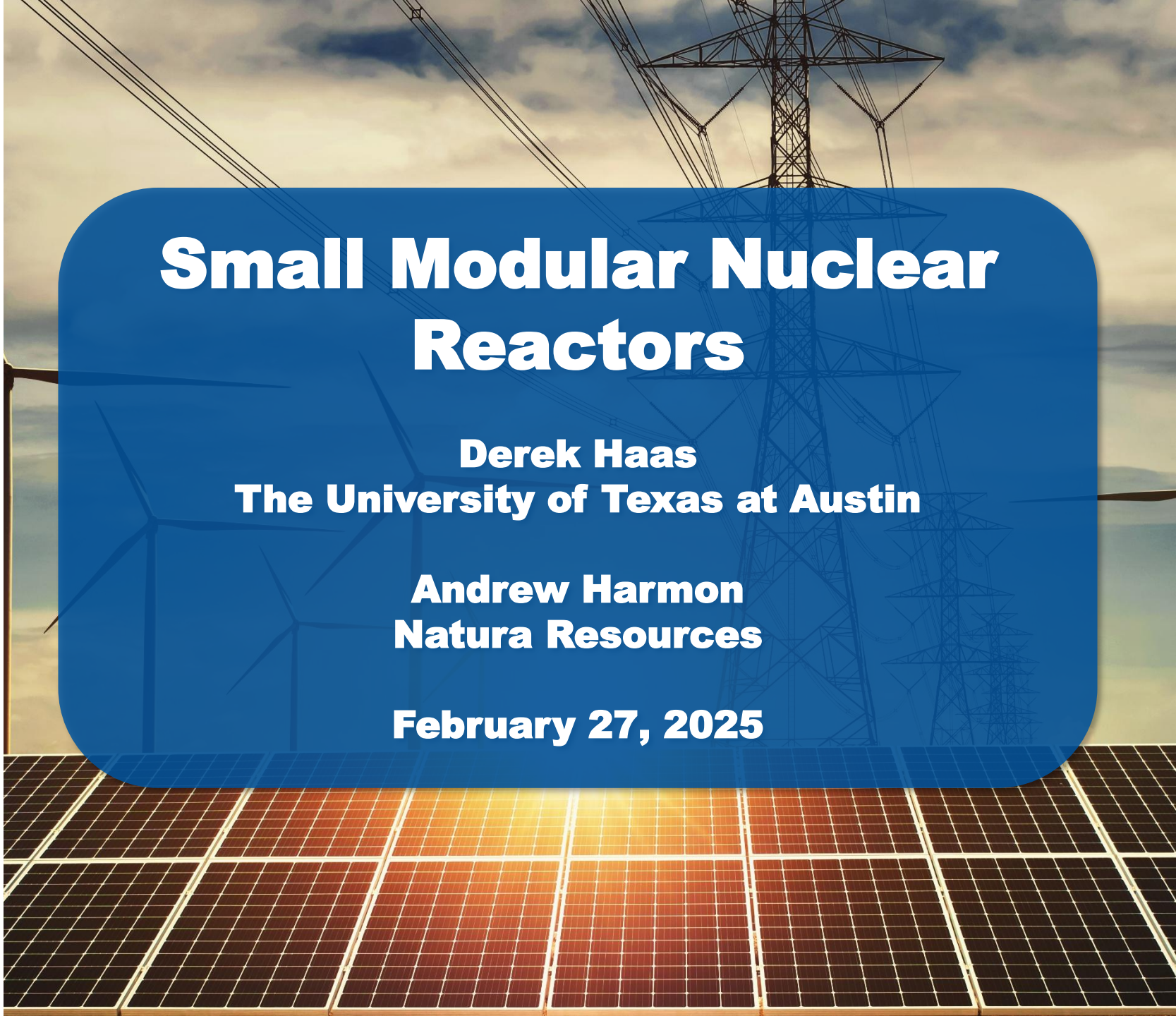
Natura Resources

TEXAS RE

THE UNIVERSITY OF TEXAS AT AUSTIN



Small Modular Nuclear Reactors

Derek Haas
The University of Texas at Austin

Andrew Harmon
Natura Resources

February 27, 2025

Antitrust Admonition

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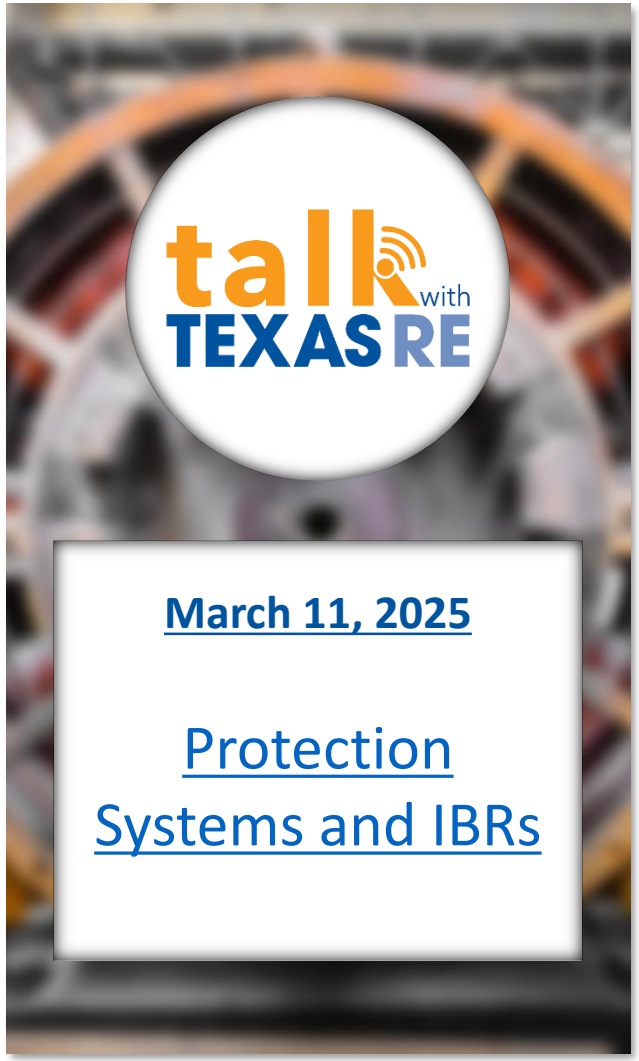
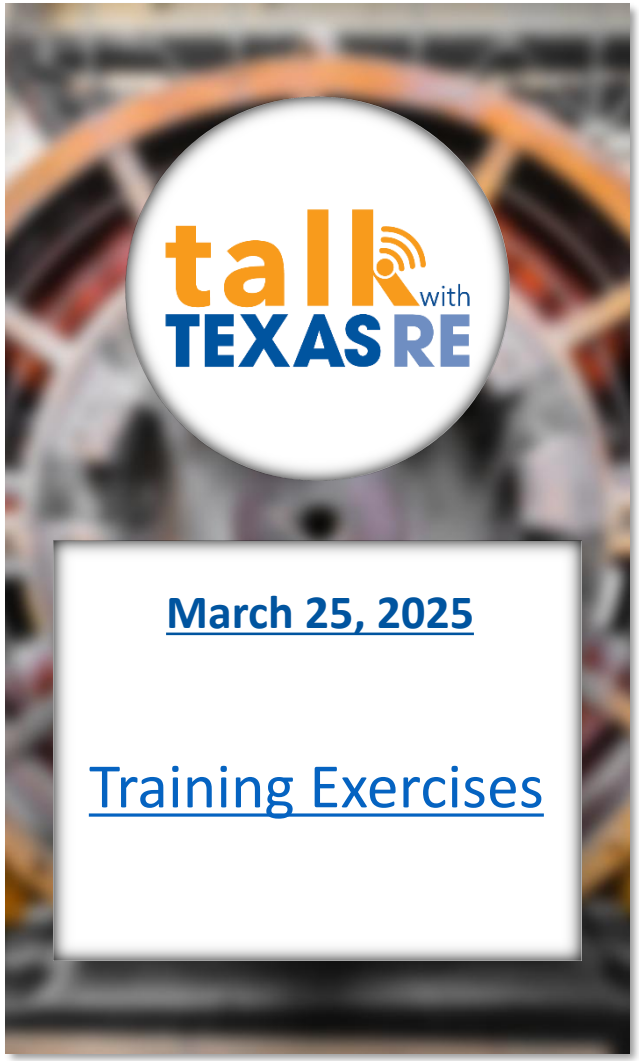
Notice of this meeting was posted on the Texas RE website and this meeting is being held in public. Participants should keep in mind that the listening audience may include members of the press, representatives from various governmental authorities, and industry stakeholders.

