard Grow, US Environmental Protection Agency (retired) • Fern Uennatornwaranggoon, Environmental Defense Fund • Azibuike Akaba, Bay Area Air Quality Management District
12:25	**Lunch and Air Monitor Demonstrations**
1:10	**Session 3: Technical considerations for community air monitoring**
2:00	**Session 4: Communicating and using air monitoring data for action**
2:15	**Break**
2:30	**Session 4 Panel and Tabletop Discussion:** **Data to Action- West Oakland Community Air Monitoring Projects** • Fern Uennatornwaranggoon, Environmental Defense Fund • David Holstius, Bay Area Air Quality Management District • Melissa Lunden, Aclima
3:20	**Session 5: Planning for sustainability and moving forward**
3:30	**Session 5 Group Discussion: Where do you go from here?**
3:50	**Wrap up**
4:00	**Adjourn**

Sample evaluation form for Community Air Monitoring Workshop

Please fill this out as directed during the workshop and return to organizers at the end of the workshop.

Name:
Organization:
Email address:

Session 1: Introduction to Community Air Monitoring

1) **What pollution concerns do you have in your community?**

2) **What is one thing you want to learn today?**

Session 2: Planning a Community Air Monitoring Network

1) **Did this session provide new information about defining your goals, priorities, and vision for air monitoring?**

   Please check your response
   ☐ Yes ☐ Somewhat ☐ No

2) **Did you find this session helpful?**

   Please check your response:
   ☐ Yes ☐ Somewhat ☐ No

   >> Please explain why:

Session 3: Getting Started

1) **Did this session provide new information about setting up a project team and engaging other stakeholders?**

   Please check your response:
   ☐ Yes ☐ Somewhat ☐ No

2) **Did you find this session helpful?**

   Please check your response:
   ☐ Yes ☐ Somewhat ☐ No

>>Please explain why:

Session 4: Choosing a Monitor and Ensuring Data Quality

1) **Did this session provide new information about considerations for selecting an air monitor?**

   Please check your response
   ☐ Yes ☐ Somewhat ☐ No

2) **Did this session provide new information about the factors that influence data quality in community air monitoring?**

   Please check your response
   ☐ Yes ☐ Somewhat ☐ No

3) **Did you find this session helpful?**

   Please check your response:
   ☐ Yes ☐ Somewhat ☐ No

   >> Please explain why:

Lunchtime Demonstrations of Monitors and Data Displays

1) **Did you visit any of the lunchtime demonstrations?**

   Please check your response
   ☐ Yes ☐ No

2) **Did you find the demonstrations helpful?**

   Please check your response:
   ☐ Yes ☐ Somewhat ☐ No

   >>Please explain why:

Session 5: Setting Up Monitors and Communicating Data

3) **Did this session provide new information about selecting monitor locations and deploying monitors?**

   Please check your response
   ☐ Yes ☐ Somewhat ☐ No

4) **Did this session provide new information about communicating CAMN data?**

   Please check your response
   ☐ Yes ☐ Somewhat ☐ No

5) **Did you find this session helpful?**

   Please check your response:
   ☐ Yes ☐ Somewhat ☐ No

   >>Please explain why:

Session 6: Using Your Data and Sustaining Your Network

1) **Did this session provide new information about how real-time and historical CAMN data can be used?**

   Please check your response
   ☐ Yes ☐ Somewhat ☐ No

2) **Did this session provide new information about considerations and requirements for sustaining a CAMN?**

   Please check your response
   ☐ Yes ☐ Somewhat ☐ No

3) **Did you find this session helpful?**

   Please check your response:
   ☐ Yes ☐ Somewhat ☐ No

   >> Please explain why:

Session 7: Panel on Air Quality Concerns in the San Joaquin Valley

1) **Did this session provide new information about air pollutants of concern in the San Joaquin Valley, their sources, and their potential health impacts?**

   Please check your response
   ☐ Yes ☐ Somewhat ☐ No

2) **Did this session provide new information about how community groups and/or agencies are monitoring these air pollutants?**

   Please check your response
   ☐ Yes ☐ Somewhat ☐ No

3) **Did you find this session helpful?**

   Please check your response:
   ☐ Yes ☐ Somewhat ☐ No

   >> Please explain why:

Overall Workshop

1) **Did you find this workshop helpful?**

   Please check your response:
   ☐ Yes ☐ Somewhat ☐ No

   >> Please explain why:

Comments and questions

Do you have any additional questions or comments about the workshop or information shared?

If you are planning to develop a CAMN, is there anything else that would help you with getting started in this work?

Thank you for filling out this evaluation! Please return to one of the workshop organizers!

APPENDIX 2- Element 2: Community Engaged Evaluation (UC Davis)

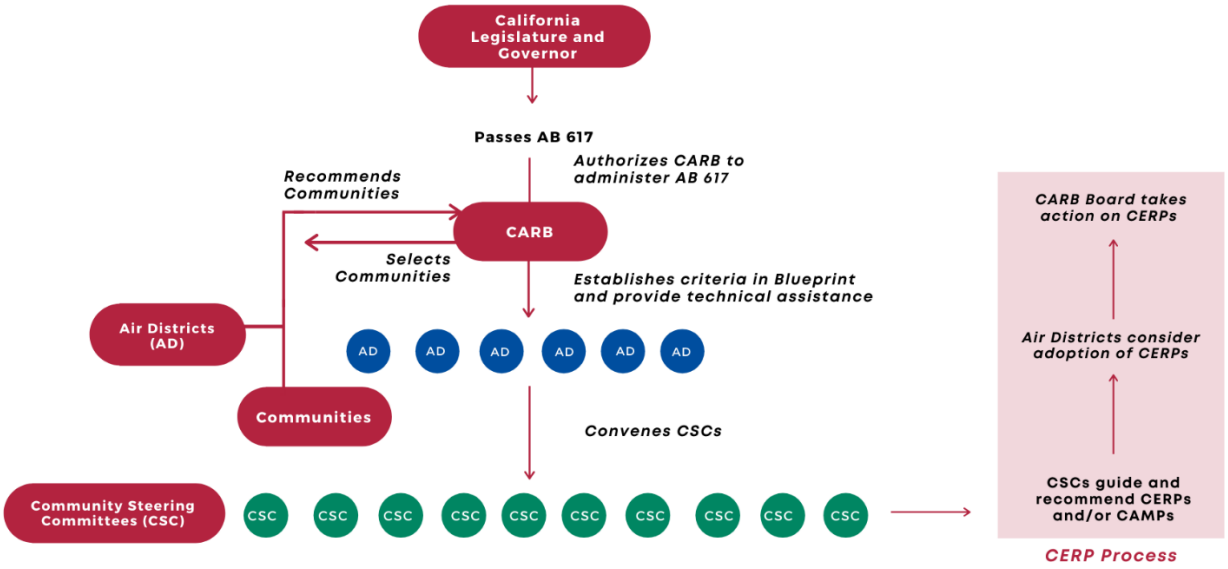


Figure 26: Graphic representation of the major milestones for the adoption and implementation of AB 617 (Source: Authors; Graphic: Katrina Manrique)

