The power of studying combustion on the ISS

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If you wanted to reduce the amount of pollution humans produce, where might you look?

Here? Yep.

That's exactly where scientists and researchers are looking: about 250 miles above Earth, on the International Space Station (ISS). Here, astronauts are working on a series of experiments to learn more about combustion.

Why combustion?

Dennis Stocker, project scientist for the Advanced Combustion via Microgravity Experiments, or ACME, says "Consider this. About 85 percent of the energy we use comes from combustion – the burning of some sort of fuel."

About 70% of the electricity we use at home and work comes from power plants that use combustion. The combustion of fuels powers the engines in many modes of transportation.

Stocker continues: "If we can learn more about the process, we might be able to find newer and less polluting ways to burn fuel."

Three series of combustion experiments taking place on the International Space Station's Combustion Integration Rack (CIR) are looking at combustion in very different ways.

The Flame Extinguishment Experiment, or FLEX, examined the burning of a single droplet of fuel in the microgravity confines of the ISS. The last of the droplet combustion experiments were conducted in September 2017.

ACME began in November 2017. ACME is composed of six major experiments, with each taking about 5 months to complete. These experiments will examine how various gasses burn without gravity affecting the flames.

The Solid Fuel Ignition and Extinction or SoFIE experiment, will explore the properties of burning solid matter.

So why study combustion in micro gravity?

As Stocker explains: "On the ISS, you have conditions that you can't replicate on Earth.

For example, consider a candle when it's burning. The flame flickers. Why? Hot gasses from the flame rise while cooler, denser air is pulled to the bottom of the flame. This flow occurs at high speeds, resulting in turbulence and instability. That instability makes it hard to study the properties of the flame. But on the ISS, there's no flicker which allows us to make more precise and consistent measurements. If we have precise measurements we get closer to learning how to burn more efficiently."

More efficiency could lead to real cost savings for producing power. The research could also lead to reducing the production of soot and other pollutants.

Combustion experiments conducted in space have contributed to practical applications on Earth, especially in the field of fire safety. A

new type of fire extinguisher is just one example.

And, as Stocker notes: "I think we're in for a few more surprises as a result of these microgravity experiments."

That's because, not surprisingly, Stocker knew where to look for answers to reducing the amount of global pollution: He looked up.

More information: For more from the International Space Station, go to www.nasa.gov/station

Provided by NASA