Upcoming Texas RE Events

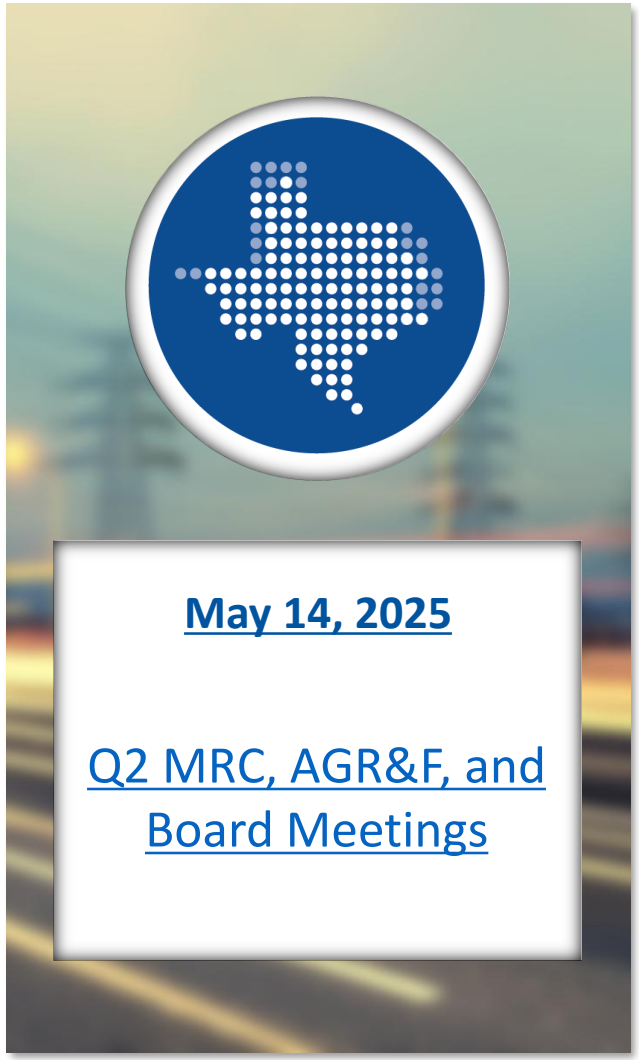




Upcoming Texas RE Events

April 23, 2025

Spring Standards, Security, & Reliability Workshop



May 14, 2025

Q2 MRC, AGR&F, and Board Meetings

July 16, 2025

Evolving Grid Workshop

Upcoming ERO Enterprise Events

Date	Event
March 3	Application of the Registration Criteria for Category 2 Generator Owner and Generator Operator Inverter-Based Resources Webinar (NERC)
March 4	2025 Women's Leadership Conference (MRO)
March 17	Technical Talk with RF
March 25-27	Physical Security Workshop (SERC)
March 25-27	Reliability & Security Workshop (WECC)
April 2	Application of IBR Practice Guide Workshop (SERC)
April 3	2025 Virtual RAM Conference (MRO)

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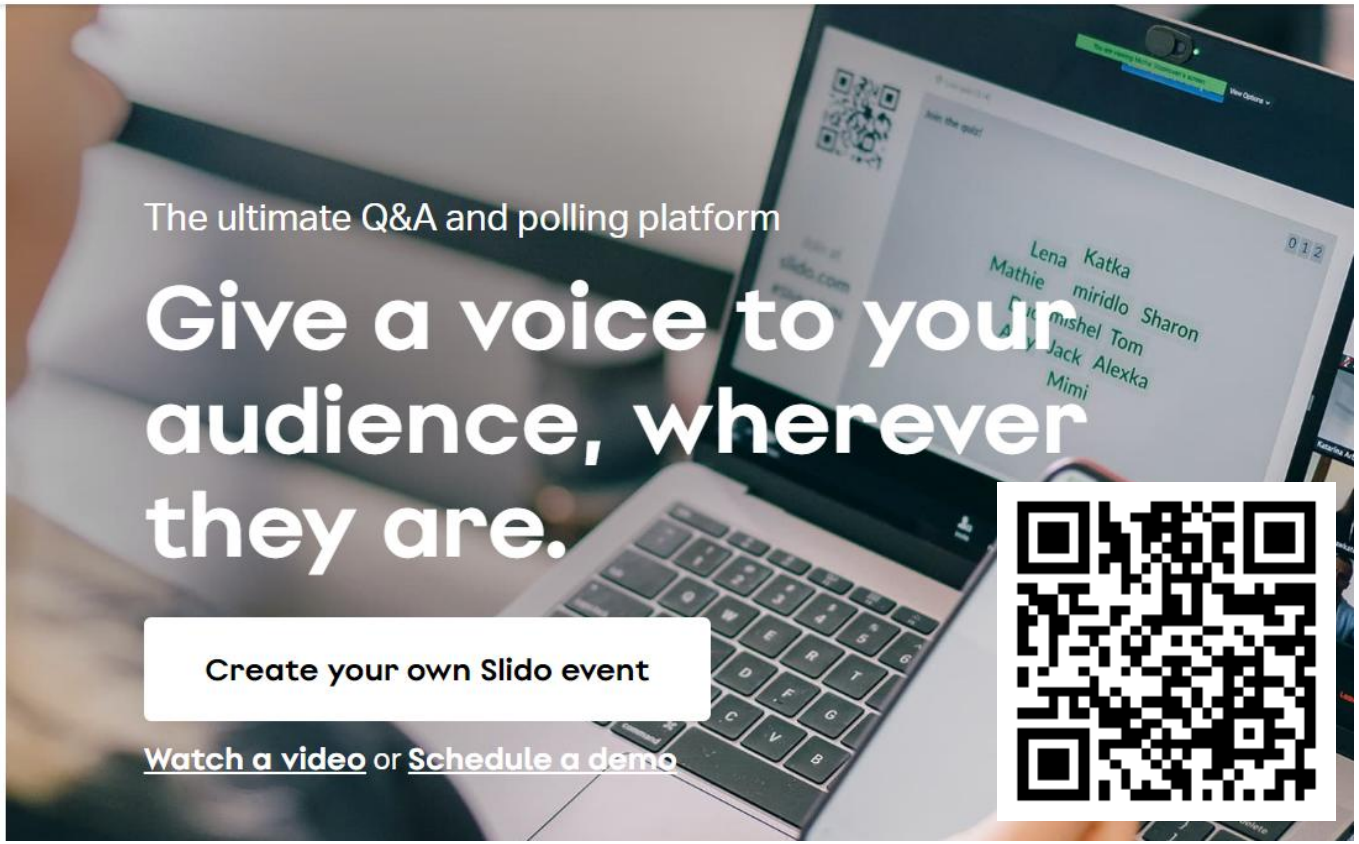
Joining as a participant?