For information about the timeline for passage and implementation of AB 617 see: https://ww2.arb.ca.gov/capp/about

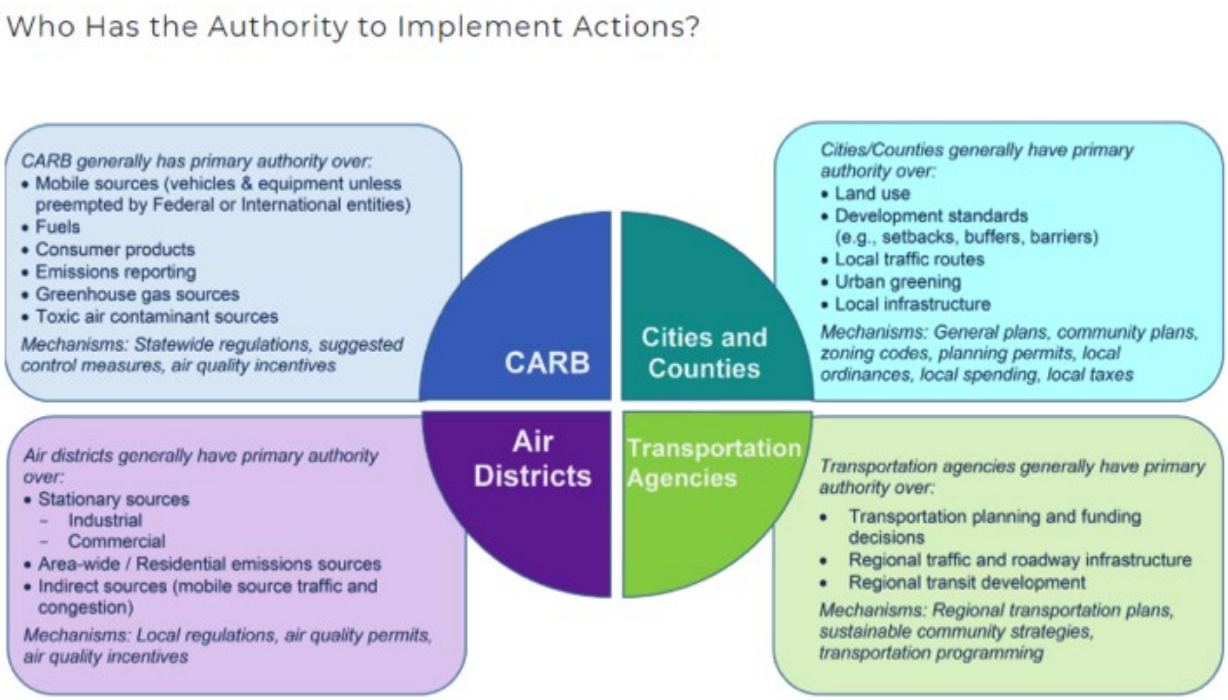


Figure 27: Air Quality Management in California (Source: CARB)

The following charts (28-31) illustrate the profile of the respondents to the two rounds of stakeholder interviews.

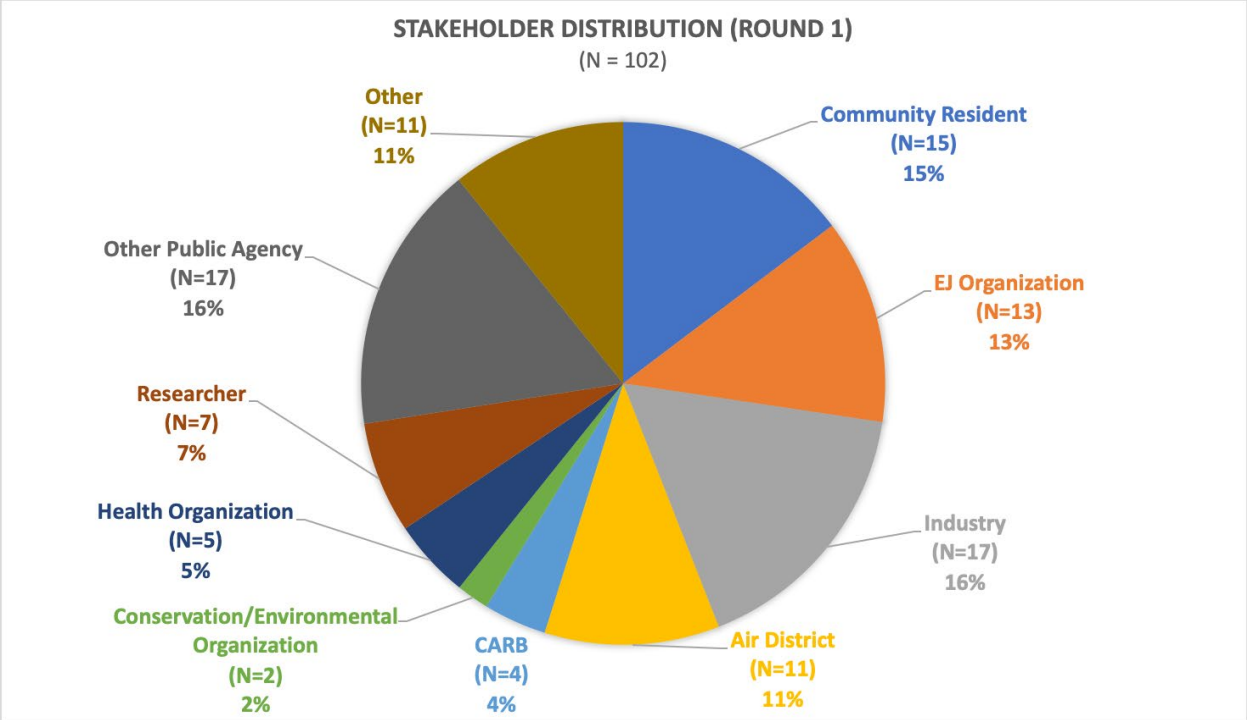


Figure 28: Survey Respondents by stakeholder groups in 2018-2019 survey (n=102).

