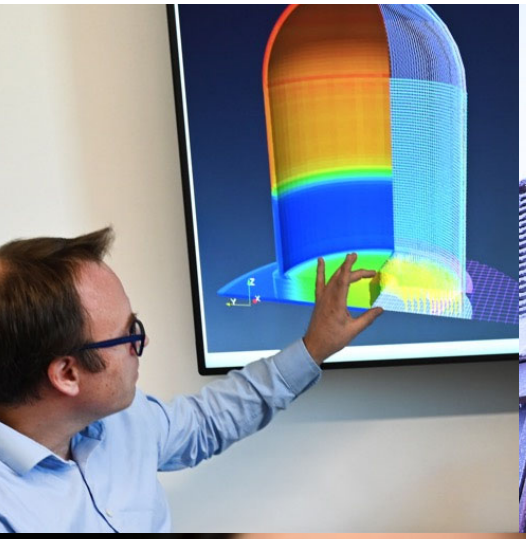
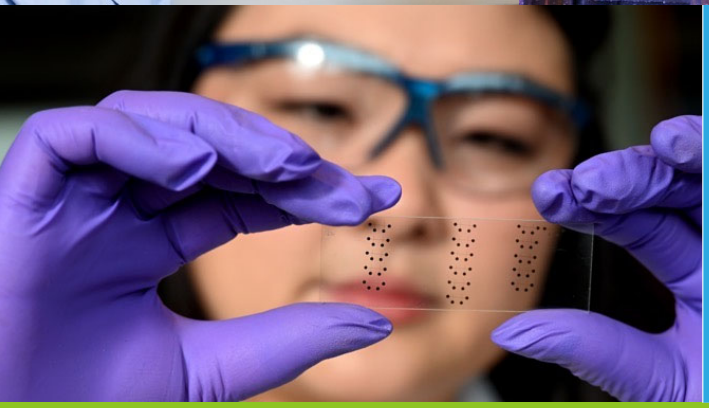




