

Measure 8: Incentives for purchase of Biochar Processing Equipment

Measure Concept

Provide financial incentives to establish biochar processing facilities to convert woody organic waste into biochar and sequester carbon in soils. The incentives would cover a percentage of the costs of material handling equipment, pyrolysis unit, wiring and installation, and utility upgrade and connection charges.

Description and Background

As plants and trees grow, they absorb atmospheric carbon dioxide in their organic makeup. Natural decomposition and deforestation release this stored carbon back into the atmosphere. The creation of biochar from plant material sequesters carbon, preventing it from being released back into the environment for long periods of time. Biochar is a carbon-rich, highly stable soil amendment that improves soil health and can store carbon in soils for over 100 years. Production of biochar through conversion of wood waste can help with sustainable agricultural practices (increase crop yields, decrease synthetic fertilizer use, and improve water retention of soils). Additionally, it can help with managing woody invasive species in grassland and rangeland. Encroachment by eastern red cedar is a threat to Nebraska's Great Plains grasslands and can reduce forage production by up to 75% in heavily invaded locations. In 2019, Nebraska rangelands lost over 419,000 tons of plant biomass forage production due to woody plant encroachment. Responsible management and harvesting of Eastern Red Cedar trees can boost carbon sequestration. Sustainable practices like selective harvesting and thinning, along with utilizing biochar as soil amendments for improved soil health, creates an integrated approach. Mechanical removal is one method for controlling red cedar but is expensive. Establishing a market for the resulting wood waste as a biochar feedstock would reduce the net expense for removal of red cedar from rangelands.

Administration

This measure would provide incentives to aid up to four entities, including the City of Lincoln for their Biochar Initiative, to purchase and install biochar processing equipment to convert organic waste into biochar and sequester carbon in soils. The incentives would cover a percentage of the costs of the material handling equipment, pyrolysis unit, wiring and installation, and utility upgrade and connection charges. CPRG grant funds would reimburse 80% of project costs, minus all available revenue streams. Remaining project costs will be the responsibility of the biochar processing equipment owner. Grant funds could be combined with incentives or grants provided by the other federal entities, such as USDA wood innovations program grants. Through this measure, identified on page 46 of Nebraska's PCAP, a portion of the funds awarded to NDEE would be sub-awarded to the City of Lincoln to complete the city's biochar processing facility. In addition, NDEE would establish a program to solicit applications and award projects to other applicants desiring to sequester carbon through conversion of wood waste into a marketable soil amendment product, with a goal of awarding funds for up to three additional projects by 2030. Awards for the remaining three projects would be capped at \$800,000 to any one entity over the span of the grant period. Future biochar projects will be evaluated based on locations not detrimental to LIDAC communities, ability to begin operations quickly, and tons of woody biomass proposed to be processed annually among other criteria yet to be finalized.

Subaward to City of Lincoln

The City of Lincoln previously used Bloomberg Foundation grant funds to purchase a pyrolysis unit to process wood waste into biochar. However, the city has lacked funds to install and operate the unit.

NDEE's subaward through this grant will provide the City of Lincoln with funds to construct a building to house and operate the biochar unit at Lincoln's solid waste transfer station, along with funds for operating costs for two years.

The City of Lincoln will be required to sign a project agreement with the Department outlining the project requirements prior to initiating work. NDEE will follow EPA subaward policies and will provide training and guidance to the City of Lincoln on the terms of the agreement. NDEE will require monthly or quarterly progress calls with the City of Lincoln to monitor expenditures, milestones, and overall project success. The City of Lincoln will be required to submit semi-annual reports to NDEE.

Rebates for Future Projects

Rebates for future projects will be treated by NDEE as participant support costs. The biochar equipment owner is responsible for the remainder of the project costs (recipient cost-share). Recipients that receive income from sale of biochar must report that amount as program income as part of their reimbursement request, but they will be allowed to apply that amount to their recipient cost-share.

The reimbursement cap applied by NDEE to future projects avoids excessive reimbursement costs. Projects that do not include startup costs should receive full 80% reimbursements below the cap. However, for some higher-cost projects an 80% reimbursement may exceed the reimbursement cap, so these projects would receive reimbursement of less than 80% of the project costs. With the proposed cap of \$800,000, we expect that the average rebate will be \$750,000, and that rebates will cover approximately 80% of aggregate project costs.