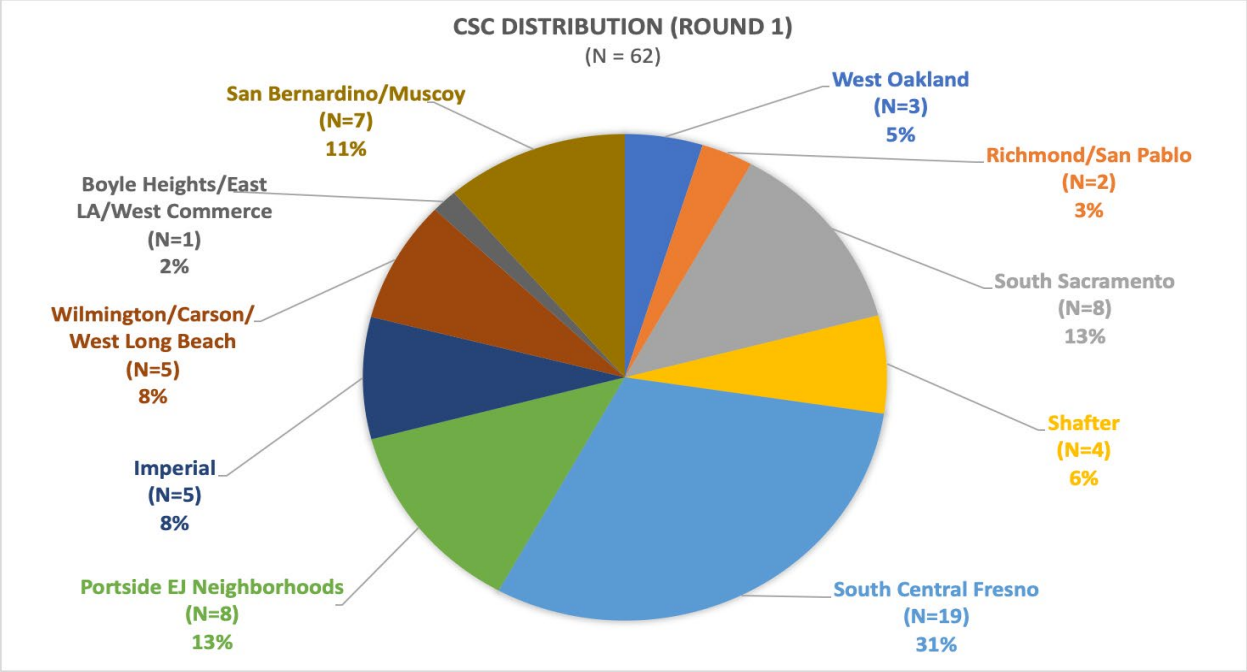


Figure 29: Survey Respondents by CSCs in 2018-2019 survey (n=62).

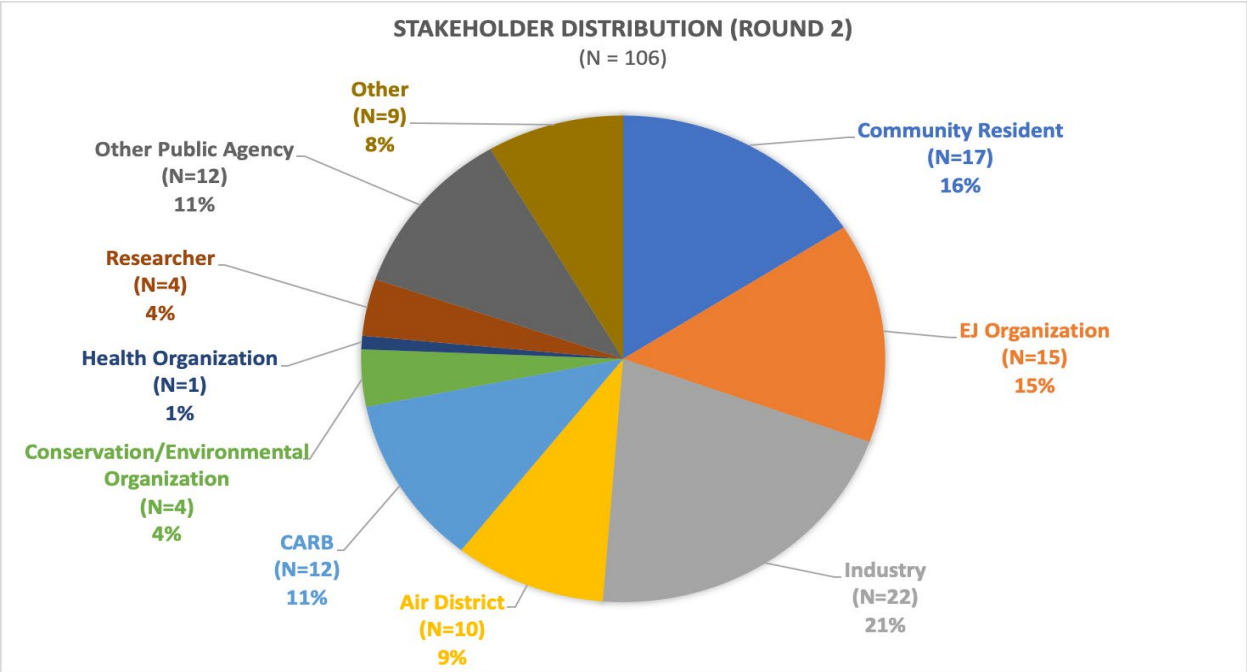


Figure 30: Survey Respondents by stakeholder groups in 2020 survey (n=106).

