

# Thrive Inland SoCal: Assessing Climate, Energy, and Environmental Impacts

## 1. Introduction

The Thrive Inland SoCal Project report provides an extensive assessment of the climate, energy, and environmental landscape in Riverside and San Bernardino counties. Funded by California Jobs First, formerly known as the Community Economic Resiliency Fund (CERF), the project aims to build a resilient, equitable, and sustainable economy in the region. The research highlighted in this report focuses on the environmental impacts of the existing logistics industry and explores the environmental impact of potential economic growth strategies. Furthermore, it includes an assessment of current programs designed to mitigate the region's environmental impact. Together, these research efforts offer valuable insights into the region's challenges and opportunities and provide critical information to guide the development of sustainable and equitable economic policies.

## 2. Logistics Industry Environmental Impact

This research examines the significant role of the logistics industry in contributing to regional greenhouse gas (GHG) emissions, focusing on the energy use and emissions from warehouses and transportation. The logistics industry is a significant economic driver in the SoCal Inland Region, contributing substantially to regional GHG emissions. Central to this industry, warehouses have large energy demands typically met by fossil fuel-powered grid energy. Additionally, transportation emissions from medium- and heavy-duty vehicles (MHDVs) play a critical role in the region's environmental footprint. However, the precise GHG emissions from the logistics industry are not well understood, and a central objective of this analysis is to estimate these emissions. The analysis also estimates the potential for rooftop solar installations on warehouses to offset energy use emissions and discusses the impact transitioning to zero-emission vehicles will have on reducing transportation emissions. By addressing both energy consumption and transportation, this research aims to provide a comprehensive understanding of the logistics industry's environmental impact and potential mitigation strategies.

### *Warehouse Energy Use*

A central component of the logistics industry are warehouses which can span more than 1,000,000 ft<sup>2</sup>. Due to their size, the buildings can have significant energy demands that are typically met with energy from the grid that is powered, to an extent, by fossil fuels. To improve our understanding of the GHG emissions associated with the logistics industry in the Inland SoCal Region we estimated GHG emissions associated with existing and planned warehouses across the region.

We estimate that there are approximately 470 million square feet of warehouses in the region (Table 1). This corresponds to an estimated warehouse energy use in the Inland SoCal Region of approximately 8 GWh annually which is associated with emissions of approximately 490,000 MTCO<sub>2</sub>e per year. Approximately 170,000 MTCO<sub>2</sub>e are associated with warehouses in Riverside County, and the other 320,000 MTCO<sub>2</sub>e are associated with warehouses in San Bernardino County. To put these results into

context, in 2017 Riverside County emitted approximately 5,000,000 MTCO<sub>2</sub>e across all sources, and San Bernardino emitted approximately 16,000,000 MTCO<sub>2</sub>e across all sources in 2016. After adjusting for the age of the county GHG emission estimates, we estimate that warehouse energy usage is responsible for approximately 2-3% of all GHG emissions in the Inland SoCal Region.

	Cumulative Warehouse Area (ft <sup>2</sup> )	Warehouse Energy Consumption (MW) per Year	Direct Warehouse Emissions (MTCO <sub>2</sub> e) per Year	All-Source Emissions (MTCO <sub>2</sub> e)
<b>Riverside</b>	163,054,078	2,770,916	170,133	4,905,518 (2017)
<b>San Bernardino</b>	306,914,564	5,215,660	320,239	15,974,244 (2016)
<b>Total</b>	469,968,643	7,986,577	490,372	20,879,762 (2016-2017)

*Table 1. Displays the estimates for warehouse area, energy use and emissions. For comparison, the table also includes estimates of all-source GHG emissions for Riverside and San Bernardino. However, it should be noted that the all-source estimates were performed in 2016 and 2017 and are not directly comparable.*

While our analysis provides valuable insights into the GHG emissions from warehouse energy use in the Inland SoCal Region, it has several limitations. The GHG emission intensity values, based on a sample of warehouses, may not fully represent the diversity of operations and energy efficiency that characterize warehouses in the region. Additionally, the building footprint data may contain inaccuracies especially for warehouses built recently. Moreover, the analysis does not account for potential future changes in energy use or emission intensity due to, e.g., energy efficiency measures and increased renewable integration into the grid, which could significantly impact future emissions. Therefore, our estimates offer a useful high-level approximation but should be interpreted with these limitations in mind.

