American Carbon Registry™

Trusted solutions for the carbon market

Methodology for Biochar Projects

Stakeholder Consultation Webinar

October 28, 2013

Agenda

- Introduction and brief background on Winrock and ACR
  - *Lauren Nichols, American Carbon Registry*
- Biochar Methodology Introduction
  - *Teresa Koper, The Climate Trust*
- Quantification of Emission Reductions
  - *Keith Driver, The Prasino Group*
- Carbon Stability
  - *Debbie Reed, International Biochar Initiative*
- Feedstock Sustainability
  - *Stefan Jirka, International Biochar Initiative*
- Q&A

Webinar logistics

- To ask questions:
  - Either type questions into '**Chat**' box near bottom of your webinar pane.
  - Or '**Raise Hand**' (in vertical bar at left of your webinar pane) to hold your place in line to ask a question verbally
- Methodology is open for public comment through November 22, 2013
  - All public and webinar comments will be addressed and posted with methodology
- Webinar will be recorded and posted shortly to www.americancarbonregistry.org

Winrock International Institute for Agricultural Development

Non-profit organization that works in the U.S. and around the world to empower the disadvantaged, increase economic opportunity, and sustain natural resources

- Formed in 1985 from three Rockefeller family organizations
- Dedicated to economic development and sound resource management in the U.S. and around the world
- Climate change and its impacts on the poor are a central concern
- Support market mechanisms as a means to improve the environment and alleviate poverty

American Carbon Registry

- **First U.S. voluntary carbon registry, founded 1996**
  - 38.6 MMT CO_2e verified carbon reductions
  - Part of the non-profit Winrock International
- **Registry roles:**
  - Develop and approve carbon protocols
  - Review and register projects
  - Oversee independent verification
  - Transparently track transactions and retirements
- **ARB-approved** Offset Project Registry (OPR) and Early Action Offset Program (EAOP) for the California cap and trade market
- **2012**: Average price of \$7.40/tCO_2e, up from \$5.70 in 2011

Why Biochar?

- Winrock's history in agriculture and land use
- Desire to innovate

EMISSION REDUCTIONS FROM BIOCHAR PROJECTS

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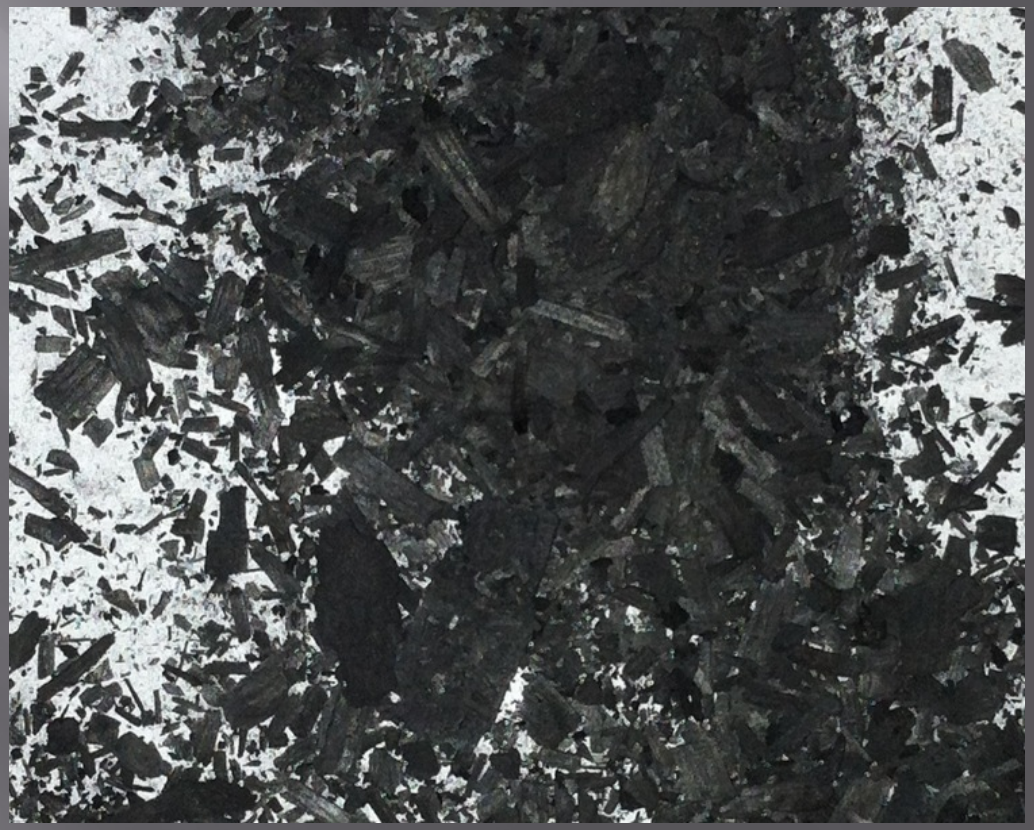
Scope and Eligible Activities

