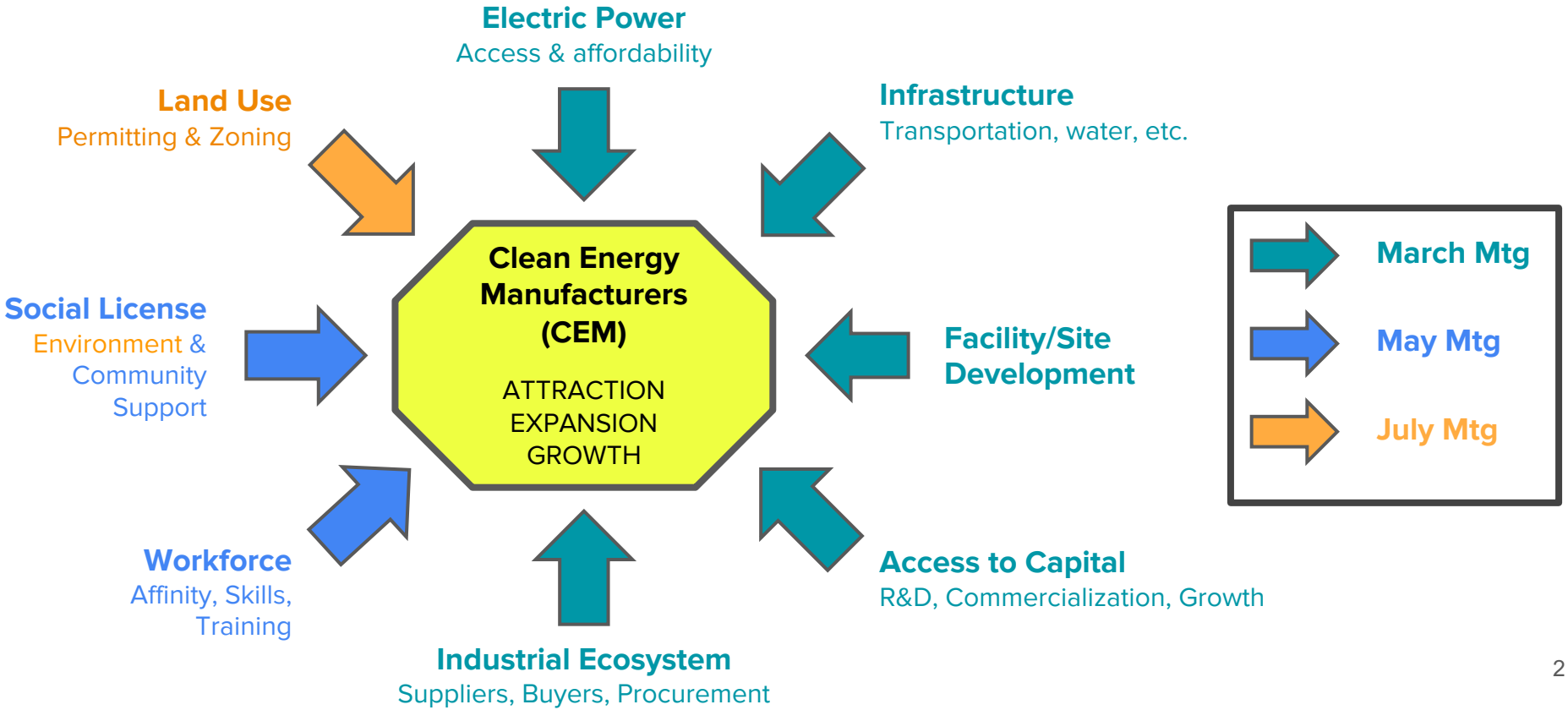
Environmental Risks, Permitting & Zoning Research update and policy discussions