April 8, 2024

J. Richard Hess, Ph.D.
Director, Idaho National Laboratory
JRichard.Hess@inl.gov

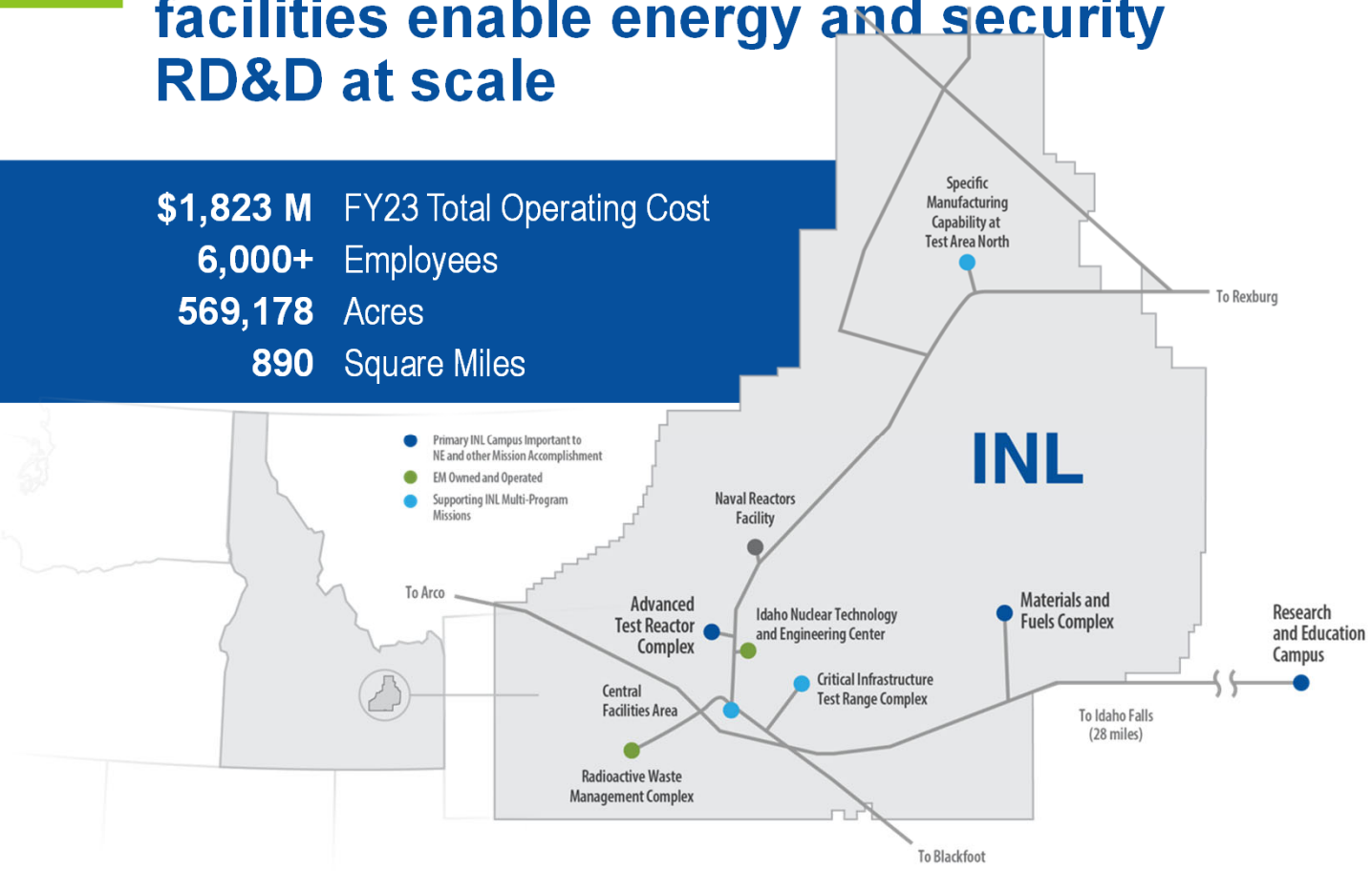
Idaho National Laboratory –
Creating a Secure, Resilient, Clean Energy Future

Battelle Energy Alliance manages INL for the
U.S. Department of Energy's Office of Nuclear Energy