### *Warehouse Solar Potential*

The substantial size of warehouses results in high energy usage but also presents a significant opportunity to generate energy through rooftop solar installations. Accordingly, we investigated the potential for solar installations on the extensive rooftops of regional warehouses. By evaluating the potential energy generation of these solar systems, we aim to identify effective pathways to mitigate the environmental impacts of the logistics industry.

This approach resulted in estimates of approximately 100-150 million ft<sup>2</sup> and 180-290 million ft<sup>2</sup> of total rooftop area suitable for PV systems in Riverside and San Bernardino counties, respectively (Table 2). These values correspond to potential annual PV energy generation of 9,000 - 15,000 GWh per year. If we assume that all the energy generated by rooftop solar installations replaces energy that would have been consumed from the grid, this would correspond to a reduction of 2.3 - 3.5 million metric tons of CO<sub>2</sub>e per year, significantly surpassing the 490,000 MTCO<sub>2</sub>e per year we estimated for warehouse

energy use in the region (Table 1). This suggests that installing rooftop solar on 14-21% of the warehouses could potentially offset the GHG emission associated with warehouse energy use in the Inland SoCal Region.

	<b>Suitable Rooftop Area (millions of ft<sup>2</sup>)</b>	<b>Potential PV System Capacity (GW)</b>	<b>Potential PV Energy Generation (GW)</b>	<b>Avoided GHG Emissions (millions of MTCO<sub>2</sub>e)</b>
<b>Riverside</b>	98 – 152	2.0 – 3.0	3,332 – 5,171	0.8 - 1.2
<b>San Bernardino</b>	184-288	3.7 - 5.8	6,271 – 9,816	1.5 – 2.3
<b>Total</b>	282-440	5.6 – 8.8	9,604 – 14,988	2.3 – 3.5

*Table 2. This table displays estimates of the suitable area for rooftop solar on warehouses in the Inland SoCal region. It also shows the corresponding potential PV system capacity, energy generation of these systems and the potential GHG reductions.*

This analysis of rooftop solar potential for warehouses in the region has several limitations that need to be considered. Firstly, we assumed that there are no existing solar PV systems on the warehouses which likely results in an overestimation of potential capacity. Additionally, warehouse size was used to determine roof size without accounting for the structural integrity of roofs for supporting solar panels, which could limit potential capacity. The variability in rooftop orientation, shading, and obstructions were not directly considered, which could also impact the efficiency and feasibility of solar installations. Moreover, connecting significant amounts of solar to the grid would likely require substantial upgrades to existing infrastructure, which could limit the potential solar integration capacity. Finally, we did not account for the timing of energy use, which would likely not correspond exactly with PV energy generation, thus limiting the ability of solar to offset energy use and decrease emissions.

#### *Transportation Emissions Associated with the Logistics Industry*

Medium- and Heavy-Duty Vehicles (MHDVs) are integral to the warehouse and logistics industry, utilizing various vehicle types for transport. MHDVs are a disproportionate source of GHG and particulate matter emissions. We estimate that there are approximately 115 million MHDV trips per year associated with the logistics industry in the region (Table 3). This corresponds to an estimate of over 4 billion miles driven in the region by the MHDVs and emissions of approximately 5 million MTCO<sub>2</sub>e per year. After adjusting for the age of the county GHG emission estimates, we estimate that MHDVs associated with the logistics industry are responsible for up to 20-25% of all GHG emissions in the Inland

SoCal Region (see the limitations of the analysis below). In addition to GHG emissions, MHDVs are also associated with other harmful emissions. We estimated that these vehicles emit approximately 70 MT of diesel particulate matter and 8,000 MT of NOx per year across the region.

