

(2) the plan¹ shall address near-term (up to 2 years), mid-term (up to 7 years), and long-term (up to 15 years) challenges to the advancement of water power systems.

(h) Report to Congress

Not later than 1 year after December 27, 2020, and at least once every 2 years thereafter, the Secretary shall provide, and make available to the public and the relevant authorizing and appropriations committees of Congress, a report on the findings of research conducted and activities carried out pursuant to this part, including the most current strategic plan under subsection (g) and the progress made in implementing such plan.

(Pub. L. 110–140, title VI, § 637, as added Pub. L. 116–260, div. Z, title III, § 3001(a), Dec. 27, 2020, 134 Stat. 2485.)

§ 17217. Applicability of other laws

Nothing in this part shall be construed as waiving, modifying, or superseding the applicability of any requirement under any environmental or other Federal or State law.

(Pub. L. 110–140, title VI, § 638, as added Pub. L. 116–260, div. Z, title III, § 3001(a), Dec. 27, 2020, 134 Stat. 2486.)

§ 17218. Authorization of appropriations

There are authorized to be appropriated to the Secretary to carry out this part \$186,600,000 for each of fiscal years 2021 through 2025, including \$137,428,378 for marine energy and \$49,171,622 for hydropower research, development, and demonstration activities.

(Pub. L. 110–140, title VI, § 639, as added Pub. L. 116–260, div. Z, title III, § 3001(a), Dec. 27, 2020, 134 Stat. 2486.)

PART D—ENERGY STORAGE FOR TRANSPORTATION AND ELECTRIC POWER

§ 17231. Energy storage competitiveness

(a) Short title

This section may be cited as the “United States Energy Storage Competitiveness Act of 2007”.

(b) Definitions

In this section:

(1) Council

The term “Council” means the Energy Storage Advisory Council established under subsection (e).

(2) Compressed air energy storage

The term “compressed air energy storage” means, in the case of an electricity grid application, the storage of energy through the compression of air.

(3) Electric drive vehicle

The term “electric drive vehicle” means—

(A) a vehicle that uses an electric motor for all or part of the motive power of the vehicle, including battery electric, hybrid elec-

tric, plug-in hybrid electric, fuel cell, and plug-in fuel cell vehicles and rail transportation vehicles; or

(B) mobile equipment that uses an electric motor to replace an internal combustion engine for all or part of the work of the equipment.

(4) Islanding

The term “islanding” means a distributed generator or energy storage device continuing to power a location in the absence of electric power from the primary source.

(5) Flywheel

The term “flywheel” means, in the case of an electricity grid application, a device used to store rotational kinetic energy.

(6) Microgrid

The term “microgrid” means an integrated energy system consisting of interconnected loads and distributed energy resources (including generators and energy storage devices), which as an integrated system can operate in parallel with the utility grid or in an intentional islanding mode.

(7) Self-healing grid

The term “self-healing grid” means a grid that is capable of automatically anticipating and responding to power system disturbances (including the isolation of failed sections and components), while optimizing the performance and service of the grid to customers.

(8) Spinning reserve services

The term “spinning reserve services” means a quantity of electric generating capacity in excess of the quantity needed to meet peak electric demand.

(9) Ultracapacitor

The term “ultracapacitor” means an energy storage device that has a power density comparable to a conventional capacitor but is capable of exceeding the energy density of a conventional capacitor by several orders of magnitude.

(c) Program

The Secretary shall carry out a research, development, and demonstration program to support the ability of the United States to remain globally competitive in energy storage systems for electric drive vehicles, stationary applications, and electricity transmission and distribution.

(d) Coordination

In carrying out the activities of this section, the Secretary shall coordinate relevant efforts with appropriate Federal agencies, including the Department of Transportation.

(e) Energy Storage Advisory Council

(1) Establishment

Not later than 90 days after December 19, 2007, the Secretary shall establish an Energy Storage Advisory Council.

