

Mapping Local Knowledge and Experiences: Co-designing Proposed Updates to CalEnviroScreen with California Communities

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Executive Summary

CalEnviroScreen is a mapping tool created by the Office of Environmental Health Hazard Assessment (OEHHA) that helps identify which communities in California are most affected by pollution. Every three to four years, OEHHA has asked for public input on CalEnviroScreen updates through workshops and written comments. Beyond these opportunities, however, community engagement has been limited—even as OEHHA has maintained regular contact with academic researchers and state agencies. For CalEnviroScreen 5.0, OEHHA strengthened community engagement by partnering with environmental community-based organizations (CBOs) statewide to co-design proposed updates to the tool.

OEHHA partnered with eight CBOs between 2024 and 2025 to implement a co-design approach to CalEnviroScreen 5.0. CBO partners made sure that proposed updates in CalEnviroScreen 5.0 reflect community needs and priorities. The CBOs included:

- [California Environmental Justice Alliance](#) (CEJA);
- [Center on Race, Poverty, and the Environment](#) (CRPE);
- [Central California Environmental Justice Network](#) (CCEJN);
- [Comité Cívico del Valle, Inc.](#) (CCV);
- [Communities for a Better Environment](#) (CBE);
- [Environmental Health Coalition](#) (EHC);
- [Physicians for Social Responsibility – Los Angeles](#) (PSR-LA); and
- [UNIDOS Network, Inc.](#) (UNIDOS).

These CBOs have a strong history of environmental leadership, commitment to using CalEnviroScreen in their programs and advocacy, and deep relationships with local communities.

The CalEnviroScreen 5.0 co-design process included three projects, which were shaped by the CBOs and are summarized below.

A. Proposed Updates to CalEnviroScreen Data, Model, and Design

CBOs proposed changes to CalEnviroScreen, including new environmental and health indicators that reflect community lived experience. The co-design team and OEHHA considered which indicators were appropriate for the 5.0 draft update and which should be explored in the future due to time and data limitations. OEHHA evaluated each of the priority indicators shared by CBOs, including researching available datasets and evaluating alignment with CalEnviroScreen’s indicator selection criteria ([Appendix B](#)). The co-design process led to the following proposed changes for CalEnviroScreen 5.0:

- **“Small Air Toxics Sites (Oil and Gas Wells)”**: CBOs prioritized including oil and gas wells in CalEnviroScreen 5.0. However, oil and gas wells are not widespread enough across California—an important criterion for CalEnviroScreen indicator selection—to be included as its own indicator. To address this, OEHHA proposed combining oil and gas well data with new information on small facilities that release air pollution into a new indicator.
- **“Diabetes”**: CBOs prioritized including additional health indicators in CalEnviroScreen 5.0. After reviewing available health data with the CBOs, OEHHA proposes a new indicator of diabetes prevalence.

- **Expanded buffer for large “Hazardous Waste” facilities:** CBOs expressed concern that CalEnviroScreen’s existing one-kilometer buffer for large hazardous waste facilities was not enough to capture community impacts. With support from the CBOs, OEHHA reviewed scientific research and different methods to include larger buffers. Based on this analysis, OEHHA proposes a four-kilometer buffer for large hazardous waste facilities.

The co-design team also discussed including **climate data in CalEnviroScreen** due to climate change’s unequal impact on disadvantaged communities. However, it was decided that this would require more time than the 5.0 update allowed, especially because of current limitations around high-quality statewide data. Climate data will instead be explored for future versions of the tool. Warehouse sites, cancer prevalence, and built environment factors (e.g., green space, tree coverage) are other suggested indicators that will be explored for CalEnviroScreen 6.0 and beyond.

B. Evaluating CalEnviroScreen’s Reach and Accessibility

CBOs helped to describe and improve the impact and reach of CalEnviroScreen in communities across California. Through several brainstorming sessions, CBOs discussed:

- **Who** uses or could use CalEnviroScreen materials?
- **Which** existing CalEnviroScreen materials have been most useful to communities?
- **How** could new materials help reach new audiences, especially residents in disadvantaged communities?

C. Developing a Public Engagement Plan for CalEnviroScreen 5.0

CBOs provided input on a public engagement plan for the draft release of CalEnviroScreen 5.0. The plan included a timeline, strategic priorities, and ways to increase engagement and attendance. To increase engagement, CBOs recommended interactive activities, pre-educational sessions (e.g., CalEnviroScreen 101), small group discussions, and examples of local CalEnviroScreen uses. CBOs also emphasized clearly communicating the goals and potential outcomes of public meetings with community members.

Final Reflections on the Co-Design Process

CBOs described the co-design process as open and focused on what matters most to communities, with plenty of opportunities for active CBO involvement. The CBOs also shared feedback on how the engagement process could be improved. This input will help shape future partnerships, including how OEHHA works with communities during the release of the CalEnviroScreen 5.0 draft.

The Need for Community Leadership in CalEnviroScreen

Since its launch, CalEnviroScreen has helped identify communities most impacted by pollution across California. This helps prioritize where government resources and funding are directed. To increase OEHHA's commitment to meaningful community engagement, OEHHA staff collaborated with CBOs statewide to co-design proposed updates to CalEnviroScreen 5.0.

Why a Co-Design Approach Matters

Many communities across California experience disproportionate exposure to pollution from sources like industrial activity, intense agriculture, and heavy traffic. CBOs across the state, including our eight co-design partners, have been on the front line of these environmental and health issues.

CBOs empower residents to turn their stories of pollution exposure—whether to PM2.5, ozone, proximity to emitting facilities, and/or pesticides—into advocacy and change. These stories are often missing from the data gathered by government agencies. This often leads to decisions based on an incomplete understanding of community needs. A co-design process provides an opportunity to have community stories shape government processes that can ultimately improve community health and wellbeing.

For CalEnviroScreen, public engagement has typically involved workshops and written comments. While important, reliance on these methods can limit community power and influence on decision-making. The CalEnviroScreen 5.0 update is a move toward a **community co-design approach**. Instead of just asking for feedback, this approach gives communities a real voice in shaping CalEnviroScreen. Inspired by the 'Spectrum of Public Participation' ([Figure 1](#)),¹ OEHHA worked with CBOs as equal partners, not just as advisors.^{2 3} By valuing community knowledge, OEHHA helps make sure that solutions to environmental and health problems are informed by the people most affected.

¹ "Core Values, Ethics, Spectrum – The 3 Pillars of Public Participation - International Association for Public Participation," accessed November 13, 2025, <https://www.iap2.org/page/pillars>.

² "Introduction to Community-Led Co-Design," Community-Led Co-Design Kit, accessed November 13, 2025, <https://main--co-design.netlify.app/introduction/>.

³ Kelly Ann McKercher, *Beyond Sticky Notes: Co-Design for Real: Mindsets, Methods and Movements* (2020).

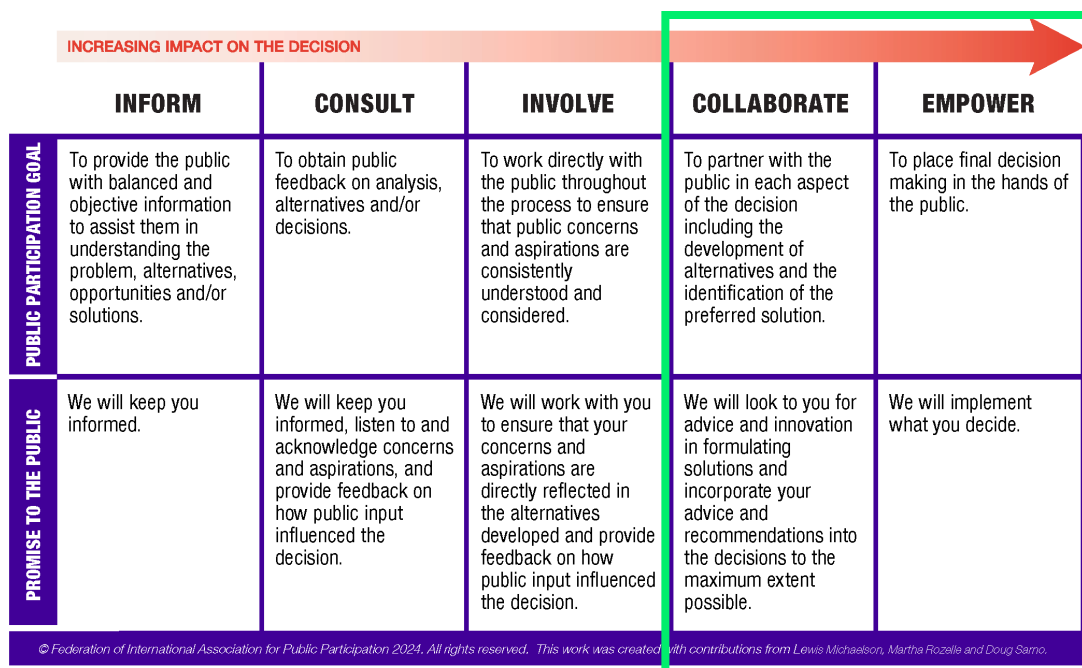


Figure 1. International Association for Public Participation's Spectrum of Public Participation. The co-design process for CalEnviroScreen focused on CBO collaboration and empowerment (outlined in green).

OEHHA's co-design approach ensures that communities directly shape CalEnviroScreen. The co-design approach strengthens:

- **Shared learning and power:** Talking openly about the science behind CalEnviroScreen helps build trust and makes the process more transparent. By working side by side with CBOs, OEHHA gains valuable knowledge that is often overlooked in traditional decision-making.
- **Deep listening that leads to action:** The co-design process made sure that community voices shaped improvements to CalEnviroScreen, with explanations of when and how their feedback was used.
- **Community-led strategies:** Instead of involving communities only at certain points, the co-design approach supports ongoing relationships that continue beyond just one update to CalEnviroScreen.

The co-design approach aimed to make CalEnviroScreen more responsive to the needs of those most impacted by pollution and build long-term partnerships between OEHHA and local communities.

Who Was Involved in the Co-Design Process?

The CBOs invited to the co-design process were selected based on existing relationships, prior engagement in CalEnviroScreen updates, and OEHHA knowledge of their leadership in environmental issues. OEHHA reached out to several CBOs across California, with eight CBOs agreeing to a yearlong partnership (see [Figure 2](#) and [Appendix A](#) for more information).

<https://oehha.ca.gov/sites/default/files/media/downloads/calenviroscreen/document/calenviroscreen50techreportd12226.pdf>



Figure 2. Headquarters of the CBOs OEHHA partnered with for the CalEnviroScreen 5.0 co-design process.

Overview of Co-Design Projects and Timeline

OEHHA implemented 12-month contracts with each of the CBOs between June 2024 and June 2025. The partnership included three projects, which are described in greater detail throughout this document:

- A. **Proposed Updates to CalEnviroScreen Data, Model, and Design** – CBOs provided input on the methods of CalEnviroScreen, ensuring the tool reflects community lived experience.
- B. **Evaluating CalEnviroScreen’s Reach and Accessibility** – CBOs helped evaluate new and existing uses of CalEnviroScreen as a statewide decision-making tool.
- C. **Developing a Public Engagement Plan for CalEnviroScreen 5.0** – CBOs provided input on engagement efforts for CalEnviroScreen, moving away from short-term feedback opportunities to long-term partnerships.

Identifying Community Priorities for CalEnviroScreen

To begin the co-design process, OEHHA’s CalEnviroScreen team met with each CBO to understand their initial partnership priorities, meeting preferences, and potential concerns.

