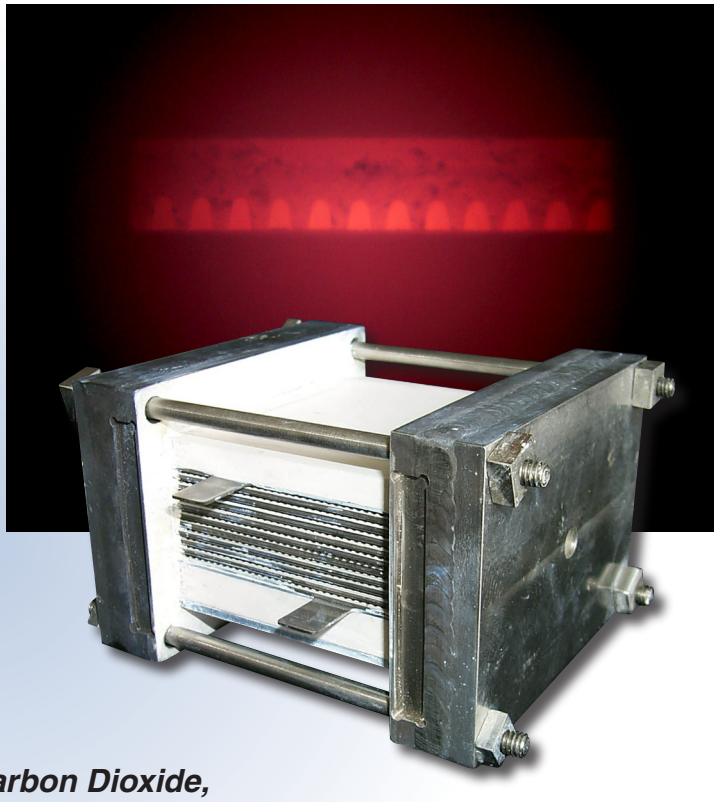


View of Syntrolysis cell operating at 830°C (1525°F). The cell consists of a sandwich of exotic metals and ceramic materials that simultaneously electrolyze carbon dioxide and steam. The resulting synthesis gas is the precursor to synthetic fuels.

Syntrolysis

Synthetic Fuels from Carbon Dioxide, Electricity and Steam

Two of the top energy priorities in the world today are finding environmentally friendly alternatives to fossil fuels and eliminating or reducing manmade carbon dioxide emissions.

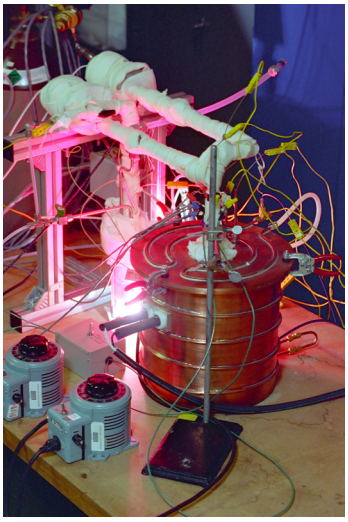
Syngas Generation from Co-electrolysis (Syntrolysis) is a process developed at the Idaho National Laboratory that addresses both priorities – consuming carbon dioxide while creating synthesis gas – a combination of hydrogen and carbon monoxide used to produce synthetic fuels.

This breakthrough technology uses a patented high-temperature electrolysis process that operates much like a hydrogen fuel cell in reverse. Instead of turning hydrogen into electricity, the process produces hydrogen from electricity and steam.

Producing Synthetic Fuels from Carbon Dioxide

When carbon dioxide is added to the mix, the resulting product is synthesis gas (syngas). Using a well known technology developed in the 1920s, syngas can be converted into a wide variety of hydrocarbon fuels and products like natural gas, diesel, jet fuel, gasoline, lubricants and plastics.

The Syntrolysis process eliminates the need for fossil resources for transportation fuels.



Carbon-Neutral Transportation Fuel

Because Syntrolysis converts carbon dioxide pollution into useful products, it can generate both profits and carbon credits for reducing greenhouse gas emissions.

Using carbon-free nuclear or renewable energy sources, the greenhouse gas carbon dioxide can actually be recycled into transportation fuels without consuming fossil energy of any kind.

