ENERGY INNOVATION
POLICY & TECHNOLOGY LLC

www.energyinnovation.org
98 Battery Street, Suite 202
San Francisco, CA 94111

Policies to Accelerate the Transition to Clean and Competitive U.S. Industry

Jeffrey Rissman
April 2023

Industrial firms manufacture the products we use every day and the technologies transforming every sector of our economy. However, manufacturing is directly responsible for a quarter of the United States' greenhouse gas emissions (or a third, when including emissions from the electricity purchased by industry).

Clean industrial technologies allow manufacturers to cut emissions while growing domestic production. The right policies can dramatically accelerate deployment of these technologies, create high-quality jobs, reduce the air pollution that harms public health, bolster the U.S.'s industrial competitiveness, and secure its technological leadership.

This memo identifies key policy options that would reduce industrial greenhouse gas (GHG) emissions, would boost U.S. GDP and jobs, and have the potential to secure bipartisan federal support in 2023 and 2024.

TRADE AND COMPETITIVENESS

The economic and environmental gains of clean industrial technology can be enhanced by expanding climate-aware trade mechanisms like Section 232 steel tariffs or adopting a carbon border adjustment mechanism (CBAM), which would help U.S. industries compete against dirty producers overseas. A CBAM or other sector-specific tariffs that account for GHG emissions would favor U.S. firms because many are already far cleaner than firms in China, India, Russia, and numerous other countries. It also would facilitate trade with U.S. allies in Europe, Canada, Japan, and South Korea, who would be less affected by a CBAM.

POLICIES TO SUPPORT CLEAN INDUSTRIAL TECHNOLOGIES

Clean industrial technologies benefit from smart policy at all stages of technological maturity. Early-stage technologies require support for demonstration of early commercial plants to refine the technology and reduce costs. Examples include primary steel made from green hydrogen or electrolysis of iron ore, electrification of cement kilns, and zero-carbon chemical feedstocks and production pathways.

Later-stage industrial technologies are commercially available today, but their use must be expanded, including in new industries. The most important examples are electrified heating technologies, such as industrial heat pumps, dielectric heating, and electric plasma torches. Other examples include energy and material efficiency technologies, improved product longevity, and increased use of recycled (and easy-to-recycle) materials. Key policy options include:

- **Research and development (R&D) support** through mechanisms such as public-private research partnerships (which allow private firms to benefit from the advanced equipment and talent in

government laboratories to accelerate development of clean industrial technologies), targeted grants, and contract research with intellectual property sharing; coordination of research efforts across government, academia, and the private sector; policies that improve firms' access to science and engineering talent; and patent system reform. While R&D support is crucial for early-stage technologies, it also benefits technologies later in their lifecycles, as sustained R&D is needed to bring down costs and improve efficiency.

- **Direct financial support** for demonstration and deployment of early commercial facilities, such as cost-sharing or tax breaks. The new Industrial Demonstrations Program and the Advanced Industrial Facilities Deployment Program, funded by the Inflation Reduction Act and Infrastructure Investment and Jobs Act, provide approximately $6 billion in federal funding to be administered through the U.S. Department of Energy (DOE) for projects that reduce GHG emissions and provide a competitive advantage for manufacturing plants. Federal support can come with additional conditions, such as local hire agreements and requirements that facilities locate in disadvantaged communities or communities that are transitioning away from fossil fuel extraction.
- **Green public procurement policies** that specify a maximum emissions intensity for products purchased with federal funds, building on the federal Buy Clean Initiative. The government purchases large quantities of emissions-intensive materials (such as steel and concrete) for roads, buildings, and other infrastructure, so this represents a large and lucrative market for industrial suppliers. The current Buy Clean program could be improved with additional funding, as well as by carving out a small share of its procurement for very early-stage, zero-carbon technologies while setting somewhat less aggressive standards for the remainder of its procurement. This would support both evolutionary improvements (such as energy efficiency) and revolutionary, zero-carbon production pathways.
- **Government backing for industrial electric rates** that support the long-term health of heavy manufacturing. Although electricity is more efficient at creating heat than fossil fuels, high electricity rates (relative to rates charged for fossil fuels) can limit electrification's upside from a cost perspective. A shift from fossil-fuel-powered boilers and heaters to electrical alternatives has the potential to significantly increase electricity costs for individual manufacturing plants and U.S. industry as a whole. While this increase in operating expenses could be offset in whole or in part by reductions in purchased fossil fuels, the government could provide backing to ensure that electric bills for industrial customers are at a level that provides financial stability. In the mid-20th century, the Bonneville Power Administration in the Pacific Northwest and the Tennessee Valley Authority in the South played important economic development roles by providing long-term and affordable electric rates to industrial facilities.
- **Emissions standards and energy efficiency standards** that help push the dirtiest and least efficient products off the market. Standards must gradually tighten over time to drive continuous improvement and innovation. Electricity is used more efficiently than fossil fuels and produces no emissions when used, so sufficiently tight emissions or energy efficiency standards can favor electrical technologies. DOE and the U.S. Environmental Protection Agency can enact standards under existing legal authorities, though Congress could specifically direct them to use those authorities and could clarify and expand the extent to which standards may require fuel switching. Standards can be made sales weighted and tradable to add flexibility and lower compliance costs for industry.
- **Subsidies and tax credits for clean production**, such as providing a subsidy per ton of material (steel, ammonia, methanol, etc.) made without GHG emissions. The existing 48C Manufacturing Tax Credit covers up to 30 percent of capital investment costs for retrofitting existing industrial facilities with equipment that reduces GHG emissions by at least 20 percent, but it is not available for newly built facilities (unless they meet other criteria, such as if the facilities manufacture certain types of energy