- Biochar Production from Sustainable Feedstocks

- Applicability – Not limited to US



Applicability Requirements

- Comply with ACR Standard
- Qualified sustainable feedstocks - biomass source or biogenic in nature
- IBI Standardized Product Definition and Product Testing Guidelines for Biochar That is Used in Soil. Annually submit compliance documentation.
- Submit a Greenhouse Gas (GHG) Project Plan for certification by ACR
- Secure independent validation/verification - ACR-approved third-party validation/verification body.

Applicability Requirements, Conti.

- H/C_{org} = or < 0.7
- Land applied or mixed with soil, compost, or medium intended as a soil amendment.
- Meet local, regional, state, and national air quality standards.
- Facility operating under applicable facility permits and meeting all regulations
- Demonstrate uncontested and exclusive claim to the ownership of the GHG benefits

Project Boundaries

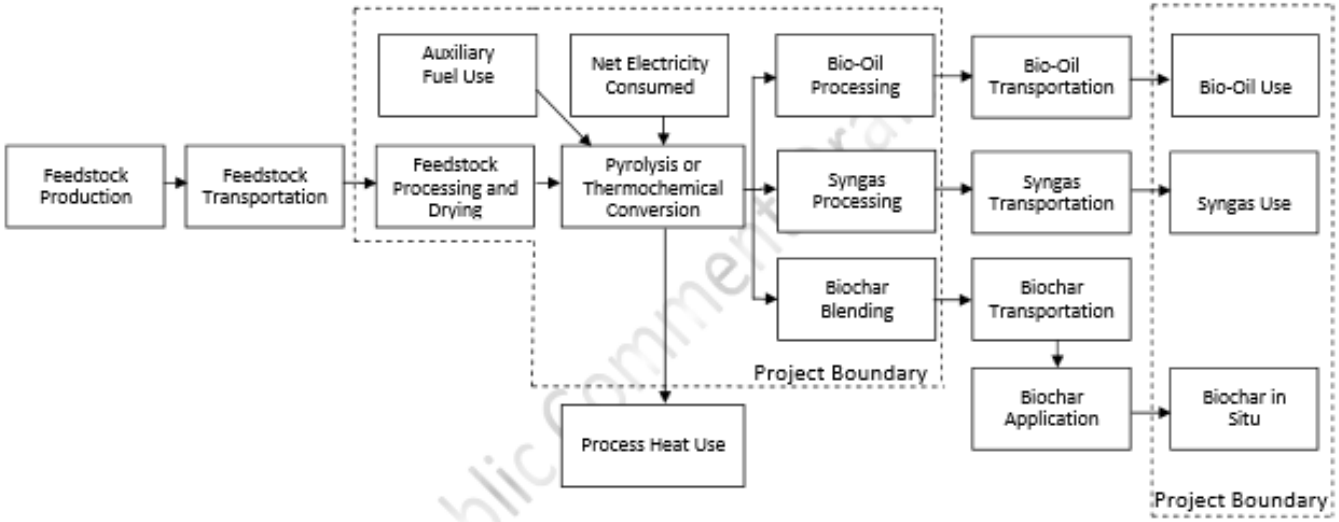


Figure 1: Process Flow Diagram for the Project Condition

Temporal Boundaries

- Project start date defined as per American Carbon Registry requirements
- Crediting period can span 7 yrs from the start date

Baseline

- Primary baseline scenario for projects consists of the combustion of feedstocks in a bioenergy production facility
  - Considers potential for these uses to generate other environmental credits
  - Results in the exclusion of all electricity, heat, bio-oil, and biogas production, as well as methane generation avoidance
- Alternative baselines positive but high burden of proof
  - Anaerobic lagoons
  - Aerobic/anaerobic digestion

Additionality

- Step 1: Identification of alternative scenarios to the proposed project activity that are consistent with current laws and regulations
- Step 2: Barrier analysis to eliminate alternatives to the project activity that face prohibitive barriers
- Step 3: Investment analysis
- Step 4: Common practice analysis

- Apply "Combined tool to identify the Baseline Scenario and Determine Additionality" from UNFCCC

