

(2) Requirements**(A) Competitive, merit-reviewed process**

The Centers shall be established through a competitive, merit-reviewed process.

(B) Applications

An eligible applicant under this subsection shall submit to the Director an application at such time, in such manner, and containing such information as the Director determines to be appropriate.

(C) Eligible applicants

The Director shall consider applications from National Laboratories, institutions of higher education, research centers, multi-institutional collaborations, and any other entity that the Secretary of Energy determines to be appropriate.

(b) Collaborations

A collaboration that receives an award under this section may include multiple types of research institutions and private sector entities.

(c) Requirements

To the maximum extent practicable, the Centers developed, constructed, operated, or maintained under this section shall serve the needs of the Department of Energy, industry, the academic community, and other relevant entities to create and develop processes for the purpose of advancing basic research in quantum information science and improving the competitiveness of the United States.

(d) Coordination

The Secretary of Energy shall ensure the coordination, and avoid unnecessary duplication, of the activities of each Center with the activities of—

- (1) other research entities of the Department of Energy, including—
 - (A) the Nanoscale Science Research Centers;
 - (B) the Energy Frontier Research Centers;
 - (C) the Energy Innovation Hubs; and
 - (D) the National Laboratories;
- (2) institutions of higher education; and
- (3) industry.

(e) Duration**(1) In general**

Each Center established under this section is authorized to carry out activities for a period of 5 years.

(2) Reapplication

An awardee may reapply for additional, subsequent periods of 5 years. The Director shall approve or disapprove of each reapplication on a competitive, merit-reviewed basis.

(3) Termination

Consistent with the authorities of the Department of Energy, the Secretary of Energy may terminate an underperforming Center for cause during the performance period.

(f) Funding

The Secretary of Energy shall allocate up to \$25,000,000 for each Center established under this section for each of fiscal years 2019 through 2023,

subject to the availability of appropriations. Amounts made available to carry out this section shall be derived from amounts appropriated or otherwise made available to the Department of Energy.

(Pub. L. 115–368, title IV, § 402, Dec. 21, 2018, 132 Stat. 5101.)

§ 8853. Department of Energy quantum network infrastructure research and development program**(a) In general**

The Secretary of Energy (referred to in this section as the “Secretary”) shall carry out a research, development, and demonstration program to accelerate innovation in quantum network infrastructure in order to—

- (1) facilitate the advancement of distributed quantum computing systems through the internet and intranet;
- (2) improve the precision of measurements of scientific phenomena and physical imaging technologies;
- (3) develop secure national quantum communications technologies and strategies;
- (4) demonstrate quantum networking utilizing the Department of Energy’s Energy Sciences Network User Facility; and
- (5) advance the relevant domestic supply chains, manufacturing capabilities, and associated simulations or modeling capabilities.

(b) Program

In carrying out this section, the Secretary shall—

- (1) coordinate with—
 - (A) the Director of the National Science Foundation;
 - (B) the Director of the National Institute of Standards and Technology;
 - (C) the Chair of the Subcommittee on Quantum Information Science of the National Science and Technology Council established under section 8813(a) of this title; and
 - (D) the Chair of the Subcommittee on the Economic and Security Implications of Quantum Science;

(2) conduct cooperative research with industry, National Laboratories, institutions of higher education, and other research institutions to facilitate new quantum infrastructure methods and technologies, including—

- (A) quantum-limited detectors, ultra-low loss optical channels, space-to-ground connections, and classical networking and cybersecurity protocols;
- (B) entanglement and hyper-entangled state sources and transmission, control, and measurement of quantum states;
- (C) quantum interconnects that allow short range local connections between quantum processors;
- (D) transducers for quantum sources and signals between optical wavelength regimes, including telecommunications regimes and quantum computer-relevant domains, including microwaves;
- (E) development of quantum memory buffers and small-scale quantum computers that

are compatible with photon-based quantum bits in the optical or telecommunications wavelengths;