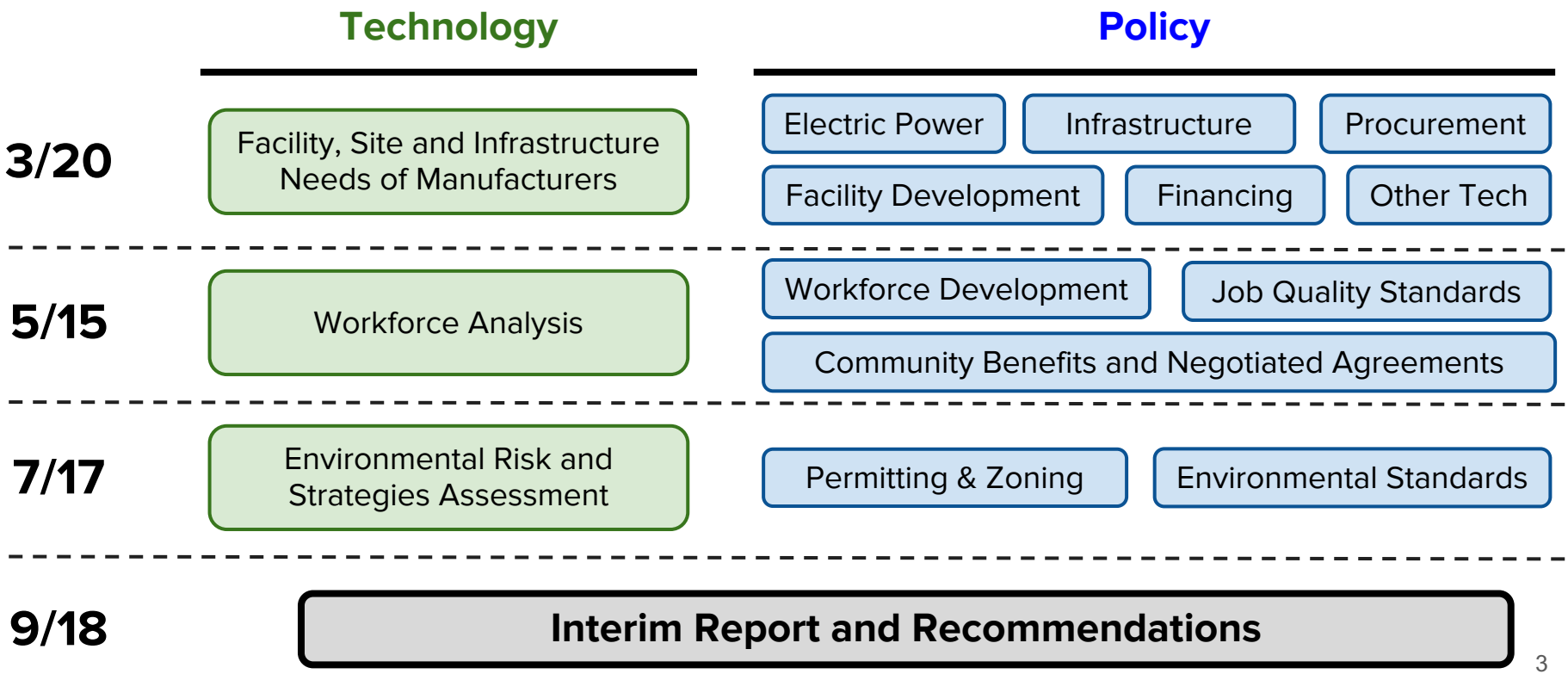
GEZ Board Meeting - 07/17/2026

UC Berkeley Labor Center

Levers to Develop Clean Energy Manufacturing in GEZ



Work plan and schedule of meetings in ‘26



Plan for today

1	Technology Research	**Environmental Risks** • Presentation by PSE Healthy Energy: *GEZ Environmental Risks & Strategies Assessment*
2	Policy Research & Discussion	**Permitting & Zoning** • Overview of Local GEZ Permitting Processes • Case Studies and Best Practices for Local Jurisdictions • Potential GEZ Permitting/Zoning Strategies

Environmental Risks and Strategies Assessment for the Green Empowerment Zone

July 17th, 2026

PSE Bringing science to energy policy

Sofia Bisogno, BSE

Air Quality Scientist

Sofia joined PSE in 2023 with a focus on the air quality and public health impacts of oil and gas production, energy generation, and the energy transition. She has a background in Environmental Engineering and experience as an environmental consultant, conducting health risk assessments for various Bay Area industries.

