

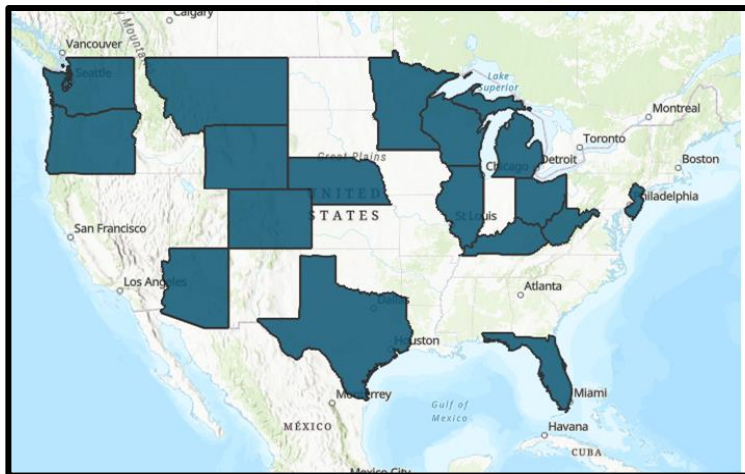
GAIN Vouchers

August 7, 2023

New Hampshire Nuclear Study Commission Meeting

Chris Lohse, GAIN Innovation and Technology Manager

2023 Activities

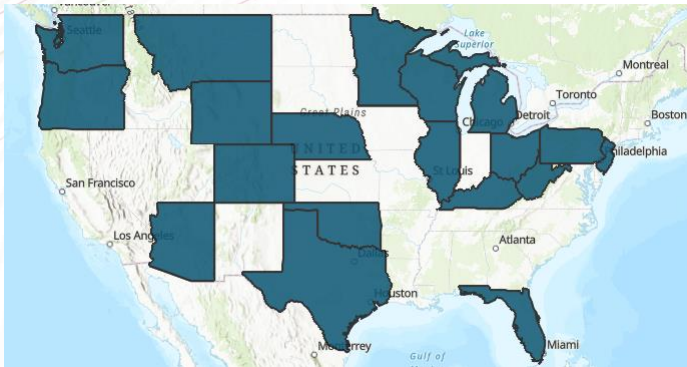
State Level Outreach

- Policymakers, NGOs, Utilities, Regulators, Industrials, Commissioners
- Introduce Advanced Nuclear through direct conversation or testimony
- Help connect states to financial or technical resources across DOE complex
- Looking at state level regs



Advanced Nuclear Industry Milestones						
						
Purdue University and Duk...	VA Legislature Passes Bill ...	Indiana Passes SMR Bill	NuScale Power and KGHM ...	West Virginia Repeals New...	Oklo Partners with Argonn...	USNC Partners with Coppe...
DATE 4/27/2022	DATE 4/11/2022	DATE 3/18/2022	DATE 2/14/2022	DATE 2/8/2022	DATE 2/8/2022	DATE 2/2/2022

Engagement Activities



[Stakeholder Engagement Website](#)

State Level Outreach

- Policymakers, NGOs, Utilities, Regulators, Industrials
- Introduce Advanced Nuclear through direct conversation or testimony
- Help connect states to financial or technical resources across DOE complex
- Follow nuclear related legislation

General Support:

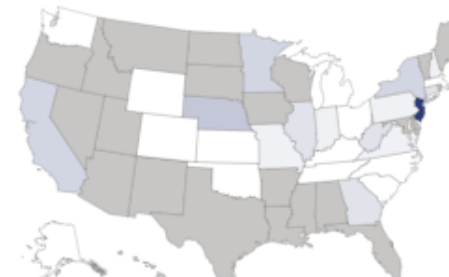
- Curated a “new to nuclear” resource kit with information written for non-nuclear audience
- Curated an advanced nuclear milestones page to stay up to date with latest industry news
- Maintain directory of developers and supply chain companies
- Track existing and pending legislation

Specific Support:

- Custom Webinar Series to State/Regional Stakeholders to Introduce Advanced Nuclear and possible applications

Legislation: [2022 Summary](#)

More Information



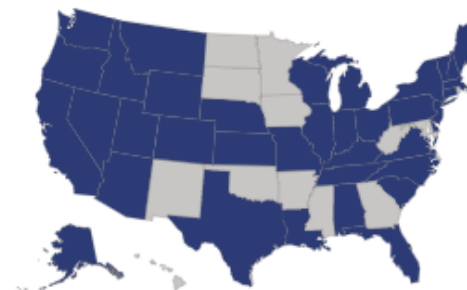
Proposed Legislation

Updated on: 12/05/2022

State	Bill Link	Status	Topic	Overview
WY	HB 131	Passed	DN/Re / Advanced Nuclear / Permitting and Certificate of Public Convenience	Amends requirements and conditions for legislative approval of high-level radioactive waste storage facilities.
CT	HB 5000	Passed	Study or Task Force / Hydrogen	Requires a study to be conducted on hydrogen power and include an examination of sources of clean hydrogens including (but not limited to) nuclear.
NH	HB 541	Passed	Study or Task Force / Advanced Nuclear / DN/Re	Establishes a commission to study nuclear power and nuclear reactor technology in New Hampshire.
MI	HB 9019	Passed	Study or Task Force	Provides for a feasibility study on building nuclear energy in State.
VA	HB 884	Passed	Study or Task Force / Advanced Nuclear / Fossil Fuel	The bill establishes the Southwest Virginia Energy Research and Development Authority and creates a stakeholder working group to identify strategies and policies for (a) promoting the development of advanced small modular reactors in localities in the Commonwealth that formerly hosted fossil fuel electric generation facilities and (b) using such reactors on brownfield sites or former military sites in such localities.
NC	HB 951	Passed	Energy Targets / Nuclear Finance	Provides a technology inclusive target to reduce electric generating facility CO2 emissions by 2030 and provides that the Commission may authorize the construction of a nuclear facility that will exceed the 2030 deadline due to technical, legal, logistical or other construction challenges.
CT	HB 2812	Passed	Moratoria	Would exempt new nuclear construction at existing Connecticut nuclear facilities from the state nuclear moratorium.
TN	HB 1008	Passed	Energy Targets	Encourages energy policies that increase domestic energy independence through the production of oil, natural gas, and nuclear energy.

States where legislation related to nuclear power was introduced or was active in 2022. Each bill listed is accompanied by a brief overview, can be sorted by topic and status of legislation. Direct link to bill is provided as well.

Legislation: [Existing Summary](#)



- Insurance/Immunity Provisions
- Nuclear Compact Adoption
- Nuclear Fuel and Waste Provisions
- Nuclear Power Facility and Nuclear Waste Site Prohibitions and Legislative Approval Requirements and Moratoria
- Nuclear Power Facility and Nuclear Waste Site Prohibitions and Restrictions
- Nuclear Reporting Requirements
- Permits/Other Approvals
- Professional Licensure, Labor, Contractor Requirements
- Rate Setting Provisions
- Relevant Panels, Councils, Committees, Authorities, Organizations, and Agencies
- State Goals Regarding Nuclear
- Studies and Resolutions Related Nuclear Power and Advanced Nuclear Technologies
- Tort Provisions