Eligibility

- Projects must be located in Nebraska.
- Entities must be in good standing with the Nebraska Secretary of State.
- The applicant must be in compliance with all Nebraska environmental laws and with the Department's regulations and permits at all Nebraska locations.

Project Requirements

- Electrical installation work must be performed by a licensed electrical contractor.
- Construction work must be performed by licensed contractors.
- Awardees must sign a project agreement with the Department outlining the project requirements prior to initiating work.
- Only expenses incurred after the signed agreement is received are eligible for reimbursement.
- The applicant must commit to operate through 2030.
- The applicant must commit to produce a minimum of 500 cubic yards of biochar annually within a year of receiving the award.
- The applicant must commit to keeping the equipment in good working order through 2030
- The project must be in compliance with all state and local regulations and ordinances. Selected applicants must obtain any required federal, state, and local permits prior to commencement of the project. NDEE may require the applicant to submit project information to the Nebraska Game and Parks Commission using the Nebraska Conservation and Environmental Review Tool for review of potential impacts to threatened and endangered species, protected lands, and other natural resources.

Application

Applicants for future projects will submit the following information on or attached to the application form:

- A detailed project proposal and business plan describing the project including;
 - Location details
 - Feed stock details for a minimum of two years
 - Pyrolysis unit information
 - Ancillary Equipment
 - Installation details
 - Planned use(s) for the biochar produced
- Quotes for all equipment and installation expenses
- Three sets of dated quotes if the total project costs exceed \$250,000
- Estimate of the annual carbon sequestration to be achieved by the project
- List of necessary permits and anticipated date of issuance

Applicant Selection

Applications that meet the eligibility requirements and provide the required information will be considered for an award. Multiple eligible applications may be funded in early years if all criteria are met and high-quality desirable projects are proposed. NDEE will develop a scoring system to rank applications based on the quality of the project planning and the annual sequestration of carbon to be achieved. Preference will be given to applications with projects resulting in positive outcomes for low-income disadvantaged communities as designated by the Climate Pollution Reduction Grant program and to applicants who have not previously received an NDEE rebate under other programs.

Reimbursement

Upon satisfactory completion of the project, NDEE will reimburse the rebate recipient 80% of the project costs up to the stated annual maximum rebate. A request for reimbursement must be made using the form provided by NDEE, signed by an authorized representative, and must include:

- Equipment manufacturer and model numbers for any equipment costing over \$5,000
- Name, address, phone number, and email address for all vendors/contractors and the cost of the equipment and/or service provided
- Copies of all invoices and proof of payment for each (copy of canceled check front and back, bank statement showing dates cleared, or credit card statement)
- Photos of the of the new equipment installation, including close-up photo of the equipment model and serial number plate (if applicable)

All disbursements of costs incurred and paid for the project shall be reviewed by NDEE for eligibility during the reporting and reimbursement process. Eligible costs include costs directly related to a preapproved program/project. All invoices will be reviewed pursuant to the provisions of the Nebraska Prompt Payment Act. No expenses incurred prior to the effective date of the agreement, or outside of the terms of the Agreement are eligible unless amended per the Agreement. The statement of costs shall be signed by the Subrecipient authorized representative.

Project Agreement

Before commencing work, successful applicants must sign a Project Agreement that codifies all of the program requirements. The agreement also includes applicable Federal Requirements from the EPA Terms and Conditions along with standard Nebraska state government requirements. NDEE will provide copies of each subrecipient agreement to EPA Project Officer (PO), upon request. Each project agreement will contain a workplan and specific budget allocations.

Program Timeline and Targets

The biochar carbon sequestration program will open a rolling application period beginning in March 2025 with the goal of funding three biochar projects by 2028. Most individual projects should be operational within a 12-month period, but some may experience delays if equipment acquisition and installation or utility work cannot be completed as planned. The City of Lincoln should begin operation in 2025 with the remaining three projects beginning operation in years 2026 – 2028.

