

Calendar No. **636**116TH CONGRESS
2^D SESSION**S. 3734****[Report No. 116–330]**

To provide for a coordinated Federal research initiative to ensure continued United States leadership in engineering biology.

 IN THE SENATE OF THE UNITED STATES

MAY 14, 2020

Mrs. GILLIBRAND (for herself, Mr. MARKEY, Mr. RUBIO, and Mr. GARDNER) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation of the Senate

DECEMBER 15, 2020

Reported by Mr. WICKER, with an amendment

[Strike out all after the enacting clause and insert the part printed in italic]

A BILL

To provide for a coordinated Federal research initiative to ensure continued United States leadership in engineering biology.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE.**

4 ~~This Act may be cited as the “Bioeconomy Research~~
5 ~~and Development Act of 2020”.~~

1 **SEC. 2. FINDINGS.**

2 The Congress makes the following findings:

3 (1) Cellular and molecular processes may be
4 used, mimicked, or redesigned to develop new prod-
5 ucts, processes, and systems that improve societal
6 well-being, strengthen national security, and con-
7 tribute to the economy.

8 (2) Engineering biology relies on a workforce
9 with a diverse and unique set of skills combining the
10 biological, physical, chemical, and information
11 sciences and engineering.

12 (3) Long-term research and development is nec-
13 essary to create breakthroughs in engineering biol-
14 ogy. Such research and development requires govern-
15 ment investment as many of the benefits are too dis-
16 tant or uncertain for industry to support alone.

17 (4) Research is necessary to inform evidence-
18 based governance of engineering biology and to sup-
19 port the growth of the engineering biology industry.

20 (5) The Federal Government has an obligation
21 to ensure that ethical, legal, environmental, safety,
22 security, and societal implications of its science and
23 technology research and investment follows policies
24 of responsible innovation and fosters public trans-
25 parency.

1 (6) The Federal Government can play an im-
2 portant role by facilitating the development of tools
3 and technologies to further advance engineering biol-
4 ogy, including user facilities, by facilitating public-
5 private partnerships, by supporting risk research,
6 and by facilitating the commercial application in the
7 United States of research funded by the Federal
8 Government.

9 (7) The United States led the development of
10 the science and engineering techniques that created
11 the field of engineering biology, but due to increas-
12 ing international competition, the United States is
13 at risk of losing its competitive advantage if does not
14 invest the necessary resources and have a national
15 strategy.

16 (8) A National Engineering Biology Initiative
17 can serve to establish new research directions and
18 technology goals, improve interagency coordination
19 and planning processes, drive technology transfer to
20 the private sector, and help ensure optimal returns
21 on the Federal investment.

22 **SEC. 3. DEFINITIONS.**

23 In this Act:

24 (1) **BIOMANUFACTURING.**—The term “bio-
25 manufacturing” means the utilization of biological

1 systems to develop new and advance existing prod-
 2 ucts, tools, and processes at commercial scale.

3 (2) **ENGINEERING BIOLOGY.**—The term “engi-
 4 neering biology” means the application of engineer-
 5 ing design principles and practices to biological sys-
 6 tems, including molecular and cellular systems, to
 7 advance fundamental understanding of complex nat-
 8 ural systems and to enable novel or optimize func-
 9 tions and capabilities.

10 (3) **INITIATIVE.**—The term “Initiative” means
 11 the National Engineering Biology Research and De-
 12 velopment Initiative established under section 4.

13 (4) **OMICS.**—The term “omics” refers to the
 14 collective technologies used to explore the roles, rela-
 15 tionships, and actions of the various types of mol-
 16 ecules that make up the cells of an organism.

17 **SEC. 4. NATIONAL ENGINEERING BIOLOGY RESEARCH AND**
 18 **DEVELOPMENT INITIATIVE.**

19 (a) **IN GENERAL.**—The President, acting through the
 20 Office of Science and Technology Policy, shall implement
 21 a National Engineering Biology Research and Develop-
 22 ment Initiative to advance societal well-being, national se-
 23 curity, sustainability, and economic productivity and com-
 24 petitiveness through—

1 (1) advancing areas of research at the intersec-
2 tion of the biological, physical, chemical, data, and
3 computational sciences and engineering to accelerate
4 scientific understanding and technological innovation
5 in engineering biology;

6 (2) advancing areas of biomanufacturing re-
7 search to optimize, standardize, scale, and deliver
8 new products and solutions;

9 (3) supporting social and behavioral sciences
10 and economics research that advances the field of
11 engineering biology and contributes to the develop-
12 ment and public understanding of new products,
13 processes, and technologies;

14 (4) improving the understanding of engineering
15 biology of the scientific and lay public and sup-
16 porting greater evidence-based public discourse
17 about its benefits and risks;

18 (5) supporting risk research, including under
19 subsection (d);

20 (6) supporting the development of novel tools
21 and technologies to accelerate scientific under-
22 standing and technological innovation in engineering
23 biology;

24 (7) expanding the number of researchers, edu-
25 cators, and students with engineering biology train-

1 ing, including from traditionally underrepresented
2 and underserved populations;

3 (8) accelerating the translation and commer-
4 cialization of engineering biology research and devel-
5 opment by the private sector; and

6 (9) improving the interagency planning and co-
7 ordination of Federal Government activities related
8 to engineering biology.

9 (b) INITIATIVE ACTIVITIES.—The activities of the
10 Initiative shall include—

11 (1) sustained support for engineering biology
12 research and development through—

13 (A) grants to individual investigators and
14 teams of investigators, including interdiscipli-
15 nary teams;

16 (B) projects funded under joint sollicita-
17 tions by a collaboration of no fewer than two
18 agencies participating in the Initiative; and

19 (C) interdisciplinary research centers that
20 are organized to investigate basic research
21 questions, carry out technology development
22 and demonstration activities, and increase un-
23 derstanding of how to scale up engineering biol-
24 ogy processes, including biomanufacturing;

1 (2) sustained support for databases and related
2 tools, including—

3 (A) support for curated genomics,
4 epigenomics, and all other relevant omics data-
5 bases, including plant and microbial databases,
6 that are available to researchers to carry out
7 engineering biology research;

8 (B) development of standards for such
9 databases, including for curation, interoper-
10 ability, and protection of privacy and security;

11 (C) support for the development of com-
12 putational tools, including artificial intelligence
13 tools, that can accelerate research and innova-
14 tion using such databases; and

15 (D) an inventory and assessment of all
16 Federal government omics databases to identify
17 opportunities for consolidation and inform in-
18 vestment in such databases as critical infra-
19 structure for the engineering biology research
20 enterprise;

21 (3) sustained support for the development, opti-
22 mization, and validation of novel tools and tech-
23 nologies to enable the dynamic study of molecular
24 processes in situ, including through—

1 (A) research conducted at Federal labora-
2 tories;

3 (B) grants to investigators at institutions
4 of higher education and other nonprofit re-
5 search institutions; and

