



U.S. Department of Energy

Categorical Exclusion Determination Form

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Proposed Action Title: Harnessing Emissions into Structures Taking Inputs from the Atmosphere (HESTIA) Program (FOA Numbers DE-FOA-0002625 and DE-FOA-0002626)

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): AK, AZ, CA, CO, FL, GA, IL, IN, MA, ME, MI, NC, NY, OR, PA, SC, TN, TX, WA, WI

Proposed Action Description:

FOURTH AMENDED PROGRAMMATIC NEPA DETERMINATION (See attached Third Amended Programmatic Determination, dated November 28, 2022; Second Amended Programmatic Determination, dated October 12, 2022; First Amended Programmatic Determination, dated September 23, 2022; and original Programmatic Determination, dated August 23, 2022). The HESTIA Program supports the development of technologies that nullify embodied greenhouse gas emissions, while simultaneously transforming buildings into net carbon storage structures. If successful, HESTIA projects will dramatically reduce CO2 emissions from building material manufacture and demonstrate net carbon negative building designs.

The HESTIA Program is composed of 17 small-scale research and development projects that will be conducted by universities, for-profit entities, and federal laboratories. This Fourth Amended Determination adds 3 projects (Oregon State University, BamCore, and National Renewable Energy Laboratory) to the previous Determinations (see Attachment for all 17 projects covered by this and the prior Determinations). These projects are covered by and fit within the class of actions identified under the DOE Categorical Exclusions identified below and do not involve any extraordinary circumstances that may affect the significance of the environmental effects of the projects. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of each project. All project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and Local regulatory requirements.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

B3.15 - Small-scale indoor research and development projects using nanoscale materials

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of [10 CFR Part 1021](#).

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

The proposal fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D.

To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal.

The proposal has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: Approved via email

Date Determined: December 30, 2022



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Proposed Action Title: Harnessing Emissions into Structures Taking Inputs from the Atmosphere (HESTIA) Program (FOA Numbers DE-FOA-0002625 and DE-FOA-0002626)

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): CA, CO, GA, IL, IN, MA, ME, MI, NC, NY, PA, SC, TN, TX, WA, WI

Proposed Action Description:

THIRD AMENDED PROGRAMMATIC NEPA DETERMINATION (See attached Second Amended Programmatic Determination, dated October 12, 2022, First Amended Programmatic Determination, dated September 23, 2022, and original Programmatic Determination, dated August 23, 2022). The HESTIA Program supports the development of technologies that nullify embodied greenhouse gas (GHG) emissions, while simultaneously transforming buildings into net carbon storage structures. If successful, HESTIA projects will dramatically reduce CO2 emissions from building material manufacture and demonstrate net carbon negative building designs.

The HESTIA Program is composed of 18 small-scale research and development projects that will be conducted by universities, for-profit entities, and federal laboratories. This Third Amended Determination adds 4 projects (Northeastern University, SkyNano LLC, Pacific Northwest National Laboratory, and University of Pennsylvania) to the Determinations signed on August 23, 2022, September 23, 2022 and October 12, 2022 (see Attachment for all 14 projects covered by this and the prior Determinations). These projects are covered by and fit within the class of actions identified under the DOE Categorical Exclusions identified below and do not involve any extraordinary circumstances that may affect the significance of the environmental effects of the projects. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of each project. All project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and Local regulatory requirements.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

B3.15 - Small-scale indoor research and development projects using nanoscale materials

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of [10 CFR Part 1021](#).

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

The proposal fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D.

To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal.

The proposal has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: **GEOFFREY GOODE** Digitally signed by GEOFFREY GOODE
Date: 2022.11.28 12:52:54 -05'00'

Date Determined:



U.S. Department of Energy Categorical Exclusion Determination Form

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Proposed Action Title: Harnessing Emissions into Structures Taking Inputs from the Atmosphere (HESTIA) Program (FOA Numbers DE-FOA-0002625 and DE-FOA-0002626)

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): CA, CO, GA, IL, IN, MA, ME, MI, NC, NY, PA, SC, TN, TX, WI

Proposed Action Description:

SECOND AMENDED PROGRAMMATIC NEPA DETERMINATION (See attached First Amended Programmatic Determination, dated September 23, 2022, and original Programmatic Determination, dated August 23, 2022) The HESTIA Program supports the development of technologies that nullify embodied greenhouse gas (GHG) emissions, while simultaneously transforming buildings into net carbon storage structures. If successful, HESTIA projects will dramatically reduce CO2 emissions from building material manufacture and demonstrate net carbon negative building designs.

