

The background of the slide is a close-up photograph of glowing biochar. The biochar consists of irregular, porous pieces of wood that have been charred, appearing in shades of orange, red, and yellow, with some darker, charred edges. The lighting is dramatic, highlighting the texture and the glowing interior of the biochar pieces.

3Degrees™

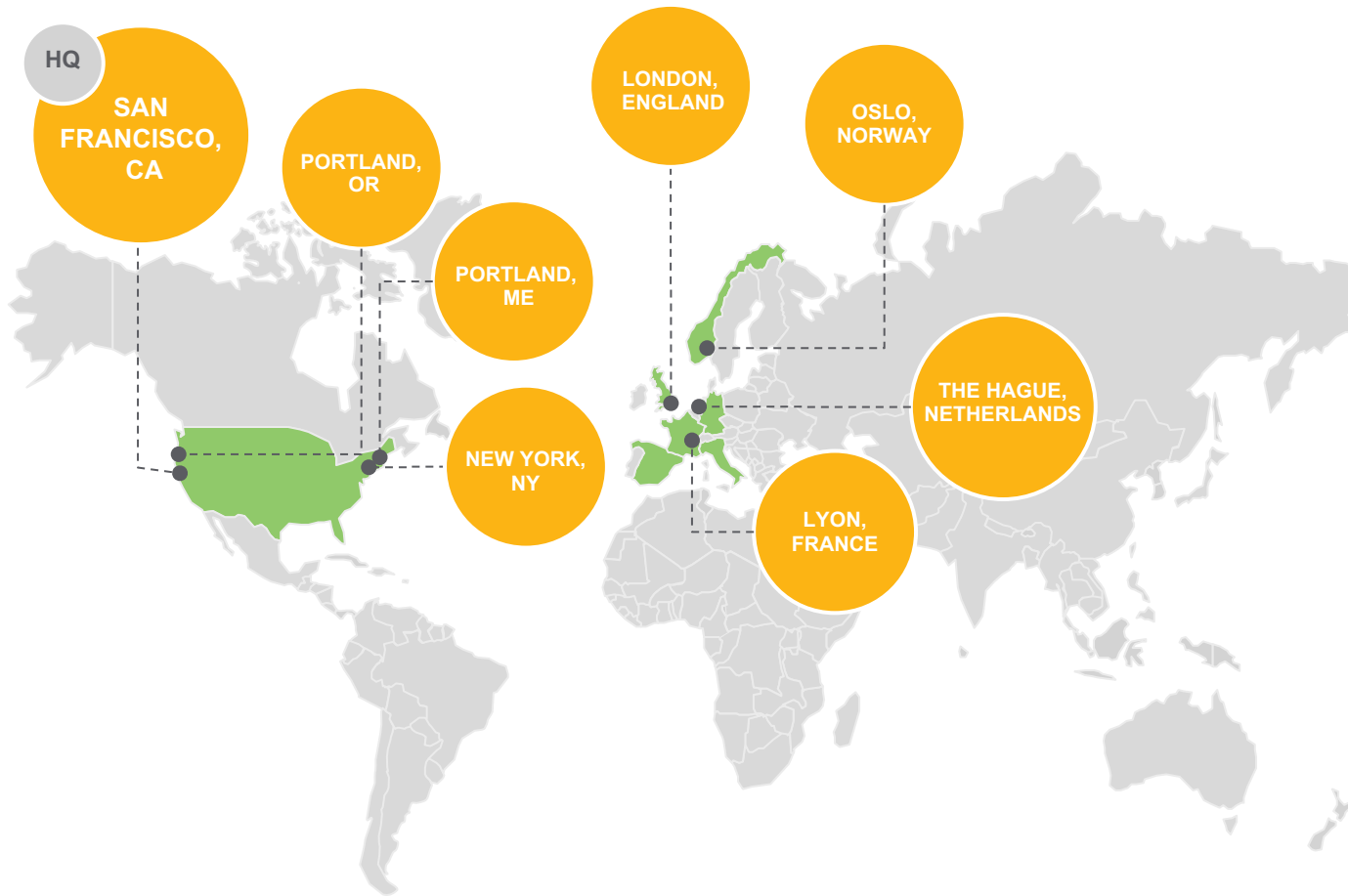
OUR MISSION

We make it possible for businesses and their customers to take urgent action on climate change.

