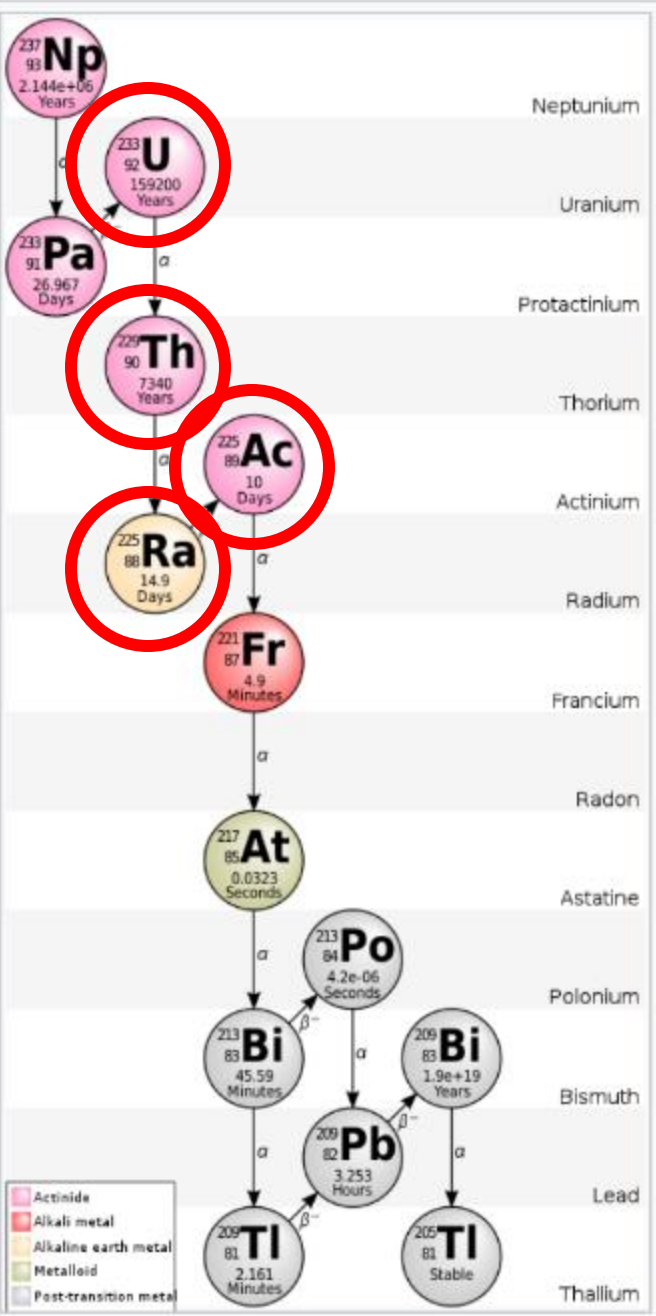
TerraPower

Scott Claunch

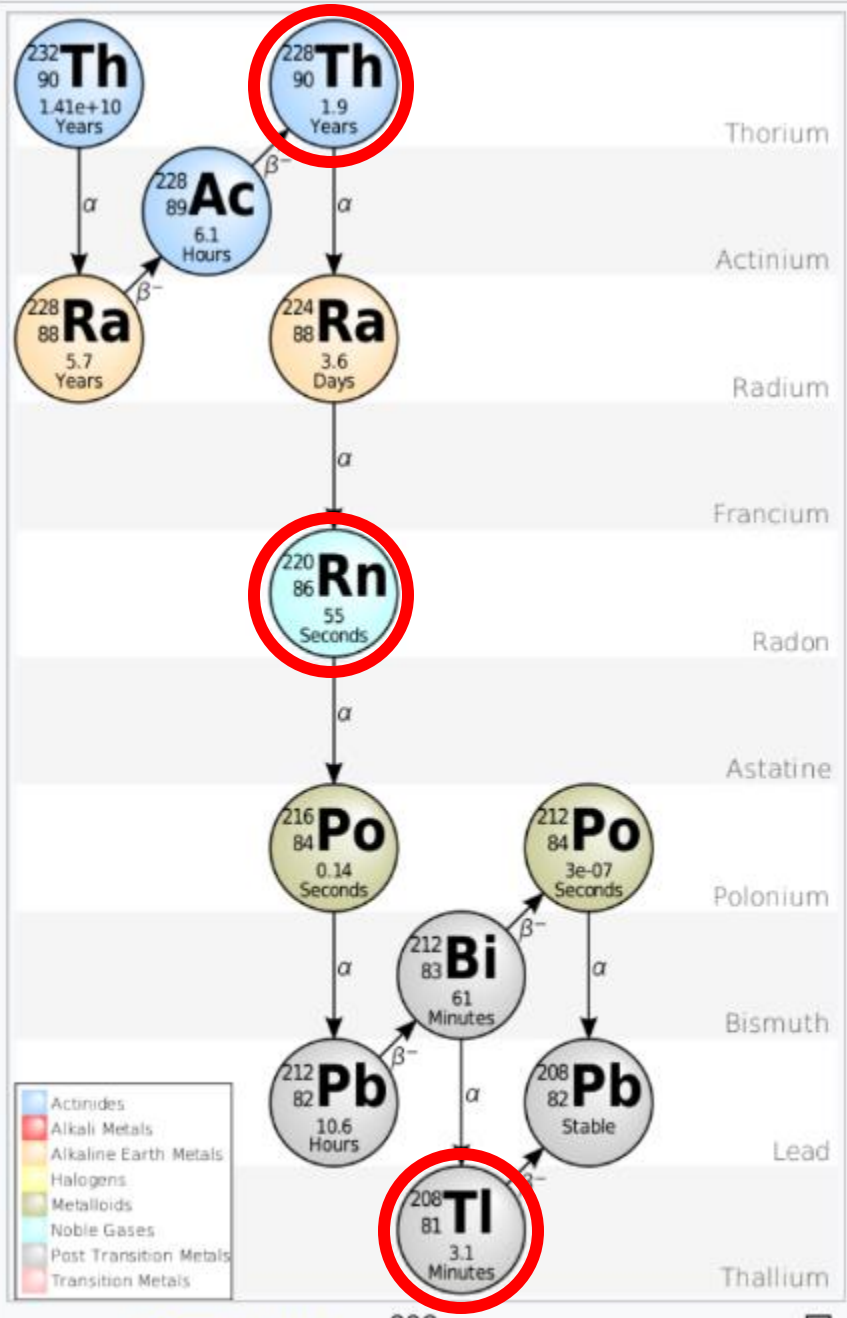
President, TerraPower Isotopes

July 30, 2025

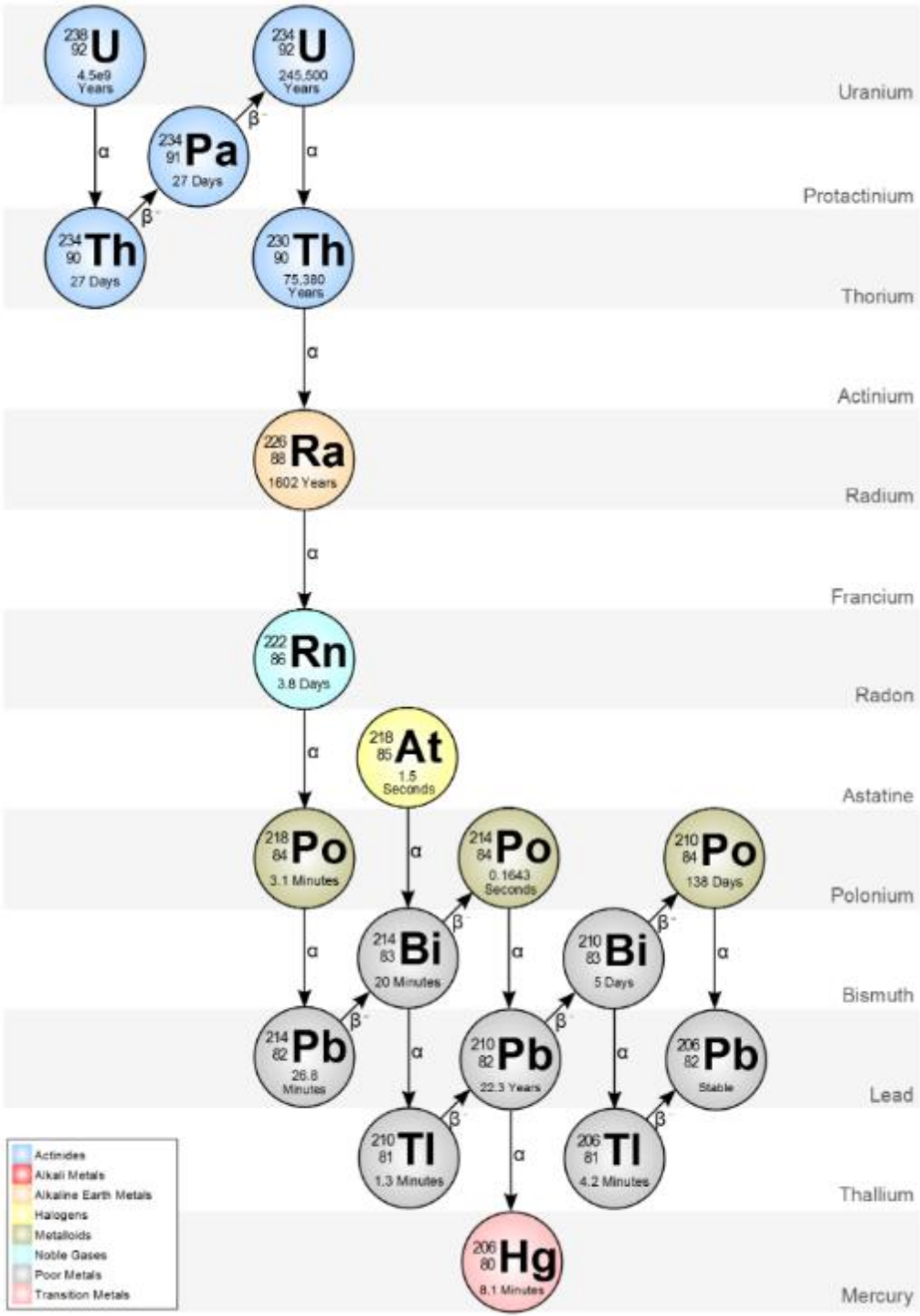
TerraPower



Actinium-225 is part of the 4n +1 chain (the neptunium series).



The 4*n* decay chain of ^{232}Th, commonly called the "thorium series"



TerraPower and Mirion have many opportunities to work together

MIRION MISSION

To harness our unrivaled knowledge of ionizing radiation for the greater good of humanity

TerraPower's ambition is to help ***solve the world's toughest problems in energy, climate and human health*** through innovative nuclear technology.

