Biochar Protocol Development

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Carbon Consulting LLC

blue moon FUND

International Biochar Initiative

The ClimateTrust®

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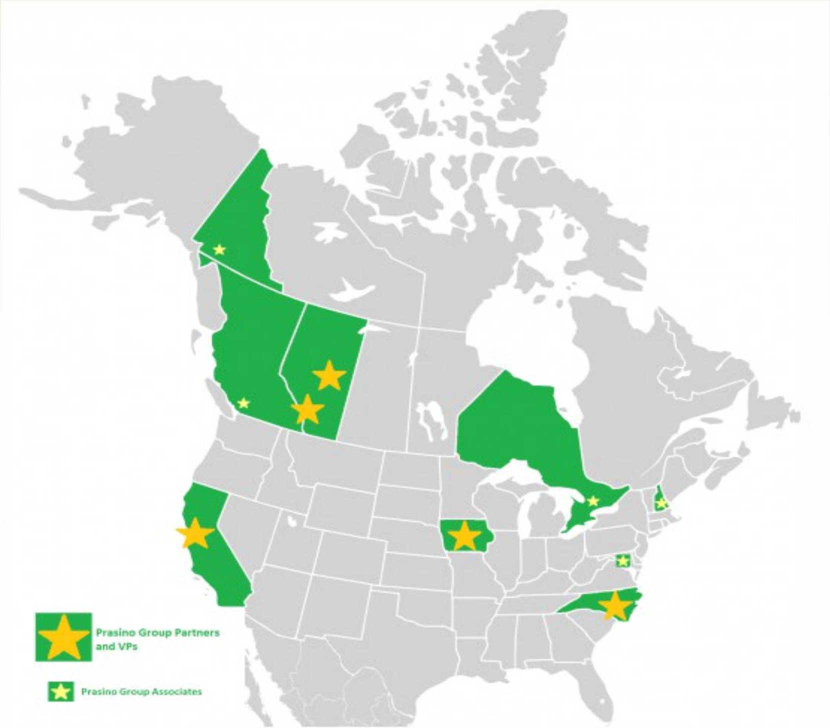
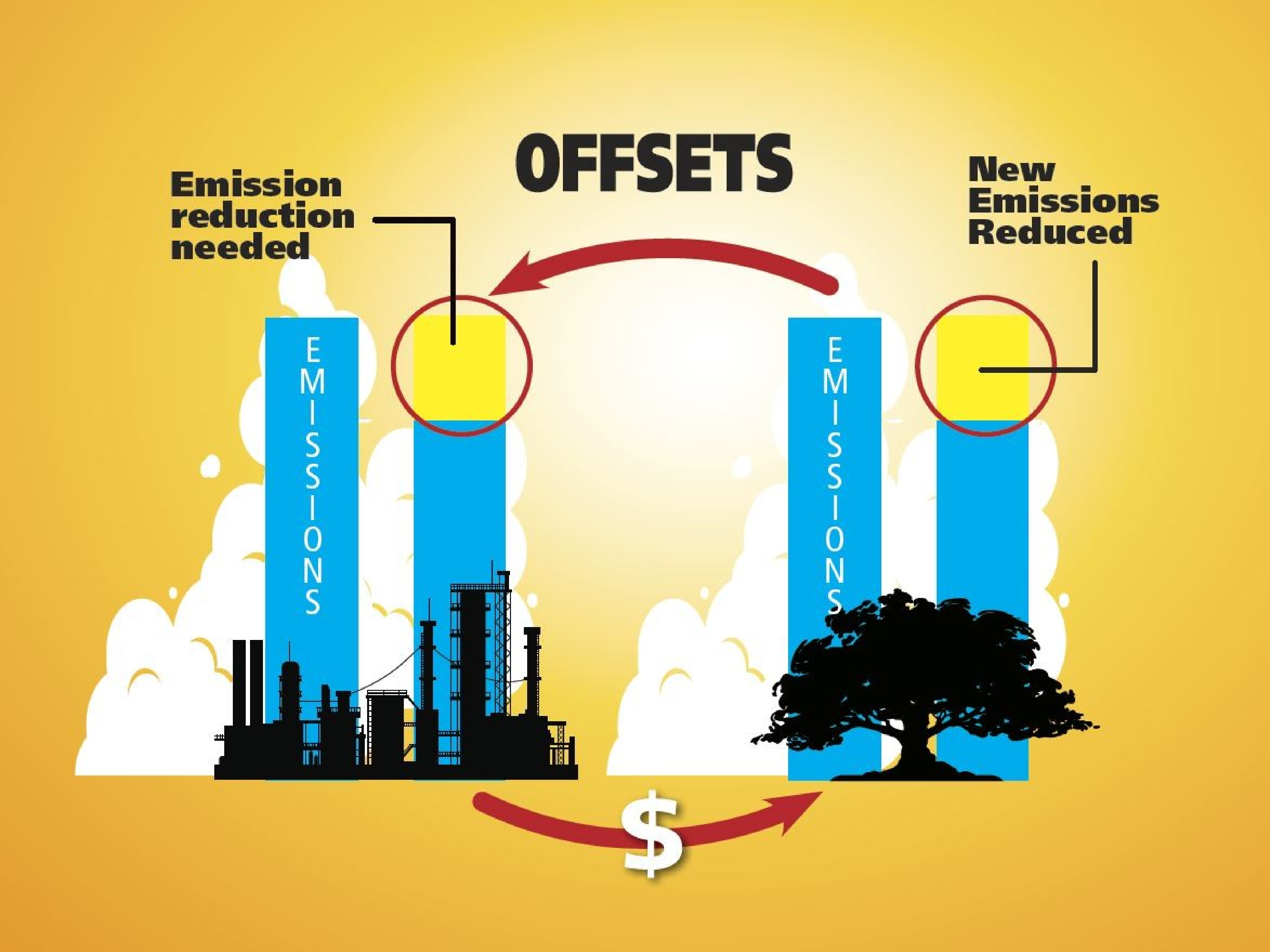


