

INTERNATIONAL WORKSHOP ON ADVANCED REACTOR SYSTEMS AND FUTURE ENERGY MARKET NEEDS

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INTEGRAL MOLTEN
SALT REACTOR

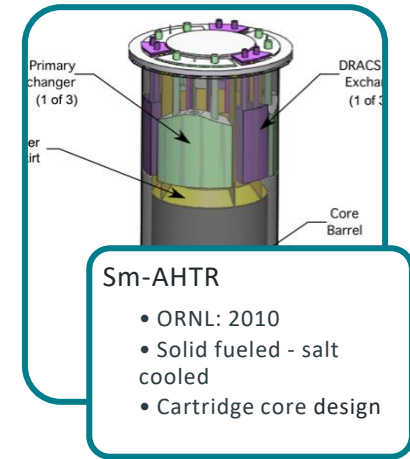
IMSR® – TECHNOLOGY READINESS

IMSR® builds on 50 years of ORNL reactor design work and relies on many demonstrated technologies.

IMSR® is a molten salt reactor system that uses:

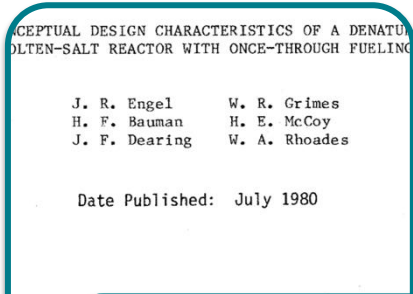
- Fluoride chemistry
- Under 5% LEU once-through fuel cycle
- Thermal spectrum
- Graphite moderator
- Integral core architecture

