



Genesis Mission



U.S. DEPARTMENT
of ENERGY

The Genesis Mission Has Launched!

The Genesis Mission has:

- An executive order (EO 14363), signed November 24, 2025
- A consortium to facilitate partnerships: <https://genesismissionconsortium.org/>
- Alignment and coordination across DOE, including Science, Applied Energy, and NNSA
- Alignment and coordination across all 17 DOE National Laboratories
- Building momentum, and increasingly, concrete engagement from public sector, private sector, academic and other partners
- Efforts across pillars on infrastructure, data, models, and partnerships which will contribute to transformative new approaches to addressing the science and technology challenges



The Platform – An Integrated DOE Effort

- The Genesis Mission Platform (The American Science and Security Platform) serves as a state-of-the-art enabling tool for DOE and all Genesis Mission partners.
- The platform connects and integrates infrastructure (computing infrastructure together with other scientific instrumentation and DOE assets), data, and models to provide unique capabilities for the Nation.
- The core platform capabilities are developed collaboratively by a team from SC, NNSA, and applied energy laboratories, alongside industry and other partners.

Genesis Mission Platform Development:



The Transformational AI Models Consortium Teams

Models

Common Framework Development

Multimodal Reasoning

AI Self Improvement

Agents with Orchestration

Model Evaluation

Safety and Security

Best Practices for Scientific Workflows

- Measure what works and propagate that knowledge

IP and Partnership Formation

- Broker connections between industry and lab teams
- Develop IP and other language for lightweight agreements

Data

Common Framework Development

AI-Driven Data-Preparation

Data Brokers and Standards

- Uniform Best Practices for AI-ready Data
- *Data Detectives*: What is available and where

- This diagram shows the major teams within the Transformational AI Models Consortium.
- These teams create reusable software components and work with teams working on science and technology challenges.

The American Science Cloud

Builds on Integrated Research Infrastructure program spanning ASCR Facilities and HPDF

Users

Goal: make complex infrastructure simple for users & empower complex agentic workflows

DOE-wide expert group is devising cybersecurity and user vetting plan



HPDF team is focusing design and early access system on AmSC data services



ESnet core operations are essential to the Genesis Mission Platform

American Science Cloud Interfaces (AmSC APIs)

SECURITY & ALLOCATION

- Authentication
- Access control
- Allocations
- Risk Ownership

RESEARCH SERVICES

DATA SERVICES Catalog Curation Movement	AT-SCALE SERVICES Training Inference Simulation	MODEL SERVICES Catalog Fine-tuning Workflows	CORE AGENTIC FRAMEWORK Orchestration Reasoning models Telemetry & control
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ALCF is developing AI inference services

INFRASTRUCTURE SERVICES

Containers Storage interfaces Secure enclaves Data fabric

INFRASTRUCTURE RESOURCES

ASCR HPC Facilities HPDF DOE Labs Cloud Service Providers



ASCR HPC Facilities are growing the computing resources available through novel public-private partnerships