Enter event code

Join an existing event



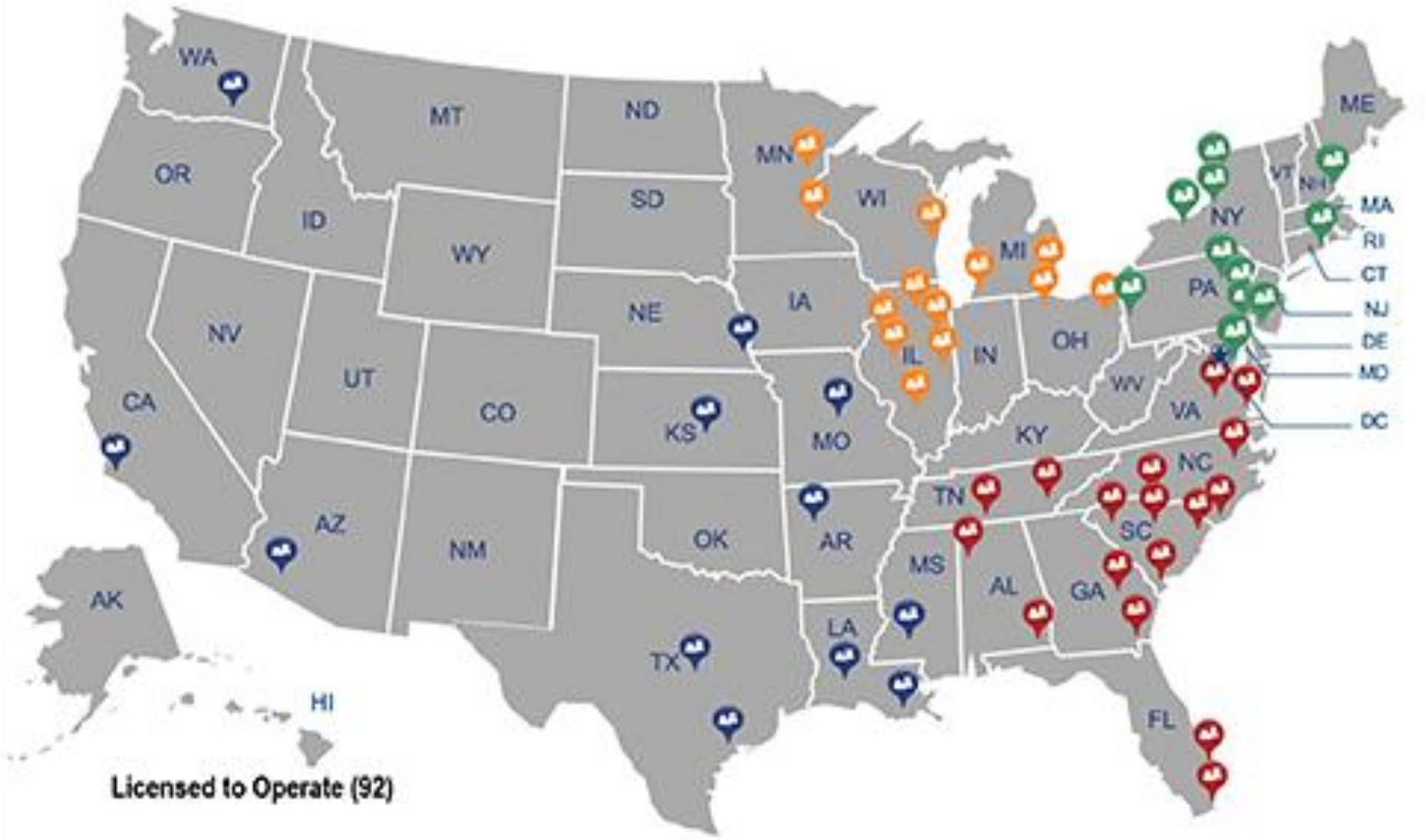
FEBRUARY 2025

TEXAS
The University of Texas at Austin

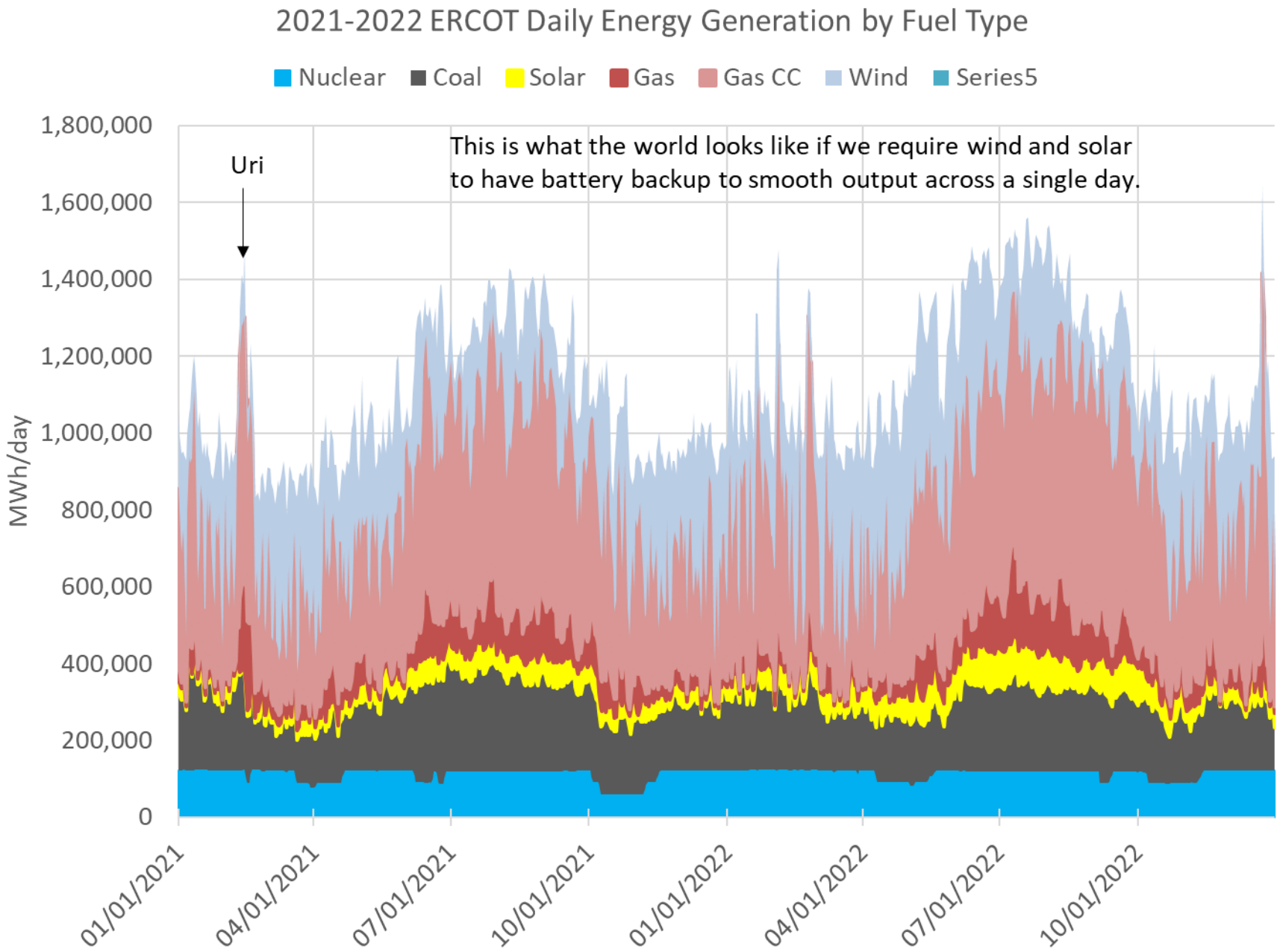
STATE OF THE NUCLEAR INDUSTRY IN TEXAS

DEREK HAAS, PHD
Associate Professor and Area Coordinator of the Nuclear and Radiation Engineering Program
The University of Texas at Austin

