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The Forgotten Emissions: Industrial Pollution and Technologies to Address It

Industrial greenhouse gas (GHG) emissions usually take the backseat to emissions from transportation and electricity in climate policy actions, but they are a serious source of global warming pollution -- accounting for up to a third of GHG emissions in the US, for example ([NE Jan.8'15](#)). Companies are taking note, however, seeing an opportunity to mint money from industrial waste emissions by reusing the waste heat and gases, while helping their hosts meet more stringent federal environmental policies. Overall, there is much that can be done to address emissions in the sector, but hurdles must first be overcome in the way of policy, cost and the sheer complexity of industry processes.

Industrial GHGs in the US totaled 28% of the country's overall emissions in 2012, according to the US Environmental Protection Agency (EPA). That includes both direct emissions from industrial processes and fuel consumption, as well as indirect emissions from electricity consumption at industrial sites. This makes industry the second-largest contributor of GHGs of any sector, after transportation -- although it doesn't seem to get near as much press. "We all drive cars. We all use electricity in our homes. That sort of broad message is easier to get out" to consumers than a message on industrial emissions, explained Jennifer Kefer of Washington-based consultancy David Gardiner and Associates.

Industrial processes have been much more efficient since the 1970s, when Congress passed the Public Utilities Regulatory Policies Act in 1978 to promote energy efficiency solutions -- such as combined heat-and-power (CHP), which captures what would otherwise be waste heat and uses it as energy. Yet there are many opportunities for cutting consumption and emissions even more. It's not just due to lack of attention, either; market barriers make it "complicated" said Ethan Rogers of the American Council for an Energy-Efficient Economy. "In a fully competitive and transparent market ... we would see a lot more CHP systems."

CHP, around since American inventor Thomas Edison built the first commercial power plant, is the industrial sector's most popular answer to addressing waste emissions. CHP generally refers to technologies that harness excess heat generated in industrial processes and reuse it to power the plant, reducing GHG emissions along the way. ArcelorMittal's steel mill, located in East Chicago, Indiana, is seen as a poster child for the technology -- the mill has a 95 megawatt CHP system that meets 25% of the site's electrical requirements and 85% of its process steam needs, replacing on-site, coal-fired steam generation. Some industries produce waste emissions that are hard to process with CHP, though, such as carbon emissions from the cement industry, which produces around 5% of the world's carbon dioxide, as well as from petrochemical, steel and glass industries.

Entrepreneurs are paying attention, though. To Alain Castro, chief executive of California-based Ener-Core, releasing waste gases is like throwing away money. His company aims to turn waste gases, primarily methane, into clean energy through an oxidation technology. Already deployed in landfills and now signed on with an ethanol producer, the publicly traded company has its sights set on oil and gas refining and drilling operations, as well as in coal mining, wastewater treatment plants and food processing plants ([NE Jan.15'15](#)).

The US Department of Energy (DOE) is also looking into the area. It's working on a large-scale project with Air Products & Chemicals, a hydrogen-production facility in Port Arthur, Texas, which has captured well over 1 million metric tons of CO₂. The facility stores and uses the CO₂ for enhanced oil recovery at a nearby oil field. The DOE is

also supporting Texas-based Skyonic with the development of SkyMine -- a first-of-its-kind process to capture 75,000 tons of CO₂ from a San Antonio, Texas, cement plant and convert it into other products, including sodium carbonate and sodium bicarbonate, hydrochloric acid and bleach ([NE Oct.23'14](#)).

While these technologies can save a sizable amount of money for the industrial host, they require large amounts of capital to install. "The high upfront cost is a real impediment to getting these projects off the ground," Kefer said. In terms of policy, a tax credit exists for CHP, but Kefer calls it "anemic" at 10% reduction in tax liabilities, and limited, applying only to traditional CHP and excluding waste heat-to-power or other emissions technologies. Drafting appropriate policies is also a challenge since industrial emissions technologies are very heterogeneous, often tailored to a specific industry, said Bruce Hedman of Institute for Industrial Productivity. The EPA's Clean Power Plan for existing power plants, to be finalized this summer, gives a fair amount of flexibility to states to look outside the box for emissions reduction -- a chance for states to incorporate policies that address industrial emissions in their compliance plans.

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