Idaho National Laboratory

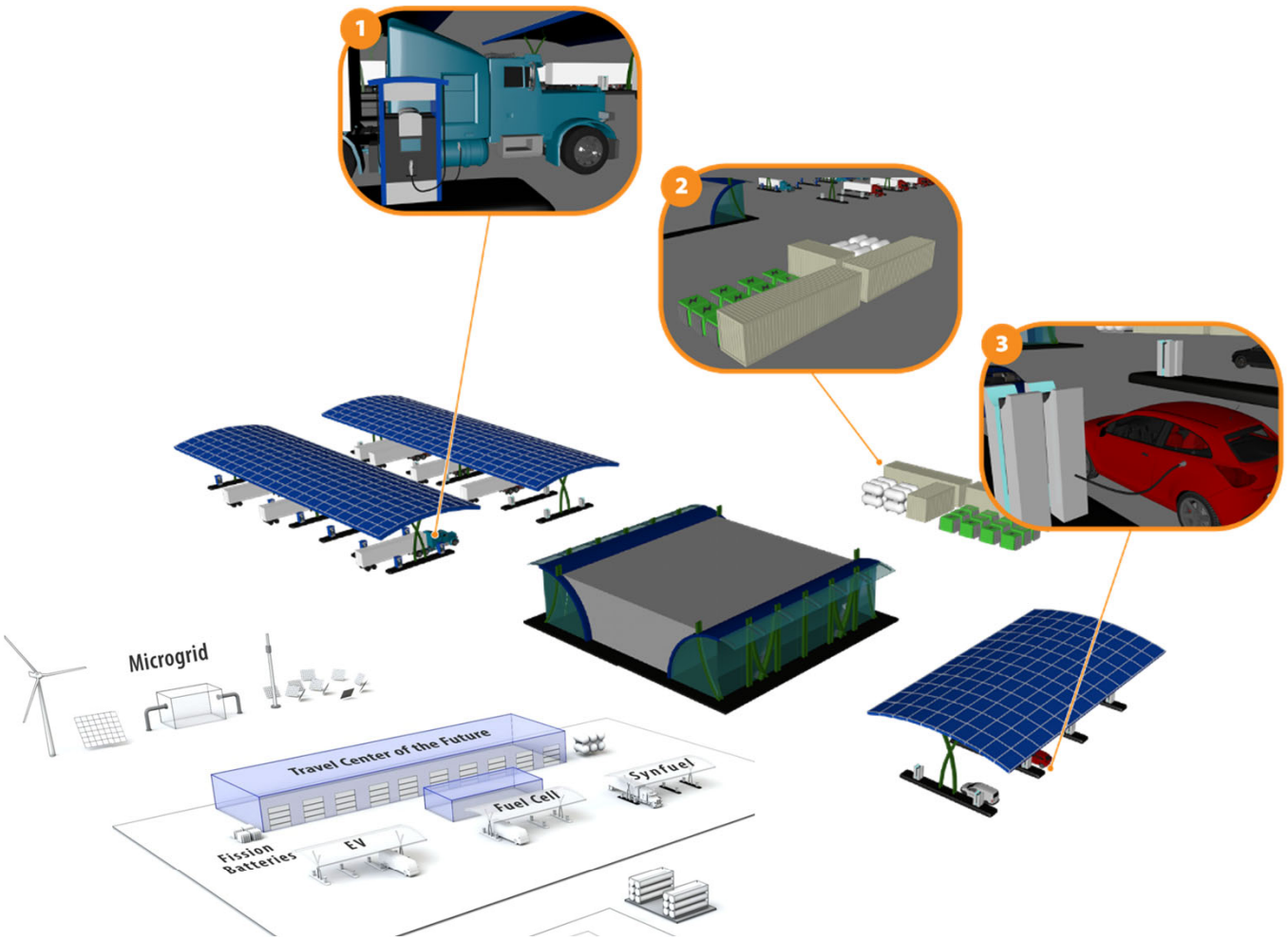
Unique INL site, infrastructure, and facilities enable energy and security RD&D at scale

$1,823 M	FY23 Total Operating Cost
6,000+	Employees
569,178	Acres
890	Square Miles



4	Operating reactors
12	Hazard Category II & III non-reactor facilities/ activities
50	Radiological facilities/activities
17.5	Miles railroad for shipping nuclear fuel
44	Miles primary roads (125 miles total)
9	Substations with interfaces to two power providers
126	Miles high-voltage transmission lines
3	Fire Stations

The "Gap": *Travel Center of the Future*



Initial Focus

1 **H2 fueling** for fuel-cell Class 8 fuel-cell electric trucks

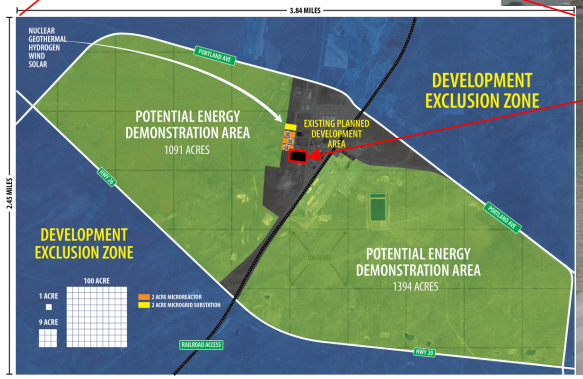
Onsite nuclear microreactor produces electricity and heat for high-temperature electrolyzer for H2 production

2 **Stationary batteries** allow balancing of microreactor/grid load with local renewable generation to minimize electricity cost