U.S. Operating Commercial Nuclear Power Reactors

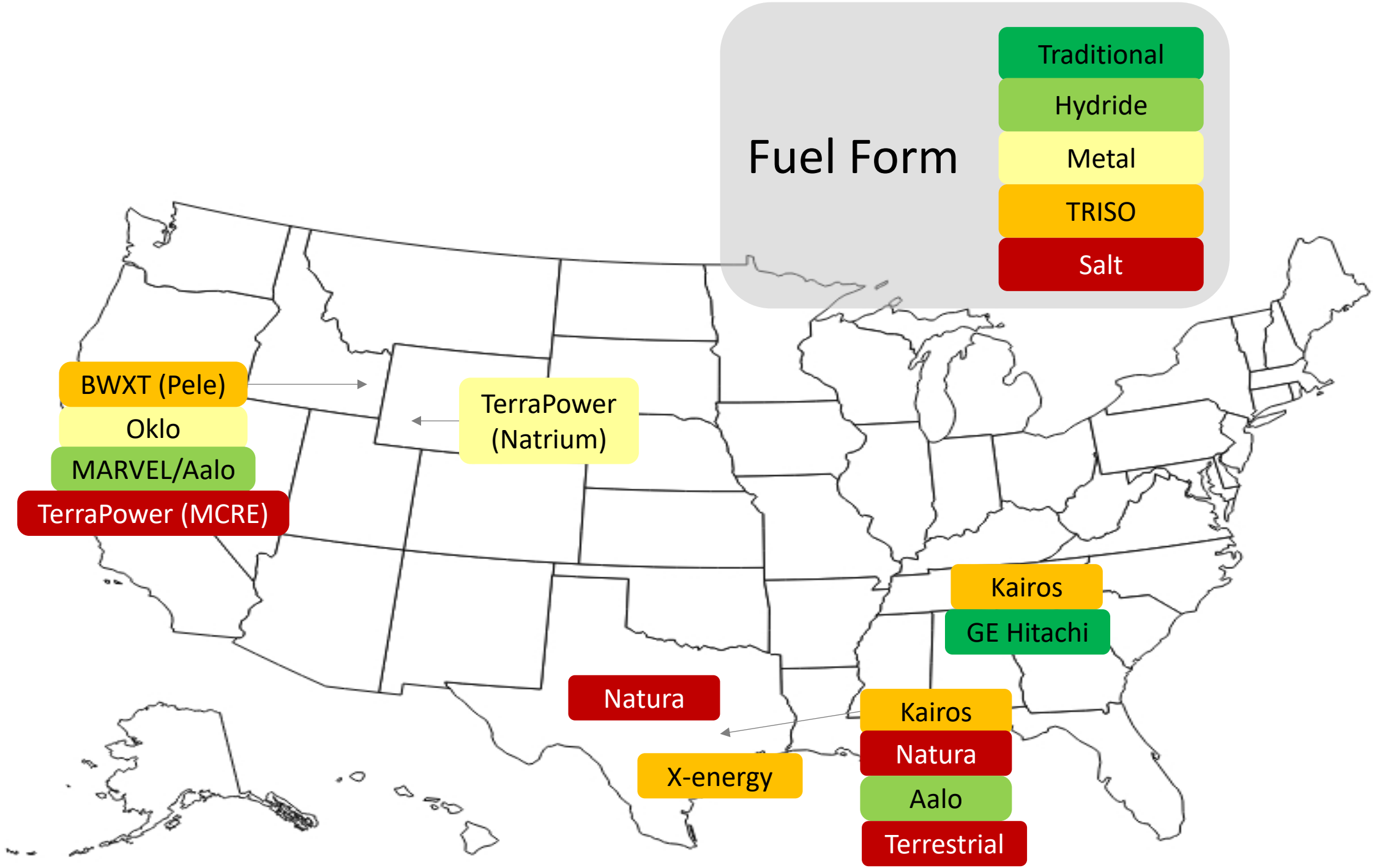


Source: U.S. Nuclear Regulatory Commission - As of February 2023


2021-2022 ERCOT Daily Energy Generation by Fuel Type
Nuclear
Coal
Solar
Gas
Gas CC
Wind
Series5
This is what the world looks like if we require wind and solar to have battery backup to smooth output across a single day.
Uri
MWh/day
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
01/01/2021
04/01/2021
07/01/2021
10/01/2021
01/01/2022
04/01/2022
07/01/2022
10/01/2022

Applications of (*some*) Advanced Reactors

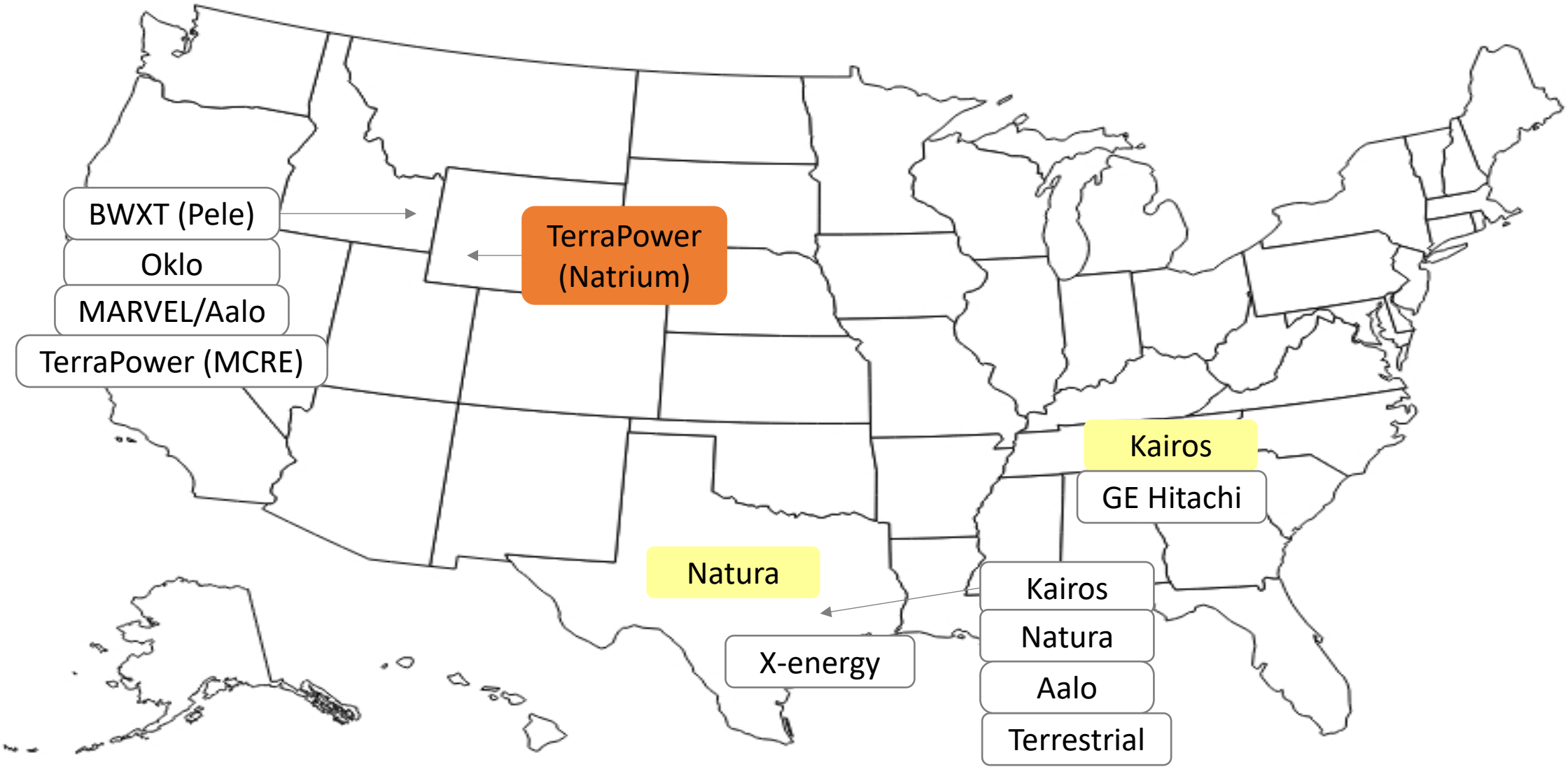
High-temperature output	High-efficiency electricity generation Industrial heat (hydrogen, chemical plants)
Waste heat	Seawater desalination Produced water cleanup
Salt energy storage	Load following
Additional applications	Isotope production Burning long-lived nuclear waste Fuel breeding (U/Th fuel cycles)


Fuel Form
Traditional
Hydride
Metal
TRISO
Salt
BWXT (Pele)
Oklo
MARVEL/Aalo
TerraPower (MCRE)
TerraPower (Natrium)
Kairos
GE Hitachi
Natura
Kairos
Natura
Aalo
Terrestrial
X-energy