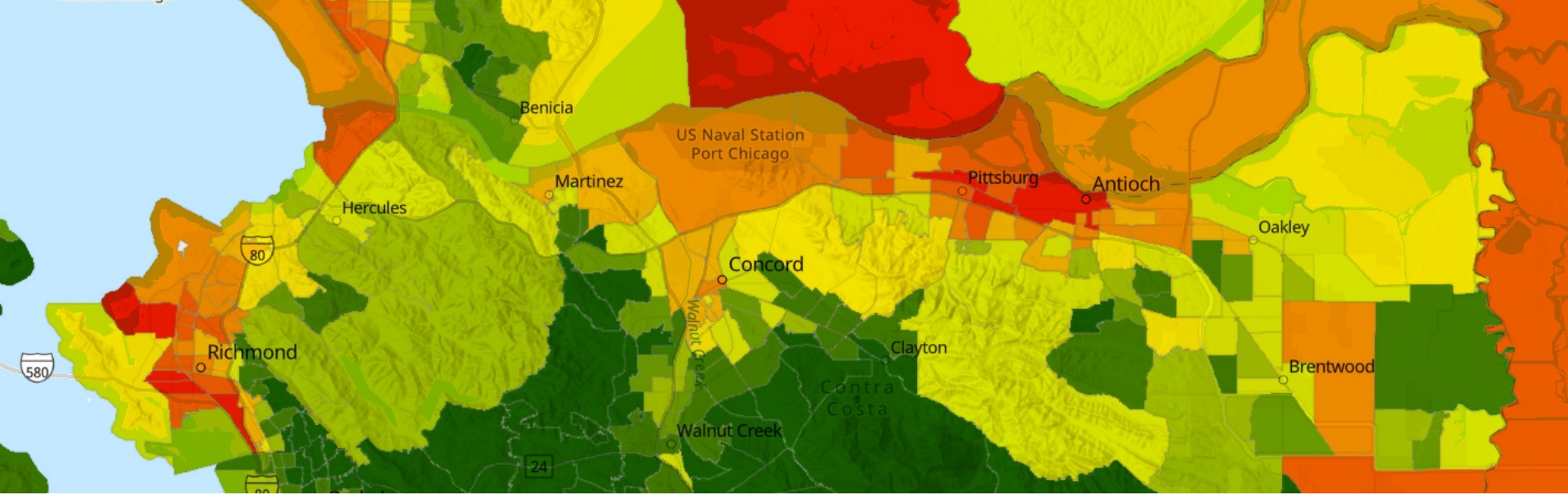
Karan Shetty, M.ESM

Clean Energy Transition Scientist

Karan joined PSE in early 2021 with a focus on air quality, public health impacts of the power sector, and energy affordability. He has performed extensive research on air quality trends in Richmond, CA and broader Contra Costa County, and has used health analysis to accelerate retirement coal and gas power plants in the Midwest.

About PSE

PSE Healthy Energy is a nonprofit energy science and policy research institute. Our mission is to generate science-based energy and climate solutions that protect public health and the environment.



Statement of Purpose

As part of the “high road” sector strategy, we assessed potential public health risks from and developed mitigation recommendations for Clean Energy Manufacturing to inform investment without recreating burdens the region is working to leave behind.

Scope of Work

UCB Scope

Identify priority clean energy manufacturing technologies viable for the GEZ.

Compile a list of example facilities across the U.S.

- Batteries
- Electric Grid Components
- Zero Emission Vehicles
- EV Chargers
- Heat Pump/Water Heaters
- Electrolyzers
- Offshore wind

PSE Scope

Assess the potential environmental/public health risks from manufacturing these technologies.

Provide GEZ board with recommendations to protect nearby communities.

Methods

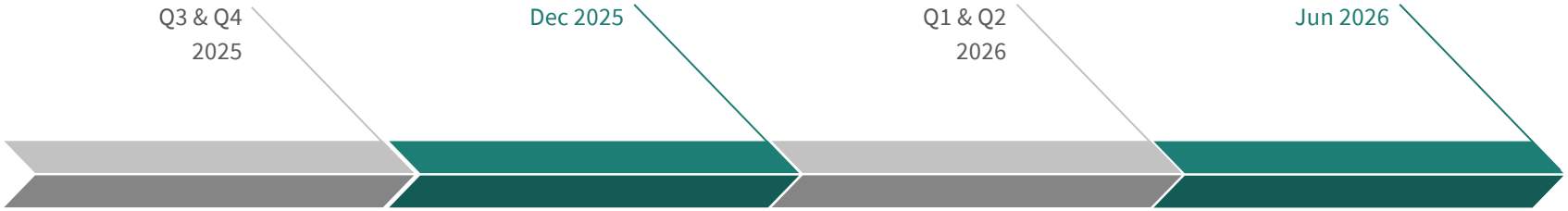
Environmental Modules

Hazardous Waste	Waste with properties that make it dangerous or capable of having a harmful effect on human health or the environment. Hazardous waste is regulated at the federal and state levels.
Air Pollution	Air pollutants that could be harmful to human health. Air pollution emissions are regulated at both the federal and state levels.
Industrial Wastewater	Water discharge that might affect the water quality of the receiving waters or interfere with publicly owned treatment works that receive these discharges. Industrial wastewater is regulated at the federal and state levels.