6 (C) through the Small Business Innovation
7 Research Program and the Small Business
8 Technology Transfer Program, as described in
9 section 9 of the Small Business Act (15 U.S.C.
10 638);

11 (4) education and training of undergraduate
12 and graduate students in engineering biology, in bio-
13 manufacturing, in bioprocess engineering, and in
14 areas of computational science applied to engineer-
15 ing biology and in the related ethical, legal, environ-
16 mental, safety, security, and other societal issues;

17 (5) activities to develop robust mechanisms for
18 tracking and quantifying the outputs and economic
19 benefits of engineering biology; and

20 (6) activities to accelerate the translation and
21 commercialization of new products, processes, and
22 technologies by—

23 (A) identifying precompetitive research op-
24 portunities;

1 (B) facilitating public-private partnerships
2 in engineering biology research and develop-
3 ment;

4 (C) connecting researchers, graduate stu-
5 dents, and postdoctoral fellows with entrepre-
6 neurship education and training opportunities;
7 and

8 (D) supporting proof of concept activities
9 and the formation of startup companies includ-
10 ing through programs such as the Small Busi-
11 ness Innovation Research Program and the
12 Small Business Technology Transfer Program.

13 (e) EXPANDING PARTICIPATION.—The Initiative
14 shall include, to the maximum extent practicable, outreach
15 to primarily undergraduate and minority-serving institu-
16 tions about Initiative opportunities, and shall encourage
17 the development of research collaborations between re-
18 search-intensive universities and primarily undergraduate
19 and minority-serving institutions.

20 (d) ETHICAL, LEGAL, ENVIRONMENTAL, SAFETY,
21 SECURITY, AND SOCIETAL ISSUES.—Initiative activities
22 shall take into account ethical, legal, environmental, safe-
23 ty, security, and other appropriate societal issues by—

24 (1) supporting research, including in the social
25 sciences, and other activities addressing ethical,

1 legal, environmental, and other appropriate societal
2 issues related to engineering biology, including inte-
3 grating research on such topics with the research
4 and development in engineering biology, and ensur-
5 ing that the results of such research are widely dis-
6 seminated, including through interdisciplinary engi-
7 neering biology research centers described in sub-
8 section (b)(1);

9 (2) supporting research and other activities re-
10 lated to the safety and security implications of engi-
11 neering biology, including outreach to increase
12 awareness among Federal researchers and Federally-
13 funded researchers at institutions of higher edu-
14 cation about potential safety and security implica-
15 tions of engineering biology research, as appropriate;

16 (3) ensuring that input from Federal and non-
17 Federal experts on the ethical, legal, environmental,
18 safety, security, and other appropriate societal issues
19 related to engineering biology is integrated into the
20 Initiative; and

21 (4) ensuring, through the agencies and depart-
22 ments that participate in the Initiative, that public
23 input and outreach are integrated into the Initiative
24 by the convening of regular and ongoing public dis-
25 cussions through mechanisms such as workshops;

1 consensus conferences, and educational events, as
2 appropriate.

3 **SEC. 5. INITIATIVE COORDINATION.**

4 (a) INTERAGENCY COMMITTEE.—The President, act-
5 ing through the Office of Science and Technology Policy,
6 shall designate an interagency committee to coordinate en-
7 gineering biology, which shall be co-chaired by the Office
8 of Science and Technology Policy, and include representa-
9 tives from the National Science Foundation, the Depart-
10 ment of Energy, the Department of Defense, the National
11 Aeronautics and Space Administration, the National Insti-
12 tute of Standards and Technology, the Environmental
13 Protection Agency, the Department of Agriculture, the
14 National Institutes of Health, the Bureau of Economic
15 Analysis, and any other agency that the President con-
16 siders appropriate (in this section referred to as the
17 “interagency committee”). The Director of the Office of
18 Science and Technology Policy shall select an additional
19 co-chairperson from among the members of the Inter-
20 agency Committee. The Interagency Committee shall over-
21 see the planning, management, and coordination of the
22 Initiative. The Interagency Committee shall—

23 (1) provide for interagency coordination of Fed-
24 eral engineering biology research, development, and

1 other activities undertaken pursuant to the Initia-
2 tive;

3 ~~(2)~~ establish and periodically update goals and
4 priorities for the Initiative;

5 ~~(3)~~ develop, not later than 12 months after the
6 date of enactment of this Act, and update every 3
7 years, a strategic plan submitted to the Committee
8 on Science, Space, and Technology of the House of
9 Representatives and the Committee on Commerce,
10 Science, and Transportation of the Senate that—

11 ~~(A)~~ guides the activities of the Initiative
12 for purposes of meeting the goals and priorities
13 established under ~~(and updated pursuant to)~~
14 paragraph ~~(2)~~; and

15 ~~(B)~~ describes—

16 ~~(i)~~ the Initiative's support for long-
17 term funding for interdisciplinary engineer-
18 ing biology research and development;

19 ~~(ii)~~ the Initiative's support for edu-
20 cation and public outreach activities;

21 ~~(iii)~~ the Initiative's support for re-
22 search and other activities on ethical, legal,
23 environmental, safety, security, and other
24 appropriate societal issues related to engi-
25 neering biology including—

- 1 (I) an applied biorisk manage-
2 ment research plan;
- 3 (II) recommendations for inte-
4 grating security into biological data
5 access and international reciprocity
6 agreements; and
- 7 (III) an evaluation of existing
8 biosecurity governance policies, guid-
9 ance, and directives for the purposes
10 of creating a unified, adaptable, evi-
11 dence-based framework to respond to
12 emerging biosecurity challenges cre-
13 ated by advances in engineering biol-
14 ogy;
- 15 (iv) how the Initiative will move re-
16 sults out of the laboratory and into appli-
17 cation for the benefit of society and United
18 States competitiveness; and
- 19 (v) how the Initiative will measure
20 and track the contributions of engineering
21 biology to United States economic growth
22 and other societal indicators;
- 23 (4) develop a national genomic sequencing
24 strategy to ensure engineering biology research fully
25 leverages plant, animal, and microbe biodiversity to

1 enhance long-term innovation and competitiveness in
2 engineering biology in the United States;

3 ~~(5) propose an annually coordinated interagency~~
4 ~~budget for the Initiative that is intended to ensure—~~

5 ~~(A) the maintenance of a robust engineer-~~
6 ~~ing biology research and development portfolio;~~
7 ~~and~~

8 ~~(B) that the balance of funding across the~~
9 ~~Initiative is sufficient to meet the goals and pri-~~
10 ~~orities established for the Program;~~

11 ~~(6) develop a plan to utilize Federal programs,~~
12 ~~such as the Small Business Innovation Research~~
13 ~~Program and the Small Business Technology Trans-~~
14 ~~fer Program as described in section 9 of the Small~~
15 ~~Business Act (15 U.S.C. 638), in support of the ac-~~
16 ~~tivities described in section 4(b)(3); and~~

17 ~~(7) in carrying out this section, take into con-~~
18 ~~sideration the recommendations of the advisory com-~~
19 ~~mittee established under section 6, the results of the~~
20 ~~workshop convened under section 7, existing reports~~
21 ~~on related topics, and the views of academic, State,~~
22 ~~industry, and other appropriate groups.~~

