



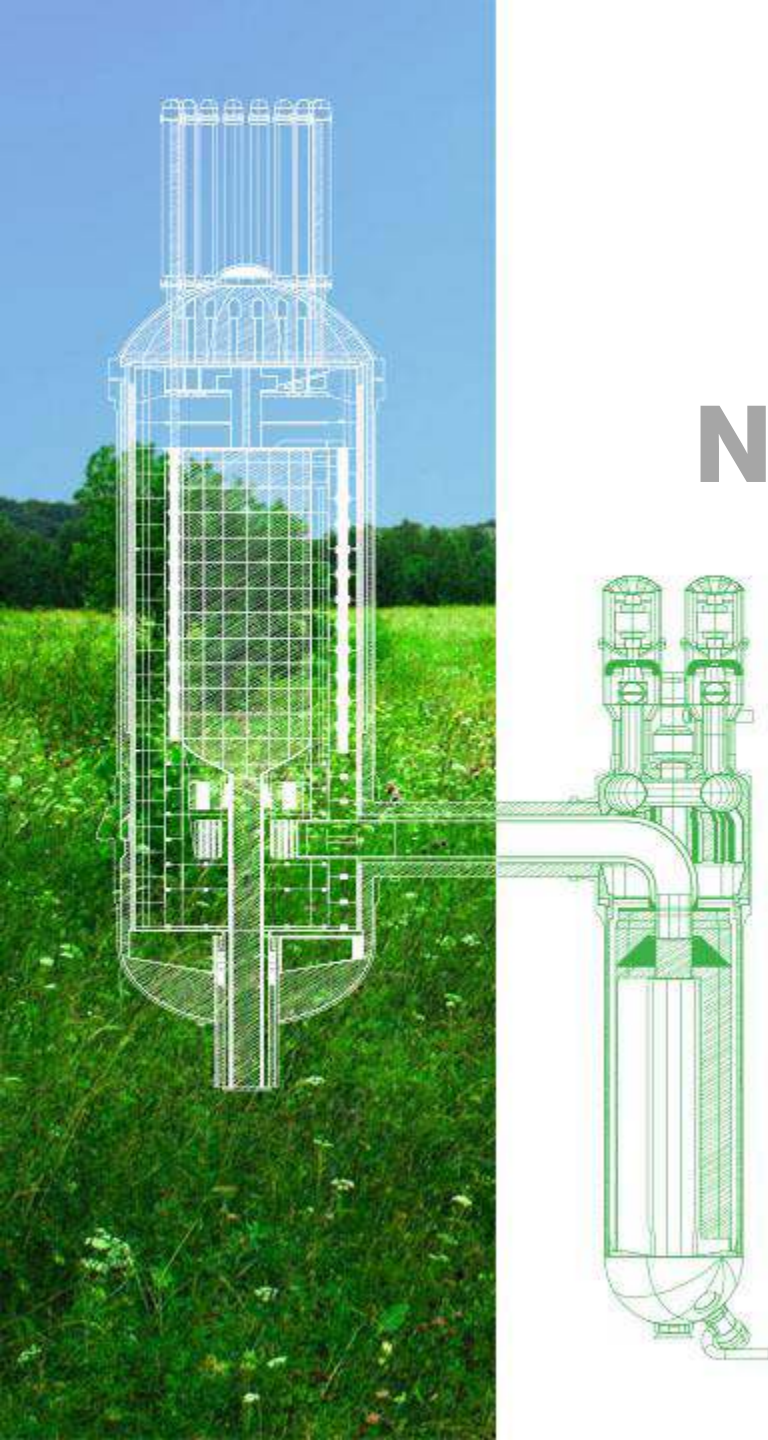
Nuclear energy. **Reimagined.**

The Xe-100

A Different Kind of Nuclear Reactor

An Overview for the American Nuclear Society

October 27, 2015



Reimagining Nuclear Energy

X-energy is reimagining nuclear's role in solving tomorrow's energy challenges

X-energy was founded in 2009 to address the world's most serious energy challenges and make a lasting contribution to clean energy technology in the United States and around the world



"I began X-energy because the world needs energy solutions that are clean, safe, secure, and affordable. With so much at stake, we cannot continue down the same path."

