To win the race against catastrophic climate change, we need to go carbon-negative now

by Joanna Underwood | Energy Vision

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We can't just slow the rate at which we add greenhouse gases to the atmosphere: we must also accelerate ways to effectively remove greenhouse gases from the atmosphere

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As the UN secretary-general António Guterres **stated** at the COP24 climate meeting in Poland, countries must quickly set and achieve much more ambitious goals to keep global warming below catastrophic levels. Even if they

met their current emissions reduction pledges under the Paris agreement, it still wouldn't be enough to keep warming under the critical threshold of 1.5 or 2 degrees Celsius.

In the run-up to COP24, a spate of **dire climate reports** trumpeted the extreme urgency of climate action. The **Intergovernmental Panel on Climate Change** and others warned the window is closing to prevent catastrophic warming, with just 12 years left to change our trajectory. We are not on pace to keep warming below 1.5 or 2 degrees, past which we can expect massive sea level rise, floods, fires, droughts, disruptions in food production, species extinctions, etc.

To avoid that, making the emissions reduction math work requires subtraction. We can't just slow the rate at which we add greenhouse gases to the atmosphere. We must also accelerate ways to effectively remove greenhouse gases from the atmosphere, using what are called "carbon-negative" strategies.

Just before COP24 an Australian consortium issued the "Perth Protocol" calling for a "truly carbon-negative" approach "that removes, sequesters, stores and binds greenhouse gas already in the atmosphere." Such strategies were touted at previous COP climate meetings, though mostly in a futuristic way – something to look forward to in decades to come. There are various carbon-negative demonstration projects in the pipeline, some of which were featured at COP24. But they are many years away from large-scale deployment, and we need to deploy carbon-negative energy on a large scale starting now.

There is one powerful carbon-negative energy strategy deployable and scalable today: renewable natural gas (RNG). Although it's natural gas, it's not a fossil fuel. It's derived from the methane biogases emitted by decomposing organic wastes such as food waste, farm waste and municipal wastewater. These wastes are ubiquitous in urban and rural environments alike.

Here's why RNG is carbon-negative: If organic wastes are left to decompose on farm fields, in landfills or elsewhere, the methane biogases they generate are mostly released into the atmosphere, where they act as powerful greenhouse gases. But if organic wastes are collected and processed in tanks called anaerobic digesters, these potent, methane-rich biogases don't escape. Instead, they are captured and refined into RNG.

Chemically RNG is nearly identical to "geologic" natural gas (the ordinary, fossil fuel kind), but it's the lowest-carbon fuel available today. It burns as cleanly as fossil natural gas, and can be used in the same pipelines, engines, power plants, etc. But producing RNG has none of the negative climate impacts of fossil fuel extraction.

A byproduct of making RNG in anaerobic digesters is "biosolids" which can be used as high-quality fertilizer, replacing chemical fertilizers and the GHG emissions related to them, on top of the emissions saved by capturing the biogases.

The California Air Resources Board (CARB) added these factors up, and verified that across its lifecycle, from production through consumption, RNG is net-carbon negative. When made using food or farm waste and used as a transportation fuel in heavy-duty buses and trucks, it cuts greenhouse gases fuel by up to *300%* compared to diesel. That number may sound counterintuitive, but it's a way of expressing that more GHG emissions are prevented by producing RNG than are generated when vehicles burn it. The net result is less GHG in the atmosphere than if the biogases had never been captured, processed and used as fuel. From a climate point of view, that's "free" energy -- in fact better than free, because it effectively lowers atmospheric GHG.

It's crucial that we deploy carbon-negative energy starting now. We can't wait another decade and another investment cycle for today's demonstration projects to become commercial. RNG isn't a demonstration project; it's already commercialized.

In the US there are over 2,000 operations capturing biogases from landfills, farms and wastewater treatment plants, with potential for some 11,000 more. Over 80 of them produce pipeline-quality RNG, much of which powers trucks and buses across North America, including municipal fleets in Los Angeles, Toronto, Indianapolis and Dallas. Many more could.

The US RNG market is young, but emerging rapidly. In the past two years it doubled, and is on track to nearly double again next year. RNG used in heavy-duty vehicles displaced some 200 million gallons of diesel fuel in the US last year and reduced lifecycle GHG emissions by approximately 1.7 million tons. As RNG deployment ramps up, so will the emissions reductions.

To head off catastrophic warming, we need much more ambitious emissions reduction goals and we need to meet them. To make that possible, those inside and outside the Paris agreement must get serious very fast about carbon-negative solutions. With rapidly emerging markets in Europe and North America, and organic wastes plentiful in every country in the world, RNG offers a practical, fast path forward. With only 12 years left to turn GHG emissions trends around, we need to take it now.