23 ~~(b) ANNUAL REPORT.—Beginning with fiscal year~~
24 ~~2020, not later than 90 days after submission of the Presi-~~
25 ~~dent's annual budget request and each fiscal year there-~~

1 after, the interagency committee shall prepare and submit
2 to the Committee on Science, Space, and Technology of
3 the House of Representatives and the Committee on Com-
4 merce, Science, and Transportation of the Senate a report
5 that includes—

6 (1) a summarized agency budget in support of
7 the Initiative for the fiscal year to which such budg-
8 et request applies, and for the then current fiscal
9 year, including a breakout of spending for each
10 agency participating in the Program and for the de-
11 velopment and acquisition of any research facilities
12 and instrumentation; and

13 (2) an assessment of how Federal agencies are
14 implementing the plan described in subsection
15 (a)(3), including—

16 (A) a description of the amount and num-
17 ber of awards made under the Small Business
18 Innovation Research Program and the Small
19 Business Technology Transfer Program (as de-
20 scribed in section 9 of the Small Business Act
21 (15 U.S.C. 638)) in support of the Initiative;
22 and

23 (B) a description of the amount and num-
24 ber of projects funded under joint solicitations

1 by a collaboration of no fewer than 2 agencies
2 participating in the Initiative.

3 ~~(c) INITIATIVE OFFICE.—~~

4 ~~(1) IN GENERAL.—~~The President shall establish
5 an Initiative Coordination Office, with a Director
6 and full-time staff, which shall—

7 ~~(A)~~ provide technical and administrative
8 support to the interagency committee and the
9 advisory committee established under section 6;

10 ~~(B)~~ serve as the point of contact on Fed-
11 eral engineering biology activities for govern-
12 ment organizations, academia, industry, profes-
13 sional societies, State governments, interested
14 citizen groups, and others to exchange technical
15 and programmatic information;

16 ~~(C)~~ oversee interagency coordination of the
17 Initiative, including by encouraging and sup-
18 porting joint agency solicitation and selection of
19 applications for funding of activities under the
20 Initiative;

21 ~~(D)~~ conduct public outreach, including dis-
22 semination of findings and recommendations of
23 the advisory committee established under sec-
24 tion 6, as appropriate;

1 ~~(E)~~ serve as the coordinator of ethical,
2 legal, environmental, safety, security, and other
3 appropriate societal input; and

4 ~~(F)~~ promote access to, and early applica-
5 tion of, the technologies, innovations, and ex-
6 pertise derived from Initiative activities to agen-
7 cy missions and systems across the Federal
8 Government, and to United States industry, in-
9 cluding startup companies.

10 ~~(2)~~ FUNDING.—The Director of the Office of
11 Science and Technology Policy shall develop an esti-
12 mate of the funds necessary to carry out the activi-
13 ties of the Initiative Coordination Office, including
14 an estimate of how much each participating agency
15 described in subsection (a) will contribute to such
16 funds, and submit such estimate to Congress no
17 later than 90 days after the enactment of this Act.

18 ~~(3)~~ TERMINATION.—The Initiative Coordination
19 Office established under this subsection shall termi-
20 nate on the date that is 10 years after the date of
21 the enactment of this Act, unless a determination is
22 made by the President that such Office is necessary
23 to meet the economic or national security goals of
24 the Program.

1 **SEC. 6. ADVISORY COMMITTEE.**

2 (a) **IN GENERAL.**—The President, acting through the
3 Office of Science and Technology Policy, shall designate
4 or establish an advisory committee on engineering biology
5 research and development (in this section referred to as
6 the “advisory committee”) to be composed of not fewer
7 than 12 members, including representatives of research
8 and academic institutions, industry, and nongovernmental
9 entities, who are qualified to provide advice on the Initia-
10 tive.

11 (b) **ASSESSMENT.**—The advisory committee shall as-
12 sess—

13 (1) the current state of United States competi-
14 tiveness in engineering biology, including the scope
15 and scale of United States investments in engineer-
16 ing biology research and development in the inter-
17 national context;

18 (2) current market barriers to commercializa-
19 tion of engineering biology products, processes, and
20 tools in the United States;

21 (3) progress made in implementing the Initia-
22 tive;

23 (4) the need to revise the Initiative;

24 (5) the balance of activities and funding across
25 the Initiative;

1 (6) whether the strategic plan developed or up-
2 dated by the interagency committee established
3 under section 5 is helping to maintain United States
4 leadership in engineering biology;

5 (7) the management, coordination, implementa-
6 tion, and activities of the Initiative; and

7 (8) whether ethical, legal, environmental, safety,
8 security, and other appropriate societal issues are
9 adequately addressed by the Initiative.

10 (e) REPORTS.—Beginning not later than 2 years
11 after the date of enactment of this Act, and not less fre-
12 quently than once every 3 years thereafter, the advisory
13 committee shall submit to the President, the Committee
14 on Science, Space, and Technology of the House of Rep-
15 resentatives, and the Committee on Commerce, Science,
16 and Transportation of the Senate, a report on—

17 (1) the findings of the advisory committee's as-
18 sessment under subsection (b); and

19 (2) the advisory committee's recommendations
20 for ways to improve the Initiative.

21 (d) APPLICATION OF FEDERAL ADVISORY COM-
22 MITTEE ACT.—Section 14 of the Federal Advisory Com-
23 mittee Act (5 U.S.C. App.) shall not apply to the Advisory
24 Committee.

1 **SEC. 7. EXTERNAL REVIEW OF ETHICAL, LEGAL, ENVIRON-**
2 **MENTAL, SAFETY, SECURITY, AND SOCIETAL**
3 **ISSUES.**

4 (a) **IN GENERAL.**—Not later than 6 months after the
5 date of enactment of this Act, the Director of the National
6 Science Foundation shall seek to enter into an agreement
7 with the National Academies of Sciences, Engineering,
8 and Medicine to conduct a review, and make recommenda-
9 tions with respect to, the ethical, legal, environmental,
10 safety, security, and other appropriate societal issues re-
11 lated to engineering biology research and development.

12 The review shall include—

13 (1) an assessment of the current research on
14 such issues;

15 (2) a description of the research gaps relating
16 to such issues;

17 (3) recommendations on how the Initiative can
18 address the research needs identified pursuant to
19 paragraph (2); and

20 (4) recommendations on how engineering biol-
21 ogy researchers can best incorporate considerations
22 of ethical, legal, environmental, safety, security, and
23 other societal issues into the development of research
24 proposals and the conduct of research.

25 (b) **REPORT TO CONGRESS.**—The agreement entered
26 into under subsection (a) shall require the National Acad-

1 emy of Sciences, Engineering, and Medicine to, not later
2 than 2 years after the date of the enactment of this Act—

3 (1) submit to the Committee on Science, Space,
4 and Technology of the House of Representatives and
5 the Committee on Commerce, Science, and Trans-
6 portation of the Senate a report containing the find-
7 ings and recommendations of the review conducted
8 under subsection (a); and

9 (2) make a copy of such report available on a
10 publicly accessible website.