Research Domains

Regulatory	Federal and state permits, reported emissions, effluent concentrations, hazardous waste types and amounts.
Scientific Literature	Potential environmental hazards associated with the facility's manufacturing processes based on peer-reviewed or other scientific sources.
Public Media	News coverage on events of environmental or public health concern or other non-regulatory, non-scientific outlets.

Stakeholder Engagement



Develop Methodology

Environmental Stakeholder Briefing #1

Review methodology, gather feedback on environmental modules and research domains.

Conduct Research and Develop Key Findings

Environmental Stakeholder Briefing #2

Review key findings, gather feedback on recommendations and notes for future work.

Risk Definitions

Risk Level	Definition
Very Low	Minimal or no reported emissions, limited or no hazardous waste generation, and little to no evidence of CAA, CWA, or RCRA permitting.
Low	Small-scale emissions (<10 tons per year of any one pollutant), non-major permitting status, and very small hazardous waste streams (<100 kg/month) with no meaningful compliance violations.
Medium	Moderate emissions (< 50 tons per year of any one pollutant), small hazardous waste generation (< 1000 kg/month), effluent monitoring requirements, with potential for localized impacts under upset conditions.
High	High emissions levels (> 50 tons for air emissions), very large quantities of hazardous waste disposal required, or significant permit violations incurred. Higher potential for significant environmental or community exposure in the event of control failures.
Very High	Exhibited major source emissions levels (> 100 tons for air emissions), very large quantities of hazardous waste disposal required, AND significant permit violations incurred.

Confidence Rating	Definition
A	Consistent findings across multiple facilities and supported by the literature.
B	Partial data completeness or a limited number of facilities examined.
C	Limited, indirect, or qualitative information or too few facilities to identify a pattern.

For Example: Risk Rating Existing Industries

Category	Air Risks (Confidence)	Water Risks (Confidence)	Hazardous Waste Risks (Confidence)
Manufacturing	Low (B)	Low (B)	High (B)
Chemical Plants	High (B)	Low (B)	Very High (A)
Oil & Gas Refining	> Very High (A)	> Very High (A)	> Very High (A)

Limitations

- Regulatory requirements may not capture all environmental risks
- Many companies are still nascent operations and therefore do not have substantial footprints or data
- Manufacturing processes are generalized – specific companies have their own patents and may not have the same steps or impacts
- Some environmental impacts were out of scope (i.e., noise, construction impacts, trucking impacts, upstream and downstream impacts)

Key Takeaways

Category	Sub-Category	Air Pollution Risk (Confidence)	Water Discharge Risk (Confidence)	Hazardous Waste Generation Risks (Confidence)
Batteries	Solid State Battery	Very Low (B)	Very Low (B)	High (B)
	Non-Vanadium Flow Battery	Very Low (C)	Very Low (C)	Medium (B)
	Thermal batteries	Very Low (C)	Very Low (C)	Medium (B)
	Module assembly	Very Low (A)	Very Low (A)	Very Low (C)
	Cathode material	Low (C)	Very Low (C)	Low (B)
Electric Grid Components	Electronics Manufacturing Services	Low (B)	Low (B)	Medium (B)
	Power Electronic Module Assembly	Low (B)	Low (B)	Medium (B)
	High Voltage Distribution Grid Transformers	Medium (B)	Low (B)	High (B)
	High Voltage Transmission Grid Transformers	High (B)	Medium (B)	High (B)
	Medium Voltage Switchgear	Low (B)	Low (B)	Low (B)
	High Voltage Switchgear	Low (C)	Low (C)	Low (C)
Heat Pumps	Commercial and Residential Heat Pump Water Heaters	Low (C)	Low (B)	Medium (C)
Electrolyzers	Catalyst, Stack, and Module Assembly, PEM/AEM/AWE	Very Low (C)	Very Low (C)	Medium (B)
EV Chargers	DC Fast Charger, Final Assembly	Very Low (C)	Very Low (C)	Very Low (C)
Zero Emissions Vehicles	Light to Medium Duty Vehicles, Final Assembly	Very Low (C)	Very Low (C)	Medium (C)
	Drone Manufacturing, Final Assembly	Very Low (C)	Very Low (C)	Very Low (C)
	Electric Ferry Manufacturing, Final Assembly	Very Low (C)	Very Low (C)	Very Low (C)
	Electric Powertrain Manufacturing	Very Low (C)	Very Low (C)	Very Low (C)
Offshore Wind	Floating Offshore Wind Steel, Semi-Submersible Platform	Medium (C)	Very Low (C)	Very Low (C)
	HVDC Subsea Cable Manufacturing	Very Low (C)	Very Low (C)	Very Low (C)

Key Findings

1. Most technologies carry **Very Low** to **Low** risk across the three environmental modules; however, a few technologies carry higher risks.
    - High-voltage transformer manufacturing poses highest risks of all technologies evaluated.

