



**TESTIMONY OF**  
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**PRESIDENT, CENTER FOR CLIMATE AND ENERGY SOLUTIONS (C2ES)**  
**ON BEHALF OF THE RENEWABLE THERMAL COLLABORATIVE (RTC)**

**BEFORE THE**  
**HOUSE ENERGY AND COMMERCE COMMITTEE AND**  
**SUBCOMMITTEE ON ENVIRONMENT AND CLIMATE CHANGE**

**MARCH 18, 2021**

Good morning.

Chairman Tonko; Ranking Member McKinley: Thank you for inviting me here today to testify on behalf of the Renewable Thermal Collaborative and C2ES. I am Bob Perciasepe, the president of the Center for Climate and Energy Solutions (C2ES). Before joining C2ES, I was most recently the Deputy Administrator of the U.S. Environmental Protection Agency (EPA) from 2009 through 2014. Before that I was the chief operating officer for the National Audubon Society and the Secretary of Maryland's Department of Environment. A full biography is attached and submitted for the record.

The Renewable Thermal Collaborative (RTC) is a global coalition of companies, institutions, and governments committed to scaling up renewable heating and cooling at their facilities, and dramatically cutting carbon emissions. The RTC was founded in 2017 and is facilitated by C2ES, along with David Gardiner and Associates, and the World Wildlife Fund.

The industrial sector is challenging to decarbonize due to its tremendous diversity, reliance on large quantities of heat, and the fundamental nature of many core manufacturing processes. Although industrial emissions have generally declined in recent years with improved energy efficiency and the move from coal to natural gas, industrial emissions still account for approximately 29 percent of total U.S. emissions.<sup>1</sup> Further, projected increases in production driven by growing demand and declining energy prices could make the sector the largest source of U.S. emissions by 2030.<sup>2</sup>

Worldwide, heat makes up roughly three-quarters (74 percent) of energy demand for industry and accounts for more than one-fifth of total global energy consumption.<sup>3</sup> In the United States, about 43 percent of industrial emissions (i.e., direct and indirect emissions) come from burning fossil fuels to produce heat or steam.<sup>4</sup> To be effective, low-carbon thermal pathways must be capable of achieving the range of temperatures demanded by each industrial process. The temperature required depends on the nature of the process; it can exceed 1,400 degrees C (2,500 degrees F) for industries such as steel and cement. However, two-thirds of process heat used in U.S. industry is for applications below 300 degrees C (572 degrees F).<sup>5</sup> Substituting low-carbon renewable thermal technologies for half of the fossil fuels currently consumed to produce heat and steam for industry could reduce total U.S. emissions by up to 6 percent.<sup>6</sup>



The goals of the RTC are to create a unique community of corporate buyers and technology and service providers, establish policy support, and put us on the path to reduce industrial sector thermal emissions 30% by 2030 and full sector decarbonization by 2050. To date, policy has been an underutilized tool to advance low-carbon renewable thermal technology solutions, especially when compared to the robust use of policy to expand the development and deployment of renewable electricity.

This task is complicated by significant differences which exist between electricity and thermal energy. While primary energy sources that are used to produce thermal energy may be easily transportable, unlike renewable electricity, thermal energy itself cannot travel over long distances, and must be produced on-site or near where it will be used and distributed locally. This presents a challenge as the supply of low-carbon renewable thermal energy sources and technologies is often limited by geography, especially for biomass, solar, or geothermal resources. The disaggregated supply of low-carbon renewable thermal resources makes it more difficult for those interested in utilizing these resources to develop a systematic and comprehensive strategy to evaluate low-carbon renewable thermal opportunities.

RTC recently published a report, titled *Low-Carbon Renewable Thermal Technology Solutions: Policies to Support Development and Deployment*. In the report, we survey leading policies in Europe and the United States to advance low-carbon renewable thermal technologies, which we define as biomass, biogas (including landfill gas), renewable natural gas (or biomethane), geothermal, beneficial electrification, green hydrogen, and solar thermal technologies. We draw key lessons from those experiences to inform recommendations for federal policymakers. A copy of the report is attached and submitted for the record.

