

GAIN

Gateway for Accelerated Innovation in Nuclear

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Vision / Mission

Vision (2030)

The U.S. nuclear industry is equipped to lead the world in development of innovative nuclear technologies to supply urgently needed abundant clean energy both domestically and globally.

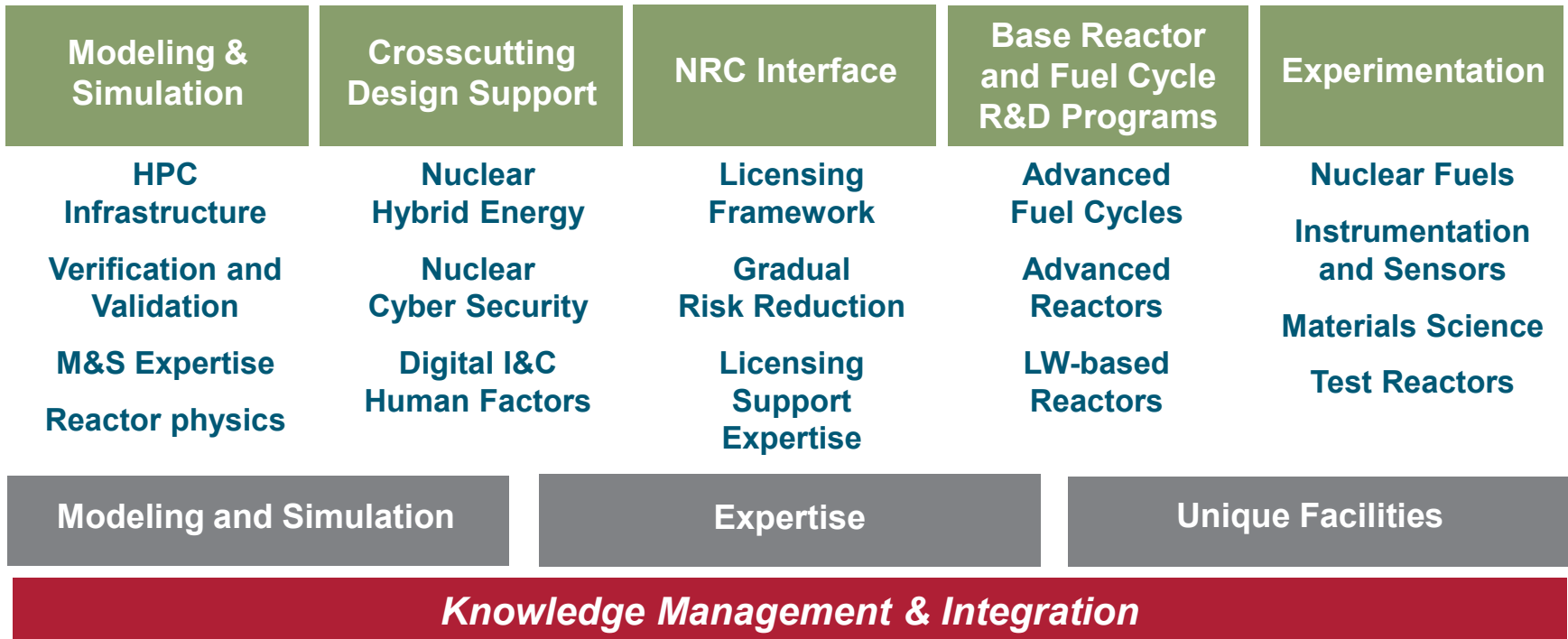


Mission

Provide the nuclear energy industry with access to the technical, regulatory and financial support necessary to move innovative nuclear energy technologies toward *commercialization* in an accelerated and cost-effective fashion

New **accident tolerant fuel (ATF) cladding**, conceived, developed, manufactured, and tested at ORNL, has been manufactured by Global Nuclear Fuels (GNF) into lead test assemblies, and shipped to Southern Nuclear Operating Company for trials in Edwin I Hatch plant. The FeCrAl cladding, called IronClad (see figure), will be the first developed through DOE's Enhanced ATF program to be installed in a commercial nuclear reactor. (February 2018)

GAIN: Connecting nuclear innovators to U.S. DOE laboratory capabilities and RD&D programs



– GAIN –

*Industry and investor access to
DOE capabilities and expertise*

Collaboration is Essential

Industry-Led, Technology Working Groups (TWGs)

