# UNITED STATES ENDOWMENT FOR FORESTRY AND COMMUNITIES SUBRECIPIENT AGREEMENT 22-00374

**PROJECT:** Production of Compostable Horticulture Plant Containers using Biochar from Downed Timber

**SUBRECIPIENT:** Auburn University

**ORGANIZATION TYPE:** University

**PERIOD OF PERFORMANCE:** August 1, 2022 to June 30, 2025

**PROJECT DESCRIPTION:** The team proposes producing “carbon-negative” compostable plant containers utilizing biochar produced from downed timber. Biochar will be produced using a rotary kiln from biomass commonly available in Alabama. The team will collect mass and energy balance data to develop an energy-efficient pyrolyzer with minimal environmental impacts. Thermal and mechanical properties will be collected for biochar-polymer blends to develop compostable plant containers that will have better or comparable characteristics compared to those on the market. These containers, after the end-of-life, will store carbon in soil. Further, the team will perform techno-economic and life-cycle analysis of biochar production from the downed timber, and the manufacturing of containers using biochar. In addition, the researchers will collect primary data from Alabama forest-land owners to understand the impact of extreme weather on their forests and the need to create new markets for downed timber. The proposed project addresses two of three priorities of the current solicitation: products (biochar), and markets (compostable plant containers) and forest management (removal of biomass for product development) in a sustainable manner. In order to achieve project objectives, a multi- disciplinary team from Auburn University, Tuskegee University, and the USDA-Forest Service (FS) Forest Products Laboratory (FPL) has been assembled.

**AWARD:** $499,098

# FUNDING SOURCE(S):

|  |  |  |
| --- | --- | --- |
| **Funding Source Name** | **Amount** | **Assistance Listing #** (Certain Federal Awards Only) |
| Forest Service 21-JV-11111124- 037 | $499,098 |  |

Page 1 of 31

22-00374 (Auburn University

Endowment Form: 12.31.15

The United States Endowment for Forestry and Communities (“Endowment”) agrees to provide the Award to the Subrecipient for the purposes of satisfactorily performing the Project described in the **Work Plan** and **Budget** as found in Appendix A and C. Project must be completed, with all funds spent, during the Period of Performance as set forth above. The Award is provided on the condition that the Subrecipient agrees that it will raise and spend at least $340,940.00 in Matching Contributions on the Project. Project must be completed, with all matching contributions spent, during the Period of Performance as set forth above.

# SUBRECIPIENT CONTACT INFORMATION

Subrecipient Name: Darren May Subrecipient Organization: Auburn University

Subrecipient Address: 540 Devall Drive, Suite 200 Auburn,AL 36832-5888

Subrecipient Phone: (334) 844-4438

Subrecipient Email: [maydarr@auburn.edu](mailto:maydarr@auburn.edu)

# ENDOWMENT ADMINISTRATIVE CONTACT INFORMATION

Endowment Administrator: Aleta Rogers Endowment Address: 908 E. North Street

Greenville, SC 29601

Endowment Phone: 864-233-7646

Endowment Email: [aleta@usendowment.org](mailto:aleta@usendowment.org)

# ENDOWMENT TECHNICAL CONTACT INFORMATION

Endowment Program Officer: Michael Goergen Endowment Address: 908 E. North Street

Greenville, SC 29601

Endowment Phone: 864-233-7646

Endowment Email: [michael@usendowment.org](mailto:michael@usendowment.org)

**To the extent possible, all communication should take place electronically via the address provided above. Please reference the project number, 22-00374, in any communication.**

**TERMS AND CONDITIONS**

1. **Payment of Funds**: The Endowment will reimburse Subrecipient for allowable costs in the performance of this Subaward. Such reimbursement shall not exceed the Award identified above, as detailed in the Budget in Appendix C.
   1. To be eligible to receive Funds, the Subrecipient must 1) return to the Endowment an original executed copy of the Agreement for the Project;

2) submit any due financial and programmatic reports; and 3) submit a complete and accurate payment request. Subrecipient may request advance payment of funds prior to expenditure provided that 1) Subrecipient demonstrates an immediate need for advance payment; and

2) Subrecipient documents expenditure of advanced funds on the next payment request and/or required financial report to the Endowment. Approval of advance payment of Funds is made at the sole discretion of the Endowment, based on an assessment of the Subrecipient’s needs. In all other cases, Funds are disbursed on a reimbursable basis. The Endowment reserves the right to retain up to ten percent (10%) of Funds until submission and acceptance of the Final Reports.

* 1. Payments by the Endowment to the Subrecipient shall be made upon receipt and approval of invoices from the Subrecipient. Invoices shall be submitted by the Subrecipient no more frequently than quarterly, with the final invoice to be submitted no later than thirty (30) days following the expiration date of the Period of Performance. Invoices shall show current claim and cumulative expenses incurred to date, by budget category. All invoices should be submitted via the Endowment’s online portal <https://usendowment.force.com/grantee>. For any questions on using the portal or if you need access, please contact [subawards@usendowment.org](mailto:subawards@usendowment.org) and include your project number.

1. **Restrictions on Use of Funds**: No Funds provided by the Endowment pursuant to this Agreement may be used to support litigation expenses, lobbying activities, terrorist activities, or activities in violation of the Foreign Corrupt Practices Act. Overhead and indirect costs must comply with the Endowment’s [Indirect Cost Rate Policy](https://usendowment.my.salesforce.com/sfc/p/%234P000000zg5A/a/6f000000g5c3/SUuItPydYSQHFg1nL4Gw6a4LMaHR3l62HvPMWAOGAj0). Travel costs must comply with the [Endowment’s Travel Policy](https://www.usendowment.org/wp-content/uploads/2022/04/travel-policy.pdf).
2. **Amendments:** During the term of the Project, the Subrecipient is required to inform the Endowment Contact of any changes in contact information, any difficulties in completing the Project by the end of the Period of Performance, or any difficulties in submitting reports by their due dates. Any modifications to the scope of the Project must be agreed to in writing by the Endowment and the Subrecipient prior to the change. If the Subrecipient determines that a change exceeding ten percent (10%) in any one budget category is required, the Subrecipient must seek approval from the Endowment Grant Administrator. Amendment requests should be initiated by the Subrecipient upon determination of a deviation from the original Agreement. The Endowment may initiate the amendment if the Endowment determines an amendment is necessary.
3. **Termination**: Failure by the Subrecipient to comply with any material term of this Agreement shall be deemed to be a breach of this Agreement and constitute cause for the Endowment to terminate the Agreement by written notice to the Subrecipient and to pursue any legal remedy to which the Endowment may be entitled. For purposes of this paragraph,

failure to perform those activities described in the Project Description and Scope of Work— Appendix A will be considered a material breach and could result in termination.