During the first group meeting, CBOs discussed their priorities and other ideas to narrow the focus of the co-design process. Based on the discussion, OEHHA was able to rank the priorities below in order of how often they were mentioned:

1. Updating and improving existing indicators (*Most mentioned*)
2. Improving tool usability
3. Reflects community experience
4. Adding new indicators
5. Identifying gaps in the model
6. Language justice
7. Community involvement, including data collection
8. Long-term planning (*Least mentioned*)

This ranking guided additional prioritization conversations. CBOs also suggested specific data topics to explore in this process, shown in [Table 1](#).

Table 1. Data topics initially suggested by CBOs to be included in the CalEnviroScreen 5.0 update. Number of CBOs in (parentheses) indicate how many CBOs initially prioritized the topic.

Category	Data Topic
Long-term changes to CalEnviroScreen	<ul style="list-style-type: none"> • Unit of geography (3 CBOs) • Gaps in the model (2 CBOs) • Process: How new data/indicators get added (2 CBOs) • Climate data (1 CBO) • Frequency of updates (1 CBO)
Existing CalEnviroScreen indicators mentioned	<ul style="list-style-type: none"> • Pesticide use data (3 CBOs) • Hazardous waste facilities (1 CBO)
New data mentioned	<ul style="list-style-type: none"> • Oil and gas facilities and proximity to oil fields (3 CBOs) • Heat waves and magnitude (2 CBOs) • Freeways and highways (1 CBO)

OEHHA and the CBOs chose to prioritize the indicator topics first in the co-design, as this is a first step in updating CalEnviroScreen. OEHHA and the CBOs reflected on each suggested topic using the following questions:

1. Can you provide additional details on this priority? For example, what data should be included in CalEnviroScreen, or where do you see this priority fitting into the tool?
2. Why is this priority important, and what are the current limitations in CalEnviroScreen?
3. How does the priority align with environmental justice principles?
4. What challenges might OEHHA face in implementing this priority (e.g., resources needed to implement it or capacity challenges)?

Responses to these questions allowed OEHHA to see how many CBOs supported each data topic (Table 2). These discussions also provided CBOs with the opportunity to continue sharing their interests and concerns.

Along with suggesting new indicators, multiple CBOs also shared their interest in strengthening existing CalEnviroScreen indicators, such as Hazardous Waste and Pesticide Use. To support this, OEHHA explained how these indicators are currently measured and used. OEHHA also led group discussions on how to add new data to CalEnviroScreen and make the methods easier to understand. These conversations helped CBOs and OEHHA consider which indicators to keep working on for the CalEnviroScreen 5.0 update (e.g., oil and gas wells, hazardous waste) and which ones to set aside for now (e.g., pesticide use data and some air quality measures like nitrogen oxides, or NOx).

Table 2. CBO prioritization of new or existing CalEnviroScreen indicators in the co-design process.

	New or Existing Indicator or Data Mentioned	Number of CBOs who Expressed Interest
New indicators or data	Oil and gas	8 CBOs
	Climate change data	7 CBOs
	Built environment	5 CBOs + OEHHA suggestion
	NOx	5 CBOs
	Additional health indicators	4 CBOs + OEHHA suggestion
	Warehouses and traffic	4 CBOs
	PFAS in drinking water	1 CBO + OEHHA suggestion
Existing indicators or data	Hazardous waste facilities	5 CBOs
	Pesticide use data	3 CBOs

Using the “Box Framework” to Prioritize CalEnviroScreen Indicators

At the suggestion of EHC partners, the co-design group created the **box framework** to further support prioritization discussions. This was a framework for evaluating and prioritizing the data and indicator priorities suggested by CBOs (**Error! Not a valid bookmark self-reference.3**). As EHC

shared, without a framework like this, the co-design group would “set [itself] up for miscommunication and false expectations” when discussing priorities for the co-design process.

The box framework has two levels of prioritization for proposed CalEnviroScreen updates:

The **center of the box** includes data and topics suggested by CBOs that fit CalEnviroScreen and can be focused on during the Version 5.0 update.

The **outer part of the box** includes ideas that are important but cannot be included in this update. This may be because they need more research, more time to review and discuss, or because there is not enough reliable data yet (See [Appendix D](#) for more details).

For example, a complete reevaluation of the CalEnviroScreen model was viewed by both OEHHA and the CBOs as a topic that would take a lot of time and greater input. Therefore, it was organized into the outer part of the box for potential exploration after the 5.0 update.

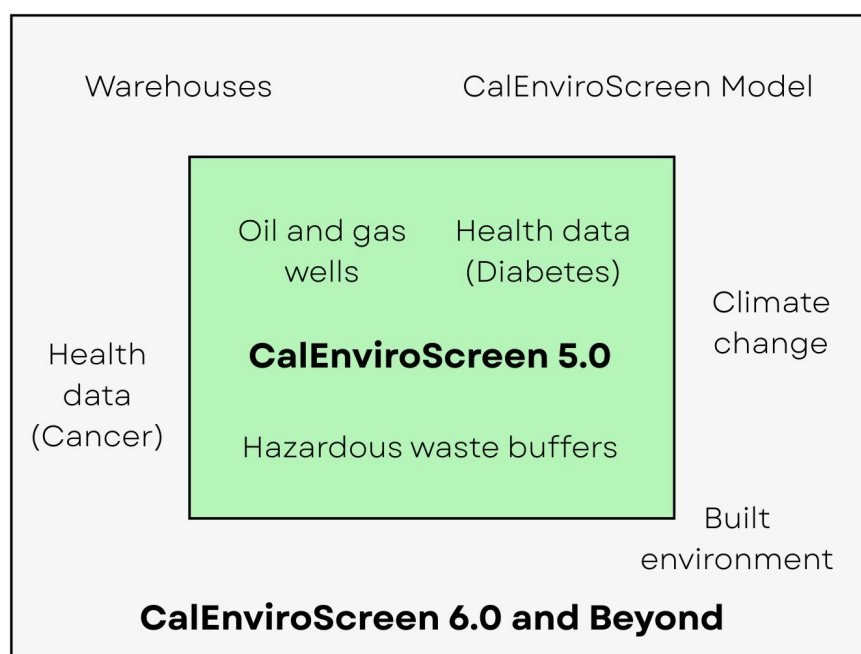


Figure 3. The “box framework” used for determining whether data and indicator priorities shared by the CBOs could be explored during the CalEnviroScreen 5.0 or future updates. Priorities in the center of the box (green) were determined to be appropriate for CalEnviroScreen and could be analyzed during the 5.0 update.

For each indicator of interest, OEHHA presented available information and shared questions and suggestions for filling data gaps. Throughout these discussions, the co-design group also referenced the CalEnviroScreen criteria for indicator selection ([Appendix B](#)). CBO partners were invited to present indicator or data topics to the group for additional feedback and learning. For example, CBE presented on climate change and the increased risk to communities from exposure to flooded contaminated sites (detailed in [Appendix D](#)).

Co-Design Subgroups to Propose CalEnviroScreen Indicator Updates

After reviewing each priority indicator shared by the CBOs, OEHHA sent out a subgroup interest form to see how CBOs wanted to continue with indicator evaluation and development. Based on the survey and group discussions ([Figure 4](#)), OEHHA and the CBOs proposed to prioritize and

develop three subgroups for **Oil and Gas**, **Hazardous Waste**, and **Health**. OEHHA organized Oil and Gas and Hazardous Waste subgroups, but in the end, did not have enough time to organize a Health subgroup. Those discussions on Health, as well as on Warehouses, were incorporated into the larger group discussions.

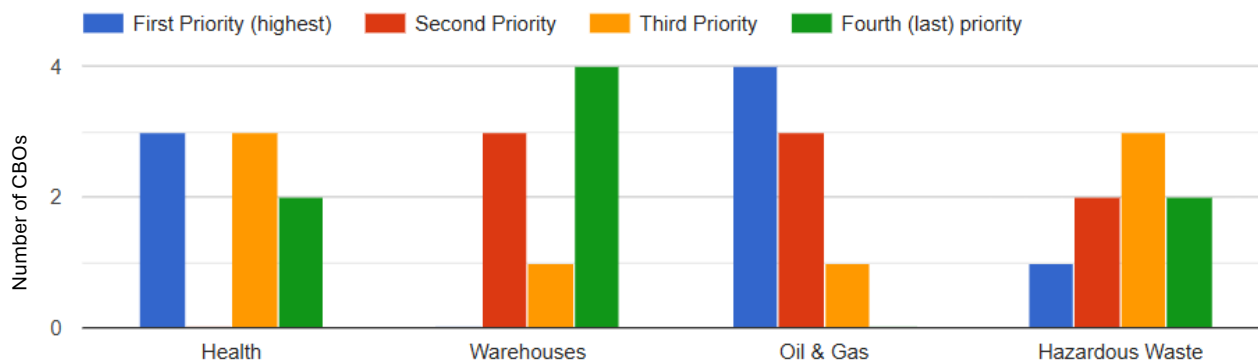


Figure 4. New and existing CalEnviroScreen indicators ranked by CBOs for the tool's 5.0 update. Most CBOs prioritized Oil and Gas, Health, and Hazardous Waste.

A. Updating CalEnviroScreen Indicators (Center of the “Box”)

Small Air Toxics Sites (Oil and Gas Wells)

Oil and gas well site data have not been previously included in CalEnviroScreen but were identified as a priority in this co-design process. The new proposed Small Air Toxics Sites indicator includes the location of active and inactive oil and gas wells, as well as small facilities releasing air pollution like gas stations and auto body shops.

Why Was This a CBO Priority?

There are over 200,000 oil and gas wells in California. These well locations and associated health risks have not been included in previous versions of CalEnviroScreen. CBOs involved in this co-design process and previous public comments on the CalEnviroScreen tool have urged for including oil and gas wells.

The following are CBO perspectives on why this indicator is important:

“Improving CalEnviroScreen to better capture oil and gas impacts aligns with environmental justice principles by ensuring that communities disproportionately affected by these activities are accurately represented and protected. By incorporating more precise data on oil and gas extraction, the tool can better highlight the cumulative environmental burdens these communities face, supporting more equitable decision-making and resource allocation.”

- UNIDOS Collaborators

“This [oil and gas well] data needs to be easily available so we can use it for advocacy. Putting dots of oil and gas facilities [in CalEnviroScreen] will provide context of the pollution in a certain census tract. It covers our long-term advocacy on oil and gas facilities and the impacts it has with disadvantaged communities.”

- CEJA Collaborators

“It is critical to assess exposure to pollution from oil and gas activities, which are known to be harmful to health.”

- CCEJN Collaborators

Collaborative Decisions and Next Steps

Oil and gas wells release harmful air and water pollutants, noise, odors, and other environmental stressors that have been associated with health issues. In 2024, data from the California Department of Conservation showed that about 1,800 census tracts were located within one kilometer of an oil or gas well. That is about 3.5 million people in California.

However, because most oil and gas wells are in just a few parts of the state, this issue does not meet CalEnviroScreen’s requirement to reflect a statewide concern. OEHHA evaluated how oil and gas well data could be combined with existing indicators, such as ‘groundwater threats,’ which already includes the impacts of oil and gas operations on groundwater. Ultimately, OEHHA proposes combining oil and gas well data with information about small sources of air pollution—like gas stations. The new indicator is called **Small Air Toxics Sites** and helps fill a gap in CalEnviroScreen and better shows the combined impact of multiple pollution sources.