2. Hazardous waste management poses most consistent risk across technologies.
    - Solid-state battery manufacturing carry significant hazardous waste risk.

3. Mitigation measures, including preventative measures, engineering controls, and operational practices, protect public health. These can be achieved through regulatory permitting processes.

Risk Mitigation Recommendations

Facility Risk Mitigation Strategies

Pollution Reduction

- Substitute for less hazardous materials
- Employ lower-risk processes and equipment

Engineering Controls

- Proper enclosure, venting, and filtering of air through air pollution control devices
- Wastewater pretreatment options by hazard

Operational Practices

- Proper storage of hazardous material/waste
- Personnel training and worker voice
- Emergency response planning/ coordination with the local authorities

Regional Mitigation Strategies

1. Ensure regulatory framework effectively encourages and enforces facility specific controls

2. Ensure best practices for occupational health and safety to protect workers from hazardous chemical exposure and minimize risk to the community

3. Site higher risk facilities further from residential populations

4. Make site specific monitoring and reporting publicly available

5. Consider cumulative impacts in permitting

Thank You!

PSE Bringing science to energy policy

www.psehealthyenergy.org

Policy Research:
Permitting & Zoning

Research Methodology

Interviews	Interviews with planning staff from 8 GEZ jurisdictions, along with 3 neighboring jurisdictions, Bay Area Air District and GoBiz. Further informed by 30+ employer interviews and other stakeholder interviews.
Research Sources	● Review of land use / zoning for all GEZ jurisdictions applicable for CEM ● Review of local/state/federal permitting process ● Review of current and pending state CEQA legislation

Overview of Key Terms

Zoning: Along with the General Plan, a primary mechanism by which local jurisdictions regulate how land can be used and developed

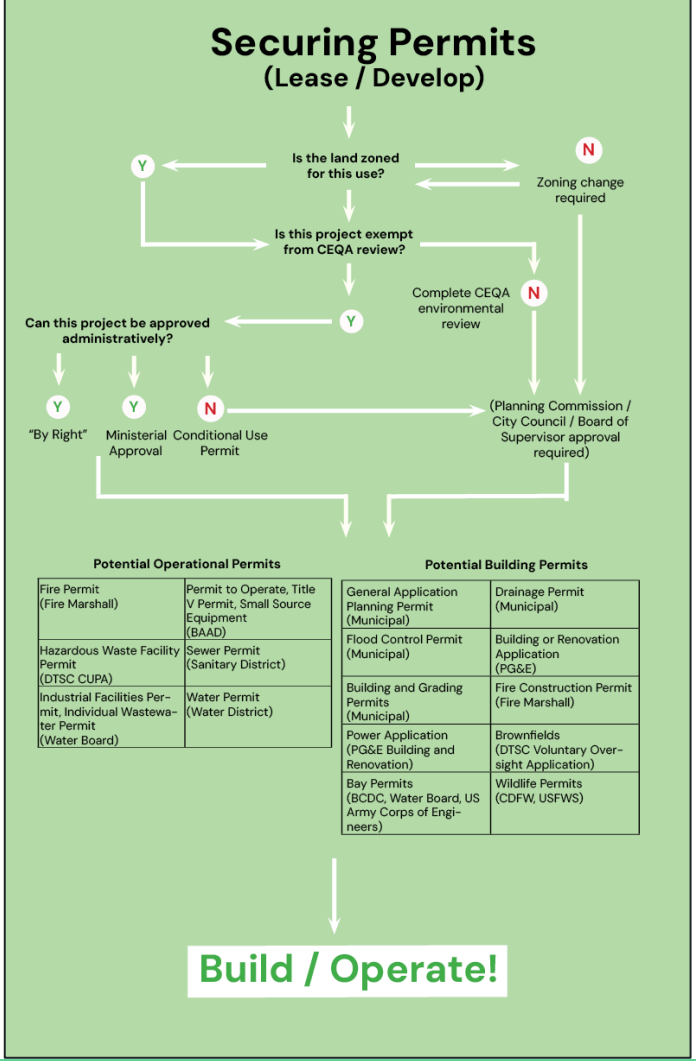
Use Permits: Local jurisdictions allow certain activities to occur on a property either “by right” (through staff/ministerial approval), or through discretionary approval (Zoning Administrator, Planning Commission, City Council/Board of Supervisors), typically through a Conditional Use Permit.