The Subrecipient may terminate this Agreement by written notice to the Endowment. In the event of termination of this Agreement prior to Project completion, the Subrecipient shall immediately (unless otherwise directed by the Endowment in its notice if the Endowment initiated the termination) undertake all reasonable steps to conclude the Project cooperatively with the Endowment, including but not limited to the following:

* 1. Stop any work that is incomplete (unless work to be completed and a different date for termination of work are specified in the Endowment’s notice);
  2. Place no further work orders or enter into any further subawards or subcontracts for materials, services, or facilities, except as necessary to complete work as specified in the Endowment’s notice;
  3. Terminate all pending Project work orders, subawards, and subcontracts for work that has not yet been commenced;
  4. With the prior written consent of the Endowment, promptly take all other reasonable and feasible steps to minimize and/or mitigate any damages that may be caused by the failure to complete the Project, including but not limited to reasonable settlements of any outstanding claims arising out of the termination of the Project work orders, subawards, and subcontracts;
  5. Deliver or make available to the Endowment all data, drawings, specifications, reports, estimates, summaries, and such other information and material as may have been accumulated by the Subrecipient under this Agreement, whether completed or in progress;
  6. Return to the Endowment any unobligated portion of the Award.

**ENDOWMENT PROCESS**

1. **Reporting Requirements**:
   1. Interim Reports: The Subrecipient will submit a concise interim, Quarterly report to the Endowment based on the schedule below.
   2. Final Reports: No later than thirty (30) days after the completion of the Project, the Subrecipient will submit 1) a Final Financial Report accounting for all Project receipts, Project expenditures, and any Budget variances; 2) a final, concise programmatic report summarizing and evaluating the accomplishments achieved during the Period of Performance; and 3) copies of any publications, press releases, and other appropriate products resulting from the Project.
   3. Report Submission: All reports will be submitted via the Endowment’s online portal <https://usendowment.force.com/grantee>. For any questions on using the portal or if you need access, please contact [subawards@usendowment.org](mailto:subawards@usendowment.org) and include your project number.
   4. Requests for Extension: Any request for an extension of any of these reporting requirements must be made in writing to the Endowment Contact and approved by the Endowment in advance.
   5. Reporting Due Dates:

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| **Due Date** | **Report Type** |
| December 15, 2022 | Interim Report |
| March 15, 2023 | Interim Report |
| June 15, 2023 | Interim Report |
| September 15, 2023 | Interim Report |
| December 15, 2023 | Interim Report |
| March 15, 2024 | Interim Report |
| June 15, 2024 | Interim Report |
| September 15, 2024 | Interim Report |
| December 15, 2024 | Interim Report |
| March 15, 2025 | Interim Report |
| June 15, 2025 | Interim Report |
| July 31, 2025 | Final Report |

1. **Matching Contributions**: Matching Contributions consist of cash, contributed goods and services, volunteer hours, and/or property raised and spent for the Project. Matching Contributions for the purposes of this Project must meet the following criteria: 1) Matching Contributions must be committed directly to the Project and must be used within the Period of Performance or as modified through agreement with the Endowment; and 2) Matching Contributions must be voluntary in nature. Funds presented for fulfillment of mitigation, restitution, or other permit or court-ordered settlements are not eligible.

# REPRESENTATIONS, CERTIFICATIONS, AND OTHER

1. **Binding Obligations**: This Agreement has been duly executed by a representative of the Subrecipient with full authority to execute this Agreement and bind the Subrecipient to the terms hereof. After execution by the representative of the Subrecipient named on the signature page hereto, this Agreement will represent the legal, valid, and binding obligation of the Subrecipient, enforceable against the Subrecipient in accordance with its terms.
2. **Assignment; Subawards and Subcontracts**: The Subrecipient may not assign this Agreement, in whole or in part, to any other individual or other legal entity without the prior written approval of the Endowment. The Subrecipient may not provide subawards nor enter into subcontracts without the prior written approval of the Endowment. Subawards and subcontracts with known parties disclosed in the proposal budget are deemed to be approved.
3. **Unexpended Funds**: Any Funds provided by the Endowment and held by the Subrecipient and not expended at the end of the Period of Performance will be returned to the Endowment within ninety (90) days after the end of the Period of Performance.
4. **Additional Support**: In making this Award, the Endowment assumes no obligation to provide further funding or support to the Subrecipient beyond the terms stated in this Agreement.
5. **Publicity and Acknowledgement of Support**: The Subrecipient agrees to give appropriate credit to the Endowment and other funders for their financial support in any and all press releases, publications, annual reports, signage, video credits, dedications, and other public communications regarding this Agreement. The Subrecipient will refer to the Endowment in such acknowledgements as follows:

*The United States Endowment for Forestry and Communities, Inc. (the "Endowment") is a not- for-profit corporation that works collaboratively with partners in the public and private sectors to advance systemic, transformative and sustainable change for the health and vitality of the nation's working forests and forest-reliant communities.*

Both parties agree to obtain prior approval before using the other party’s logo and the logo of any funding sources in any public information releases concerning this Award. The Subrecipient also gives the Endowment the right and authority to publicize the Endowment’s financial support for this Agreement and the Project in press releases, publications, and other public communications.

1. **Evaluation**: The Subrecipient agrees to cooperate with the Endowment by providing timely responses to all reasonable requests for information to assist the Endowment in evaluating the accomplishments of the Project for a period of five (5) years after the date on which the final financial and programmatic reports are provided.
2. **Arbitration**: ~~All claims, disputes, and other matters in question arising out of, or relating to this Agreement, its interpretation or breach, shall be decided through arbitration by a person or persons mutually acceptable to both the Endowment and the Subrecipient. Notice of the demand for arbitration shall be made within a reasonable time after the claim, dispute, or other matter in question has arisen. The award rendered by the arbitrator or arbitrators shall be final. The terms of this provision will survive termination of this Agreement.~~

In the event of a dispute between the parties, the parties agree to negotiate a settlement in good faith. Should this fail to resolve the dispute, the parties shall be free to pursue resolution through mediation where a mutually agreed upon neutral third party assists the disputants in reaching a negotiated settlement but has no authority to bind either party to any resolution. If the representatives of the parties are unable to resolve the dispute through mediation, the parties shall have the right to pursue any other remedies legally available to resolve such dispute.

1. **Indemnity**: ~~The Subrecipient shall indemnify and hold harmless the Endowment, any Funding Source identified in this Agreement, their respective officers, agents, and employees, in respect of any and all claims, injuries, losses, diminution in value, damages, liabilities, whether or not currently due, and expenses including without limitation, settlement costs and any legal or other expenses for investigating or defending any actions or threatened actions arising from or in connection with the Project. Likewise, the Endowment shall indemnify and hold harmless the Subrecipient, its officers, agents, and employees, in respect of any and all claims, injuries, losses, diminution in value, damages, liabilities, whether or~~

~~not currently due, and expenses including without limitation, settlement costs and any legal or other expenses for investigating or defending any actions or threatened actions arising from or in connection with the Project. The terms of this provision will survive termination of this Agreement.~~

Each party hereby assumes any and all risks of personal injury and property damage attributable to the negligent acts and omissions of that party and the officers, employees, and agents thereof. Neither party shall be responsible for the personal injury and property damage attributable to the negligent acts and omissions of the other party and the officers, employees, and agents thereof.