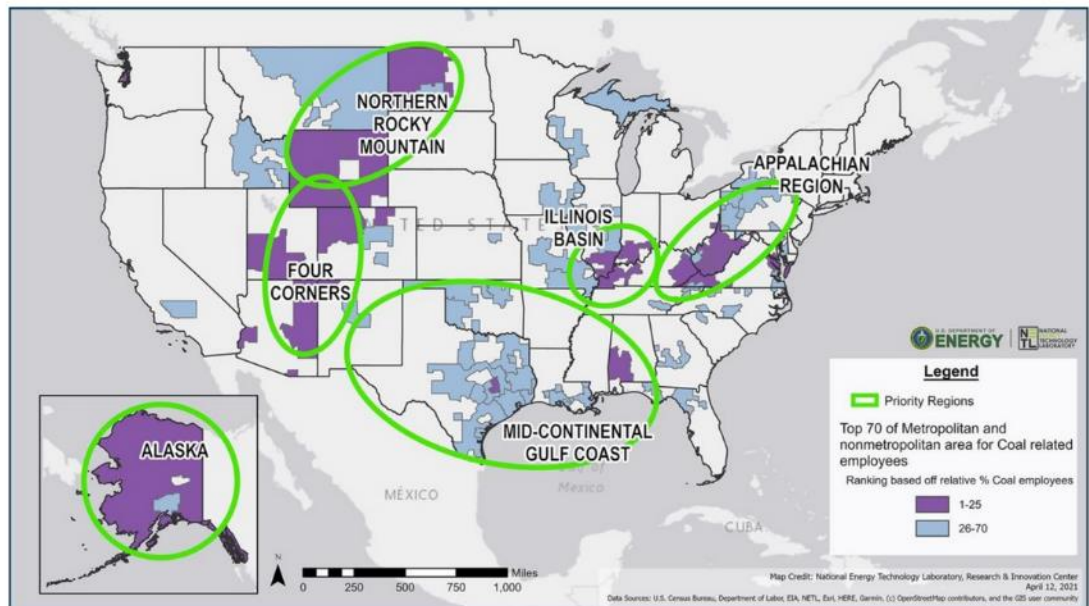
Zero Emission Credits, Taxes, and Other Financial Provisions Applicable to Nuclear

COAL TO NUCLEAR ENERGY COMMUNITY TRANSITIONS



Case Study Pilot (in partnership with DOE-FECM)

GAIN is in the process of scoping several case studies of specific coal sites/plants to understand the parameters that will have the most influence on moving forward with transitioning a coal site to nuclear. Scope several this year – complete 1 or 2 in the calendar year and initiate others in the future.



Coal to Nuclear Research Group

Each group is leading important projects associated with potential repurposing coal sites with nuclear technology. Use group discussions to align our individual efforts to make the most of this opportunity for the broader industry. In addition, get constructive feedback on GAIN case study pilot project.

GAIN Vouchers

- GAIN Vouchers started in 2016
- Since Inception
 - 86 vouchers awarded - 58 completed - 50 different companies
 - \$30.9M awarded to date
- GAIN Vouchers are open to support multiple areas for advanced nuclear technology developers.

#GAINAccess

#GAINAccess

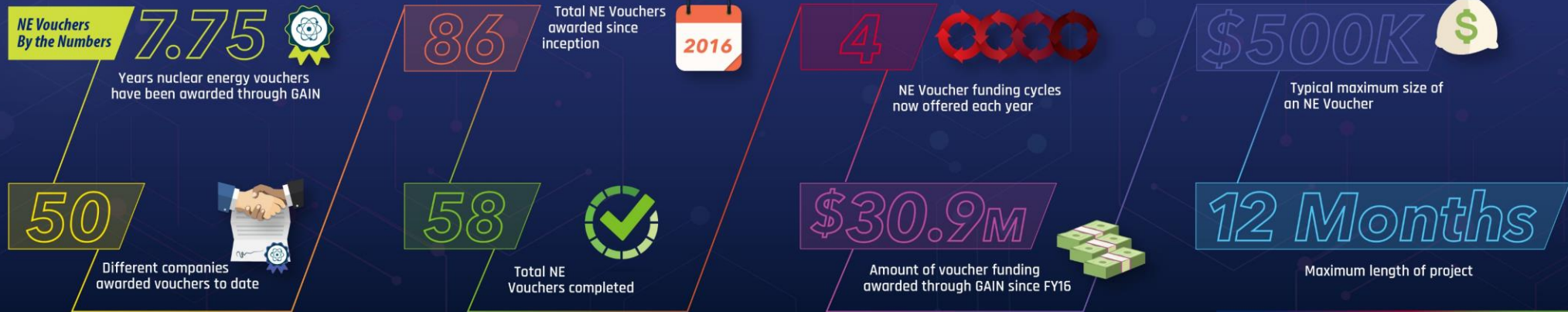
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The U.S. Department of Energy's Office of Nuclear Energy established the GAIN initiative to provide the nuclear community with access to the technical, regulatory, and financial support necessary to move innovative technologies toward commercialization.