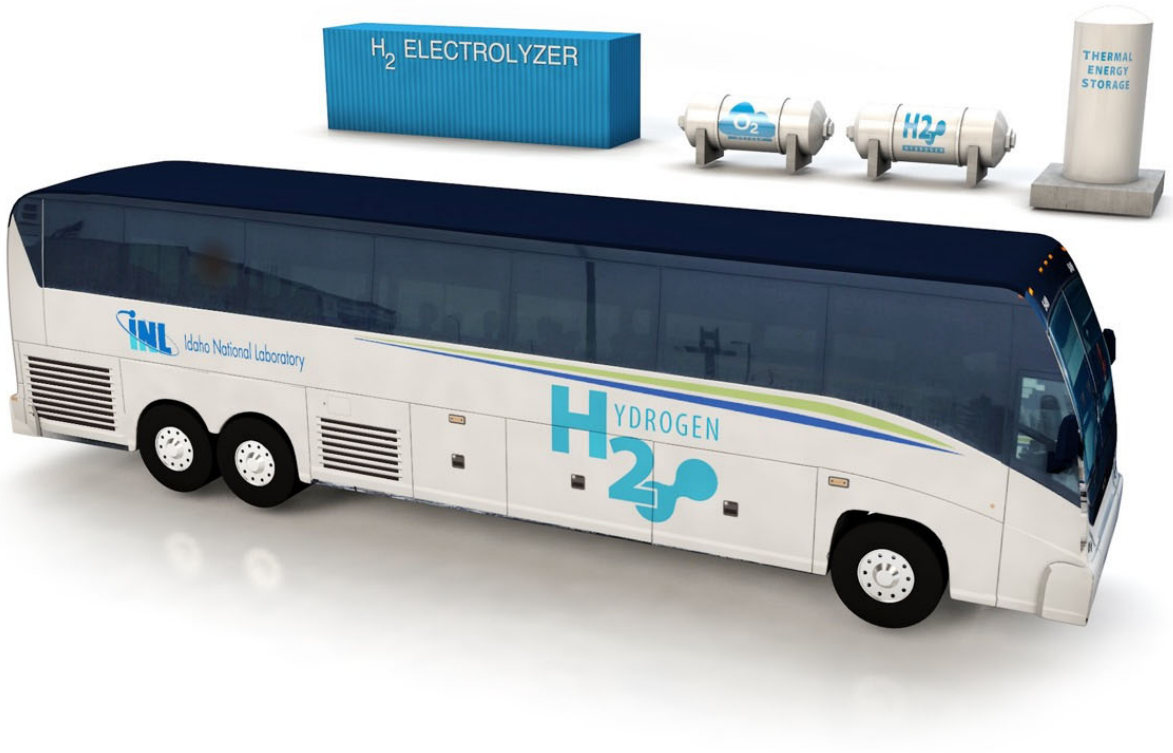
3 **350-kW charging** for medium and heavy-duty electric trucks and light-duty EVs in the near term

1-3 MW for HD EVs mid/long term

INL Central Facilities Area
the new Energy Technology Proving Ground



Converting the INL fleet to hydrogen and electric vehicles is essential to achieve net-zero by 2031