11 (c) ~~ALTERNATE CONTRACT SCIENTIFIC ORGANIZA-~~
12 ~~TION.—~~

13 (1) ~~IN GENERAL.—~~If the Director is unable to
14 enter into an agreement described in subsection (a)
15 with the National Academy of Sciences before the
16 date specified in such subsection on terms acceptable
17 to the Director, the Director shall seek to enter into
18 such an agreement with another appropriate sci-
19 entific organization that—

20 (A) is not part of the Government;

21 (B) operates as a not-for-profit entity; and

22 (C) has expertise and objectivity com-
23 parable to that of the National Academy of
24 Sciences.

1 (2) TREATMENT.—If the Director enters into
2 an agreement with another organization as described
3 in paragraph (1), any reference in this subsection to
4 the National Academy of Sciences shall be treated as
5 a reference to the other organization.

6 **SEC. 8. AGENCY ACTIVITIES.**

7 (a) NATIONAL SCIENCE FOUNDATION.—As part of
8 the Initiative, the National Science Foundation shall—

9 (1) support basic research in engineering biol-
10 ogy through individual grants and through inter-
11 disciplinary research centers;

12 (2) support research on the environmental,
13 legal, ethical, and social implications of engineering
14 biology;

15 (3) provide support for research instrumenta-
16 tion for engineering biology disciplines, including
17 support for research, development, optimization and
18 validation of novel technologies to enable the dy-
19 namic study of molecular processes in situ;

20 (4) support curriculum development and re-
21 search experiences for secondary, undergraduate,
22 and graduate students in engineering biology and
23 biomanufacturing; and

24 (5) award grants, on a competitive basis, to en-
25 able institutions to support graduate students and

1 postdoctoral fellows who perform some of their engi-
2 neering biology research in an industry setting.

3 (b) DEPARTMENT OF COMMERCE.—As part of the
4 Initiative, the Director of the National Institute of Stand-
5 ards and Technology shall—

6 (1) establish a bio science research program to
7 advance the development of standard reference ma-
8 terials and measurements and to create new data
9 tools, techniques, and processes necessary to advance
10 engineering biology and biomanufacturing;

11 (2) provide access to user facilities with ad-
12 vanced or unique equipment, services, materials, and
13 other resources to industry, institutions of higher
14 education, nonprofit organizations, and government
15 agencies to perform research and testing; and

16 (3) provide technical expertise to inform the po-
17 tential development of guidelines or safeguards for
18 new products, processes, and systems of engineering
19 biology.

20 (c) DEPARTMENT OF ENERGY.—As part of the Ini-
21 tiative, the Secretary of Energy shall—

22 (1) conduct and support research, development,
23 demonstration, and commercial application activities
24 in engineering biology, including in the areas of syn-

1 thetic biology, advanced biofuel development,
2 biobased materials, and environmental remediation;

3 (2) support the development, optimization and
4 validation of novel, scalable tools and technologies to
5 enable the dynamic study of molecular processes in
6 situ; and

7 (3) provide access to user facilities with ad-
8 vanced or unique equipment, services, materials, and
9 other resources, as appropriate, to industry, institu-
10 tions of higher education, nonprofit organizations,
11 and government agencies to perform research and
12 testing.

13 (d) DEPARTMENT OF DEFENSE.—As part of the Ini-
14 tiative, the Secretary of Defense shall—

15 (1) conduct and support research and develop-
16 ment in engineering biology and associated data and
17 information sciences;

18 (2) support curriculum development and re-
19 search experiences in engineering biology and associ-
20 ated data and information sciences across the mili-
21 tary education system, to include service academies,
22 professional military education, and military grad-
23 uate education; and

1 ~~(2) assess risks of potential national security~~
2 ~~and economic security threats relating to engineering~~
3 ~~biology.~~

4 ~~(c) NATIONAL AERONAUTICS AND SPACE ADMINIS-~~
5 ~~TRATION.—As part of the Initiative, the National Aero-~~
6 ~~nautics and Space Administration shall—~~

7 ~~(1) conduct and support basic and applied re-~~
8 ~~search in engineering biology, including in synthetic~~
9 ~~biology, and related to Earth and space sciences,~~
10 ~~aeronautics, space technology, and space exploration~~
11 ~~and experimentation, consistent with the priorities~~
12 ~~established in the National Academies' decadal sur-~~
13 ~~veys; and~~

14 ~~(2) award grants, on a competitive basis, that~~
15 ~~enable institutions to support graduate students and~~
16 ~~postdoctoral fellows who perform some of their engi-~~
17 ~~neering biology research in an industry setting.~~

18 ~~(f) DEPARTMENT OF AGRICULTURE.—As part of the~~
19 ~~Initiative, the Secretary of Agriculture shall—~~

20 ~~(1) support research and development in engi-~~
21 ~~neering biology, including in synthetic biology and~~
22 ~~biomaterials;~~

23 ~~(2) award grants through the National Institute~~
24 ~~of Food and Agriculture; and~~

1 (3) support development conducted by the Agri-
2 cultural Research Service.

3 (g) ENVIRONMENTAL PROTECTION AGENCY.—As
4 part of the Initiative, the Environmental Protection Agen-
5 cy shall support research on how products, processes, and
6 systems of engineering biology will affect or can protect
7 the environment.

8 (h) DEPARTMENT OF HEALTH AND HUMAN SERV-
9 ICES.—

10 (1) NATIONAL INSTITUTES OF HEALTH.—As
11 part of the Initiative, the Director of the National
12 Institutes of Health shall—

13 (A) support research and development to
14 advance the understanding and application of
15 engineering biology for human health, including
16 in synthetic biology, cell and tissue engineering,
17 computational biology, and artificial intel-
18 ligence;

19 (B) support and accelerate the application
20 of biomedical research and technologies through
21 cross-disciplinary collaboration and training
22 programs;

23 (C) support research on ethical, legal, safe-
24 ty, and societal implications of emerging bio-
25 technologies; and

1 ~~(D)~~ award grants on a competitive basis,
2 that enable institutions to support graduate
3 students and postdoctoral fellows who perform
4 some of their engineering biology research
5 across multiple disciplinary departments.

6 ~~(2)~~ ~~FOOD AND DRUG ADMINISTRATION.~~—As
7 part of the Initiative, the Commissioner of Food and
8 Drugs shall—

9 ~~(A)~~ support research and evaluation of
10 safety, potency, and efficacy of novel biologic
11 products and biomanufacturing technologies;
12 and

13 ~~(B)~~ ensure the timely development of
14 screening methods to evaluate safety and secu-
15 rity of new biological products and processes.