Conclusion: IMSR® has no fundamental technology challenges remaining



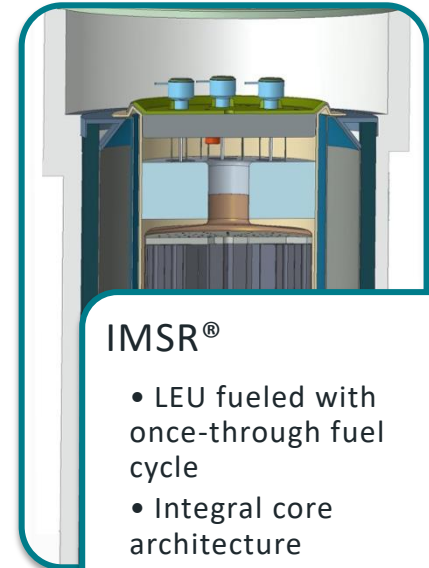
MSRE

- ORNL: 1964-1969
- Molten Salt Reactor
- Built and operated for 18,000 hours



DMSR

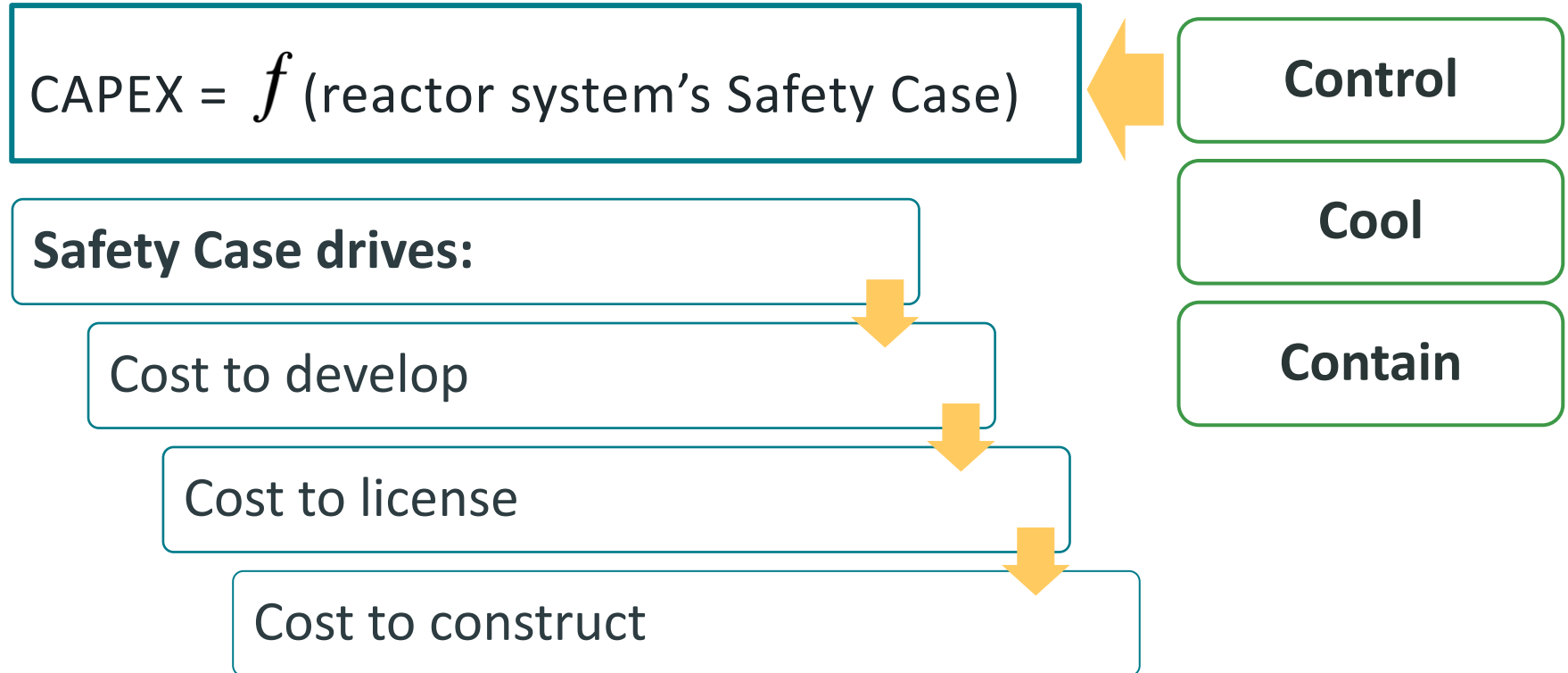
- ORNL: 1980
- Denatured Molten Salt Reactor
- Conceptual Design
- LEU fueled with once-through fuel cycle



IMSR®

- LEU fueled with once-through fuel cycle
- Integral core architecture
- Fully passive safety