In the report, we explore a number of policy approaches to catalyze a wide variety of low-carbon renewable thermal technologies. These include research, development, demonstration and deployment (RDD&D), technical assistance, financial incentives, market-based mechanisms and federal procurement. As investors, governments and consumers around the globe increasingly demand low-carbon products, companies are focused on finding ways to remove greenhouse gas emissions from their supply chains. Smart federal support for low-carbon renewable thermal technologies could go a long way toward not only ensuring that domestic manufacturing has the tools it needs to compete in a low-carbon world, but can also help establish the U.S. as a global leader in supplying technologies that will enable the transformation to a low-carbon economy.

It will also be critical for policymakers to support impacted communities. Environmental and social justice issues among both workforce and frontline communities should be prioritized in the development of policies to decarbonize the industrial sector. Support from policymakers can enable private sector investments in low-carbon renewable technologies, which can help industrial companies, as well as the communities in which they operate, to succeed in highly-competitive global markets over the long-term. In particular, financial incentives will be critical to driving the private investment needed to decarbonize the industrial sector.

### **Advancing Low-Carbon Renewable Thermal Solutions**

Our research found that financial incentives have been an effective tool in the European Union (EU) to support the deployment of low-carbon renewable thermal technologies. However, to date, these incentives have focused largely on bioenergy. In 2017 alone, 15 EU Member States spent more than €6.5 billion to directly subsidize bioenergy.<sup>7</sup> This support has led to widespread use of bioenergy in the EU, which comprised 59



percent of all renewables and 10 percent of all energy sources) to the gross final energy consumption in the EU in 2016. Seventy-five percent of this energy was used for heating purposes.<sup>8</sup> Although these financial incentives have been an effective tool for scaling renewable thermal solutions, incentives to scale bioenergy must also come with full life-cycle greenhouse gas criteria and sustainable land and forest management standards to avoid unintended climate, land, forest and biodiversity impacts. Further, financial incentives should be accessible by a diverse and balanced set of low-carbon renewable thermal technologies.

In the United States, state-level incentives for low-carbon renewable thermal technologies include direct financial incentives, sales tax exemptions and rebates, incentive payments for interconnection costs, and pilot programs. These incentives are frequently aimed at specific technologies and specific customer classes. While this level of specificity may be a result of the fuels or technologies available in a particular state or based on a state's largest sources of emissions, excluding technologies or sectors may create an uneven playing field for promising solutions, or leave certain customer classes without access to the low-carbon renewable thermal solutions they need.

At the federal level, there are fewer examples of financial incentives designed to support low-carbon renewable thermal technologies. In the electricity sector, the PTC and ITC spurred investment on the order of hundreds of billions in the solar photovoltaic and wind industries. This led to drastic cost declines and rapid scaling of renewable electricity technologies. Similar incentives could catalyze the low-carbon renewable thermal sector, with broad enough eligibility and sufficient expiration horizons, including those for CHP and waste heat to power.

A variety of policies exist to support the expanded availability of low-carbon renewable thermal technologies. Funding for research, development and demonstration projects, financial incentives such as grants and tax credits, as well as policies to support clean procurement all help to create market momentum for lower carbon products. Varying levels of commercial readiness for renewable thermal technologies means that to support a broad portfolio of technologies, policymakers will need to provide a range of accessible incentives.

Expanded research and development activities, including the establishment of an industrial emissions reduction technology research, development, demonstration, and commercial application program as authorized in the Energy Act of 2020 would provide important support to advance a broad range of low-carbon renewable thermal technologies.

Grant programs could also provide much needed support to deploy technologies to address industrial thermal emissions. In particular, a national climate bank could provide grants as well as low-cost loans for an expansive range of low-carbon renewable thermal technologies in the residential, commercial and industrial sectors. Close coordination with existing state and local green banks will be important, given their ability to identify and meet local needs, particularly for smaller residential and commercial projects, including those financed through property assessed clean energy (PACE) programs. Further, a national climate bank should help support the establishment of new state and local green banks and also leverage its scale to fund the development of infrastructure projects with regional or even national benefit.