- Molten Salt Reactor
- Fast Reactor
- High Temperature Gas Reactor

Roles and Responsibilities

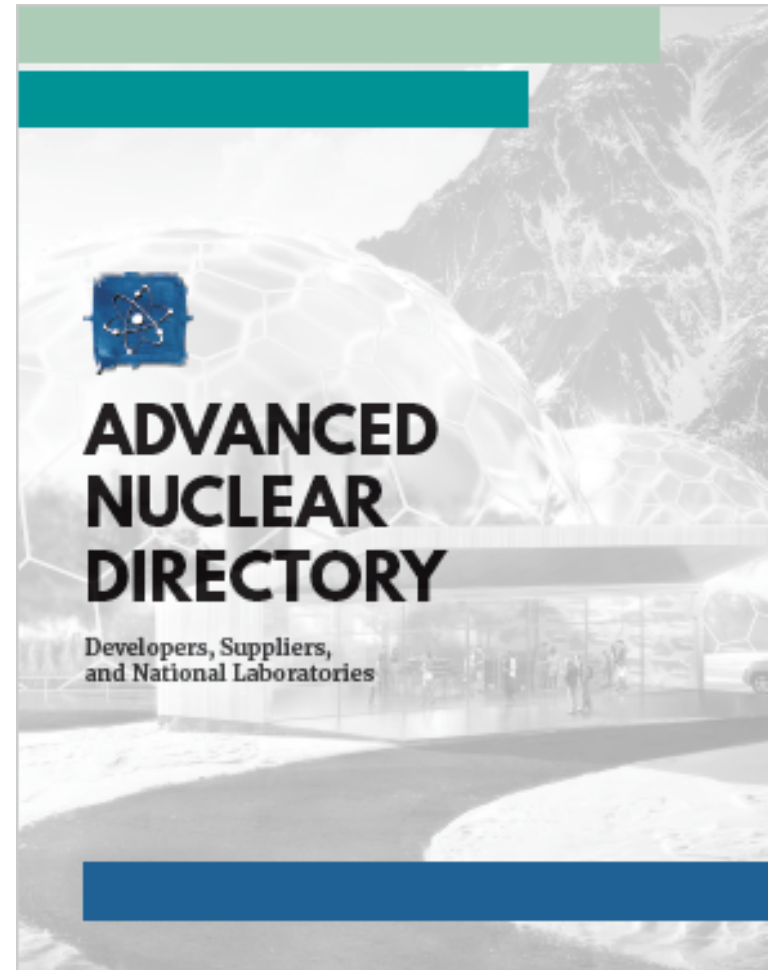
- **Electric Power Research Institute (EPRI): Develop joint-strategies for V&V**
 - Stakeholders – advanced Modeling & Simulation cross-cutting tools
 - NRC – usage of advanced M&S tools for licensing analysis
- **Nuclear Energy Institute (NEI): Facilitate/coordinate TWG activities with NEI's ARWG**
 - Coordinate with GAIN and EPRI to support working groups
 - Work with industry, DOE, and NRC on issues associated with High Assay LEU
- **GAIN:** Integrate TWGs needs with DOE programs and resources
- **National Technical Directors (NTDs):** Provide expert guidance and research prioritization
- **U.S. NRC:** Communicate with the advanced reactor industry and, as appropriate, modernize NRC licensing processes and regulations (MOU with DOE)
- **US Nuclear Industry Council (NIC):** Partner in developing Advanced Nuclear Directory

Advanced Nuclear Directory

- Directory was created in partnership between GAIN and Third Way, with help of US Nuclear Industry Council (US NIC)
- Includes a sample of companies engaged in development of advanced nuclear technologies
- All entries are voluntary and include developers, suppliers, and national laboratories

gain.inl.gov

➤ About, Industry/Directory



GAIN Highlights

FY16

- GAIN Initiative Announced at the White House (11/06/15)
- NE Voucher Pilot
- GAIN Execution Plan
- GAIN Executive Advisory Committee (EAC)
- Eight NE Voucher Awards
- DOE-NRC Workshop on Licensing Adv Reactors
- MSR/HTGR/FR Technology Workshops
- Standard CRADAs for NE-Vouchers
- GAIN Communications Plan