Licensing Status

Design Certification Submitted → Design Certification Approved → COL Submitted

CP Submitted → CP Approved → OL Submitted → OL Approved

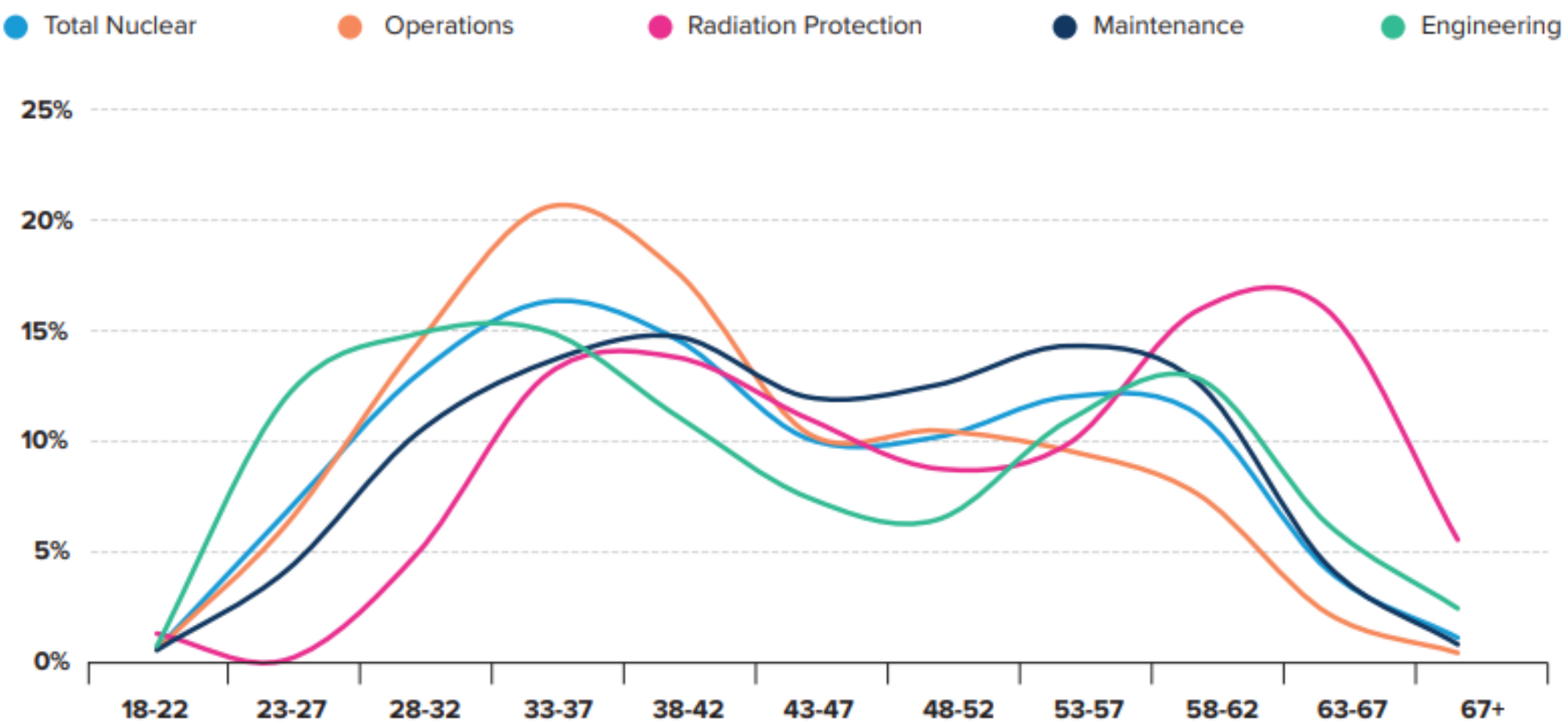


With the enactment of the *Inflation Reduction Act* and other key legislation, significant federal investment is being made to set the stage for the United States to meet its decarbonization goals. Much of that investment supports the continued use and growth of nuclear energy as a necessary element of the national clean energy transition. With more than 90%[1] of the existing plants intending to extend their operating licenses to 80 years through subsequent license renewal; the expected deployment of advanced reactors; and other on-going critical industry activities, it is imperative that the industry ensures an adequate supply of fully qualified and diverse workers to meet the demand of all industry segments. In Advanced Reactors alone, the Department of Energy projects 236,000 workers will be needed to manufacture, construct, and operate advanced reactors through 2035, with that number increasing to approximately 376,000 workers by 2050.[2]