(2) Composition

(A) In general

Subject to subparagraph (B), the Council shall consist of not less than 15 individuals

¹ So in original.

appointed by the Secretary, based on recommendations of the National Academy of Sciences.

(B) Energy storage industry

The Council shall consist primarily of representatives of the energy storage industry of the United States.

(C) Chairperson

The Secretary shall select a Chairperson for the Council from among the members appointed under subparagraph (A).

(3) Meetings

(A) In general

The Council shall meet not less than once a year.

(B) Chapter 10 of title 5

Chapter 10 of title 5 shall apply to a meeting of the Council.

(4) Plans

No later than 1 year after December 19, 2007, and every 5 years thereafter, the Council, in conjunction with the Secretary, shall develop a 5-year plan for integrating basic and applied research so that the United States retains a globally competitive domestic energy storage industry for electric drive vehicles, stationary applications, and electricity transmission and distribution.

(5) Review

The Council shall—

(A) assess, every 2 years, the performance of the Department in meeting the goals of the plans developed under paragraph (4); and

(B) make specific recommendations to the Secretary on programs or activities that should be established or terminated to meet those goals.

(f) Basic research program

(1) Basic research

The Secretary shall conduct a basic research program on energy storage systems to support electric drive vehicles, stationary applications, and electricity transmission and distribution, including—

(A) materials design;

(B) materials synthesis and characterization;

(C) electrode-active materials, including electrolytes and bioelectrolytes;

(D) surface and interface dynamics;

(E) modeling and simulation; and

(F) thermal behavior and life degradation mechanisms.

(2) Nanoscience centers

The Secretary, in cooperation with the Council, shall coordinate the activities of the nanoscience centers of the Department to help the energy storage research centers of the Department maintain a globally competitive posture in energy storage systems for electric drive vehicles, stationary applications, and electricity transmission and distribution.

(3) Funding

For activities carried out under this subsection, in addition to funding activities at

National Laboratories, the Secretary shall award funds to, and coordinate activities with, a range of stakeholders including the public, private, and academic sectors.

(g) Applied research program

(1) In general

The Secretary shall conduct an applied research program on energy storage systems to support electric drive vehicles, stationary applications, and electricity transmission and distribution technologies, including—

(A) ultracapacitors;

(B) flywheels;

(C) batteries and battery systems (including flow batteries);

(D) compressed air energy systems;

(E) power conditioning electronics;

(F) manufacturing technologies for energy storage systems;

(G) thermal management systems; and

(H) hydrogen as an energy storage medium.

(2) Funding

For activities carried out under this subsection, in addition to funding activities at National Laboratories, the Secretary shall provide funds to, and coordinate activities with, a range of stakeholders, including the public, private, and academic sectors.

(h) Energy storage research centers

(1) In general

The Secretary shall establish, through competitive bids, not more than 4 energy storage research centers to translate basic research into applied technologies to advance the capability of the United States to maintain a globally competitive posture in energy storage systems for electric drive vehicles, stationary applications, and electricity transmission and distribution.

(2) Program management

The centers shall be managed by the Under Secretary for Science of the Department.

(3) Participation agreements

As a condition of participating in a center, a participant shall enter into a participation agreement with the center that requires that activities conducted by the participant for the center promote the goal of enabling the United States to compete successfully in global energy storage markets.

(4) Plans

A center shall conduct activities that promote the achievement of the goals of the plans of the Council under subsection (e)(4).

(5) National laboratories

A national laboratory (as defined in section 15801 of this title) may participate in a center established under this subsection, including a cooperative research and development agreement (as defined in section 3710a(d) of title 15).

(6) Disclosure

Section 13293 of this title may apply to any project carried out through a grant, contract, or cooperative agreement under this subsection.

