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From Chicago, I cover green technology, energy, and the environment.

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Nobel Physicist: Society Should Convert To Natural Gas

Of all the energy sources in play, natural gas offers the most immediate promise as a clean, abundant fuel that can meet society's needs, including the need to mitigate global warming, Nobel prize winning physicist Carlo Rubbia said in Chicago Friday.

Society should pursue two goals, now within reach, to fulfill the promise of natural gas, Rubbia told about 250 people at Northwestern University:

- a technology to burn natural gas without CO2 emissions, and
- a conversion of the transportation sector from gasoline to [methanol](#).



Nobel prize winning physicist Carlo Rubbia predicts "a methane society." (Image: Wikipedia)

"It seems to me that if you can have natural gas with no CO2 emissions there's no reason not to use it," said Rubbia, the director of scientific studies at the [Institute for Sustainability Studies](#) in Pottsdam, Germany. "It seems to me that a methane-based society is the best choice you have in the present time."

Asked about pollution from the hydraulic fracturing of shale, Rubbia said: "This is a separate problem which of course must be resolved in some way."

Rubbia named shale gas and methane hydrate—natural gas frozen on the sea floor and elsewhere—as abundant sources of energy that can meet society's needs soon enough to respond to anthropogenic climate change.

"In my view it will take many years before the solar energy and the wind energy can meet all of your needs," Rubia said. And although he was an early proponent of thorium reactors, Rubia said: "I'm thinking nuclear has too many headaches."

Among those headaches, the kinds of nuclear reactors now feasible would have to proliferate such that "instead of one Yucca Mountain you may need 20 Yucca Mountains."

Rubbia was working for the European Organization for Nuclear Research ([CERN](#)) in 1984 when he and Simon Van der Meer won the Nobel Prize in Physics for the discovery of [weak interaction particles](#). Prior to his appointment at CERN, he was a professor of physics at Harvard. In the 1990s he turned his attention to energy and environmental problems, and he has led the Potsdam institute since 2010.

Natural gas can be integrated into human society more quickly and easily than nuclear, solar or wind, Rubbia said, and because of global warming, speed is of the essence.

“A necessary premise for civilization is a stable climate,” he said, displaying graphs that map human history across relatively calm variations in climate. “We are terribly dependent on this kind of stability.”

When burned, natural gas emits about half as much CO₂ as coal, but Rubbia believes those emissions can be reduced to zero by “cracking” methane to remove the carbon. And his laboratory is working on such a method.

Researchers in Germany have cracked methane by passing it through a superheated graphite tube and by bubbling it through hot liquid metal. The methane degrades into hydrogen gas and solid black carbon.

“This system, if it is possible to make it, would be very successful apparently at reducing CO₂ emissions.”

The [German system](#) uses about the same amount of energy as the conventional method of converting methane to hydrogen, but the conventional method emits large amounts of CO₂. About 5 percent of global emissions derive from hydrogen emissions.

Researchers at Virginia Tech announced recently they produced hydrogen from plant materials without CO₂ emissions by using [enzymes](#).

Once hydrogen is separated from methane, Rubbia suggests using hydrogen for power generation, but not directly for transportation.

For transportation, he suggests producing methanol liquid by recombining hydrogen with CO₂ that has been removed from the atmosphere. Cars burning methanol would still produce CO₂ emissions, but as long as the fuel is made with captured CO₂ they would not increase existing CO₂ levels.

Because methanol can be handled like ethanol or gasoline is now, society could avoid several of the obstacles it would face if it tried to convert transportation to hydrogen, including the need for new storage and transportation infrastructure and the need to switch from internal combustion engines to electricity-producing fuel cells.

Rubbia spoke at Northwestern Friday as part of the Department of Physics and Astronomy’s annual [Heilborn Lectures](#).

“It seems to me this will be a natural gas society,” he said.

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