The **Small Air Toxics Sites** indicator includes about 100,000 active and inactive oil and gas wells and 25,000 small air pollution sites. Areas with higher scores have more of these pollution sources near communities. This data is available statewide. For more information on the scientific explanation and decision-making process for this indicator, please see [Appendix C](#).

Hazardous Waste Buffers

Hazardous waste generators and facilities have been included in all previous versions of CalEnviroScreen. Census tracts within 1 kilometer of a hazardous waste site were scored based on how close they were. The closer a community was to one of these sites, the higher its score for the Hazardous Waste indicator. CBOs recommended expanding the distance around hazardous waste sites to include communities that live farther than 1 kilometer away but still feel the impacts.

In CalEnviroScreen, a **buffer** is a defined area around a pollution source, such as an oil or gas well or hazardous waste facility, used to estimate the magnitude of pollution sources around nearby communities. Census tracts within a buffer are generally given a higher CalEnviroScreen indicator score the closer they are to the pollution source. When we update CalEnviroScreen, OEHHA reviews the buffer distances to ensure they reflect current science and incorporate community input on the impacts of pollution sources.

Why Was This a CBO Priority?

Hazardous Waste is a top priority for CBOs, which is why it is the only existing CalEnviroScreen indicator placed at the center of the Version 5.0 box framework. When asked about their priorities, CBOs made the following suggestions for improving the Hazardous Waste indicator:

- Use more complete data about hazardous waste sites, including permits, inspection records, and how close they are to homes—especially in vulnerable communities.
- Look at the connection between where hazardous waste is created and where it ends up, especially when the waste is sent to a different census tract.
- Include the effects of hazardous waste sites in nearby areas, not just the ones located within the same census tract.

The following are CBO perspectives on why this indicator is important:

“Health impacts [caused by] hazardous waste facilities exist beyond census tract boundaries. [Reconsidering buffers is] important for understanding cumulative impacts.”

- PSR-LA Collaborators

“[Hazardous waste] facilities near Kettleman City [...] have a direct impact on health, air, and water quality. Current limitations in CalEnviroScreen might not fully capture the cumulative or long-term impacts.”

- UNIDOS Collaborators

Collaborative Decisions and Next Steps

Research shows that using larger distances around hazardous waste sites gives a better picture of who may be affected. For example, studies have linked living more than 1 kilometer from these sites with health problems like poor birth outcomes.⁴ Other screening tools, such as the national EJScreen and tools used in Colorado and Washington, have also increased their buffer distances to 5 to 10 kilometers. This helped guide the Hazardous Waste subgroup to consider larger buffers for CalEnviroScreen.

⁴ Wahida Kihal-Talantikite et al., “Systematic Literature Review of Reproductive Outcome Associated with Residential Proximity to Polluted Sites,” *International Journal of Health Geographics* 16 (May 2017): 20, <https://doi.org/10.1186/s12942-017-0091-y>.

OEHHA and the subgroup compared the current 1-kilometer buffer used in CalEnviroScreen 4.0 with six other distance options. Each one was tested to see how it would affect results across the state and in local communities.

CBOs helped evaluate how well the larger buffers reflected real conditions in their communities. As a result of these discussions, OEHHA proposes a 4-kilometer buffer for CalEnviroScreen 5.0. For more information on the scientific explanation and decision-making process for the changes to the **Hazardous Waste** indicator, please see [Appendix C](#).

Health Data: Diabetes Prevalence

Although the CBOs originally prioritized having a subgroup for Health data, there was not enough time or capacity for a third subgroup during the co-design process. Instead, health data priorities were discussed during group meetings, including discussions on a diabetes prevalence indicator. An indicator of diabetes prevalence using the Centers for Disease Control and Prevention (CDC) PLACES data is proposed for CalEnviroScreen 5.0.

Why Was This a CBO Priority?

Health data, particularly for diabetes and cancer, were mentioned by CBOs as a priority update to CalEnviroScreen's sensitive population component. This data would help measure the number of people in a community who may be more severely affected by pollution. Below, PSR-LA shares why this topic is a priority:

“Environmental justice communities experience higher burden of exposures to pollution and toxins, including carcinogenic and endocrine-disrupting chemicals. Exposure to these toxins lead to increased risk of cancers and diabetes and other metabolic disorders. Diabetes can also worsen the impacts of extreme weather events.”

– PSR-LA Collaborators

Collaborative Decisions and Next Steps

Since the release of CalEnviroScreen 4.0, OEHHA has investigated new health data available at the community level and found reliable information to support adding diabetes as a new indicator. CBOs pointed out that people with diabetes are more at risk from pollution, extreme weather, and other environmental challenges. Previous public comments had also suggested including diabetes in CalEnviroScreen.

OEHHA proposes a **Diabetes** indicator in the sensitive populations component for the CalEnviroScreen 5.0 draft update. This is because research shows that exposure to pollution can

increase the risk of developing diabetes and dying from related complications.^{5 6 7} Diabetes is also very common, with a prevalence in about 11% of California adults.⁸ Diabetes disproportionately affects disadvantaged communities.^{9 10} The CDC, along with the Robert Wood Johnson Foundation and the CDC Foundation, created a data project called PLACES that provides reliable statewide diabetes data. For more information on the scientific explanation and decision-making process for the new **Diabetes** indicator, please see [Appendix C](#).

Updating CalEnviroScreen Indicators: Proposal Summary

Table 3. Summary table of co-design proposals for the CalEnviroScreen indicator update process. More details for topics that were determined to be outside of the scope of the CalEnviroScreen 5.0 update are included in [Appendix D](#).

	Topic discussed	Summary of co-design proposals
New indicators or data	Oil and gas	New proposed indicator combined with small sources of air toxics
	Climate change data	Determined to be outside of the scope of the CalEnviroScreen 5.0 update, but elevated as a priority for future versions
	Built environment	Determined to be outside of the scope of the CalEnviroScreen 5.0 update, but elevated as a priority for future versions
	Nitrogen oxides (NOx)	After OEHHA and the CBOs discussed current air quality data, it was determined that NOx was not a priority for the co-design process.
	Additional health indicators	A new indicator of health, Diabetes Prevalence, was evaluated in this process

⁵ Nuha A. ElSayed et al., “Introduction and Methodology: Standards of Care in Diabetes-2023,” *Diabetes Care* 46, no. Suppl 1 (2023): S1–4, <https://doi.org/10.2337/dc23-Sint>.

⁶ Benjamin Bowe et al., “The 2016 Global and National Burden of Diabetes Mellitus Attributable to PM2.5 Air Pollution,” *The Lancet. Planetary Health* 2, no. 7 (2018): e301–12, [https://doi.org/10.1016/S2542-5196\(18\)30140-2](https://doi.org/10.1016/S2542-5196(18)30140-2).

⁷ Chuangxin Wu et al., “Short-Term Exposure to Ambient Air Pollution and Type 2 Diabetes Mortality: A Population-Based Time Series Study,” *Environmental Pollution* 289 (November 2021): 117886, <https://doi.org/10.1016/j.envpol.2021.117886>.

⁸ “Diabetes Prevention,” California Department of Public Health, accessed January 6, 2026, <https://www.cdph.ca.gov/Programs/CCDPHP/DCDIC/CDCB/pages/diabetesprevention.aspx>.

⁹ Roy Taylor et al., “Understanding the Mechanisms of Reversal of Type 2 Diabetes,” *The Lancet. Diabetes & Endocrinology* 7, no. 9 (2019): 726–36, [https://doi.org/10.1016/S2213-8587\(19\)30076-2](https://doi.org/10.1016/S2213-8587(19)30076-2).

¹⁰ Tara P. McAlexander et al., “Urban and Rural Differences in New Onset Type 2 Diabetes: Comparisons across National and Regional Samples in the Diabetes LEAD Network,” *SSM - Population Health* 19 (July 2022): 101161, <https://doi.org/10.1016/j.ssmph.2022.101161>.

		and proposed in the CalEnviroScreen 5.0 update.
	Warehouses and traffic	Determined to be outside of the scope of the CalEnviroScreen 5.0 update, but elevated as a priority for future versions
	PFAS in drinking water	Although PFAS data was not a priority for the CBOs, they supported including data in the drinking water indicator
Existing indicators or data	Hazardous waste facilities	A proposed larger 4-kilometer buffer for hazardous waste facilities is proposed in the Hazardous Waste indicator. The existing 1-kilometer buffer for the hazardous waste generators remains.
	Pesticide use data	OEHHA and the CBOs discussed the existing Pesticide Use indicator and did not propose any additional changes at this time.
CalEnviroScreen model topics	Regional rankings	OEHHA plans to gather input on the availability of regional maps as part of the 5.0 update.
	Normalization methods	The CBOs did not have any feedback or suggested changes on the percentile normalization method used in CalEnviroScreen.

B. Evaluating CalEnviroScreen’s Reach and Accessibility

CBOs helped OEHHA describe and improve the impact and reach of CalEnviroScreen as a decision-making tool. This part of the co-design work consisted of the following activities:

- **Who?** Identify potential audiences for and uses of CalEnviroScreen 5.0 to inform public engagement strategies
- **Which?** Provide input on existing CalEnviroScreen materials and tools (e.g., website, materials and maps, training resources)
- **How?** Suggest new CalEnviroScreen materials and tools that could support the use of the tool

Identifying Potential Audiences for CalEnviroScreen Engagement (“Who?”)

OEHHA led a conversation around potential audiences the agency could tailor CalEnviroScreen materials, meetings, and general engagement for. Table 4 shows four example audiences that OEHHA and the CBOs identified: residents who live in disadvantaged communities, new CalEnviroScreen users, CalEnviroScreen users who are already familiar with the tool, and public and academic sector representatives. These categories do not cover all the different types of CalEnviroScreen users and partners, and people may fit into more than one group. For example, a

policy maker might also be new to using CalEnviroScreen. Still, these categories can help guide how OEHHA plans community outreach and engagement for CalEnviroScreen.

Table 4. Potential audiences for CalEnviroScreen 5.0 community engagement and engagement needs.

Potential Audience	CalEnviroScreen 5.0 Engagement Needs
Residents who live in disadvantaged communities	<ul style="list-style-type: none"> ● Build an understanding of CalEnviroScreen’s scoring methods and what percentiles mean for their community ● Build an understanding of how disadvantaged communities are prioritized in state and other investments ● Updated and easy-to-use CalEnviroScreen website ● Clear communication, including language justice ● Communication of the CalEnviroScreen 5.0 development process, including the co-design approach
New CalEnviroScreen users	<ul style="list-style-type: none"> ● Communicate the purpose of the tool ● Build an understanding of how disadvantaged communities are identified using CalEnviroScreen ● Communicate limitations of using CalEnviroScreen
Users already familiar with CalEnviroScreen	<ul style="list-style-type: none"> ● Share information on proposed changes to the 5.0 version, including explanations ● Share example uses of CalEnviroScreen
Public and academic sector representatives (e.g., policy makers, local government, academic researchers, nonprofits, etc.)	<ul style="list-style-type: none"> ● Build an understanding of CalEnviroScreen’s scoring methods and what percentiles mean ● Share example uses of CalEnviroScreen, including use in funding opportunities ● Make CalEnviroScreen data accessible and easy-to-use for a range of public and academic uses

Review of CalEnviroScreen Materials and Tools (“Which?”)

OEHHA wanted to understand which audiences its existing CalEnviroScreen materials were reaching and identify any *new* materials that might be needed. To do so, CBOs shared which CalEnviroScreen materials they use and are familiar with (e.g., indicator map, data dashboard, SB535 map, etc.). OEHHA and the CBOs then categorized these materials by the potential audiences we thought would use them ([Figure 5](#)), using the categories identified in [Table 4](#).