The NE Voucher Program is one way to provide industry with access to the unique research capabilities and expertise at DOE's national labs.



GAIN Voucher Details

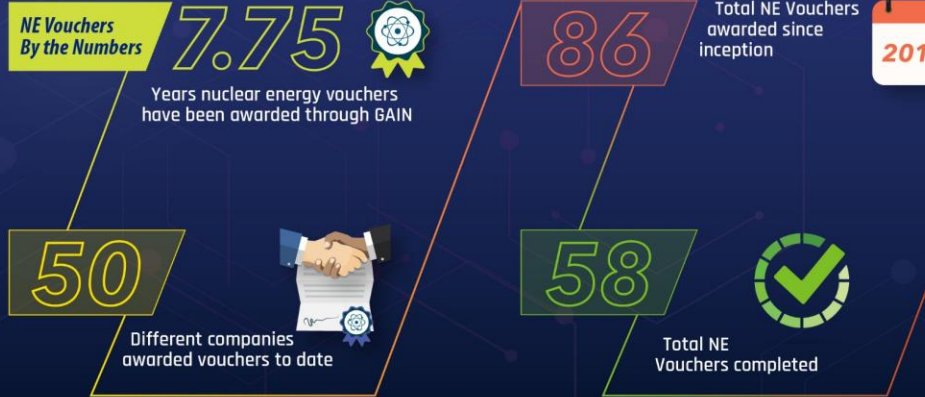
- Vouchers competitively award access to facilities and staff in the DOE national laboratory complex – NOT a financial award
- Voucher value is ~\$50K to \$500K
- Voucher recipient is responsible for 20% cost share
- One-year Period of Performance
- Standard CRADA
- Available to businesses that are majority (>51%) U.S. owned
- Limit to one application per cycle
- Four cycles per year – Next deadline is October 31st

Relevant GAIN Vouchers

- Assessment of SMRs for DOW – DOW Chemical
- Siting Studies
 - Elementl Power
 - TVA
- Integrated Hybrid Nuclear Energy System – Eastman
 - <https://www.osti.gov/servlets/purl/1643929>
- All Awarded Vouchers are here:
 - https://gain.inl.gov/SiteAssets/Funding%20Opportunities/NE_VoucherRecipientsConsolidated_06.20.2023.pdf

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AVAILABLE NOW: Completed Voucher Summary

Year ↓	Recipient	Proposal
2019	Analysis & Measurement Services Corp.	Testing of I&C Sensors and Cables for Small Modular Reactors
2018	Exelon Corporation	Plasma Separation Process Feasibility Study for the Commercial Enrichment of Gadolinium-157
2018	Vega Wave Systems	Radiation Testing for Nuclear Inspection Systems
2018	Oklo Inc.	Accelerate Development of Industry-Relevant Features in Modern Simulation Tools
2017	Micro Nuclear LLC	Development of the Microscale Nuclear Battery
2017	Kairos Power	Nuclear Energy Advanced Modeling and Simulation Program Thermal-Fluids Test Stand

GAIN Voucher

<https://gain.inl.gov/SitePages/Nuclear%20Energy%20Vouchers.aspx>

Kairos Power
partnered with

Argonne National Laboratory and Idaho National Laboratory

RFA-17-14580, Nuclear Energy Advanced Modeling and Simulation Program Thermal-Fluids Test Stand

YEAR AWARDED: 2017

TOTAL PROJECT VALUE: \$500K (\$400K DOE funds awarded, \$100K awardee cost share)