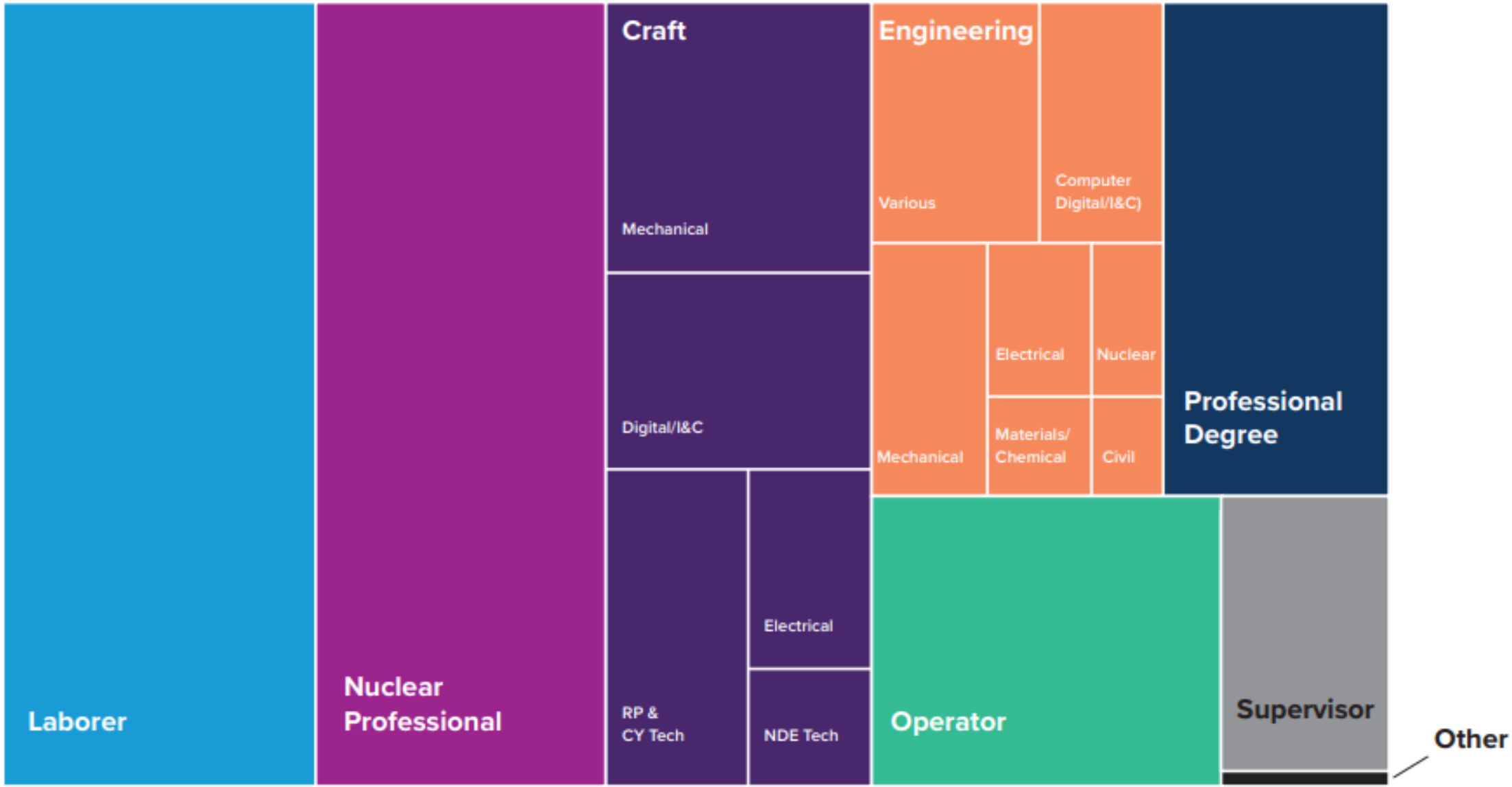
20,000/year

NEI. Nuclear Energy Industry Workforce Strategic Plan. 2023

Nuclear Industry Employment Distribution by Age

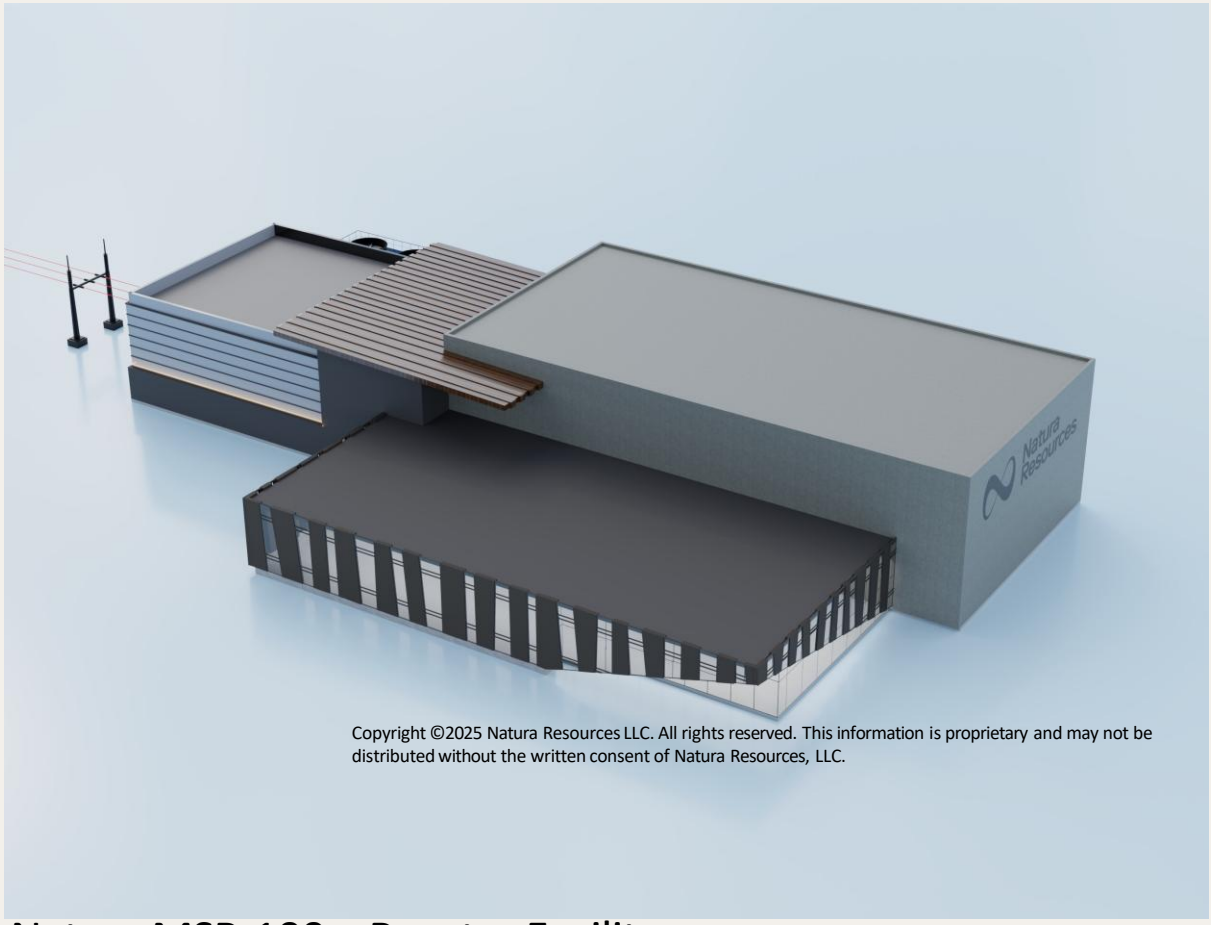


NEI. Nuclear Energy Industry Workforce Strategic Plan. 2023



NEI. Nuclear Energy Industry Workforce Strategic Plan. 2023

Natura Resources



Natura MSR-100 – Reactor Facility

EXECUTIVE SUMMARY

- Natura is the leading developer of liquid-fueled molten salt reactors (MSRs) in the U.S.
- 1st advanced reactor facility in the country
- 1st liquid-fueled advanced reactor ever licensed by the U.S. Nuclear Regulatory Commission
- Our liquid-fueled MSR design enhances safety and efficiency, while reducing waste
- Natura reactors are 100MWe small modular reactors designed for factory fabrication, rapid deployment and on-site assembly
- We have two planned deployments of the Natura MSR-100, Permian Basin and RELLIS
- Experienced team with demonstrated ability to perform

Liquid-fueled molten salt reactors make nuclear power safer, cheaper, and more accessible than ever.

SALT COOLED

High Temperature

- Improved Efficiency
- Industrial Heat Applications

Low Pressure

- No Phase Transition to Gas
- Enhanced Safety

LIQUID-FUELED

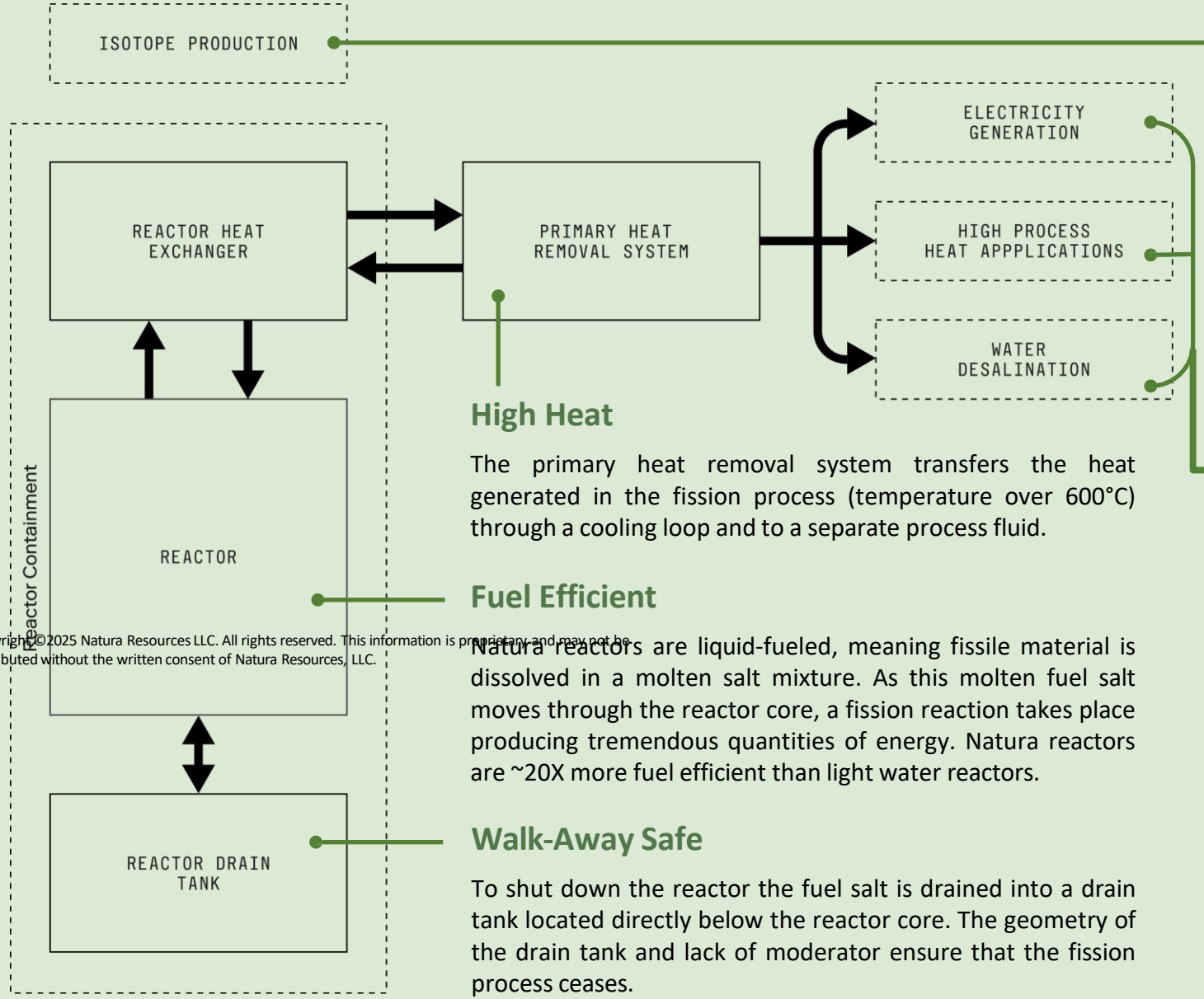
Increased Fuel Utilization

Decreased Waste

Walk-away Safe

Modular Production & Assembly

The Natura MSR-100 is a small modular reactor capable of producing 100MWe. It is designed for factory fabrication and onsite assembly, allowing it to be rapidly deployed at scale to meet the world's energy needs



High Heat

The primary heat removal system transfers the heat generated in the fission process (temperature over 600°C) through a cooling loop and to a separate process fluid.