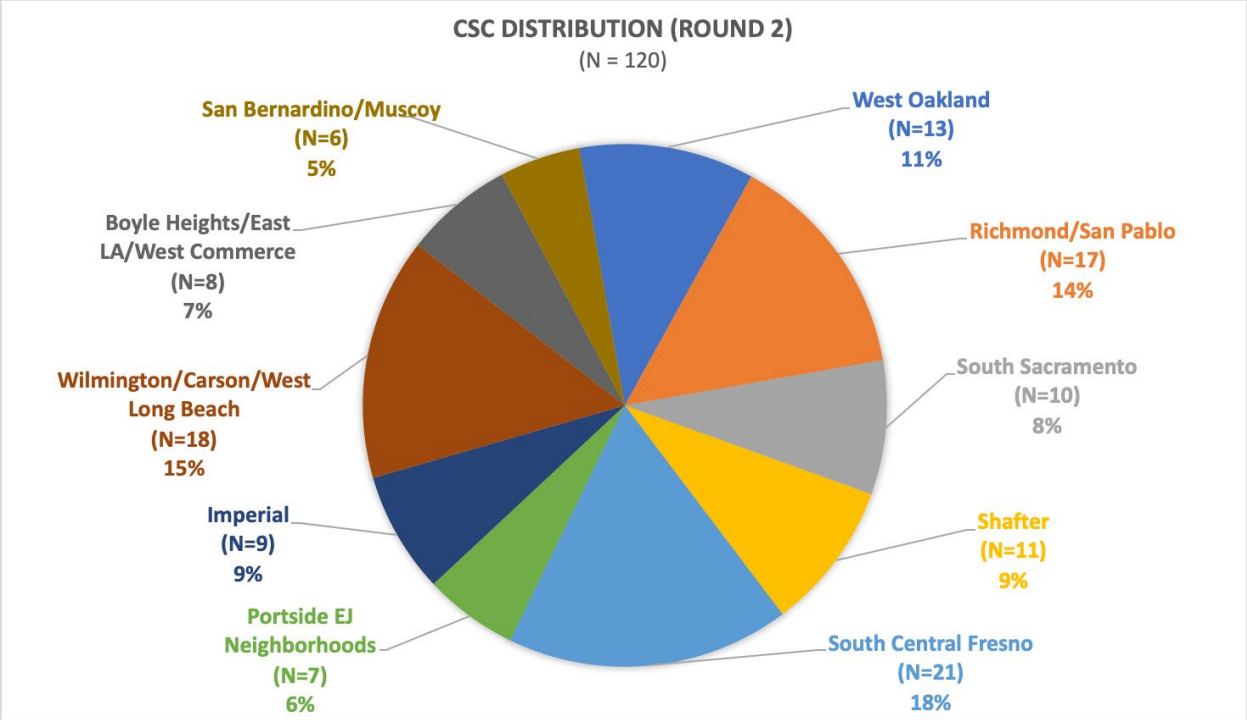


Figure 31: Survey Respondents by CSCs in 2020 survey (n=120).

APPENDIX 3- Element 3: Geographic Indicators for Cumulative Impacts Analysis (UC Berkeley, San Francisco State University, University of Southern California)

CES 3.0 Score vs. Percentile

The raw CalEnviroScreen 3.0 "scores" are simply the point total between 0-100 for each census tract computed as the sum of all the various exposure factors calculated as part of the CES 3.0 dataset. In contrast, the percentile values represent percentiles (also from 0-100) of those scores. Therefore, if there are not many scores of given value range, it requires a large change in score to result in a difference in percentile. Indeed, we see this with the CES 3.0 score and percentile data, where due to the lack of high score instances, there is a very large range of scores which result in very high percentile values.