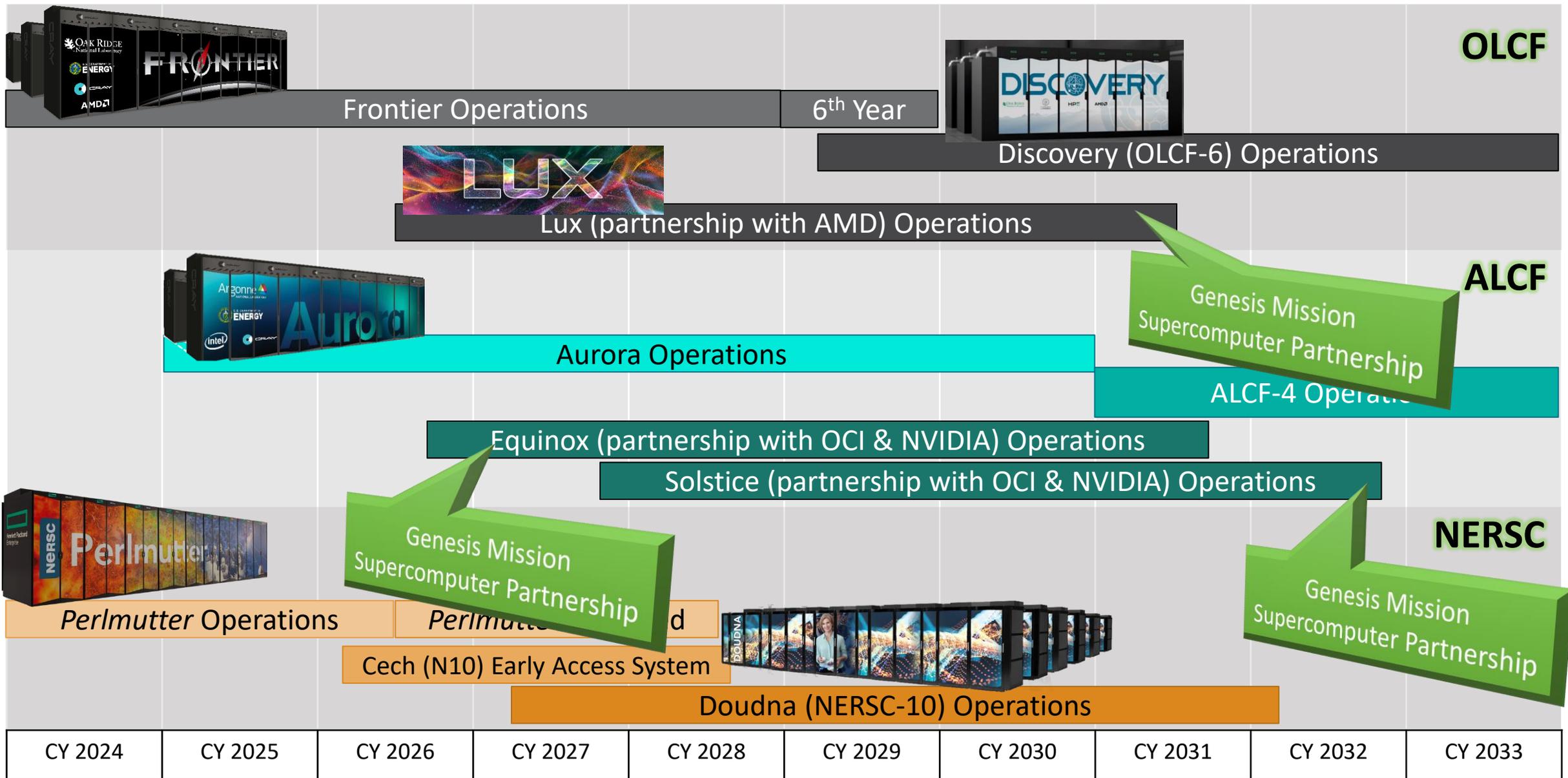


The American Science Cloud – Initial Infrastructure Partners

Infrastructure Partner(s)	Lab(s)
Oak Ridge Leadership Computing Facility (OLCF)	ORNL
Argonne Leadership Computing Facility (ALCF)	ANL
Energy Sciences Network (ESnet)	LBNL
National Energy Research Scientific Computing Center (NERSC)	LBNL
High Performance Data Facility (HPDF)	TJNAF, LBNL
Center for Continuum Computing (C3)	PNNL
Scientific User Facilities (SUF) Team	LBNL, ANL, TJNAF, BNL, FNAL, SLAC, ORNL
Digital Engineering Data Warehouse (DeepLynx)	INL

Infrastructure Partner(s)	Lab(s)
DIII-D Digital Twin	General Atomics
Energy Data Exchange (EDX)	NETL
US Lattice Quantum Chromodynamics Collaboration (FemtoMind)	TJNAF, FNAL
Fermi Data Platform (FDP)	FNAL
Hardware-accelerated AI-based Distributed Inverse Solver (HAIDIS)	TJNAF
Scientific Computing and Data Facilities (SCDF)	BNL
SLAC Shared Science Data Facility (S3DF)	SLAC
Stellar-AI compute system	PPPL
Virtual Emulation Environment for Advanced Research on Integrated Energy Systems (VEE-ARIES)	NLR

ASCR Announced HPC Systems and Projects Timeline



Energy Department Launches Genesis Mission Consortium

- Identify partnerships among its members and external stakeholders, strengthening collaborative responses to funding opportunities
- Amplify DOE's outreach by promoting solicitations, executing agreements, and tracking project successes
- Serve as a single, coordinated access point for members and their resources
- Facilitate working groups focused on AI model development and validation, data integration and standards, high-performance computing and cloud infrastructure, and robotics and automation
- Host annual member meetings, workshops, and technology showcases, providing members with high-impact networking and collaboration opportunities

Genesis Mission Consortium

Create the Next Era in Science

See <https://www.energy.gov/articles/energy-department-launches-genesis-mission-consortium-accelerate-ai-driven-scientific> for more.



