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The NuScale Microreactor

TRTR & IGORR Research Reactor Conference

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NuScale Microreactor Technology

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Features

SMARTER

- Designed with simplicity in mind.
- Quick to deploy, easy to operate, highly efficient, and scalable to fit a variety of energy and research educational needs.

CLEANER

- Produces no greenhouse gas emissions during operation.
- Has a small environmental footprint.

SAFER

- Inherent protection rather than system actuation enables a safe and reliable microreactor by removing the need for mechanical reactivity control systems and other safety-related protection systems.

COST COMPETITIVE

- Fewer and simpler components leads to more a economic design.
- Design is scalable for a range of power output.

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Applications

UNIVERSITY RESEARCH AND POWER

MINING

SPACE POWER

REMOTE OFF-GRID COMMUNITIES

PERMANENT MILITARY INSTALLATIONS.

DISASTER RELIEF

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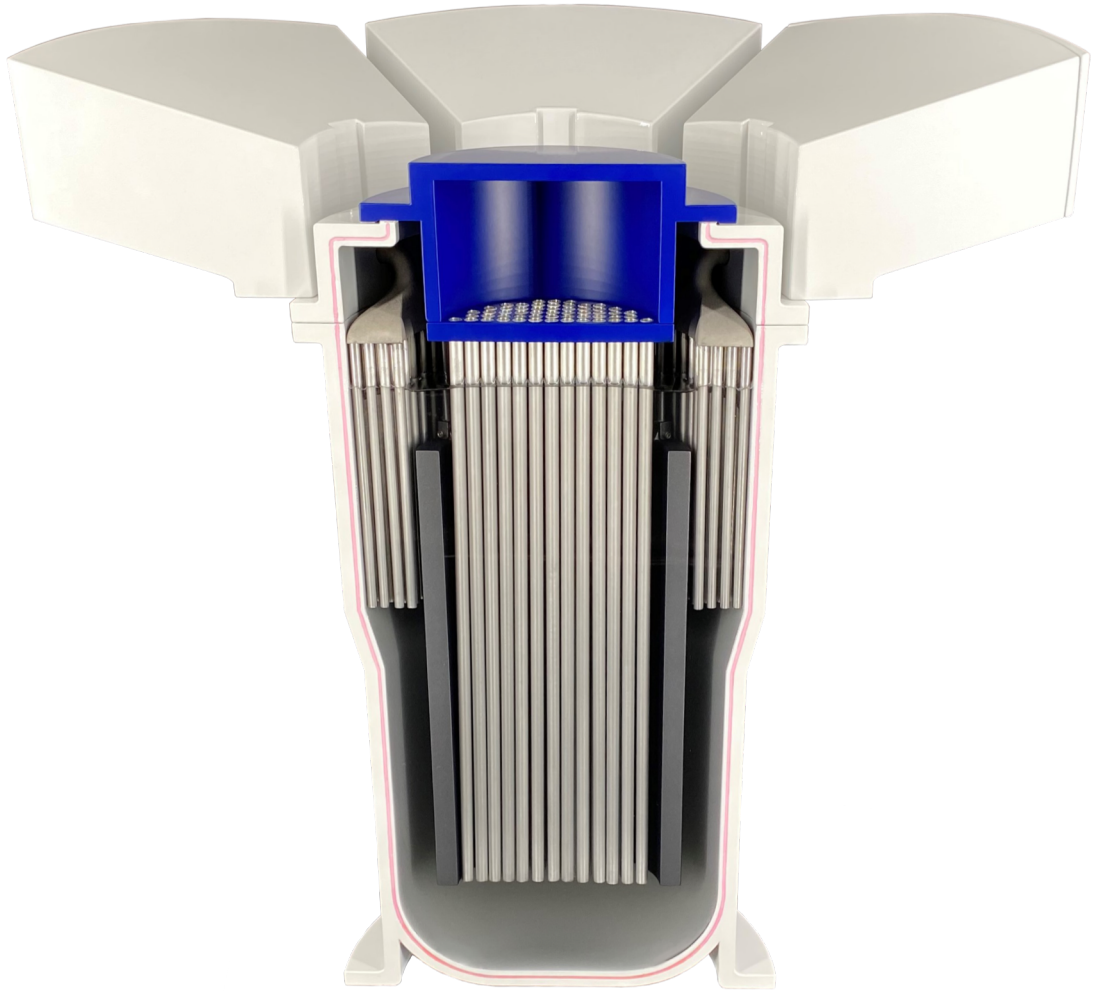
NuScale Microreactor Technology