The co-design group also brainstormed what new materials could increase engagement with CalEnviroScreen and audience feedback (labeled as “New” in [Figure 5](#)). For example, for residents who live in disadvantaged communities and new users, more effective engagement could look like: **shortform videos** describing CalEnviroScreen (i.e., in the style of Instagram reels to engage younger audiences), local **examples of uses**, and versions of our existing materials with **plain language explanations**. For users already familiar with CalEnviroScreen and public and academic sector representatives, **community profiles** that could be exported as PDF files from the CalEnviroScreen maps (like the [Census “OnTheMap”](#) tool) were suggested. OEHHA will continue to build out these ideas for new materials with the CBOs.



Figure 5. Brainstorm for which existing CalEnviroScreen materials and tools could benefit each audience. Sticky notes labeled "New" indicate a proposed new material to support each audience in using CalEnviroScreen.

Uses of CalEnviroScreen ("How?")

To build on the idea of sharing **examples of CalEnviroScreen uses** to reach more audiences, the CBOs discussed how they have used the tool in their own work. OEHHA was previously familiar with how CalEnviroScreen is used by other government agencies (e.g., California Air Resources Board (CARB) for the [SB535 Disadvantaged Communities map](#)). The uses that were shared by the CBOs were divided into five categories: funding and grants, advocacy, community science,

education, and other (Figure 6). Many of the examples shared by the CBOs could be highlighted in future CalEnviroScreen materials.

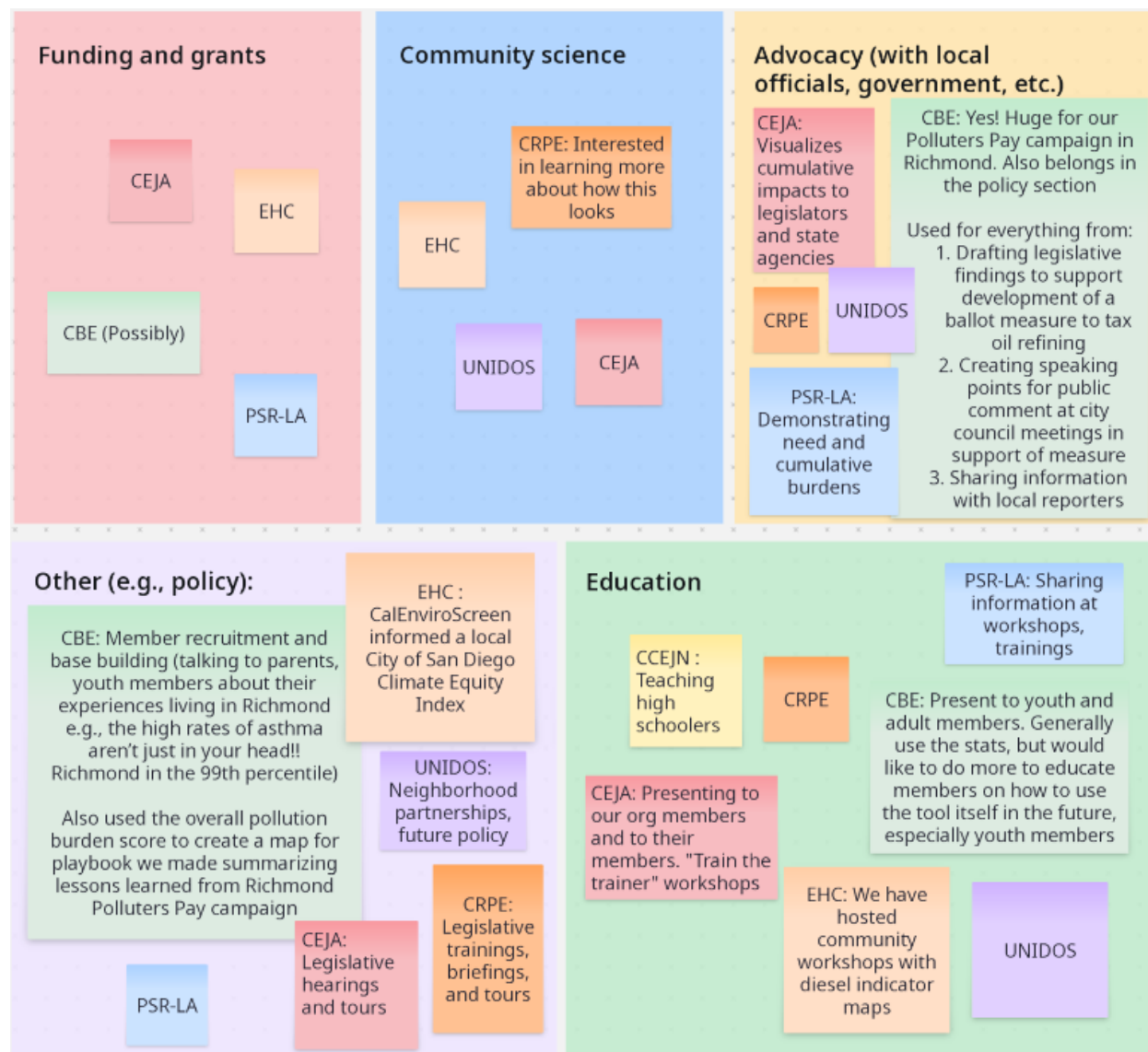


Figure 6: Examples of how CBOs use or have used CalEnviroScreen in their work, categorized by funding and grants, advocacy, community science, education, and other.

Most of the CBOs use or have used CalEnviroScreen for educational, advocacy, and/or other purposes. Seven CBOs have used CalEnviroScreen for educational purposes, such as “train the trainer” workshops, community workshops on environmental issues, and youth training. CalEnviroScreen has also been used for advocacy purposes, such as showing cumulative burdens to legislators and state agencies and supporting the Polluters Pay campaign in Richmond. Uses shared in the “Other” category included community base building, developing neighborhood partnerships, informing a climate equity index, and legislative tours.

Examples of how other tools describe their uses include:

- [CDC Environmental Justice Index—“A Closer Look”](#)

- [California Office of Land Use and Climate Innovation Vulnerable Communities Platform—“Local Impact Case Studies”](#)
- [California Healthy Places Index—“Case Studies”](#)
- [Colorado EnviroScreen—“StoryMaps”](#)

To better reach new users and residents who live in disadvantaged communities, CBOs proposed publishing examples of uses alongside CalEnviroScreen 5.0 mapping tools and webpages. More specific plans for including these examples into CalEnviroScreen will be developed in the future.

C. Developing a Public Engagement Plan for CalEnviroScreen 5.0

As part of the co-design process, the CBOs provided input on the public engagement plan for the CalEnviroScreen 5.0 draft release. This plan would build on previous public engagement processes for CalEnviroScreen. It would also help promote sustained partnerships between OEHHA and local communities that go beyond the CalEnviroScreen updates.

For Versions 1.0 to 3.0, OEHHA held in-person workshops across different regions. These events used a “World Café” style, where people moved between tables or posters to share their thoughts. OEHHA gave a short presentation, then participants talked in small groups, gave verbal feedback, and wrote comments on cards. Interpreters were available to help make the workshops accessible to everyone. Starting with Version 3.0, OEHHA also added webinars as another way for people to participate. For Version 4.0 in 2021, all engagement moved online. OEHHA hosted virtual workshops focused on different regions, with small group discussions in breakout rooms and live interpretation to support participation.

To strengthen OEHHA’s approach to public engagement for CalEnviroScreen, CBOs discussed and shared the most effective engagement strategies they have used or seen in their communities. Ideas and recommendations included:

Active and Informed Engagement:

- Make the workshops interactive, such as including an activity where community members explore where they live in CalEnviroScreen
- Incorporate a pre-educational component, such as CalEnviroScreen 101, to explain concepts like percentiles, before gathering feedback on 5.0
- Share examples of how CalEnviroScreen has been or could be used to support community understanding and discussion (e.g., How can CalEnviroScreen support my health and wellbeing? My children’s health? My community?)
- Offer opportunities to discuss CalEnviroScreen 5.0 updates and environmental and health challenges in small groups or pairs
- Share important links and summary materials to review before the meeting

Meaningful Engagement:

- Identify clear meeting goals and purpose as a first step in the planning process
- Be as transparent as possible with community members about the potential outcomes (e.g., what can and cannot be changed because of this meeting?) and timeline of the engagement process

- Make sure that activities and discussions allow all attendees to meaningfully engage, including youth and older adults

Meeting Logistics:

- Use different communication methods for spreading the word about the meeting, such as direct communication (text), outreach at community hubs like schools, and social media
- Consider the specific local context when deciding whether to host in-person or virtual sessions. There is not always a single approach.
- Consider location and equipment capacity for in-person meetings
- Host meetings during the late afternoon or evening when community members are more likely to be off from work
- Consider that virtual attendees may be joining from their phones. It will be more difficult for them to access and use CalEnviroScreen and other materials.
- Always prioritize interpretation and language access
- Provide food (in person) or food credits (virtual), and make sure it is tasty!

OEHHA summarized this feedback and developed options to potentially implement as part of the CalEnviroScreen update. This visual summary ([Appendix E](#)) was shared with CBOs for input.

[Figure 7](#) shows a suggested timeline for public engagement proposed by the CBOs. CBOs suggested that: pre-draft launch activities include public communications and online materials telling the story of CalEnviroScreen; release and public comment activities include webinars and in-person workshops; and final and post-draft activities include community teach-ins and youth engagement. While working on this timeline, CBOs shared that timing may look different depending on which audience OEHHA is trying to reach.

Due to timing and logistical constraints, OEHHA was unable to build out many of the pre-draft launch activities suggested by the CBOs. However, OEHHA will continue to partner with the co-design CBOs in 2026 to refine and implement engagement activities in their regions and communities for the draft release of CalEnviroScreen 5.0 and beyond.



Figure 7. Brainstorm of public engagement strategies for the 5.0 release suggested by CBOs. These ideas were specific to engagement with residents who live in disadvantaged communities.

Final Reflections on the Co-Design Process

The co-design group referred to a body metaphor to guide final reflections on this co-design process. OEHHA and the CBOs thought about and shared what they learned (mind), what they took away (arms), what they felt (heart), and what next steps they identified (legs) through the CalEnviroScreen co-design process (Figure 8). These perspectives, which are summarized below, will inform future co-design partnerships between OEHHA and local communities and OEHHA's overall partnership practices. This includes the implementation of the public engagement plan for CalEnviroScreen 5.0, which CBOs will continue supporting in 2026.