Regulatory Permits: Required for construction and operation of facilities. Includes air, water, hazardous materials, habitat/species, and other permits, depending on the nature of the project.

CA Environmental Quality Act (CEQA): Environmental analysis required for new discretionary projects that do not qualify for a CEQA exemption. Mitigations may be applied to reduce environmental impacts.

Local Permitting Flow Chart
(Leasing / Development of a Facility)

Flow chart illustrates the permitting pathway for a Clean Energy Manufacturer seeking to lease or develop a site. Includes whether the land is zoned for the use, whether CEQA is required, whether the project can be approved administratively or whether it requires a Conditional Use Permit or other approval from the local Planning Commission, City Council or Board of Supervisors. The chart then describes the range of additional potential permits the project might need to secure prior to breaking ground or beginning operations.



State Permitting: California Environmental Quality Act

Passed in 2025:
SB 131 (Weiner)

In June 2025, the California State Legislature and Governor Newsom passed a broad CEQA reform bill that among other things, **created a statutory exemption, waiving CEQA requirements for all "advanced manufacturing" projects** not located on "natural and protect lands."

Pending in 2026:
SB 954 (Blakespear)

Spearheaded by a coalition of labor, environmental and environmental justice organizations, the bill **would narrow CEQA exemption for advanced manufacturing to the final assembly of products and require projects to meet specific labor and environmental standards to qualify.** Currently advancing in the Legislature.

Pending in 2026:
Ballot Initiative
(Sponsored by CA Chamber of Commerce)

Does not apply to manufacturing.

Local Permitting of CEM in the GEZ

Jurisdiction	Zone	Heavy/Gen Industrial	Light Industrial	R&D	Indoor Warehousing & Storage	Chemical Storage
Contra Costa Co.	*"Light Industrial"*	NP	P/C	U	C	C
Contra Costa Co.	*"Heavy Industrial"*	P/C	C	U	C	C
Antioch	*"Light Industrial"*	C	C	C	C	NP
Antioch	*"Heavy Industrial"*	C	C	C	P	C
Benicia	*"Limited Industrial"*	NP	P	P	P	
Benicia	*"General Industrial"*	P	P	P	P	
Benicia	*"Water-related Industrial"*	P	P	P	P	
Benicia	*"Industrial Park"*	P	P	P	C	
Brentwood	*"Planned Employment Center"*	NP	P			
Brentwood	*"Industrial/Commercial"*	NP	P			
Concord	*"Industrial Business Park"*	NP	P	P	P	NP
Concord	*"Industrial Mixed Use"*	NP	P	P	P	NP
Concord	*"Heavy Industrial"*	C	P	P	P	C
El Cerrito	*"Commercial and Mixed Use"*	C	C		C	
Martinez	*"Commercial Light Industrial"*	P	P	P	C	
Martinez	*"Industrial and Manufacturing"*	P	P	P		

	Zone	Heavy/Gen Industrial	Light Industrial	R&D	Indoor Warehousing & Storage	Chemical Storage
Oakley	*"Light Industrial"*	NP	P			
Pinole	*"Office Professional Mixed Use Zoning District"*	C	C	P		
Pinole	*"Office Industrial Mixed Use Zoning District"*	C	P	P		
Pittsburg	*"Industrial Park"*		P	C	C	
Pittsburg	*"Limited Industrial"*	P	P	P	C	
Pittsburg	*"General Industrial"*	C	P	P	C	
Richmond	*M1: "Industrial, Business";*		P	P	U	NP
Richmond	*M2: "Industrial, Light"*	C	P	P	P	C
Richmond	*M3: "General Industrial";*	P	P	P	P	C
Richmond	*M4: "Water-related Industrial";*	C	C	NP	P	C
Richmond	*"Richmond Bay Specific Plan - Limited Industrial"*	NP	P			
San Pablo	*"Employment Mixed Use"*	C	P	P	P	
San Pablo	*"Industrial Mixed Use"*	P	P	P	P	
Vallejo	*"General Industrial"*	P		U	P	C
Vallejo	*"Limited Industrial"*	C		U	P	NP

Key:

P: Permitted Use
(By Right or Administrative)

C: Conditional Use Permit Required

U: Permitted with Unique Requirements

NP: Not Permitted

The above chart lists all local jurisdictions within the GEZ along with industrial zones where CEM projects could be permitted. It then identifies where CEM could be permitted By Right, with an Administrative Permit, or where a Conditional Use Permit or other unique permitting requirement may be required. The chart demonstrates that CEM is generally a permitted-use across industrial zones in the GEZ, however with a lot of variation depending on the type of project and the specific local jurisdiction.

