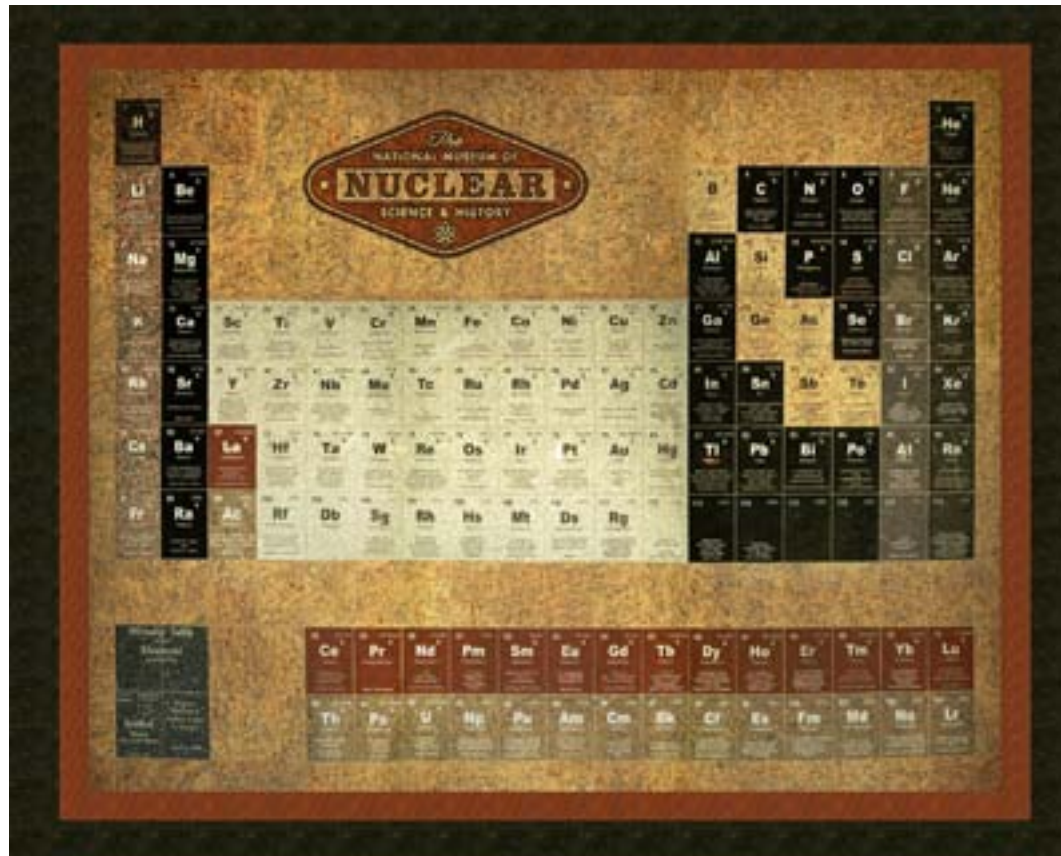


# Thorium Energy Education & Outreach



Dr. Joe Bonometti  
4th Annual Future of Energy Conference  
May 31 – June 1 2012

# Motivation

- Key Lessons Learned
  - Technologies that take years to develop and get to market will face incredible opposition
    - Electric cars
    - Directed energy for military
  - Technology that requires Government involvement will take even longer to progress
    - SpaceX supplying ISS
- Education is key to the long-term development
  - NASA's promotion of math and science at grade school level
- Sustainment of technology intensive activities must invest in maintaining a steady stream of qualified people
  - Science, Technology, Engineering and Mathematics (STEM) Education and Outreach at the DoD
- Educate the public
  - Green nuclear
  - Deaths from energy industry

# The National Museum of Nuclear Science & History

- Located in Albuquerque, New Mexico
- Nation's only congressionally chartered museum in its field
- Smithsonian Affiliate member
- Privately supported