We make sustainability real...

Contents


OFFSETS
Emission reduction needed
New Emissions Reduced
EMISSIONS
EMISSIONS
$

GHG Offset Protocol: Qualify and Quantify

- **Qualify** projects
  - What types of biochar projects are eligible to generate offsets?
  - Where? What technologies? What uses of the biochar?
- **Quantify** GHG reduction
  - How many offset credits?
  - Comparison of baseline vs. project scenario GHG emissions

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Contents

- What is a carbon market protocol?
- Introduction to carbon markets
- Previous protocol history
- How will a biochar protocol work?
- Offset opportunity for biochar

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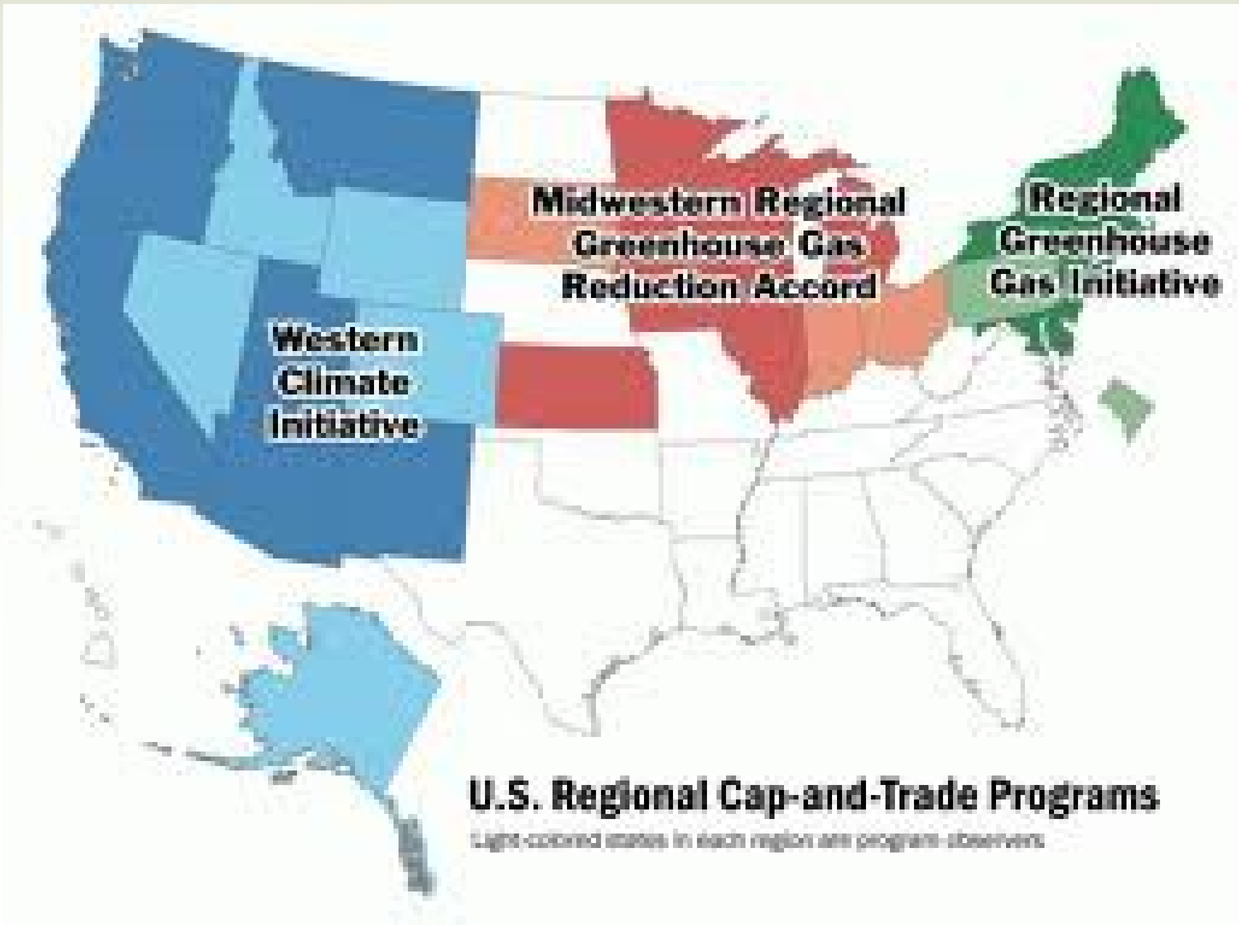
In the beginning…