1. **Choice of Law**: ~~The Agreement shall be subject to and interpreted by the laws of the State of South Carolina without regard to choice of law principles. By entering into this Agreement, the Subrecipient agrees to submit to the jurisdiction of the courts of South Carolina. The terms of this provision will survive termination of this Agreement.~~

The Grant Agreement shall remain silent as to the choice of law.

1. **Compliance with Laws**: In conducting its activities relating to the Project, the Subrecipient agrees to conduct all such activities in compliance with all applicable Federal, State, and local laws, regulations, and ordinances and to secure all appropriate necessary public or private permits and consents. The terms of this provision will survive termination of this Agreement.
2. **Insurance:** The Subrecipient agrees to obtain and maintain all appropriate insurance against liability for injury to persons or property from any and all activities undertaken by the Subrecipient and associated with this Award in any way.

# REPRESENTATIONS, CERTIFICATIONS, AND OTHER STATEMENTS RELATING TO FEDERAL FUNDS

1. **Federal Provisions**: The Subrecipient must read and understand certain federal regulations, including but not limited to, those identified below which may be located on the Internet at

[<www.gpo.gov>.](http://www.gpo.gov/) Many Federal agencies have agency-specific regulations that govern the issuance of awards and subawards with their funds; it is the obligation of the Subrecipient to review and comply with any such regulations issued by its Federal Agency Funding Source(s). Applicable terms and conditions to this Award—and reference to additional applicable provisions—can be found in **Appendix B, Subaward Terms**.

1. **Federal Cost Principles**: If the Subrecipient is a non-profit organization, it must understand and comply with 2 CFR Part 200 “Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards” as adopted and supplemented by the USDA in 2 CFR Part 400, including, but not limited to: (i) 2 CFR, Part 215 “Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations” and, (ii) depending on what kind of organization it is, either (a) 2 CFR, Part 220 “Cost Principles for Educational Institutions” or (b) 2 CFR, Part 230 “Cost Principles for Non-Profit Organizations.”
2. **Uniform Guidance Audits**: If the Subrecipient is any type of U.S organization and its expends an aggregate of $750,000 or more from all Federal sources in a fiscal year, it is subject to a special audit as detailed in 2 C.F.R. Part 200, Subpart F, “Audit Requirements” which it will need to understand and comply with, in addition to other applicable Federal regulations detailed in Appendix B Section 7.
3. **Subrecipient Lobbying:** The Subrecipient agrees, to the best of his or her knowledge and belief, that:
   1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering of any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan, or cooperative agreement.
   2. If any funds other than Federal appropriated funds have been paid or will be paid to any person influencing or attempting to influence an officer or employee of any agency or a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.
   3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.
4. **Subrecipient Debarment and Suspensions**: The Subrecipient shall enter into no contract or subcontract using Federal funds provided by the Endowment with any party listed on the General Services Administration’s List of Parties Excluded from Federal Procurement or Nonprocurement Programs in accordance with Executive Orders 12549 and 12689 (Debarment and Suspension).
5. **Rights to Inventions**: If applicable to this Project, the Subrecipient shall abide by the provisions of 37 CR Part 401 (Rights to Inventions Made by Non-Profit Organizations and Small Business Firms Under Government Grants, Contracts, and Cooperative Agreements) and any implementing regulations issued by the Federal agency that provided funds for this Agreement.

***Signature page follows***

# SIGNATURES

IN WITNESS WHEREOF, the parties have executed this Agreement, intending to be bound legally.

# UNITED STATES ENDOWMENT FOR FORESTRY AND COMMUNITIES

Name:

Title:

**Date**:

**Auburn University**

Name:

Title:

**Date**:

# APPENDIX A—WORK PLAN

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| **Work Plan Activity** | **Description** | **End Date** |
| Task 1: Southern Biomass Collection (AU) | Forest biomass is generally derived from many different sources, but the three most likely areas include whole tree material, forest residue material, and clean-chip residuals.  Whole tree material is derived when trees are harvested from a site and the entire tree is placed into the chipper/grinder. Usually these trees are small in diameter and/or are of poor quality (not large enough to make pulpwood or sawtimber). Forest residue material is generally composed of limbs and tops from operations where the primary products are pulpwood and sawtimber. The material removed from the tree during processing is placed in a chipper or grinder and blown into a chip van for delivery. The third category is clean chip residual, which is the material remaining after trees go through a chain-flail debarker to remove the bark, limbs, and top.  This material consists of more bark and foliage than the previous categories. Also, the team will collect different fractions (bark, limbs and tops, clean chips) from five woody biomass types (yellow pine, red and white oak, sweetgum and yellow poplar) that are prevalent in Alabama. Another huge impact on the characteristic of the material is the forest type. Whether the trees are from a natural stand, young pine plantation, or a mature plantation will impact the material components. In this study, the team will collect at least 15 samples from operations around the Southeastern US and chip on-site for biochar production. Data will be recorded to document site characteristics such as the location of | February 28,  2023 |

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|  | operation, type of stand, age, soil type, operation methods, production levels, and markets. Large quantities (several super sacks) of samples will be collected and processed in the laboratories. |  |
| Task 2: Characterize Southern Biomass (AU) | Once the samples are collected, the team will employ air classification to see if fines, needles, leaves, and dirt can be removed from the samples. These materials will not provide a good quality of biochar, and also these can be used to provide needed energy for the process. Once the samples are prepared, the following standardized methods will be used for biomass characterization: energy (ASTM E870), moisture content (ASTM 871), ash content (ASTM E1755), volatile content (ASTM E872), cellulose, hemicellulose, and lignin (NREL/TP-510-42622), and mineral composition (ISO 16967). Physical properties such as bulk density and particle size distribution will be measured using the American Society of Agricultural and Biological Engineers (ASABE) or ISO (the International Organization for Standardization) standards. | July 31, 2023 |
| Task 4: Biochar-Polymer Composite for Engineering Properties (AU) | Biobased, biodegradable polymers-such as starch, polyhydroxyalkanoates (PHAs), and plant-based (soy) proteins- will be used as a plasticizer of cellulose fibers and biochar mixed at various proportions (i.e. 5 to 33 wt.% biochar in polymer). Casted films of the blends will be prepared, and thermal, mechanical, and rheological properties of biochar-fibers polymer blends will be measured using analytical instruments such as thermogravimetric analyzer (TGA), differential scanning calorimeter (DSC), rheometer and dynamic mechanical analysis (DMA). Selected films will then be thermoformed into a desirable shape, such as seedling container.  The proposed testing of the mechanical properties such as tensile strength, modulus, and elongation will be done on the films using | July 31, 2024 |