- Non-light water thermal reactor generating electricity and heat.
- Design to be small, compact, highly reliable, fully automated, and rapidly deployed.
- 2 to 10 MWe for terrestrial application.
- Refueling cycle every 10 years.
- Liquid uranium alloy fuel (LEU or HALEU) and a liquid moderator-coolant.
- Passive heat transfer:
  - From fuel to liquid-moderator coolant via natural circulation.
  - From liquid moderator-coolant to power conversion.
  - Heat pipes provide a versatile heat exchange interface with different power conversion options (Brayton cycle and/or Thermophotovoltaic cells).
- The system operates at low pressure, eliminating the need and associated cost and licensing effort for pressure vessels.



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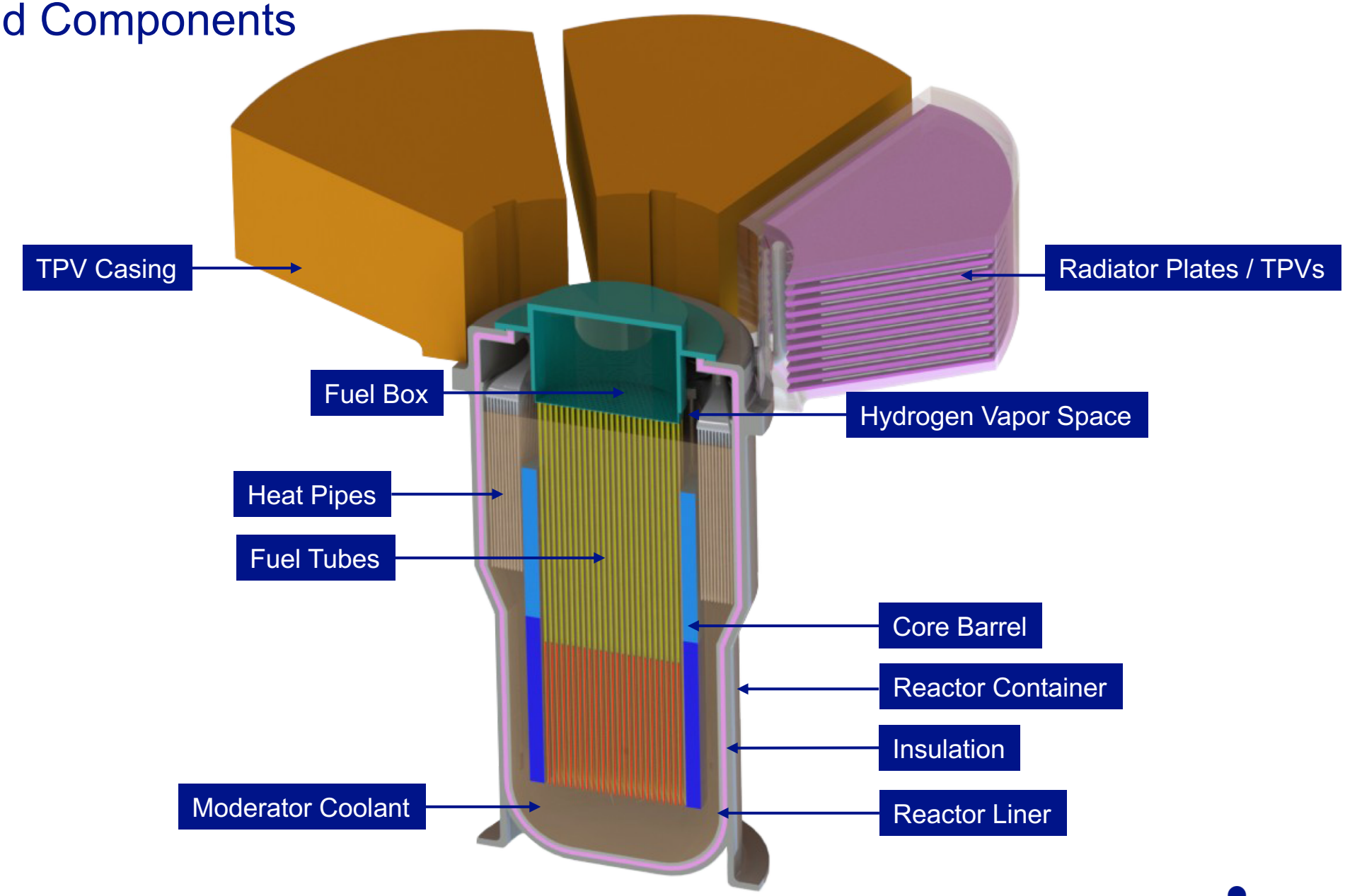
Key Systems and Components