Fuel Efficient

Natura reactors are liquid-fueled, meaning fissile material is dissolved in a molten salt mixture. As this molten fuel salt moves through the reactor core, a fission reaction takes place producing tremendous quantities of energy. Natura reactors are ~20X more fuel efficient than light water reactors.

Walk-Away Safe

To shut down the reactor the fuel salt is drained into a drain tank located directly below the reactor core. The geometry of the drain tank and lack of moderator ensure that the fission process ceases.

Isotope Production

When a Uranium atom fissions, it splits into fragments known as fission products. Many of these fission products, such as Molybdenum-99, are vital isotopes for medical diagnostics and treatment. These fission products are inaccessible in solid-fueled reactors. With the fuel dissolved in a molten salt these fission products can be extracted via a variety of methods.

Flexible End Uses

Natura reactors are flexible in their potential end use applications including, but not limited to: electricity generation, high process heat applications such as hydrogen or steel production and water desalination.

Science & Engineering Research Center (SERC)

The Natura MSR-1 will be deployed in the only completed advanced reactor demonstration facility in the U.S.

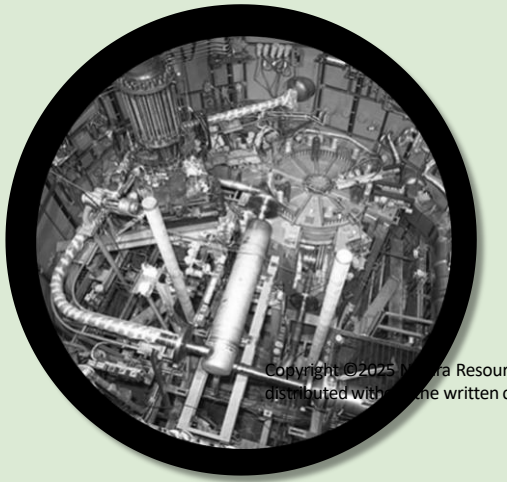
1st liquid-fueled advanced reactor design approved for construction by the Nuclear Regulatory Commission

Demonstrated Technology
Molten salt reactor operated successfully for 5 years

University Sponsored Research
Unique path to develop and deploy MSR technology to reduce costs, schedule and regulatory risk

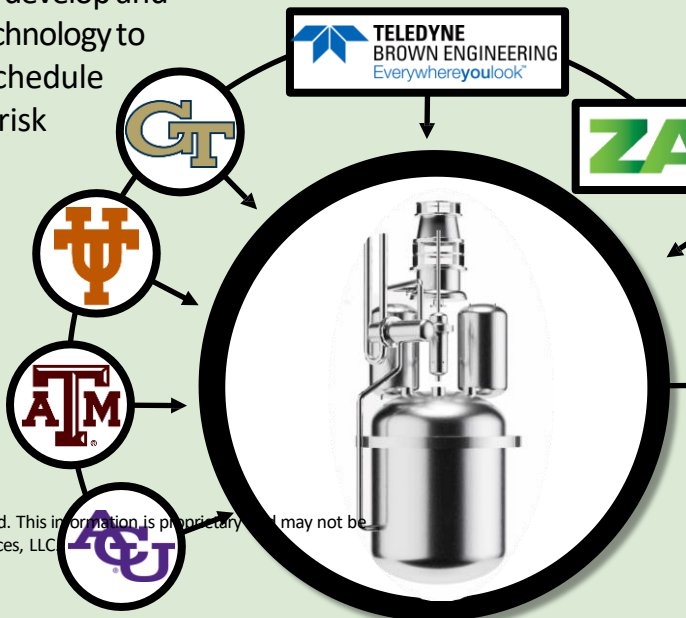
Industry Expertise
Delivering complex projects on-time and on-budget

Commercial Deployment
Successful FOAK deployment made possible through the data, knowledge, and experience gained through the deployment of the MSR-1



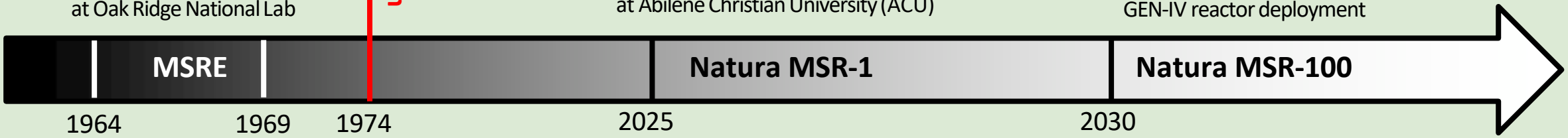
Molten Salt Reactor Experiment
U.S. Atomic Energy Commission
at Oak Ridge National Lab

Nuclear Regulatory Commission



Pilot Reactor
Molten Salt Research Reactor (MSRR)
at Abilene Christian University (ACU)

Commercial Reactor
100 MWe (250 MWth)
GEN-IV reactor deployment



Expedited Regulatory Path

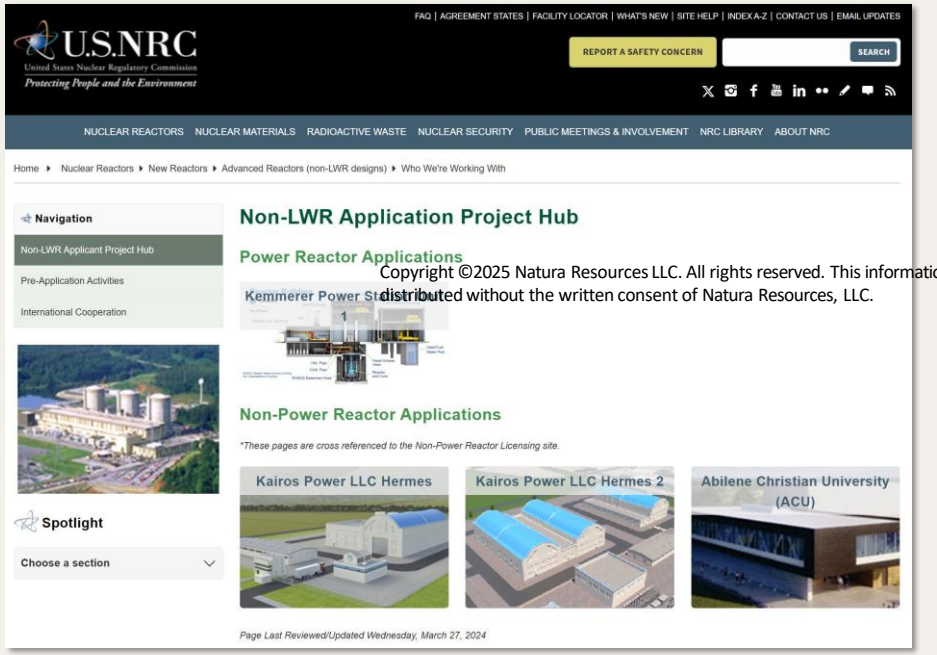
Natura MSR-1 is the first liquid-fueled advanced reactor ever licensed by the Nuclear Regulatory Commission (NRC). The licensing path for the Natura MSR-100 will be accelerated by the work already approved by the NRC and the ~15,000 hours they spent studying our molten salt reactor being deployed in Abilene, TX.