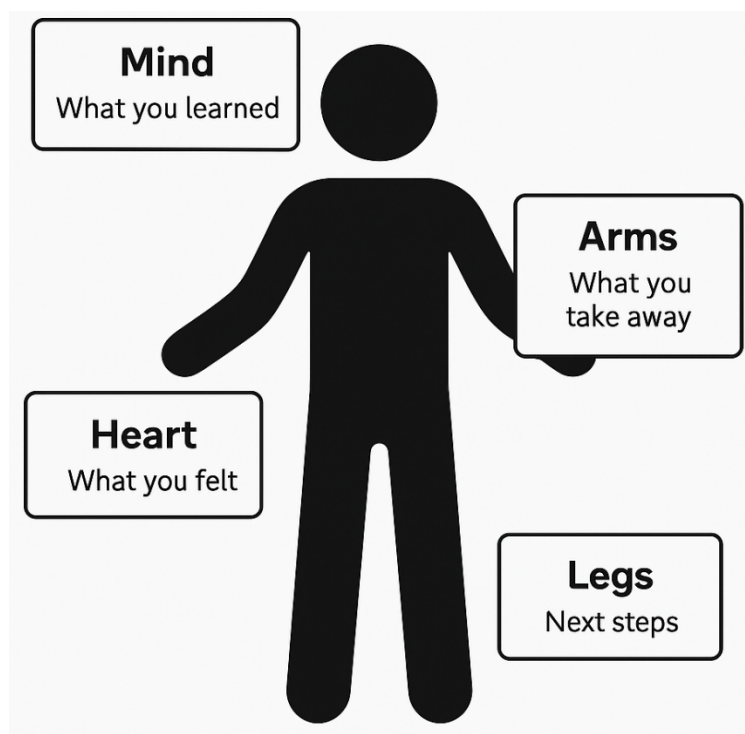


Figure 8. The body metaphor used to guide final reflections on the CalEnviroScreen co-design process. CBOs shared their responses with OEHHA during one-on-one conversations. OEHHA team members also responded to these prompts.

Mind: What you learned

CBOs shared an appreciation for transparency and engagement throughout the co-design process, while also appreciating learning about the limitations that shaped what could be achieved—such as data limitations, scientific complexity, and timing. CBOs valued the opportunity to better understand both the possibilities and boundaries of the CalEnviroScreen 5.0 update.

- “Appreciated the ability to bring in [a] proposal and the **transparency** around why that is not ending up in [CalEnviroScreen].”
- “The process provided an opportunity to understand the **scope of what was changeable** at the time and what would have to be considered beyond this year.”

Arms: What you took away

Many CBOs appreciated seeing the issues they were most interested in prioritized through the co-design process. For example, CBOs agreed on the importance of addressing oil and gas well impacts, leading to the development of the new Small Toxics Air Sites indicator.

- “One of the special priorities was oil and gas. This was definitely addressed with the proximity [indicator] and taking that into account.”
- “Nice to be on the same page as other organizations and come to a **consensus**.”

CBOs highlighted the transparency and thoughtful design of the co-design’s partnership structure. They appreciated how the group balanced short- and long-term priorities for CalEnviroScreen, the

realistic expectations set by the OEHHA team, and the meaningful inclusion of CBO input and expertise into the CalEnviroScreen model.

- “[The co-design process] was done really well. One of the better engagements we’ve done with a government entity. Great we **documented it.**”
- “Liked **the way decisions were made.** A lot of feedback from the organizations, and bringing in the expertise and being able to explain it clearly.”
- “We usually have a lot on our plates, and it was evident that the OEHHA team made an effort to **design realistic expectations.**”

CBOs also highlighted the co-design’s effective meeting structure, including facilitation, note-taking, and thoughtful pacing. CBOs suggested improvements that could inform future partnerships, such as more time to review technical content, increased use of virtual breakout rooms, better brainstorm tools, and co-facilitation with CBOs to boost engagement.

- “**Good frequency** [of meetings]. Appreciated meeting notes. Note taker was super helpful.”
- “Worked well to review same questions in [multiple] meetings once everyone had a chance to **review the material** and become more familiar with the content.”

Heart: What you felt

CBOs felt genuinely heard and valued throughout the co-design process and that they were part of a collaborative, transparent environment. OEHHA’s openness, responsiveness to feedback, and consistent follow-through helped build trust with the CBOs. This process was a strong example of meaningful community engagement for many CBOs, with one sharing that it was a rare and refreshing experience with government agencies.

- “Felt like we were in a space where we were actually heard. Good **collaborative space.**”
- “**Transparency** is an important part of being heard. When OEHHA presented and we had a discussion over the course of a few meetings was helpful. Helped to build trust. Felt like [OEHHA] really **considered the feedback.**”
- “I’ve been doing community planning for close to 15 years. It is refreshing to finally get to experience an opportunity where **a government agency is doing justice to community engagement.**”

Legs: Next steps

Most CBOs shared that they look forward to ongoing collaboration with OEHHA and other CBOs, including the implementation of the public engagement plan for CalEnviroScreen 5.0 in 2026. They also suggested greater attention to data limitations and transparency in future efforts. This includes tracking data gaps and communicating them back to data sources.

Looking Ahead

This co-design process marked a major step forward in how OEHHA works with communities. Instead of just asking for feedback, OEHHA partnered with CBOs as equal collaborators to inform proposed updates to CalEnviroScreen. This helps ensure that CalEnviroScreen 5.0 better reflects the real environmental and health experiences faced by communities across California. Together, OEHHA and our partner CBOs worked on three key projects: identifying proposed updates to

CalEnviroScreen's data and indicators, improving its reach and accessibility, and creating a community engagement plan for the Version 5.0 update. These efforts led to several proposed changes to CalEnviroScreen for continued public feedback, including a new indicator that combines oil and gas well data with small air pollution sources, a larger buffer zone around hazardous waste facilities, and the addition of diabetes prevalence as a health indicator.

Through this process, OEHHA and the CBOs built a strong, trusting partnership grounded in transparency, shared learning, and mutual respect. Looking ahead, OEHHA will continue working with these CBOs to implement the CalEnviroScreen 5.0 engagement plan and explore new ideas for future updates. However, this partnership was not just about one version of CalEnviroScreen. It was about building long-term relationships that support healthier, more resilient communities across California.

Appendix A: Descriptions of Co-Design Partner CBOs

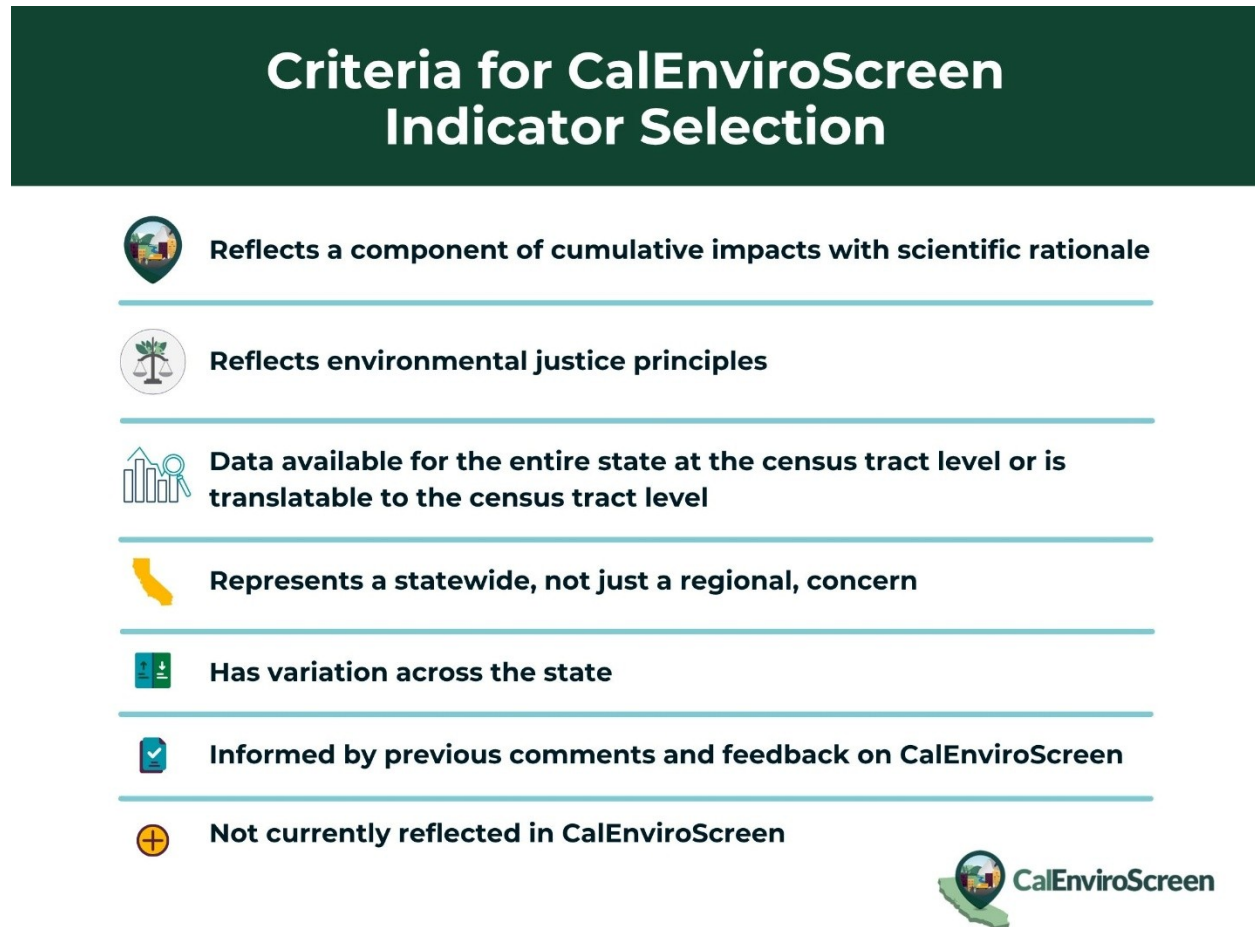
Table 5. CBOs OEHHA partnered with for the CalEnviroScreen 5.0 co-design process, in alphabetical order.

Organization	Location	Summary
California Environmental Justice Alliance (CEJA)	Statewide	Community-led alliance working on policy solutions and advancing environmental justice. Through community organizing, CEJA focuses on clean air and water, healthy, safe housing, sustainable energy, and holding government agencies and elected officials accountable to protect the health and well-being of California communities.
Center for Race, Poverty, and the Environment (CRPE)	Nationwide (Focus on San Joaquin Valley)	Environmental justice organization that focuses on legal, organizing, and technical support for grassroots groups and low-income communities/communities of color. CRPE's current work includes sustainable agriculture, climate change and energy, community investment and infrastructure, toxic waste, and environmental justice advocacy.
Central California Environmental Justice Network (CCEJN)	Central Valley	This Central Valley environmental justice organization works on the health impacts of pesticides, anti-fracking and oil and gas advocacy, community-based monitoring networks, and environmental education on the negative health effects of pollution.
Comité Cívico del Valle (CCV)	Imperial County	Environmental justice organization focused on civic engagement and educating disadvantaged communities. CCV's previous programming has included <i>promotoras</i> (community health workers), community outreach events, training, health education, research, and annual environmental health leadership summits. CCV has also worked on programs related to asthma education, electric vehicle infrastructure, Salton Sea outreach and education, and air and water pollution research and education.

Communities for a Better Environment (CBE)	Statewide	Organization building people power in California's communities of color and low-income communities to achieve environmental justice. Through community organizing, legal advocacy, and research, CBE aims to facilitate a Just Transition across California – reducing the state's dependence on fossil fuels, reducing pollution, and moving towards a green economy rooted in cooperation, deep democracy, and social and environmental wellbeing.
Environmental Health Coalition (EHC)	San Diego	Environmental justice organization focused on the San Diego/Tijuana region that works on reducing greenhouse gas emissions and air pollution, creating a sustainable public mass transportation network, increasing public investment in environmental justice communities, improving children's health, maintaining healthy communities, growing community power, and environmental justice advocacy.
Physicians for Social Responsibility – Los Angeles (PSR-LA)	Nationwide, Los Angeles chapter	LA Chapter that works on connecting communities and health professionals to uplift efforts centered on counteracting environmental racism, addressing fossil fuel dependency, abolishing nuclear weapons, and creating healthy and green economies within communities.
UNIDOS Network, Inc. (UNIDOS)	Statewide, Kettleman City chapter	Environmental justice organization focused on zero waste, hazardous waste landfills, clean air and water, cleanup for contaminated sites, community education and empowerment, protection of indigenous lands, energy and climate justice, and environmental and civil rights.

