

# Union Calendar No. 170

117<sup>TH</sup> CONGRESS  
2<sup>D</sup> SESSION

# H. R. 4521

**[Report No. 117–235, Part I]**

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

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## IN THE HOUSE OF REPRESENTATIVES

JULY 19, 2021

Ms. JOHNSON of Texas (for herself and Mr. LUCAS) introduced the following bill; which was referred to the Committee on Science, Space, and Technology, and in addition to the Committees on Agriculture, and Energy and Commerce, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned

JANUARY 28, 2022

Additional sponsors: Mr. GARAMENDI, Mr. NEAL, Mr. NADLER, Ms. WATERS, Mrs. CAROLYN B. MALONEY of New York, Mr. SCOTT of Virginia, Mr. GRIJALVA, Mr. THOMPSON of Mississippi, Mr. MEEKS, Mr. TONKO, Mr. SHERMAN, Mr. KILDEE, Mrs. MCBATH, Mr. BISHOP of Georgia, Mrs. DEMINGS, Ms. ROSS, Mr. STANTON, Mr. FOSTER, Mrs. BEATTY, Mr. MCNERNEY, Ms. LEGER FERNANDEZ, Mr. SABLAN, Mr. MFUME, Mrs. DINGELL, Mr. SEAN PATRICK MALONEY of New York, Mr. MRVAN, Ms. WILSON of Florida, Mr. DOGGETT, Mr. BLUMENAUER, Mr. CUELLAR, Miss RICE of New York, Mr. HUFFMAN, Ms. NEWMAN, Mr. COURTNEY, Mr. PASCRELL, Mr. MORELLE, Mr. DEUTCH, Mr. MICHAEL F. DOYLE of Pennsylvania, Mr. LYNCH, Mr. KHANNA, Mr. GARCÍA of Illinois, Ms. BONAMICI, Ms. BLUNT ROCHESTER, Mr. CLEAVER, Mrs. AXNE, Mrs. LAWRENCE, Ms. CRAIG, Mr. CASTEN, Mr. BUTTERFIELD, Mr. PERLMUTTER, Mr. LANGEVIN, Mr. MCEACHIN, Mr. EVANS, Mr. RUSH, Ms. TITUS, Ms. STANSBURY, Mr. AGUILAR, Mr. GREEN of Texas, Ms. DELAURO, Ms. MATSUI, Ms. STEVENS, Mr. HORSFORD, Mr. BERA, Ms. KUSTER, Ms. DEGETTE, Mr. LARSON of Connecticut, Mr. COSTA, Ms. ROYBAL-ALLARD, Ms. MCCOLLUM, Ms. CLARK of Massachusetts, Mr. SIRES, Mr. DANNY K. DAVIS of Illinois, Ms. BROWNLEY, Ms. KELLY of Illinois, Mr. GALLEGO, Ms. ESHOO, Mr. PAYNE, Mr. HOYER, Ms.

BOURDEAUX, Mr. CARSON, Mr. JEFFRIES, Mrs. TORRES of California, Mr. BEYER, Ms. DEAN, Mr. O'HALLERAN, Mr. KIM of New Jersey, Mr. TORRES of New York, Mr. THOMPSON of California, Ms. ADAMS, Mr. LARSEN of Washington, Mr. KILMER, Ms. ESCOBAR, Mr. ALLRED, Mr. CARTWRIGHT, Mr. SWALWELL, Ms. SHERRILL, Mr. JOHNSON of Georgia, Ms. VELÁZQUEZ, Mr. LAWSON of Florida, and Ms. SEWELL

JANUARY 28, 2022

Reported from the Committee on Science, Space, and Technology with an amendment

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

JANUARY 28, 2022

Committees on Agriculture and Energy and Commerce discharged; committed to the Committee of the Whole House on the State of the Union and ordered to be printed

[For text of introduced bill, see copy of bill as introduced on July 19, 2021]

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## **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 2021”.*

6 **SEC. 2. FINDINGS.**

7 *The Congress makes the following findings:*

8 *(1) Cellular and molecular processes may be*  
9 *used, mimicked, or redesigned to develop new prod-*  
10 *ucts, processes, and systems that improve societal*  
11 *well-being, strengthen national security, and con-*  
12 *tribute to the economy.*

13 *(2) Engineering biology relies on a workforce*  
14 *with a diverse and unique set of skills combining the*  
15 *biological, physical, chemical, and information*  
16 *sciences and engineering.*