TerraPower's Business Needs Span Most of Mirion's Product Offerings

- Radiation Monitoring Solutions
- Fission Detection Solutions
- Dosimetry Services
- Gamma Spectroscopy
- Dose Calibration
- Alpha Spectroscopy
- Area Monitoring
- Contamination & Clearance Monitoring
- Facility Management Software
- Waste Management

Sample of Mirion Products

Source: 06/23/2025 Mirion Technologies Presentation to TerraPower Natrium

Founded 15+ Years Ago with the Mission of Spearheading Nuclear Innovation

TerraPower by the Numbers

Last Equity Raise	**U.S. Government Support Awarded** $2.0bn+	**Advanced Power Reactor Program submitted CPA[1] to NRC** 1st
Partnerships Announced Since Inception 40+	**Laboratory Space for Testing and Materials Development** 130,000 sq ft	**Pending and Issued Patents Globally** 822
Employees[2] ~600	**Engineers[3]** ~85%	**Employees with Ph.D.s** ~20%

Key Upcoming Milestones in the Next 12 Months

- ✓ Advancing discussions with two of the largest data center companies in the world
- ✓ Progressing the PPA agreement with PacifiCorp
- ✓ Energy Island construction start in Kemmerer, Wyoming
- ✓ TPI realizes revenue through its own channel, as well as Cardinal and RayzeBio

Excellence Through Board Leadership and Governance

Bill Gates
Co-Founder, Chairman
Co-Founder of Microsoft, co-chair of the Bill & Melinda Gates Foundation

Chris Levesque
President and CEO
More than 30 years of experience in the nuclear field

Kristine Svinicki
Board Member
Longest-serving member of the U.S. Nuclear Regulatory Commission (NRC)

David Scott
Board Member
Founder and president of the Investment Diplomacy Group (IDG)

Bill Pitesa
Board Member
Former Chief Nuclear Officer, Duke Energy

Thomas Kuhn
Advisor to the Board
30+ years as President and CEO of the Edison Electric Institute (EEI)

Nathan Myhrvold, Ph.D.
Co-Founder, Vice Chairman
Founder and CEO of Intellectual Ventures

John Gilleland, Ph.D.
Co-Founder, Chief Technical Officer
Founded and served as the CEO of Archimedes Technology Group

Mohamed Al Hammadi
Board Observer
Led the Emirates Nuclear Energy Corporation (ENEC) since 2008

Moohwan Kim
Board Observer
Executive Vice President and Head of Green Investment Center of SK Inc

Ralph Izzo
Board Observer
Previously served as Chairman, CEO, President and Executive Chair of the Board of Directors at PSEG

Notes:
1 Construction Permit Application
2 As of April 2024
3 Includes Engineering, IT, Lab Operations, Reg Affairs and Licensing

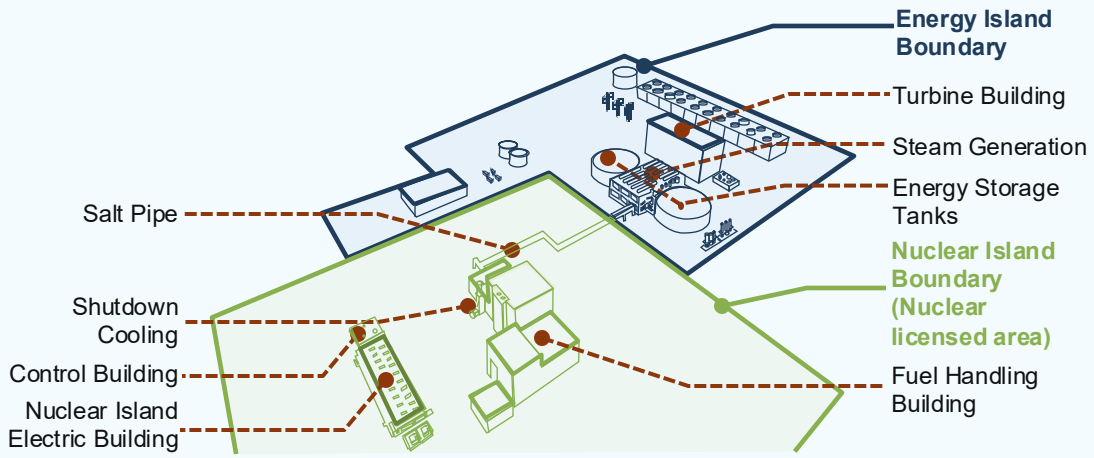
Purpose-Built to Provide a Wide-Range of Nuclear Innovation Solutions

Natrium

TerraPower Natrium Technology – 4th Generation Reactor Design

- Natrium's advanced nuclear reactor design enables **simultaneous production of carbon-free electricity, heat and steam** to support the decarbonization of power and industrial sector
- Represents a new paradigm based on **simple and streamlined design, making it easier, faster and cheaper to construct** compared to all other reactor designs
- Provides **built-in gigawatt-scale energy storage** to balance growing intermittent renewables generation and provides critical **dispatchable zero-carbon generation**

Rendering of Demonstration Reactor



tpi TERRAPOWER ISOTOPES

TerraPower Isotopes – Using Radioisotopes to Target Cancer

- Born out of TerraPower's nuclear capabilities, TPI leverages Actinium-225 radioisotopes to help **develop next generation cancer treatments**
- **With exclusive access to** Thorium-229, TPI manufactures Actinium-225 at a **competitive advantage of cost, quality and scalability** using the Decay Method
- In January 2024, TPI successfully **shipped its first batch of Actinium-225 to multiple drug manufacturers**

Medical Radioisotope Manufacturing Process

Internal TPI production

Thorium-229 Source from Isotek

TPI produces Actinium using Decay Method

Actinium-225 Product

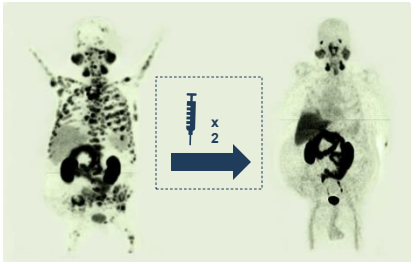
Ship to drug manufacturer

Biopharma Manufacturers the Drug

Ship to hospital or infusion center

Deliver Therapy to Patient at Hospital or Infusion Center

Complete Response in TATCIST Trial of ^{225}Ac based Therapy



Radiographic assessment (by PSMA-PET) showed significant improvement in visual tumor lesions

TerraPower Technology At a Glance

The Natrium Technology

The Natrium reactor is a 345-megawatt sodium fast reactor coupled with TerraPower's breakthrough innovation – a molten salt integrated energy storage system, providing built-in gigawatt-scale energy storage

Molten Chloride Fast Reactor

TerraPower's Molten Chloride Fast Reactor (MCFR) project expands the ability of nuclear reactor technology to decarbonize the economy in sectors including maritime and electricity

TerraPower Isotopes

Born out of TerraPower's nuclear capabilities, TPI leverages Actinium-225 radioisotopes to help develop next generation cancer treatments.

TPI produced Ac-225 is intended to be used as starting material for further manufacturing processes and, as starting material is not manufactured in accordance with current good manufacturing processes.

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WE ARE
TERRAPOWER

First, Who is this Person?

A Proud Graduate of the University of New Mexico

The Natrium® Technology

The Natrium Reactor Program Mission

COST-COMPETITIVE, FLEXIBLE TECHNOLOGY FOR THE CLEAN ENERGY FUTURE

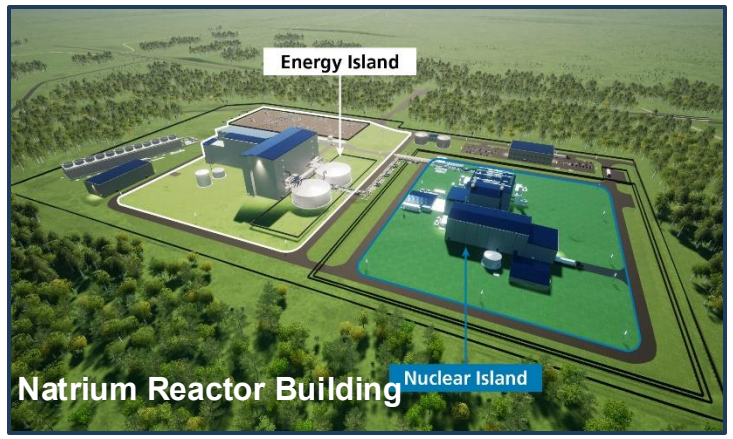
- Natrium Reactor and Integrated Energy System
  - **safer**, *simpler*, easier and ***less costly*** to construct,
  - ***less expensive*** to operate, and
  - able to provide energy that is competitive with fossil fuels and *complementary to renewables*.
- Natrium's focus is to enable the commercialization and widespread deployment that are crucial to the health of the nuclear industry and long-term U.S. energy leadership.

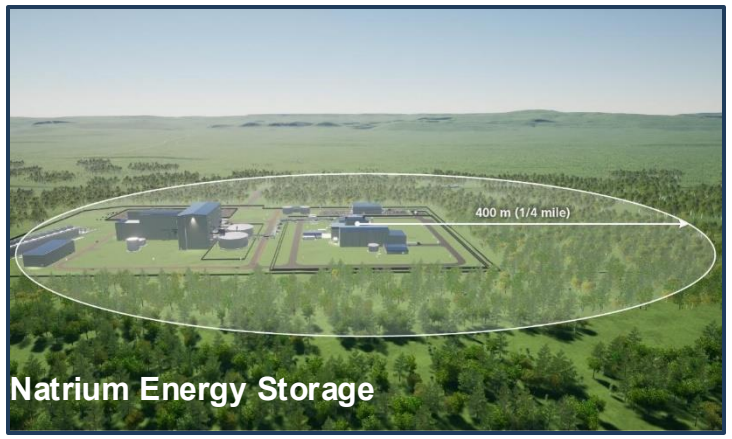
Groundbreaking Public-Private Partnership

- TerraPower wins U.S. DOE's Advanced Reactor Demonstration Program in Oct. 2020
- U.S. DOE committed to providing nearly *$2 billion* and TerraPower and partners will match dollar-for-dollar
- Demonstrate the ability to design, license, construct, startup, operate Natrium reactor
- Build the supply chain for sodium fast reactors in the United States
- Infrastructure Act, passed by the Senate and the House secures ARDP demo funding for 5+ years

