Modernizing Industry in Texas

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Key takeaways

1. The **Lone Star State's manufacturing sector** heavily relies on **chemicals** and **refined petroleum production**. Chemical manufacturing recently experienced 7.3% employment growth, and the state employs 2.5 times more refinery workers per capita than the national average.

2. As demand for chemicals and refined petroleum shifts to low-emissions products, **Texas can** leverage its specialized workforce and existing infrastructure to **establish an early-mover advantage in green markets**.

3. The **strategies with the greatest potential** for reducing manufacturing emissions in Texas are **electrifying thermal processes** and **transitioning away from fossil fuel feedstocks**.

4. Texas can **support industrial modernization and economic competitiveness through enabling state policy**, such as a production tax credit for clean industrial heat or green hydrogen and public procurement of low-carbon products.

Texas's manufacturing sector heavily relies on chemicals and petroleum; it's among the top five states with the greatest concentration of chemical manufacturing facilities, and the greatest capacity for crude oil refining in the nation. The Lone Star State has economic momentum and strength in these industries. Chemical manufacturing experienced 7.3% employment growth in the last five years, and the state employs 2.5 times more refinery workers per capita than the national average.

But global changes necessitate a new strategy to keep Texas competitive. Chemical markets are shifting to low-emissions products. US refineries, which largely produce transportation fuels, are increasingly closing or converting to cleaner uses as global demand for renewable diesel and sustainable aviation fuel grows. By 2050, sustainable aviation fuels are expected to comprise 12% of global aviation fuel demand. Ammonia and methanol will account for 37% of maritime energy demand. As the chemicals and petroleum refining markets transition, Texas has significant assets it can leverage to establish an early-mover advantage.

Supporting development of green chemicals and clean fuels will also reduce climate pollution. Chemicals and refined petroleum and coke are the leading sources of statewide manufacturing emissions. In 2024, Texas's manufacturing sector collectively released 242 million metric tons (MMT) of carbon dioxide equivalent (CO_2e), according to data

Health impact from Texas' chemical and refining facilities

Current levels of air pollution from chemical and refined petroleum and coke facilities adversely impact public health and economic activity.

Health Event	*Estimated Annual Incidents from Facilities*		
	Chemicals	**Refined petrol and coke**	**Total**
Premature deaths	46-85	104-203	150-288
ER Visits, respiratory	81	92	173
Asthma symptoms	38,464	46,759	85,223
Work loss days	4,986	7,544	12,530
School loss days	11,520	10,311	21,831
Total health costs*	$725 M-1.3B	$921 M-1.8B	$1.6B-$3.1B
Lost economic activity**	$24.8 M	$25.5 M	$50.3 M

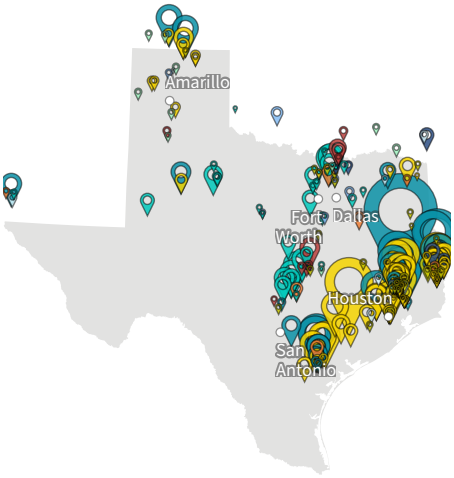
**Includes health costs incurred from additional incidents not listed like cardiac arrests, stroke, and hospital admits*
***Includes economic impact of minor restricted activity days, in addition to school and work loss days*

Source: EPA CO-Benefits Risk Assessment (COBRA)

from the Energy Policy Simulator. If the state does not take action, by 2050, the manufacturing sector is forecast to emit similar levels of pollution as today. However, if the state incorporates the strategies outlined below, it could reduce manufacturing emissions to 95.4 MMT CO_2e.