17 *(3) Long-term research and development is nec-*  
18 *essary to create breakthroughs in engineering biology.*  
19 *Such research and development requires government*  
20 *investment as many of the benefits are too distant or*  
21 *uncertain for industry to support alone.*

22 *(4) Research is necessary to inform evidence-*  
23 *based governance of engineering biology and to sup-*  
24 *port the growth of the engineering biology industry.*

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

6           (6) *The Federal Government can play an impor-*  
7           *tant role by facilitating the development of tools and*  
8           *technologies to further advance engineering biology,*  
9           *including user facilities, by facilitating public-private*  
10          *partnerships, by supporting risk research, and by fa-*  
11          *cilitating the commercial application in the United*  
12          *States of research funded by the Federal Government.*

13          (7) *The United States led the development of the*  
14          *science and engineering techniques that created the*  
15          *field of engineering biology, but due to increasing*  
16          *international competition, the United States is at risk*  
17          *of losing its competitive advantage if it does not stra-*  
18          *tegetically invest the necessary resources.*

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

1 **SEC. 3. DEFINITIONS.**

2 *In this Act:*

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

7 (2) *ENGINEERING BIOLOGY.*—*The term “engi-*  
8 *neering biology” means the application of engineering*  
9 *design principles and practices to biological systems,*  
10 *including molecular and cellular systems, to advance*  
11 *fundamental understanding of complex natural sys-*  
12 *tems and to enable novel or optimize functions and*  
13 *capabilities.*

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

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

21 **SEC. 4. NATIONAL ENGINEERING BIOLOGY RESEARCH AND**  
22 **DEVELOPMENT INITIATIVE.**

23 (a) *IN GENERAL.*—*The President, acting through the*  
24 *Office of Science and Technology Policy, shall implement*  
25 *a National Engineering Biology Research and Development*  
26 *Initiative to advance societal well-being, national security,*

1 *sustainability, and economic productivity and competitive-*  
2 *ness through—*

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

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

11           (3) *supporting social and behavioral sciences*  
12 *and economics research that advances the field of en-*  
13 *gineering biology and contributes to the development*  
14 *and public understanding of new products, processes,*  
15 *and technologies;*

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

20           (5) *supporting research relating to the risks and*  
21 *benefits of engineering biology, including under sub-*  
22 *section (d);*

23           (6) *supporting the development of novel tools and*  
24 *technologies to accelerate scientific understanding and*  
25 *technological innovation in engineering biology;*

1           (7) *expanding the number of researchers, edu-*  
2           *cators, and students and a retooled workforce with en-*  
3           *gineering biology training, including from tradition-*  
4           *ally underrepresented and underserved populations;*

5           (8) *accelerating the translation and commer-*  
6           *cialization of engineering biology and biomanufac-*  
7           *turing research and development by the private sector;*  
8           *and*

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

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

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

16                       (A) *grants to fund the work of individual*  
17                       *investigators and teams of investigators, includ-*  
18                       *ing interdisciplinary teams;*

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

22                       (C) *interdisciplinary research centers that*  
23                       *are organized to investigate basic research ques-*  
24                       *tions, carry out technology development and*  
25                       *demonstration activities, and increase under-*

1           *standing of how to scale up engineering biology*  
2           *processes, including biomanufacturing;*

3           (2) *sustained support for databases and related*  
4           *tools, including—*

5                   (A) *support for the establishment, curation,*  
6                   *and maintenance of curated genomics,*  
7                   *epigenomics, and other relevant omics databases,*  
8                   *including plant, animal, and microbial data-*  
9                   *bases, that are available to researchers to carry*  
10                  *out engineering biology research in a manner*  
11                  *that does not compromise national security or*  
12                  *the privacy or security of information within*  
13                  *such databases;*

14                   (B) *development of standards for such data-*  
15                   *bases, including for curation, interoperability,*  
16                   *and protection of privacy and security;*

17                   (C) *support for the development of computa-*  
18                   *tional tools, including artificial intelligence*  
19                   *tools, that can accelerate research and innova-*  
20                   *tion using such databases; and*

21                   (D) *an inventory and assessment of all Fed-*  
22                   *eral government omics databases to identify op-*  
23                   *portunities to improve the utility of such data-*  
24                   *bases, as appropriate and in a manner that does*  
25                   *not compromise national security or the privacy*



1           *and security of information within such data-*  
2           *bases, and inform investment in such databases*  
3           *as critical infrastructure for the engineering biol-*  
4           *ogy research enterprise;*