U.S. DEPARTMENT OF ENERGY

The Natrium Technology



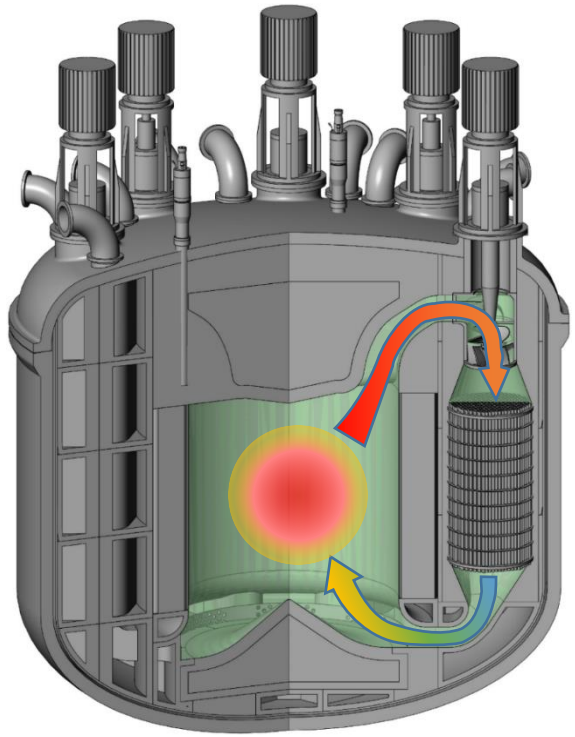


- Couples a 345 MWe Gen IV sodium-cooled fast reactor with gigawatt-scale energy storage that can ramp to 500 MW for 5.5+ hours
- Larger than any commercial battery available today
- Safe and resilient by design - low pressure system, always on passive cooling, sodium coolant provides tremendous safety benefits
- Modern operating model, small EPZ
- 35% less water usage in the cooling process than current light water reactor technologies
- 30% more efficient thermal cycle

MCFR

Molten Salt Reactors (MSRs), including the Molten Chloride Fast Reactor (MCFR) have distinguishing features

- MSRs use liquid salt fuel
- The liquid fuel flows through the core
- Heated salt rises
- Heated salt expands

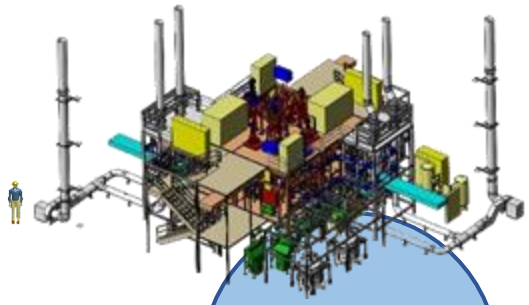


- Low pressure — **Cost ↓**
- Salt synthesis vs. solid fuel fabrication — **Cost ↓**
- Online refueling — **Avail.↑**
- High grade heat — **Revenue ↑**
- Fast spectrum w/ little processing — **Cap cost ↓**

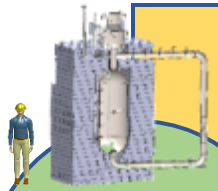
Development Pathway for MCFR

= non-nuclear facility

= nuclear reactor/facility



IET Facility



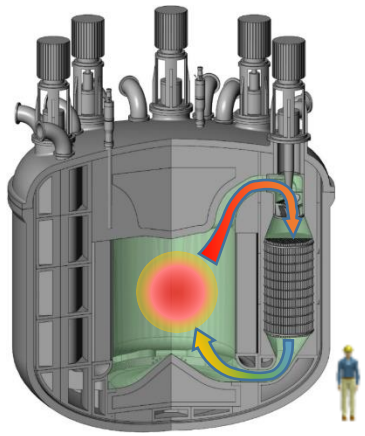
MCRE 150 kWt

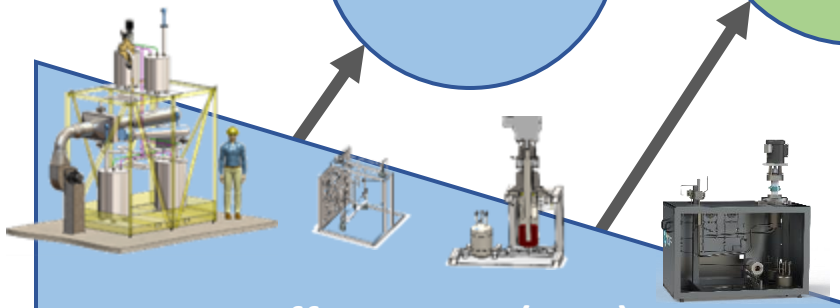
HALEU Demo Reactor (30-180 MWt)

Delta Program:
Salt Props, Synthesis & Purification
Materials Selection
Irradiation Studies
Extended IET Operations
Component Development
Remote Maintenance
Safeguards/Non-Proliferation
Waste Management
Demo Conceptual Design
Licensing
…

MCFR Grid-scale Product
350-1200 MW_e

MCFR Small-to-Mid-scale Product
30-300 MW_e
(w/o component scale-up)

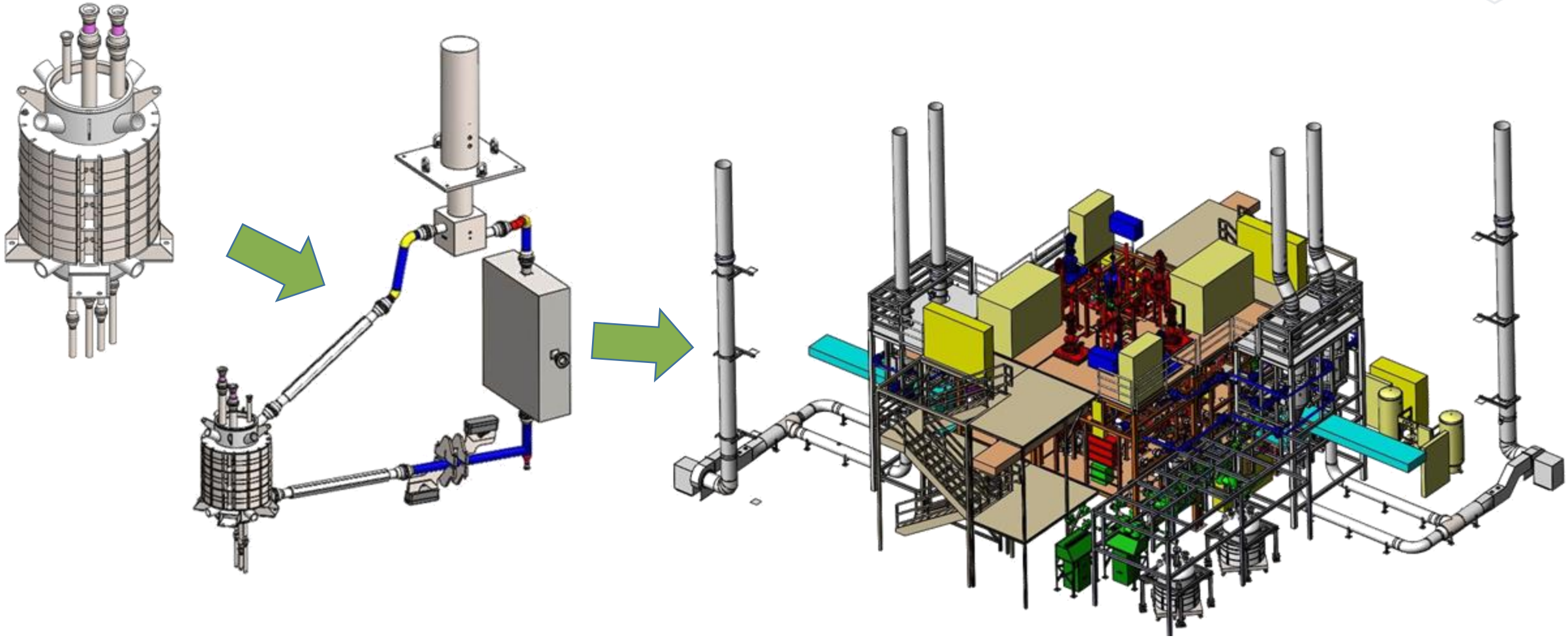




Separate Effects Tests (SETs)

2020 – 2025 → 2026 – 2033 → Mid-2030s

The IET is the world's largest chloride salt system; it will be used to assist in thermal hydraulics validation

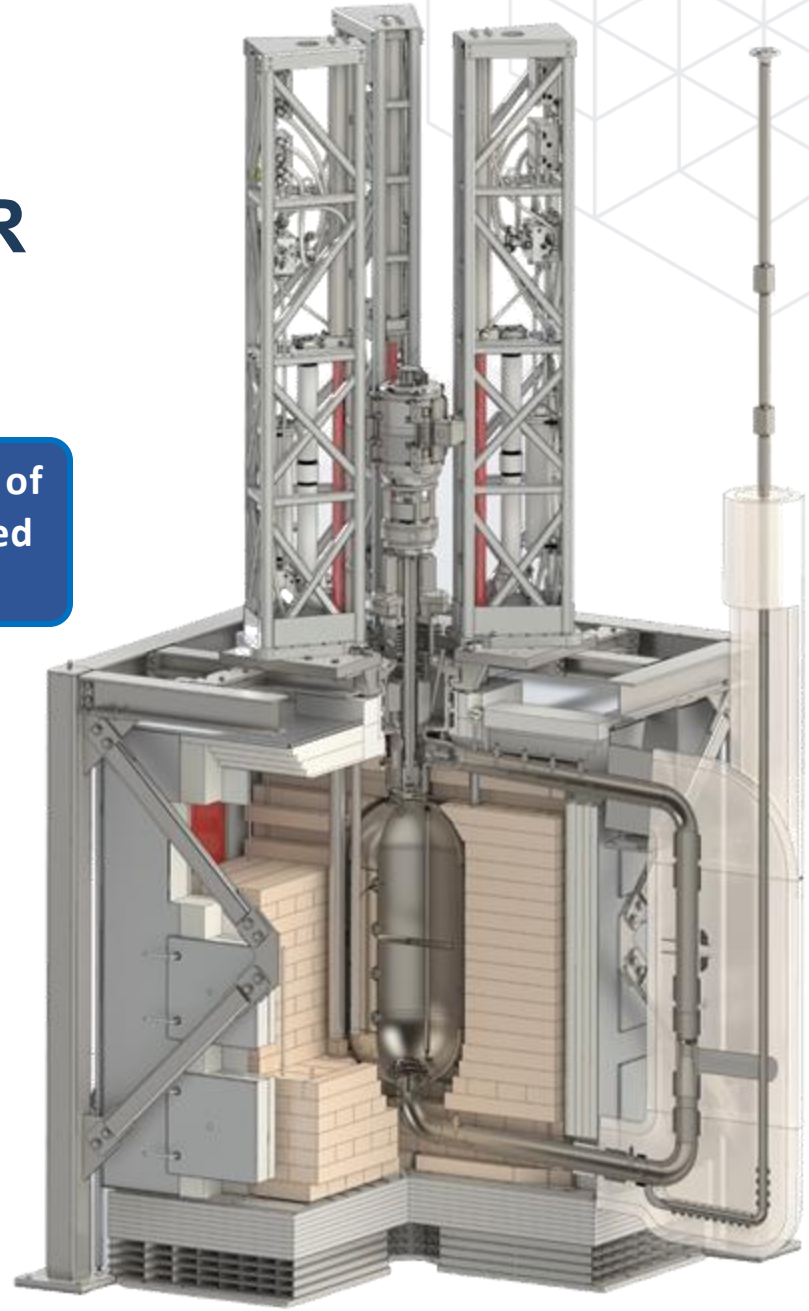


IET is teaching us on a daily basis (>200 documented “lessons learned”).