16 **SECTION 1. SHORT TITLE.**

17 *This Act may be cited as the “Bioeconomy Research*
18 *and Development Act of 2020”.*

19 **SEC. 2. FINDINGS.**

20 *The Congress makes the following findings:*

21 (1) *Cellular and molecular processes may be*
22 *used, mimicked, or redesigned to develop new prod-*
23 *ucts, processes, and systems that improve societal*
24 *well-being, strengthen national security, and con-*
25 *tribute to the economy.*

1 (2) *Engineering biology relies on a workforce*
2 *with a diverse and unique set of skills combining the*
3 *biological, physical, chemical, and information*
4 *sciences and engineering.*

5 (3) *Long-term research and development is nec-*
6 *essary to create breakthroughs in engineering biology.*
7 *Such research and development requires government*
8 *investment as many of the benefits are too distant or*
9 *uncertain for industry to support alone.*

10 (4) *Research is necessary to inform evidence-*
11 *based governance of engineering biology and to sup-*
12 *port the growth of the engineering biology industry.*

13 (5) *The Federal Government has an obligation to*
14 *ensure that ethical, legal, environmental, safety, secu-*
15 *rity, and societal implications of its science and tech-*
16 *nology research and investment follows policies of re-*
17 *sponsible innovation and fosters public transparency.*

18 (6) *The Federal Government can play an impor-*
19 *tant role by facilitating the development of tools and*
20 *technologies to further advance engineering biology,*
21 *including user facilities, by facilitating public-private*
22 *partnerships, by supporting risk research, and by fa-*
23 *cilitating the commercial application in the United*
24 *States of research funded by the Federal Government.*

1 (7) *The United States led the development of the*
2 *science and engineering techniques that created the*
3 *field of engineering biology, but due to increasing*
4 *international competition, the United States is at risk*
5 *of losing its competitive advantage if it does not stra-*
6 *tegetically invest the necessary resources.*

7 (8) *A National Engineering Biology Initiative*
8 *can serve to establish new research directions and*
9 *technology goals, improve interagency coordination*
10 *and planning processes, drive technology transfer to*
11 *the private sector, and help ensure optimal returns on*
12 *the Federal investment.*

13 **SEC. 3. DEFINITIONS.**

14 *In this Act:*

15 (1) *BIOMANUFACTURING.*—*The term “biomanu-*
16 *facturing” means the utilization of biological systems*
17 *to develop new and advance existing products, tools,*
18 *and processes at commercial scale.*

19 (2) *ENGINEERING BIOLOGY.*—*The term “engi-*
20 *neering biology” means the application of engineering*
21 *design principles and practices to biological systems,*
22 *including molecular and cellular systems, to advance*
23 *fundamental understanding of complex natural sys-*
24 *tems and to enable novel or optimize functions and*
25 *capabilities.*

1 (3) *INITIATIVE.*—*The term “Initiative” means*
2 *the National Engineering Biology Research and De-*
3 *velopment Initiative established under section 4.*

4 (4) *OMICS.*—*The term “omics” refers to the col-*
5 *lective technologies used to explore the roles, relation-*
6 *ships, and actions of the various types of molecules*
7 *that make up the cells of an organism.*

8 **SEC. 4. NATIONAL ENGINEERING BIOLOGY RESEARCH AND**
9 **DEVELOPMENT INITIATIVE.**

10 (a) *IN GENERAL.*—*The President, acting through the*
11 *Office of Science and Technology Policy, shall implement*
12 *a National Engineering Biology Research and Development*
13 *Initiative to advance societal well-being, national security,*
14 *sustainability, and economic productivity and competitive-*
15 *ness through—*

16 (1) *advancing areas of research at the intersec-*
17 *tion of the biological, physical, chemical, data, and*
18 *computational sciences and engineering to accelerate*
19 *scientific understanding and technological innovation*
20 *in engineering biology;*

21 (2) *advancing areas of biomanufacturing re-*
22 *search to optimize, standardize, scale, and deliver new*
23 *products and solutions;*

24 (3) *supporting social and behavioral sciences*
25 *and economics research that advances the field of en-*

1 *engineering biology and contributes to the development*
2 *and public understanding of new products, processes,*
3 *and technologies;*

4 (4) *improving the understanding of engineering*
5 *biology of the scientific and lay public and sup-*
6 *porting greater evidence-based public discourse about*
7 *its benefits and risks;*

8 (5) *supporting risk research, including under*
9 *subsection (d);*

10 (6) *supporting the development of novel tools and*
11 *technologies to accelerate scientific understanding and*
12 *technological innovation in engineering biology;*

13 (7) *expanding the number of researchers, edu-*
14 *cators, and students and a retooled workforce with en-*
15 *gineering biology training, including from tradition-*
16 *ally underrepresented and underserved populations;*

17 (8) *accelerating the translation and commer-*
18 *cialization of engineering biology research and devel-*
19 *opment by the private sector; and*

20 (9) *improving the interagency planning and co-*
21 *ordination of Federal Government activities related to*
22 *engineering biology.*

23 (b) *INITIATIVE ACTIVITIES.*—*The activities of the Ini-*
24 *tiative shall include—*

1 (1) *sustained support for engineering biology re-*
2 *search and development through—*

3 (A) *grants to individual investigators and*
4 *teams of investigators, including interdiscipli-*
5 *nary teams;*

6 (B) *projects funded under joint solicitations*
7 *by a collaboration of no fewer than two agencies*
8 *participating in the Initiative; and*

9 (C) *interdisciplinary research centers that*
10 *are organized to investigate basic research ques-*
11 *tions, carry out technology development and*
12 *demonstration activities, and increase under-*
13 *standing of how to scale up engineering biology*
14 *processes, including biomanufacturing;*

15 (2) *sustained support for databases and related*
16 *tools, including—*

17 (A) *support for curated genomics,*
18 *epigenomics, and all other relevant omics data-*
19 *bases, including plant and microbial databases,*
20 *that are available to researchers to carry out en-*
21 *gineering biology research;*

22 (B) *development of standards for such data-*
23 *bases, including for curation, interoperability,*
24 *and protection of privacy and security;*

1 (C) support for the development of computa-
2 tional tools, including artificial intelligence
3 tools, that can accelerate research and innova-
4 tion using such databases; and

5 (D) an inventory and assessment of all Fed-
6 eral government omics databases to identify op-
7 portunities for consolidation and inform invest-
8 ment in such databases as critical infrastructure
9 for the engineering biology research enterprise;

10 (3) sustained support for the development, opti-
11 mization, and validation of novel tools and tech-
12 nologies to enable the dynamic study of molecular
13 processes in situ, including through—

14 (A) research conducted at Federal labora-
15 tories;

16 (B) grants to investigators at institutions of
17 higher education and other nonprofit research
18 institutions;

19 (C) incentivized development of retooled in-
20 dustrial sites across the country that foster a
21 pivot to modernized engineering biology initia-
22 tives; and

23 (D) through the Small Business Innovation
24 Research Program and the Small Business Tech-

1 *nology Transfer Program, as described in section*
2 *9 of the Small Business Act (15 U.S.C. 638);*