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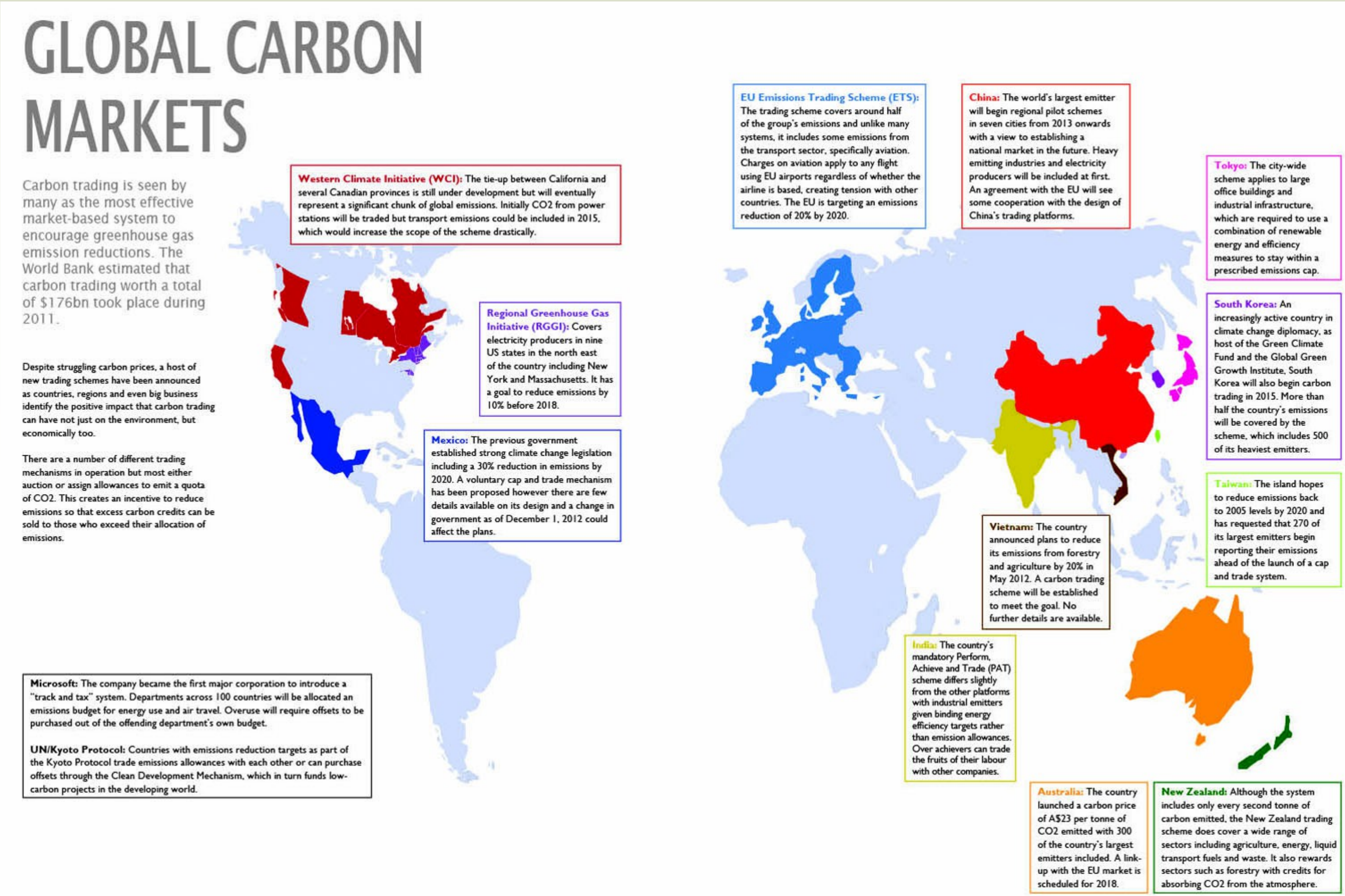
And then there was a loss of will…