Appendix B: Criteria for CalEnviroScreen Indicator Selection

Figure 9. These criteria helped OEHHA and the CBOs prioritize indicators of interest for the CalEnviroScreen 5.0 update.



Appendix C: Scientific Explanations for Proposed Indicators

Small Air Toxics Sites (Oil and Gas Wells)

Scientific Explanation and Data Evaluation

When wells are drilled, built, or used to extract oil and gas, they can release harmful pollution into the air and water. These activities can also cause noise, strong odors, and other environmental problems that affect people’s health and quality of life. Studies have linked living near active oil and gas wells to health problems, including breathing issues and complications during pregnancy and birth.^{11 12} These findings have helped shape rules about how far oil and gas operations should be from where people live. Even wells that are no longer in use—called idle wells—can still leak harmful pollution. Because these leaks are unpredictable, it’s harder to measure the risk they pose to nearby communities.^{13 14}

Active Well: A well that is currently being used to produce oil or gas. In 2024, there were 59,000 active wells in California, according to CalGEM’s WellSTAR Data Dashboard. Living near active wells has been linked to breathing issues and complications during pregnancy and birth.

Idle Well: An oil or gas well that has not been used for at least six months and has not yet been sealed and closed. These wells can still leak harmful contaminants into drinking water or to the surface, which may affect the health of surrounding communities. In 2024, there were 39,000 idle wells in California, according to CalGEM’s WellSTAR Data Dashboard.

Plugged and Abandoned Well: An oil or gas well that has been permanently sealed with cement to prevent leakage to the surface.

Oil and gas well data in California is publicly available and regularly updated by the California Department of Conservation’s Geologic Energy Management Division (CalGEM).¹⁵ This data includes each well’s location, ID number, status (see definitions above), and how much oil or gas it produces. As of 2024, CalGEM reported about 59,000 active wells and 39,000 idle wells in the state. About 1,800 census tracts in California are located within one kilometer of a well. That means around 3.5 million Californians live close to at least one oil or gas well. However, the impact

¹¹ Seth B C Shonkoff and Rachel Morello-Frosch, *Public Health Dimensions of Upstream Oil and Gas Development in California: Scientific Analysis and Synthesis to Inform Science-Policy Decision Making* (California Oil & Gas Public Health Rulemaking Scientific Advisory Panel, 2024), <https://iopscience.iop.org/article/10.1088/1748-9326/ac7967>.

¹² SB-1137 Oil and Gas: Operations: Location Restrictions: Notice of Intention: Health Protection Zone: Sensitive Receptors., SB 1137, California Senate 2021–2022 (2022), https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=202120220SB1137.

¹³ Shonkoff and Morello-Frosch, *Public Health Dimensions of Upstream Oil and Gas Development in California: Scientific Analysis and Synthesis to Inform Science-Policy Decision Making*.

¹⁴ California Department of Conservation, “WellSTAR Data Dashboard,” n.d., <https://wellstar-dashboard.conservation.ca.gov/>.

¹⁵ California Department of Conservation, “WellSTAR Data Dashboard.”

is not spread evenly. Just 10 census tracts contain 82% of active wells and 72% of idle wells, showing that some communities are much more affected than others. Please see the CalEnviroScreen 5.0 draft report for additional information on the new [Small Air Toxics Sites](#) indicator.

Indicator Proposals

At the first Oil and Gas subgroup meeting, the conversation focused on the health problems faced by people living near oil and gas wells. The co-design group also discussed how pollution levels can vary depending on whether a well is active, idle, or permanently closed, and reviewed current state rules for managing wells. CBOs suggested creating a new indicator that would show the full range of oil and gas impacts, from large sources like wells to smaller ones like gas stations. They shared helpful resources and data sources to support this idea. CBOs also gave input on which types of oil and gas wells should be included and how to make sure the indicator reflects the lived experiences of impacted communities. For smaller sources of pollution, the CalEnviroScreen team explained that refineries are already included in the tool as toxic release facilities.

At the second meeting, the co-design group worked to answer remaining questions about the potential new indicator, such as which well types to include, how far the pollution might spread (buffer distances), and whether to factor in how much oil or gas each well produces. OEHHA also shared information on how the oil and gas data could be combined with existing environmental effects indicators like ‘Groundwater Threats’ and shared a proposal to consider combining the data with other small sources of air pollution.

The proposed indicator in the 5.0 draft combines the locations of oil and gas wells with smaller sources of air pollution, like gas stations. The data on small pollution sources would come from the CARB’s CEIDARS database (California Emissions Inventory Data Analysis and Reporting System). Facilities such as gas stations, dry cleaners, and autobody shops—common in communities and known to emit pollutants—are now captured using the CEIDARS database. Although mandated facility reporting to CARB is currently undergoing phased implementation, the inclusion of CEIDARS data in CalEnviroScreen significantly improves neighborhood-level exposure estimates by accounting for sources previously excluded.¹⁶

In addition, pollution burdens contributed to by Small Air Toxics Sites are not evenly distributed across California. Socioeconomically disadvantaged people and people of color are more likely to live near these sites, adding to existing vulnerabilities. The CBOs emphasized that, for communities living near oil and gas wells, small air toxics sites also represent a significant environmental health burden and strongly supported their inclusion in the tool. CEIDARS currently includes approximately 25,000 smaller sources out of an estimated 60,000 statewide, as new reporting requirements are phased in. Under these new reporting requirements, annual reporting for all sources in large air districts will begin with 2026 emissions data reported in 2027, while smaller districts will start with 2028 emissions data reported in 2029.

¹⁶ *Staff Report: Initial Statement of Reasons to Consider Amendments to the Regulation for the Reporting of Criteria Air Pollutants and Toxic Air Contaminants* (State of California Air Resources Board, 2020), 122.

Hazardous Waste Buffers

Scientific Explanation & Data Evaluation

Research shows that people can be affected by hazardous waste sites even if they do not live very close by. For example, exposure distances larger than 1 kilometer have been associated with negative birth outcomes.¹⁷ A European study (EUROHAZCON) found a higher risk of birth defects within 3 kilometers of landfill sites.^{18 19} In Washington State, living up to 8 kilometers from hazardous waste sites was linked to birth defects.²⁰ The most serious health effects, like low birth weight and premature birth, were seen within 1 kilometer, but impacts were also found farther away.²¹ These findings support using larger buffer zones to better understand who may be affected.

Other screening tools, like EJScreen and tools used in Colorado and Washington, have already increased their buffer distances. EJScreen’s most recent update of their hazardous waste buffers was from 5 to 10 kilometers. Although the tool’s technical documentation acknowledges that its standardized buffer size is appropriate for comparison nationally, it may not be appropriate for individual states. [Washington’s Environmental Health Disparities Map](#) and [ColoradoEnviroScreen use 5-kilometer buffers](#). These comparisons helped guide OEHHA to do the same for CalEnviroScreen. Based on scientific research and strong support from CBOs, our subgroup reviewed several options for using larger buffer distances when measuring exposure to hazardous waste.

Indicator Proposals

OEHHA reviewed how proximity to hazardous waste sites was measured in earlier versions of CalEnviroScreen ([Figure 10](#)). OEHHA discussed how CalEnviroScreen scores areas based on how close they are to hazardous waste facilities and how serious the site’s impact is. This includes looking at factors such as the type of permit the facility has, whether it has had violations, and how active it is, called the facility’s “weight.” Other national (e.g., EJScreen) and state tools (e.g., Washington and Colorado) have historically used larger buffers than CalEnviroScreen, but rank all facilities the same, regardless of facility size, violations, and activity. Due to the unique differences between the types of hazardous waste represented in CalEnviroScreen, the subgroup prioritized

¹⁷ Kihal-Talantikite et al., “Systematic Literature Review of Reproductive Outcome Associated with Residential Proximity to Polluted Sites.”

¹⁸ H. Dolk et al., “Risk of Congenital Anomalies near Hazardous-Waste Landfill Sites in Europe: The EUROHAZCON Study,” *Lancet (London, England)* 352, no. 9126 (1998): 423–27, [https://doi.org/10.1016/s0140-6736\(98\)01352-x](https://doi.org/10.1016/s0140-6736(98)01352-x).

¹⁹ M. Vrijheid et al., “Chromosomal Congenital Anomalies and Residence near Hazardous Waste Landfill Sites,” *Lancet (London, England)* 359, no. 9303 (2002): 320–22, [https://doi.org/10.1016/s0140-6736\(02\)07531-1](https://doi.org/10.1016/s0140-6736(02)07531-1).

²⁰ Carrie M. Kuehn et al., “Risk of Malformations Associated with Residential Proximity to Hazardous Waste Sites in Washington State,” *Environmental Research* 103, no. 3 (2007): 405–12, <https://doi.org/10.1016/j.envres.2006.08.008>.

²¹ M. Berry and F. Bove, “Birth Weight Reduction Associated with Residence near a Hazardous Waste Landfill,” *Environmental Health Perspectives* 105, no. 8 (1997): 856–61, <https://doi.org/10.1289/ehp.97105856>.

keeping the weights used in CalEnviroScreen. In the past, CalEnviroScreen used buffer zones up to 1 kilometer around each site. Areas closer to a hazardous waste facility received higher scores, meaning greater potential impact. The Hazardous Waste subgroup looked at different ways to expand these buffer zones to better reflect how nearby communities may be affected, even if they live farther away.

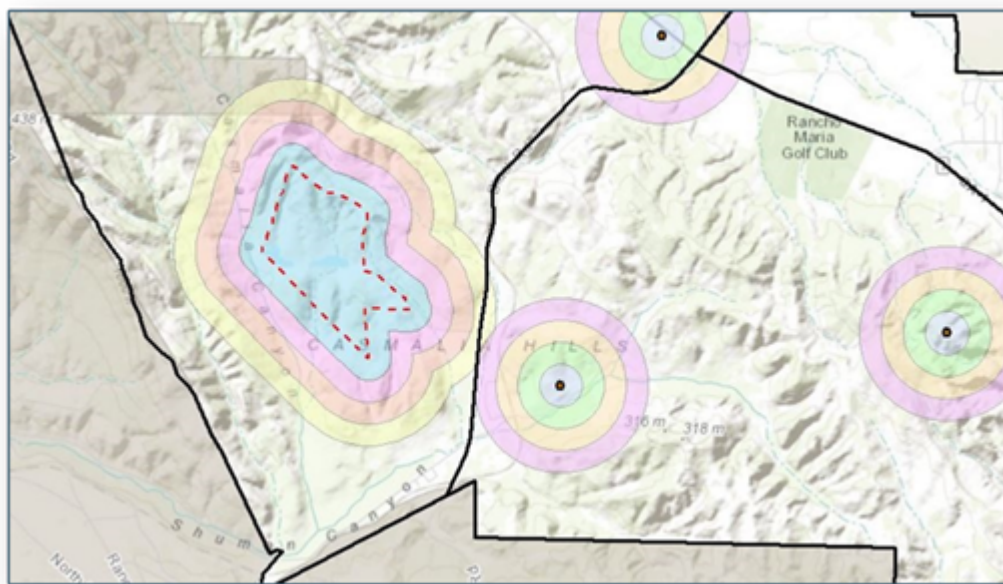


Figure 10: Methodology for 1-kilometer hazardous waste buffers in previous versions of CalEnviroScreen.