Quantification

- Baseline Condition

$$BE_y = BE_{B,y}$$

or

$$BE_y = BE_{A,y} + BE_{An,y} + BE_{L,y} + BE_{C,y} + BE_{E,y} + BE_{O,y} + BE_{G,y} + BE_{H,y}$$

- Project Condition

$$PE_y = PE_{TR,y} + PE_{P,y} + PE_{Py,y} + PE_{E,y} + PE_{PNB,y} + PE_{B,y} + PE_{OP,y} + PE_{GP,y} + PE_{OU,y} + PE_{GU,y} - C_{BS,y}$$

- Summary of Emission Reductions

$$ER_y = BE_y - PE_y - Leakage_y$$

Leakage

- Three issues identified related to Leakage
  - Restricted use of purpose grown biomass
  - Control depletion of soil organic carbon
  - Bioenergy production relative to biochar yield

Quantification

- Baseline Condition (pages 31 to 45)

$$BE_y = BE_{B,y}$$

or

$$BE_y = BE_{A,y} + BE_{An,y} + BE_{L,y} + BE_{C,y} + BE_{E,y} + BE_{O,y} + BE_{G,y} + BE_{H,y}$$

- Project Condition (pages 45 to 52)

$$PE_y = PE_{TR,y} + PE_{P,y} + PE_{Py,y} + PE_{E,y} + PE_{PNB,y} + PE_{B,y} + PE_{OP,y} + PE_{GP,y} + PE_{OU,y} + PE_{GU,y} - C_{BS,y}$$

- Summary of Emission Reductions

$$ER_y = BE_y - PE_y - Leakage_y$$

Data Procedures

Equation #	Equation 10
Data Unit / Parameter:	$T_{2,m}$
Data unit:	K
Description:	Average temperature at the baseline lagoon site in month *m*
Source of data:	Measurement in the project site, or national regional weather statistics.
Measurement Procedures (if any):	In the case that Project Proponents decide to measure temperature in the project site: • The temperature sensor must be housed in a ventilated radiation shield to protect the sensor from thermal radiation. Measurements should be continuously aggregated into monthly average values. Uncertainty of the measurements provided by the temperature sensor supplier should be discounted from the readings IF the Project Proponent decides to measure temperature at the project site.
Any comment:	-

Data Management

Record keeping practices shall be established that include:

- Electronic recording of values of logged primary parameters for each measurement interval;
- Offsite electronic back-up of all logged data;
- Written logs of operations and maintenance of the project system including notation of all shut-downs, start-ups and process adjustments;
- Storage of all documents and records in a secure and retrievable manner for at least two years after the end of the project Crediting Period.

The Project Proponent must also develop a QA/QC plan to add confidence that all measurements and calculations have been made correctly. QA/QC measures that may be implemented include, but are not limited to:

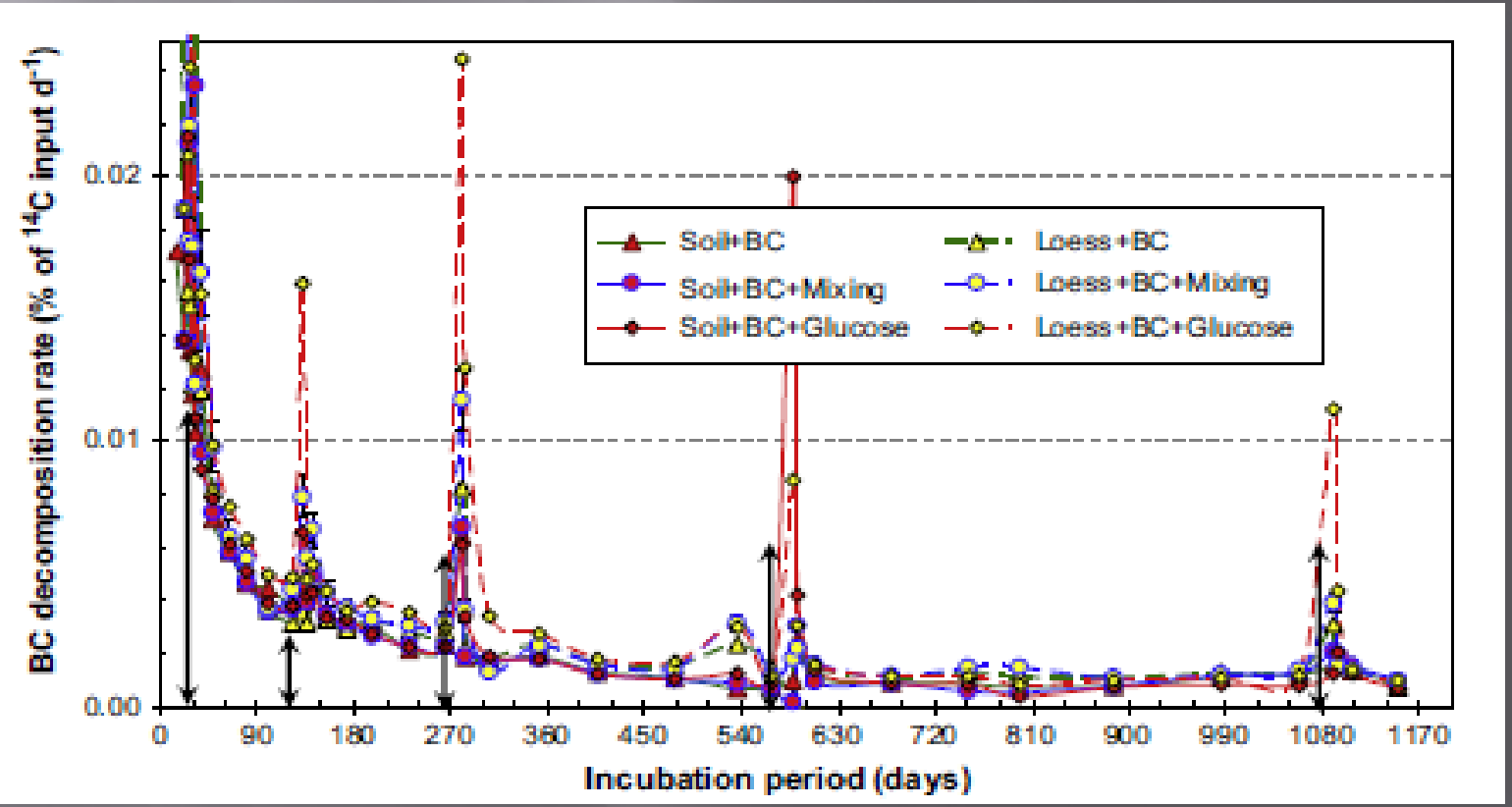
- Protecting monitoring equipment (sealed meters and data loggers);
- Protecting records of monitored data (hard copy and electronic storage);
- Checking data integrity on a regular and periodic basis (manual assessment, comparing redundant metered data, and detection of outstanding data/records);
- Comparing current estimates with previous estimates as a 'reality check';
- Provide sufficient training to operators to perform maintenance and calibration of monitoring devices;
- Establish minimum experience and requirements for operators in charge of project and monitoring; and
- Performing recalculations to ensure no mathematical errors have been made.

