Bipartisan Policy Center

Pathways to Decarbonization: Reducing Industrial Sector Emissions

1. Why Focus on the Industrial Sector?

The industrial sector is the third largest source of greenhouse gas emissions in the United States, accounting for 22% of emissions in 2017.[1] The sector encompasses a range of different industries, including construction, mining, and manufacturing, where manufacturing includes the production of cement, steel, aluminum, paper, glass, and chemicals. Reducing industrial sector emissions is particularly challenging because cost-effective technologies and alternative fuels are not currently available that could decarbonize many types of industrial facilities. For this reason, there tends to be a greater focus on the power generation and transportation sectors for GHG emission reductions.

2. What Makes the Industrial Sector Different in Terms of Reducing Carbon Emissions?

Some unique features of this sector add to the challenges of industrial decarbonization:

Industrial heat: Cost-effective, low-carbon substitutes for fossil fuels that could create the kind of long-duration, high-temperature heat required for some industrial processes are not widely available.[2] Moreover, industrial processes vary widely. As a result, there is no one-size-fits-all solution for industrial heat needs. Innovation is needed to explore a range of potential low-carbon heat sources including renewable natural gas (natural gas derived from organic waste material), hydrogen, electricity, and biodiesel.

Emissions from chemical reactions: Some industrial processes generate carbon dioxide emissions as a direct byproduct of the chemical reactions inherent in the synthesis steps, rather than as a result of fossil fuel combustion. For example, in the traditional blast furnace production of steel, iron oxide is directly reduced with coke.[3] Since these emissions are not energy-related and therefore cannot be avoided by switching away from fossil fuels, technologies for capturing these emissions once they have been created—rather than eliminating the emissions altogether —will likely be necessary to decarbonize certain industrial subsectors. Carbon capture, utilization and storage technology exists today, but costs will need to fall further to support wide-scale adoption. CCUS technology could also be used to mitigate emissions from industries that cannot avoid the use of fossil fuels to provide high-temperature heat. Additionally, applied R&D for key product types can help commercialize new industrial processes with fewer emissions. For example, direct electrochemical reduction could be employed to reduce iron ore in a process similar to how aluminum is

1 U.S. Environmental Protection Agency, Sources of Greenhouse Gas Emissions (www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions) (Aug. 8, 2019).
2 https://energypolicy.columbia.edu/research/report/low-carbon-heat-solutions-heavy-industry-sources-options-and-costs-today
3 $2Fe_2O_3 + 3C \rightarrow 4Fe + 3CO_2$

made today.[4] Provided that low-carbon electricity is being used, then this process would yield a decarbonized steel.

Competitiveness: Many industries compete in highly competitive global markets. This makes them highly sensitive to changes in production costs, including as a result of environmental requirements. The concern could be that decarbonization policies, if they imposed costs on domestic industries, could cause producers to shut down and move overseas. Of course, competitiveness considerations can also be a driver for reducing other types of costs, including costs incurred by reliance on outdated or inefficient technologies.

Technology and business innovation are needed to address these challenges and bring new solutions to market that could drive down the cost of emissions reductions in the industrial sector.

3. What Types of Federal Policies Can Help Decarbonize the Industrial Sector?

A variety of federal policies could help spur the innovation needed to reduce industrial sector GHG emissions, incentivize widespread deployment of low- and zero-carbon technologies, and protect trade-exposed businesses in this sector:

Research and development: Federal investment in R&D, including a focus on basic research, is needed to create new technologies and push them toward commercial readiness. Further, public-private partnerships can provide a forum to advance and test technologies and policies which is important for market integration at scale.

Government procurement: The federal government buys large quantities of industrial goods, such as cement and steel. Establishing a preference in federal procurement for products made using innovative low-carbon technologies and methods could help pull new technologies into the market.

Tax incentives: Targeted financial incentives provided through the tax code could help offset the cost of bringing low-carbon technologies to the market.

Updated standards: Establishing performance standards for energy use or GHG emissions, and strengthening equipment efficiency standards at federal industrial facilities, could help reduce emissions and drive technology innovation in this sector.

Policies to address international competitiveness concerns: The United States could coordinate with its global trading partners on the design and implementation of carbon policies. The federal government could also correct for policy discrepancies with other countries, for example through border adjustment taxes, to ensure that American companies are not at a competitive disadvantage in global markets as a result of domestic carbon policy.

Carbon pricing: Whether the government puts a price on carbon via a carbon tax or a cap-and-trade policy, the result would be to create a financial incentive that helps drive down GHG emissions in the industrial sector and throughout the economy.

4. What Action Has Been Taken in the 116th Congress to Address Industrial-Sector Emissions?

There is growing recognition among members of Congress about the importance of decarbonizing the industrial sector and about the need for technology innovation to make decarbonization possible. In recognition of that, the Clean Industrial Technology Act was introduced with bipartisan support in the House and Senate in the 116th Congress. The Senate version, S. 2300, was introduced by Sens. Sheldon Whitehouse (D-RI) and Shelley Moore Capito (R-WV), and included in the Senate energy bill, the American Energy Innovation Act. The House version, H.R. 4230, was introduced by Reps. Sean Casten (D-IL) and David McKinley (R-WV) and passed the Energy Subcommittee of the House Science, Space, and Technology Committee.

4 2Fe2O3 + electricity -> 4Fe + 3O2