-Dr. Kam Ghaffarian, Founder & CEO

World Class Leadership Team



Ralph Loretta

Chief Financial Officer

30 years of experience in power generation & energy distribution financial management



Jeff Harper

Executive Director for

Strategy & Business Development

30 years of experience in nuclear, regulatory, and strategic business development and innovation



Dr. Pete Pappano

Vice President for Fuel Production

15 years of experience in graphite & fuel development & fabrication

Other Key Executives:

Doug McCuiston

Chief Operating Officer

35 years of experience in aerospace and technical executive management

Dr. Eben Mulder

Chief Nuclear Officer

30 years of experience in pebble bed design and architecture

Dr. Martin van Staden

Vice President of Reactor Development

25 years of experience in nuclear design and analysis

Dr. Fred Silady

Special Assistant to the COO

40 years of experience in HTGR engineering

Dimitri Lutchenkov

Vice President of Licensing

35 years of experience in nuclear & fossil projects

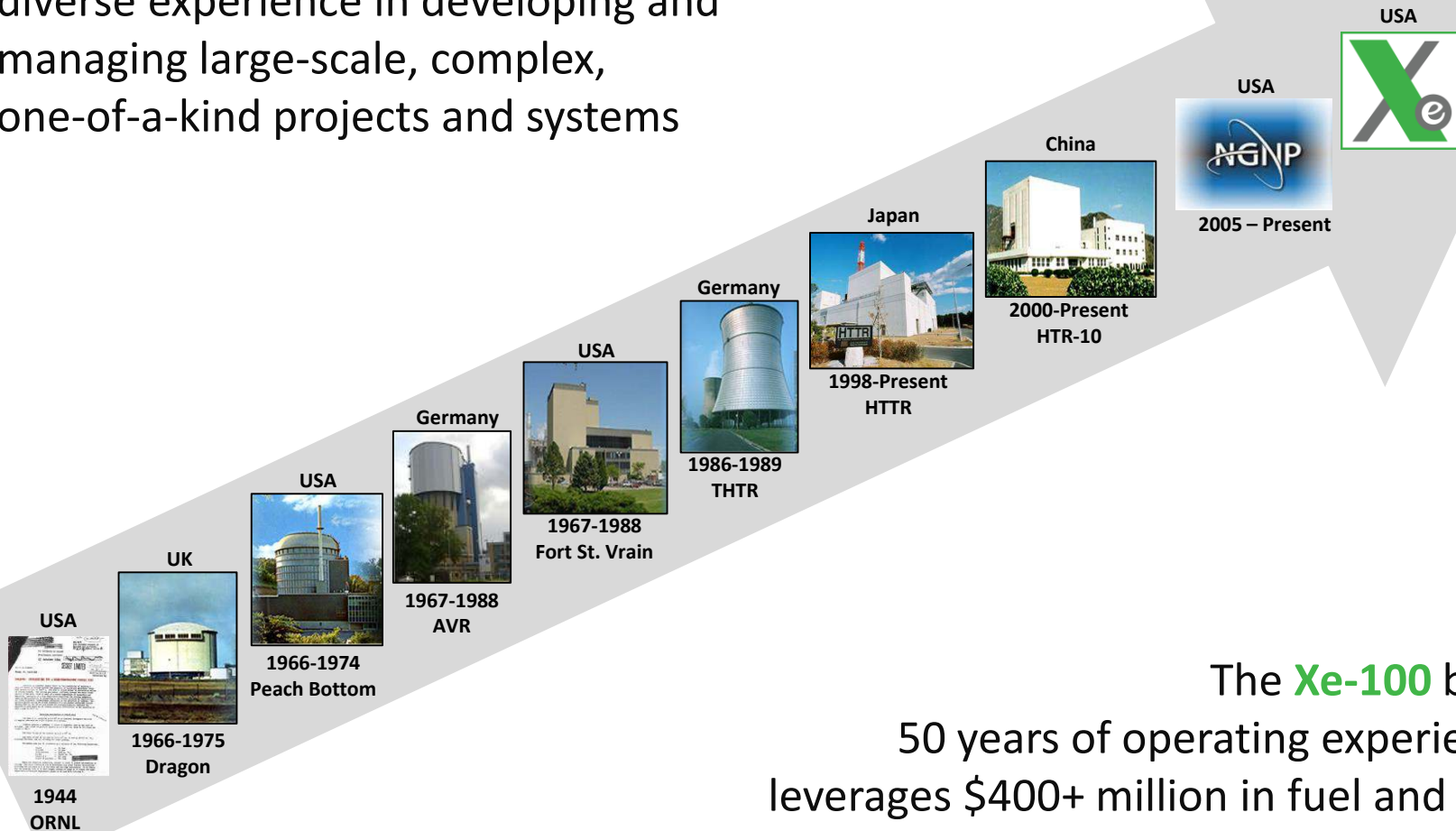
Lisa May

Program Systems Engineer

30 years of experience in aerospace systems engineering

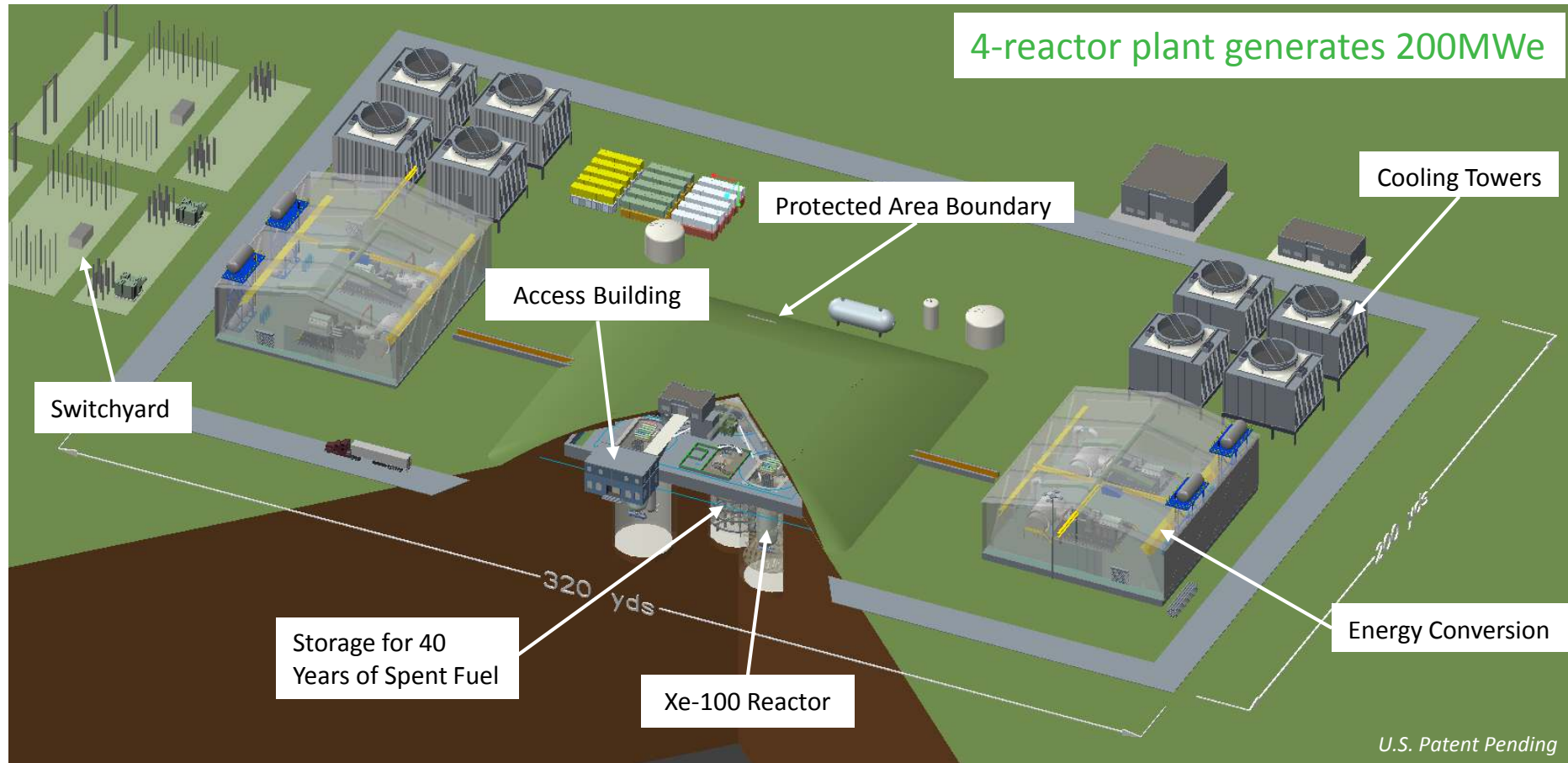
Innovating on a Proven Foundation

X-energy's **world class leadership team** brings diverse experience in developing and managing large-scale, complex, one-of-a-kind projects and systems