	MHDV Trips per Year (millions)	MHDV Miles (millions) per Year	CO2 Emissions (millions of MT)	NOx Emissions (MT)	Diesel PM2.5 Emissions (MT)
<b>Riverside</b>	40	1,516	1.7	2,819	25
<b>San Bernardino</b>	75	2,854	3.2	5,307	47
<b>Total</b>	115	4,370	4.8	8,127	72

*Table 3. This table displays estimates on the number of trips, miles driven and emission associated with MHDVs and the logistics industry.*

The emissions associated with the logistics industry can be mitigated through the transition to zero-emission vehicles. The California Air Resources Board (CARB) has outlined comprehensive strategies for the electrification of medium and heavy-duty vehicles.<sup>1</sup> California has developed regulations to facilitate the transition to zero emission MHDVs. Specifically, requirements for drayage fleets mandate that beginning in 2024, all new drayage trucks must be zero-emission vehicles (ZEVs) and by 2035 drayage services can only be performed by ZEVs. From the 2036 model year onwards, all regulated Class 2b-8 vehicles produced or delivered for sale in California must be ZEVs. This will require significant charging infrastructure to support the increased demand for electric vehicle charging, ensuring that the fleet of zero-emission MHDVs can operate efficiently and reliably throughout the regions. The electrification of transportation will have a significant impact on GHG and other harmful emissions across the region.

There are several major caveats to this analysis. First, the analysis is based on a number of critical assumptions such as the number of truck trips per warehouse based on the size of the warehouses. These assumptions were based on limited amounts of data and may not be representative of smaller warehouses. Additionally, the current emission estimates do not account for vehicle idling, which can significantly contribute to total emissions near warehouses and likely results in underestimating the actual emissions. Moreover, we do not know the variability of MHDVs in terms of their efficiency, and it is likely that some already incorporate hybrid and other more efficient technologies. Furthermore, variations in warehouse operational practices, such as the frequency of loading and unloading activities and the types of goods transported, can also influence the emission estimates. Future analyses should consider these factors to provide a more accurate assessment of MHDV-related emissions in the region.

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<sup>1</sup> California Air Resources Board. (n.d.). Zero-emission road: Medium- and heavy-duty strategies. Retrieved from <https://ww2.arb.ca.gov/resources/documents/zero-emission-road-medium-and-heavy-duty-strategies>

## *Discussion*

Overall, our estimates provide a high-level approximation of the environmental impacts associated with the logistics industry in the Inland SoCal Region. These estimates should be interpreted with caution, considering the limitations and assumptions inherent in the analysis. Future work should aim to refine these estimates by incorporating more detailed data on warehouse operations and vehicle characteristics. By addressing these factors, we can develop a more comprehensive understanding of the environmental impacts of the logistics industry and pathways to mitigate these impacts in this region. Although there were significant limitations to our approach, it did allow us to draw several conclusions:

- Emissions associated with MHDVs and the logistics industry result in a significant portion of all GHG emissions for the region and they are a significant source of other harmful emissions such as diesel PM<sub>2.5</sub>;
- Energy consumption by warehouses across the region is associated with significantly less GHG emissions than from MHDVs, but is still a significant source of GHG emissions for the region;
- Warehouse rooftops likely present a significant opportunity for solar energy generation and could offset GHG emissions from warehouse energy use (not including MHDVs) during the daylight hours.

Warehouses in the SoCal Inland Region consume a considerable amount of energy from the grid, contributing an estimated 2-3% of the region's total GHG emissions. However, the flat rooftop areas that characterize these warehouses present a significant opportunity for solar installation, which could completely offset daytime energy use (Table 1 and 2). The addition of energy storage systems could further supply emission-free energy when solar panels are not generating power. Further, while we did not investigate energy efficiency measures due to a lack of warehouse-specific data, it is likely that such measures would be a cost-effective way to reduce energy consumption and emissions.

Although the direct energy use by warehouses is a significant contributor to GHG emissions across the region, it is relatively minor compared to the transportation emissions associated with the logistics industry. We estimated that MHDVs associated with the logistics industry contribute up to 20-25% of all GHG emissions across the region and also emit large quantities of other harmful pollutants (Table 3). This problem will be mitigated as transportation is electrified. However, this will be a relatively slow process which will likely take several decades before emissions reach acceptable levels. The region can facilitate the transition to electric MHDVs by ensuring adequate charging infrastructure is in place and by providing businesses and fleet owners with information about new clean transportation technologies and programs that support the purchase of electric trucks and chargers.