Energy Department Announces 26 Genesis Mission Science and Technology Challenges

Examples Include:

Enhancing Particle Accelerators for Discovery

Designing Materials with Predictable Functionality

Scaling the Grid to Power the American Economy

Unleashing Subsurface Strategic Energy Assets

Achieving AI-Driven Autonomous Laboratories

Harnessing America's Historic Nuclear Data

Reenvisioning Adv. Manufacturing/ Industrial Productivity

Discovering Quantum Algorithms with AI

Recentring Microelectronics in America

Addressing a Portfolio of Key National Challenges: Work Has Already Started

- **Q2C Science at Scale:** From Quarks to Cosmos
- **The Autonomous Microelectronics Consortium**
 - **Accelerating Microelectronics Codesign** (MTv2-Microelectronics)
 - **MOAT:** Multi-Office Accelerator Operations & Controls
 - **PROMETHEUS:** Autonomous Power Plant Design (APPD)
 - **SYNAPS-I:** Light and Neutron Imaging FM
 - **GRID-UNI:** Agentic AI Foundation for the U.S. Power Grid
 - **MAIQMag:** Multimodal AI for Quantum Magnets
 - **OPAL-OMAHA:** Bio/Autonomous Labs
 - **Fusion-FM:** Foundational Model for Magnetic Confinement Fusion

Request for Application (RFA) “The Genesis Mission: Transforming Science and Energy with AI”

Purpose: to advance the Genesis Mission’s efforts to tackle the nation’s most complex science and technology challenges

This RFA (\$293M) encourages interdisciplinary teams to leverage novel AI models and frameworks to address >20 national challenges spanning advanced manufacturing, biotechnology, critical materials, nuclear energy, and quantum information science

Two types of awards will be established:

- Phase I awards (\$500,000 to \$750,000 over nine months)
- Phase II awards (\$6M to \$15M over three years) project period

Teams may apply directly to either phase in FY 2026, and successful Phase I teams will be eligible to compete for larger Phase II awards in future cycles

“The Genesis Mission has caught the imagination of our scientific and engineering communities to tackle national challenges in the age of AI. With these investments we seek breakthrough ideas and novel collaborations leveraging the scientific prowess of our National Laboratories, the private sector, universities, and science philanthropies.”

Under Secretary for
Science and Genesis
Mission Director,
Darío Gil

RFA is a cross-Departmental solicitation

Office of Science (SC)

Office of Critical Minerals and Energy Innovation (CMEI)

Office of Environmental Management (EM)

Office of Nuclear Energy (NE)

Office of Electricity (OE)

Hydrocarbons and Geothermal Energy Office (HGEO)

The National Nuclear Security Administration will be addressing the security-focused National Science and Technology Challenges through a separate mechanism

RFA Topics

- Reenvisioning Advanced Manufacturing and Industrial Productivity (SC, CMEI)
- Scaling the Biotechnology Revolution (SC, CMEI)
- Securing America's Critical Minerals Supply (CMEI, SC)
- Delivering Nuclear Energy that is Faster, Safer, Cheaper (NE, SC)
- Accelerating Delivery of Fusion Energy (SC, NE)
- Transforming Nuclear Restoration/Revitalization (EM, SC)
- Discovering Quantum Algorithms with AI (SC)
- Realizing Quantum Systems for Discovery (SC)

- Recentering Microelectronics in America (SC, CMEI)
- Securing U.S. Leadership in Data Centers (CMEI, SC)
- Achieving AI-Driven Autonomous Laboratories (SC)
- Designing Materials with Predictable Functionality (SC, CMEI)
- Enhancing Particle Accelerators for Discovery (SC)
- Unifying Physics from Quarks to the Cosmos (SC)
- Predicting U.S. Water for Energy (SC, CMEI)
- Scaling the Grid to Power the American Economy (OE, CMEI, SC)
- Unleashing Subsurface Strategic Energy Assets (HGEO, SC)

Additional RFA Topics

Crosscutting Needs for the American Science and Security Platform

- HPC Code Curation, Translation, and Development for Accelerated Scientific Discoveries (SC, CMEI)
- AI for Scientific Reasoning (SC)
- Cybersecurity for AI-driven Science Workflows (SC)
- AI in Fluid Flow for Energy Components and Technologies (SC, CMEI)

Grand Challenges



Energy

AI will be used to accelerate sustainable fusion power, optimize advanced nuclear reactor design and operation, and enable a more intelligent and resilient electrical grid.