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|  | a universal testing machine according to ASTM standards. Fracture patterns in composite materials will be measured using scanning electron microscopy (SEM).  Biodegradation, and moisture stability of the thermoformed containers will be measured by placing the specimens in soil blends with characteristics similar to Alabama’s environment during summer (90% RH and 35 oC) and inside an insulated environmental chamber with controlled temperature and humidity conditions (70% and 50 % RH at 25 oC). |  |
| Task 3: Biochar Production and Characterization (AU) | Biochar will be produced from collected biomass using a rotary kiln, that has a 6-inch diameter tube, at three temperatures (500o, 600 oC and 700 oC) to understand the effect of pyrolysis temperature on biochar properties.  Additionally, a small amount of oxygen will be injected to minimize the amount of energy needed for biochar production. Our experience has taught us that the particle size of biochar can be controlled much better using a rotary kiln than with other processes. The team will collect solid and gases yield data, energy consumption, and gas composition to perform complete mass and energy balances. The produced biochar will be characterized for the following properties. i) Physical properties including bulk density, particle density, physisorption (specific surface area, pore size distribution and pore volume), scanning electron microscopy (SEM), and dynamic contact angle (for hydrophobicity), and ii) Chemical properties analysis will include CHNS elemental analysis (atomic ratios of H/C, O/C, C/N, indicative of bonding arrangement and polarity), proximate analysis, cation exchange capacity (CEC), anion exchange capacity (AEC), pH, electrical conductivity (EC), zeta potential, X-ray photoelectron spectroscopy (XPS) analysis (to quantify surface functional groups), and Boehm titration (to measure the surface acidic | June 30, 2025 |

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|  | groups). |  |
| Task 5: Evaluate Biochar- Polymer Container for Horticulture Application (AU) | Biopolymer composites obtained from Task  1.4 will be selected for evaluation in short- cycle (8-12 weeks) and long-cycle (1-3 years) plant production evaluations. Two different sizes of biopolymer plant containers will be thermoformed with the most promising biochar-fibers polymer blends and compared with currently available biodegradable and plastic containers. The polymer type and the biochar percentage will be based on the mechanical properties data obtained from Task  1.4. Poinsettia (Euphorbia pulcherrima), the most valuable floriculture industry crop, will be planted in containers for short-term performance, whereas long-term evaluations will be conducted similarly with panicle hydrangea (Hydrangea paniculata ‘Limelight Prime’), a valuable outdoor container plant nursery crop. The performance metrics for plant containers will include plant growth, water-use efficiency, nutrient-use efficiency, root-zone temperature, and qualitative/quantitative container characteristics through each production cycle. Further, the team will seek feedback from Alabama growers to understand their reception of biochar-based plant containers. Post- production plantability of the containers will be assessed in various Alabama soils and environments. On-farm grower trials will be used for industry demonstrations. Following these demonstrations, industry member adoption/aversion levels of the technology will be assessed. Marketability and consumer perception will be evaluated through product surveys at retail garden centers. | June 30, 2025 |
| Task 6: Perform Techno- economic and Life-cycle Analyses (FS-FPL and AU) | The process simulation model will be developed and optimized using experimental data. SuperPro® Designer and in-house process models will provide information on the specific unit operations required for the process, e.g., biomass handling, drying, and | June 30, 2025 |

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|  | pyrolysis. Further, a robust supply chain model will be designed, including inbound and outbound logistics of biochar production and of making the horticultural container. The techno-economic assessment (TEA) and life- cycle analysis (LCA) will be developed utilizing experimental data generated from this study, process simulation models, supply chain models, and literature. The capital investment for the process plant includes equipment costs, direct fixed capital, working capital, and start- up and validation costs, which depend on process plant size and capacity. The operating cost includes facility dependents, raw materials, utilities and labor. For techno- economic analysis, the input economic data will be collected from literature, equipment manufacturers, and stakeholders. Also, the previously developed TEA reports on biomass pyrolysis of forest biomass will be used to estimate capital expenditure (CAPEX) required using the sizing of the unit operations determined based on the flow rate calculated by the process simulators. For processing steps, we will estimate CAPEX using data from literature and via contacting vendors directly. Finally, the overall operating costs (OPEX) will be estimated. A discounted cash flow analysis method will then be used to estimate various economic metrics, including net present value (NPV), minimum selling price (MSP), internal rate of return (IRR), return on investment (ROI), payback period considering various tax structures, and governmental incentives. The SimaPro 9.3 commercial software will be used to build the life cycle inventory (LCI), configure the LCA model, and quantify environmental impacts using the TRACI impact estimator. The LCA will be carried out following the ISO 14040/44standards. The input data necessary for LCA will be obtained from mass and energy balances of the process models for each processing step. A suite of LCA models will be |  |

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|  | developed for various configurations of the supply chain and major alternative unit operations, and the estimated environmental impacts will be compared with a base case scenario where a conventional plant container (non-biochar-based) is produced and downed timber is unutilized (left to decay on the forest floor). Finally, the impacts of uncertainties in the inputs on TEA and LCA results will be evaluated using the Monte-Carlo simulations method to identify the most sensitive and critical parameters affecting the results. |  |
| Task 7: Conduct Economic Impacts of Downed Timber in Alabama (TU) | To assess the economic impacts of downed timber and the major concerns of forest-land farmers associated with downed timber, we plan to utilize two different approaches to data collection: 1) conducting a survey to assess economic and ecological impacts, and 2) conducting case studies for downed timber management and associated concerns. In the first case, we will design a questionnaire to collect the characteristics of the respondent’s properties (forest acreage, ownership, road access, distance to water source, and sociodemographic information of the respondents). Regarding the extent of damage to trees, specific damage information will be solicited through 10-point Likert scale questions. Additionally, we will access appropriate information for estimating the owners’ willingness to pay (in this case sell) (WTP) for downed timber (salvation, harvesting, and transportation) depending on the type of trees and extent of damage. We will administer the mail and internet survey questionnaire following the standard procedure suggested by Dillman (2011) [8]. Regarding the statistical method, we will use the discrete choice model to estimate the economic impacts of downed timber and WTP values. In the second case, we will host a limited number of discussion sessions (in-person or virtual), in which forest-land owners will share their experiences and concerns associated with the | June 30, 2025 |

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|  | management of downed timber and their expected strategies to help optimize benefit from downed timber. We expect to draw valuable information helpful in formulating appropriate strategies that could help manage downed timber appropriately in the future, providing reasonable economic returns. |  |