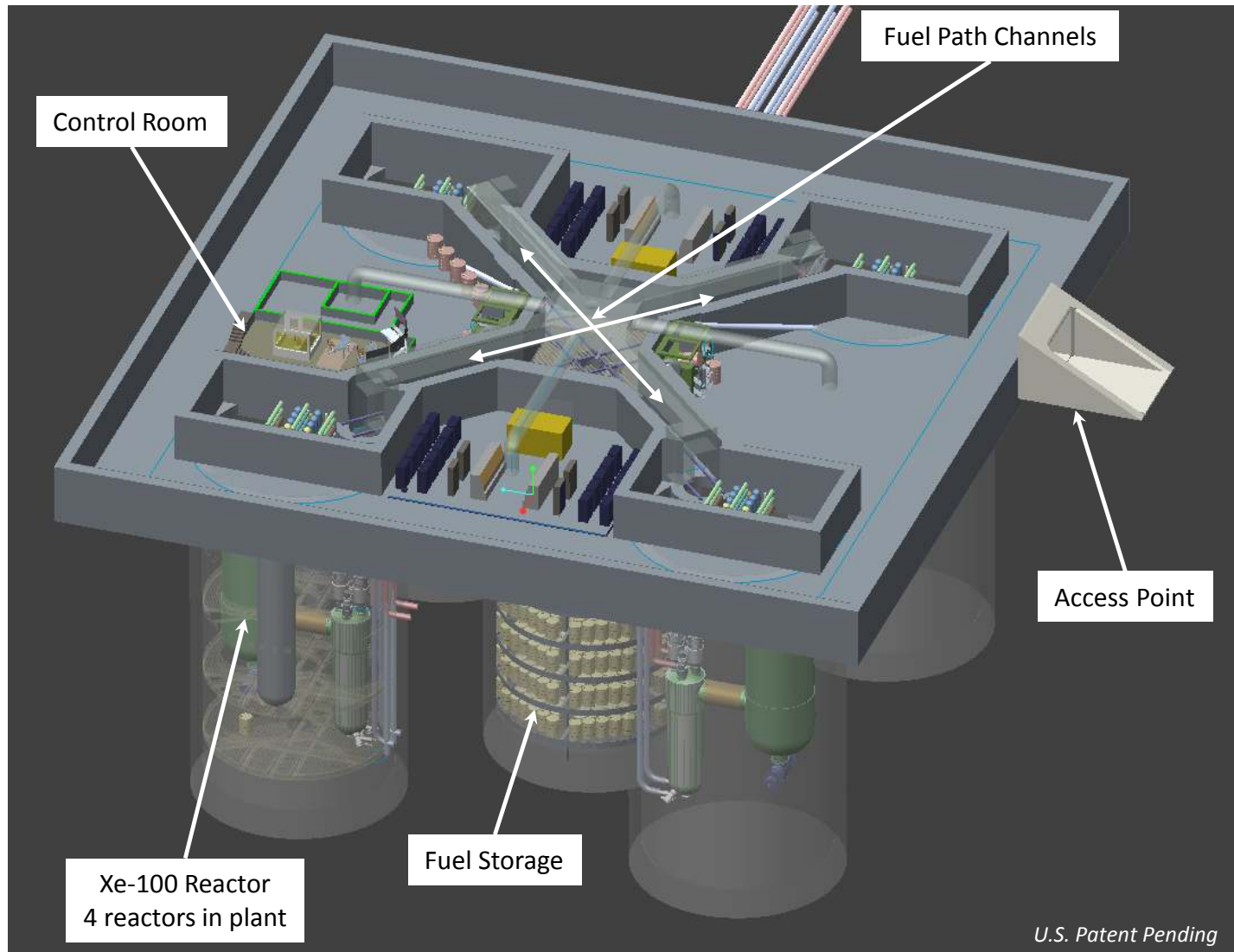


The **Xe-100** builds on 50 years of operating experience and leverages \$400+ million in fuel and graphite research by the U.S. Department of Energy