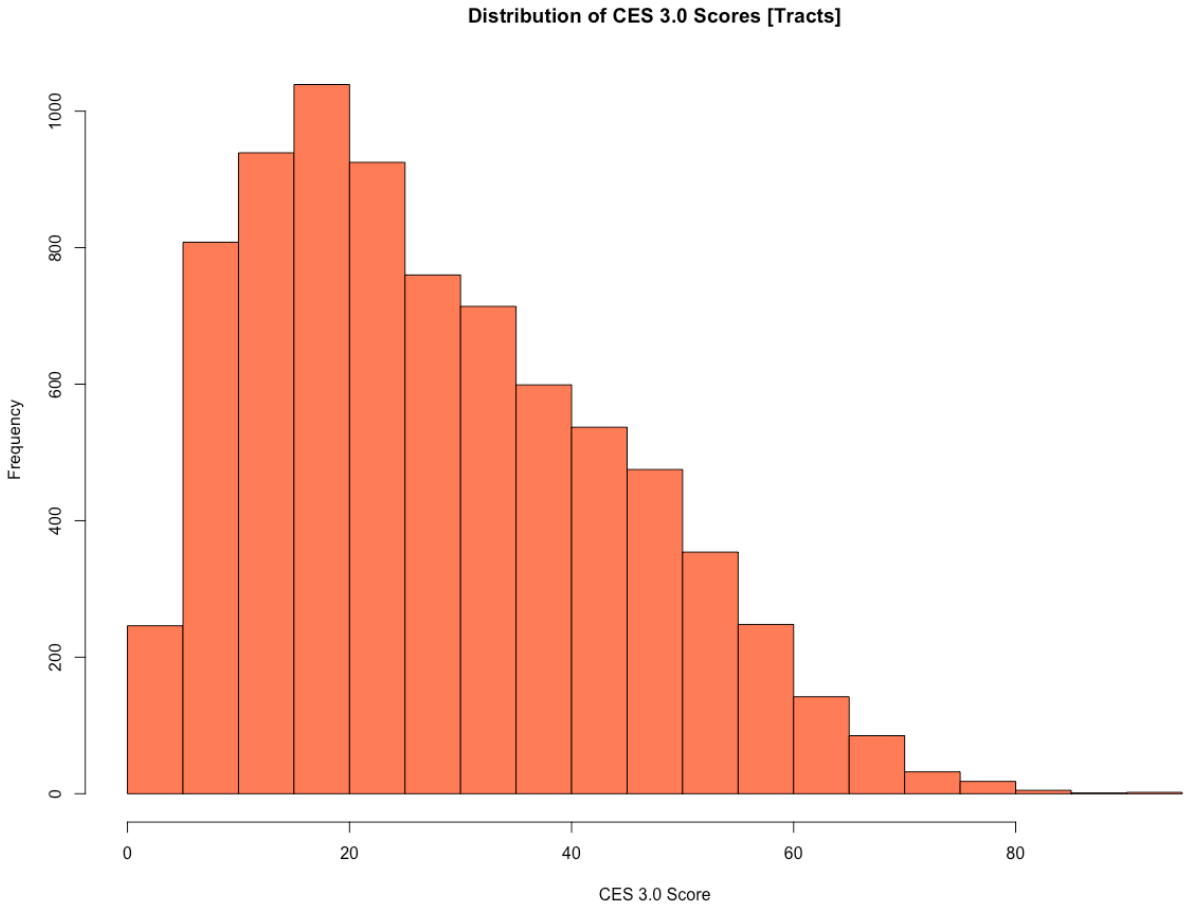


Figure 32: Distribution of CES 3.0 Scores

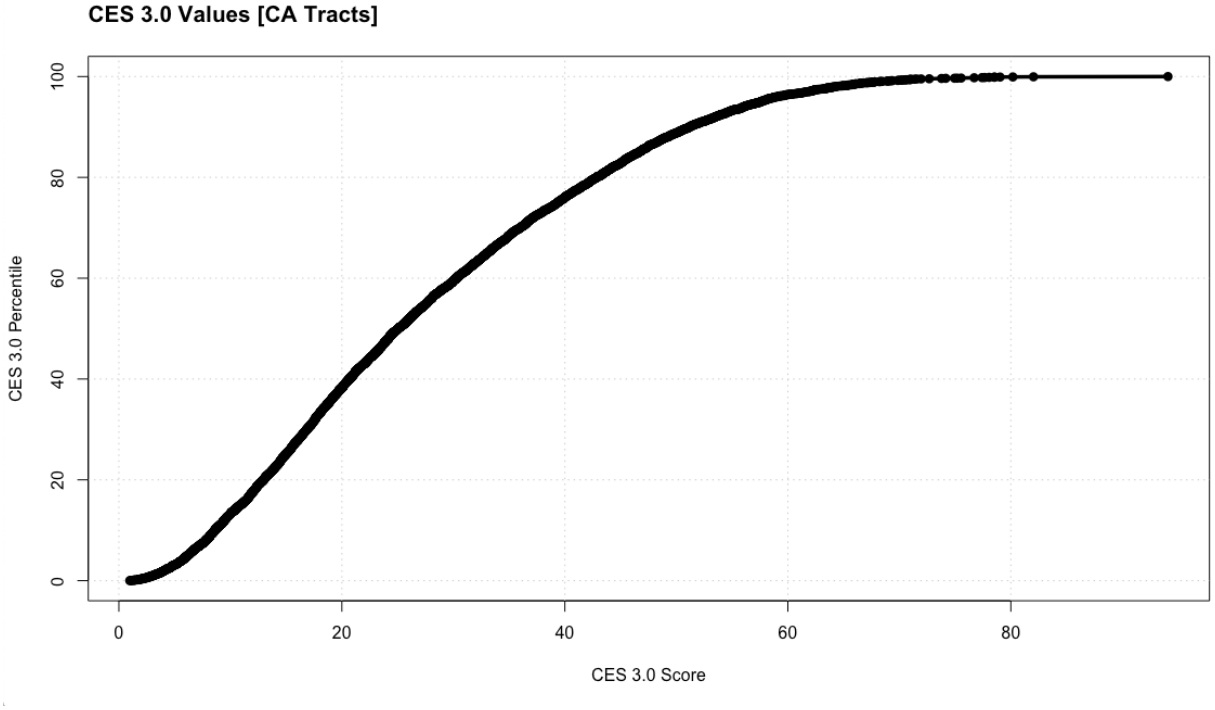


Figure 33: CES 3.0 Percentiles (y-axis) vs. CES 3.0 Scores (x-axis).

Residential Parcel Classifications

Classes identified as residential using the “USE_CODE_2” land classification field.

USE_CODE_2
APARTMENT HOUSE (100+ UNITS)
APARTMENT HOUSE (5+ UNITS)
APARTMENTS (GENERIC)
CLUSTER HOME (RESIDENTIAL)
COMM/OFC/RES MIXED USE
CONDOMINIUM (RESIDENTIAL)
COOPERATIVE (RESIDENTIAL)
DORMITORY, GROUP QUARTERS (RESIDENTIAL)
DUPLEX (2 UNITS, ANY COMBINATION)
FRATERNITY HOUSE, SORORITY HOUSE
GARDEN APT, COURT APT (5+ UNITS)
HIGHRISE APARTMENTS
HOMES (RETIRED; HANDICAP, REST; CONVALESCENT; NURSING)
MANUFACTURED, MODULAR, PRE-FABRICATED HOMES
MISC RESIDENTIAL IMPROVEMENT
MOBILE HOME

MOBILE HOME PARK, TRAILER PARK

MULTI-FAMILY DWELLINGS (GENERIC, ANY COMBINATION 2+)

PLANNED UNIT DEVELOPMENT (PUD) (RESIDENTIAL)

QUADRUPLEX (4 UNITS, ANY COMBINATION)

RESIDENTIAL (GENERAL) (SINGLE)

RESIDENTIAL COMMON AREA (CONDO/PUD/ETC.)

RESIDENTIAL INCOME (GENERAL) (MULTI-FAMILY)

RURAL RESIDENCE (AGRICULTURAL)

SINGLE FAMILY RESIDENTIAL

STORES & APARTMENTS

TIMESHARE (RESIDENTIAL)

TOWNHOUSE (RESIDENTIAL)

TRIPLEX (3 UNITS, ANY COMBINATION)

ZERO LOT LINE (RESIDENTIAL)

Populated Area Layer Construction Example

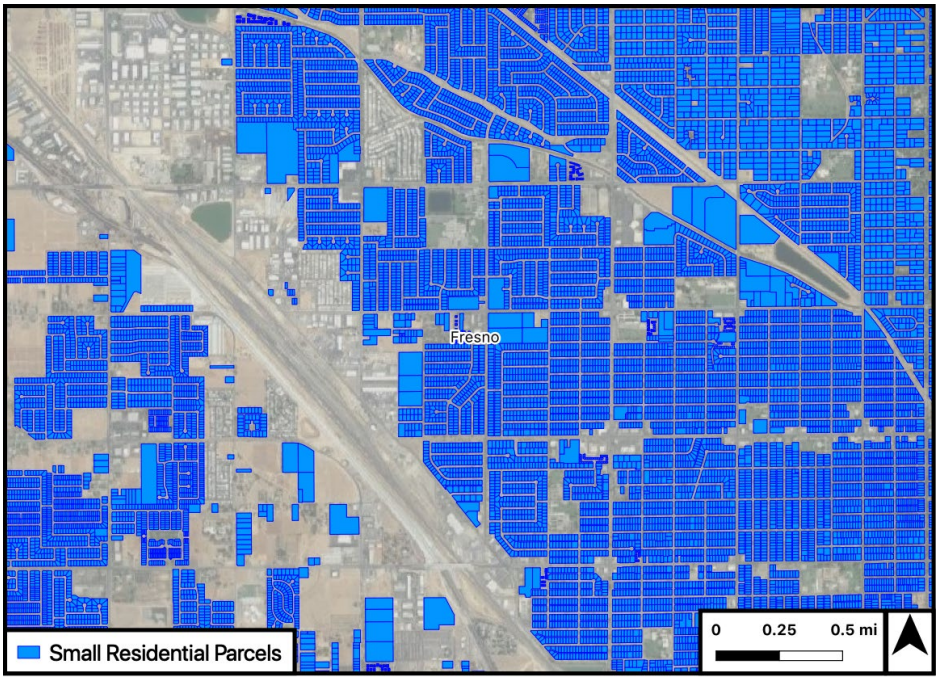


Figure 34: "Small" residential parcels (area < 1-acre for low-density, < 50-acre for high-density) for area in Fresno. These parcels were used in final populated area layer.