**APPENDIX B – SUBAWARD TERMS AND CONDITIONS**

**Section I: Title and Description**

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| **Title of Subaward Project** | **Production of Compostable Horticulture Plant Containers using Biochar from Downed Timber** |
| **Subaward Project**  **Description** | The team proposes producing “carbon-negative” compostable plant containers utilizing biochar produced from downed timber. Biochar will be produced using a rotary kiln from biomass commonly available in Alabama. The team will collect mass and energy balance data to develop an energy-efficient pyrolyzer with minimal environmental impacts. Thermal and mechanical properties will be collected for biochar- polymer blends to develop compostable plant containers that will have better or comparable characteristics compared to those on the market. These containers, after the end-of-life, will store carbon in soil. Further, the team will perform techno-economic and life-cycle analysis of biochar production from the downed timber, and the manufacturing of containers using biochar. In addition, the researchers will collect primary data from Alabama forest-land owners to understand the impact of extreme weather on their forests and the need to create new markets for downed timber. The proposed project addresses two of three priorities of the current solicitation: products (biochar), and markets (compostable plant containers) and forest management (removal of biomass for product development) in a sustainable manner. In order to achieve project objectives, a multi-disciplinary team from Auburn University, Tuskegee University, and the USDA-Forest Service (FS) Forest Products Laboratory (FPL) has been assembled. |

**Section II: Subrecipient Information**

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| **Subrecipient Name** | Auburn University |
| **Subrecipient UEI Number** | ~~S2Y7SMVZ1R96~~ |
| **Subaward period of**  **performance** | August 1, 2022 **-** June 30, 2025 |
| **Federal Funds to Subrecipient from Awarding Agency** | $499,098.00 |
| **Endowment (Non-Federal)** | $0.00 |

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| --- | --- |
| **Funds to Subrecipient** |  |
| **Subaward Total** | **$499,098.00** |
| **Subrecipient’s ICR** | 0% |

**Section III: Federal Disclosure Requirements**

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| **Awarding Agency** | Forest Service |
| **Pass-through Entity** | **United States Endowment for Forestry and Communities** |
| **Awarding Official** | Robert Echternach |
| **FAIN, Assistance ID**  **Number** | 21-JV-11111124-037 |
| **R&D Subaward?** | Yes |
| **Federal Award Date** | July 14, 2021 |
| **Total Federal Award to**  **Endowment** | $1,650,000.00 |
| **Federal Award Project**  **Description** | Downed Timber Research FY2021 |
| **Assistance Listing Number** |  |

**Federal Disclosure Requirements Flow Down Requirements** (*the term “Recipient” refers to the Subrecipient entity identified on the first page of this Agreement, where applicable*)

1. **Drug-Free Workplace**
2. **Lobbying and Litigation**
3. **Trafficking in Persons**
4. **Reporting Subawards and Executive Compensation**
5. **Management Fees**
6. **Procurement Standards**
7. **Other Federally Mandated Contract Provisions**
8. **Drug-Free Workplace**
   1. The recipient organization of this federal assistance agreement must make an ongoing, good faith effort to maintain a drug-free workplace pursuant to the specific requirements set forth in Title 2 CFR Part 421. Additionally, in accordance with these regulations, the recipient organization must identify all known workplaces under its federal awards and keep this information on file during the performance of the award.
   2. Those recipients who are individuals must comply with the drug-free provisions set forth in Title 2 CFR Part 421 Subpart C. The consequences for violating this condition are detailed under Title 2 CFR Part 421 Subpart E.
9. **Lobbying and Litigation All Recipients**.
   * 1. The chief executive officer of this recipient agency shall ensure that no grant funds

awarded under this assistance agreement are used to engage in lobbying of the Federal Government or in litigation against the U.S. unless authorized under existing law. The recipient shall abide by their respective Cost Principles (OMB Circulars A-21, A-87 and A-122), which generally prohibits the use of federal grant funds for litigation against the U.S. or for lobbying or other political activities.

* + 1. The recipient agrees to comply with Title 2 CFR Part 418, New Restrictions on Lobbying. The recipient shall include the language of this provision in award documents for all subawards exceeding $100,000, and require that subrecipients submit certification and disclosure forms accordingly.
    2. In accordance with the Byrd Anti-Lobbying Amendment, any recipient who makes a prohibited expenditure under 2 CFR Part 418 or fails to file the required certification or lobbying forms shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such expenditure.

1. **Trafficking in Persons**

**Provisions applicable to a recipient that is a private entity.**

* + 1. The recipient, the recipient’s employees, subrecipients under this award, and subrecipients’

employees may not—

* + - 1. Engage in severe forms of trafficking in persons during the period of time that the award is in effect;
      2. Procure a commercial sex act during the period of time that the award is in effect; or
      3. Use forced labor in the performance of the award or subawards under the award.
    1. We as the Federal awarding agency may unilaterally terminate this award, without penalty, if the recipient or a subrecipient that is a private entity —
       1. Is determined to have violated a prohibition in paragraph 3.1 of this award term; or
       2. Has an employee who is determined by the agency official authorized to terminate the award to have violated a prohibition in paragraph 3.1 of this award term through conduct that is either—
          1. Associated with performance under this award; or
          2. Imputed to the recipient or subrecipient using the standards and due process for imputing the conduct of an individual to an organization that are provided in 2 CFR part 180, ‘‘OMB Guidelines to Agencies on Governmentwide Debarment and Suspension

(Nonprocurement),’’

**Provisions applicable to any recipient.**

* + 1. The recipient must inform the federal awarding agency immediately of any information received from any source alleging a violation of a prohibition in paragraph 3.1.1 of this award term.
    2. Our right to terminate unilaterally that is described in paragraph 3.1.2
       1. Implements section 106(g) of the Trafficking Victims Protection Act of 2000 (TVPA), as amended (22 U.S.C. 7104(g)), and
       2. Is in addition to all other remedies for noncompliance that are available to us under this award.
    3. The recipient must include the requirements of paragraph 3.1 of this award term in any subaward made to a private entity.

**Definitions.** For purposes of this award term:

* + 1. ‘‘Employee’’ means either:
       1. An individual employed by you or a subrecipient who is engaged in the performance of the project or program under this award; or
       2. Another person engaged in the performance of the project or program under this award and not compensated by you including, but not limited to, a volunteer or individual whose services are contributed by a third party as an in-kind contribution toward cost sharing or matching requirements.
    2. ‘‘Forced labor’’ means labor obtained by any of the following methods: the recruitment,

harboring, transportation, provision, or obtaining of a person for labor or services, through the use of force, fraud, or coercion for the purpose of subjection to involuntary servitude, peonage, debt bondage, or slavery.

* + 1. ‘‘Private entity’’:
       1. Means any entity other than a State, local government, Indian tribe, or foreign public entity, as those terms are defined in 2 CFR 175.25.
       2. Includes:
          1. A nonprofit organization, including any nonprofit institution of higher education,

hospital, or tribal organization other than one included in the definition of Indian tribe at 2 CFR 175.25(b).