Discovery Science

AI will be used to illuminate molecular dynamics, unify data to understand the universe from quarks to cosmos, and generate new quantum algorithms.



National Security

AI will be used to secure critical materials, accelerate advanced manufacturing, and discover mission-ready materials for defense and industry.

 Genesis Mission

Bone yard



Key Dates For Consideration for FY26 Funding

Phase I proposal due date: April 28, 2026, at 11:59 PM Eastern

- No pre-application or letter of intent is required

Phase II Letter of Intent (LOI) due date: April 28, 2026, at 5:00 PM Eastern

- LOIs are not required but strongly encouraged. DOE may hold any subsequent Phase II application until FY 2027 if a LOI is not submitted by the deadline.

Phase II proposal due date: May 19, 2026, at 11:59 PM Eastern

Phase II proposal resulting from a FY 2026 Phase I award due date: December 17, 2026, at 11:59 PM Eastern (subject to change pending award starts)

Additional Phase I and Phase II applications may be submitted after the corresponding deadlines; however, DOE reserves the right to decline such applications without review

The FY 2026 RFA is soliciting new applications for both Phase I and Phase II proposals

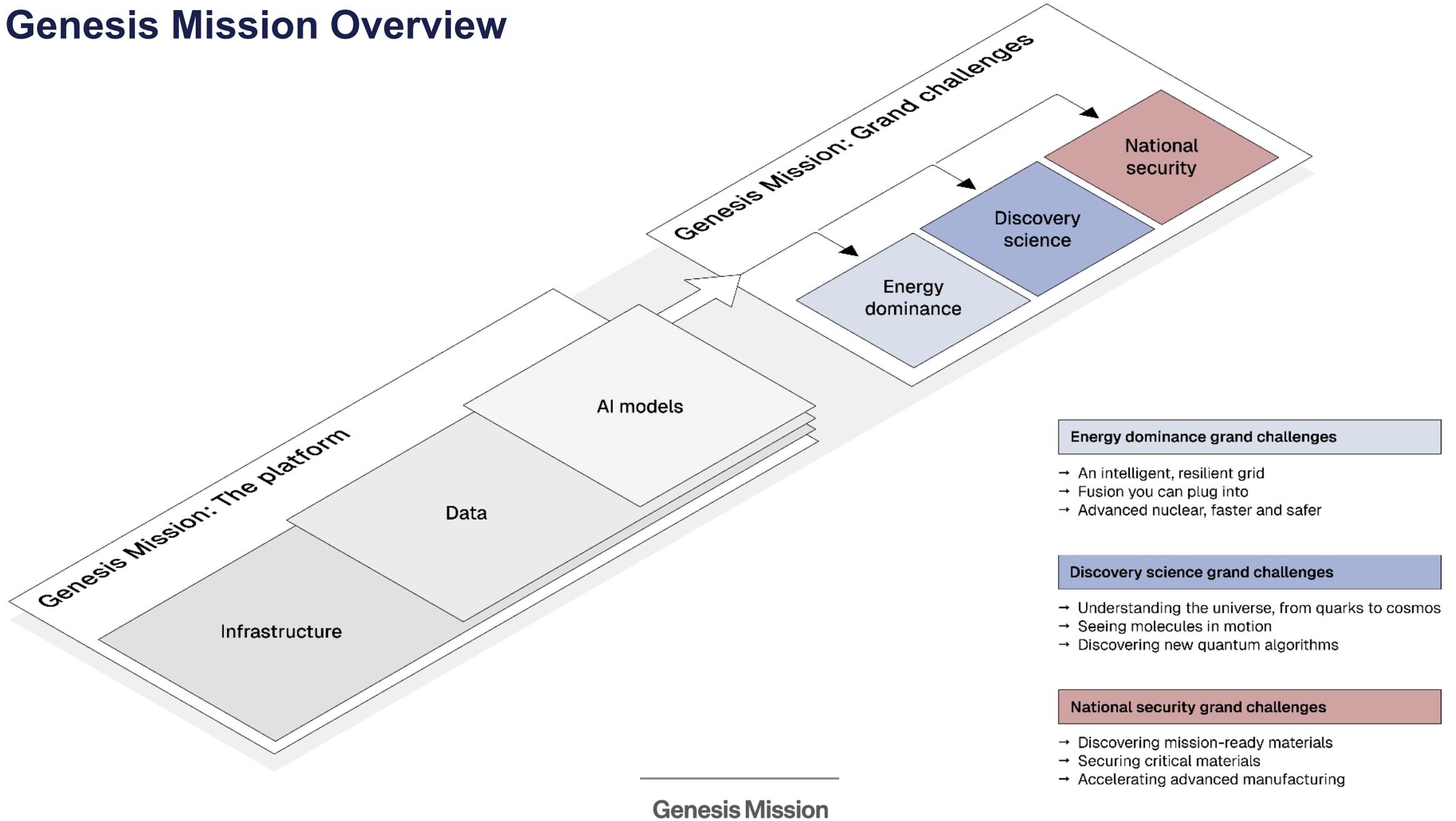
Phase I proposals

- Scope: Small team projects to design and demonstrate a clear, tangible research workflow that incorporates AI with concrete evaluation of the potential for AI advantage. Limited to one focus area.
- Goals: Provide a quantitative assessment of whether the proposed approach to demonstrating AI advantage in the scientific and/or technical research workflow is on a trajectory to yield a transformative scientific capability or transformative approach to an energy application, thereby justifying increased investment in a Phase II project
- A go/no go decision to determine eligibility to advance to phase II will occur at 6 months (9 months with a requested extension)