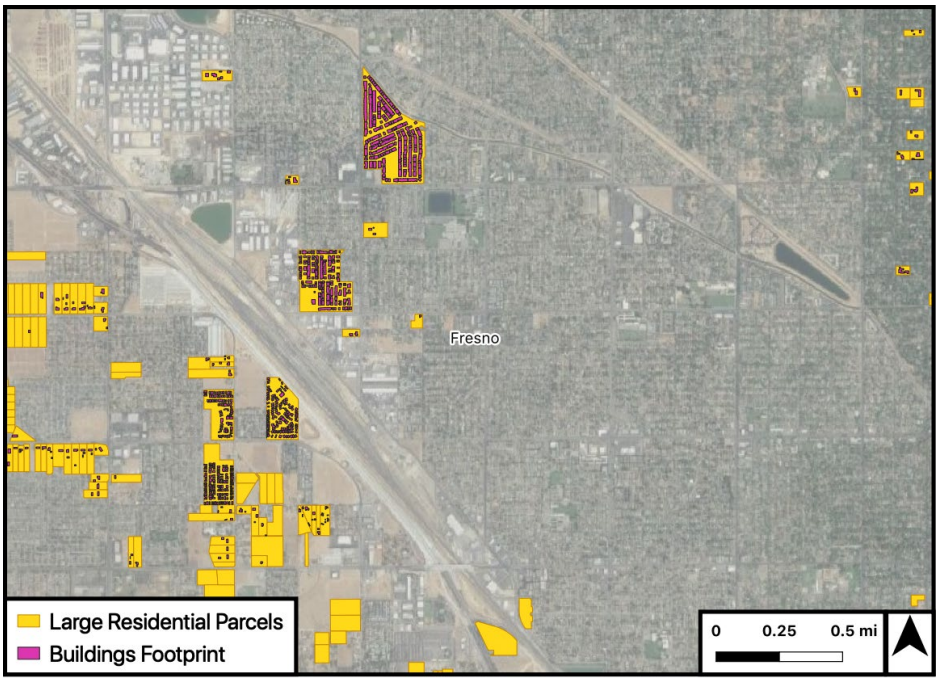


Figure 35: "Large" residential parcels. Intersecting buildings used in final populated areas layer.

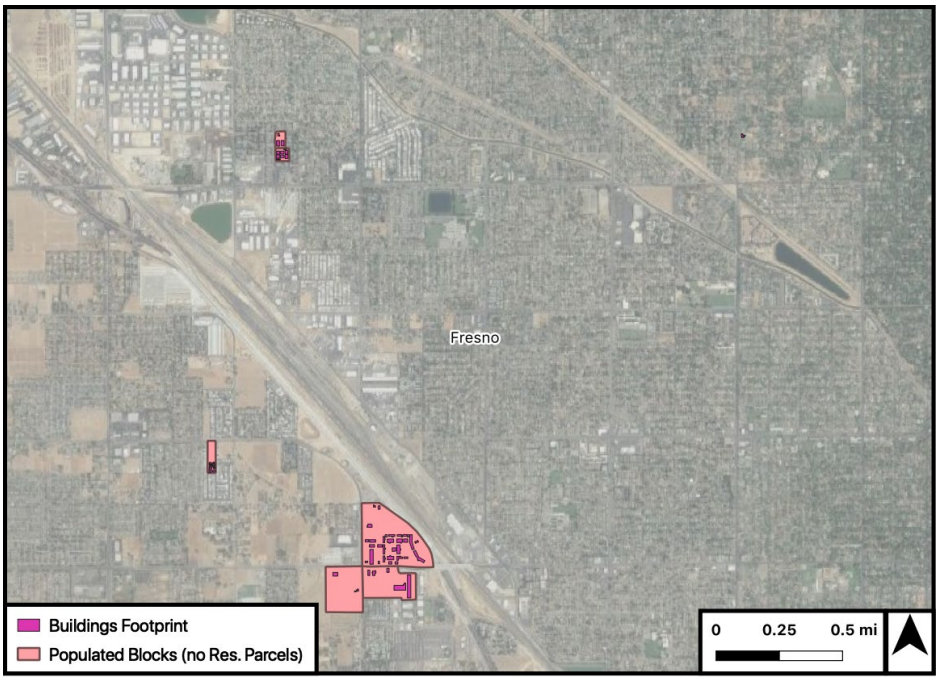


Figure 36: Populated blocks with no residential parcels within them. Intersecting buildings used in final populated areas layer.

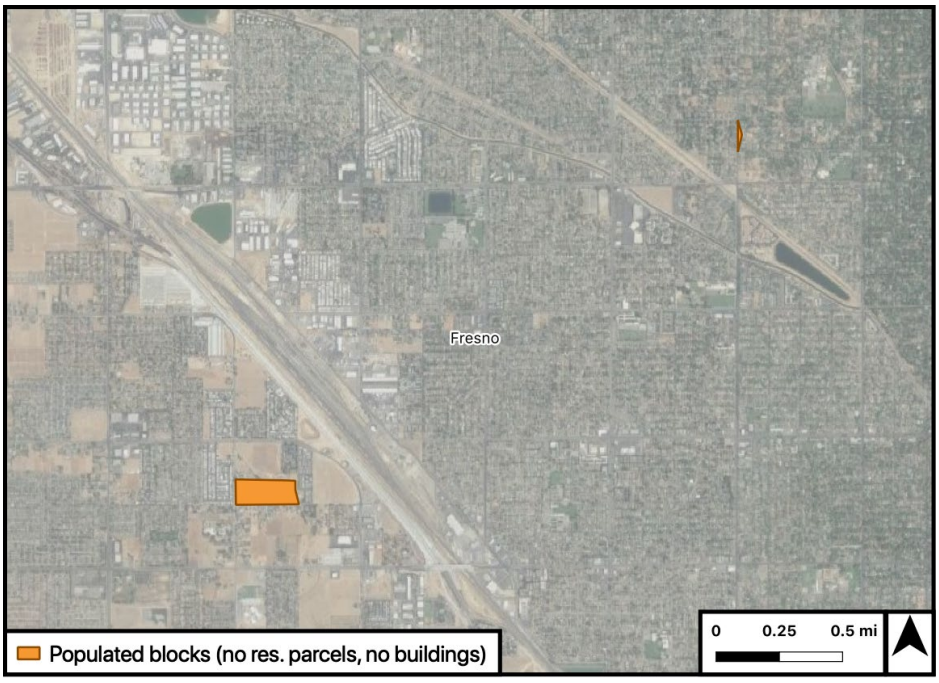


Figure 37: Populated blocks with no residential parcels or buildings within them. Block boundaries used in final populated areas layer.