(F) long-range entanglement distribution, including allowing entanglement-based protocols between small- and large¹ scale quantum processors, at the terrestrial and space-based level using quantum repeaters and optical or laser communications;

(G) quantum routers, multiplexers, repeaters, and related technologies necessary to create secure long-distance quantum communication; and

(H) integration of systems across the quantum technology stack into traditional computing networks, including the development of remote controlled, high-performance, and reliable implementations of key quantum network components by leveraging the expertise, infrastructure and supplemental investments at the National Laboratories in the Energy Sciences Network User Facility;

(3) engage with the Quantum Economic Development Consortium and other organizations, as applicable, to transition component technologies to help facilitate as appropriate the development of a quantum supply chain for quantum network technologies;

(4) advance basic research in advanced scientific computing, particle and nuclear physics, and material science to enhance the understanding, prediction, and manipulation of materials, processes, and physical phenomena relevant to quantum network infrastructure;

(5) develop experimental tools and testbeds in collaboration with the Energy Sciences Network User Facility necessary to support cross-cutting fundamental research and development activities with diverse stakeholders from industry, National Laboratories, and institutions of higher education; and

(6) consider quantum network infrastructure applications that span the Department of Energy's missions in energy, environment, and national security.

(c) Leveraging

In carrying out this section, the Secretary shall leverage resources, infrastructure, and expertise across the Department of Energy and from—

- (1) the National Institute of Standards and Technology;
- (2) the National Science Foundation;
- (3) the National Aeronautics and Space Administration;
- (4) other relevant Federal agencies;
- (5) the National Laboratories;
- (6) industry stakeholders;
- (7) institutions of higher education; and
- (8) the National Quantum Information Science Research Centers.

(d) Research plan

Not later than 180 days after August 9, 2022, the Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a 4-year re-

search plan that identifies and prioritizes basic research needs relating to quantum network infrastructure.

(e) Standard of review

The Secretary shall review activities carried out under this section to determine the achievement of technical milestones.

(f) Funding

Of the funds authorized to be appropriated for the Department of Energy's Office of Science, there is authorized to be appropriated to the Secretary to carry out the activities under this section \$100,000,000 for each of fiscal years 2023 through 2027.

(Pub. L. 115-368, title IV, § 403, as added Pub. L. 117-167, div. B, title I, § 10104(b)(2)(A), Aug. 9, 2022, 136 Stat. 1438.)

§ 8854. Department of Energy Quantum User Expansion for Science and Technology program

(a) In general

The Secretary of Energy (referred to in this section as the "Secretary") shall establish and carry out a program, to be known as the "Quantum User Expansion for Science and Technology program" or "QUEST program", to encourage and facilitate access to United States quantum computing hardware and quantum computing clouds for research purposes—

- (1) to enhance the United States quantum research enterprise;
- (2) to educate the future quantum computing workforce;
- (3) to accelerate the advancement of United States quantum computing capabilities; and
- (4) to advance the relevant domestic supply chains, manufacturing processes, and associated simulations or modeling capabilities.

(b) Program

In carrying out this section, the Secretary shall—

- (1) coordinate with—
 - (A) the Director of the National Science Foundation;
 - (B) the Director of the National Institute of Standards and Technology;
 - (C) the Chair of the Subcommittee on Quantum Information Science of the National Science and Technology Council established under section 8813(a) of this title; and
 - (D) the Chair of the Subcommittee on the Economic and Security Implications of Quantum Science;

(2) provide researchers based within the United States with access to, and use of, United States quantum computing resources through a competitive, merit-reviewed process;

(3) consider applications from the National Laboratories, multi-institutional collaborations, institutions of higher education, industry stakeholders, and any other entities that the Secretary determines are appropriate to provide national leadership on quantum computing related issues;

(4) coordinate with private sector stakeholders, the user community, and interagency

¹ So in original. Probably should be followed by a hyphen.