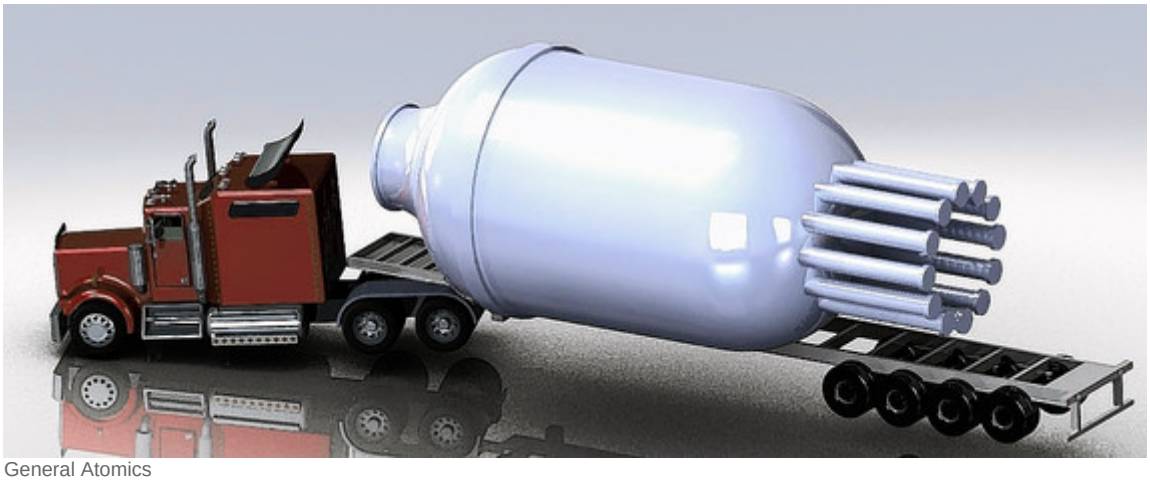
General Atomics Proposes a Plant That Runs on Nuclear Waste

By REBECCA SMITH



General Atomics

An artist's modeling of the proposed EM2 reactor, which would be small enough to be transported by truck.

Nuclear and defense supplier General Atomics announced Sunday it will launch a 12-year program to develop a new kind of small, commercial nuclear reactor in the U.S. that could run on spent fuel from big reactors.

In starting its campaign to build the helium-cooled reactor, General Atomics is joining a growing list of companies willing to place a long-shot bet on reactors so small they could be built in factories and hauled on trucks or trains.

The General Atomics program, if successful, could provide a partial solution to one of the biggest problems associated with nuclear energy: figuring out what to do with highly radioactive waste. With no agreement on where to locate a federal storage site, that waste is now stored in pools or casks on utilities' property.

The General Atomics reactor, which is dubbed EM2 for Energy Multiplier Module, would be about one-quarter the size of a conventional reactor and have unusual features, including the ability to burn used fuel, which still contains more than 90% of its original energy. Such reuse would reduce the volume and toxicity of the waste that remained. General Atomics calculates there is so much U.S. nuclear waste that it could fuel 3,000 of the proposed reactors, far more than it anticipates building.

The decision to proceed with its 12-year program indicates that General Atomics believes the time is right to both make a nuclear push and to try to gain approval for an unconventional design proposal despite the likely difficulty of getting it certified by the Nuclear Regulatory Commission.

The EM2 would operate at temperatures as high as 850 degrees Centigrade, which is about twice as hot as a conventional water-cooled reactor. The very high temperatures would make the reactor especially well suited to industrial uses that go beyond electricity production, such as extracting oil from tar sands, desalinating water and refining petroleum to make fuel and chemicals.

Success is far from certain. High-temperature reactors place special stress on the metals used in reactor components, and there isn't any commercial certification process at the NRC to assess

the reactors' unique characteristics and to verify that they could operate safely for an expected 40- to 60-year life. That process would need to be developed or such reactors couldn't be certified.

The regulatory agency would also have to decide how to handle license requests from companies that might want to locate reactors near industrial facilities, such as oil refineries, something that current regulations don't contemplate and that could pose special safety risks in the event of an industrial fire or explosion.

"We anticipate that [reviewing the reactors] will take a great deal of additional effort because of the uniqueness of the designs," said David Matthews, head of the new reactor program at the U.S. Nuclear Regulatory Commission, the governmental agency that regulates civilian uses of nuclear technology. He added that the agency "isn't in a position to make any firm commitments" to review the EM2.

Another possible problem is financing. General Atomics expects the development effort to cost $1.7 billion, and it intends to seek financial assistance from the Energy Department that may not materialize. Technical problems could also emerge, as could opposition from scientists and other activists who oppose nuclear expansion.

"We know we're in the very early stage with a lot of work ahead of us," said John Parmentola, senior vice president of General Atomics, a company that was founded in 1955, eventually became part of General Dynamics and was then taken over by Gulf Oil Corp. and then by Chevron USA. In 1986, General Atomics was purchased from Chevron by Neal Blue, its current chief executive and chairman, and other family members.

The Obama administration has said it wants to stimulate the U.S. nuclear sector to give the nation more low-emission energy and a high-value export product. It recently approved the first loan guarantee for a new nuclear plant and has said it would be willing to triple guarantees to $54.5 billion.

General Atomics has built more than five dozen small reactors over the years, mostly for research purposes, including two gas-cooled units. Its Peach Bottom unit, in Pennsylvania, ran from 1967 to 1974, and its unit at Fort St. Vrain in Colorado produced electricity from 1976 to 1989.

Mr. Parmentola said the company learned lessons from both reactors and has designed its EM2 reactor to be simpler and to integrate passive safety systems that use natural physical forces to keep the reactor operating within safe limits. The company makes many other products, including aircraft-carrier catapults for the U.S. Navy and Predator unmanned drones used in Iraq and Afghanistan.

General Atomics intends to complete a preliminary design for the reactor and demonstrate that it can manufacture fuel elements in the next few years. It wants to be in a position to seek NRC design certification within five years, and, if no big problems emerge, to gain required approvals to sell reactors and make fuel assemblies by 2022.

Mr. Parmentola said the company hasn't yet sought agreements with forges or other vendors that might make the pressure vessels or other key components, but he said the reactor's moderate 240-megawatt size means it should be possible to make all important parts in domestic factories. "We want to create a U.S. enterprise," he said.

The NRC is currently reviewing certification requests for five conventional large reactors. It may soon be asked to consider certification requests for two conventional small reactors as well, one by Virginia-based Babcock & Wilcox Co. and the other by Oregon-based NuScale Power Inc.

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