(7) Intellectual property

In accordance with section 202(a)(ii) of title 35, section 2182 of this title, and section 5908 of this title, the Secretary may require, for any new invention developed under this subsection, that—

(A) if an industrial participant is active in a¹ energy storage research center established under this subsection relating to the advancement of energy storage technologies carried out, in whole or in part, with Federal funding, the industrial participant be granted the first option to negotiate with the invention owner, at least in the field of energy storage technologies, nonexclusive licenses, and royalties on terms that are reasonable, as determined by the Secretary;

(B) if 1 or more industry participants are active in a center, during a 2-year period beginning on the date on which an invention is made—

(i) the patent holder shall not negotiate any license or royalty agreement with any entity that is not an industrial participant under this subsection; and

(ii) the patent holder shall negotiate nonexclusive licenses and royalties in good faith with any interested industrial participant under this subsection; and

(C) the new invention be developed under such other terms as the Secretary determines to be necessary to promote the accelerated commercialization of inventions made under this subsection to advance the capability of the United States to successfully compete in global energy storage markets.

(i) Energy storage systems demonstrations**(1) In general**

The Secretary shall carry out a program of new demonstrations of advanced energy storage systems.

(2) Scope

The demonstrations shall—

(A) be regionally diversified; and
(B) expand on the existing technology demonstration program of the Department.

(3) Stakeholders

In carrying out the demonstrations, the Secretary shall, to the maximum extent practicable, include the participation of a range of stakeholders, including—

(A) rural electric cooperatives;
(B) investor owned utilities;
(C) municipally owned electric utilities;
(D) energy storage systems manufacturers;
(E) electric drive vehicle manufacturers;
(F) the renewable energy production industry;
(G) State or local energy offices;
(H) the fuel cell industry; and
(I) institutions of higher education.

(4) Objectives

Each of the demonstrations shall include 1 or more of the following:

(A) Energy storage to improve the feasibility of microgrids or islanding, or transmission and distribution capability, to improve reliability in rural areas.

(B) Integration of an energy storage system with a self-healing grid.

(C) Use of energy storage to improve security to emergency response infrastructure and ensure availability of emergency backup power for consumers.

(D) Integration with a renewable energy production source, at the source or away from the source.

(E) Use of energy storage to provide ancillary services, such as spinning reserve services, for grid management.

(F) Advancement of power conversion systems to make the systems smarter, more efficient, able to communicate with other inverters, and able to control voltage.

(G) Use of energy storage to optimize transmission and distribution operation and power quality, which could address overloaded lines and maintenance of transformers and substations.

(H) Use of advanced energy storage for peak load management of homes, businesses, and the grid.

(I) Use of energy storage devices to store energy during nonpeak generation periods to make better use of existing grid assets.

(j) Vehicle energy storage demonstration**(1) In general**

The Secretary shall carry out a program of electric drive vehicle energy storage technology demonstrations.

(2) Consortia

The technology demonstrations shall be conducted through consortia, which may include—

(A) energy storage systems manufacturers and suppliers of the manufacturers;
(B) electric drive vehicle manufacturers;
(C) rural electric cooperatives;
(D) investor owned utilities;
(E) municipal and rural electric utilities;
(F) State and local governments;
(G) metropolitan transportation authorities; and
(H) institutions of higher education.

(3) Objectives

The program shall demonstrate 1 or more of the following:

(A) Novel, high capacity, high efficiency energy storage, charging, and control systems, along with the collection of data on performance characteristics, such as battery life, energy storage capacity, and power delivery capacity.

(B) Advanced onboard energy management systems and highly efficient battery cooling systems.

(C) Integration of those systems on a prototype vehicular platform, including with drivetrain systems for passenger, commercial, and nonroad electric drive vehicles.

(D) New technologies and processes that reduce manufacturing costs.

(E) Integration of advanced vehicle technologies with electricity distribution system and smart metering technology.

¹ So in original. Probably should be “an”.

(F) Control systems that minimize emissions profiles in cases in which clean diesel engines are part of a plug-in hybrid drive system.