## *Data and Methodology*

To estimate warehouse GHG emissions, we used energy benchmark data for warehouses in California sourced from the California Energy Commission which provides the GHG emission intensity for a sample of warehouses across California.<sup>2</sup> We filtered this data to focus on warehouses located in San Bernardino and Riverside counties and calculated their average GHG emissions intensity (kgCO<sub>2</sub>e/ft<sup>2</sup>).

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<sup>2</sup> California Energy Commission. (n.d.). Greenhouse gas emission intensity for warehouses. Retrieved from <https://www.energy.ca.gov/media/8751>

We then used data from the Warehouse City project<sup>3</sup> in combination with building footprint data<sup>4</sup> to estimate the building area of all warehouses across the SoCal Inland Region. Finally, we estimated the GHG emissions for each warehouse in the region by multiplying the average GHG emission intensity factor by the area of each warehouse.

To assess the solar potential of warehouse roofs in the region, we used the warehouse footprints estimated above and assumed that the area of the warehouse footprint was equivalent to the rooftop area. We also assumed that no rooftop solar installations currently exist on any of the warehouses. We then used two approaches to estimate the percentage of collective roof area suitable for PV systems. For the lower-end estimate, we based our calculations on an NREL report indicating that, in general, approximately 60% of rooftop areas are suitable for PV installation.<sup>5</sup> For the upper-end estimate, we employed the US Department of Housing and Urban Development's methodology for calculating building rooftop area.<sup>6</sup> Although this method required the width and length of the building, which were not available, we assumed the rooftop area to be square and applied a six-foot setback due to fire code requirements. Together, this approach allowed us to estimate the maximum potential rooftop area suitable for PV systems on warehouses across the region.

Once we had the suitable rooftop area estimates we converted the rooftop areas into PV system size in kW using a standard formula provided by NREL (<https://pvwatts.nrel.gov/pvwatts.php>). Next, we used the NREL PVWatts tool (<https://pvwatts.nrel.gov>) to estimate the total annual energy generation which takes into account the local climate and standard system specifications on energy generation. Finally, we utilized the EPA's equivalency calculator which accounts for regional grid characteristics (<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>) to estimate the avoided GHG emissions associated with the PV generation.

To estimate emissions from MHDVs, we utilized the approach detailed in the Warehouse CITY tool developed by Radical Research LLC.<sup>3</sup> Specifically, the Warehouse CITY tool assumes that there are 0.67 MHDV trips per 1,000 square feet of warehouse space. The average MHDV trip is assumed to be 38 miles based on data provided to Radical Research from Streetlight. The emission values are derived from the 2022 EMFAC fleet-average estimates for the South Coast Air Quality Management District (SCAQMD).

### 3. Growth Strategies and Climate Impacts

This research assesses the environmental impacts associated with various economic growth strategies in the Inland SoCal region, providing insights into how economic development can impact GHG emissions and other environmental factors. Specifically, it compares emissions across sectors, including business

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<sup>3</sup> Radical Research LLC. (n.d.). Warehouse City project. Retrieved from <https://radicalresearch.shinyapps.io/WarehouseCITY/>

<sup>4</sup> Esri. (n.d.). Microsoft building footprints features. Retrieved from <https://hub.arcgis.com/datasets/esri:microsoft-building-footprints-features/about>

<sup>5</sup> National Renewable Energy Laboratory. (2013). Rooftop solar photovoltaic technical potential in the United States: A detailed assessment. Retrieved from <https://www.nrel.gov/docs/fy14osti/60593.pdf>

<sup>6</sup> U.S. Department of Housing and Urban Development. (n.d.). Appendix F: Rooftop calculation tool. Retrieved from <https://files.hudexchange.info/resources/documents/Appendix-F-Rooftop-Calculation-Tool.pdf>

services, cleantech, advanced manufacturing, logistics and clean supply chains. By understanding these impacts, stakeholders can make informed decisions that maximize sustainable economic growth in the region.