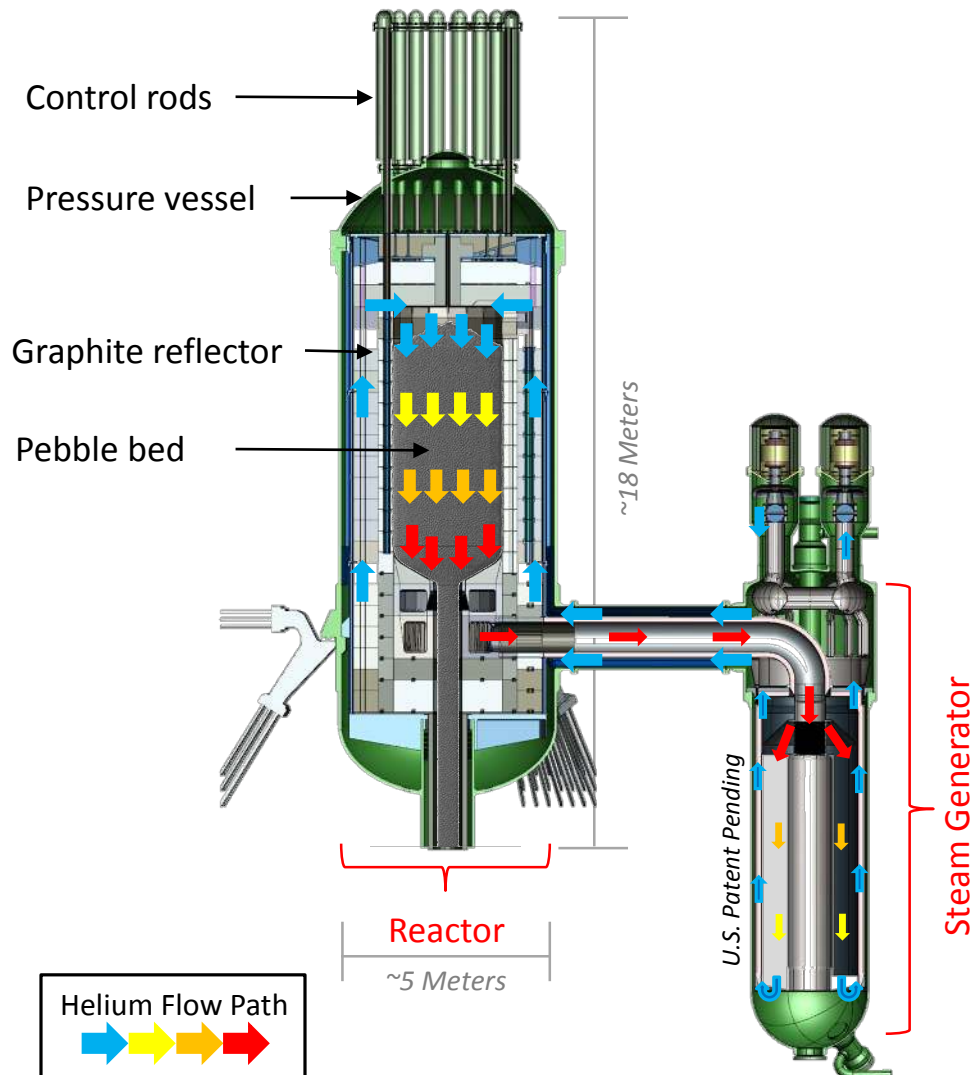
Compact, Low-Impact Nuclear



Underground Nuclear Island



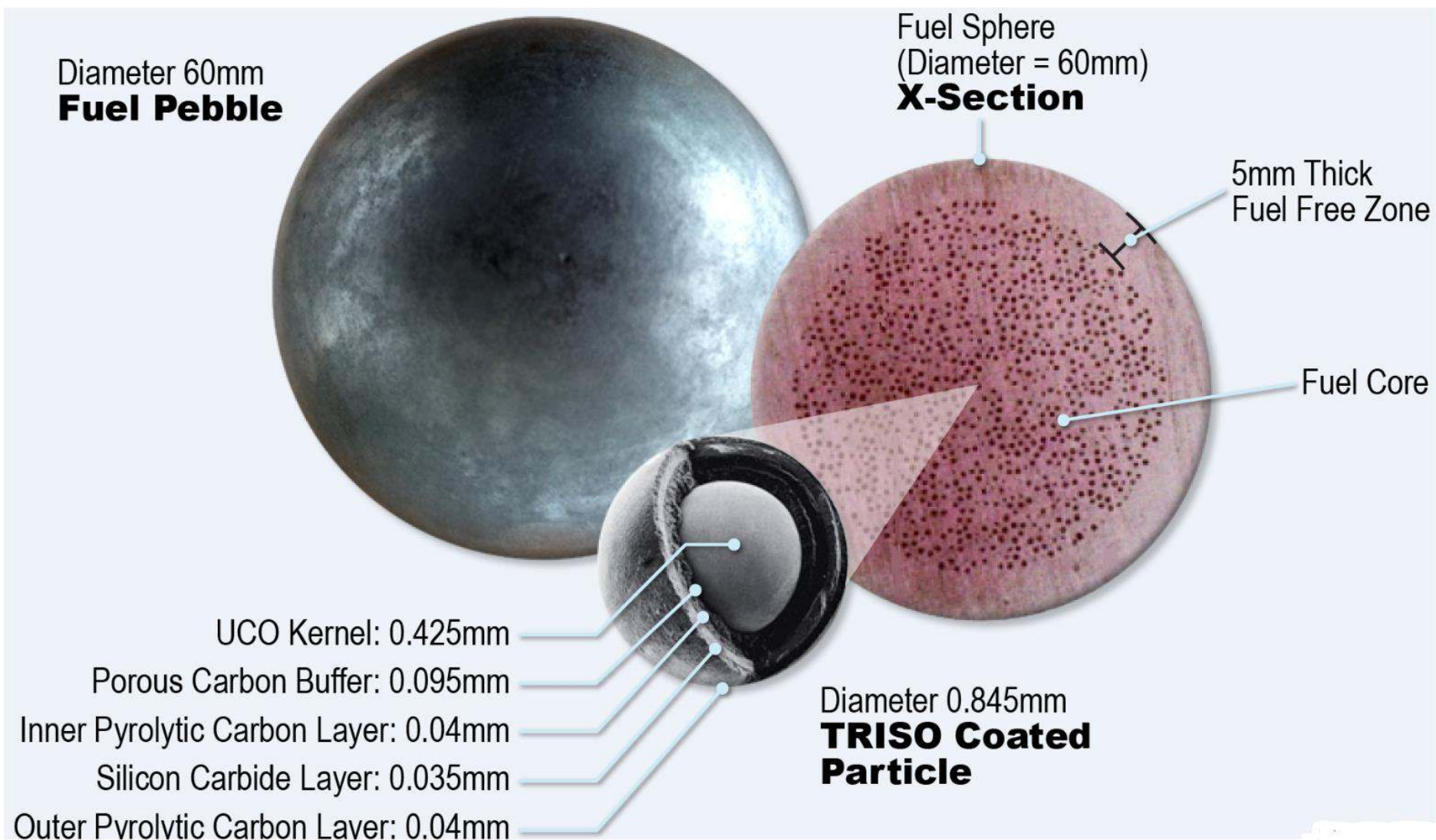
The Xe-100 Reactor Cannot Melt Down



Xe-100 Reactor Benefits

- Helium transports heat from the reactor to the steam generator; no cooling fluid required
- Reactor core design eliminates the possibility of meltdown
- On-line refueling allows for continuous operations
- Able to quickly respond to energy demands
- Used fuel is proliferation resistant