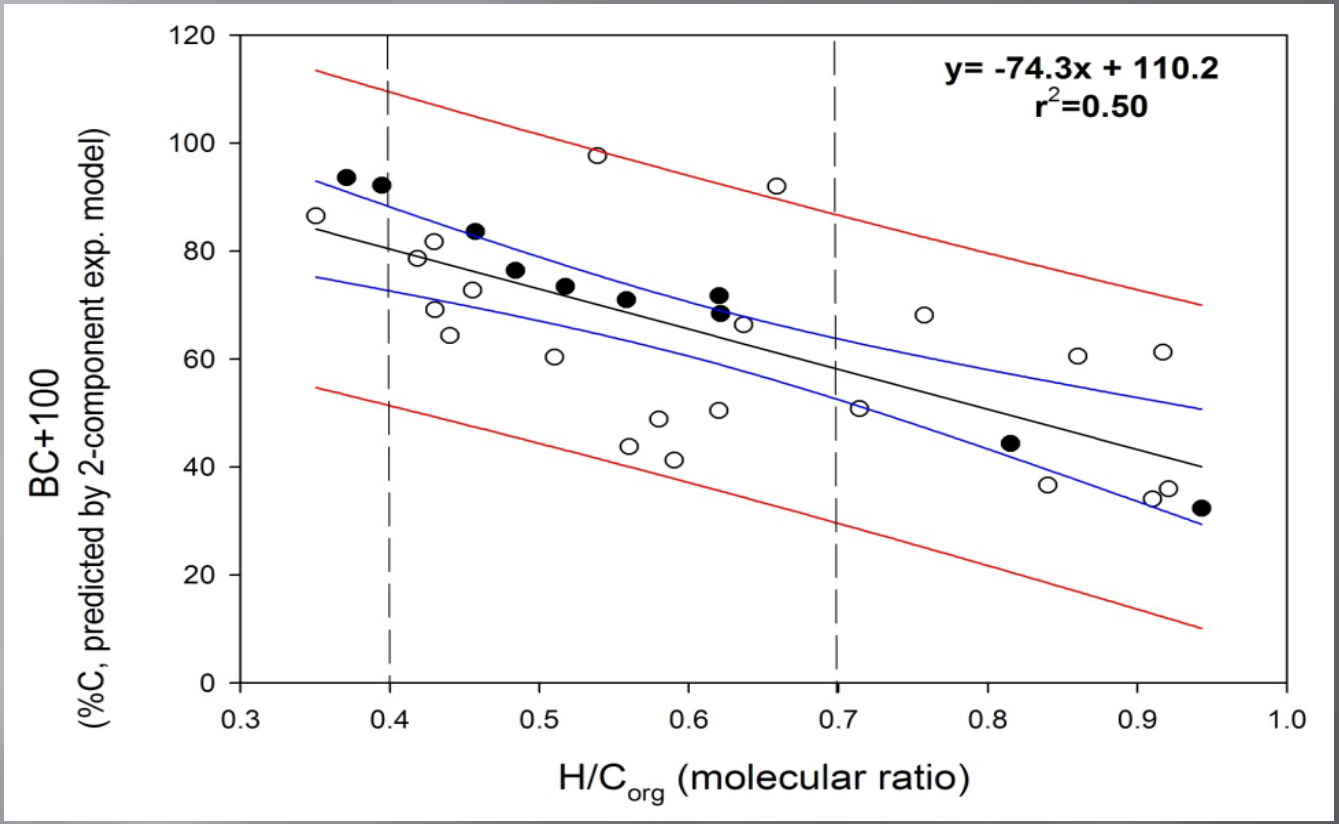
Biochar Carbon Stability

- **Biochar carbon stability test method (BC_{+100})**
  - Developed by leading biochar carbon stability research scientists
  - 27 methods to characterize biochar C content were compared
    - "alpha" methods → simple physical/chemical measures of stability
    - "beta" methods → directly quantify BC+100
    - "gamma" methods → provide physiochemical underpinning for alpha and beta

Incubation and field studies

- Initial mineralization of labile C fraction until 600-700 days mineralization rates reach a constant → remaining biochar C is stable





Hydrogen/organic carbon molar ratio

- strong correlation between H/C_{org} and Biochar C predicted to remain after 100 years

	BC_{+100} (%)			
H/C_{org}	Mean	Lower limit	Upper limit	Chosen value
0.4	80.5	72.6	88.2	70
0.5	73.1	67.1	78.9	50
0.6	65.6	60.5	70.6	50
0.7	58.2	52.5	63.8	50

H/C_{org} and BC_{+100} equivalences at 95% confidence

- **Example:**
  - **H/Corg of biochar X = 0.55**
  - **BC+100 = 50%**
- **So, 50% of C in biochar X will be credited in methodology**

Sustainable Feedstock Rationale

- **Described in Appendix 4**
- To ensure no net negative impacts
  - Primarily GHG emissions
    - Soil C loss via overharvesting of residues, erosion
  - But also other environmental and social impacts
    - Soil degradation e.g., compaction, nutrient loss
    - Land use change → conversion to purpose grown
    - Biodiversity loss
    - Livelihoods

Allowable Feedstocks

- Feedstocks include, but are not limited to:
  - Biomass residues from forestry
  - Biomass residues from agriculture
  - Municipal solid wastes and other biomass-based materials approved for use under the International Biochar Initiative's (IBI) Biochar Standards (2013)

Sustainable feedstock criteria

1. Any Biomass Residue → *by-products* from ag, forestry and related industries
2. No land use change attributable to Feedstock procurement for past 7 years
3. Evidence of no environmental/social impacts from diverting residues for other uses
4. No depletion of C stocks → 25% residues left in place
5. Management plan in place for sustainable harvest monitoring

Additional feedstock criteria

- Documentation of
  - Biomass treatment with agrochemicals
  - Biosolids use
  - Chain of Custody including harvest locations

Forestry and Ag Feedstocks

- Certification
  - Forest Stewardship Council
  - Council on Sustainable Biomass Production
  - Roundtable on Sustainable Biomaterials

OR

- Verification by independent 3rd party forestry or ag professional

OR

- Peer –reviewed studies, soil C modeling, proving sustainable removal rates [**ag only**]

Evaluation of feedstock criteria

- One-time evaluation for each 7-year crediting period
- Biochar producer collects necessary documentation and submits to Validation/Verification Body (VVB)
- Periodic and random evaluation for adherence to the criteria

Further Information

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To provide comments during public comment period
(closing November 22nd)
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