The HESTIA Program is composed of 18 small-scale research and development projects that will be conducted by universities, for-profit entities, and federal laboratories. This Second Amended Determination adds 3 projects (Purdue University, Biomason, Inc., and National Renewable Energy Laboratory) to the Determinations signed on August 23, 2022 and September 23, 2022 (see Attachment for all 10 projects covered by this and the prior Determinations). These projects are covered by and fit within the class of actions identified under the DOE Categorical Exclusions identified below and do not involve any extraordinary circumstances that may affect the significance of the environmental effects of the projects. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of each project. All project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and Local regulatory requirements.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

B3.15 - Small-scale indoor research and development projects using nanoscale materials

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of [10 CFR Part 1021](#).

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

The proposal fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D.

To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal.

The proposal has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: **GEOFFREY GOODE** Digitally signed by GEOFFREY GOODE
Date: 2022.10.12 17:01:51 -04'00'

Date Determined:



U.S. Department of Energy Categorical Exclusion Determination Form

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Proposed Action Title: Harnessing Emissions into Structures Taking Inputs from the Atmosphere (HESTIA) Program (FOA Numbers DE-FOA-0002625 and DE-FOA-0002626)

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): CA, CO, GA, IL, MA, ME, NC, NY, PA, SC, TN, TX, WI

Proposed Action Description:

FIRST AMENDED PROGRAMMATIC NEPA DETERMINATION (See attached original Programmatic Determination, dated August 23, 2022) The HESTIA Program supports the development of technologies that nullify embodied greenhouse gas (GHG) emissions, while simultaneously transforming buildings into net carbon storage structures. If successful, HESTIA projects will dramatically reduce CO2 emissions from building material manufacture and demonstrate net carbon negative building designs.

The HESTIA Program is composed of 18 small-scale research and development projects that will be conducted by universities, for-profit entities, and federal laboratories. This First Amended Determination adds 3 projects (University of Tennessee-Knoxville, Aspen Products Group, Inc., and Texas A&M University) to the Determination signed on August 23, 2020 (see Attachment for all 7 projects covered by this and the prior Determination). These projects are covered by and fit within the class of actions identified under the DOE Categorical Exclusions identified below and do not involve any extraordinary circumstances that may affect the significance of the environmental effects of the projects. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of each project. All project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and Local regulatory requirements.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

B3.15 - Small-scale indoor research and development projects using nanoscale materials

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of [10 CFR Part 1021](#).

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

The proposal fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D.

To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal.

The proposal has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: **GEOFFREY GOODE** Digitally signed by GEOFFREY GOODE
Date: 2022.09.23 13:00:11 -04'00'

Date Determined:



U.S. Department of Energy

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Proposed Action Title: Harnessing Emissions into Structures Taking Inputs from the Atmosphere (HESTIA) Program (FOA Numbers DE-FOA-0002625 and DE-FOA-0002626)

Program or Field Office: Advanced Research Projects Agency - Energy

Location(s) (City/County/State): CO; IL; NC; NY; PA; SC; WI

Proposed Action Description:

The HESTIA Program supports the development of technologies that nullify embodied greenhouse gas (GHG) emissions, while simultaneously transforming buildings into net carbon storage structures. Specifically, projects funded under the HESTIA Program will develop and test building materials and whole-building designs that are net carbon negative on a life cycle basis by utilizing atmospheric CO₂ or CH₄ from a wide range of potential feedstocks (e.g., forestry and purpose-grown products, agricultural residues, marine derived, direct carbon utilization) in the production process. If successful, HESTIA projects will dramatically reduce CO₂ emissions from building material manufacture and create net carbon negative building designs.