50+ advanced reactor companies worldwide

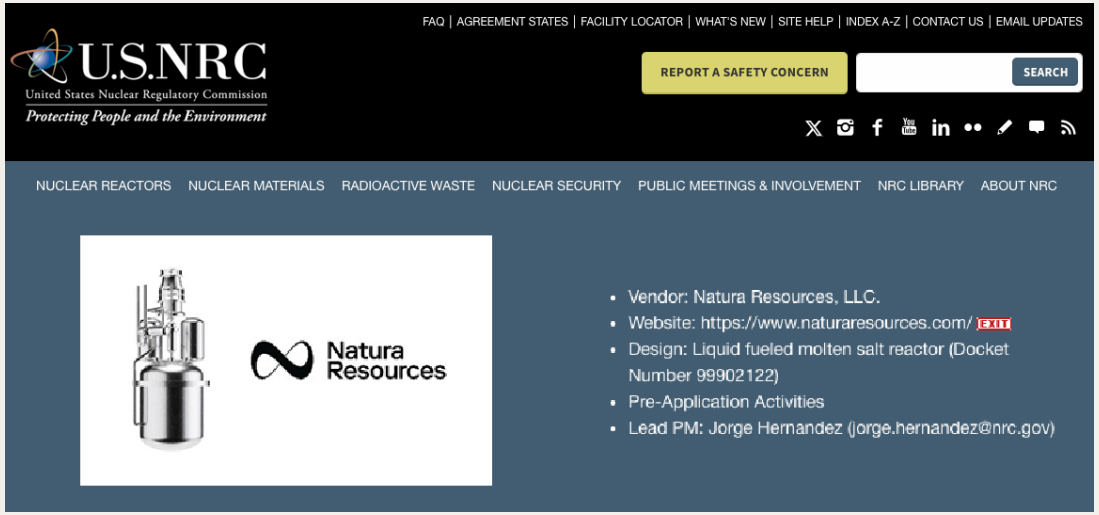
14 advanced reactors in NRC pre-application

3 advanced reactors with an active project

2 advanced reactor technologies with approved construction permit



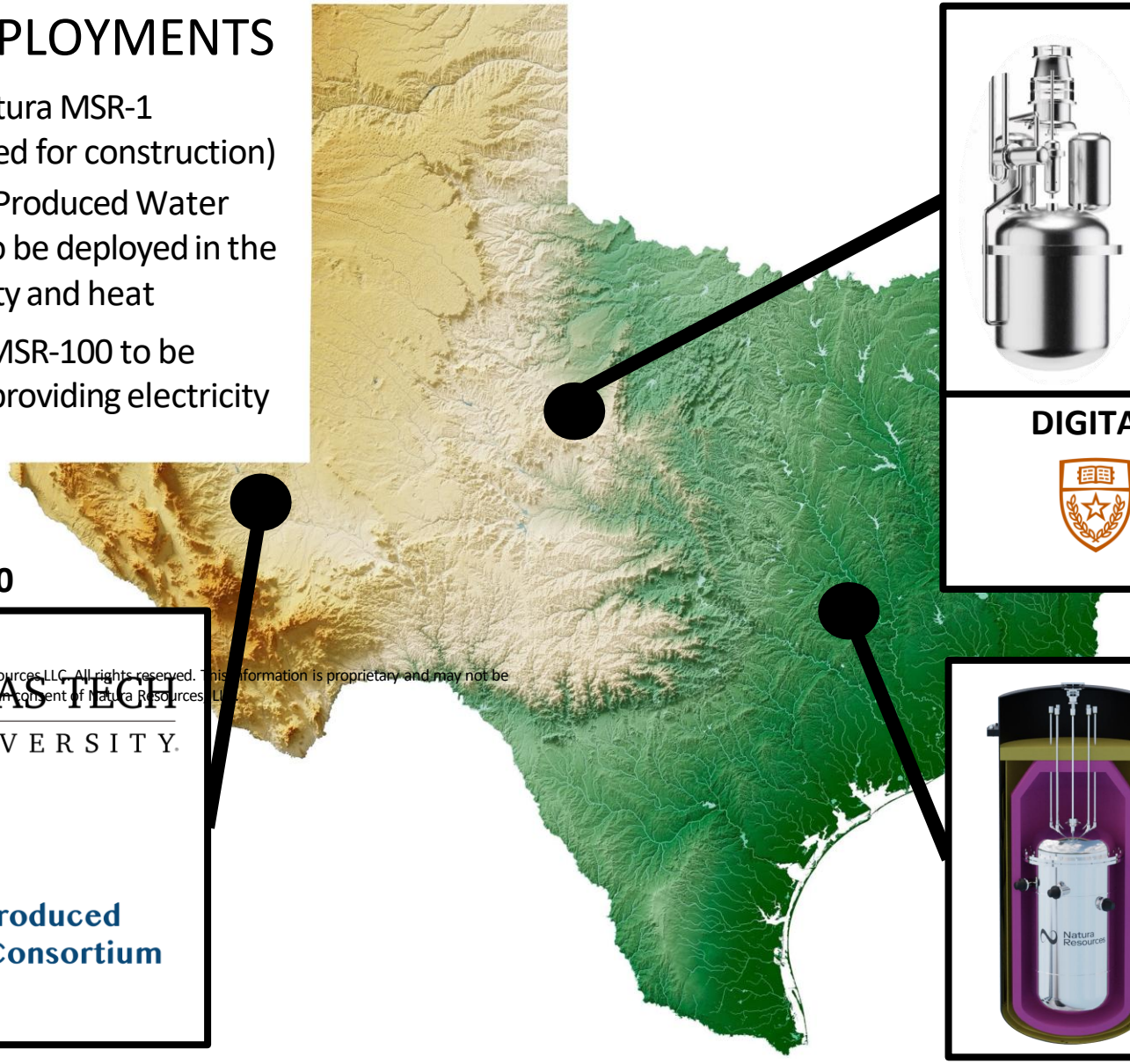
U.S. NRC – Non-LWR Application Project Hub



U.S. NRC – New Reactors – Pre-Application Activities: Natura Resources

PLANNED REACTOR DEPLOYMENTS

- Abilene Christian University – Natura MSR-1 demonstration unit (NRC approved for construction)
- Texas Tech University and Texas Produced Water Consortium – Natura MSR-100 to be deployed in the Permian Basin providing electricity and heat
- Texas A&M University – Natura MSR-100 to be deployed on the RELLIS campus providing electricity



NATURA MSR-1

ABILENE CHRISTIAN UNIVERSITY

NEXT
Nuclear Energy eXperimental Testing

DIGITAL MOLTEN SALT REACTOR

TEXAS
The University of Texas at Austin

NATURA MSR-100

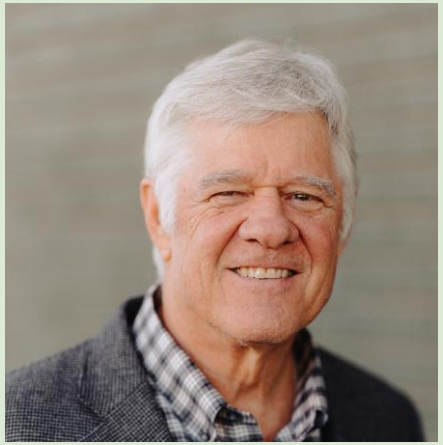
TEXAS TECH UNIVERSITY

Texas Produced Water Consortium

NATURA MSR-100

RELLIS
INNOVATION & TECH CAMPUS

Team



Douglass Robison
FOUNDER, CHIEF EXECUTIVE OFFICER

Douglass Robison is the founder and President of Natura Resources. Throughout his career in the energy sector, Douglass has been at the forefront of leading-edge technologies, in his role as Partner, Co-founder, President and Executive Chairman of Element Petroleum, a Permian-based oil and gas exploration and production company, and now as the founder and President of Natura Resources. In 2004 he was appointed by former Texas Gov. Rick Perry to serve on the Texas Energy Planning Council and co-chaired the Energy Supply Committee during which time his committee identified the importance of nuclear energy in our energy future. Natura Resources is a natural fit for his deep-seated interest in advanced energy technologies.

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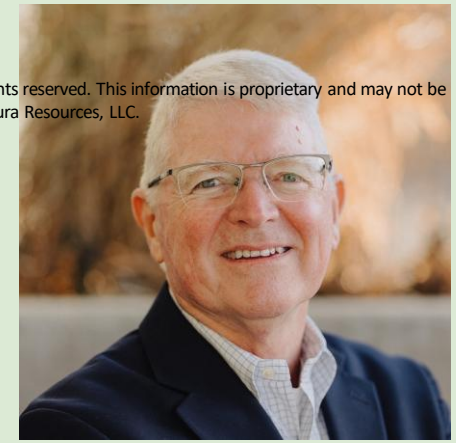
Andrew Harmon
VP OF OPERATIONS & BUSINESS DEVELOPMENT

Jordan Robison, PE
VP OF ENGINEERING & PROGRAM MANAGEMENT

Jack Shoemate, PE
CHIEF ENGINEER



Ben Beasley
DIRECTOR OF LICENSING

Gard Clark, PMP
DEFENSE SOLUTION LEAD

Dr. Jonathan Scherr
SR. NUCLEAR ENGINEER

We don’t need more promises
We need performance