*Mission is "to serve as America's resource for nuclear history and science."*

<http://www.nuclearmuseum.org/>



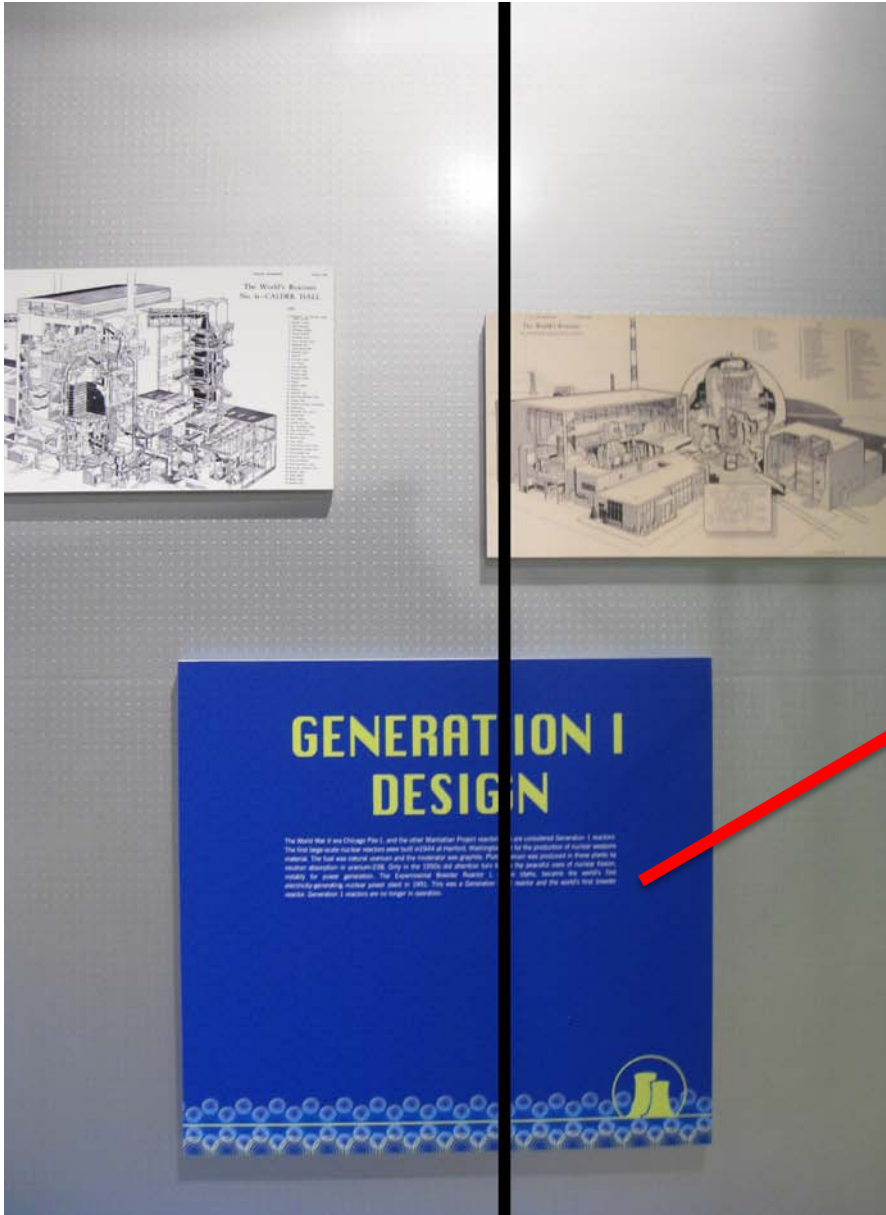
# GEN IV Display

Museum is interested including advanced thorium or mobile reactor concepts!