The HESTIA Program is composed of 18 small-scale research and development projects that will be conducted by universities, for-profit entities, and federal laboratories. This Determination covers 4 of the 18 projects (listed in Attachment A). All 4 projects fit within the class of actions identified under the DOE Categorical Exclusions identified below. This assessment was based on a review of the proposed scope of work and the potential environmental impacts of each project. All project tasks will be conducted in accordance with established safety and materials/waste management protocols and pursuant to applicable Federal, State, and Local regulatory requirements.

Categorical Exclusion(s) Applied:

A9 - Information gathering, analysis, and dissemination

B3.6 - Small-scale research and development, laboratory operations, and pilot projects

B3.15 - Small-scale indoor research and development projects using nanoscale materials

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of [10 CFR Part 1021](#).

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

The proposal fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D.

To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal.

The proposal has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: **GEOFFREY GOODE** Digitally signed by GEOFFREY GOODE
Date: 2022.08.23 06:05:16 -04'00'

Date Determined:

**Attachment A: Projects in the HESTIA (FOA No. DE-FOA-0002625 and DE-FOA-0002626)
Program**

Prime Recipient (Control No.)	Project Title	Categorical Exclusion
Oregon State University (2625-1587)	Cellulose Cement Composite (C3) for Residential and Commercial Construction	A9; B3.6; B3.15
BamCore (2626-1533)	Maximizing Carbon Negativity in Next Generation Bamboo Framing Materials	A9; B3.6;
National Renewable Energy Laboratory (2625-1542)	Celium: Cellulose-Mycelium Composites for Carbon Negative Buildings/Construction	A9; B3.6
Northeastern University (2625-1626)	4C2B: Century-scale Carbon-sequestration in Cross-laminated Timber Composite Bolted-steel Buildings	A9; B3.6
SkyNano LLC (2626-1535)	CO ₂ mposite: Recycling of CO ₂ , Carbon Fiber Waste, and Biomaterials into Composite Panels for Lower Embodied Carbon Building Materials	A9; B3.6; B3.15
Pacific Northwest National Laboratory (2625-1550)	The Circular Home: Development and Demonstration of a Net-Negative-Carbon, Reusable Residence	A9; B3.6
University of Pennsylvania (2625-1538)	High-Performance Building Structure with 3D-Printed Carbon Absorbing Funicular Systems	A9; B3.6
National Renewable Energy Laboratory (2625-1521)	High-Performing Carbon-Negative Concrete Using Low Value Byproducts from Biofuels Production	A9; B3.6; B3.15
Biomason, Inc. (2626-1546)	Soteria - Carbon Negative Bioconcrete Unit Production Concept	A9; B3.6
Purdue University (2625-1627)	Strong and CO ₂ Consuming Living Wood for Buildings	A9; B3.6
Aspen Products Group, Inc. (2626-1508)	High Performance, Carbon Negative Building Insulation	A9; B3.6
University of Tennessee-Knoxville (2625-1631)	Lignin-derived Carbon Storing Foams for High Performance Insulation	A9; B3.6

**Attachment A: Projects in the HESTIA (FOA No. DE-FOA-0002625 and DE-FOA-0002626)
Program**

Prime Recipient (Control No.)	Project Title	Categorical Exclusion
Texas A&M University (2625-1528)	Hempcrete 3D Printed Buildings for Sustainability and Resilience	A9; B3.6
Clemson University (2625-1632)	An Entirely Wood Floor System Designed for Carbon Negativity, Future Adaptability, and End of Life De/re/Construction	A9; B3.6
University of Colorado Boulder (2625-1532)	A Photosynthetic Route to Carbon-Negative Portland Limestone Cement Production	A9; B3.6
State University of New York (SUNY) Buffalo (2625-1537)	Modular Design and Additive Manufacturing of Interlocking Superinsulation Panel from Bio-based Feedstock for Autonomous Construction	A9; B3.6; B3.15
University of Wisconsin, Madison (2625-1618)	Carbon-Negative Ready-Mix Concrete Building Components Through Direct Air Capture	A9; B3.6

Bold text indicates the three projects added in the Fourth Amended CX.