### *GHG emissions of growth strategies*

The various sustainable economic growth strategies being considered have a wide range of climate impacts per job added (Table 4). At the low end, the business services strategy has a low impact of roughly 1 ton of CO<sub>2</sub> per job per year, mostly from the energy use in office buildings. Cleantech jobs that center on software development will have a similar profile. Advanced manufacturing businesses that focus on producing fabricated or electronic products produce roughly 5-10 tons of CO<sub>2</sub> per job per year. These higher emissions are due primarily to equipment electric power requirements. Cleantech jobs such as solar panel assembly, battery assembly or power electronics manufacturing will have emissions in this range. Strategies such as Clean Supply Chains and some forms of Advanced Manufacturing have emissions in the 20-40 tons/job/year range. In both cases, these emissions are largely driven by transportation vehicles in the case of Clean Supply Chains, and by high temperature processes in the case of manufacturing plastics and rubber components, food and beverage products, and foundries.

Manufacturing of primary materials, such as iron or steel, cement, aluminum, and chemicals is associated with much higher emissions, 200 or more tons/job/year, and in some cases much more. These emissions come from a combination of high fuel use required for very high temperature processes and emissions that are inherent to the material itself.

All growth strategies considered have pathways to reduce the emissions per job and eventually reach zero emissions in the future, but those pathways depend on the current source of emissions. Office-based jobs and manufacturing jobs that use electricity for power will decline in carbon intensity as renewable energy supplies a greater percentage of the electrical grid. Industries that use fuel for transportation or process heat will have to shift to electric heat sources and transportation, both of which are in the early stages of expansion. Clean Supply Chains businesses have the potential to offset some emissions by using their large roof area to host solar generation resources as well. Finally, high emissions materials industries will require new technologies for decarbonization, such as hydrogen-based iron and steel production, carbon capture and sequestration, or other new approaches. In many cases, early examples of these technologies exist, but may currently be only at the pilot plant or demonstration level.

GHG Impact	Sector	Sector Description	Notes
Low (~1 MTCO <sub>2</sub> e/year/per job)	Professional/Business Services	Office-based jobs with low energy needs outside of building environmental control and commuting	<ul style="list-style-type: none"> <li>• Impact can be mitigated by reduced commuting distance and frequency, and through electrification of light-duty fleet</li> <li>• Additional mitigation through energy efficient building standards</li> <li>• Reducing CO<sub>2</sub> intensity of electricity will also mitigate impacts</li> </ul>
	Cleantech (business services subset)	Software for grid coordination, planning, power management, demand response	<ul style="list-style-type: none"> <li>• Climate impacts similar for office positions, possibly higher computing power needs</li> </ul>

Medium (~5-10 MTCO <sub>2</sub> e /year/per job)	Advanced Manufacturing	Aerospace manufacturing, metal fabrication, machinery, semiconductor and electronics products	<ul style="list-style-type: none"> <li>• Manufacturing has higher energy needs due to electricity or fuel use for material forming and processing operations</li> </ul>
	Cleantech (manufacturing subset)	Solar panel assembly, power electronics products, semiconductor products, and battery assembly	<ul style="list-style-type: none"> <li>• Impacts similar to other advanced manufacturing activities - energy use in material forming and processing operations</li> <li>• Reducing CO<sub>2</sub> intensity of electricity in combination with electrifying operations that currently use fuel onsite (heat treatment, other high-temperature processes) will reduce climate impacts</li> </ul>
High (~20-40 MT/year/per job)	Clean Supply Chains/Logistics	Management, movement and storage of goods.	<ul style="list-style-type: none"> <li>• Impact dominated by fuel use in transportation</li> <li>• Shifting to electric vehicles will reduce climate impact</li> <li>• Reducing energy use and integrating rooftop solar in logistics warehouses will mitigate impact</li> </ul>
	Advanced Manufacturing	Production of plastics and rubber products, foods and beverages, textiles and foundries	<ul style="list-style-type: none"> <li>• Climate impacts are due to higher energy needs in process, more high temperature processes</li> <li>• Mitigation possible through greening of electricity grid and electrification of high temperature processes that currently use fuel</li> </ul>
Very High (>200 MT/year/per job)	Materials Manufacturing	production of iron, steel, aluminum, cement, and chemicals	<ul style="list-style-type: none"> <li>• Impacts come from a combination of fuel use to generate very high process temperatures and inherent emission of GHG through chemical processes in manufacturing</li> <li>• Electrification of process or shift to alternate fuels can reduce climate impacts in some cases (iron and steel)</li> <li>• Alternate process development required to eliminate inherent emissions for cement, aluminum production</li> </ul>