Continued next page

Idaho National Laboratory

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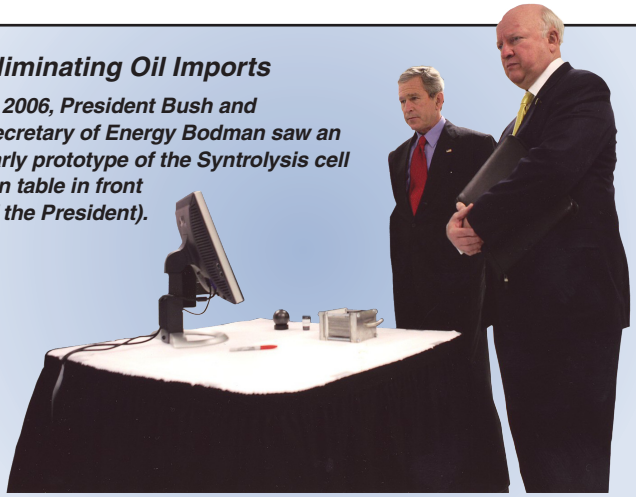
From Hydrogen to Upgraded Oil

In addition to producing syngas, Syntrolysis cells can also efficiently produce pure hydrogen more efficiently than current electrolysis technologies. In fact, using process heat and electricity from an advanced nuclear reactor, hydrogen can be produced at a cost that is energetically equivalent to $30/barrel oil.

Hydrogen can be used in the near-term to upgrade low quality petroleum resources such as Canadian oil sands, enhance biofuel production, and facilitate the long-term transition to a hydrogen economy.

Eliminating Oil Imports



In 2006, President Bush and Secretary of Energy Bodman saw an early prototype of the Syntrolysis cell (on table in front of the President).

"America is on the verge of technological breakthroughs that will enable us to live our lives less dependent on oil. These technologies will help us become better stewards of the environment -- and they will help us to confront the serious challenge of global climate change."

President George W. Bush
State of the Union Address
January 22, 2007

For more information

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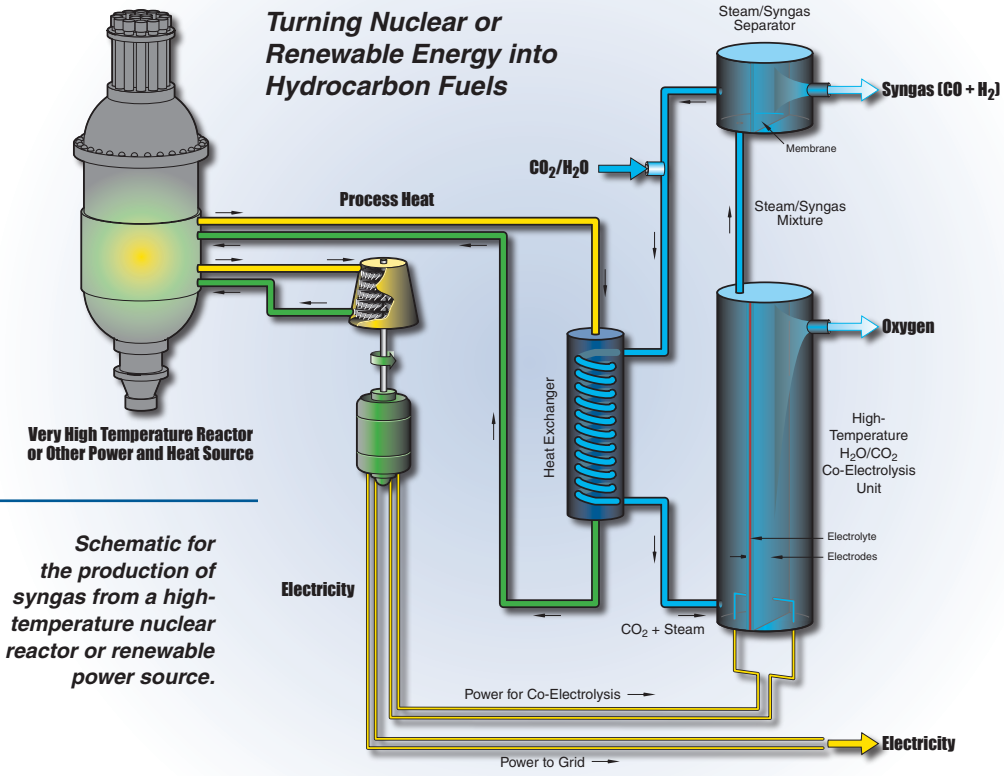
Turning Nuclear or Renewable Energy into Hydrocarbon Fuels



Schematic for the production of syngas from a high-temperature nuclear reactor or renewable power source.

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