86
MOTOR COACHES

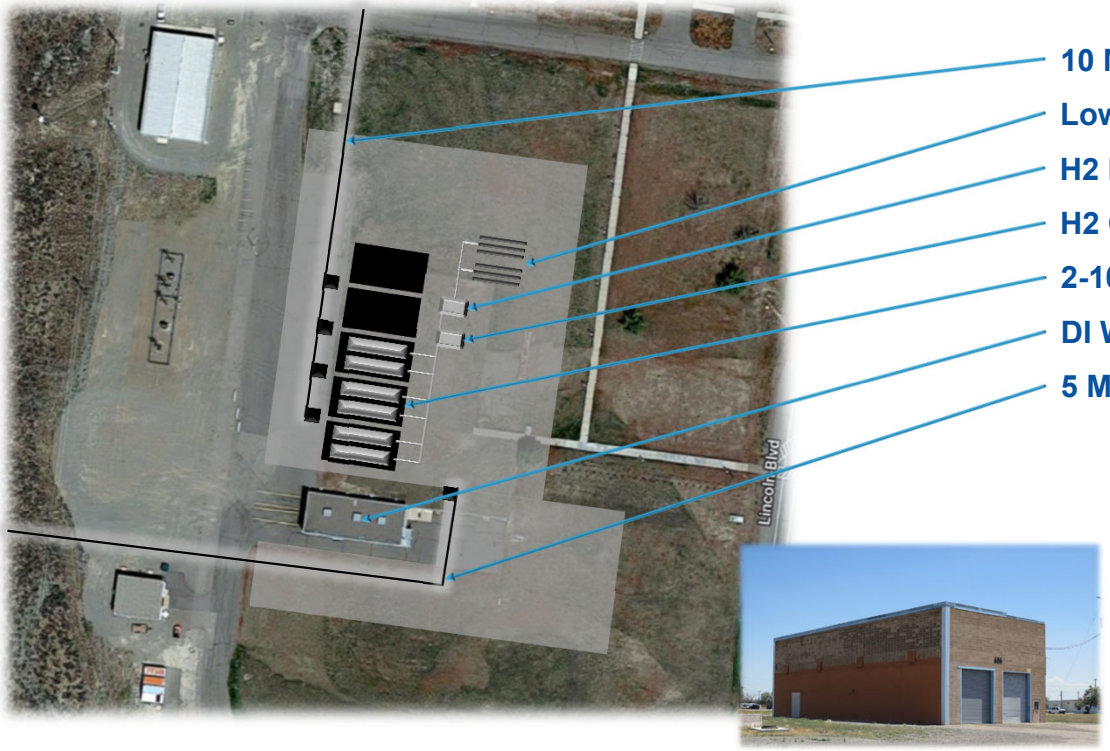
2.7
MILLION MILES DRIVEN EACH YEAR

435,000
GALLONS OF FUEL USED EACH YEAR

IDAHO NATIONAL LABORATORY

Proving Ground Hydrogen Production & Utilization

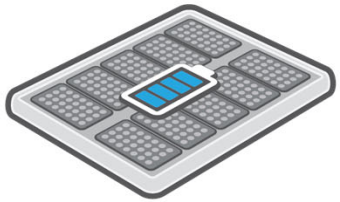
More than 10 Acres of Initial Testing Space Available

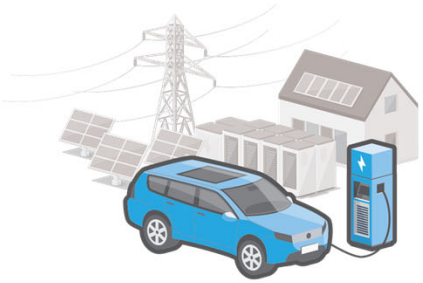


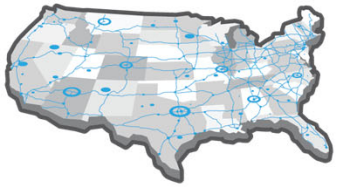
- 10 MW System Under Test Power Line
- Low and high Compression H2 Tanks
- H2 Multi-Stage Compression
- H2 Gas Dewatering and Clean-up
- 2-10 MWe Electrolyzers
- DI Water Supply and MWe Boiler
- 5 MW Balance of Plant Power Line

Transportation & Energy Storage Research Focus

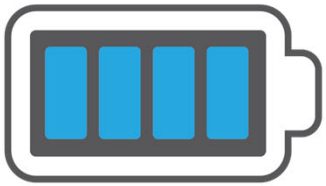
CYBER SECURITY







Emerging Battery Technology | **Advanced Battery Systems** | **Vehicle-Grid Integration** | **Future Mobility Systems**



BATTERY TEST CENTER
(BTC)