Table 4. Climate impacts by different priority economic development sectors.

#### Other environmental risks of growth strategies

Advanced manufacturing, Clean Supply Chains and Cleantech businesses can pose additional risks of environmental harm, however these industries include a wide range of very different activities. As a group, they all have risks of air, water and solid waste pollution, but individual businesses may be safe in one or more of these areas due to good pollution prevention practices, the nature of their business, or both (Table 5).

In general, businesses have a variety of strategies available to reduce their environmental impact. The air pollution risks differ depending on the manufacturing type, but mitigation strategies broadly include identifying alternate materials, changing processes to capture and recycle pollutants instead of releasing them, and treating plant exhaust to burn or neutralize pollutants. Water pollution is similarly managed through a combination of material selection, process modification and onsite water treatment. Solid



waste pollutants are managed through recycling where possible, as well as incineration for energy recovery.

Businesses within a manufacturing category have a wide range of varying pollution profiles depending on their specific processes, mitigation strategies and level of corporate responsibility. Maintaining a low pollution risk for the community requires identifying good operators, mandating good practices and monitoring behavior. State and federal regulatory frameworks already support these efforts.

Business Sector	Risk Types	Mitigation Strategies	References
Professional/Business Services	--	--	--
Cleantech (business services subset)	--	--	--
Advanced manufacturing	Water contamination	Process modification	<a href="https://www.epa.gov/trinationalanalysis?">https://www.epa.gov/trinationalanalysis?</a>
		Material substitution	EPA TRI analysis for aerospace manufacturing specifically: <a href="https://www.epa.gov/toxics-release-inventory-tri-program/aerospace-manufacturing-sector-pollution-prevention-p2">https://www.epa.gov/toxics-release-inventory-tri-program/aerospace-manufacturing-sector-pollution-prevention-p2</a>
		Onsite water treatment	
	VOC releases	Process modification (enclosure of solvent processes)	
		Process/material substitution (solvent for aqueous degreasing)	
		Recycling	
	Solid waste	Material substitution	
		Process modification	
		Onsite/offsite recycling	This is the searchable EPA toxic release database that everything at left is based on: <a href="https://enviro.epa.gov/facts/tri/p2.html">https://enviro.epa.gov/facts/tri/p2.html</a>
Semiconductor and electronics	Water contamination	Process modification	
		Material substitution	
		Onsite water treatment	
	High GHG/Air pollution potential	Material substitution	
		Exhaust treatment to decompose materials	
		Process modification	
	Solid waste	Material substitution	
		Process modification	
Plastics manufacturing		Onsite/offsite recycling	
	VOC (especially styrene)	Process modification	
		Material substitution	
		Energy recovery (burning off exhaust for heat/energy)	
	Solid waste	Product modification	
		Process modification	
		Onsite/offsite recycling	

Food and beverage manufacturing	Water contamination (nitrate)	Onsite water treatment	
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Table 5. Environmental impacts (outside of GHG emissions) by different priority economic development sectors.