5           *(3) sustained support for the development, opti-*  
6           *mization, and validation of novel tools and tech-*  
7           *nologies to enable the dynamic study of molecular*  
8           *processes in situ, including through—*

9                   *(A) research conducted at Federal labora-*  
10                  *tories;*

11                   *(B) grants to fund the work of investigators*  
12                  *at institutions of higher education and other*  
13                  *nonprofit research institutions;*

14                   *(C) incentivized development of retooled in-*  
15                  *dustrial sites across the country that foster a*  
16                  *pivot to modernized engineering biology initia-*  
17                  *tives; and*

18                   *(D) awards under the Small Business Inno-*  
19                  *vation Research Program and the Small Busi-*  
20                  *ness Technology Transfer Program, as described*  
21                  *in section 9 of the Small Business Act (15*  
22                  *U.S.C. 638);*

23           *(4) support for education and training of under-*  
24           *graduate and graduate students in engineering biol-*  
25           *ogy, biomanufacturing, bioprocess engineering, and*

1 *computational science applied to engineering biology*  
2 *and in the related ethical, legal, environmental, safe-*  
3 *ty, security, and other societal domains;*

4 *(5) support for biomanufacturing testbeds, in-*  
5 *cluding by repurposing existing facilities such as*  
6 *those in paragraph 3(C), that would enable scale up*  
7 *of laboratory engineering biology research;*

8 *(6) activities to develop robust mechanisms for*  
9 *documenting and quantifying the outputs and eco-*  
10 *nommic benefits of engineering biology; and*

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

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

16 *(B) facilitating public-private partnerships*  
17 *in engineering biology research and development,*  
18 *including to address barriers to scaling up inno-*  
19 *vations in engineering biology;*

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

24 *(D) supporting proof of concept activities*  
25 *and the formation of startup companies includ-*

1            *ing through programs such as the Small Busi-*  
2            *ness Innovation Research Program and the*  
3            *Small Business Technology Transfer Program.*

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

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

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

24                    *(2) supporting research and other activities re-*  
25                    *lated to the safety and security implications of engi-*

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

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

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

18                *(5) complying with all applicable provisions of*  
19        *Federal law.*

20        **SEC. 5. INITIATIVE COORDINATION.**

21                *(a) INTERAGENCY COMMITTEE.—The President, acting*  
22        *through the Office of Science and Technology Policy, shall*  
23        *designate an interagency committee to coordinate activities*  
24        *of the Initiative as appropriate, which shall be co-chaired*  
25        *by the Office of Science and Technology Policy, and include*

1 *representatives from the National Science Foundation, the*  
2 *Department of Energy, the National Aeronautics and Space*  
3 *Administration, the National Institute of Standards and*  
4 *Technology, the Environmental Protection Agency, the Na-*  
5 *tional Oceanic and Atmospheric Administration, the De-*  
6 *partment of Agriculture, the Department of Health and*  
7 *Human Services, the Bureau of Economic Analysis, and*  
8 *any other agency that the President considers appropriate*  
9 *(in this section referred to as the “Interagency Committee”).*  
10 *The Director of the Office of Science and Technology Policy*  
11 *shall select an additional co-chairperson from among the*  
12 *members of the Interagency Committee. The Interagency*  
13 *Committee shall oversee the planning, management, and co-*  
14 *ordination of the Initiative. The Interagency Committee*  
15 *shall—*

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

19           (2) *establish and periodically update goals and*  
20 *priorities for the Initiative;*

21           (3) *develop, not later than 12 months after the*  
22 *date of the enactment of this Act, and update every*  
23 *3 years thereafter, a strategic plan submitted to the*  
24 *Committee on Science, Space, and Technology and the*  
25 *Committee on Energy and Commerce of the House of*

1 *Representatives and the Committee on Commerce,*  
2 *Science, and Transportation and the Committee on*  
3 *Health, Education, Labor, and Pensions of the Senate*  
4 *that—*

5 *(A) guides the activities of the Initiative for*  
6 *purposes of meeting the goals and priorities es-*  
7 *tablished under (and updated pursuant to) para-*  
8 *graph (2); and*

9 *(B) describes—*

10 *(i) the Initiative’s support for long-*  
11 *term funding for interdisciplinary engineer-*  
12 *ing biology research and development;*

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

15 *(iii) the Initiative’s support for re-*  
16 *search and other activities on ethical, legal,*  
17 *environmental, safety, security, and other*  
18 *appropriate societal issues related to engi-*  
19 *neering biology including—*