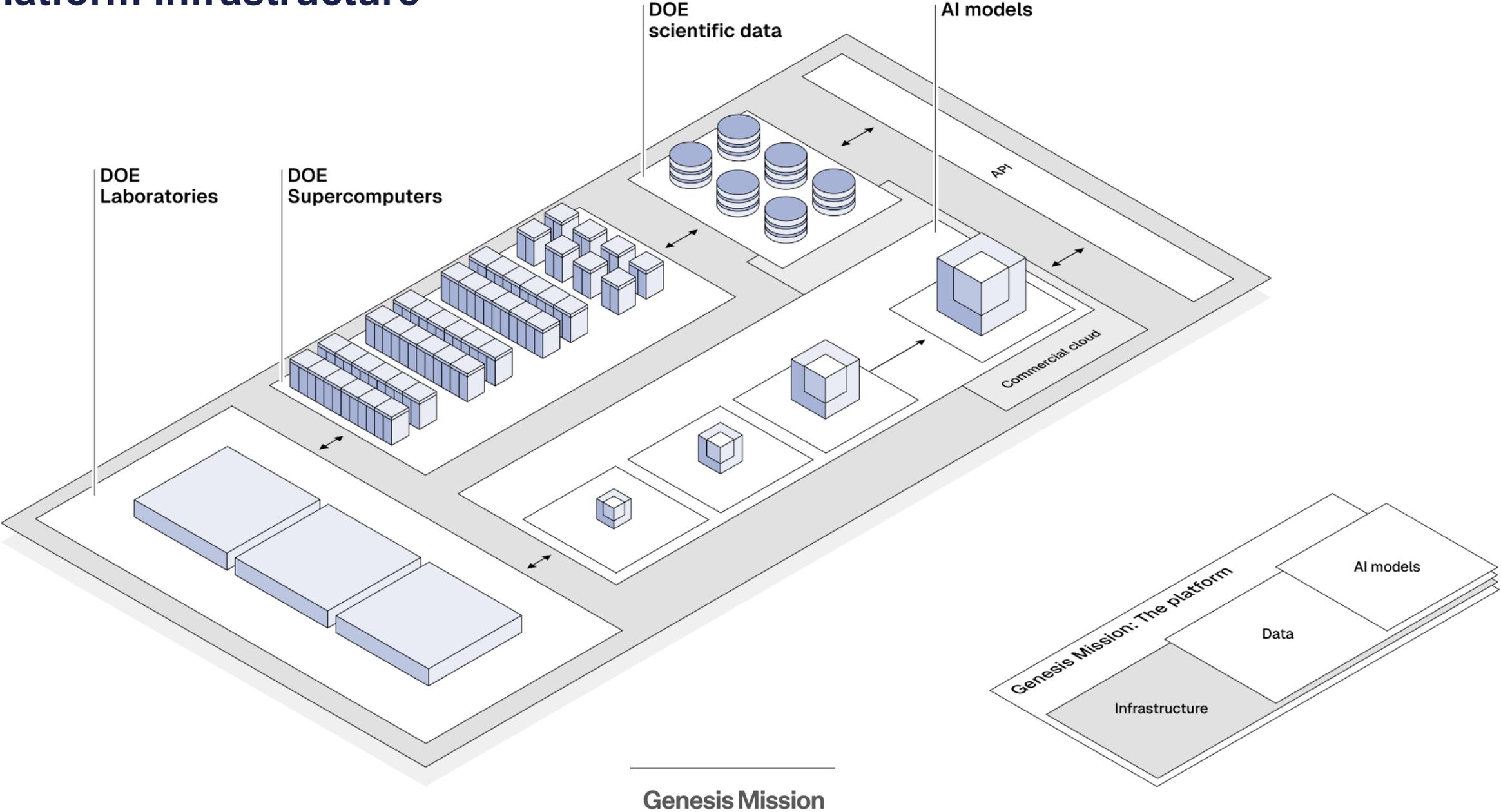
Phase II proposals

- Scope: Larger team projects that build on Phase I projects. New Phase II projects that meet the objectives of a Phase I project may be submitted. Must identify a primary focus area but can address secondary focus areas.
- Goals: Pursue the promising directions identified during a successful Phase I project, or a new Phase II project that has met the goals expected of Phase I projects
- Phase II projects will be 3-5 times the level of effort of a Phase I project. Phase II projects following a Phase I award in future fiscal years may include multiple Phase I teams.

Genesis Mission Overview



Platform Infrastructure



Energy Department Announces 26 Genesis Mission Science and Technology Challenges

- **Scaling the Grid to Power the American Economy:** Using AI to improve power grid planning, interconnection, operations, and security — enabling decisions up to 20–100 times faster and improving electricity cost and reliability by up to 10 percent.
- **Harnessing America’s Historic Nuclear Data:** Digitizing eight decades of nuclear research to create a secure, searchable database to inform future energy and security decisions.
- **Enhancing Particle Accelerators for Discovery:** Deploying AI to make accelerators adaptive and autonomous, accelerating breakthroughs in medicine, materials, and energy.
- **Designing Materials with Predictable Functionality:** Using AI to design materials based on performance goals, shrinking development timelines from decades to months.
- **Unleashing Subsurface Strategic Energy Assets:** Applying AI to model underground environments for responsible, cost-effective energy development.