* + - * 1. A for-profit organization.
    1. ‘‘Severe forms of trafficking in persons,’’ ‘‘commercial sex act,’’ and ‘‘coercion’’ have the meanings given at section 103 of the TVPA, as amended (22 U.S.C. 7102).

1. **Reporting Subawards and Executive Compensation**
   1. **Reporting of first-tier subawards.**
      1. **Applicability.** Unless the recipient is exempt as provided in paragraph 4.4. of this award term, the recipient must report each action that obligates $25,000 or more in Federal funds that does not include Recovery funds (as defined in section 1512(a)(2) of the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5) for a subaward to an entity (see definitions in paragraph 4.5 of this award term).
      2. **Where and when to report.** (1) The recipient must report each obligating action described in paragraph 4.1.1 of this award term to [www.fsrs.gov.](http://www.fsrs.gov/) (2) For subaward information, report no later than the end of the month following the month in which the obligation was made. (For example, if the obligation was made on any date during the month of November of a given year, the obligation must be reported by no later than December 31 of that year.)
      3. **What to report.** The recipient must report the information about each obligating action as described in the submission instructions available at: [http://www.fsrs.gov.](http://www.fsrs.gov/)
   2. **Reporting Total Compensation of Recipient Executives.**
      1. **Applicability and what to report.** The recipient must report total compensation for each of their five most highly compensated executives for the preceding completed fiscal year, if:
         1. the total Federal funding authorized to date under this award is $25,000 or more;
         2. in the preceding fiscal year, the recipient received:(i.) 80 percent or more of their annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); (ii.) and $25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR

170.320 (and subawards); and

* + - 1. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of

the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at <http://www.sec.gov/answers/execomp.htm>.)

* + 1. **Where and when to report.** The recipient must report executive total compensation described in paragraph 4.2.1 of this award term: (i.) As part of the registration Central System for Award Management profile available at [www.sam.gov.](http://www.sam.gov/) (ii.) By the end of the month following the month in which this award is made, and annually thereafter.
  1. **Reporting of Total Compensation of Subrecipient Executives.**
     1. **Applicability and what to report.** Unless exempt as provided in paragraph 4.4. of this award term, for each first-tier subrecipient under this award, the recipient shall report the names and total compensation of each of the subrecipient’s five most highly compensated executives for the subrecipient’s preceding completed fiscal year, if:
        1. in the subrecipient's preceding fiscal year, the subrecipient received: (i.) 80 percent or more of its annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and (ii.)

$25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts), and Federal financial assistance subject to the Transparency Act (and subawards); and

* + - 1. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at <http://www.sec.gov/answers/execomp.htm>.)
    1. **Where and when to report.** The recipient must report subrecipient executive total compensation described in paragraph 4.3.1. of this award term:
       1. To the recipient.
       2. By the end of the month following the month during which the recipient makes the subaward. For example, if a subaward is obligated on any date during the month of October of a given year (i.e., between October 1 and 31), the recipient must report any required compensation information of the subrecipient by November 30 of that year.
  1. **Exemptions**
     1. If, in the previous tax year, the recipient had gross income, from all sources, under

$300,000, the recipient is exempt from the requirements to report:

* + - 1. subawards, and the total compensation of the five most highly compensated executives of any subrecipient.
  1. **Definitions.** For purposes of this award term:
     1. **Entity** means all of the following, as defined in 2 CFR part 25: (i.) A Governmental organization,which is a State, local government, or Indian tribe; (ii.) A foreign public entity; (iii.) A domestic or foreign nonprofit organization; (iv.) A domestic or foreign for-profit organization; (v.) A Federal

agency, but only as a subrecipient under an award or subaward to a non-Federal entity.

* + 1. **Executive** means officers, managing partners, or any other employees in management positions.
    2. **Subaward:**
       1. This term means a legal instrument to provide support for the performance of any portion of the substantive project or program for which you received this award and that the recipient award to an eligible subrecipient.
       2. The term does not include procurement of property and services needed to carry out the

project or program (for further explanation, see Sec. .210 of the attachment to OMB Circular A-133, “Audits of States, Local Governments, and Non-Profit Organizations”).

* + - 1. A subaward may be provided through any legal agreement, including an agreement that

the recipient or a subrecipient considers a contract.

* + 1. **Subrecipient** means an entity that:
       1. Receives a subaward from the recipient under this award; and
       2. Is accountable to the recipient for the use of the Federal funds provided by the subaward.
    2. **Total compensation** means the cash and noncash dollar value earned by the executive during the recipient’s or subrecipient’s preceding fiscal year and includes the following (for more information see 17 CFR 229.402(c)(2)):
       1. Salary and bonus.
       2. Awards of stock, stock options and stock appreciation rights. Use the dollar amount recognized for financial statement reporting purposes with respect to the fiscal year in accordance with the Statement of Financial Accounting Standards No. 123 (Revised 2004) (FAS 123R), Shared Based Payments.
       3. Earnings for services under non-equity incentive plans. This does not include group life, health, hospitalization or medical reimbursement plans that do not discriminate in favor of executives, and are available generally to all salaried employees.
       4. Change in pension value. This is the change in present value of defined benefit and actuarial pension plans.
       5. Above-market earnings on deferred compensation which is not tax-qualified.
       6. Other compensation, if the aggregate value of all such other compensation (e.g. severance, termination payments, value of life insurance paid on behalf of the employee, perquisites or property) for the executive exceeds $10,000.

1. **Management Fees**
   1. Management fees or similar charges in excess of the direct costs and approved indirect rates are not allowable. The term "management fees or similar charges" refers to expenses added to the direct costs in order to accumulate and reserve funds for ongoing business expenses; unforeseen liabilities; or for other similar costs that are not allowable under this assistance agreement. Management fees or similar charges may not be used to improve or expand the project funded under this agreement, except to the extent authorized as a direct cost of carrying out the scope of work.
2. **Procurements Standards**
   1. The recipient (or Subrecipient) agrees to conduct all procurement actions under this assistance agreement in accordance with the procurement standards set forth in the Procurement Standards of 2 CFR 200 Subpart D (200.317 through 200.326). No assistance agreement funds shall be used to reimburse the Federal share of any procurement action found to be in noncompliance with the procurement standards. Any costs incurred by the recipient under contracts and/or small purchases that the Federal agency determines to be in noncompliance with Federal procurement standards shall be unallowable for Federal reimbursement . In addition:
      1. In accordance with the Procurement Standards of 2 CFR 200 Subpart D (200.317 through 200.326), for each proposed procurement with a threshold of $150,000 or more that is to be awarded without competition, prior to contract execution the recipient shall provide the following documentation to the Project Officer for review:
         1. Justification of the single source procurement and how the procurement is permissible under the recipient’s written procurement procedures;
         2. A copy of the cost or price analysis;
         3. Basis for selection;
         4. A copy of the proposed contract; and
         5. Basis for award cost or price.
      2. In accordance with the Procurement Standards of 2 CFR 200 Subpart D (200-317 through 200.326), for each proposed competitive procurement with a threshold of

$150,000 or more, prior to contract execution, the recipient shall provide the following documentation to the Project Officer for review:

* + - 1. A copy of the solicitation announcement;
      2. A copy of the cost or price analysis;

**6.1.2.4** Basis for selection;

* + - 1. A copy of the proposed contract; and
      2. Basis for award cost or price.