20 *(I) an applied biorisk manage-*  
21 *ment research plan;*

22 *(II) recommendations for inte-*  
23 *grating security into biological data*  
24 *access and international reciprocity*  
25 *agreements;*

1                   (III) recommendations for manu-  
2                   facturing restructuring to support en-  
3                   gineering biology research, develop-  
4                   ment, and scaling-up initiatives; and

5                   (IV) an evaluation of existing bio-  
6                   security governance policies, guidance,  
7                   and directives for the purposes of cre-  
8                   ating an adaptable, evidence-based  
9                   framework to respond to emerging bio-  
10                  security challenges created by advances  
11                  in engineering biology;

12                  (iv) how the Initiative will contribute  
13                  to moving results out of the laboratory and  
14                  into application for the benefit of society  
15                  and United States competitiveness; and

16                  (v) how the Initiative will measure  
17                  and track the contributions of engineering  
18                  biology to United States economic growth  
19                  and other societal indicators;

20                  (4) develop a national genomic sequencing strat-  
21                  egy to ensure engineering biology research fully  
22                  leverages plant, animal, and microbe biodiversity, as  
23                  appropriate and in a manner that does not com-  
24                  promise national security or the privacy or security  
25                  of human genetic information, to enhance long-term

1 *innovation and competitiveness in engineering biol-*  
2 *ogy in the United States;*

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

9 (6) *in carrying out this section, take into consid-*  
10 *eration the recommendations of the advisory com-*  
11 *mittee established under section 6, the results of the*  
12 *workshop convened under section 7, existing reports*  
13 *on related topics, and the views of academic, State,*  
14 *industry, and other appropriate groups.*

15 (b) *TRIENNIAL REPORT.*—*Beginning with fiscal year*  
16 *2022 and ending in fiscal year 2028, not later than 90 days*  
17 *after submission of the President’s annual budget request*  
18 *and every third fiscal year thereafter, the Interagency Com-*  
19 *mittee shall prepare and submit to the Committee on*  
20 *Science, Space, and Technology of the House of Representa-*  
21 *tives and the Committee on Commerce, Science, and Trans-*  
22 *portation of the Senate a report that includes—*

23 (1) *a summarized agency budget in support of*  
24 *the Initiative for the fiscal year to which such budget*  
25 *request applies, for the following 2 fiscal years, for the*



1        *then current fiscal year, including a breakout of*  
2        *spending for each agency participating in the Pro-*  
3        *gram, and for the development and acquisition of any*  
4        *research facilities and instrumentation; and*

5                *(2) an assessment of how Federal agencies are*  
6        *implementing the plan described in subsection (a)(3),*  
7        *including—*

8                        *(A) a description of the amount and num-*  
9                        *ber of awards made under the Small Business*  
10                        *Innovation Research Program and the Small*  
11                        *Business Technology Transfer Program (as de-*  
12                        *scribed in section 9 of the Small Business Act*  
13                        *(15 U.S.C. 638)) in support of the Initiative;*

14                        *(B) a description of the amount and num-*  
15                        *ber of projects funded under joint solicitations by*  
16                        *a collaboration of no fewer than 2 agencies par-*  
17                        *ticipating in the Initiative; and*

18                        *(C) a description of the effect of the newly*  
19                        *funded projects by the Initiative.*

20        *(c) INITIATIVE OFFICE.—*

21                        *(1) IN GENERAL.—The President shall establish*  
22        *an Initiative Coordination Office, with a Director*  
23        *and full-time staff, which shall—*

1           (A) provide technical and administrative  
2 support to the interagency committee and the ad-  
3 visory committee established under section 6;

4           (B) serve as the point of contact on Federal  
5 engineering biology activities for government or-  
6 ganizations, academia, industry, professional so-  
7 cieties, State governments, interested citizen  
8 groups, and others to exchange technical and  
9 programmatic information;

10          (C) oversee interagency coordination of the  
11 Initiative, including by encouraging and sup-  
12 porting joint agency solicitation and selection of  
13 applications for funding of activities under the  
14 Initiative, as appropriate;

15          (D) conduct public outreach, including dis-  
16 semination of findings and recommendations of  
17 the advisory committee established under section  
18 6, as appropriate;

19          (E) serve as the coordinator of ethical, legal,  
20 environmental, safety, security, and other appro-  
21 priate societal input; and

22          (F) promote access to, and early applica-  
23 tion of, the technologies, innovations, and exper-  
24 tise derived from Initiative activities to agency  
25 missions and systems across the Federal Govern-

1           ment, and to United States industry, including  
2           startup companies.