Loan guarantees are an additional tool to help establish market confidence in low-carbon renewable thermal technologies. The Energy Act of 2020 expanded eligibility for the Department of Energy's Loan Program Office to



include technologies or processes for reducing greenhouse gas emissions from industrial applications, including iron, steel, cement, and ammonia production, hydrogen production, and the generation of high-temperature heat. This was a significant step to decarbonizing industrial thermal heat. We hope that the Loan Program Office focuses on not only thermal projects, but is able to support infrastructure projects necessary to facilitate the expanded availability of low-carbon renewable thermal technologies.

Deployment incentives are also a critical tool to decarbonizing the industrial sector. Tax credits for renewable thermal technology deployment, modeled on the highly-effective investment and production tax credits could catalyze significant investment, particularly if they are established on a sufficiently long-term basis that would provide certainty to the market. The Federal government also has a tremendous opportunity to leverage its buying power to scale low-carbon industrial products.

Market-based mechanisms have also proven adept at facilitating both low-carbon renewable thermal and renewable electricity solutions. We identify three market mechanisms in the report that could be well-suited to incentivizing industrial decarbonization: a thermal renewable portfolio standard and accompanying thermal renewable energy credit market; carbon pricing and industrial performance standards.

In electricity markets, renewable portfolio standards helped drive significant adoption of renewable energy by mandating a minimum percentage of electricity generated from renewable sources. As much as half of the growth in renewable electricity capacity since 2000 can be attributed to renewable portfolio standards.<sup>9</sup> Thirteen states and Washington, D.C. now include low-carbon renewable thermal in their RPS: some states classify low-carbon renewable thermal technologies separately from electricity-generating renewable technologies, while in other states, low-carbon renewable thermal technologies are included with electricity-generating renewable technologies. Establishing thermal renewable energy credits would not only support renewable portfolio standards, but also help develop credible standards and certification of environmental attributes for low-carbon renewable thermal sources. The expansion of market-based policies could lead to significant deployment of low-carbon renewable thermal technologies. For example, an economy-wide price on carbon emissions – accompanied by a suite of other policies – could accelerate adoption of low-carbon renewable thermal technologies and could generate revenue to support climate mitigation efforts, address impacts on low-income households and support affected workers and communities.

Performance standards can also drive decarbonization across the industrial sector, and a benchmarking process for major industrial subsectors would be a key enabling step toward the enactment of a performance standard.

### **CLEAN Future Act**

The CLEAN Future Act includes a number of policies that would support industrial decarbonization. The creation of an Assistant Secretary for Manufacturing and Industrial Decarbonization at the Department of Energy would aid RDD&D efforts and provide crucial leadership to ensure that domestic manufacturers are able to compete in a low-carbon economy.

There are a number of provisions in the CLEAN Future Act that would help to scale technologies to reduce industrial emissions. The environmental product declarations established as part of the Federal Buy Clean Program would enable the federal government to leverage its purchasing power to drive low-carbon products



into the marketplace, while creating a framework for other purchasers to do the same. The Clean Energy Manufacturing Grant Program in Section 504 would support a range of zero and low-emission thermal technologies, and emphasizes – correctly – the need for special attention to energy intensive industrial products. The Carbon Mitigation Fund would support beneficial electrification, a key strategy for decarbonizing the industrial sector. Expanding fund eligibility to include other renewable thermal technologies, including biomass, biogas (including landfill gas), renewable natural gas (or biomethane), geothermal, green hydrogen, and solar thermal would help ensure that a diversity of technologies are afforded the opportunity to meet the variety of low-carbon thermal needs of industry. Robust sustainability criteria should guide development and deployment.

The Clean Energy and Sustainability Accelerator outlined in the CLEAN Future Act would not only provide financial support to reduce industrial emissions, but also grow market confidence and scale investments in critical low-carbon renewable thermal technologies. As drafted, it would authorize funding for projects in “industrial decarbonization, fuel switching and electrification,” which would support a range of low-carbon renewable thermal technologies. Explicitly including infrastructure would ensure that project developers are able to access a low-cost supply of low-carbon renewable thermal energy.