FY17

- “Applied Technology” Label Cancelled on New Docs
- DOE-NRC MOU for GAIN
- MSR/FR Legacy Documents on gain.inl.gov
- RELAP5-3D Single-use License
- Fourteen NE Voucher Awards
- ORNL MSR Workshop
- GAIN EPRI M&S Gap Analysis Workshop
- GAIN Fuel Safety Research Workshop
- NSUF-GAIN Thermal Hydraulics Workshop

FY18

- TREAT Restart (November 15, 2017)
- NEAMS Executive Advanced Reactor Industry Council (NEARIC)
- Advanced Nuclear Directory
- TREXR Database (TREAT Docs)
- Five Voucher Awards – 1st Round
- Two Voucher Awards – 2nd Round
- NRC M&S tools coupled to MOOSE-Comp Reactor Analysis Bundle
- NaSCoRD Database (FR Design)
- NEAMS MSR Workshop
- Enabling Advanced Reactors for the Market Symposium
- Digital Environment for Advanced Reactors Workshop
- HTR Symposium

2016-2018:

109 Nuclear Technology Companies* Involved with GAIN

| | | | | |
|--|--|---|--|--|
| 27 Companies participate in a Technology Working Group (TWG) | 2016 NE Vouchers awarded to 8 companies, including 5 not in a TWG | 2017 NE Vouchers awarded to 14 companies, including 9 not in a TWG | 2018 NE Vouchers awarded to 6 companies, including 3 not in a TWG | 65 Companies involved with GAIN not in a TWG or a NE Voucher recipient |
|--|--|---|--|--|

**Developers/Suppliers/Utilities*

TECHNOLOGY WORKING GROUPS (TWG)



Molten Salt Reactor

| | |
|-------------------------------|---------------------------|
| Alpha Tech Research Corp | Salt Lake City, Utah |
| Duke Energy | Charlotte, North Carolina |
| Elysium Industries | Boston, Massachusetts |
| Exelon Corporation | Chicago, Illinois |
| Flibe Energy, Inc. | Huntsville, Alabama |
| Muons, Inc. | Batavia, Illinois |
| Southern Company | Birmingham, Alabama |
| TerraPower, LLC | Bellevue, Washington |
| Terrestrial Energy USA Ltd. | New York, New York |
| ThorCon USA | Stevenson, Washington |
| Transatomic Power Corporation | Cambridge, Massachusetts |

High Temperature Gas Reactor

| | |
|------------------------|---------------------------|
| Framatome, Inc. | Lynchburg, Virginia |
| BWX Technologies, Inc. | Lynchburg, Virginia |
| Duke Energy | Charlotte, North Carolina |
| Kairos Power | Oakland, California |
| StarCore Nuclear | Montreal, Canada |
| X-Energy, LLC | Greenbelt, Maryland |

Fast Reactor

| | |
|--------------------------------------|----------------------------------|
| Advanced Reactor Concepts, LLC | Chevy Chase, Maryland |
| Columbia Basin Consulting Group, LLC | Kennewick, Washington |
| Duke Energy | Charlotte, North Carolina |
| Elysium Industries | Boston, Massachusetts |
| Exelon Corporation | Chicago, Illinois |
| General Atomics | San Diego, California |
| General Electric-Hitachi | Wilmington, North Carolina |
| Hydromine, Inc. | New York City, New York |
| Oklo, Inc. | Sunnyvale, California |
| Southern Company | Birmingham, Alabama |
| Studsvik Scandpower, Inc. | Gaithersburg, Maryland |
| TerraPower, LLC | Bellevue, Washington |
| Westinghouse Electric Co., LLC | Cranberry Township, Pennsylvania |

Note: GAIN, DOE NTDs, EPRI and NEI participate on all of the TWG teams

Future Activities in 2018

Workshops:

- Molten Salt Reactor Workshop at Oak Ridge National Lab: October 2-4, 2018
- Advanced Manufacturing at Oak Ridge National Lab: Dec. 4-6, 2018

Database/catalog:

- Expand the list of historical advanced-reactor documents to support knowledge transfer; facilitate access to key documents through OSTI
- Develop and initiate the process to appropriately remove AT designation on high priority documents requested by industry

Funding Opportunities:

- Industry-focused FOA and Vouchers awarded quarterly for 5 years

Challenge: Streamline contracting mechanisms

- Class patent waivers
- Extended IP protection

The Future for Nuclear is Bright



Reference: Third Way

*If you don't like something,
change it.*

*If you can't change it, change your attitude.
~ Maya Angelou*



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