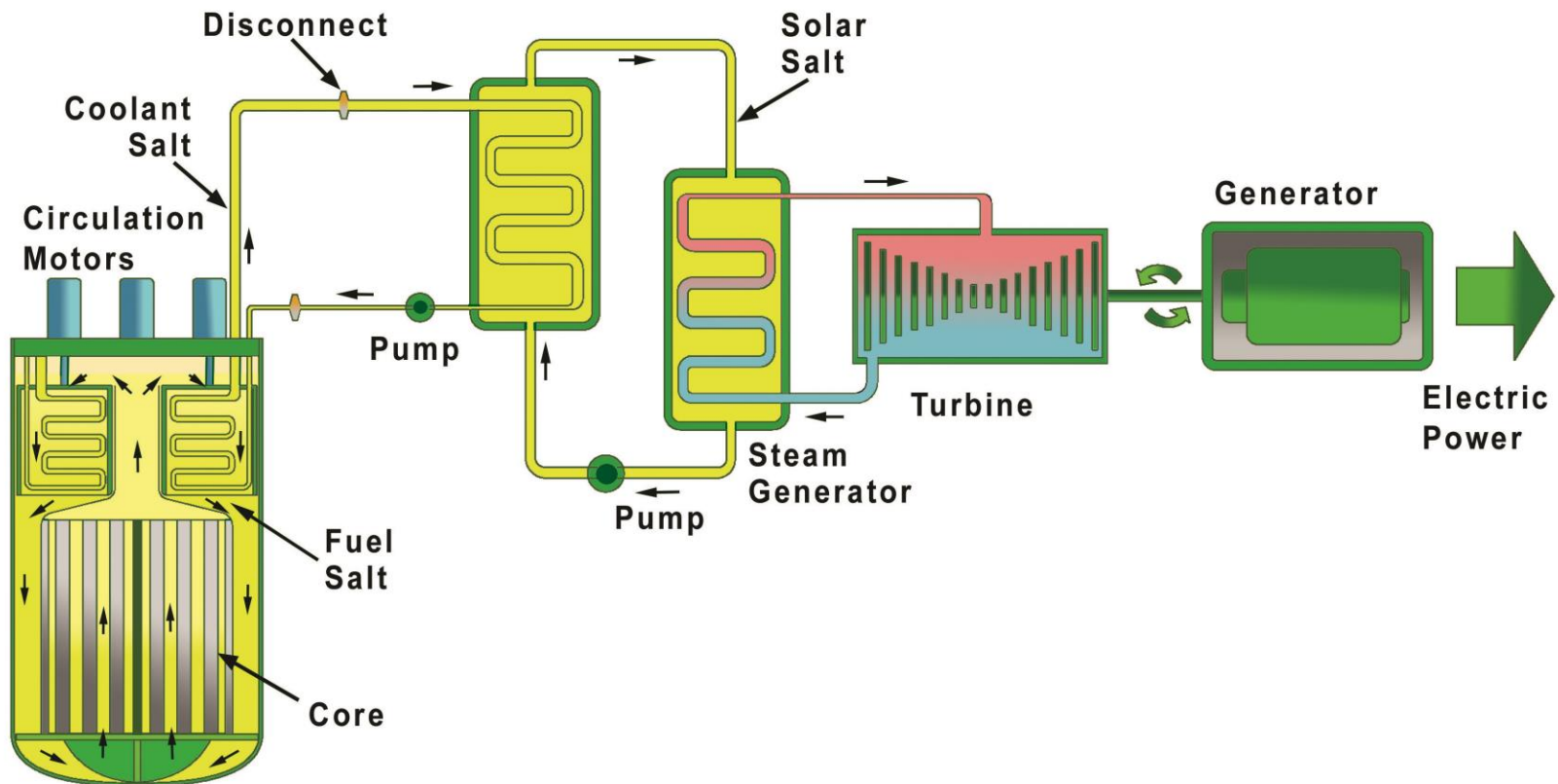
WHY DO NUCLEAR TECHNOLOGY CHOICES MATTER? A FUNDAMENTAL RELATIONSHIP



- A reactor's Safety Case is technology specific
- Technology choices impact CAPEX strongly

Technology choices drive CAPEX

SCHEMATIC VIEW OF IMSR® POWER TRAIN



PRAGMATIC INNOVATION OF THE IMSR®

- 7 year Core-unit replacement, allows advantages of graphite moderation and simplifies vessel and HX code qualification
- Inexpensive carrier salt that avoids tritium production of ${}^7\text{LiF}$ or BeF_2
- New passive decay heat removal featuring a closed cycle natural circulation version of RVACS
- Designed with strongly negative temperature coefficients for inherent load following (control rods not needed) and passive shutdown
- Greatly simplified Off-Gas management
- Soft spectrum allows very low enrichment startup and 4.95% makeup
- Large reduction in Pu waste production while avoiding salt processing
- Good fuel economy with planned evolutionary improvements

RECENT TERRESTRIAL ENERGY DEVELOPMENTS

1Q	2016	<ul style="list-style-type: none"> ✓ Commenced regulatory engagement, signed CNSC Service Agreement for IMSR® Vendor Design Review ✓ Awarded C\$5.7 Mn Cleantech grant by SDTC Canadian Federal Government
April	2016	<ul style="list-style-type: none"> ✓ Formed Corporate Industrial Advisory Board with senior executives from ENW, OPG, PSEG, Southern Company
June	2016	<ul style="list-style-type: none"> ✓ Terrestrial Energy USA Ltd (TEUSA) awarded first grant from United States Department of Energy (USDOE), a small but significant award from DOE GAIN program
Aug	2016	<ul style="list-style-type: none"> ✓ Duke Energy joins Corporate Industrial Advisory Board
Sept	2016	<ul style="list-style-type: none"> ✓ TEUSA receives invitation to submit Part II application for USDOE \$1 Bn loan guarantee to support engineering, licensing and construction of first U.S. IMSR® power plant ✓ NB Power joins Corporate Industrial Advisory Board
Nov	2016	<ul style="list-style-type: none"> ✓ TEUSA submits Part II loan guarantee application to USDOE ✓ Innovation Award by the Organization of Canadian Nuclear Industries (OCNI)
Feb	2017	<ul style="list-style-type: none"> ✓ Regis Matzie, former CTO of Westinghouse, joins Advisory Board ✓ TEUSA moves into due diligence with the USDOE for \$1 Bn loan guarantee
Mar	2017	<ul style="list-style-type: none"> ✓ TVA joins Corporate Industrial Advisory Board

Recent developments demonstrate strong business momentum