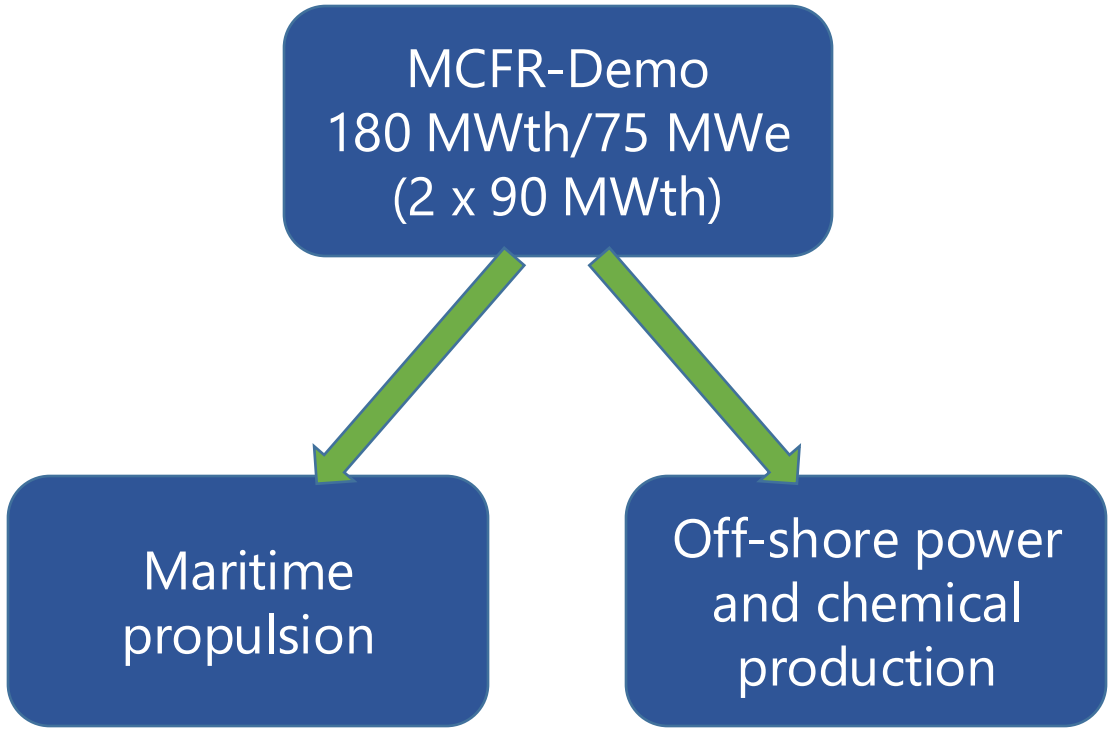
The Molten Chloride Reactor Experiment (MCRE) will be built at INL to validate MCFR reactor physics

Parameter	MCRE
Rated Thermal Power	150 kW
Design Temp	700°C
Design Pressure	500 kPa-g
Fuel Salt Mass Flow Rate	25-100 kg/s
Operating Temp	600-650°C
Fuel Salt Melting Temp	523°C
Fuel Salt Composition	NaCl-UCl_3 (67-33mol%)
Fuel Salt Volume	0.3 m^3
Fuel Salt / HEU Mass	~1000 kg / ~500 kg
Neutron Reflector	~82% dense MgO
Reactivity Control	Four ex-core B_4C elements
ASME BPVC	Section III Division 5

An electrically-heated Mockup of MCRE will be built and operated in our Everett lab – 1Q2026.



MCFR-Demo will be suitable for maritime applications

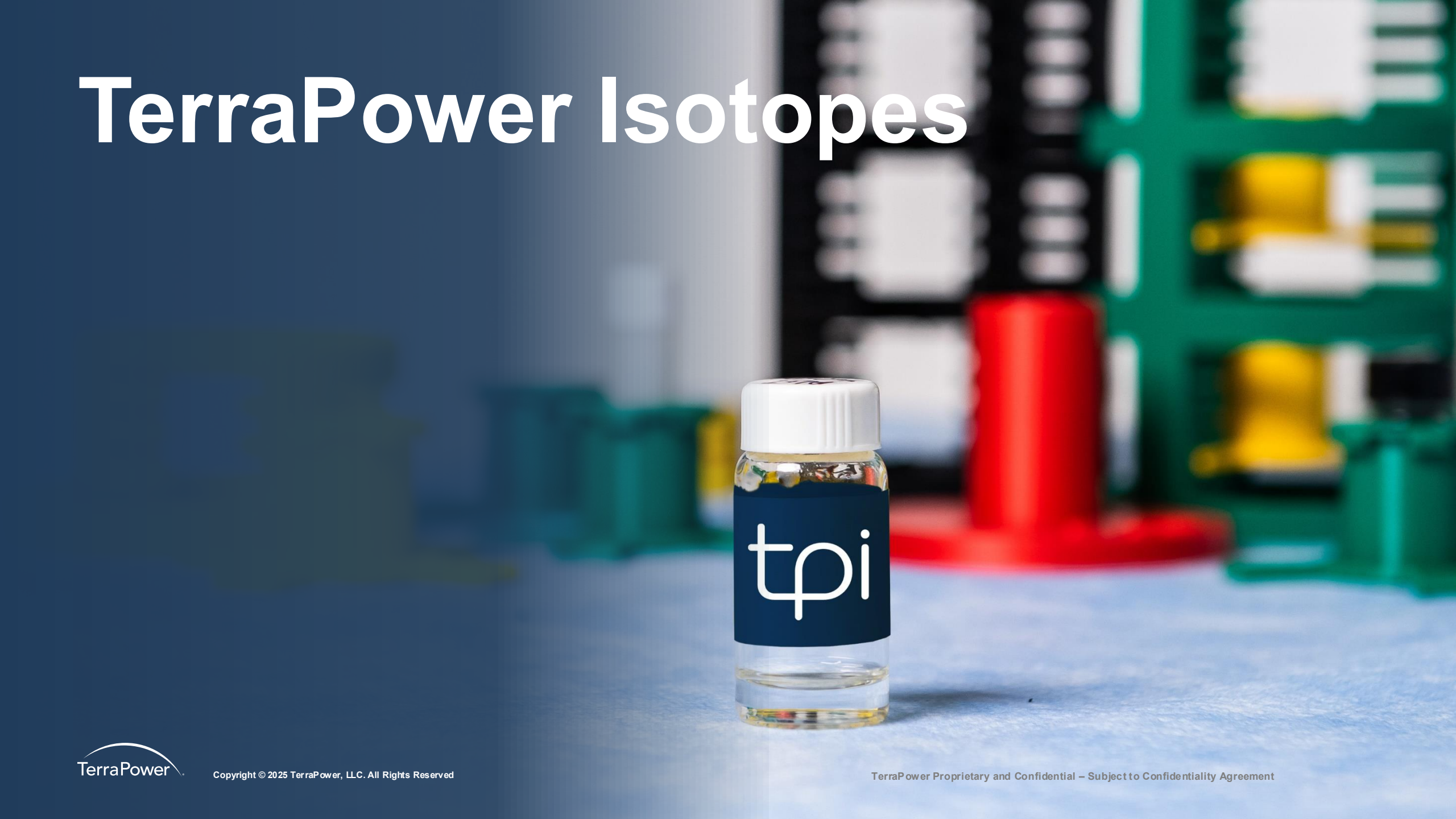


- Fleet of MCFR-D plants
- 20 full-power-year lifetime
- Small Emergency Planning Zone (EPZ)
- Able to go into port

- Fleet of MCFR-D plants
- 75 MWe for starters
- Subsequent scale up to 300-350 MWe

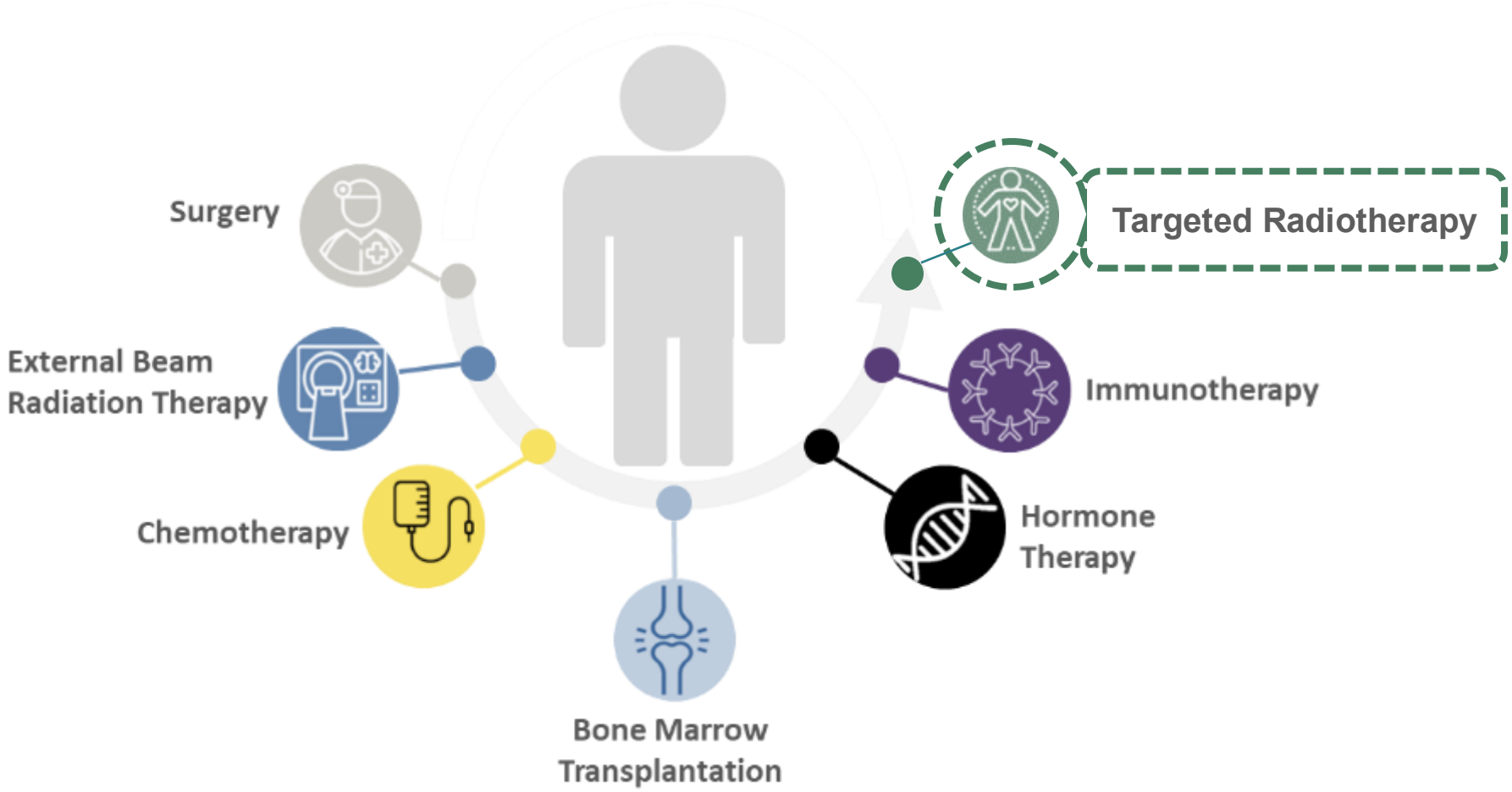
- ✓ Simple Design
- ✓ Extensive Testing Campaigns
- ✓ Inherent & Passive Safety
- ✓ Safety & Safeguards by Design
- ✓ Simple Fuel Synthesis & Qualification
- ✓ Fuel Flexibility & Reuse
- ✓ High Thermal Efficiency
- ✓ Low System Pressure
- ✓ High Availability
- ✓ Load Following
- ✓ Compact Size
- ✓ Small EPZ for insurability