3 *(4) education and training of undergraduate*
4 *and graduate students in engineering biology, bio-*
5 *manufacturing, bioprocess engineering, and computa-*
6 *tional science applied to engineering biology and in*
7 *the related ethical, legal, environmental, safety, secu-*
8 *rity, and other societal domains;*

9 *(5) activities to develop robust mechanisms for*
10 *tracking and quantifying the outputs and economic*
11 *benefits of engineering biology; and*

12 *(6) activities to accelerate the translation and*
13 *commercialization of new products, processes, and*
14 *technologies by—*

15 *(A) identifying precompetitive research op-*
16 *portunities;*

17 *(B) facilitating public-private partnerships*
18 *in engineering biology research and development;*

19 *(C) connecting researchers, graduate stu-*
20 *dents, and postdoctoral fellows with entrepre-*
21 *neurship education and training opportunities;*
22 *and*

23 *(D) supporting proof of concept activities*
24 *and the formation of startup companies includ-*
25 *ing through programs such as the Small Busi-*

1 *ness Innovation Research Program and the*
2 *Small Business Technology Transfer Program.*

3 (c) *EXPANDING PARTICIPATION.*—*The Initiative shall*
4 *include, to the maximum extent practicable, outreach to*
5 *primarily undergraduate and minority-serving institutions*
6 *about Initiative opportunities, and shall encourage the de-*
7 *velopment of research collaborations between research-inten-*
8 *sive universities and primarily undergraduate and minor-*
9 *ity-serving institutions.*

10 (d) *ETHICAL, LEGAL, ENVIRONMENTAL, SAFETY, SE-*
11 *curity, AND SOCIETAL ISSUES.*—*Initiative activities shall*
12 *take into account ethical, legal, environmental, safety, secu-*
13 *rity, and other appropriate societal issues by—*

14 (1) *supporting research, including in the social*
15 *sciences, and other activities addressing ethical, legal,*
16 *environmental, and other appropriate societal issues*
17 *related to engineering biology, including integrating*
18 *research on such topics with the research and develop-*
19 *ment in engineering biology, and ensuring that the*
20 *results of such research are widely disseminated, in-*
21 *cluding through interdisciplinary engineering biology*
22 *research centers described in subsection (b)(1);*

23 (2) *supporting research and other activities re-*
24 *lated to the safety and security implications of engi-*
25 *neering biology, including outreach to increase aware-*

1 *ness among Federal researchers and Federally-funded*
2 *researchers at institutions of higher education about*
3 *potential safety and security implications of engineer-*
4 *ing biology research, as appropriate;*

5 *(3) ensuring that input from Federal and non-*
6 *Federal experts on the ethical, legal, environmental,*
7 *safety, security, and other appropriate societal issues*
8 *related to engineering biology is integrated into the*
9 *Initiative; and*

10 *(4) ensuring, through the agencies and depart-*
11 *ments that participate in the Initiative, that public*
12 *input and outreach are integrated into the Initiative*
13 *by the convening of regular and ongoing public dis-*
14 *cussions through mechanisms such as workshops, con-*
15 *sensus conferences, and educational events, as appro-*
16 *priate.*

17 **SEC. 5. INITIATIVE COORDINATION.**

18 *(a) INTERAGENCY COMMITTEE.—The President, acting*
19 *through the Office of Science and Technology Policy, shall*
20 *designate an interagency committee to coordinate engineer-*
21 *ing biology, which shall be co-chaired by the Office of*
22 *Science and Technology Policy, and include representatives*
23 *from the National Science Foundation, the Department of*
24 *Energy, the Department of Defense, the National Aero-*
25 *nautics and Space Administration, the National Institute*

1 *of Standards and Technology, the Environmental Protec-*
2 *tion Agency, the Department of Agriculture, the National*
3 *Institutes of Health, the Bureau of Economic Analysis, and*
4 *any other agency that the President considers appropriate*
5 *(in this section referred to as the “Interagency Committee”).*
6 *The Director of the Office of Science and Technology Policy*
7 *shall select an additional co-chairperson from among the*
8 *members of the Interagency Committee. The Interagency*
9 *Committee shall oversee the planning, management, and co-*
10 *ordination of the Initiative. The Interagency Committee*
11 *shall—*

12 (1) *provide for interagency coordination of Fed-*
13 *eral engineering biology research, development, and*
14 *other activities undertaken pursuant to the Initiative;*

15 (2) *establish and periodically update goals and*
16 *priorities for the Initiative;*

17 (3) *develop, not later than 12 months after the*
18 *date of enactment of this Act, and update every 3*
19 *years, a strategic plan submitted to the Committee on*
20 *Science, Space, and Technology of the House of Rep-*
21 *resentatives and the Committee on Commerce,*
22 *Science, and Transportation of the Senate that—*

23 (A) *guides the activities of the Initiative for*
24 *purposes of meeting the goals and priorities es-*

1 *tablished under (and updated pursuant to) para-*
2 *graph (2); and*

3 *(B) describes—*

4 *(i) the Initiative’s support for long-*
5 *term funding for interdisciplinary engineer-*
6 *ing biology research and development;*

7 *(ii) the Initiative’s support for edu-*
8 *cation and public outreach activities;*

9 *(iii) the Initiative’s support for re-*
10 *search and other activities on ethical, legal,*
11 *environmental, safety, security, and other*
12 *appropriate societal issues related to engi-*
13 *neering biology including—*

14 *(I) an applied biorisk manage-*
15 *ment research plan;*

16 *(II) recommendations for inte-*
17 *grating security into biological data*
18 *access and international reciprocity*
19 *agreements;*

20 *(III) recommendations for manu-*
21 *facturing restructuring to support en-*
22 *gineering biology research, develop-*
23 *ment, and scaling-up initiatives; and*

24 *(IV) an evaluation of existing bio-*
25 *security governance policies, guidance,*

1 *and directives for the purposes of cre-*
2 *ating a unified, adaptable, evidence-*
3 *based framework to respond to emerg-*
4 *ing biosecurity challenges created by*
5 *advances in engineering biology;*

6 *(iv) how the Initiative will move re-*
7 *sults out of the laboratory and into applica-*
8 *tion for the benefit of society and United*
9 *States competitiveness; and*

10 *(v) how the Initiative will measure*
11 *and track the contributions of engineering*
12 *biology to United States economic growth*
13 *and other societal indicators;*

14 *(4) develop a national genomic sequencing strat-*
15 *egy to ensure engineering biology research fully*
16 *leverages plant, animal, and microbe biodiversity to*
17 *enhance long-term innovation and competitiveness in*
18 *engineering biology in the United States;*

19 *(5) develop a plan to utilize Federal programs,*
20 *such as the Small Business Innovation Research Pro-*
21 *gram and the Small Business Technology Transfer*
22 *Program as described in section 9 of the Small Busi-*
23 *ness Act (15 U.S.C. 638), in support of the activities*
24 *described in section 4(b)(3); and*

1 (6) *in carrying out this section, take into consid-*
2 *eration the recommendations of the advisory com-*
3 *mittee established under section 6, the results of the*
4 *workshop convened under section 7, existing reports*
5 *on related topics, and the views of academic, State,*
6 *industry, and other appropriate groups.*