What's left to support projects…

- Regulatory driven markets
  - US (California x2, RGGI)
  - Canada (Alberta, BC, Quebec)
- Voluntary (pre-compliance) markets
  - American Carbon Registry
  - Verified Carbon Standard

Contents

Previous Protocol History

- Original protocol efforts presented to the public at the 2010 US Biochar Conference

Goal: To develop a universally applicable biochar offset protocol for the Alberta Offset System (AOS) and then Voluntary Carbon Standard (VCS)

- Addressed a variety of project scales, diverse feedstocks, and process technologies

www.biocharprotocol.org

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CARBON WAR ROOM

ConocoPhillips Canada

Previous Protocol History

- Protocol development created 2 primer documents:

  Biochar Science, Feedstocks and Technology 101

  Carbon Policy & Markets 101

- Webinars on primer materials presented to public
- Technical Stakeholder Review Workshops hosted to address outstanding science and carbon policy issues. Feedback collected for protocol revisions:
  - IBI Rio de Janeiro 2010 workshop
  - Free public webinars summer 2010

Previous Protocol History

- Protocol drafted and entered AOS evaluation and approval process
- Technical Stakeholder Working Group assembled for transparent protocol review process
- AOS identified need for Alberta-specific biochar research and applicability prior to protocol approval
  - Alberta research group making progress on biochar use and application
  - Protocol re-submittal part of this initiative
- Further gap for pursuing broader approval
  - ...s Trust and Blue Moon Fund

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Contents

- What is a carbon market protocol?
- Introduction to carbon markets
- Previous protocol history
- How will a biochar protocol work?
    - Scope
    - Carbon stability test
    - Technological benchmark
    - Ownership of credits
    - Next steps

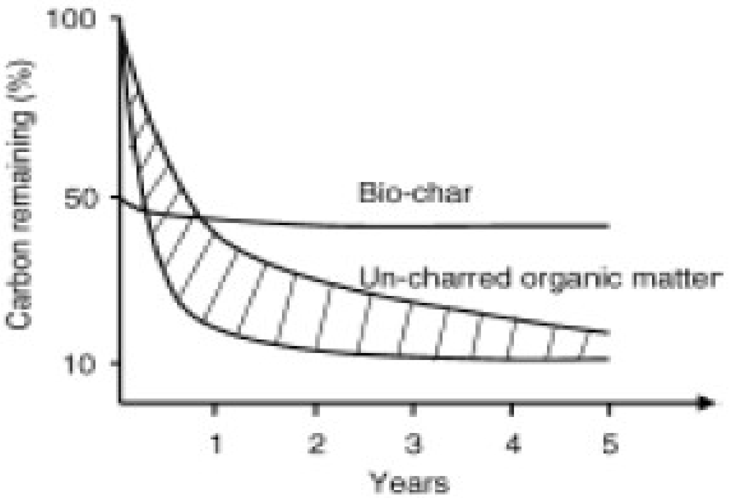
Funding & Project Partners

- **The Climate Trust**
  - Peter Weisberg, Teresa Koper
- **International Biochar Initiative**
  - Debbie Reed, Stefan Jirka,

    Wiley Barbour
- **The Prasino Group**
  - Keith Driver
- **Carbon Consulting LLC**
  - John Gaunt

Emission Reduction Pathways

Carbon Stability



	BC+100 (%)			
H/Corg	**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

A. Budai; A. R. Zimmerman; A.L. Cowie; J.B.W. Webber; B.P. Singh; B. Glaser; C. A. Masiello; D. Andersson; F. Shields; J. Lehmann; M. Camps Arbestain; M. Williams; S. Sohi; S. Joseph, Miguel Rodriquez

Further Considerations

- Offsets must "do no harm"
  - Biochar in soils must meet the IBI's "Standardized Product Definition and Product Testing Guidelines"
  - Use of sustainable feedstocks to ensure no leakage of the benefit
  - Projects must be in industrialized countries and pass all air emissions standards

