

**LanzaTech**

**Abstract for Nova Conference "CO<sub>2</sub> as feedstock for fuels and chemicals", in March 2021 in Cologne, Germany**

***Widening the Feedstock Pool: Creating a Circular Carbon Economy***

If we are to achieve climate goals, we need a systems-level view and solutions that can draw on multiple sources of waste carbon.

Advances in technology and a global momentum to avert the deepening climate crisis have brought us to the cusp of a new industrial era in which recycled CO<sub>2</sub> will be the feedstock, and clean electricity the energy source, to produce the climate-safe materials and fuels that are today made from oil.

Moving to an industry based on refining CO<sub>2</sub> rather than oil allows us to harness the very basis of the climate crisis as a climate solution. A transition from oil refining to "carbon refining" enables us to turn the threat of the climate crisis into an opportunity for industrial rebirth, distributed sustainable production, domestic supply chain security, and rural economic development.

The technical barriers to end the age of oil and oil-refining have been overcome. A new circular carbon economy based on CO<sub>2</sub> and carbon refining provides for a more sustainable and resilient economy, providing a path to correlate economic growth and national prosperity with environmental justice in a positively reinforcing cycle.

Rural communities can emerge as the major beneficiaries from this transition. Energy from the sun is already being harvested for sustainable production of power, food and fuels in these communities. Large scale wind and solar farms ensure lowest cost sustainable power is now a feature of these regions. Add to this the fact that some of the most highly concentrated sources of CO<sub>2</sub> are produced by the rural bioethanol industry, and we have the basis for the growth of a new carbon refining infrastructure.

The dramatic fall in the cost of clean electricity is a key enabler for carbon refining. Electricity will not only power appliances and vehicles, but thanks to processes like water electrolysis, electrical energy can be transformed into chemical energy in the form of hydrogen and drive fuel, chemical, and materials manufacture.

To match the almost inconceivable scale at which oil is refined, carbon refineries must look far beyond increasing the output efficiency of bioethanol plants. There are clear logical phases to ramp up production capacity centered around harnessing available high-volume, low-cost, carbon-rich resources including, agricultural residues from farms and forests, landfill waste, and hard to abate industrial emissions. These either exist as a gas or can be readily converted to gases with known industrial technology. When combined with green hydrogen and additional CO<sub>2</sub>, these resources could be sufficient to entirely displace the products from oil refining in the US today.

A carbon refining strategy offers a pathway to re-invigorate domestic rural communities with a diversity of green manufacturing jobs that leverage the latest technologies from the energy, chemical and biotech industries.