(k) Electric drive vehicle battery second-life applications and recycling

(1) Definitions

In this subsection:

(A) Battery recycling and second-life applications program

The term “battery recycling and second-life applications program” means the electric drive vehicle battery recycling and second-life applications program established under paragraph (3).

(B) Critical material

The term “critical material” has the meaning given the term in section 1606(a) of title 30.

(C) Economically distressed area

The term “economically distressed area” means an area described in section 3161(a) of this title.

(D) Electric drive vehicle battery

The term “electric *drive*² vehicle battery” means any battery that is a motive power source for an electric drive vehicle.

(E) Eligible entity

The term “eligible entity” means an entity described in any of paragraphs (1) through (5) of section 16353(b) of this title.

(2) Program

The Secretary shall carry out a program of research, development, and demonstration of—

(A) second-life applications for electric drive vehicle batteries that have been used to power electric drive vehicles; and

(B) technologies and processes for final recycling and disposal of the devices described in subparagraph (A).

(3) Electric drive vehicle battery recycling and second-life applications

(A) In general

In carrying out the program under paragraph (2), the Secretary shall establish an electric drive vehicle battery recycling and second-life applications program under which the Secretary shall—

(i) award grants under subparagraph (D); and

(ii) carry out other activities in accordance with this paragraph.

(B) Purposes

The purposes of the battery recycling and second-life applications program are the following:

(i) To improve the recycling rates and second-use adoption rates of electric drive vehicle batteries.

(ii) To optimize the design and adaptability of electric drive vehicle batteries to make electric drive vehicle batteries more easily recyclable.

(iii) To establish alternative supply chains for critical materials that are found in electric drive vehicle batteries.

(iv) To reduce the cost of manufacturing, installation, purchase, operation, and maintenance of electric drive vehicle batteries.

(v) To improve the environmental impact of electric drive vehicle battery recycling processes.

(C) Targets

In carrying out the battery recycling and second-life applications program, the Secretary shall address near-term (up to 2 years), mid-term (up to 5 years), and long-term (up to 10 years) challenges to the recycling of electric drive vehicle batteries.

(D) Grants

(i) In general

In carrying out the battery recycling and second-life applications program, the Secretary shall award multiyear grants on a competitive, merit-reviewed basis to eligible entities—

(I) to conduct research, development, testing, and evaluation of solutions to increase the rate and productivity of electric drive vehicle battery recycling; and

(II) for research, development, and demonstration projects to create innovative and practical approaches to increase the recycling and second-use of electric drive vehicle batteries, including by addressing—

(aa) technology to increase the efficiency of electric drive vehicle battery recycling and maximize the recovery of critical materials for use in new products;

(bb) expanded uses for critical materials recovered from electric drive vehicle batteries;

(cc) product design and construction to facilitate the disassembly and recycling of electric drive vehicle batteries;

(dd) product design and construction and other tools and techniques to extend the lifecycle of electric drive vehicle batteries, including methods to promote the safe second-use of electric drive vehicle batteries;

(ee) strategies to increase consumer acceptance of, and participation in, the recycling of electric drive vehicle batteries;

(ff) improvements and changes to electric drive vehicle battery chemistries that include ways to decrease processing costs for battery recycling without sacrificing front-end performance;

(gg) second-use of electric drive vehicle batteries, including in applications outside of the automotive industry; and

(hh) the commercialization and scale-up of electric drive vehicle battery recycling technologies.

²So in original.

(ii) Priority

In awarding grants under clause (i), the Secretary shall give priority to projects that—

- (I) are located in geographically diverse regions of the United States;
- (II) include business commercialization plans that have the potential for the recycling of electric drive vehicle batteries at high volumes;
- (III) support the development of advanced manufacturing technologies that have the potential to improve the competitiveness of the United States in the international electric drive vehicle battery manufacturing sector;
- (IV) provide the greatest potential to reduce costs for consumers and promote accessibility and community implementation of demonstrated technologies;
- (V) increase disclosure and transparency of information to consumers;
- (VI) support the development or demonstration of projects in economically distressed areas; and
- (VII) support other relevant priorities, as determined to be appropriate by the Secretary.