Federal Fiscal Year	Projects Completed	Milestones	Tasks
2025		Oct 2024 – February 2025	EPA Funding received in October 2024. Subaward to City of Lincoln. Develop general rebate program guidelines, application procedures, forms, and QAPP if needed.
	1	March 2025 & October 2025	Open rolling project application period. Submit Semiannual Report to EPA including LIDAC Benefit Analysis, and program income
2026	1	March 2026 & October 2026	Accept applications as needed. Submit Semiannual Report to EPA
2027	1	March 2027 & October 2027	Accept applications as needed. Submit Semiannual Report to EPA, including program income
2028	1	March 2028 & October 2028	Accept applications as needed. Submit Semiannual Report to EPA, including program income
2029	0	March 2029 & October 2029	Submit Semiannual Report to EPA, including any program income.
2030	0	January 2030	Submission of final report to EPA.

Expected Outputs and Outcomes

Outputs/ Performance Measures	Outcomes / Projected Environmental or Programmatic Improvement
Cubic Yards/tons of organic waste processed Cubic Yards/tons of biochar produced Semi-annual progress reports and final report	Sequestration of metric tons CO ₂ e in LIDAC Sequestration in metric tons CO ₂ e \$ Funding distributed to projects in LIDAC CAP in LIDAC

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Greenhouse Gas Emissions Reductions

This measure involves the conversion of organic waste into a material called biochar with the overall goal of reducing GHGs through the sequestration of carbon. Biochar is a long-lasting material (stable for more than 100 years) that can be used as a soil amendment and animal feed supplement among other uses. Processing the woody waste that will be converted into biochar requires energy and transportation to the processing facility. The pyrolysis process used to produce biochar involves the use of both electricity and propane or other similar fuel to 'start' the process each time production is paused.

A summary of the methodology is presented below and is based on the calculations supplied by the City of Lincoln and performed by their contractor, Stantec.

Methodology

In the CPRG implementation grant application, emissions reductions for this measure were calculated assuming that one new biochar production facility would be operational each year from 2025 through 2029 for a total of five, with facility designs similar to that of the City of Lincoln's facility. For the workplan, NDEE modified this measure to reduce the total number of projects in the rebate program to three additional facilities between 2026 and 2028, for a total of four facilities. The City of Lincoln facility is anticipated to be completed in 2025. The GHGcalcs spreadsheet has been updated to reflect the reduction in total number of facilities implemented to four and the current estimated timetable for installation and completion.

Emissions reduction estimates continue to be based on the Lincoln facility and were calculated by a consultant using the Verra VM0044 Methodology for Biochar Utilization in Soil and Non-Soil Applications, v1.1.16. This methodology quantifies the carbon dioxide removals resulting from the conversion of waste biomass into biochar at new biochar production facilities. The calculations assumed that the biochar production process will utilize a high-technology pyrolysis production facility meeting the following conditions:

- Pyrolytic greenhouse gases will be recovered or combusted
- At least 70% of the heat energy produced by pyrolysis will be recovered
- Emissions controls meet local and national standards
- The facility will operate 24 hours per day, 250 days per year
- Electricity consumption at 50 amps, 220 volts, with a power factor of 80%
- 0.22 gallons of diesel fuel consumed per cubic yard of biomass during screening and grinding
- 10,000 cubic yards of biomass annually provided by the City of Lincoln
- 6,000 cubic yards of biomass annually transported 43 miles (round trip) to the facility
- Biomass is transported to the facility using a 100 cubic yard diesel tractor trailer
- A small diesel bulldozer is operated in the facility
- 75% organic content of biochar produced

Using these conditions, Stantec estimated that the Lincoln facility will result in net reduction of 836.84 million metric tons of carbon dioxide equivalent (MTCO_{2e}) annually. This GHG reduction estimate did not account for the transportation of the biochar to its end-use location or the soil or non-soil

application. The installation and operation of one facility annually between 2025 and 2029 will result in cumulative GHG reductions of 12,050 metric tons by 2030, as shown in the table below. The Stantec analysis also did not include estimates of criteria air pollutants emitted during pyrolysis and other operations. NDEE will work with the City of Lincoln to obtain information on these additional emissions in order to accurately track GHG emissions reductions as well as criteria air pollutant disbenefits.

