



# IMPROVE

## Conventional Energy Methods

BUILDINGS | CARBON CAPTURE AND STORAGE | FUEL CELLS | NUCLEAR | POLICY | PLANNING  
RENEWABLES | SMART GRID | STORAGE | SUSTAINABLE MOBILITY | SUSTAINABILITY ANALYSES



## EXTRACTING ENERGY FROM VOCs

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Around the world, manufacturers are trying to reduce their emissions of volatile organic compounds (VOCs). These byproducts of solvent-based paints and coatings contribute to smog, accelerate climate change, and harm human health. Unfortunately, existing "end of pipe" solutions don't come cheap.

Chemical engineering researchers at Waterloo are proposing a different approach. Would it be possible to capture and reuse the energy stored in the chemical bonds of VOCs?

According to the model they've developed, the answer is yes. Using simulation software, the researchers designed a three-part system to slash the emissions of a typical mid-sized auto parts painting facility.

Part one is an adsorber that captures and concentrates the VOCs. Next, a reformer uses steam to convert the pollutants into a mixture rich in hydrogen and carbon monoxide. Finally, a solid oxide fuel cell oxidizes that mixture into water and carbon dioxide, capturing usable energy in the process.

The researchers still have a few key questions to address: how economically viable the system would be, how to integrate the subsystems effectively, and how to manage potentially explosive gases. However, the numbers look very promising. According to the model, this system could remove 95 per cent of VOCs and recover 85 per cent of their energy in the form of heat and electricity.

For industry, it's an attractive proposition indeed.

Partners: Natural Sciences and Engineering Research Council of Canada