1. **Uniform Guidance Audits**: If the Contractor is any type of U.S organization and its expends an aggregate of $750,000 or more from all Federal sources in a fiscal year, it is subject to a special audit as detailed in 2 C.F.R. Part 200, Subpart F, “Audit Requirements” which it will need to understand and comply with, in addition to other applicable Federal regulations. The above statement includes, but is not limited to, the following specific acts, as applicable.
   * 1. REMEDIES. **Contracts for more than the simplified acquisition threshold currently set at $250,000**, which is the inflation-adjusted amount determined by the Civilian Agency Acquisition Council and the Defense Acquisition Regulations Council (Councils) as authorized by 41 U.S.C. 1908, must address administrative, contractual, or legal remedies in instances where Consultants violate or breach contract terms, and provide for such sanctions and penalties as appropriate.
     2. TERMINATION. **All contracts in excess of $10,000** must address termination for cause and convenience by the non-Federal entity including the manner by which it will be effected and the basis for settlement.
     3. EQUAL EMPLOYMENT OPPORTUNITY. Except as otherwise provided under 41 CFR Part 60, **all contracts that meet the definition of “Federally assisted construction contract” in 41 CFR Part 60-1.3** must include the equal opportunity clause provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, “Equal Employment Opportunity” (30 FR 12319, 12935, 3 CFR Part, 1964- 1965 Comp., p. 339), as amended by Executive Order 11375, “Amending Executive Order 11246 Relating to Equal Employment Opportunity,” and implementing regulations at 41 CFR part 60, “Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor.”
     4. DAVIS-BACON ACT, as amended (40 U.S.C. 3141-3148). **When required by Federal program legislation, all prime construction contracts in excess of**

**$2,000** awarded by non-Federal entities must include a provision for compliance with the Davis- Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, “Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction”). Per the statute, Consultants must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, Consultants must be required to pay wages not less than once a week. The non- Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. The contracts must also include a provision for compliance with the Copeland “Anti-Kickback” Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, “Consultants and subconsultants on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States”). The Act provides that each Consultant or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.

* + 1. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT (40 U.S.C.

3701- 3708). **Where applicable, all contracts awarded by the non-Federal entity in excess of $100,000 that involve the employment of mechanics or laborers** must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40

U.S.C. 3702 of the Act, each Consultant, must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay

for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 apply to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

* + 1. RIGHTS TO INVENTIONS MADE UNDER A CONTRACT OR AGREEMENT.

**If the Federal award meets the definition of “funding agreement” under 37 CFR §401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm** or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that “funding agreement,” the recipient or subrecipient must comply with the requirements of 37 CFR Part 401, “Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements,” and any implementing regulations issued by the awarding agency.

* + 1. CLEAN AIR ACT (42 U.S.C. 7401-7671q.) and the FEDERAL WATER POLLUTION CONTROL ACT (33 U.S.C. 1251-1387), as amended—**Contracts**

**and subgrants of amounts in excess of $150,000** must contain a provision that requires the non-Federal award to agree to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

* + 1. ENERGY EFFICIENCY. Mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (42 U.S.C. 6201).
    2. DEBARMENT AND SUSPENSION. (Executive Orders 12549 and 12689)—A

contract award (see 2 CFR 180.220) must not be made to parties listed on the governmentwide Excluded Parties List System in the System for Award Management(SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR Part 1986 Comp., p. 189) and 12689 (3 CFR Part 1989 Comp., p. 235), “Debarment and Suspension.” The Excluded Parties List System in SAM contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

* + 1. BYRD ANTI-LOBBYING AMENDMENT (31 U.S.C. 1352)—Consultants that

apply or bid for an award of $100,000 or more must file the required certifications. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer

or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the non-Federal award.

* + 1. PROCUREMENT OF RECOVERED MATERIALS. A non-Federal entity that is a state agency or agency of a political subdivision of a state and its Consultants must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds $10,000 or the value of the quantity acquired by the preceding fiscal year exceeded $10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery, and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.
    2. DEBARMENT AND SUSPENSION. Furthermore, the Consultant certifies that to the best of its knowledge and belief, that it and its principals are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.
    3. BID GUARANTEES AND BONDS. In accordance with § 200.325 for construction or facility improvement contracts or subcontracts exceeding the Simplified Acquisition Threshold, the Federal awarding agency or pass-through entity may accept the bonding policy and requirements of the non-Federal entity provided that the Federal awarding agency or pass-through entity has made a determination that the Federal interest is adequately protected. If such a determination has not been made, the minimum requirements must be as follows:
       1. A bid guarantee from each bidder equivalent to five percent of the bid price. The “bid guarantee” must consist of a firm commitment, such as a bid bond, certified check, or other negotiable instrument accompanying a bid as assurance that the bidder will, upon acceptance of the bid, execute such contractual documents as may be required within the time specified.
       2. A performance bond on the part of the Consultant for 100 percent of the contract price. A “performance bond” is one executed in connection with a contract to secure fulfillment of all the Consultant's obligations under such contract.
       3. A payment bond on the part of the Consultant for 100 percent of the contract price. A “payment bond” is one executed in connection with a contract to assure payment as required by law of all persons supplying

labor and material in the execution of the work provided for in the contract.

* + 1. CONTRACTING WITH SMALL AND MINORITY-OWNED BUSINESSES. In

accordance with § 200.321 “Contracting with small and minority businesses, women's business enterprises, and labor surplus area firms,” if subcontracts are to be let, the prime Consultant agrees to take affirmative steps such as those listed in paragraphs (1) through (5) of this section.