**Existing Display Panel Available!**

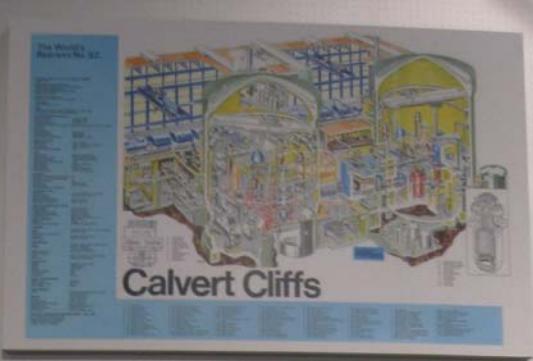
# Generation I



“The experimental Breeder Reactor I, in Idaho, became the world’s first electricity-generating nuclear power plant in 1951. This was a Generation I reactor and the world’s first breeder reactor. Generation I reactors are no longer in operation.”

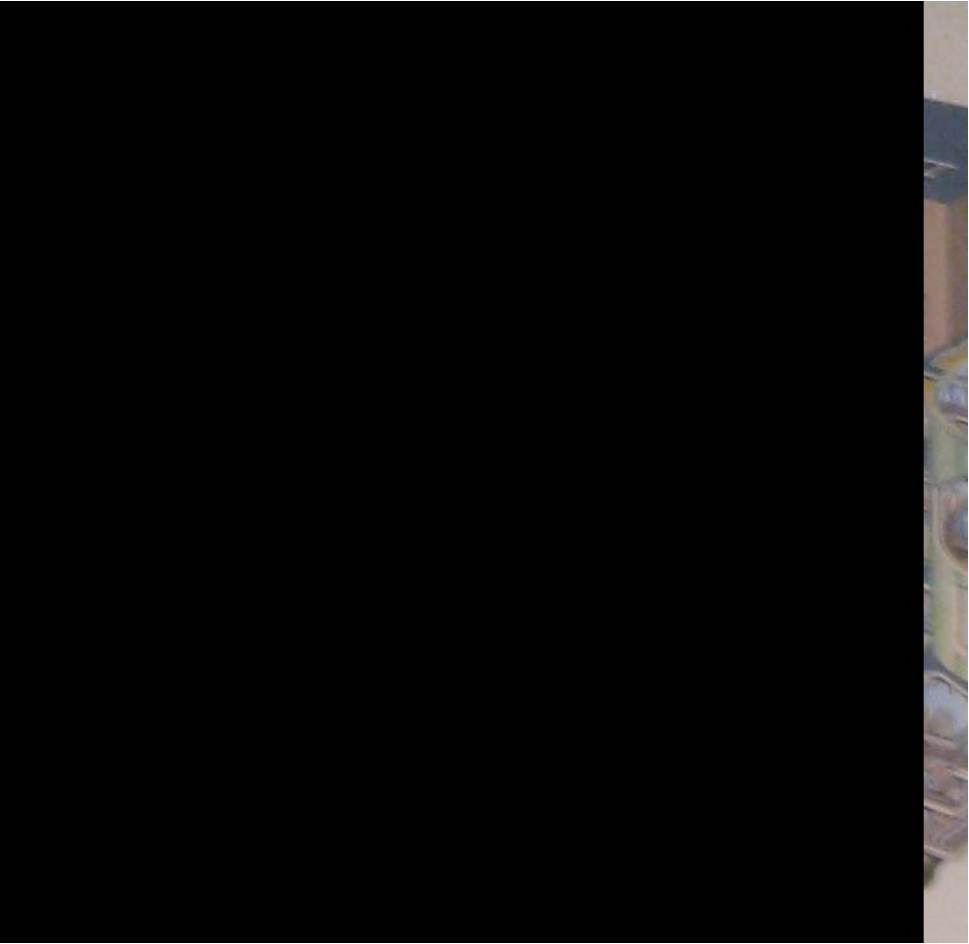


# Gen II Details

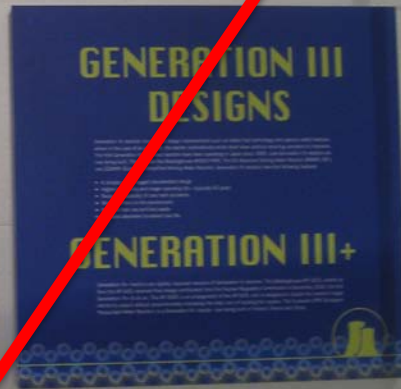


## GENERATION II DESIGN

The Generation II design is a mature, well-understood design that has been proven over many years of operation. It is a simple, robust design that is easy to build and operate. The design is based on a single loop, pressurized water reactor (PWR) cycle. The primary loop circulates water from the reactor core to a steam generator, where it heats a secondary loop of water. The secondary loop circulates water from the steam generator to a turbine, which drives a generator. The turbine exhausts steam into a condenser, which is cooled by a third loop of water. The condenser exhausts steam into a cooling tower, which is cooled by a fourth loop of water. The cooling tower exhausts steam into the atmosphere. The design is simple, robust, and easy to operate. It is a mature, well-understood design that has been proven over many years of operation.



# Gen III Details



# General Requirements

## VISION IN FUTURE

By being researched and developed by experts from 10  
the United States, the countries involved are: Argentina,  
India, the United Kingdom, and the United States. The  
visions that can be realized, constructed, and operated  
in all safety, proliferation, and other public perception  
and are ready to start building by 2020.

capital cost. They are more fuel efficient, are inherently  
safe and are more efficient. There are no prototype reactors  
yet, while the other three are fast reactors.

### Reactors:

react and will use helium as a coolant and like the  
other electricity and hydrogen at a competitive price. The  
reactor generates water. Currently the design that includes  
Gen IV reactor designs.

is in light-water reactor development, it will operate at  
water reactors, and will also be less expensive to build  