(iii) Solicitation

Not later than 90 days after November 15, 2021, and annually thereafter, the Secretary shall conduct a national solicitation for applications for grants described in clause (i).

(iv) Dissemination of results

The Secretary shall publish the results of the projects carried out through grants awarded under clause (i) through—

- (I) best practices relating to those grants, for use in the electric drive vehicle battery manufacturing, design, installation, refurbishing, or recycling industries;
- (II) coordination with information dissemination programs relating to general recycling of electronic devices; and
- (III) educational materials for the public, produced in conjunction with State and local governments or nonprofit organizations, on the problems and solutions relating to the recycling and second-life applications of electric drive vehicle batteries.

(E) Coordination with other programs of the Department

In carrying out the battery recycling and second-life applications program, the Secretary shall coordinate and leverage the resources of complementary efforts of the Department.

(F) Study and report**(i) Study**

The Secretary shall conduct a study on the viable market opportunities available for the recycling, second-use, and manufacturing of electric drive vehicle batteries in the United States.

(ii) Report

Not later than 1 year after November 15, 2021, the Secretary shall submit to the

Committee on Energy and Natural Resources of the Senate, the Committee on Science, Space, and Technology of the House of Representatives, and any other relevant committee of Congress a report containing the results of the study under clause (i), including a description of—

(I) the ability of relevant businesses or other entities to competitively manufacture electric drive vehicle batteries and recycle electric drive vehicle batteries in the United States;

(II) any existing electric drive vehicle battery recycling and second-use practices and plans of electric drive vehicle manufacturing companies in the United States;

(III) any barriers to electric drive vehicle battery recycling in the United States;

(IV) opportunities and barriers in electric drive vehicle battery supply chains in the United States and internationally, including with allies and trading partners;

(V) opportunities for job creation in the electric drive vehicle battery recycling and manufacturing fields and the necessary skills employees must acquire for growth of those fields in the United States;

(VI) policy recommendations for enhancing electric drive vehicle battery manufacturing and recycling in the United States;

(VII) any recommendations for lowering logistics costs and creating better coordination and efficiency with respect to the removal, collection, transportation, storage, and disassembly of electric drive vehicle batteries;

(VIII) any recommendations for areas of coordination with other Federal agencies to improve electric drive vehicle battery recycling rates in the United States;

(IX) an aggressive 2-year target and plan, the implementation of which shall begin during the 90-day period beginning on the date on which the report is submitted, to enhance the competitiveness of electric drive vehicle battery manufacturing and recycling in the United States; and

(X) needs for future research, development, and demonstration projects in electric drive vehicle battery manufacturing, recycling, and related areas, as determined by the Secretary.

(G) Evaluation

Not later than 3 years after the date on which the report under subparagraph (F)(ii) is submitted, and every 4 years thereafter, the Secretary shall conduct, and make available to the public and the relevant committees of Congress, an independent review of the progress of the grants awarded under subparagraph (D) in meeting the recommendations and targets included in the report.

(l) Cost sharing

The Secretary shall carry out the programs established under this section in accordance with section 16352 of this title.

(m) Merit review of proposals

The Secretary shall carry out the programs established under subsections (i), (j), and (k) in accordance with section 16353 of this title.

(n) Coordination and nonduplication

To the maximum extent practicable, the Secretary shall coordinate activities under this section with other programs and laboratories of the Department and other Federal research programs.

(o) Review by National Academy of Sciences

On the business day that is 5 years after December 19, 2007, the Secretary shall offer to enter into an arrangement with the National Academy of Sciences to assess the performance of the Department in carrying out this section.