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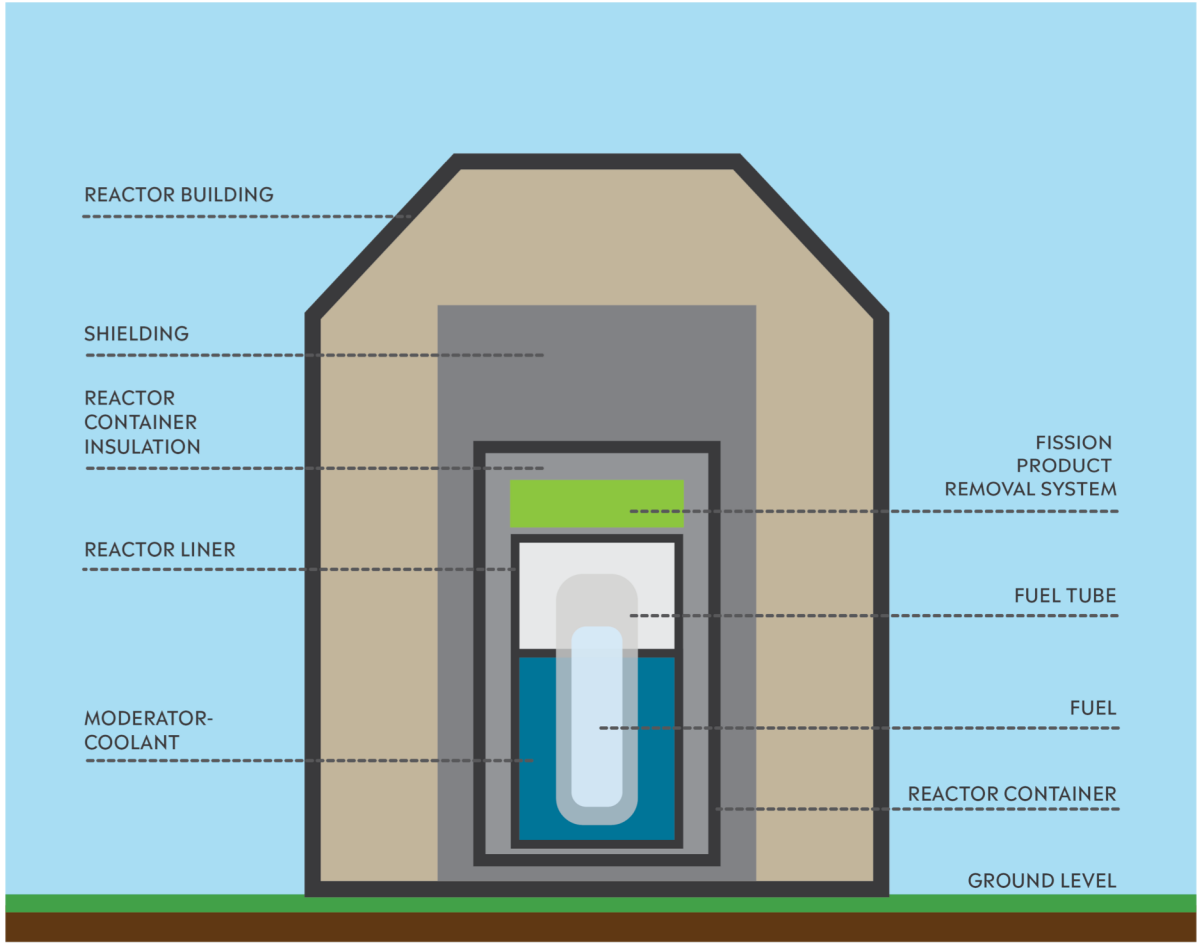
Safety Features



- Inherent and passive reactor protection, reactivity control, and heat removal.
  - Electric power is not required to shut down.
  - Electric power is not required to indefinitely maintain the safety of the reactor.
- Reactivity is controlled through the addition or removal of hydrogen (no control rods or moveable reflector drum).
- Small normal operation and accident source term (site boundary emergency planning zone).
- Continuously operating passive fission product removal system further reduces source term.