In addition to having a negative climate impact, industrial emissions harm public health. Certain industrial processes can release pollutants like particulate matter, nitrogen oxides, and sulfur dioxide, which are linked to adverse health conditions, ranging from asthma exacerbation to premature death and disease. Curbing emissions from facilities is particularly critical to the health of local communities, which are disproportionately impacted by exposure to air pollution.

Texas' industrial facilities



Facilities by industry

- Chemicals
- Refined petroleum and coke
- Cement and other nonmetalic minerals
- Other manufacturing
- Computers and electronics
- Iron and steel
- Pulp and paper
- Glass products
- Food and beverage
- Other metals

Metric tons CO_2e

Source: US EPA

Strategies for emissions reduction

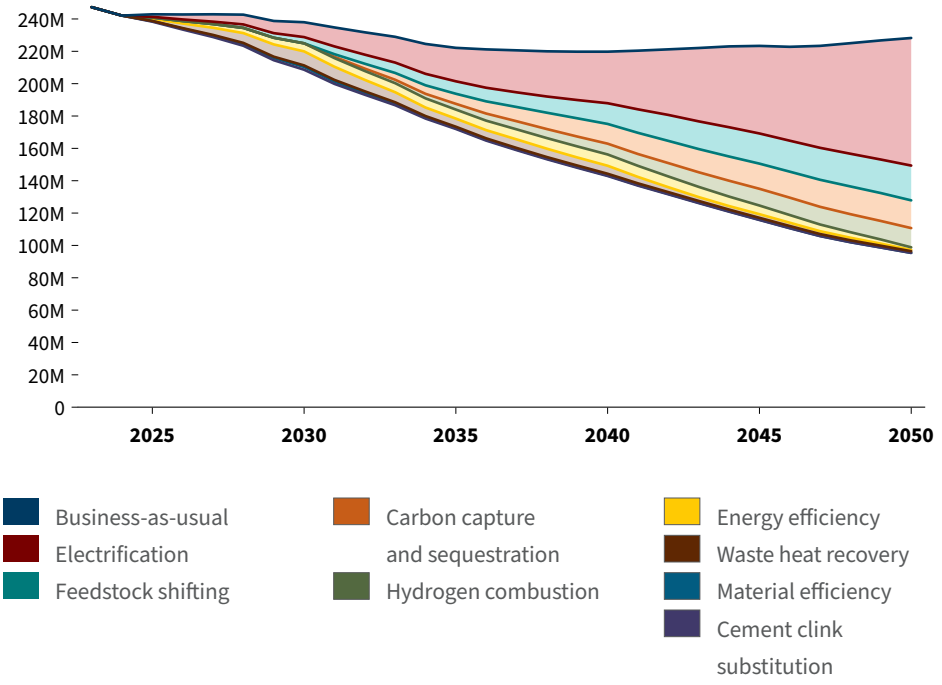
Modernizing facilities can support competitiveness in emerging markets while reducing air and climate pollution. Based on the Energy Policy Simulator, an open-source model for estimating the impacts of energy policies, the strategies with the greatest potential for reducing emissions in Texas are electrifying thermal processes, especially those requiring heat below 400°C, and transitioning away from fossil fuel feedstocks.

If nearly all industrial processes below 400°C are electrified by 2050, Texas can reduce emissions from manufacturing by a cumulative 820.3 MMT CO_2e, or 47% of overall potential emissions reductions from the set of strategies. Electrification of thermal processes is an immediate opportunity to reduce emissions from on-site combustion of fossil fuels. Direct electrification for low- to medium-temperature heat has the greatest potential in light industries, including food and beverage and certain chemicals. To support growth in electricity consumption, including new industrial loads, Texas can deploy distributed generation resources and demand flexibility.