Summary from Interviews

- A maze of permit requirements for employers, which can be confusing, costly and time-intensive. Larger companies hire consultants, small to mid-size companies need the most assistance and are most at-risk
- Outdated zoning codes across GEZ jurisdictions, multiple jurisdictions in the process of updating. CEM generally permitted in much of the GEZ, however not well communicated, and no unique zoning codes for CEM or advanced manufacturing
- Discretionary permits, particularly Conditional Use Permits, introduce uncertainty and delays for employers. Employers want clear standard guidelines and predictability
- Old and outdated infrastructure a major issue. Results in catch-22: Permitting review of projects triggers new, unanticipated site improvement requirements that can be costly
- Very little awareness of CEQA exemption for advanced manufacturing. No reported uses
- Securing permits from regional regulatory agencies can be a challenge, particularly at the Bay Area Air District. Bay Area Air District currently assessing their permit process
- Small econ dev staff teams at most GEZ jurisdictions (1-2 people). Mixed awareness of GEZ by planners. Desire for concierge-style services, but insufficient capacity

Case Study: Fremont

Highlights

- Over **900** manufacturers, employing approx. **65,000** workers
- Manufacturing responsible for **35%** of employment, and a significant portion of the city's tax revenue
- Strategically leveraged Tesla's presence to attract EV supply chain, and now represents 75% of Silicon Valley's advanced manufacturing leasing

Image: Aerial photograph of Tesla's factory in Fremont *(Source: AP)*

Successful Approach

- **City leadership prioritization & coordination across departments**
- **Comprehensive employer concierge service**
- **Pro-active site conversion & heavy power procurement**
- **In-house hazardous materials & fire permits**
- **Building a brand:** *"The Hardware Side of the Bay"*

Case Study: Hayward

Highlights

- Hundreds of manufacturers, ~10,000 residents working in manufacturing
- Recent major announcements include Zoox and robotics firm 1X
- Leveraging strategic location, industrial acreage. Updated zoning code to create clarity for manufacturers and stronger buffers for community

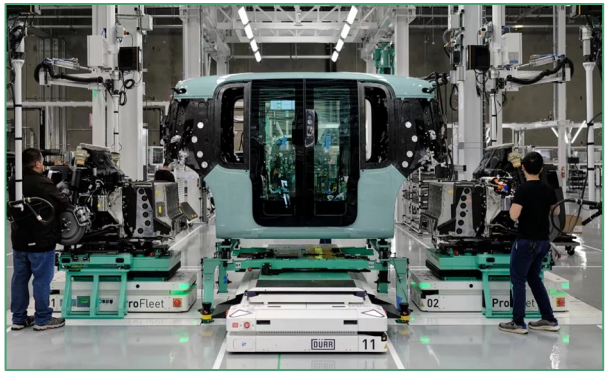


Image: Zoox workers assemble a autonomous vehicle at their factory in Hayward.
(Source: Zoox)

Successful Approach

- **Focused attraction strategy & prioritization rubric**
- **By-right zoning that steers manufacturers to core industrial areas**
- **Comprehensive employer concierge service**
- **In-house hazardous materials & fire permits**
- **Building a brand:** Leveraging attraction success to develop interest from other manufacturers

Case Study: Alameda

Highlights

- Leveraging city-owned Alameda Point, a former Naval Air Station, attractive community and proximity to the inner Bay Area
- Home to a large number of start-up clean energy manufacturing companies
- Key resource: Alameda Municipal Power, the city's electric utility, which offer rates significantly lower than PG&E

Image: Aerial photo of businesses at Alameda Point in Alameda, with San Francisco Bay and San Francisco in the distance *(Source: SF Business Times)*

Successful Approach

- **Focused Attraction Strategy:** R&D and smaller scale manufacturing. "Green tech, blue tech and moonshot" start-ups
- **Clarity on Zoning**: By-Right industrial permitting under the Alameda Point Specific Plan
- **Comprehensive concierge service**
- **Municipal power utility: Alameda Municipal Power**
- **In-House Hazardous Waste and Fire Permits**
- **Building a Brand:** A family-friendly place for start-ups