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NuScale MRX Research Reactor Deployment

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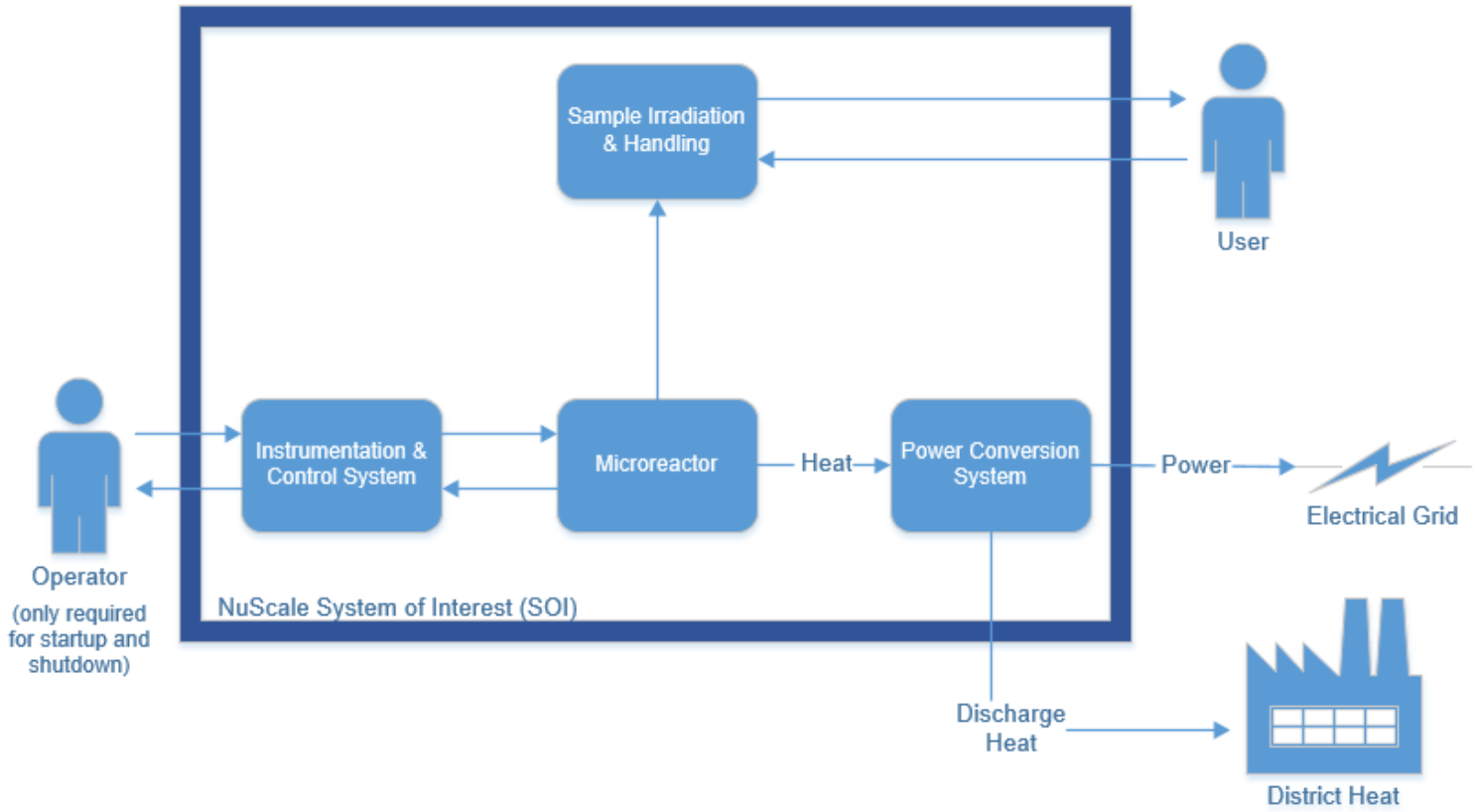
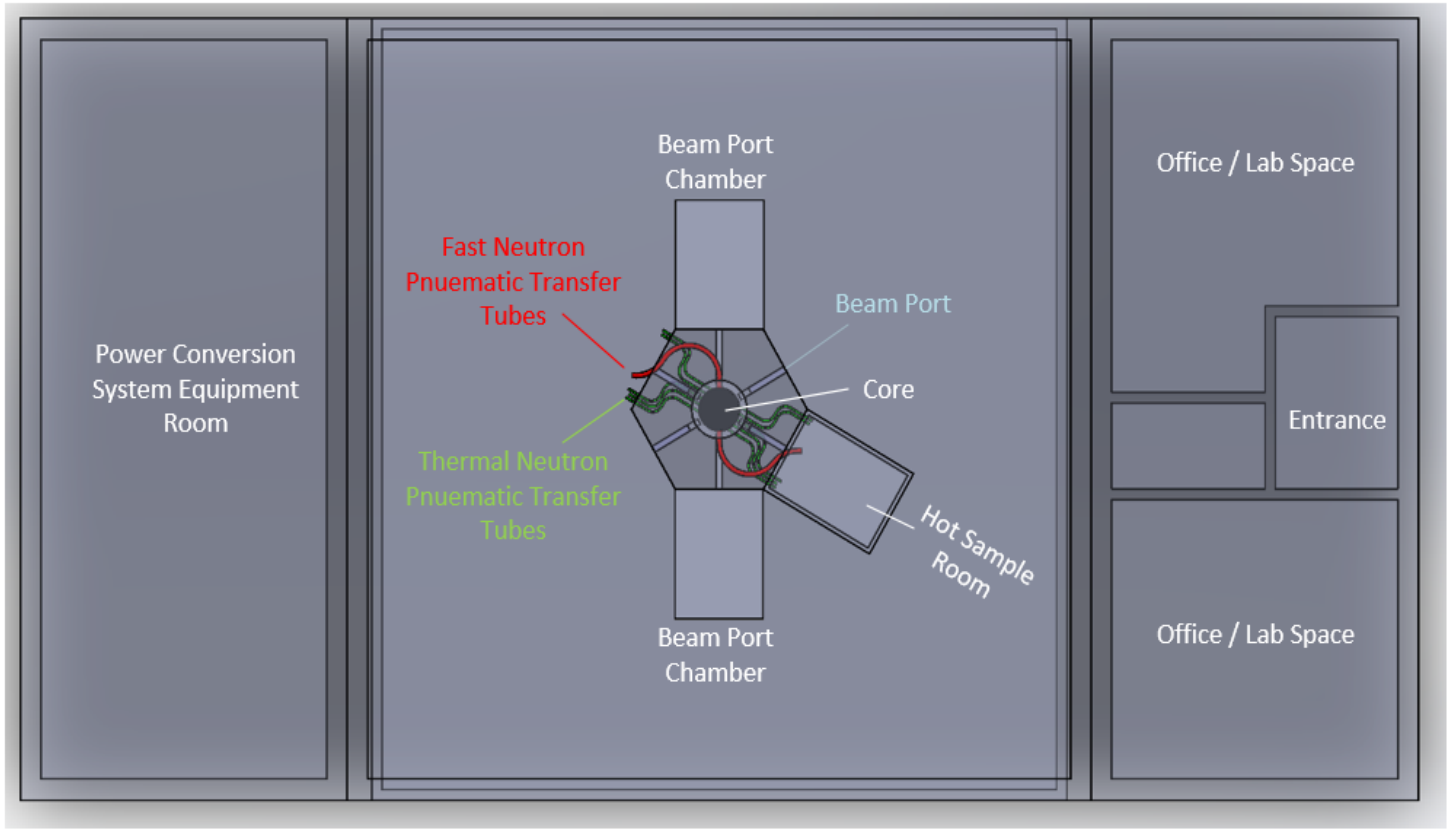
Co-Generation Opportunity



- Co-generation capabilities allow the MRX to simultaneously produce:
  - Non carbon-emitting electricity
  - District heating
  - High-value radioisotopes

Reactor Facilities

- In-Core
  - All pneumatically/remoting handled
  - Discrete epithermal and thermal regions
- Beam Ports
  - Up to 6 arranged hexagonally
- Maximum flux magnitude goals on the order of $10^{14}\ \frac{n}{cm^2-s}$



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