TerraPower Isotopes



TerraPower

Cancer Treatment Evolution



National cancer-attributed medical care costs in the U.S. exceeds $208 Billion in 2020

Source: National Cancer Institute. https://progressreport.cancer.gov/after/economic_burden

First Some Definitions

Nuclear Medicine is the **use of radioactive materials inside the body** to see how organs or tissue are **functioning** (for diagnosis), or, **to target and destroy** damaged or diseased organs or tissue (for treatment).

A **radiopharmaceutical** is a **radioactive drug** used for **diagnostic** or **therapeutic** purposes in nuclear medicine.

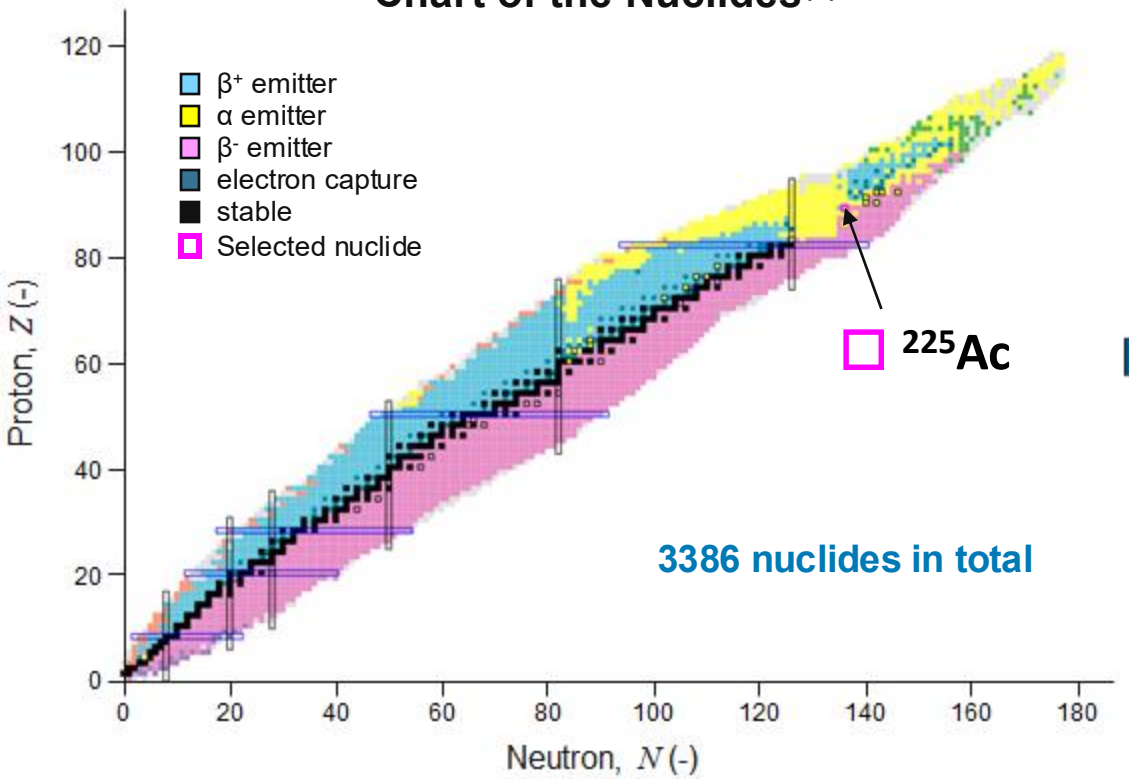
Targeted Radiotherapy, also known as molecular radiotherapy, is **a type of systemic radiation therapy** used to treat advanced prostate cancer or gastroenteropancreatic neuroendocrine tumors (GEP-NET).

Source: Cancer.gov, Cleveland Clinic.org

Landscape of Alternative Targeted Alpha Radiotherapy Isotopes

Hypothesis: The list of viable alternative isotopes to Ac-225 is very short. Nuclear physics is constraining, as there are not many alpha emitters, and few decay chains with suitable properties.

Chart of the Nuclides[1]



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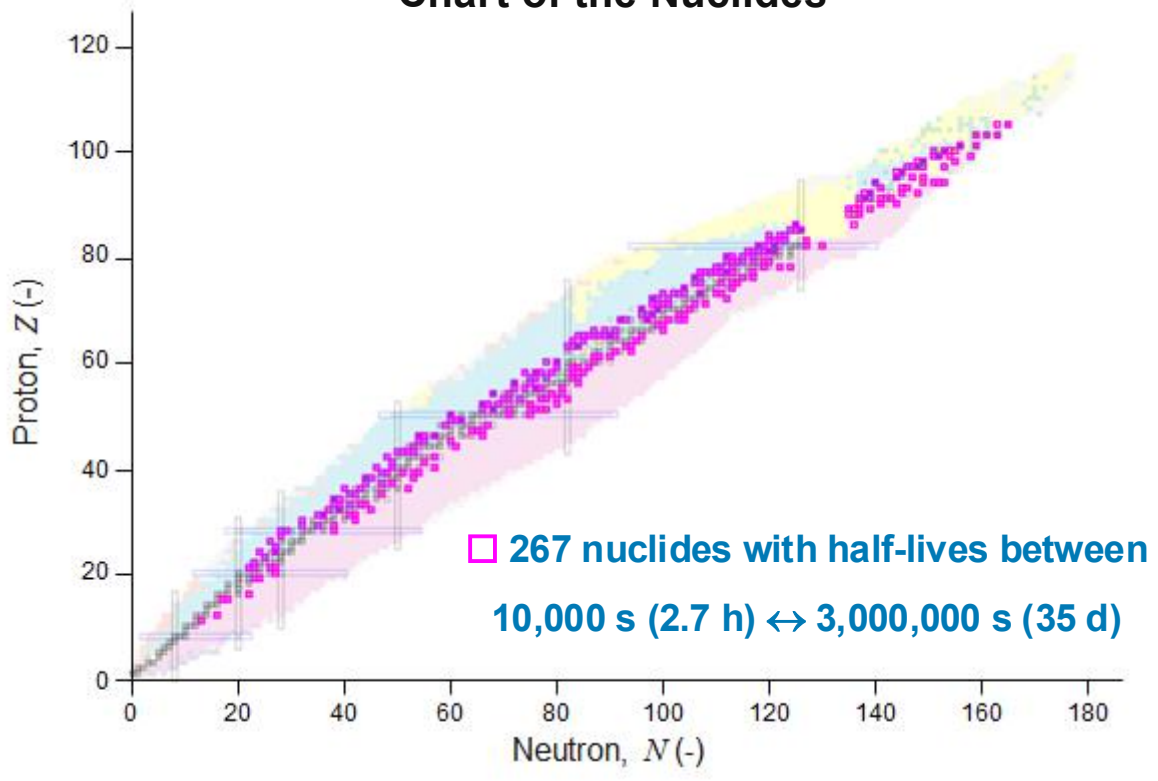

(1) National Nuclear Data Center, information extracted from the NuDat database, https://www.nndc.bnl.gov/nudat/

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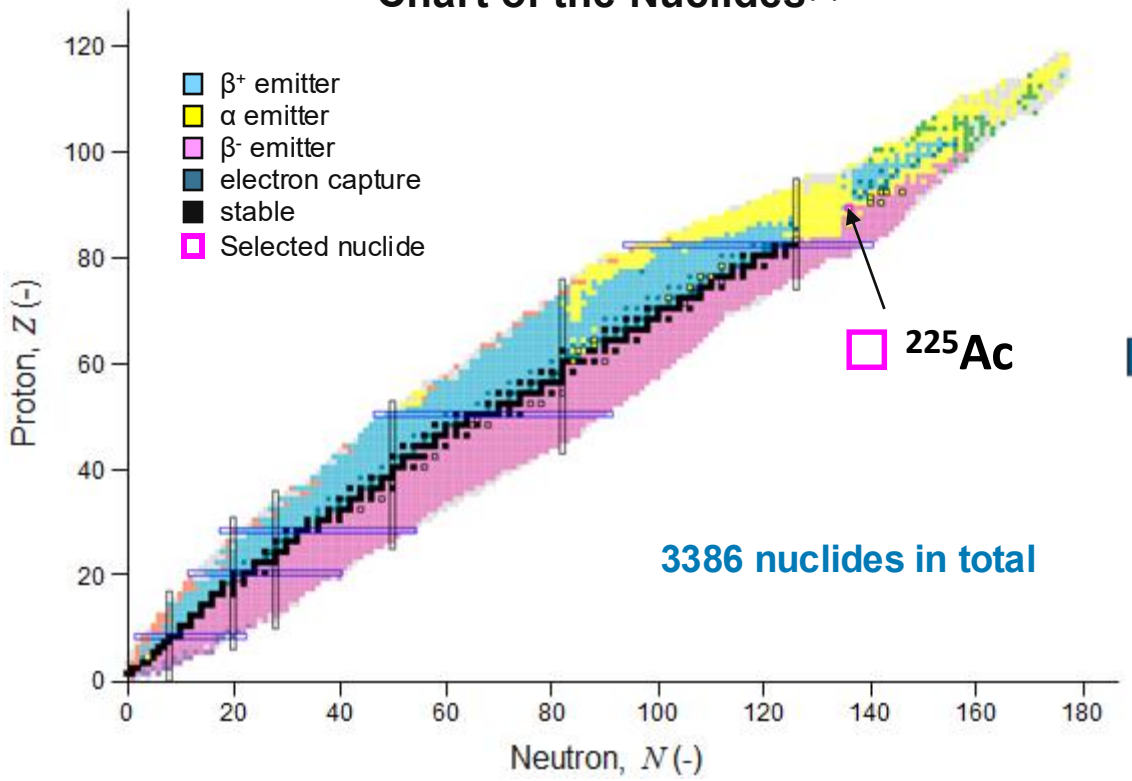