Fuel is the Key to Unsurpassed Safety



Concept of Functional Containment



Safety Concept: System of Independent Fission Product Barriers

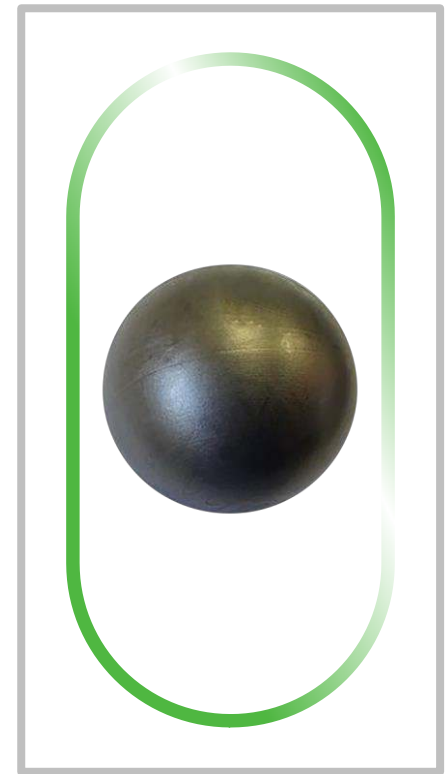
Pebble



Helium Pressure Boundary

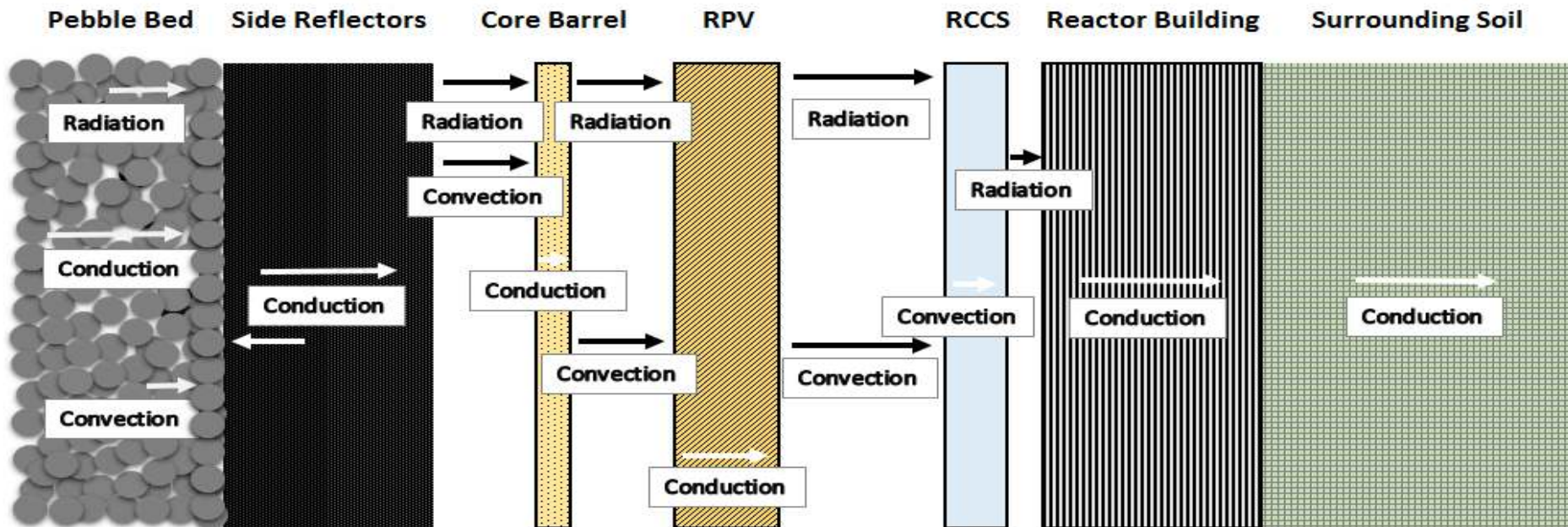


Reactor Building



Passive Heat Removal

- During a loss of normal forced cooling, with or without helium pressure, core heat is removed through passive means:
 - Conduction through the pebbles and side reflector
 - Convection and thermal radiation to the core barrel and RPV to the RCCS
 - Normal heat removal through reactor cavity cooling system (RCCS) by natural convection
 - Conduction through the concrete to the environment if the RCCS is not available



Promising Market Segments

X-energy has identified three market segments with requirements that are aligned with the Xe-100's unique benefits:



Government

- On-base, grid independent power source aligned with federal emissions reduction goals



Utilities

- Compact, ultra-safe capacity that will replace retiring coal-fired power plants in line with federal mandates