technologies or process critical minerals), and it rewards capital investment, not clean production. Also, a 20 percent emissions reduction can be achieved using energy efficiency, material efficiency, and other incremental technologies, so 48C may not incentivize the development of transformative, zero-carbon processes. A subsidy per ton of high-carbon material (steel, cement, chemicals) produced in a very low- or zero-carbon way would provide a long-term incentive to commercialize and scale up clean production of materials and would be effective for both new and retrofitted facilities. Subsidies can help overcome any cost gaps between cleaner production routes and technologically mature, dirty production processes, which helps new technologies to scale up and drive down costs. Subsidies for clean production should be seen as leveling the playing field (not as a handout), since dirty producers today do not pay for the human health and climate damages caused by their activities. One way to set the subsidy value is a "contract for difference," which pays a firm only for the excess costs incurred from using clean production technologies, to bring clean producers' costs in line with dirty producers' costs.

- **Lending mechanisms** that help firms access affordable financing. Government funds can leverage a larger number of private-sector dollars, increasing the impact of these programs. Tools include co-lending, aggregation (bundling smaller industrial products to diversify risk and increase scale), providing loan loss reserves, offering loan guarantees, and selling tax-favored bonds for clean industrial projects. DOE's Loan Programs Office (LPO) provides one example of how government can use lending mechanisms. The LPO provides direct loans and loan guarantees for energy infrastructure (including fossil, nuclear, and renewable energy), advanced technology vehicle manufacturing, and carbon dioxide transport infrastructure, but it does not finance manufacturing of materials (except "critical materials" like rare earth elements) or non-vehicle, non-energy-related products. The LPO's loans and loan guarantees are sized for large projects (at least tens of millions of dollars in funding), so they are not a good fit for many small to medium manufacturers. For industry, a better model exists at the state level, where green banks such as the Connecticut Green Bank use a broader array of financing tools and support projects at smaller scales. But state-level green banks focus more on building upgrades than on manufacturing processes, and they lack the financial resources of the federal government. This gap could be filled by lending programs operated by the Industrial Efficiency and Decarbonization Office and the Advanced Materials and Manufacturing Technologies Office, or an expanded mandate and financial toolset for the LPO.
- **Equipment fees and rebates** that make it cheaper to purchase clean industrial technology (such as industrial heat pumps) and that make it more expensive to purchase dirty technology (such as fossil-fuel-fired boilers). Fees and rebates can be combined as a revenue-neutral "feebate," such that fees paid by buyers of dirty equipment fund the rebates for buyers of clean equipment.
- **Circular economy policies** that encourage manufacturers to make higher-quality, repairable, recyclable products to reduce waste and reduce the need to manufacture new products. Policies include right-to-repair legislation, extended producer responsibility, expanding recycling availability and requirements, and standards requiring that products contain more recycled (and more easily recyclable) materials.

SECURING A CLEAN U.S. INDUSTRIAL FUTURE

The policies described above would boost investment in domestic manufacturing and industrial technologies, boosting U.S. GDP and jobs. The U.S. has an opportunity to seize technological leadership in clean industry while combatting climate change, adding jobs, improving public health, and strengthening our competitive position internationally. But there is no time to waste: manufacturers invest in facilities intended to operate for decades. The sooner we enact policies to support clean industry, the greater the economic gains and climate benefits.