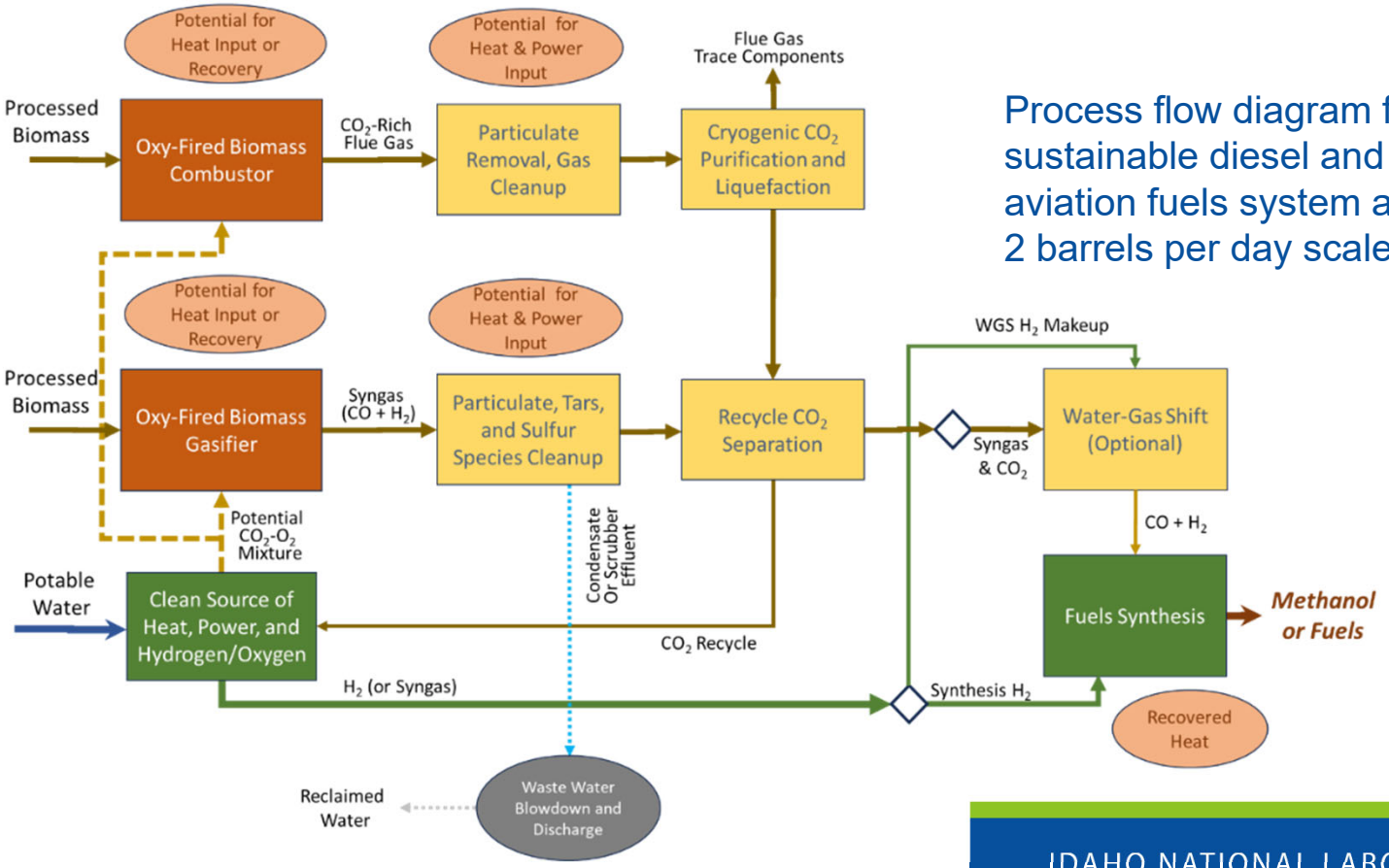
ELECTRIC VEHICLE INFRASTRUCTURE LABORATORY
(EVIL)

CALDERA EV CHARGING INFRASTRUCTURE SIMULATION PLATFORM

Low Carbon Intensity Fuels from Biomass Carbon + Non-Carbon Energy Sources

Upstream emulation of advanced reactor thermal energy

Capability to integrate a Micro Reactor



Process flow diagram for sustainable diesel and aviation fuels system at 2 barrels per day scale

INL's Heritage: *The National Reactor Testing Station drove nuclear innovation in the U.S. and around the world*