### *Contextualizing Environmental Impacts of Development Strategies*

Comparing the environmental impacts of the target development strategies to the existing environmental risk landscape in the region can be considered two ways. First, we examined the list of contaminated locations in the region to identify if these business types have a legacy of pollution in this area. Of the 114 superfund sites identified in the region,<sup>7</sup> 33 are from spills resulting from one-time events, improperly stored materials, or drug labs. A further analysis shows that illegal dumps or landfills that did not properly segregate and manage hazardous waste account for 17 sites. These are the two largest categories of contaminated sites. Additionally, chemical, ordnance, or pyrotechnic businesses have contaminated 15 locations. Another nine locations are classified as plating or coating businesses (which could potentially be considered “advanced manufacturing”), and two sites are metal manufacturing facilities. Development projects that include businesses of this type will need to ensure that current waste reduction, storage, and disposal regulations are followed to reduce risks from this type of manufacturing activity. Of the remaining contaminated sites that can be classified, the military (seven sites) and mining and smelting (seven sites) are the two largest categories. Overall, these results suggest that manufacturing as a whole is not primarily responsible for legacy environmental issues in the region, however specific categories of manufacturing, particularly plating and coating, chemical manufacture and processing, and pyrotechnics manufacturing warrant particular attention to ensure compliance with environmental regulations. In addition, the prevalence of illegal dump sites indicates the need for enforcement of waste disposal regulations more broadly.

The second approach to contextualizing the environmental risks of these growth strategies is examining the recent record of toxic material releases in the region.<sup>8</sup> In 2022, of the top 20 emitters in the region, half could fall in the category of advanced manufacturing, in particular, manufacturers of plastic or rubber products, fabricated metals, or transportation equipment. However, looking at the 87 companies in those categories that reported toxic emissions, there is a broad range of performance within each category, with some facilities recycling a large fraction of their waste or treating it onsite rather than releasing toxic materials. Across those three categories, 63% of companies reduced their emissions by 95% or more through treatment and recycling, and 10% reported having no emissions at all. This data suggests that supporting sustainable growth in the region through the advanced manufacturing strategy need not result in environmental harm, provided that companies follow robust practices (as required by existing federal and state regulations) to reduce and manage waste safely. This suggests that investing in

<sup>7</sup> U.S. Environmental Protection Agency. (n.d.). Superfund Site Information. Retrieved June 2024, from <https://cumulis.epa.gov/supercpad/Cursites/srchsites.cfm>

<sup>8</sup> U.S. Environmental Protection Agency. (n.d.). *TRI Basic Data Files: Calendar Years 1987-Present*. Retrieved June 25, 2024, from <https://www.epa.gov/toxics-release-inventory-tri-program/tri-basic-data-files-calendar-years-1987-present>

inspection and enforcement resources, as well as support and guidance to help companies upgrade their practices, may be helpful for minimizing the environmental impacts of growth.

## 4. Environmental Mitigation Programs

We also provide an overview of various initiatives aimed at promoting environmental sustainability, energy efficiency, and emissions reduction in California. The entries include diverse types of programs, plans and regulations including financial incentives for renewable energy installations, regulatory measures to limit vehicle and industrial emissions, and plans for developing energy-efficient infrastructure and buildings. These efforts collectively aim to improve air quality, reduce greenhouse gas emissions, and support the transition to a sustainable economy.

The table was created using information sourced from the Alternative Fuels Data Center, DSIRE database, state and local government agency websites, and other web sources. Each entry includes sources and references, some of which may contain multiple links. The sources range from state and federal websites to program-specific and utility-specific websites. However, due to time constraints this document does not include every relevant program or regulation/law available in California or the Inland Empire Region. Instead, we focused on identifying and summarizing the largest and most relevant programs to provide an overview of significant environmental impact mitigation efforts. The table can be found [here](#).

## 5. Water Agencies

This analysis covers the broad regional issues related to water quality, supply and reliability. The 98 water districts in the region (76 in San Bernardino County, 22 in Riverside County) will have individual concerns and issues related to local contamination and treatment requirements, encouraging customer conservation efforts in response to state-mandated consumption reductions, local infrastructure maintenance and upgrades, and the financial challenges of supporting upgrade costs while consumption decreases. Further research is needed to survey these stakeholders and identify their particular challenges, specifically efforts to identify common themes or opportunities for larger-scale investment. Understanding local water district issues in greater detail will also help identify areas with the necessary capacity to support particular development projects.