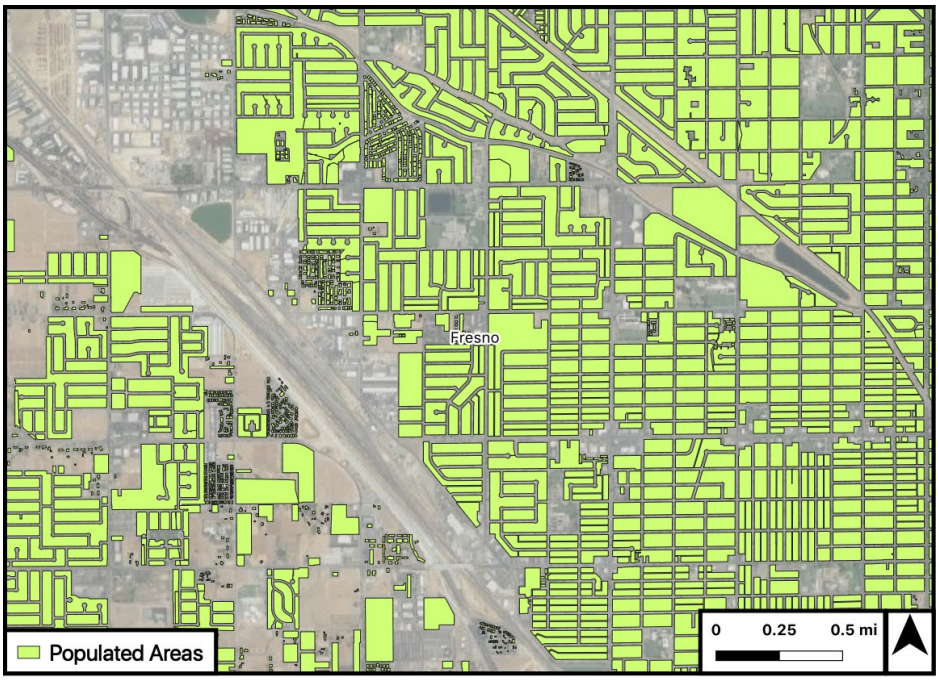


Figure 38: Composite of the four geometries highlighted in figures A1.3-A1.6, which makes up the final populated areas layer in this example region in Fresno.

Population Weighting vs. Area-Weighting

The use of population weighting for the analysis of many of the community metrics was done due to the fact that it accounts for the relative distribution of people within a given area of interest (AoA) and weights their respective characteristics accordingly. This is relevant when an AoA intersects residential areas of more than one block group (or tract when considering CES metrics).

Let's explore an example where we want to calculate the average CES 3.0 score within a given AoA. Say our AoA intersects residential portions of three different census tracts, let's call them A, B, and C. Let's pretend their characteristics are as follows:

Tract	Residential area within AoA [km^2]	Tract Residential Area [km^2]	Tract Population	CES 3.0 Score
A	0.4	1.6	30	65
B	0.4	1.2	200	40
C	0.2	1.0	750	85

Area Weighting

If we were to calculate the average CES score using a simple, area-weighted approach, we would just calculate the fraction of each tract's total residential area that is within the AoA and then use those values as our weights for the weighted-averaging process. This essentially assumes that all residential area, regardless of its parent tract's population, is treated equally when calculating average CES scores. The formula for each tract would look like this:

(Area in AoA/Total area)*CES + … + …

Putting this all together for all tracts using our hypothetical values:

(0.4/1.6)*65 + (0.4/1.2)*40 + (0.2/1.0)*85 = <u>46.6</u>

This approach is simple and does not require knowledge about each tract's population. However, area-weighting is most appropriate when the metric of concern is related to land area. For example, say you are surveying three different wheat fields, each of which has a different, uniform rate of yield. If you wanted to calculate the average yield across the area of these three fields, you would want to employ an area-weighted approach, with the weights corresponding to the total area of each field. However, when calculating metrics of vulnerability or exposure that inherently pertain to populations, it may not be sufficient to simply employ an area-weighted approach.

Population Weighting

For any metrics that relate to the residents of an area, using a simple area-weighted approach will still be using the area of land as its weights, rather than the presence or absence of people themselves, which can be misleading. Say we want to calculate the average, median income across two different

census tracts, each with equal area, but one of which has 10 people and the other 100. An area-weighted approach would simply be the average of the two tracts' median incomes, which would mean that the incomes of the 10 people in the sparsely-populated tract would have equal influence as the incomes of the 100 people in the more densely-populated tract. However, if we employ a population-weighted approach, we would instead account for the populations of each tract and therefore find the true average income of all 110 people in the study area.

Using the numbers from our hypothetical example, let's recalculate the average CES score using population-weighting. The steps are as follows:

1. Assuming population is evenly distributed *within* each tract, estimate the total population within the AoA. This intermediate step is done using the area fractions of each tract within the AoA as follows:

(Area in AoA/Total area)* (Tract Population) + … + …

Total Population in AoA = (0.4/1.6)*30 + (0.4/1.2)*200 + (0.2/1.0)*750 = 224 people

2. Now that we have our total estimated population within our AoA, we can use that value as the denominator in our calculation of population weights for each tract:

   (Area in AoA/Total area)* (Tract Population/Total Population in AoA)*CES + …

(0.4/1.6)*(30/224)*65 + (0.4/1.2)*(200/224)*40 + (0.2/1.0)*(750/224)*85 = <u>71.0</u>

Notice how different our population-weighted result (71.0) is from the simple, area-weighted one (46.6). This is due to the fact that the three tracts each have different population densities, and even though tract C has a smaller area of intersection with our AoA, it has far more people total, meaning that there are more people within this area of intersection, who have a higher CES score than tracts A and B. These people were being underrepresented in the simple, area-weighting scheme because it simply weighted tract C's CES score based on its area and not population.