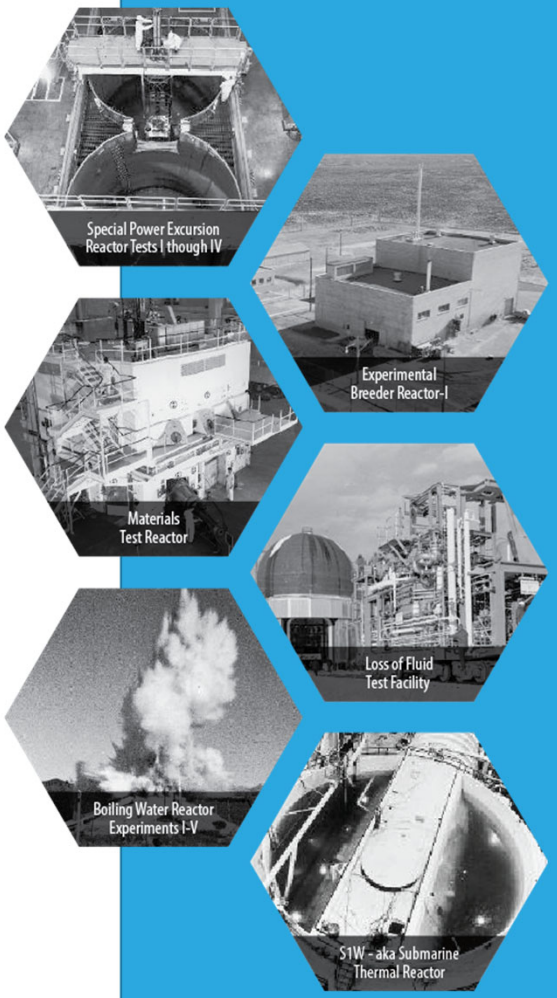
1st Nuclear power plant

U.S. city to be powered by nuclear energy

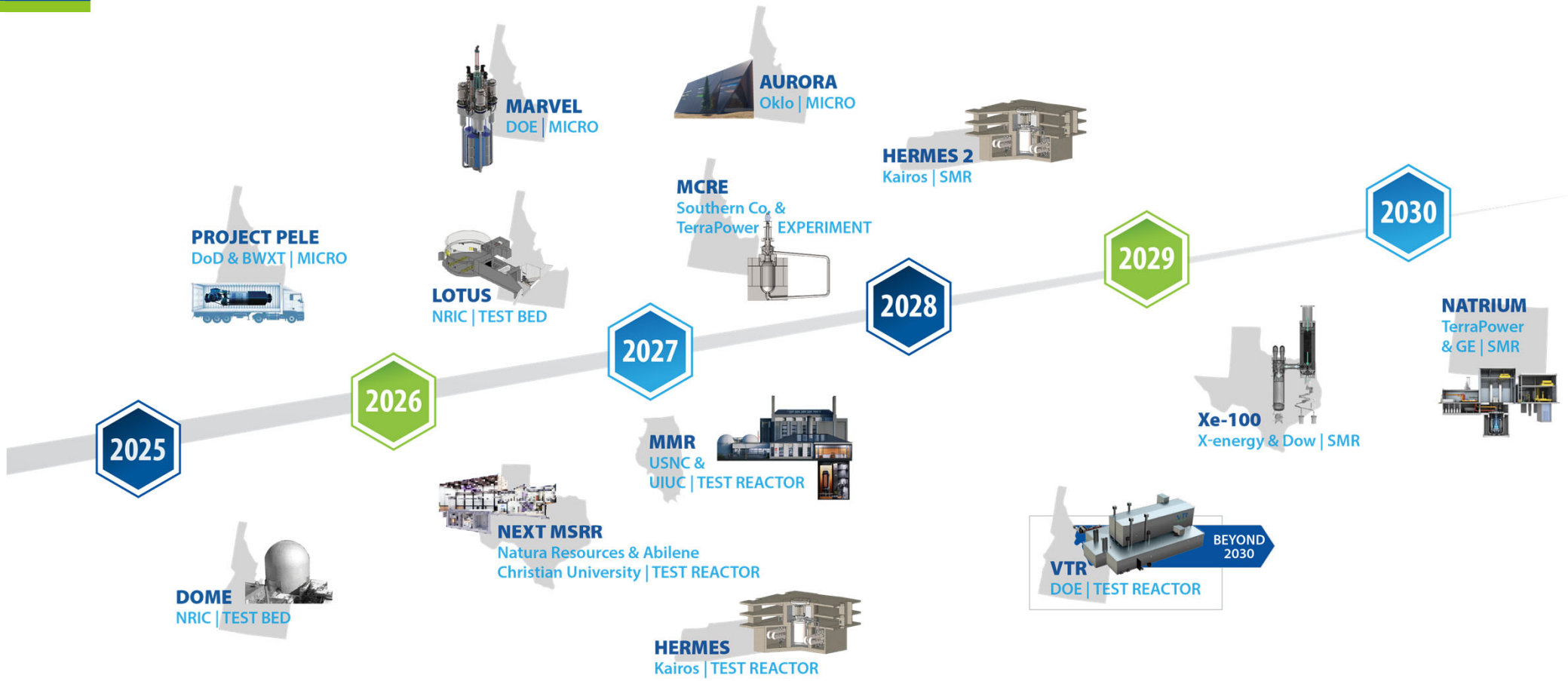
Submarine reactor tested; training of nearly 40,000 reactor operators until mid-1990s