- Producer <u>or</u> final user of biochar can claim ownership of emission reductions
  - Must clearly document that the other has given them

Next Steps

- Completion of the ACR methodology
  - Technical review webinar on October 28th, 2013
  - Public posting and comment period extending through November 6th, 2013
  - Final review and approval to follow
- California protocol to be adapted
  - Proposal solicited to adapt biochar protocol for local projects to help meet CEQA compliance
  - Adapt protocol for use under AB-32

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What Offsets Mean to Biochar

- Value of 1 tonne of biochar
  - Pricing ranges from $400 - $2,000 per tonne
- Volume of offsets per tonne of biochar
  - Assume 70% stable carbon with 44/12 conversion of C to CO2e
  - Landfill diversion of C&D waste is 4 tonnes CO2e per tonne (25% biochar yield)
- Value of offsets per 1 tonne of biochar
  - With offset pricing at $12 per tonne of CO2e
    - With landfill diversion ~7 tCO2e or $84 per tonne of biochar

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beast™

Powered by The Prasino Group

BEAST is:

- **Consulting Services** to help clients develop and realize the value of environmental assets (RFS2 RINs, LCFS credits and carbon)
- **Workshop(s)** for sharing lessons learned and best-practices, for tracking ongoing policy requirements and asset prices and for sharing

BEAST High-Level Process Flowchart

BEAST //

High-Level Process Flowchart

1. Client shares their goals specific to the U.S. market
    - Federal Renewable Identification Number (RIN) and/or
    - California Low Carbon Fuel Standard (LCFS) market and/or
    - Carbon offsets (California, Canada or voluntary) and/or
    - Renewable Energy Certificate (REC) state issued

2. Project intake session

3. Proposal submitted to client outlining potential asset eligibility

4. Asset feasibility and value assessment

5. Asset development process
    - Carbon: manage validation and verification process

6. Project submission to appropriate entity
    - Manage asset eligibility process with entity

7. Entity / entities issues eligibility decision

8. Marketing the asset

Service Range

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Value Add of BEAST

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1.) A biochar particle is porous; its high surface area allows it to CAPTURE and RETAIN many times its weight in WATER.
2.) It INCREASES NUTRIENT EFFICIENCY by attracting cations (positively charged ions, which include plant nutrients like calcium, magnesium and potassium) and anions (negatively charged ions, which include nitrates and phosphates), sharing them with the soil food web.
3.) Biochar is RESISTANT to biological and environmental DECAY. It can last in the soil for hundreds to thousands of years, making it an effective form of CARBON SEQUESTRATION.
5.) It ENHANCES SOIL AERATION.
5 PROPERTIES THAT MAKE BIOCHAR VALUABLE IN AGRICULTURE.
4.) Provides a SECURE HABITAT for fungi, bacteria and other microorganisms.
(Gases and oils emitted from the material during the firing process will one day be used to support additional farm operations.)
The biomass enters a rotary hearth self-heated to 650°C. As the oxygen-limited environment carbonizes the biomass, rakes turning in a circular motion cause it to fall through the kiln's multiple layers. It is then distributed out the bottom as biochar.
I. THE FOREST (400,000 Albizia Trees)
II. WOOD CHIPS
III. THE FEED
IV. FEED CONVEYOR
V. THE KILN
VI. CHAR CONVEYOR
VII. BIOCHAR (careful, it's still hot)
VIII. FINAL PRODUCT (ready for use)
JOSIAH The CharMaster
BRETT The Operator
(embers)
BIG CHAR 1500 (made in Australia)
Black is the new green.
BIOCHAR (after)
FEEDSTOCK (before)
JEFF The Entrepreneur
HMI Hawai'i Biochar
Hawaiian Mahogany Farm
Lawai (Island of Kauai), Hawai'i
BIOCHAR
A sustainably made charcoal substance that increases soil fertility (and sequesters carbon)
HOW TO MAKE BIOCHAR: I.) Fast growing albizia trees are cut down; II.) A chipper turns the timber into wood chips; III.) The wood chips are shoveled into a feed conveyor; IV.) The conveyor maintains a constant flow of chips into the kiln; V.) A kiln converts the wood chips into biochar via the process of pyrolysis [from the Greek: PYRO (fire) + LYSIS (separating)]. The combination of intense heat + limited oxygen makes it possible to convert organic carbon (wood) into stable carbon (biochar); VI.) Steaming hot char travels out of the kiln and drops into a wheelbarrow; VII.) The biochar is now ready for agricultural use, either by adding it directly to the soil or mixing it with additional soil amendments.

Thank you!

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