- **Achieving AI-Driven Autonomous Laboratories:** Automating experiments to speed discovery of new drugs, advanced materials, and next-generation energy technologies.
- **Reenvisioning Advanced Manufacturing and Industrial Productivity:** Bridging research and production with AI-driven systems that strengthen supply chains, improve manufacturing productivity and capability, speed the design to production loop, and create American jobs.
- **Discovering Quantum Algorithms with AI:** Accelerating quantum algorithm development to unlock breakthroughs in energy, chemistry, and logistics.
- **Recentering Microelectronics in America:** Advancing next-generation microelectronics to secure U.S. technological leadership, economic prosperity, and national security.

See <https://www.energy.gov/articles/energy-department-announces-26-genesis-mission-science-and-technology-challenges> for more.

Energy Department Announces 26 Genesis Mission Science and Technology Challenges – AI Approaches

The documents highlights the key approaches that might be relevant for addressing these challenges, and these include:

Advanced AI Systems & Learning Techniques

Agentic & Generative AI: Deploys autonomous AI agents and generative models to discover novel materials, design new quantum algorithms, and create innovative manufacturing solutions without prior domain knowledge.

Foundation Models: Leverages massive, pre-trained models on diverse datasets (e.g., decades of operational data, multimodal sensor feeds) to enable broad applications like nuclear cleanup prediction and threat intelligence analysis.