Mobile nuclear power plant for the army

Demonstration of self-sustaining fuel cycle	Basis for LWR reactor safety	Aircraft and aerospace reactor testing	Materials testing reactors



Accelerating advanced reactor demonstration & deployment



Energy Technology Proving Ground

Nuclear Energy Generation

MARVEL #53
DOE | MICRO

MCRE #55
Southern Co. & TerraPower | EXPERIMENT

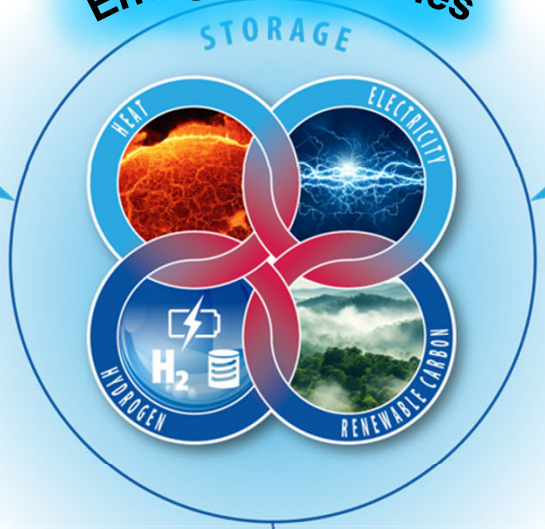
AURORA #56
Oklo | MICRO

PROJECT PELE #54
DoD & BWXT | MICRO

LOTUS
NRIC | TEST BED

DOME
NRIC | TEST BED

Energy Currencies



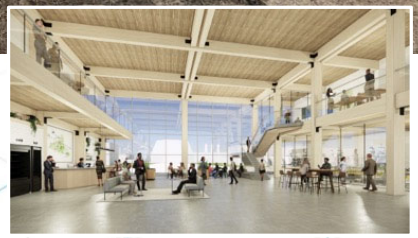
Other Clean Energy Generation

Variable renewables, geothermal, MSW, fossil with carbon capture, etc.

ETPG will advance the existing kW-scale Energy Systems Laboratory to MW demonstration scale

Polymers, Chemicals | Biofuel | H_2 | Ammonia Fertilizer | Steel, Metals | Paper Products | General Industry | Clean Water | District Heating | Flexible Electricity

INL's Energy Technology Proving Ground



*Artist rendition

A demonstration and testbed complex that:

- *Validates industrial technologies*
- *Designs and controls integrated energy systems*
- *Leverages contributions from nuclear energy beyond electricity*
- *Integrates and leverages testbeds across the DOE laboratory complex, e.g. NREL-ARIES*

INL/MMIS-23-75532