Cumulative Net Emissions Reductions for one biochar project per year 2025-2028	
	Net GHG Emissions Reductions (MT CO ₂ e)
2025	837
2026	2,511
2027	5,021
2028	8,368
2029	11,716
2030	15,063
2050	82,010
Cumulative Net Emissions Reductions attributed to 80% Grant Funding:	
2030	12,050
2050	65,608

Longevity of GHG Reductions

Because biochar can drastically reduce wood waste through conversion into a beneficial material and help with sustainable agricultural practices (increase crop yields, decrease synthetic fertilizer use, and improve water retention of soils) as well as play a role in woody invasive species management for grassland and rangeland, it is believed that investments into this technology will have long-lasting sustainable effects and grow this fledgling industry. In addition, with the support of UNL through its research projects and other funding, biochar may become a widely used soil amendment throughout agriculture and gardening alike.

Woody waste and other organic material feedstock are plentiful across Nebraska and construction and installation of biochar processing facilities requires a significant investment of commercial equipment and infrastructure with long lifespans. Once this investment is made and the facility operational, it is unlikely its use will diminish as the market for biochar continues to grow. Thus we expect that this measure will produce permanent emissions reductions through the grant period and to 2050.

LIDAC Benefits and Disbenefits

The state as a whole will benefit from the GHG reductions associated with creating four new biochar production facilities. However, biochar production and the transport of feedstock and product will likely increase criteria air pollutant (CAP) emissions in the vicinity of the facilities.

The Lincoln solid waste transfer station, where the city’s biochar facility will be installed, is not within a LIDAC census area, and it is in an open nonresidential area about one-half mile from two such tracts. The installation will be far enough away from residences so that impacts of CAP emissions on residents will likely be minimal.

All parts of the state will be eligible to apply for rebates for future biochar production projects. NDEE will work to ensure that projects are not sited in locations that would create disbenefits to low-income disadvantaged communities.

Cost-Effectiveness

NDEE has budgeted \$4,373,035 for Measure 8 to achieve a cumulative 12,050 metric tons of greenhouse gas reductions (attributed to 80% grant funding) through 2030. The resulting cost-effectiveness of this measure is therefore \$362.91 per MT CO₂e sequestered.

Budget

Category	Budget	Narrative
Personnel	\$199,500	Estimated at 0.70 FTE per year. Includes portions of salary of full-time staff to perform tasks.
Fringe Benefits	\$63,341	Includes taxes, medical insurance, retirement, and other non-salary expenses estimated as a percentage of salary. The current rate for Fringe Benefits is 31.75%.
Travel	\$4,895	Includes costs for mileage, vehicle rental, meals, and lodging necessary to implement the program and to oversee projects. Costs are estimated annually for staff travel to project site visits. Costs are estimated for 600 miles per year of travel to conduct sub-recipient monitoring of activities and project site visits.
Equipment	\$0	EPA definition of equipment is any item over \$5,000. There is no anticipated additional equipment needed to implement these activities.
Supplies	\$0	Includes usual office and laboratory materials necessary to implement tasks. Office supplies are considered part of this category also and include things such as furniture, staff desk supplies and computers. There are no anticipated additional supplies needed to implement these activities.
Contractual	\$25,000	Contractual work for a grant management system via subscription service to develop an electronic application database for applicants to submit their application, track their project status, submit required reports, and track reimbursement. NDEE will also use this system to track expenditures and project metrics.
Other	\$1,700,000 \$2,300,000	Subaward to the City of Lincoln. Includes contractual costs for the construction of a building to house the biochar unit and Equipment. Financial assistance program soliciting applications and awarding projects to applicants desiring to sequester carbon through conversion of wood waste into marketable soil amendment product, with a goal of

	\$4,000,000	awarding funds for a total of four projects by 2030. Participant Support Costs: Biochar projects at 80% of cost, up to 3 total over the grant project period. TOTAL
Total Direct Charges	\$4,292,736	
Indirect Charges	\$80,299	40.25% Calculated as a percentage of salary cost (approved FY24 rate)
<u>TOTALS</u>	\$4,373,035	
<u>Program Income</u>	\$800,000	Estimated Program Income generated during the project period.

Budget Narrative

Program Income: It is anticipated that there will be program income generated from implementation of this measure. The subrecipient will be required to report the amount of program income earned, expended, and a description of how the program income is being used on a semi-annual basis. NDEE will report this information in each of the required performance reports and submit with the Federal Financial Report.