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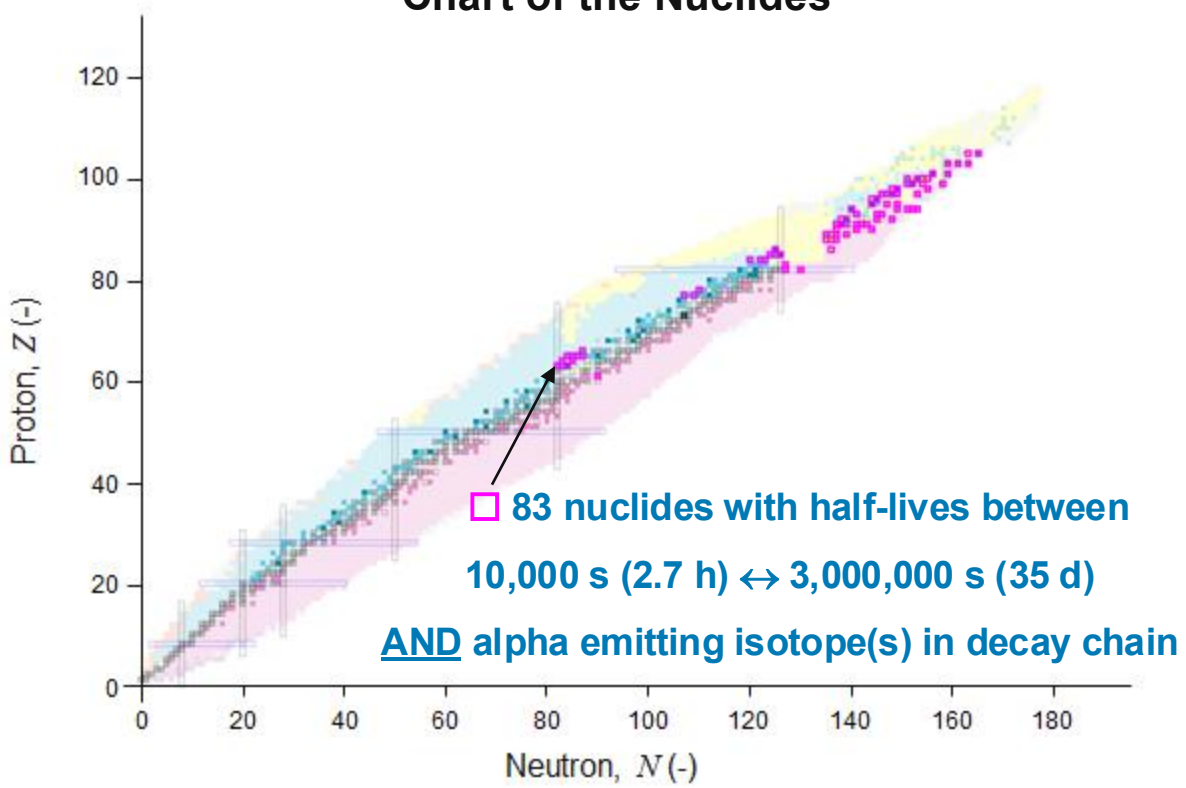

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There are many other isotopes that might have potential use in TAT

Possible, but with issues

- Tb-150
- Dy-152
- Pb-209
- Bi-210
- Po-204
- Po-206
- Po-207
- At-207
- At-208
- At-209
- **At-210** (1)
- **Rn-222** (1)
- **Ac-228** (2)
- Th-226
- Th-231
- Th-234
- Pa-228
- Pa-229
- Pa-230
- Pa-232
- Pa-233
- U-230
- U-231
- U-237
- U-240
- **Th-227** (3)

More promising

- Tb-149
- Tb-151
- Pb-211
- Ra-224
- Ra-225
- Ac-224
- Ac-226

Most promising

- Ac-225
- Ra-223
- At-211
- Pb-212
- Bi-212
- Bi-213

(1) Decays to Po-210.
(2) Long lived alpha emitting daughter (Th-228).
(3) Calcium analog.

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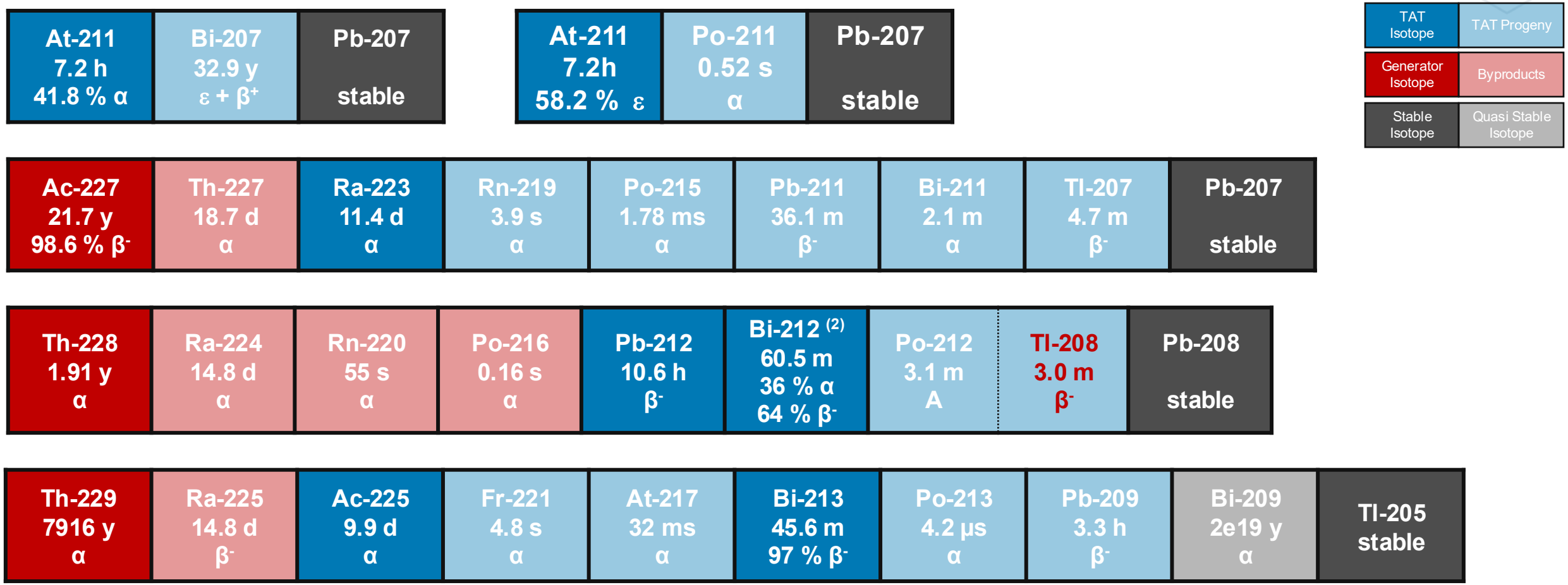
Landscape of Alternative Targeted Alpha Radiotherapy Isotopes

Hypothesis: **The list of viable alternative isotopes to Ac-225 is very short. Nuclear physics is constraining, as there are not many alpha emitters, and few decay chains with suitable properties.**

Factors Determining Viability of Isotopes for Targeted Radiotherapy (TRT)

1. **Half-life**: Is the half life long enough to manufacture and ship, but short enough that the extended lifetime of progeny in the patient after treatment does not create challenges from safety / waste perspective?
2. **Method of production**: is there technology available to produce a suitable isotope product at reasonable cost?
3. **Targeting chemistry**: do selective, robust, and economic chelators exist for the chemical element?
4. **Toxicity** and **waste** considerations:
    - will the progeny remain in the tumor, be excreted swiftly from the body, or collect sensitive organs?
    - will the TRT dose generate elemental concentrations above thresholds that could lead to harm?
    - does the half-life of progeny create potential for toxic effects or ongoing issues with waste excreted?
    - could there be adverse public or physician perception, separate from actual data indicating risk?

Targeted Alpha Radiotherapy Isotopes Being Studied



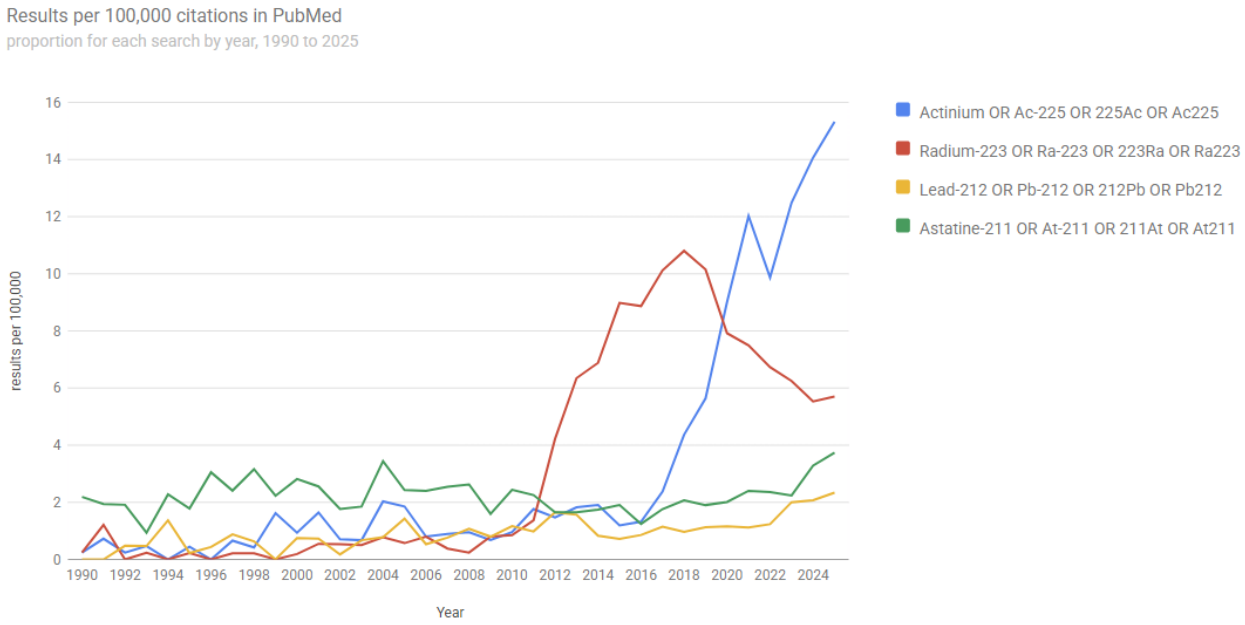
(1) National Nuclear Data Center, information extracted from the NuDat database, https://www.nndc.bnl.gov/nudat/

(2) Alternative path via Tl-208 terminates with β^- emission to Pb-208.