3           (2) *FUNDING.*—*The Director of the Office of*  
4           *Science and Technology Policy, in coordination with*  
5           *each participating Federal department and agency,*  
6           *as appropriate, shall develop and annually update an*  
7           *estimate of the funds necessary to carry out the ac-*  
8           *tivities of the Initiative Coordination Office and sub-*  
9           *mit such estimate with an agreed summary of con-*  
10          *tributions from each agency to Congress as part of the*  
11          *President’s annual budget request to Congress.*

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

16          (d) *RULE OF CONSTRUCTION.*—*Nothing in this section*  
17          *shall be construed to alter the policies, processes, or prac-*  
18          *tices of individual Federal agencies in effect on the day be-*  
19          *fore the date of the enactment of this Act relating to the*  
20          *conduct of biomedical research and advanced development,*  
21          *including the solicitation and review of extramural research*  
22          *proposals.*

23          **SEC. 6. ADVISORY COMMITTEE.**

24          (a) *IN GENERAL.*—*The agency co-chair of the inter-*  
25          *agency committee established in section 5 shall, in consulta-*

1 *tion with the Office of Science and Technology Policy, des-*  
2 *ignate or establish an advisory committee on engineering*  
3 *biology research and development (in this section referred*  
4 *to as the “advisory committee”) to be composed of not fewer*  
5 *than 12 members, including representatives of research and*  
6 *academic institutions, industry, and nongovernmental enti-*  
7 *ties, who are qualified to provide advice on the Initiative.*

8 (b) *ASSESSMENT.—The advisory committee shall as-*  
9 *sess—*

10 (1) *the current state of United States competi-*  
11 *tiveness in engineering biology, including the scope*  
12 *and scale of United States investments in engineering*  
13 *biology research and development in the international*  
14 *context;*

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

18 (3) *progress made in implementing the Initia-*  
19 *tive;*

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

21 (5) *the balance of activities and funding across*  
22 *the Initiative;*

23 (6) *whether the strategic plan developed or up-*  
24 *dated by the interagency committee established under*

1        *section 5 is helping to maintain United States leader-*  
2        *ship in engineering biology;*

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

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

8        *(c) REPORTS.—Beginning not later than 2 years after*  
9        *the date of enactment of this Act, and not less frequently*  
10       *than once every 3 years thereafter, the advisory committee*  
11       *shall submit to the President, the Committee on Science,*  
12       *Space, and Technology of the House of Representatives, and*  
13       *the Committee on Commerce, Science, and Transportation*  
14       *of the Senate, a report on—*

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

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

19        *(d) APPLICATION OF FEDERAL ADVISORY COMMITTEE*  
20        *ACT.—Section 14 of the Federal Advisory Committee Act*  
21        *(5 U.S.C. App.) shall not apply to the Advisory Committee.*

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

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, and  
8 Medicine to conduct a review, and make recommendations  
9 with respect to, the ethical, legal, environmental, safety, se-  
10 curity, and other appropriate societal issues related to engi-  
11 neering biology research and development. The review shall  
12 include—

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

15 (2) *a description of the research gaps relating to*  
16 *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 researchers engaged*  
21 *in engineering biology can best incorporate consider-*  
22 *ations of ethical, legal, environmental, safety, secu-*  
23 *rity, and other societal issues into the development of*  
24 *research 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 *emies 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 Transpor-*  
6 *tation of the Senate a report containing the findings*  
7 *and recommendations of the review conducted under*  
8 *subsection (a); and*

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

11 **SEC. 8. AGENCY ACTIVITIES.**

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

14 *(1) support research in engineering biology and*  
15 *biomanufacturing through individual grants, collabo-*  
16 *rative grants, and through interdisciplinary research*  
17 *centers;*

18 *(2) support research on the environmental, legal,*  
19 *ethical, and social implications of engineering biol-*  
20 *ogy;*

21 *(3) provide support for research instrumentation,*  
22 *equipment, and cyberinfrastructure for engineering*  
23 *biology disciplines, including support for research, de-*  
24 *velopment, optimization and validation of novel tech-*

1 *nologies to enable the dynamic study of molecular*  
2 *processes in situ;*

3 *(4) support curriculum development and re-*  
4 *search experiences for secondary, undergraduate, and*  
5 *graduate students in engineering biology and bio-*  
6 *manufacturing, including through support for grad-*  
7 *uate fellowships and traineeships in engineering biol-*  
8 *ogy; and*