OEHHA and the Hazardous Waste subgroup evaluated the existing CalEnviroScreen method as well as six other approaches for better defining the buffers around hazardous waste facilities, while prioritizing keeping facility weights (Table 6). The methods were only applied to transport, storage, and disposal facilities (TSDFs), not the generators of hazardous waste, which are also included in the indicator. After reviewing the seven methods in Table 6 and assessing community relevance with CBOs, OEHHA proposes a 4-kilometer buffer with CalEnviroScreen weights per facility based on size, activity, and violation history. Although smaller than buffers used in other tools, CBOs urged that the facility-level weighting better reflected community experiences across different hazardous waste facilities, which is not reflected in other tools with larger buffers. The concentrated effects within 1 kilometer, extending to 4 kilometers, also align with CBO input that impacts are strongest nearby, but extend to surrounding communities.

Please see the [Hazardous Waste](#) indicator chapter in the CalEnviroScreen 5.0 draft report for more on how the increased buffer sizes affect scoring.

Table 6. Methods analyzed for expanding the CalEnviroScreen Hazardous Waste indicator buffers around TSDF facilities. The proposed method for CalEnviroScreen 5.0 is highlighted in green.

Method	Summary of Method

CalEnviroScreen 4.0 method: 1-kilometer buffer	All hazardous waste facilities, including treatment, storage, and disposal facilities (TSDFs), have a geographic 1-kilometer buffer. The closer a census tract is to the TSDF within that buffer, the higher its score for the Hazardous Waste indicator. According to CBOs, a 1-kilometer buffer is too small to consider pollution impacts on communities that are farther away from a TSDF but are still negatively impacted. CBOs prioritized keeping CalEnviroScreen weights based on facility size, activity, and violations.
10-kilometer buffer	TSDFs have a geographic 10-kilometer buffer. The closer a census tract is to the TSDF within that buffer, the higher its score for the Hazardous Waste indicator. Facilities are given weights based on size, activity, and violations.
5-kilometer buffer	TSDFs have a geographic 5-kilometer buffer. The closer a census tract is to the TSDF within that buffer, the higher its score for the Hazardous Waste indicator. Facilities are given weights based on size, activity, and violations.
Inverse Distance Weighting (ESRI tool)	ESRI's Inverse Distance Weighting tool applied around TSDFs with a 10-kilometer buffer. The closer a census tract is to the TSDF within that buffer, and the more TSDFs that are grouped together, the higher its score for the Hazardous Waste indicator.
U.S. EPA EJScreen 2.3 10-kilometers	Each census block group gets a score based on the number of hazardous waste facilities within 10 kilometers of the center of the block group. All facilities are weighted the same, regardless of size, activity, or violations. This method is used in EJScreen. The same methodology at 5 kilometers is used in ColoradoEnviroScreen and the Washington Health Disparities Map.
Kernel Density (ESRI tool)	Kernel Density shows where hazardous waste facilities are grouped together. It works by drawing smooth, hill-like shapes around each TSDF point—taller in the middle and lower as you move away.
4-kilometer buffer (~2.5 mi)	TSDF buffers of 4 kilometers. The closer a census tract is to the TSDF within that buffer, the higher its score for the Hazardous Waste indicator. Facilities are given weights based on size, activity, and violations. This method is supported by scientific research on the association between distance to hazardous waste facilities and health effects.

Health Data: Diabetes Prevalence

Scientific Explanation & Data Evaluation

CalEnviroScreen uses health data from trusted public agencies—such as federal, state, regional, or local sources. To be included, the data must:

- Measure pollution exposure or population health;
- Be accurate and up to date;
- Be available for the entire state of California; and
- Include location details so scores can be calculated for each census tract.

Since CalEnviroScreen 4.0 was released, OEHHA has investigated the availability of new community-level health data and found options to support an indicator of diabetes prevalence. OEHHA shared why a **Diabetes** indicator is appropriate for CalEnviroScreen. CBOs also emphasized how individuals with diabetes are more vulnerable to the health effects of extreme weather events, pollution exposure, and other environmental stressors. Previous public comments had also suggested including diabetes in CalEnviroScreen.

Diabetes meets the criteria for a new indicator because:

- Pollution exposure has been linked to higher rates of diabetes and related deaths;²²
- It is common—about 11% of adults in California have diabetes;²³
- Reliable data is available for the entire state; and
- Disadvantaged communities are more heavily affected.^{24 25}

The CalEnviroScreen team shared the best data sources for diabetes prevalence with CBOs for feedback and discussion. Below is an example of a slide OEHHA presented to the CBOs on two potential data sources: CDC PLACES and UCLA’s California Health Interview Survey (CHIS).

²² Bowe et al., “The 2016 Global and National Burden of Diabetes Mellitus Attributable to PM2.5 Air Pollution”; McAlexander et al., “Urban and Rural Differences in New Onset Type 2 Diabetes”; Sanjay Rajagopalan et al., “Air Pollution and Cardiovascular Disease: JACC State-of-the-Art Review,” *Journal of the American College of Cardiology* 72, no. 17 (2018): 2054–70; Wu et al., “Short-Term Exposure to Ambient Air Pollution and Type 2 Diabetes Mortality”; A. Zanobetti et al., “Are There Sensitive Subgroups for the Effects of Airborne Particles?,” *Environ Health Perspect* 108, no. 9 (2000): 841–45.

²³ Calif. Dep. Public Health, “Diabetes Prevention.”

²⁴ Taylor et al., “Understanding the Mechanisms of Reversal of Type 2 Diabetes.”

²⁵ McAlexander et al., “Urban and Rural Differences in New Onset Type 2 Diabetes.”

Data
quality
criteria

Accurate	<ul style="list-style-type: none"> • Smaller CA sample size than CHIS • Simpler, potentially less realistic modeling • Validated at county/city level 	<ul style="list-style-type: none"> • ~2X sample size • More advanced modeling • Validated at county/city level
Accessible	<ul style="list-style-type: none"> • Free • Publicly available/shareable 	<ul style="list-style-type: none"> • Pay for data • Only percentiles can be shared
Coverage	<ul style="list-style-type: none"> • More coverage, particularly for rural areas 	<ul style="list-style-type: none"> • Less coverage
Current	<ul style="list-style-type: none"> • Updated every few years 	<ul style="list-style-type: none"> • Updated every few years

Figure 113. Slide from an OEHHA presentation on evaluating two potential data sources for a diabetes indicator for CalEnviroScreen 5.0. Highlighted colors indicate pros (green) and cons (red) of each data source.

If CHIS was selected, OEHHA would not be allowed to publicly share the actual diabetes rates for each census tract—only how those rates compare to others (in percentiles). OEHHA presented an analysis comparing the two data sources, which had relatively similar patterns statewide. Public availability was prioritized by CBOs, and the CDC PLACES data was selected as the data source for the **Diabetes** indicator. Please see the [Diabetes](#) chapter in the CalEnviroScreen 5.0 draft report for more details on the new proposed indicator.

Appendix D: Exploring Priorities Beyond CalEnviroScreen 5.0 (Outer Part of the “Box”)

CBO ideas that were determined to be outside the timeline for the 5.0 update or lower priority were added to the outer part of the box framework ([Figure 3](#)). These ideas, which are described throughout this section, represent potential developments for CalEnviroScreen 6.0 and beyond. OEHHA will continue exploring these ideas through future co-design processes.

Warehouses

Many of the CBOs suggested prioritizing warehouse sites for CalEnviroScreen because of their rapid expansion in areas that already face high levels of pollution. More warehouses often mean more diesel trucks, which can increase air pollution and lead to serious health problems like asthma, heart disease, and early death.²⁶ CBOs pointed out that places like the Inland Empire, Fresno and Kern counties, and North Richmond are already feeling the effects of warehouse growth. People in these areas are worried about the combined impact on their health and the environment.

New state rules are being put in place to address these concerns. For example:

- **California Assembly Bill 98 (AB98)** will limit where new warehouses can be built.
- **Rule 2305**, also called WAIRE (Warehouse Actions and Investments to Reduce Emissions), was adopted in 2021 by the South Coast Air Quality Management District. It requires warehouse operators to take steps to cut pollution, such as using zero-emission trucks and equipment.²⁷
- The **Advanced Clean Truck Rule (ACT 2032)** requires that by 2032, 40% of heavy-duty trucks sold in California must be zero-emission.

During group discussions, CBOs said that having better data on warehouse locations, truck traffic, and pollution would help support their advocacy. They suggested this information should be included in CalEnviroScreen. One tool mentioned was [Warehouse CITY](#), which provides data on warehouses and their environmental impacts in Los Angeles, Orange, Riverside, and San Bernardino counties. It includes information like:

- Number of warehouses
- Size of the land and buildings
- Estimated number of truck trips per day

²⁶ Victor Juan et al., *Proposed Rule 2305 – Warehouse Indirect Source Rule - Warehouse Actions and Investments to Reduce Emissions (WAIRE) Program and Proposed Rule 316 – Fees for Rule 2305* (South Coast Air Quality Management District, 2021), https://www.aqmd.gov/docs/default-source/planning/fbmsm-docs/pr-2305_sr_2nd-draft_4-7-21_clean.pdf?sfvrsn=6badd261_8.

²⁷ *Rule 2305. Warehouse Indirect Source Rule – Warehouse Actions and Investments to Reduce Emissions (WAIRE) Program* (South Coast Air Quality Management District, 2021), <http://www.aqmd.gov/docs/default-source/rule-book/reg-xxiii/r2305.pdf?sfvrsn=15>.

- Estimated daily emissions of diesel particles (PM_{2.5}), nitrogen oxides (NO_x), and carbon dioxide (CO₂)
- Estimated number of jobs

This data comes from public records and direct communication with local sources. However, Warehouse CITY only covers parts of Southern California, so it does not meet the full requirements for CalEnviroScreen referenced in [Appendix B](#). Other challenges include keeping the data up to date and knowing whether certain warehouses are still in use.

Future Directions

To decide whether warehouse impacts should be included in CalEnviroScreen, a full review of available data on warehouse locations is needed. OEHHA plans to support and stay informed about efforts to map warehouses and their effects across California. This includes tools like Warehouse CITY and CoStar, a statewide real estate database.

OEHHA is also following work by the California Air Resources Board (CARB), such as warehouse-related [research projects proposed for 2025–2026](#) and a recently funded [Community Air Grant](#) awarded to R-NOW. As part of this grant, R-NOW is helping organize community meetings with local and regional agencies to talk about how to carry out AB98.

In addition, OEHHA's Community and Environmental Impacts Section is working with students from UCLA on a project to study how warehouses affect air quality and health in Southern California. The project, called [ECHO-AIR](#), is a tool that will estimate how different levels of warehouse activity could affect pollution (specifically fine particles known as PM_{2.5}) and early deaths in communities that already face environmental and health challenges.

Climate Change

Including climate data in CalEnviroScreen was a frequent topic in the co-design meetings. Early on, the topic was decided to be outside the timeline of the CalEnviroScreen 5.0 update ([Figure 3](#)). However, OEHHA and the CBOs agreed that the topic deserves consideration for future updates.

CBOs emphasized that including climate data will help reflect climate change's unequal impact on disadvantaged communities. CBOs emphasized heat waves as a priority, particularly in rural and agricultural areas. CBOs also discussed how many California communities face increased risk from environmental hazards and pollution due to climate-related events, which are already occurring and likely to get worse. In discussions on the topic, the CBOs highlighted that the availability of climate data in CalEnviroScreen could support the most vulnerable communities. OEHHA presented the types of climate data that could be evaluated, including OEHHA's [CalHeatScore](#) extreme heat ranking system, the CDC's [Environmental Justice Index](#) (EJI) climate layers, and California's Office of Land Use and Climate Innovation's [Vulnerable Communities Platform](#) (VCP). Below CBOs describe the importance of including climate change impacts in CalEnviroScreen:

"Heatwaves disproportionately impact vulnerable populations without adequate housing or cooling resources. CalEnviroScreen's current climate data might not fully account for these intersectional vulnerabilities."