Texas can also shift the use of fossil fuel feedstocks in chemical and refined petroleum and coke facilities to green hydrogen. This immediately reduces process emissions associated with production. If the transition begins promptly, feedstock shifting is expected to result in cumulative emissions reductions of 11.8 MMT CO_2e by 2030 and 280.8 MMT CO_2e by 2050. Feedstock shifting will also create the offtake demand for the state's growing production of clean hydrogen.

Industrial emissions in Texas

Emissions from manufacturing have the potential to decline by 132.9 million metric tons of CO_2e by 2050, compared to a business-as-usual scenario.



The wedges show each strategy's annual impact towards emissions reductions and was calculated using the Energy Policy Simulator (EPS). The business-as-usual scenario corresponds to the Federal Policy Repeal and Rollback scenario in the EPS, which is more representative of today's policy landscape, and assumes that Texas does not take additional action to reduce industrial emissions.

Source: RMI Analysis, Energy Policy Simulator

Cumulative emissions reduction by strategy

Strategy	cumulative MMT CO_2e reductions through 2030	cumulative MMT CO_2e reductions through 2050	% of cumulative industrial emissions reductions
Electrification	32.0	820.3	47.0%
Feedstock Shifting	11.8	280.8	16.0%
Carbon Capture and Sequestration	0.0	226.3	13.0%
Hydrogen Combustion	0.0	139.4	8.0%
Energy Efficiency	16.8	124.5	7.0%
Waste Heat Recovery	31.0	109.4	6.0%
Material Efficiency	3.2	23.9	1.0%
Cement Clinker Substitution	6.0	14.2	1.0%

These values were calculated using the Texas Energy Policy Simulator (EPS), and they assume both stringent implementation and carbon capture and sequestration and hydrogen combustion reaching technological readiness by 2031.

Source: RMI Analysis, Energy Policy Simulator

Additional interventions that can be deployed in the near term include:

- Increasing the efficiency of industrial equipment, including updating heat pumps and compressors, and integrating advanced process control systems. Energy efficiency is the quickest and most cost-effective mitigation strategy.
- Recovering waste heat using economizers and heat exchangers and converting it into usable energy.
- Reducing fugitive and flaring emissions across oil and gas production, gas transport, oil refining, and chemicals equipment through enhanced leak detection and repair and upgrades to flare gas systems.
- Lowering the threshold for defining a methane leak to mitigate emissions from natural gas transportation and petroleum refining.

Supporting policies

With recent changes in federal policy causing market uncertainty, state leadership is critical to maintaining the interest and energy of its investors and project developers. Texas policymakers can support industrial competitiveness and decarbonization through policies that establish certainty, which involves setting standards, and providing support, including reducing costs of technical interventions and increasing the value of low-emissions products.

There are several actions that Texas can take to modernize its industrial sector. Examples include:

Creating standards

- **State target setting** or mandates to direct the industry sector's transition to green products.
- **Improve transparency around upstream methane emissions** associated with the production and transmission of natural gas and petroleum by requiring measurement-informed, independently verified, facility-specific emission data.

Providing support

- **Developing midstream infrastructure,** including electric transmission lines, hydrogen pipelines, and energy storage, is essential for clean energy to reach industrial facilities.
- **Technical assistance grants** to assist facilities in transitioning to low-carbon production. Technical assistance can help facilities overcome financial barriers, capacity constraints or knowledge gaps in modernizing.

Adding value

- **A production tax credit (PTC) for clean industrial heat** would reward industrial facilities for meeting thermal energy needs with clean fuel sources, like electricity or hydrogen, instead of fossil fuels. The credit can be structured per unit of clean heat delivered to an industrial process and would increase clean fuel's cost competitiveness.
- **Support offtake agreements** that enable refineries to shift production toward heavy non-fuel products, such as specialty chemicals, asphalt, lubricants, and metals recovery. This can improve industry resilience to fuel market shocks while reducing emissions.
- **Government procurement for low-carbon products** to create the offtake certainty required for capital expenditures, such as deploying novel membrane separations or catalyst upgrades at refineries.

For more information about industrial decarbonization, please email USAnalysis@rmi.org