in Japan.

that uses sodium-potassium and boron fluoride to cool  
reactors at very high temperatures and electrically cool  
systems such as those found in gas-cooled reactors  
not away the coolant and cause the reactor to overheat.

### Reactors:

for coolant to drive a gas turbine generator to produce  
fusion of hydrogen. Numerous companies are currently  
selecting power supply for the 21st century.

the design choice for breeder reactors for the past 50  
mixed plutonium-uranium metal fuel and liquid-sodium  
of 550 degrees C, enabling high efficiency electricity  
used to make more fuel by absorbing neutrons that are  
neutrons that is also used by the industry for fuel for

or a heat exchanger for cooling by natural convection.  
source. One of the features of the LWR is that the reactor  
fuel for developing countries.



- Match style
  - Font size & type
  - Colors
  - Quality & Materials
- Approval by the museum technical committee
- Museum handles the fabrication and installation activities
- Cost \$1,000 to \$2,000



# Thorium Community Proposal

- Create a thorium energy education outreach program
  - Part of T.E.A.
- Collect donations for the completion of GEN IV panel at the National Nuclear Museum
  - Goal is \$2000
  - Displayed by 1 Jan 2013
- Add on video or interactive to display
  - Goal is \$5000
  - Displayed by 1 Jan 2014
- Explore major interactive exhibit (hands-on) as part of the museum's special exhibition series
  - Goal is \$25,000
  - Six-month program at National Nuclear Museum
  - Provide residual educational resources afterwards
  - Make travelling 'road show' available to other cities/groups
  - Other museum menus ORNL, Smithsonian, etc.

# Suggested Panel Material

- Molten Salt History
  - Need some help/contact with ORNL
- Future Thorium Cycle
  - Diagram of thorium process in a reactor
- Small Reactor Design
  - Tractor-trailer size graphic
- Nuclear Waste Reduction Potential
  - Reduced thorium waste stream
  - Burning existing reactor waste

# Pass The Hat....

- Contact Information:
  - Joe Bonometti
  - [Think.Thorium@hotmail.com](mailto:Think.Thorium@hotmail.com)
  - 505-833-4121

Thank You!