- UNIDOS Collaborators

"Heat waves exacerbate health issues, especially in low-income communities with limited access to air conditioning or healthcare. The current version [of CalEnviroScreen] lacks comprehensive climate-related indicators."

- CCEJN Collaborators

"Climate impacts are important, especially to pollution and how it fits the framework."

- PSR-LA Collaborators

CBO Presentation on Climate Change and Flood-Related Risks to Environmental Justice Communities

Communities for a Better Environment (CBE) shared ideas for a new CalEnviroScreen indicator to show the risk of flooding in areas with contaminated sites—such as hazardous waste sites or places being cleaned up due to pollution. CBE suggested using different types of data to show flood risk, such as FEMA flood maps (used for insurance), sea level rise projections, and rising groundwater levels. Approaches discussed included:

- Creating a new flood risk indicator using FEMA maps, with the option to also include sea level rise data from NOAA (the National Oceanic and Atmospheric Administration); or

- Adding a higher risk score to existing CalEnviroScreen indicators for Hazardous Waste and Cleanup Sites if a census tract is also at risk of flooding.

WATER-RELATED RISK INDICATORS			
INDICATOR	RATIONALE	CONSIDERATIONS	DATA/PRECEDENTS
Flood Risk	<ul style="list-style-type: none"> Seasonal flooding is an issue in EJ communities across the state Stormwater infrastructure is not set up to deal with worsening climate events (e.g., atmospheric rivers) 	<ul style="list-style-type: none"> No great data that I have seen on existing, but FEMA flood insurance maps show “flood risk” that cover most of the state <ul style="list-style-type: none"> Are there gaps/considerations when working with these insurance maps? 	FEMA Insurance Maps
Flood Risk + adding SLR	<ul style="list-style-type: none"> See above Flood risks are only expected to increase for coastal communities as sea level rises due to climate change 	<ul style="list-style-type: none"> Weights heavier for coastal communities and may have implications for inland EJ communities 	FEMA Insurance Maps NOAA Sea-Level projections Surging Seas Climate Central
At-Risk Haz Waste Facilities	<ul style="list-style-type: none"> Hazardous Waste facilities contain toxic materials that, if spread via flooding and/or water rise, present a huge risk to EJ communities Studies have already shown that hazardous waste sites are at risk due to flooding, SLR & groundwater rise 	<ul style="list-style-type: none"> There is precedent in CES 4.0 to consider anticipated threats i.e., groundwater threats Groundwater rise data is important, but extremely limited as far as I have seen... 	Existing Hazardous Waste facilities in CES 4.0 Toxic Tides Map & Paper SFEI Groundwater & SLR
At-Risk Cleanup Sites	<ul style="list-style-type: none"> Similar to hazardous waste facilities, cleanup sites (brownfield sites, Superfund, etc.) 	<ul style="list-style-type: none"> Same as above Would involve slightly expanding scope of CES 5.0 	Existing Cleanup Sites in CES 4.0 Toxic Tides Map & Paper

Figure 124. Slide from a presentation by CBE on flood-related risk indicator development for CalEnviroScreen.

The presentation led to group discussion on including multiple climate impacts that can increase the risk of pollution exposure to communities. Interest in one climate impact, such as flooding, versus another, such as extreme heat, depended on what was most likely to affect communities represented by the CBOs.

Potential options for including climate indicators in CalEnviroScreen include:

- Incorporate a climate scoring component;
- Include individual climate components into existing indicators (e.g., flood risk as an additional scoring component of an environmental effects indicator, such as Hazardous Waste); or
- Add supplemental datasets to CalEnviroScreen maps.

Future Directions

Climate change remains a key area of interest within the CalEnviroScreen program. A strategy for evaluating climate data for use in CalEnviroScreen remains a priority for future versions of the tool. OEHHA plans to conduct a comprehensive evaluation of climate indicators that centers community perspectives. OEHHA will then establish a public process with CBOs and other stakeholders to determine the suitability of climate change data in CalEnviroScreen.

Cancer Health Data

Cancer is a major health concern in communities that face high levels of pollution and other environmental problems. Cancer was raised by several CBOs as a priority health outcome for the communities they work with, and a suggested area of exploration for CalEnviroScreen. Research also shows that exposure to pollution can increase the risk of cancer,²⁸ and could increase mortality and other negative health effects among cancer patients and survivors.²⁹ However, most state screening tools do not include cancer as a health indicator.

OEHHA and CBOs talked about the difficulties in finding local cancer data. Because of privacy rules and the small number of cases in some areas, it is hard to get reliable cancer data for neighborhoods or cities. Most data are only available at the county level. Some CBOs said that including cancer rates in CalEnviroScreen would help show the added vulnerability that many communities with high cancer rates face due to environmental burdens.

Through additional research and data assessment, OEHHA could determine if cancer meets the criteria to be included as a Sensitive Population indicator in CalEnviroScreen. At a group meeting, OEHHA shared cancer data from the CDC's PLACES project, which provides estimates at the census tract level. However, both OEHHA and the CBOs agreed that this data does not fully reflect the unique risks and challenges related to cancer in disadvantaged communities. They suggested that tracking rare types of cancer might be a better way to highlight these issues in the future.

Future Directions

Before deciding whether to include cancer prevalence in CalEnviroScreen, several questions must be answered to ensure accurate and meaningful use. These include determining the appropriate type of data to use, such as prevalence or incidence, ensuring that there is no overlap between indicator data sets, and knowing which cancer types or stages to consider. Additional considerations include data availability and how to interpret and communicate this indicator within CalEnviroScreen's broader goal of showing the combined impacts of pollution and other health risks.

Built Environment

CBOs highlighted several features of the built environment that affect health and equity, including access to green space, impermeable surfaces (e.g., concrete, asphalt), the lasting effects of redlining, and infrastructure quality. Housing quality was also mentioned, though this is partially addressed through CalEnviroScreen's Children's Lead Risk from Housing indicator, which considers the age of homes. Statewide data on redlining is unavailable, but resources like the [Pollution and Prejudice StoryMap](#) help show its impacts.

²⁸ Michelle C. Turner et al., "Outdoor Air Pollution and Cancer: An Overview of the Current Evidence and Public Health Recommendations," *CA: A Cancer Journal for Clinicians*, August 25, 2020, 10.3322/caac.21632, <https://doi.org/10.3322/caac.21632>.

²⁹ Judy Y. Ou et al., "Air Pollution across the Cancer Continuum: Extending Our Understanding of the Relationship between Environmental Exposures and Cancer," *Cancer Epidemiology, Biomarkers & Prevention* 29, no. 10 (2020): 1876–79, <https://doi.org/10.1158/1055-9965.EPI-19-1588>.

OEHHA is also looking into creating a new CalEnviroScreen indicator that combines access to green space and tree canopy coverage (how much of an area is shaded by trees). These are important for public health and helping communities cope with climate change and extreme heat. This work highlights how city planning, environmental health, and climate resilience are all connected.

Future Directions

Like climate change, the built environment is potentially a combined indicator made of multiple indicators and datasets and will require further exploration before including it in CalEnviroScreen. OEHHA will continue to explore this topic as part of the next steps for including climate change data into CalEnviroScreen.

Additional Topics Discussed

Regional Rankings Maps

In the past, some people have asked OEHHA to create regional rankings using CalEnviroScreen data. In response, OEHHA explained that CalEnviroScreen is mainly designed to compare communities across the whole state, not just within a region. To make it work well for regional comparisons, the indicators and scoring system might need to be adjusted. However, anyone is welcome to use CalEnviroScreen data to create their own regional analyses.

At the same time, OEHHA understands that regional rankings could be helpful. They might make it easier to understand local issues and support local planning and projects. In the future, OEHHA may consider offering a separate tool that shows regional rankings alongside the CalEnviroScreen 5.0 maps.

Use of Percentiles

At the beginning of the co-design process, CBOs asked why CalEnviroScreen uses percentile scores and how this method works. In response, OEHHA gave an overview to explain and document this decision.

To create a single score that shows either pollution burden or population vulnerability, CalEnviroScreen combines many different types of data. But first, the data must be put on the same scale—a process called normalization. For example, ozone pollution is measured in parts per million (ppm), and values across California's 8,035 census tracts range from 0.03 to 0.07 ppm. In contrast, pesticide use is measured in pounds per square mile and can range from 0 to 80,000. Because these numbers are so different and use different units, OEHHA cannot simply average them together. OEHHA needs to first convert them to a common scale.

CalEnviroScreen does this by using percentile scores (see definition below). Each census tract gets a percentile score for each indicator. This shows how a community compares to others in the state for that specific issue. This method was chosen because it is:

- Simple and easy to understand

- Consistent across all indicators
- More transparent than using raw data
- Better at showing combined (cumulative) impacts

After this explanation, the CBOs did not suggest any changes to this method.

A **percentile** is a way of describing how a score compares to other scores from the same set. CalEnviroScreen uses percentiles to rank California census tracts from lowest to highest for pollution burden and population vulnerability. For example, an overall CalEnviroScreen score of 90 (or 90th percentile) means that a census tract has a higher pollution burden than 90% of all other census tracts in California.

Appendix E: CalEnviroScreen Community Engagement Strategy Ideas






	STRATEGIC PRIORITIES	CATEGORY	DETAILS	FOCUS
OUTREACH	At-Large Outreach	Webinars & Virtual Town Halls	Open forums for discussion and Q&A on pressing topics.	Broad Audience Engagement and Awareness 
		World Café Discussions	Community dialogues with rotating topics and collective learning.	
		Community Exhibits & Pop-Ups	Leveraging existing community events with EJ groups to share CES information, education, and opportunities to provide input.	
	Educational Engagement	Train-the-Trainer Programs	Equip community leaders with tools to educate their peers.	Knowledge Sharing & Empowerment 
		Community Teach-ins	Interactive sessions led by experts or lived-experience speakers.	
		School & Youth Engagement	Presentations, workshops, and partnerships with schools.	
		Public Information Sessions	Presentations on CES and gathering input.	
		Interactive Learning Modules + Materials	Online/videos on educational sessions.	
	Grassroots Outreach	Language-Justice Outreach	Bilingual materials, interpretation services, and culturally relevant translations.	Tailoring Outreach to Communities 
		Arts-Based Storytelling	CES 5.0 outreach materials using storytelling to also gather feedback for tool update.	
CAPACITY AND COLLABORATION	Capacity Building & Skill Development	Community-Led Workshops	Hands-on training in CES 5.0 and community interactive feedback for the update leadership.	Community Leadership 
		Technical Training	Teaching data collection, mapping, and CES policy implications skills.	
	Collaborative Partnerships Cross CalEPA BDO Engagement	State and Local Agencies Education Workshops	Training on CES usability and implications	Strengthening Cross Collaborations 
		Cross-Sector Roundtables	Bringing together government, NGOs, academia, and community leaders for cross learning on CES.	
		EJ Peer Learning Exchanges	Connecting communities and other EJ groups for sharing CES 5.0 update information.	

Figure 135. Potential community engagement strategies shared by CBOs for the public release of the CalEnviroScreen 5.0 draft. Strategies are organized by five strategic priorities (in color)