Summary of Best Practices: Local Permitting & Zoning

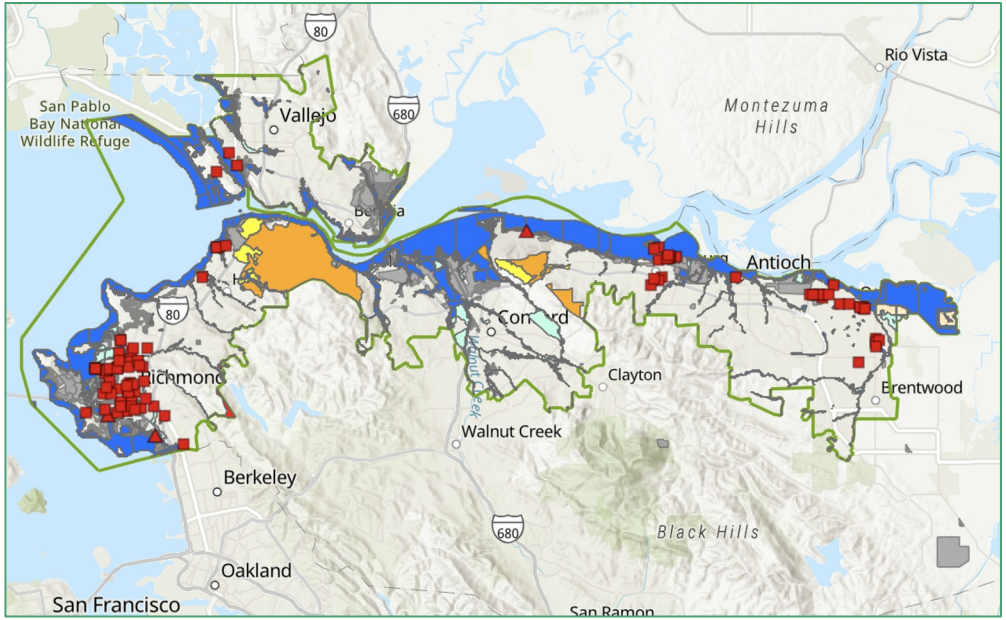
- CEM as a shared priority of elected leadership, with city staff working across departments to attract, permit projects
- Robust economic development teams with technical expertise in target technologies. Hands-on employer concierge program, supporting site identification, permit & power navigation, utilizing GoBiz as needed
- Clear, straightforward zoning code, with By Right CEM in zones that are appropriate
- Expedited permitting pathways, at cost
- In-house fire and hazardous waste permits, with strong coordination and technical expertise
- Proactive engagement with development community to redevelop and pre-permit heavy power sites for advanced manufacturing
- Branding and communications: building reputation as business-friendly jurisdictions that understand advanced manufacturing and help employers get projects online

New Tool: GEZ Industrial Lands and Environmental Constraints GIS Map

Informational Tool: Designed to assist policymakers and stakeholders in assessing environmental constraints of GEZ's industrial lands, in the context of future development.

Layers:

- GEZ industrial parcels
- Flooding
- Sea level rise
- Groundwater rise
- Wildfire risk
- CalEnviroScreen pollution burden
- U.S. EPA brownfield sites
- Sensitive receptors
- Wetlands
- Wetland migration



Coming soon to the UCB Labor Center's website!

Image: A GIS map showing an outline of the Green Empowerment Zone, with different colors representing industrial zones and different environmental considerations, such as flooding, sea level rise, fire risk and brownfield sites.

Potential GEZ Strategies: Permitting & Zoning

Potential GEZ Strategies: Permitting and Zoning

1. **GEZ CEM Employer Concierge Program:** Establish a GEZ-wide economic development program to create a one-stop shop for site identification, power & permit navigation, partnering with and amplifying existing capacity of local jurisdiction economic development teams.

2. **Develop CEM Model Zoning Code Language for Local GEZ Jurisdictions to Adopt:** Develop a “Clean Energy Manufacturing” specific zoning use classification or use type that can be applied across the GEZ with zoning code updates, with clear objective standards and requirements. Engage the community and local government in the process.

3. **Identify Zones for CEM:** Identify industrial zoned areas across GEZ appropriate for CEM use By-Right or through ministerial approval, taking into consideration community health, climate resilience and other factors. Integrate into zoning code updates.

4. **Engage in Statewide Legislative CEQA Reform Discussions:** Consider engaging in legislative CEQA reform discussions around advanced manufacturing, with a focus on advancing low-risk CEM projects that include strong labor, community health and environmental protections.

5. **Regional Regulatory Agencies:** Engage with the Bay Area Air District’s permit reform process to determine appropriate standards and effective processes for CEM permitting, while ensuring strong regulatory oversight that protects community health.

Policy research discussion

1. Which of the policy strategies are of most interest?
2. What are the ideas that you feel like you could act on? What would you need to be able to act on them?
3. What obstacles do you foresee?
4. What additional information would you like?