STATUS: Completed

PRINCIPAL LAB INVESTIGATORS: Elia Merzari (emerzari@anl.gov); Rich Martineau (INL retired)

DESCRIPTION: Argonne National Laboratory (ANL), Idaho National Laboratory (INL), and Kairos Power, LLC partnered to implement a multiscale thermal-fluids hierarchy analysis methodology for Kairos' fluoride high-temperature reactor (FHR). The project demonstrated Kairos Power's design optimization process for the heat exchanger, a vital component of the reactor's design. ANL performed high-fidelity simulations of Kairos' heat exchanger design at different spatial scales. Simulations using Nek5000, an open-source computational fluid dynamic code developed under the Nuclear Energy Advanced Modeling and Simulation program analyzed the heat and fluid flow in twisted tube heat exchangers. Software design improvements were implemented in the System Analysis Module (SAM) with the ultimate goal of providing a reliable thermal-fluid system simulator for FHRs. INL implemented additional efforts to improve the software compatibility between SAM and RELAP-7 and to bring SAM in line with the Multiphysics Object-Oriented Simulation Environment (MOOSE) Software Quality Assurance Plan. A prototype-coupled simulation was performed for a simplified tank loop. Based on the MOOSE multi-app framework, this prototype-coupled code will constitute the basis of future work in this area.

BENEFIT: Plant-scale physics (SAM) informed by the lower-length scale (Nek5000) can significantly improve solution accuracy and reduce uncertainty when using the software in a predictive sense where little to no empirical data is available.

IMPACT: This collaborative process between INL, ANL, and Kairos resulted in multiscale, multiphysics advances for FHR concepts and other advanced reactor concepts. Forming a team that worked cooperatively using the same simulation tools resulted in a shared ownership of the tools.

LESSONS LEARNED: Improved cooperation among DOE laboratories enhanced industry partners' confidence in relying on DOE for developing advanced modeling and simulation tools.

NEXT STEPS: Incorporating the Griffin application environment's use into reactor physics and radiation transport should be straightforward, as both INL and ANL are developing Griffin. Including Griffin will allow the state-of-the-art calculations to be performed on most advanced reactors incorporating single-phase coolants. Finally, the BISON nuclear fuel performance code can be coupled to the system to evaluate long-term fuel phenomena, such as irradiation damage and creep.

GAIN Vouchers – How to Apply

- Go to the GAIN Website: <https://gain.inl.gov>



HOME ABOUT **FUNDING OPPORTUNITIES** RESOURCES REGULATORY WORKSHOPS AND WEBINARS

How to do Business Through GAIN

NE Advance Class Patent Waiver

Request For Information - Input to DOE-NE programmatic R&D planning (DE-SOL-0008246)

NE Vouchers

Industry FOA: DE-FOA-0001817

Advanced Reactor Demonstration FOA: DE-FOA-0002271

Helpful Links

How to do business through GAIN

 [How to do Business through GAIN](#)

Proposal Submission System

 [Submit a Proposal](#)

Nuclear Energy Voucher Documents

 [NE Voucher Process Flowchart](#)

 [NE Voucher Request 5.1.2020](#)

 [Voucher RFA Summary of Changes 5.01.2020](#)