(p) Authorization of appropriations

There are authorized to be appropriated to carry out—

(1) the basic research program under subsection (f) \$50,000,000 for each of fiscal years 2009 through 2018;

(2) the applied research program under subsection (g) \$80,000,000 for each of fiscal years 2009 through 2018; and;²

(3) the energy storage research center program under subsection (h) \$100,000,000 for each of fiscal years 2009 through 2018;

(4) the energy storage systems demonstration program under subsection (i) \$30,000,000 for each of fiscal years 2009 through 2018;

(5) the vehicle energy storage demonstration program under subsection (j) \$30,000,000 for each of fiscal years 2009 through 2018; and

(6) the electric drive vehicle battery recycling and second-life applications program under subsection (k) \$200,000,000 for the period of fiscal years 2022 through 2026.

(q) Critical material recycling and reuse research, development, and demonstration program**(1) Definitions**

In this subsection:

(A) Critical material

The term “critical material” has the meaning given the term in 1606 of title 30.

(B) Critical material recycling

The term “critical material recycling” means the separation and recovery of critical materials embedded within an energy storage system through physical or chemical means for the purpose of reuse of those critical materials in other technologies.

(2) Establishment

Not later than 180 days after December 27, 2020, the Secretary shall establish a research, development, and demonstration program for critical material recycling and reuse of energy storage systems containing critical materials.

(3) Research, development, and demonstration

In carrying out the program established under paragraph (1), the Secretary shall conduct—

(A) research, development, and demonstration activities for—

(i) technologies, process improvements, and design optimizations that facilitate and promote critical material recycling of energy storage systems, including separation and sorting of component materials of such systems, and extraction, recovery, and reuse of critical materials from such systems;

(ii) technologies and methods that mitigate emissions and environmental impacts that arise from critical material recycling, including disposal of toxic reagents and byproducts related to critical material recycling processes;

(iii) technologies to enable extraction, recovery, and reuse of energy storage systems from electric vehicles and critical material recycling from such vehicles; and

(iv) technologies and methods to enable the safe transport, storage, and disposal of energy storage systems containing critical materials, including waste materials and components recovered during the critical material recycling process; and

(B) research on nontechnical barriers to improve the collection and critical material recycling of energy storage systems, including strategies to improve consumer education of, acceptance of, and participation in, the critical material recycling of energy storage systems.

(4) Report to Congress

Not later than 2 years after December 27, 2020, and every 3 years thereafter, the Secretary shall submit to the Committee on Science, Space, and Technology and the Committee on Energy and Commerce of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report summarizing the activities, findings, and progress of the program.

(Pub. L. 110-140, title VI, § 641, Dec. 19, 2007, 121 Stat. 1688; Pub. L. 116-260, div. Z, title III, § 3201(f), formerly § 3201(e), Dec. 27, 2020, 134 Stat. 2523, renumbered § 3201(f), Pub. L. 117-58, div. D, title III, § 40334(1), Nov. 15, 2021, 135 Stat. 1025; Pub. L. 117-58, div. D, title II, § 40208, Nov. 15, 2021, 135 Stat. 971; Pub. L. 117-286, § 4(a)(280), Dec. 27, 2022, 136 Stat. 4336.)

Editorial Notes**CODIFICATION**

Section 40334(1) of Pub. L. 117-58, which directed amendment of section 3201 of the Energy Policy Act of 2020 by redesignating subsection (e) as subsection (f), was executed by making the amendment to section 3201 of div. Z of Pub. L. 116-260, known as the Energy Act of 2020, to reflect the probable intent of Congress.

AMENDMENTS

2022—Subsec. (e)(3)(B). Pub. L. 117-286 substituted “Chapter 10 of title 5” for “Federal Advisory Committee Act” in heading and “Chapter 10 of title 5” for “The Federal Advisory Committee Act (5 U.S.C. App.)” in text.

2021—Subsec. (k). Pub. L. 117-58, § 40208(1), added subsec. (k) and struck out former subsec. (k) which related to secondary applications and disposal of electric drive vehicle batteries.