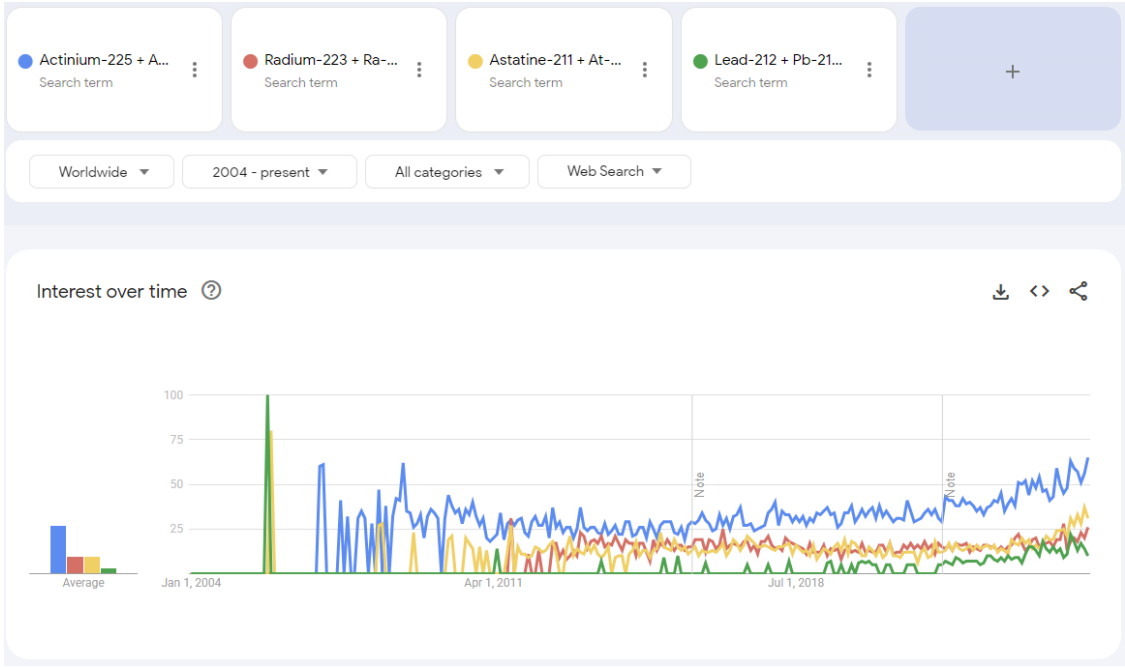
Assessment From a Clinical Trial Perspective

Search trends to date.

PubMed



Google



Ac-225 has the most favorable decay chain and chemistry. However, availability and cost matters.

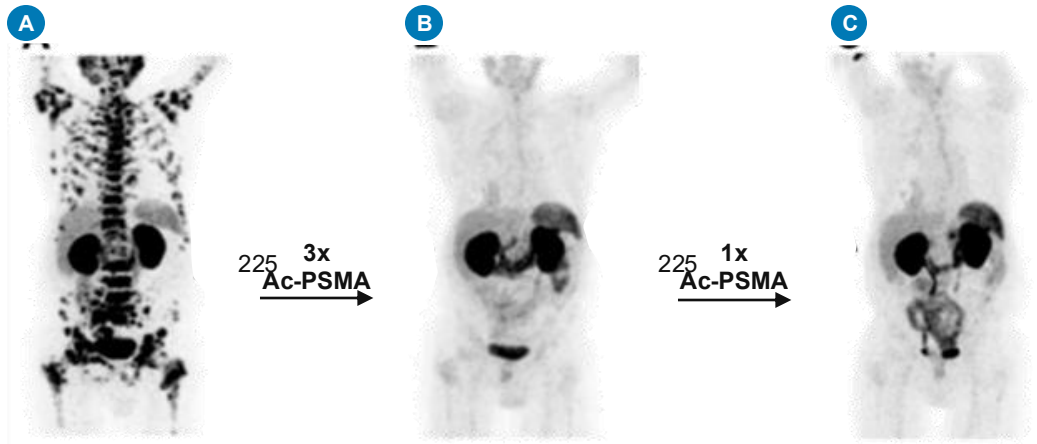
Assessment From a Clinical Trial Perspective

Isotope	Search Terms Used	Current Trials	NCT Numbers clinicaltrials.gov/
Ac-225	"Actinium-225", "Ac-225", "225Ac", "Ac225"	**30**	NCT06229366, NCT03867682, NCT06402331, NCT05219500, NCT05204147, NCT04225910, NCT06287944, NCT05605522, NCT05363111, NCT05477576, NCT05496686, NCT04506567, NCT05902247, NCT04576871, NCT03746431, NCT06147037, NCT06411301, NCT06217822, NCT04946370, NCT05983198, NCT04597411, NCT05595460, NCT06052306, NCT06492122, NCT04644770, NCT06888323, NCT06549465, NCT07054346, NCT06802523
Radium-223	"Radium-223", "Ra-223", "223Ra", "Ra223", "Xofigo"	14	NCT04521361, NCT03076203, NCT03361735, NCT02194842, NCT02218606, NCT02199197, NCT03737370, NCT02366130, NCT05133440, NCT05383079, NCT05924672, NCT04109729, NCT04071223, NCT02043678
Lead-212	"Lead-212", "Pb-212", "212Pb", "Pb212"	6	NCT06710756, NCT05636618, NCT05557708, NCT05655312, NCT01384253, NCT07009184
Astatine-211	"Astatine-211", "At-211", "211At", "At211"	5	NCT05275946, NCT04083183, NCT03128034, NCT04579523, NCT03670966

Ac-225 is ahead of other isotopes on path toward true targeted drug products.

Precision Medicine, Delivered with Targeted Alpha Therapy (TAT)

Effectiveness of Ac-225 Against Castration Resistant Prostate Cancer[1]

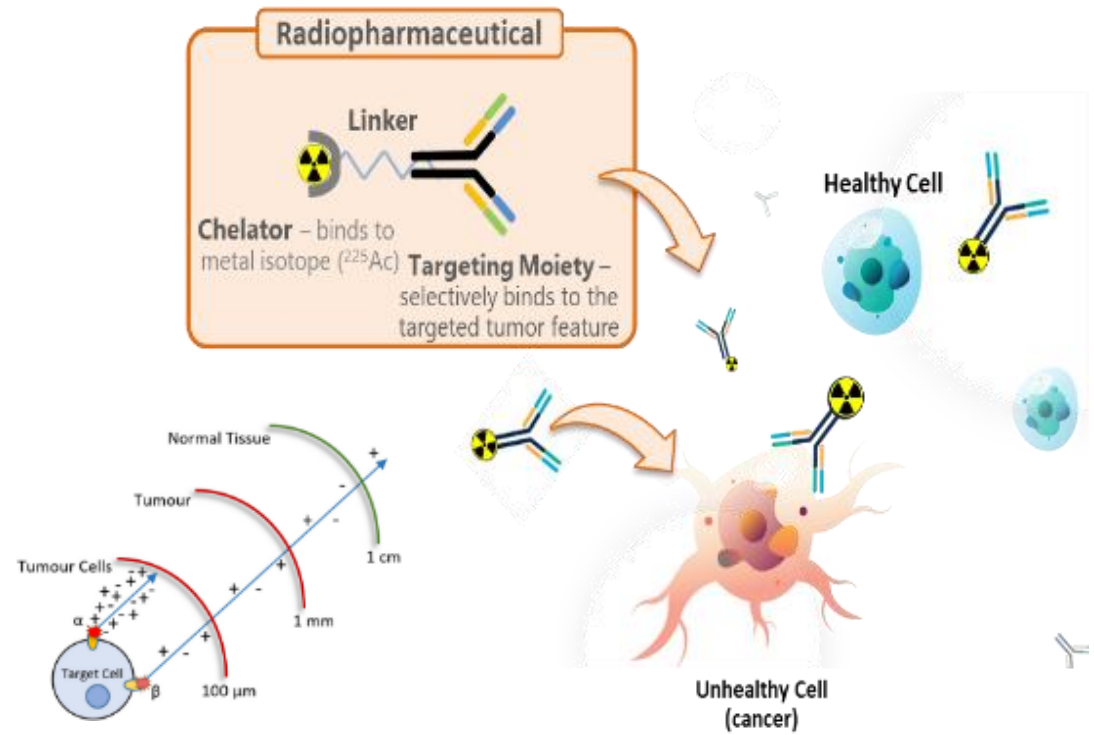


A Baseline image of patient with metastatic prostate disease who had been previously treated with all available treatment methods

B Restaging image of patient after third cycle of ^{225}Ac-PSMA-617 bi-monthly therapy

C Restaging image of patient two months after one additional therapy infusion. Note in images B and C the absence of metastatic disease and significant improvement in PSA score

Drug Developers Vigorously Pursuing Cancer Treatment using TAT



DNA double-strand breaks using alpha

Note:

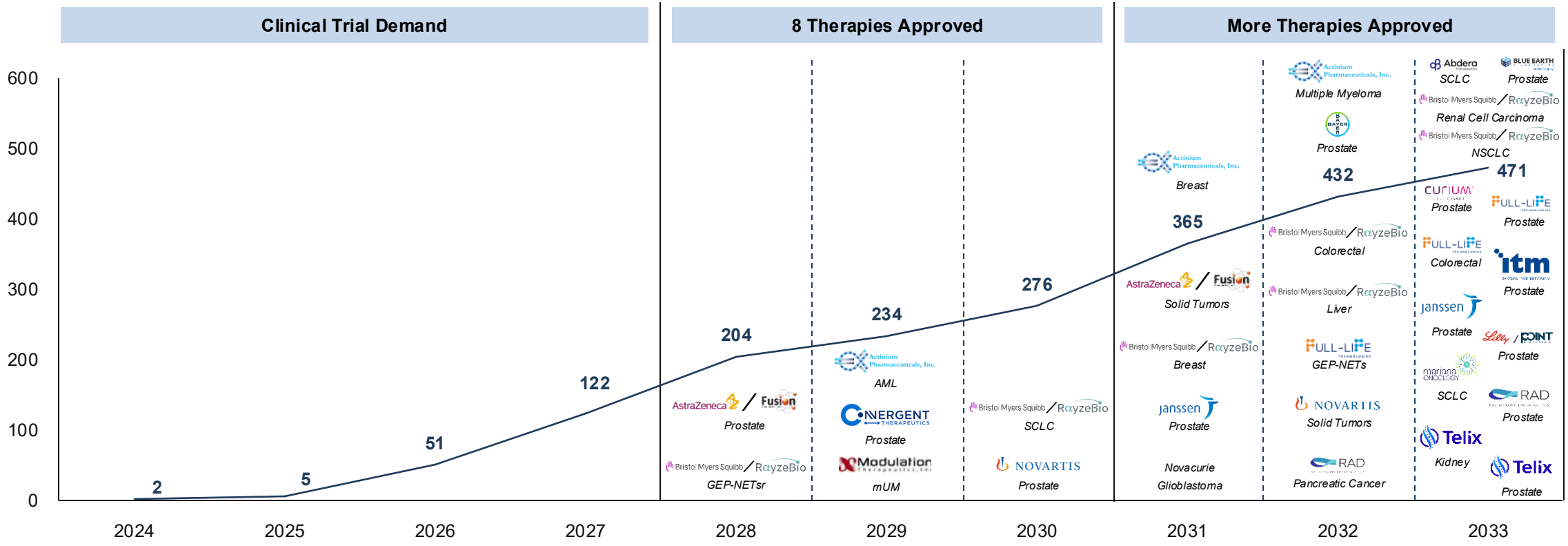
1 Kratochwil, Clemens, et al. "225Ac-PSMA-617 for PSMA-targeted α-radiation therapy of metastatic castration-resistant prostate cancer." Journal of Nuclear Medicine 57.12 (2016): 1941-1944

Projected Increase in Clinical Trial Demand for Actinium-225

Near-term demand is driven by a broad clinical pipeline with an expected inflection into commercialization in 2028

Actinium-225 Demand Projection

(In Ci)



Repurposing Legacy Material for Human Health

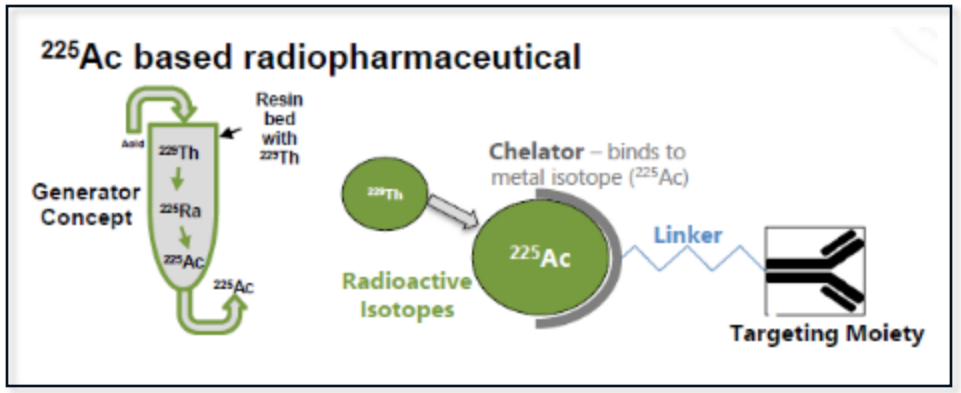
Through TerraPower's Public-Private-Partnership with DOE and Isotek, TerraPower Isotopes (TPI), is distributing the key material input actinium-225 (Ac-225) globally to drug developers investigating Targeted Alpha Therapy.

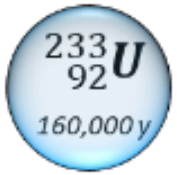
Partnership for Healthcare

U.S. DEPARTMENT OF ENERGY

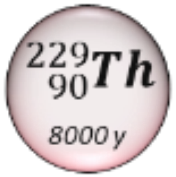
TerraPower

AtkinsRéalis Isotek Systems, LLC

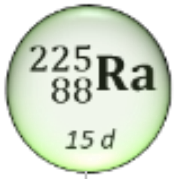




TPI is working in partnership with DOE and their contractor, Isotek, for the extraction of thorium-229 (Th-229) from all remaining U.S. legacy material uranium-233.



TPI incorporates Th-229 into an isotope generator to produce actinium-225 (Ac-225). At scale TPI's efforts will increase global supply by 75 times or more.



Ra-225 and Ac-225 eluted with each harvest. Ra-225 continues to produce Ac-225

Ac-225 is shipped to drug developers for further manufacturing of therapy Radiopharmaceuticals

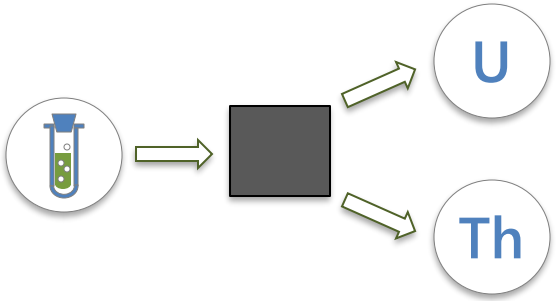
There are 4 Major Efforts Underway at TPI

Receive and Store

Secure Access to ^{229}Th

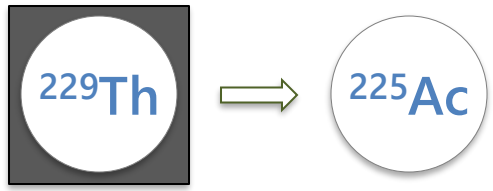
Purify Thorium

Enable Production of ^{225}Ac



Generate ^{225}Ac

Generator Development
Produce & Ship ^{225}Ac



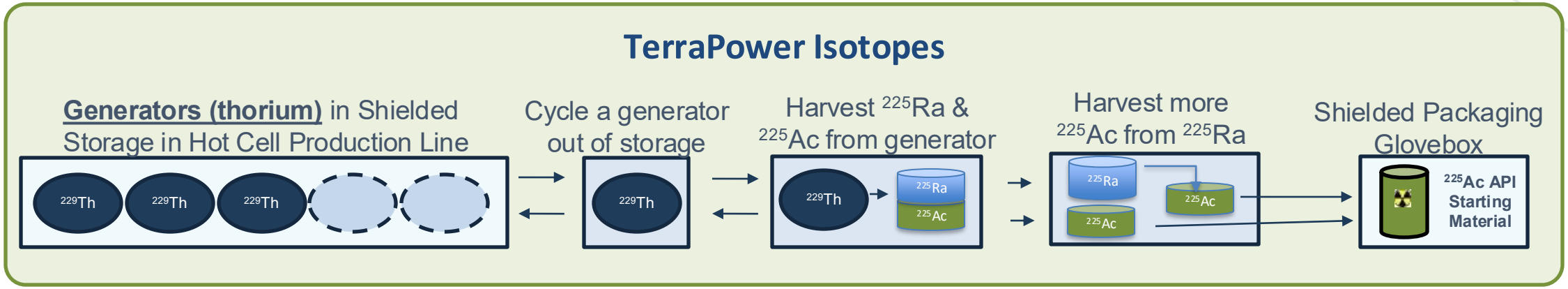
Supply ^{225}Ac to

Drug Developers

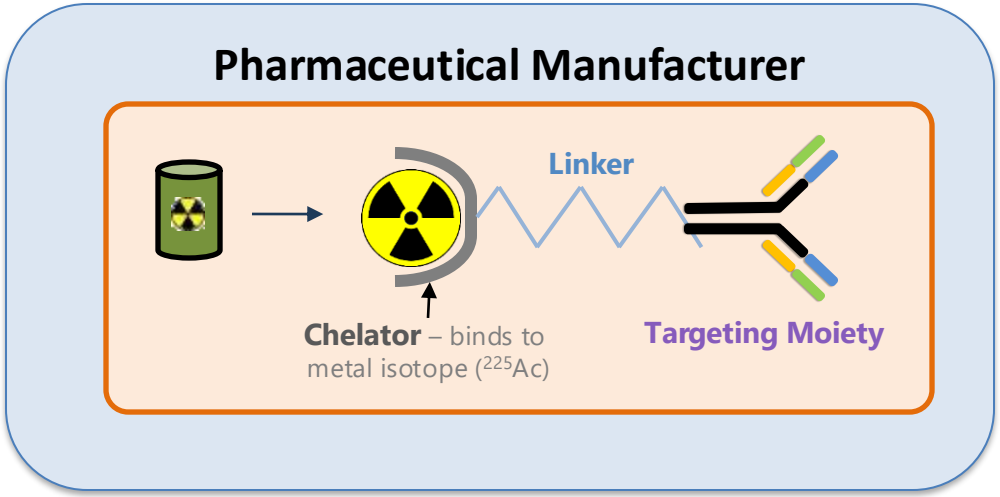
Enable Treatments

TPI Everett	TPI Everett Purify EVL supply over 2 years	TPI Everett from ^{229}Th stock (Late 2023 and Beyond)	TPI Everett (2024 and Beyond)
Temporary Storage (future)	Isotek (~43 g Th) over 4-5 years	Cardinal Health (undisclosed amount of Th)	Cardinal Health (2024 and beyond)
			PanTera (2025 and Beyond)
			TBD Next TPI Facility (2028 and beyond)

From Generators to Finished Radiopharmaceutical



Shipped from TerraPower to a pharmaceutical manufacturer



Radiolabeling: joining ^{225}Ac to a **Chelator**, **Linker** and **Targeting Moiety**

TPI's Diversified Partnership Model Accelerates Commercialization

Multiple different go-to-market channels reduce commercial risk and time to market

Segment	Now	Medium-Term	Longer-Term
	 Generate Actinium-225 from Thorium-229 Generator Development Produce and Ship Actinium-225	 Increase scale by building in-house cGMP production facility	 Produce Actinium-225 from Radium-226 Increasing possible Actinium supply
Channels	PANTERA CardinalHealth	**Planning construction of own cGMP Facility (2028 COD)**	**Leverage Partner's Technology to Expand Supply (2032)**

Solved for Immediate to Medium-Term

Solving for Long-Term Demand Over Time

TPI Production Progress

Success with full-scale production, multiple times

- Completed 46x production runs since January 2024
  - Weekly Production started Q4-2024
- Shipped 1800+ mCi of Ac-225
- 15+ customers have received material
- 29 unique locations in 8 countries

THANK YOU

To learn more, visit **www.terrapower.com**