7 (b) *TRIENNIAL REPORT.—Beginning with fiscal year*
8 *2022 and ending in fiscal year 2028, not later than 90 days*
9 *after submission of the President’s annual budget request*
10 *and every third fiscal year thereafter, the Interagency Com-*
11 *mittee shall prepare and submit to the Committee on*
12 *Science, Space, and Technology of the House of Representa-*
13 *tives and the Committee on Commerce, Science, and Trans-*
14 *portation of the Senate a report that includes—*

15 (1) *a summarized agency budget in support of*
16 *the Initiative for the fiscal year to which such budget*
17 *request applies, for the following 2 fiscal years, for the*
18 *then current fiscal year, including a breakout of*
19 *spending for each agency participating in the Pro-*
20 *gram, and for the development and acquisition of any*
21 *research facilities and instrumentation; and*

22 (2) *an assessment of how Federal agencies are*
23 *implementing the plan described in subsection (a)(3),*
24 *including—*

1 (A) a description of the amount and num-
2 ber of awards made under the Small Business
3 Innovation Research Program and the Small
4 Business Technology Transfer Program (as de-
5 scribed in section 9 of the Small Business Act
6 (15 U.S.C. 638)) in support of the Initiative;

7 (B) a description of the amount and num-
8 ber of projects funded under joint solicitations by
9 a collaboration of no fewer than 2 agencies par-
10 ticipating in the Initiative; and

11 (C) a description of the effect of the newly
12 funded projects by the Initiative.

13 (c) INITIATIVE OFFICE.—

14 (1) IN GENERAL.—The President shall establish
15 an Initiative Coordination Office, with a Director
16 and full-time staff, which shall—

17 (A) provide technical and administrative
18 support to the interagency committee and the ad-
19 visory committee established under section 6;

20 (B) serve as the point of contact on Federal
21 engineering biology activities for government or-
22 ganizations, academia, industry, professional so-
23 cieties, State governments, interested citizen
24 groups, and others to exchange technical and
25 programmatic information;

1 (C) oversee interagency coordination of the
2 Initiative, including by encouraging and sup-
3 porting joint agency solicitation and selection of
4 applications for funding of activities under the
5 Initiative;

6 (D) conduct public outreach, including dis-
7 semination of findings and recommendations of
8 the advisory committee established under section
9 6, as appropriate;

10 (E) serve as the coordinator of ethical, legal,
11 environmental, safety, security, and other appro-
12 priate societal input; and

13 (F) promote access to, and early applica-
14 tion of, the technologies, innovations, and exper-
15 tise derived from Initiative activities to agency
16 missions and systems across the Federal Govern-
17 ment, and to United States industry, including
18 startup companies.

19 (2) FUNDING.—The Director of the Office of
20 Science and Technology Policy shall develop an esti-
21 mate of the funds necessary to carry out the activities
22 of the Initiative Coordination Office, including an es-
23 timate of how much each participating agency de-
24 scribed in subsection (a) will contribute to such funds,

1 *and submit such estimate to Congress no later than*
2 *90 days after the enactment of this Act.*

3 (3) *TERMINATION.*—*The Initiative Coordination*
4 *Office established under this subsection shall termi-*
5 *nate on the date that is 10 years after the date of the*
6 *enactment of this Act.*

7 **SEC. 6. ADVISORY COMMITTEE.**

8 (a) *IN GENERAL.*—*The agency co-chair of the inter-*
9 *agency committee established in section 5 shall, in consulta-*
10 *tion with the Office of Science and Technology Policy, des-*
11 *ignate or establish an advisory committee on engineering*
12 *biology research and development (in this section referred*
13 *to as the “advisory committee”) to be composed of not fewer*
14 *than 12 members, including representatives of research and*
15 *academic institutions, industry, and nongovernmental enti-*
16 *ties, who are qualified to provide advice on the Initiative.*

17 (b) *ASSESSMENT.*—*The advisory committee shall as-*
18 *sess—*

19 (1) *the current state of United States competi-*
20 *tiveness in engineering biology, including the scope*
21 *and scale of United States investments in engineering*
22 *biology research and development in the international*
23 *context;*

1 (2) *current market barriers to commercialization*
2 *of engineering biology products, processes, and tools*
3 *in the United States;*

4 (3) *progress made in implementing the Initia-*
5 *tive;*

6 (4) *the need to revise the Initiative;*

7 (5) *the balance of activities and funding across*
8 *the Initiative;*

9 (6) *whether the strategic plan developed or up-*
10 *dated by the interagency committee established under*
11 *section 5 is helping to maintain United States leader-*
12 *ship in engineering biology;*

13 (7) *the management, coordination, implementa-*
14 *tion, and activities of the Initiative; and*

15 (8) *whether ethical, legal, environmental, safety,*
16 *security, and other appropriate societal issues are*
17 *adequately addressed by the Initiative.*

18 (c) *REPORTS.*—*Beginning not later than 2 years after*
19 *the date of enactment of this Act, and not less frequently*
20 *than once every 3 years thereafter, the advisory committee*
21 *shall submit to the President, the Committee on Science,*
22 *Space, and Technology of the House of Representatives, and*
23 *the Committee on Commerce, Science, and Transportation*
24 *of the Senate, a report on—*

1 (1) *the findings of the advisory committee’s as-*
2 *essment under subsection (b); and*

3 (2) *the advisory committee’s recommendations*
4 *for ways to improve the Initiative.*

5 (d) *APPLICATION OF FEDERAL ADVISORY COMMITTEE*
6 *ACT.—Section 14 of the Federal Advisory Committee Act*
7 *(5 U.S.C. App.) shall not apply to the Advisory Committee.*

8 (e) *TERMINATION.—The advisory committee estab-*
9 *lished under subsection (a) shall terminate on the date that*
10 *is 10 years after the date of the enactment of this Act.*

11 **SEC. 7. EXTERNAL REVIEW OF ETHICAL, LEGAL, ENVIRON-**
12 **MENTAL, SAFETY, SECURITY, AND SOCIETAL**
13 **ISSUES.**

14 (a) *IN GENERAL.—Not later than 6 months after the*
15 *date of enactment of this Act, the Director of the National*
16 *Science Foundation shall seek to enter into an agreement*
17 *with the National Academies of Sciences, Engineering, and*
18 *Medicine to conduct a review, and make recommendations*
19 *with respect to, the ethical, legal, environmental, safety, se-*
20 *curity, and other appropriate societal issues related to engi-*
21 *neering biology research and development. The review shall*
22 *include—*

23 (1) *an assessment of the current research on such*
24 *issues;*

1 (2) *a description of the research gaps relating to*
2 *such issues;*

3 (3) *recommendations on how the Initiative can*
4 *address the research needs identified pursuant to*
5 *paragraph (2); and*

6 (4) *recommendations on how engineering biology*
7 *researchers can best incorporate considerations of eth-*
8 *ical, legal, environmental, safety, security, and other*
9 *societal issues into the development of research pro-*
10 *posals and the conduct of research.*