Multimodal AI Fusion: Integrates and reasons across varied data types—including imagery, sensor readings, text, and simulations—to create comprehensive situational awareness for nuclear threat assessment and materials attribution.

Automation & Process Optimization

AI-Driven Autonomous Laboratories: Integrates AI with robotics and real-time analysis to create "self-driving" labs that automate the entire scientific workflow from hypothesis generation to experimentation and discovery.

Agentic Workflows: Uses AI agents to automate and streamline complex processes, such as planning experiments, managing supply chains, and co-optimizing design and manufacturing for nuclear deterrence.

Predictive Modeling & Simulation

Digital Twins: Develops dynamic, virtual replicas of physical systems (e.g., nuclear reactors, fusion facilities, manufacturing processes) to simulate, test, and optimize operations in real-time.

Physics-Informed AI: Embeds scientific principles and domain knowledge into machine learning models to ensure predictions are physically consistent and reliable, crucial for complex systems like materials science and climate modeling.

Surrogate Models: Creates simplified, fast-running AI models that approximate complex, computationally expensive simulations, enabling rapid exploration of design and operational scenarios.

Energy Department Announces 26 Genesis Mission Science and Technology Challenges – Data Sources

The documents highlights potential data sources that might be relevant for addressing these challenges, and these include:

Scientific & Experimental Data

Multi-Omics Data: Integrates genomics, phenomics, and more to understand and engineer biological systems for biotechnology and biofuels.

Physics & Cosmological Data: Utilizes data from particle collisions, nuclear decays, and cosmological surveys to build unified models of physics from the smallest to the largest scales.

Materials Science Data: Leverages large, curated datasets from X-ray light sources, neutron scattering facilities, and nanoscale science centers to accelerate the discovery and design of new materials.

Geoscience Data: Combines geophysical, geochemical, biological, and hydrologic data to model subsurface energy assets and more.

Operational & Industrial Data

Energy Systems Data: Includes operational data from nuclear reactors, fusion facilities, particle accelerators, and the electric grid to optimize performance, safety, and reliability.

Manufacturing & Supply Chain Data: Integrates real-time information from machines, products, and processes to create digital twins of industrial manufacturing ecosystems.

Building & Infrastructure Data: Uses data from the entire building lifecycle—from design and construction to operations—to improve effectiveness and reduce costs.

National Security & Intelligence Data

Historical Archives: Digitizes and analyzes eight decades of classified and unclassified records, including written notes, reports, and imagery from scientific experiments and nuclear tests.

Multimodal Intelligence Data: Fuses satellite imagery, sensor data (e.g., radiation detectors), open-source information, and government intelligence to detect nuclear proliferation and support threat response.

Nuclear Forensics Signatures: Builds curated libraries of radiological and material signatures to enable the rapid materials attribution.

Addressing a Portfolio of Key National Challenges – Work has Already Started

- Accelerating scientific discovery through AI-driven code development
- AI driven co-design for microelectronics
- AI for efficient quantum algorithms
- AI for planning and operation of the U.S. power grid
- AI for transforming combustion science and technology for energy applications
- AI for nuclear security and non-proliferation
- **Q2C Science at Scale:** From Quarks to Cosmos
- **The Autonomous Microelectronics Consortium**
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DOE Funding Opportunities Website: <https://science.osti.gov/Funding-Opportunities> (Includes RFA; Templates; Frequently Asked Questions; Webinar Slides and Recordings)

Genesis Mission Consortium - Partnership Exchange:
<https://partnerships.genesismissionconsortium.org/user/login>

Office of Science Updates: <https://public.govdelivery.com/accounts/USDOEOS/subscriber/new>
(including announcements about RFA updates)

Information about participating DOE offices:

- Office of Science (SC): <https://www.energy.gov/science/office-science>
- Office of Critical Minerals and Energy Innovation (CMEI): <https://www.energy.gov/cmei/office-critical-minerals-and-energy-innovation>
- Office of Environmental Management (EM): <https://www.energy.gov/em/office-environmental-management>
- Office of Nuclear Energy (NE): <https://www.energy.gov/ne/office-nuclear-energy>
- Office of Electricity (OE): <https://www.energy.gov/oe/office-electricity>
- Hydrocarbons and Geothermal Office (HGEO): <https://www.energy.gov/hgeo/about-hydrocarbons-and-geothermal-energy-office>