Note above how in this population-weighting scheme we still use the areas to calculate how many people are presumed to be within each tract's area within the AoA. This is because we do not have detailed population distribution information regarding changing population densities within each tract and therefore must assume that the tract's population is spread uniformly across its residential area.

Other important clarifications:

- Population-weighting only accounts for populations *within* a given area of interest and not beyond. Therefore, this approach does not inherently under-weight AoAs in which few people reside compared to a different AoA with a higher total population. If 10 people reside in one AoA and all have a CES score of 60, the average CES score for that AoA will be 60, even if there exist other AoAs that have much higher populations within them around the state.

It is true that population-weighting does weight more populous tracts within a given AoA, and therefore may dilute certain values of sparsely-populated tracts within the same AoA. However, this is an issue inherent to any form of averaging. If one would like to capture the highest or lowest CES in an AoA, we suggest using the Max/Min CES 3.0 metrics provided.

Another visual example for calculating the CES score showing a hypothetical AoA intersecting multiple census tracts is shown below:

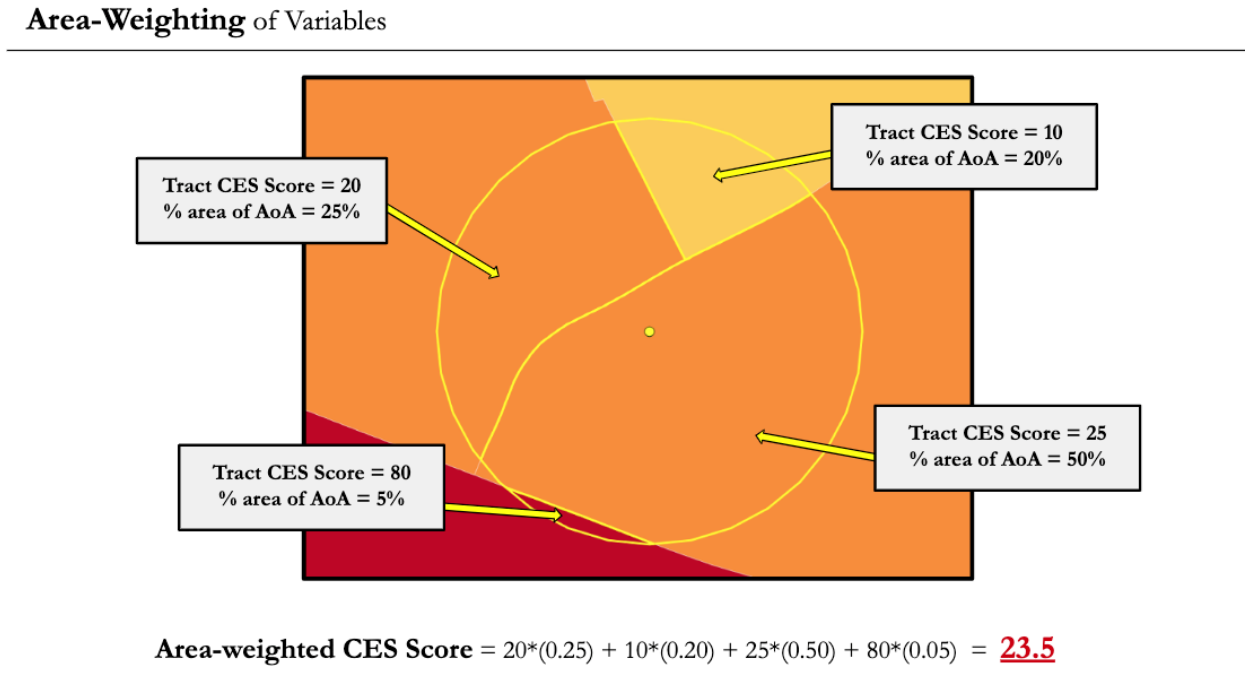
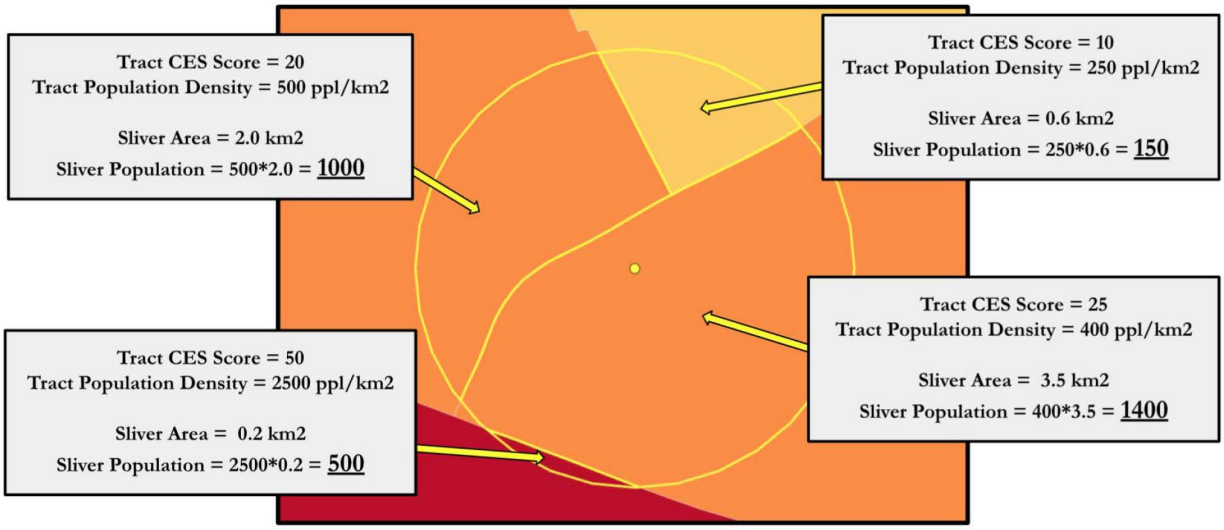


Figure 39: Area-weighting of variables

Population-Weighting of Variables



Total AoA Population = 1000 + 150 + 1400 + 500 **= 3050 people**

Pop.-Weighted CES Score = 20*(1000/3050) + 10*(150/3050) + 25*(1400/3050) + 80*(500/3050) = **31.6**

Figure 40: Population-weighting of variables