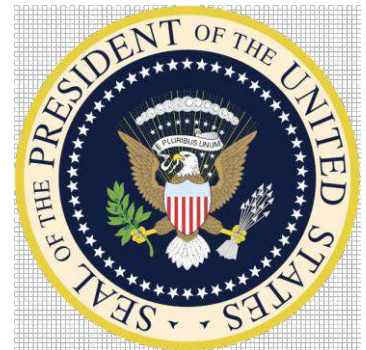


Industrial / Commercial Clients

- Nuclear that can support new industrial and commercial applications for the first time

Benefits Recognized by Federal Government

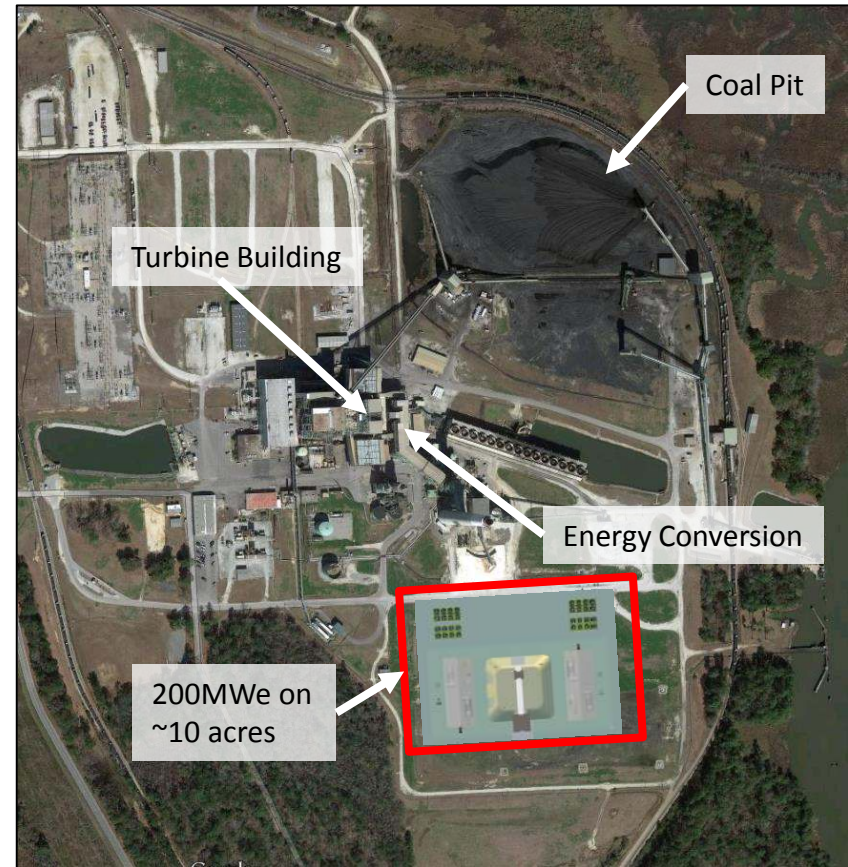
- **Department of Energy**: a recent Technical Review Panel on advanced reactor technology rated the Xe-100 favorably against competition
 - “...Xe-100 can be placed in close proximity to the power users due to its intrinsic safety that excludes the possibility of a core melt.”
 - “Xe-100 uses UCO fuel, is capable of reducing minor actinides in spent LWR fuel to less than 1%, and has the capability to reduce plutonium stockpiles.”
 - “...the X-energy pebble-bed concept...[has] greater readiness for licensing than the other concepts.”
- **Department of Defense**: the FY15 Defense Appropriations Bill urged the Secretary of Defense to study pebble bed reactors at military installations
 - The Secretary was specifically urged to consider expedited licensing paths and development strategies
- **Executive Branch**: Executive Order 13693 (March 19, 2015) classified small nuclear reactors as an “alternative energy source” for the first time



Exciting Feasibility Studies Underway

X-energy has partnered with utilities to study the exciting applications of the Xe-100

- Feasibility Study:
 - Joint study with a major U.S. utility
 - Confirmed the technical and economic feasibility of using the Xe-100 to expand an existing coal-fired station
 - The Xe-100 complemented the utility's long-range resource planning and was one of the lowest-cost clean-energy solutions available



Contact Information



X Energy LLC

7701 Greenbelt Road, Suite 320
Greenbelt, MD 20770

Ralph Loretta
(571) 236-2461

Jeff Harper
(301) 641-7906

Pete Pappano
(301) 841-8152