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

13 *(b) DEPARTMENT OF COMMERCE.—*

14 *(1) NATIONAL INSTITUTE OF STANDARDS AND*  
15 *TECHNOLOGY.—As part of the Initiative, the Director*  
16 *of the National Institute of Standards and Technology*  
17 *shall—*

18 *(A) establish a bioscience research program*  
19 *to advance the development of standard reference*  
20 *materials and measurements and to create new*  
21 *data tools, techniques, and processes necessary to*  
22 *advance engineering biology and biomanufac-*  
23 *turing;*

24 *(B) provide access to user facilities with ad-*  
25 *vanced or unique equipment, services, materials,*



1           *and other resources to industry, institutions of*  
2           *higher education, nonprofit organizations, and*  
3           *government agencies to perform research and*  
4           *testing; and*

5                   *(C) provide technical expertise to inform the*  
6           *potential development of guidelines or safeguards*  
7           *for new products, processes, and systems of engi-*  
8           *neering biology.*

9           *(2) NATIONAL OCEANIC AND ATMOSPHERIC AD-*  
10          *MINISTRATION.—As part of the initiative, the Admin-*  
11          *istrator of the National Oceanic and Atmospheric Ad-*  
12          *ministration shall—*

13                   *(A) conduct and support research in omics*  
14          *and associated bioinformatic sciences and de-*  
15          *velop tools and products to improve ecosystem*  
16          *stewardship, monitoring, management, assess-*  
17          *ments and forecasts, consistent with the mission*  
18          *of the agency; and*

19                   *(B) collaborate with other agencies to un-*  
20          *derstand potential environmental threats and*  
21          *safeguards related to engineering biology.*

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

24                   *(1) conduct and support research, development,*  
25          *demonstration, and commercial application activities*

1 *in engineering biology, including in the areas of syn-*  
2 *thetic biology, advanced biofuel and bioproduct devel-*  
3 *opment, biobased materials, and environmental reme-*  
4 *diation;*

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

9 (3) *provide access to user facilities with ad-*  
10 *vanced or unique equipment, services, materials, and*  
11 *other resources, including secure access to high-per-*  
12 *formance computing, as appropriate, to industry, in-*  
13 *stitutions of higher education, nonprofit organiza-*  
14 *tions, and government agencies to perform research*  
15 *and testing; and*

16 (4) *strengthen collaboration between the Office of*  
17 *Science and the Energy Efficiency and Renewable*  
18 *Energy Office to help transfer fundamental research*  
19 *results to industry and accelerate commercial appli-*  
20 *cations.*

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

24 (1) *conduct and support research in engineering*  
25 *biology, including in synthetic biology, and related to*

1 *Earth and space sciences, aeronautics, space tech-*  
2 *nology, and space exploration and experimentation,*  
3 *consistent with the priorities established in the Na-*  
4 *tional Academies' decadal surveys; and*

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

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

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

14 (2) *award grants through the National Institute*  
15 *of Food and Agriculture and the Agriculture Ad-*  
16 *vanced Research and Development Authority; and*

17 (3) *support development conducted by the Agri-*  
18 *cultural Research Service.*

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

24 (g) *DEPARTMENT OF HEALTH AND HUMAN SERV-*  
25 *ICES.—As part of the Initiative, the Secretary of Health*

1 *and Human Services, as appropriate and consistent with*  
2 *activities of the Department of Health and Human Services*  
3 *in effect on the day before the date of the enactment of this*  
4 *Act, shall—*

5           (1) *support research and development to advance*  
6           *the understanding and application of engineering bi-*  
7           *ology for human health;*

8           (2) *support relevant interdisciplinary research*  
9           *and coordination; and*

10           (3) *support activities necessary to facilitate over-*  
11           *sight of relevant emerging biotechnologies.*

12 **SEC. 9. RULE OF CONSTRUCTION.**

13           *Nothing in this Act shall be construed to require public*  
14 *disclosure of information that is exempt from mandatory*  
15 *disclosure under section 552 of title 5, United States Code.*



Union Calendar No. 170

117<sup>TH</sup> CONGRESS  
2<sup>D</sup> SESSION

**H. R. 4521**

[Report No. 117-235, Part I]

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**A BILL**

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

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JANUARY 28, 2022

Reported from the Committee on Science, Space, and  
Technology with an amendment

JANUARY 28, 2022

Committees on Agriculture and Energy and Commerce  
discharged; committed to the Committee of the Whole  
House on the State of the Union and ordered to be  
printed