11 (b) *REPORT TO CONGRESS.*—*The agreement entered*
12 *into under subsection (a) shall require the National Acad-*
13 *emies of Sciences, Engineering, and Medicine to, not later*
14 *than 2 years after the date of the enactment of this Act—*

15 (1) *submit to the Committee on Science, Space,*
16 *and Technology of the House of Representatives and*
17 *the Committee on Commerce, Science, and Transpor-*
18 *tation of the Senate a report containing the findings*
19 *and recommendations of the review conducted under*
20 *subsection (a); and*

21 (2) *make a copy of such report available on a*
22 *publicly accessible website.*

23 **SEC. 8. AGENCY ACTIVITIES.**

24 (a) *NATIONAL SCIENCE FOUNDATION.*—*As part of the*
25 *Initiative, the National Science Foundation shall—*

1 (1) *support basic research in engineering biology*
2 *through individual grants, collaborative grants, and*
3 *through interdisciplinary research centers;*

4 (2) *support research on the environmental, legal,*
5 *ethical, and social implications of engineering biol-*
6 *ogy;*

7 (3) *provide support for research instrumentation*
8 *for engineering biology disciplines, including support*
9 *for research, development, optimization and valida-*
10 *tion of novel technologies to enable the dynamic study*
11 *of molecular processes in situ;*

12 (4) *support curriculum development and re-*
13 *search experiences for secondary, undergraduate, and*
14 *graduate students in engineering biology and bio-*
15 *manufacturing; and*

16 (5) *award grants, on a competitive basis, to en-*
17 *able institutions to support graduate students and*
18 *postdoctoral fellows who perform some of their engi-*
19 *neering biology research in an industry setting.*

20 (b) *DEPARTMENT OF COMMERCE.—As part of the Ini-*
21 *tiative, the Director of the National Institute of Standards*
22 *and Technology shall—*

23 (1) *establish a bioscience research program to ad-*
24 *vance the development of standard reference materials*
25 *and measurements and to create new data tools, tech-*

1 *niques, and processes necessary to advance engineer-*
2 *ing biology and biomanufacturing;*

3 (2) *provide access to user facilities with ad-*
4 *vanced or unique equipment, services, materials, and*
5 *other resources to industry, institutions of higher edu-*
6 *cation, nonprofit organizations, and government*
7 *agencies to perform research and testing; and*

8 (3) *provide technical expertise to inform the po-*
9 *tential development of guidelines or safeguards for*
10 *new products, processes, and systems of engineering*
11 *biology.*

12 (c) *DEPARTMENT OF ENERGY.—As part of the Initia-*
13 *tive, the Secretary of Energy shall—*

14 (1) *conduct and support research, development,*
15 *demonstration, and commercial application activities*
16 *in engineering biology, including in the areas of syn-*
17 *thetic biology, advanced biofuel development, biobased*
18 *materials, and environmental remediation;*

19 (2) *support the development, optimization and*
20 *validation of novel, scalable tools and technologies to*
21 *enable the dynamic study of molecular processes in*
22 *situ; and*

23 (3) *provide access to user facilities with ad-*
24 *vanced or unique equipment, services, materials, and*
25 *other resources, including secure access to high-per-*

1 *formance computing, as appropriate, to industry, in-*
2 *stitutions of higher education, nonprofit organiza-*
3 *tions, and government agencies to perform research*
4 *and testing.*

5 *(d) DEPARTMENT OF DEFENSE.—As part of the Ini-*
6 *tiative, the Secretary of Defense shall—*

7 *(1) conduct and support research and develop-*
8 *ment in engineering biology and associated data and*
9 *information sciences;*

10 *(2) support curriculum development and re-*
11 *search experiences in engineering biology and associ-*
12 *ated data and information sciences across the mili-*
13 *tary education system, to include service academies,*
14 *professional military education, and military grad-*
15 *uate education; and*

16 *(3) assess risks of potential national security and*
17 *economic security threats relating to engineering biol-*
18 *ogy.*

19 *(e) NATIONAL AERONAUTICS AND SPACE ADMINISTRA-*
20 *TION.—As part of the Initiative, the National Aeronautics*
21 *and Space Administration shall—*

22 *(1) conduct and support basic and applied re-*
23 *search in engineering biology, including in synthetic*
24 *biology, and related to Earth and space sciences, aero-*
25 *navitics, space technology, and space exploration and*

1 *experimentation, consistent with the priorities estab-*
2 *lished in the National Academies' decadal surveys;*
3 *and*

4 (2) *award grants, on a competitive basis, that*
5 *enable institutions to support graduate students and*
6 *postdoctoral fellows who perform some of their engi-*
7 *neering biology research in an industry setting.*

8 (f) *DEPARTMENT OF AGRICULTURE.—As part of the*
9 *Initiative, the Secretary of Agriculture shall—*

10 (1) *support research and development in engi-*
11 *neering biology, including in synthetic biology and*
12 *biomaterials;*

13 (2) *award grants through the National Institute*
14 *of Food and Agriculture; and*

15 (3) *support development conducted by the Agri-*
16 *cultural Research Service.*

17 (g) *ENVIRONMENTAL PROTECTION AGENCY.—As part*
18 *of the Initiative, the Environmental Protection Agency shall*
19 *support research on how products, processes, and systems*
20 *of engineering biology will affect or can protect the environ-*
21 *ment.*

22 (h) *DEPARTMENT OF HEALTH AND HUMAN SERV-*
23 *ICES.—*

1 (1) *NATIONAL INSTITUTES OF HEALTH.*—As part
2 of the Initiative, the Director of the National Insti-
3 tutes of Health shall—

4 (A) support research and development to
5 advance the understanding and application of
6 engineering biology for human health, including
7 in synthetic biology, cell and tissue engineering,
8 computational biology, and artificial intel-
9 ligence;

10 (B) support and accelerate the application
11 of biomedical research and technologies through
12 cross-disciplinary collaboration and training
13 programs;

14 (C) support research on ethical, legal, safe-
15 ty, and societal implications of emerging biotech-
16 nologies; and

17 (D) award grants on a competitive basis,
18 that enable institutions to support graduate stu-
19 dents and postdoctoral fellows who perform some
20 of their engineering biology research across mul-
21 tiple disciplinary departments.

22 (2) *FOOD AND DRUG ADMINISTRATION.*—As part
23 of the Initiative, the Commissioner of Food and
24 Drugs shall—

1 (A) support research and evaluation of safe-
2 ty, potency, and efficacy of novel biologic prod-
3 ucts and biomanufacturing technologies; and

4 (B) ensure the timely development of screen-
5 ing methods to evaluate safety and security of
6 new biological products and processes.

Calendar No. 636

116TH CONGRESS
2^D SESSION

S. 3734

[Report No. 116-330]

A BILL

To provide for a coordinated Federal research initiative to ensure continued United States leadership in engineering biology.

DECEMBER 15, 2020

Reported with an amendment