* + - 1. Placing qualified small and minority businesses and women's business enterprises on solicitation lists;
      2. Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;
      3. Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;
      4. Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises;
      5. Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce.
    1. PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO

SURVEILLANCE SERVICES OR EQUIPMENT. In accordance with § 200.216, recipients and subrecipients are prohibited from obligating or expending loan or grant funds to: Procure or obtain; Extend or renew a contract to procure or obtain; or Enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in Public Law 115-232, section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

1. For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
2. Telecommunications or video surveillance services provided by such entities or using such equipment.
3. Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.
4. In implementing the prohibition under Public Law 115-232, section 889, subsection (f), paragraph (1), heads of executive agencies administering loan, grant, or subsidy programs shall prioritize available funding and technical support to assist affected businesses, institutions and organizations as is reasonably necessary for those affected entities to transition from covered communications equipment and services, to procure replacement equipment and services, and to ensure that communications service to users and customers is sustained.
   * 1. PROCUREMENT OF RECOVERED MATERIALS. In accordance

with § 200.323, a non-Federal entity that is a state agency or agency of a political subdivision of a state and its contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds $10,000 or the value of the quantity acquired during the preceding fiscal year exceeded $10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

* + 1. DOMESTIC PREFERENCES FOR PROCUREMENTS. In accordance

with § 200.322, as appropriate and to the extent consistent with law, the non-Federal entity should, to the greatest extent practicable under a Federal award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award. For purposes of this section:

* + - 1. “Produced in the United States” means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
      2. “Manufactured products” means items and construction materials composed in whole or in part of non-ferrous metals

such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

|  |  |
| --- | --- |
| **Provision** | **Citation** |
| Recipient Termination | 2 CFR Part 200 Appendix II |
| Equal Employment Opportunity | E.O. 11246, "Equal Employment Opportunity," as amended by  E.O. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor." |
| Clean Air Act | 42 U.S.C. 7401 |
| Federal Water Pollution Control Act | 33 U.S.C. 1251 |
| Energy Efficiency | 2 CFR Part 200 Appendix II |
| Copeland “Anti- Kickback” Act | 18 U.S.C. 874 and 40 U.S.C. 276C |
| Byrd Anti-Lobbying Amendment | 31 U.S.C. 1352 |
| Debarment and Suspension | Executive Orders 12549 and 12689 |
| Recycling | 2 CFR Part 200 Appendix II |
| Davis-Bacon Act | 40 U.S.C. 276a to a-7 |
| Contract Work Hours and Safety Standards Act | 40 U.S.C. 327-333 |
| Rights to Inventions Made Under a Contract or Agreement | 37 CFR part 401 |
| Contractor Breach Clause | 2 CFR Part 200 Appendix II |
| Prohibition on Certain Telecommunications and Video Surveillance Services and Equipment | 2 CFR Part 200 Subpart C; Public Law 115-232 section 889 |
| Procurement of Recovered Materials | 2 CFR Part 200 Property Standards; section 6002 of the Solid Waste Disposal Act |
| Domestic Preferences for Procurements | 2 CFR Part 200 Property Standards |

**APPENDIX C—BUDGET**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Project Budget by Year** | | | | | |
| **Organization Name:** | **Auburn University/Center for Bioenergy and Bioproducts** | | | | |
| **Project Name:** | **Production of Compostable Horticulture Plant Containers using Biochar from Downed Timber** | | | | |
| ***This form only includes funds requested from the Endowment under this project; do not include outside funds. Matching funds (if applicable) will go on Tab 2.***  *Only complete budget years applicable to your performance period (e.g., Year 1 and 2 for two years of funding under this grant).* | | | | | |
| *Please upload your Negotiated Indirect Cost Rate Agreement (if applicable) to the grantee portal.* | | | | | |
| **Project Budget by Year** | | | | | |
| **Category** | | **Year 1** | **Year 2** | **Year 3** | **Total** |
| **Personnel** | | $ 115,687.00 | $ 116,547.00 | $ 114,434.00 | $ 346,668.00 |
| **Fringe Benefits** | | $ 7,673.00 | $ 7,827.00 | $ 7,987.00 | $ 23,487.00 |
| **Travel** | | $ 6,000.00 | $ 6,000.00 | $ 6,000.00 | $ 18,000.00 |
| **Equipment (> $5,000)\*** | | $ - | $ - | $ - | $ - |
| **Supplies** | | $ 12,000.00 | $ 12,000.00 | $ 12,000.00 | $ 36,000.00 |
| **Contractual** | | $ 31,955.00 | $ 29,578.00 | $ 13,410.00 | $ 74,943.00 |
| **Other** | | $ - | $ - | $ - | $ - |
| **Subtotal/Direct Costs Only** | | **$ 173,315.00** | **$ 171,952.00** | **$ 153,831.00** | **$ 499,098.00** |
| **Modified Total Direct Costs (MTDC)\*\*** | | $ 173,315.00 | $ 171,952.00 | $ 153,831.00 | $ 499,098.00 |
| **Indirect %** | | 0.0% | 0.0% | 0.0% | 0.0% |
| **Indirect Costs\*\*\*** | | $ - | $ - | $ - | $ - |
| **Total** | | **$ 173,315.00** | **$ 171,952.00** | **$ 153,831.00** | **$ 499,098.00** |
| **Budget Narrative:**  *(Describe how funds will be used in each category of the above table)* | | | | | |
| PERSONNEL: Funds in the amount of $115687, $116547 and $114434 are requested for personnel for Year 1, 2 and 3, respectively.  Funds in the amount of $8,687are requested for Drs. Adhikari, Peresin, Bartley and Jahromi in Year 1. Similarly, salaries of 6 months for a Post-doc are requested each year. In year 1, funds in the amount of $20,000 are requested. For Year 2 and 3, the requested amount is increased by 3% each year.  Funds in the amount of $72,000 per year for three years are requested to support three graduate students. One graduate student will work with Drs. Adhikari and Jahromi on biomass collection, biochar production, and characterization. Another graduate will work on life-cycle and techno-economic analyses under the supervision of Dr. Nepal and the FPL team. The student will be admitted to the Biosystems Engineering Department at Auburn University. The third graduate student will work with Dr. Bartley on testing the performance of biobased containers. A post-doc (TBD) will work with Dr. Peresin on the mechanical and chemical characterization of biochar-based composite for plant containers.  Funds in the amount of $15,000 per year for Year 1 and 2 and $12,000 for Year 3 are requested for undergraduate students who will work with Drs. Gallagher and Adhikari for collecting biomass samples for this study.  FRINGE BENEFITS: Fringe benefits are calculated at a rate of 31.0% for faculty, 12.3% for a Post-doc, and 3.5% for graduate students. Funds in the amount of $7673, $7827 and $7987 are requested for Year 1, 2 and 3, respectively.  TRAVEL: Funds in the amount of $6,000 are requested for travel each year for three years. The Principal Investigator (PI) and other researchers will attend annual conferences (TBD) to present findings from this study. Funds will be used for meeting registration, flights, and rooms that are allowed by Auburn University.  SUPPLIES: Funds in the amount of $12,000 per year (a total of $36,000 over three years) are budgeted for this study. Funds will be used to purchase standards, chemicals, gases, tubings, and gaskets that will be used for the proposed work.  SUBCONTRACT: Funds in the amount of $74,943 are allocated for Tuskegee University. Dr. Gautam and his graduate student from Ag. Economics Department will conduct the study to understand the impact of hurricanes on forest | | | | | |