Further, the Accelerator’s ability to provide financing through debt, credit enhancements, aggregation and warehousing, equity capital and other financial products approved by its Board of Directors would position it to play an especially important role in regions of the United States with concentrated manufacturing facilities. Not only would it help attract co-investment from the private sector, in doing so it could increase understanding in capital markets about technologies to reduce industrial emissions. It could help underwrite loans and also help reduce the risks and costs for a range of projects by bundling loans. The flexibility to invest senior, mezzanine and especially subordinated debt is also a key feature for attracting private sector investment. Importantly, the Accelerator would also support the establishment of new state and local green banks, which are well suited to enhancing job creation and ensuring that the benefits of low-carbon renewable thermal project development accrue to local communities.

### **Key insights**

Fragmented policies that only apply in certain locations, to certain technologies, or to certain customer classes can lead to uneven results and slow the development and deployment of low-carbon renewable thermal technologies. In the United States, not all states have low-carbon renewable thermal policies and those that do vary in the types of technologies supported and customers who are able to benefit from those policies. Federal financial incentives will be key to accelerating the deployment of these technologies, and the CLEAN Future Act includes a number of key provisions that can help to accelerate and scale low-carbon renewable thermal technologies. Broad eligibility for the full range of low-carbon renewable thermal technologies can ensure that the range thermal requirements among industrial subsectors can be met with low-carbon technologies.

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<sup>1</sup> U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2018* (Washington, DC: U.S. Environmental Protection Agency, 2020), Table 2-12, <https://www.epa.gov/sites/production/files/2020-04/documents/us-ghg-inventory-2020-main-text.pdf>.

<sup>2</sup> Doug Vine and Jason Ye, *Decarbonizing U.S. Industry* (Arlington, VA: Center for Climate and Energy Solutions, 2018), <https://www.c2es.org/document/decarbonizing-u-s-industry>.

<sup>3</sup> Elie Bellevrat and Kira West, “Clean and efficient heat for industry,” *International Energy Agency (commentary)*, January 2018, <https://www.iea.org/commentaries/clean-and-efficient-heat-for-industry>.

<sup>4</sup> U.S. industrial greenhouse gas emissions were 1,931 MMT CO<sub>2</sub> Eq. in 2018 – direct and indirect from imported electricity. Industrial CO<sub>2</sub> emissions from the combustion of fuels were 1,320 MMT CO<sub>2</sub> Eq. in 2018 – direct and indirect. 63 percent of the fossil fuel combustion emissions, 832 MMT CO<sub>2</sub> Eq., are attributed to production of steam and/or heat for industrial processes. U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2018*.

<sup>5</sup> “Solar for Industrial Process Heat Analysis,” National Renewable Energy Laboratory, accessed March 16, 2021, <https://www.nrel.gov/analysis/solar-industrial-process-heat.html>.

<sup>6</sup> U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2018*.

<sup>7</sup> The Member States are United Kingdom, Belgium, Spain, Germany, Italy, The Netherlands, Slovakia, Austria, Ireland, Portugal, France, Denmark, Finland, Sweden, and Poland. Renewable Thermal Collaborative, *Low-Carbon Renewable Thermal Technology Solutions: Policies to Support Development and Deployment* (Arlington, VA: Renewable Thermal Collaborative, 2021), <https://www.renewablethermal.org/low-carbon-renewable-thermal-technology-solutions/>.

<sup>8</sup> Sasha Stashwick, *Burnout: E.U. Clean Energy Policies Lead to Forest Destruction* (Rotterdam, The Netherlands: Natural Resources Defense Council, Inc., 2019), <https://www.nrdc.org/resources/burnout-eu-clean-energy-policies-lead-forest-destruction>.

<sup>9</sup> Galen Barbose, *U.S. Renewable Portfolio Standards 2018 Annual Status Report* (Berkeley, CA: Lawrence Berkeley National Laboratory, November 2018), [https://eta-publications.lbl.gov/sites/default/files/2018\\_annual\\_rps\\_summary\\_report.pdf](https://eta-publications.lbl.gov/sites/default/files/2018_annual_rps_summary_report.pdf).