Subsec. (p)(6). Pub. L. 117-58, §40208(2), added par. (6) and struck out former par. (6) which read as follows: “the secondary applications and disposal of electric drive vehicle batteries program under subsection (k) \$5,000,000 for each of fiscal years 2009 through 2018.”

2020—Subsec. (q). Pub. L. 116-260 added subsec. (q).

Statutory Notes and Related Subsidiaries

EFFECTIVE DATE

Section effective on the date that is 1 day after Dec. 19, 2007, see section 1601 of Pub. L. 110-140, set out as a note under section 1824 of Title 2, The Congress.

WAGE RATE REQUIREMENTS

For provisions relating to rates of wages to be paid to laborers and mechanics on projects for construction, alteration, or repair work funded under div. D or an amendment by div. D of Pub. L. 117-58, including authority of Secretary of Labor, see section 18851 of this title.

§ 17232. Better energy storage technology

(a) Definitions

In this section:

(1) Energy storage system

The term “energy storage system” means any system, equipment, facility, or technology that—

(A) is capable of absorbing or converting energy, storing the energy for a period of time, and dispatching the energy; and

(B)(i) uses mechanical, electrochemical, thermal, electrolysis, or other processes to convert and store electric energy that was generated at an earlier time for use at a later time;

(ii) uses mechanical, electrochemical, biochemical, or thermal processes to convert and store energy generated from mechanical processes that would otherwise be wasted, for delivery at a later time; or

(iii) stores energy in an electric, thermal, or gaseous state for direct use for heating or cooling at a later time in a manner that avoids the need to use electricity or other fuel sources at that later time, such as a grid-enabled water heater.

(2) Program

The term “program” means the Energy Storage System Research, Development, and Deployment Program established under subsection (b)(1).

(3) Secretary

The term “Secretary” means the Secretary of Energy.

(b) Energy Storage System Research, Development, and Deployment Program

(1) Establishment

Not later than 180 days after December 27, 2020, the Secretary shall establish a program, to be known as the Energy Storage System Research, Development, and Deployment Program.

(2) Initial program objectives

The program shall focus on research, development, and deployment of—

(A) energy storage systems, components, and materials designed to further the development of technologies—

(i) for large-scale commercial deployment;

(ii) for deployment at cost targets established by the Secretary;

(iii) for hourly and subhourly durations required to provide reliability services to the grid;

(iv) for daily durations, which have the capacity to discharge energy for a minimum of 6 hours;

(v) for weekly or monthly durations, which have the capacity to discharge energy for 10 to 100 hours, at a minimum; and

(vi) for seasonal durations, which have the capability to address seasonal variations in supply and demand;

(B) distributed energy storage technologies and applications, including building-grid integration;

(C) long-term cost, performance, and demonstration targets for different types of energy storage systems and for use in a variety of regions, including rural areas;

(D) transportation energy storage technologies and applications, including vehicle-grid integration;

(E) cost-effective systems and methods for—

(i) the sustainable and secure sourcing, reclamation, recycling, and disposal of energy storage systems, including critical minerals; and

(ii) the reuse and repurposing of energy storage system technologies;

(F) advanced control methods for energy storage systems;

(G) pumped hydroelectric energy storage systems to advance—

(i) adoption of innovative technologies, including—

(I) systems with adjustable-speed and other new pumping and generating equipment designs;

(II) modular systems;

(III) closed-loop systems, including mines and quarries; and

(IV) other innovative equipment and materials as determined by the Secretary; and

(ii) reductions of civil works costs and construction times for hydropower and pumped storage systems, including comprehensive data and systems analysis of hydropower and pumped storage construction technologies and processes in order to identify areas for whole-system efficiency gains;

(H) models and tools to demonstrate the costs and benefits of energy storage to—

(i) power and water supply systems;

(ii) electric generation portfolio optimization; and

(iii) expanded deployment of other renewable energy technologies, including in integrated energy storage systems;

(I) energy storage use cases from individual and combination technology applications, including value from various-use cases and energy storage services; and