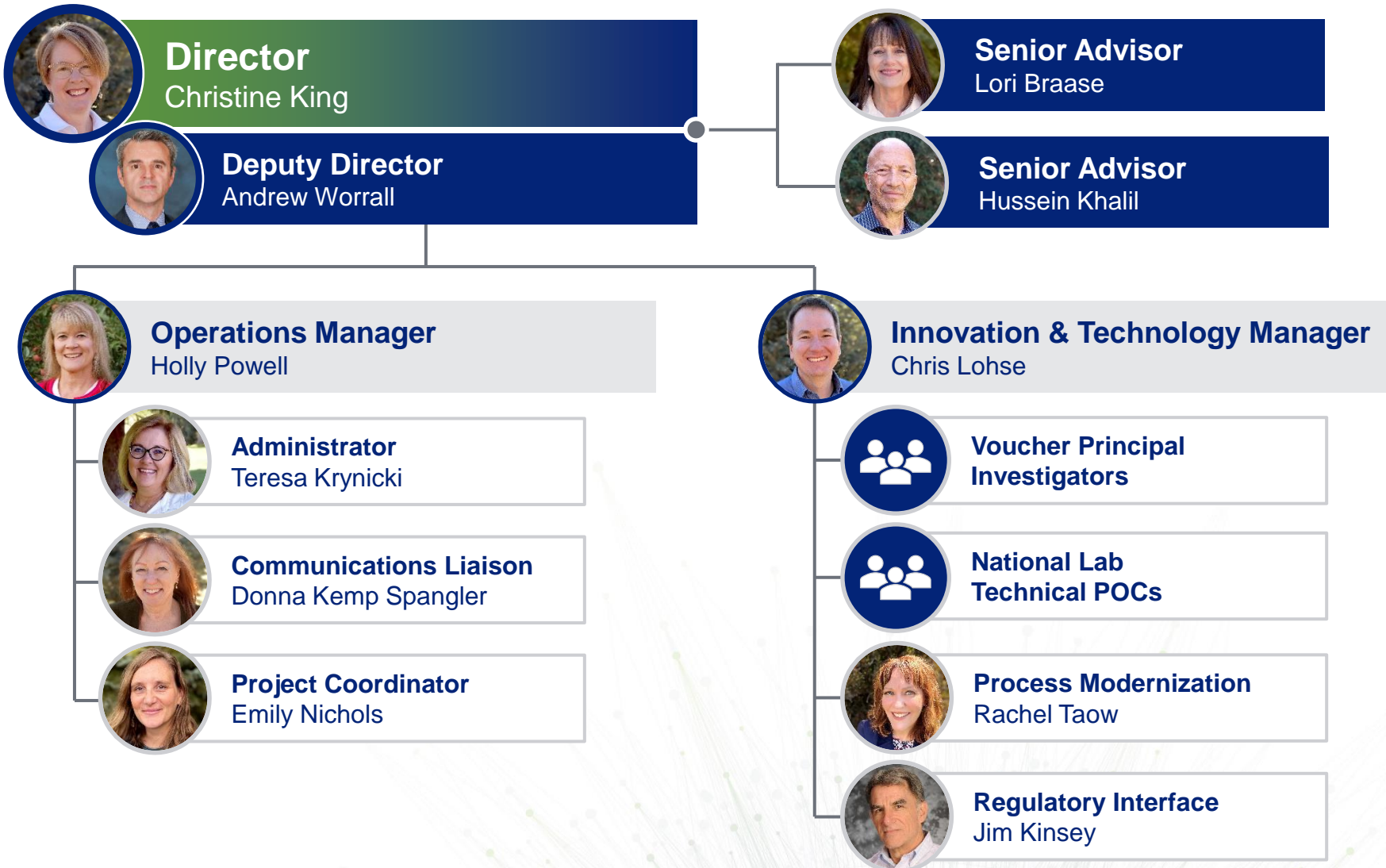
 [Ten Tips for Writing a Successful NE Voucher Request](#)

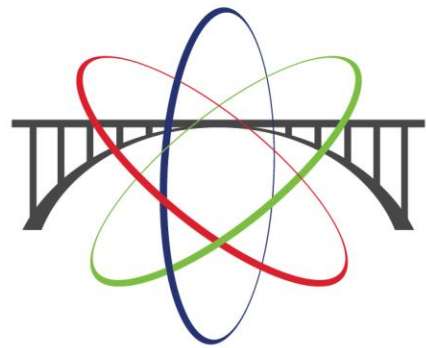
 [NE Voucher FAQ's 5.1.2020](#)

 [GAIN Small Business Voucher CRADA 11.1.18](#)

 [DOE Standard CRADA 11.1.18](#)

The GAIN Team





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