Biochar in Carbon Markets



3Degrees.



ABOUT 3DEGREES

Company overview



GREEN = 3Degrees Employee Presence



Wyatt Catron
*Manager, Project
Development*

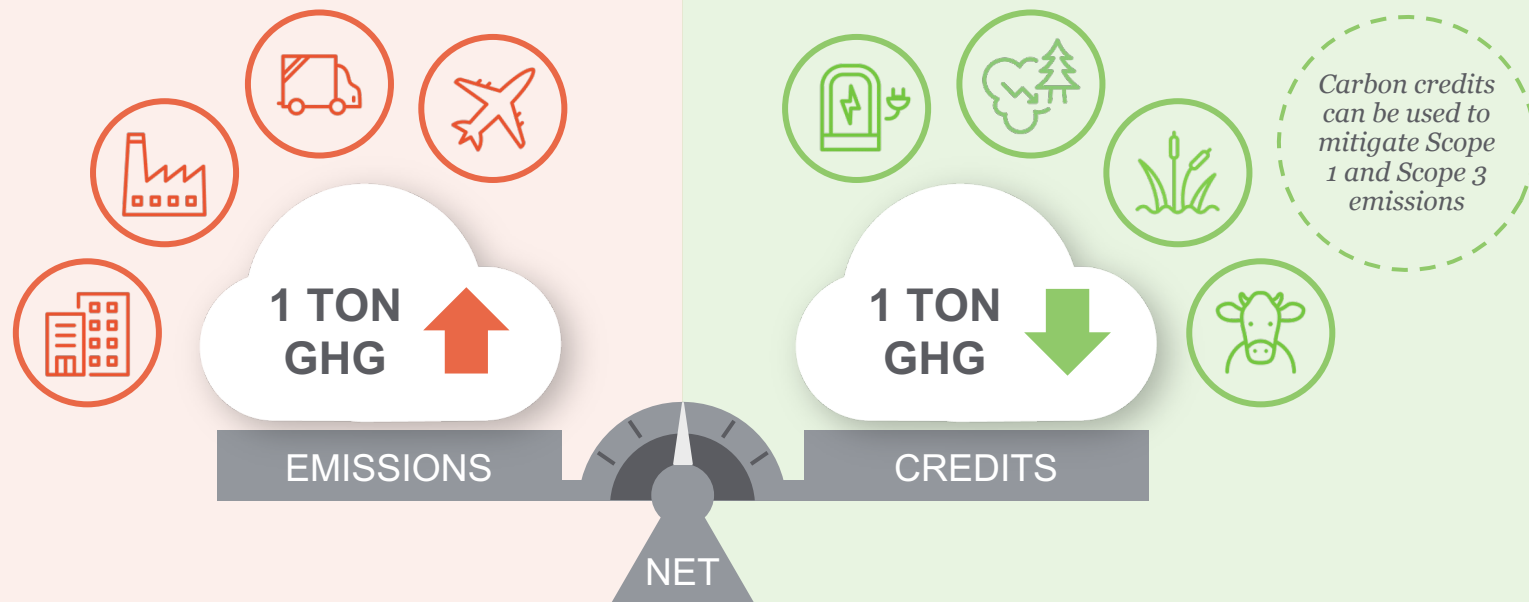


Serene Kuramarohit
*Associate,
Carbon Markets*

History of Biochar

- + Oldest description of charcoal use in agriculture in **Encyclopedia of Agriculture - *Nogyo Miyazaki 1697***
 - + “Ash Manure” knowledge used in Japan, Korea, China since ancient times.
- + 2,500 Year uses of biochar in the Amazon
 - + Fertile “black land” and rich “terra petra” - *Herbert Smith 1879*
- + Colonial America and Europe (Video)
- + From the Kilns of Kishu: The Making of Binchotan Charcoal (Article)

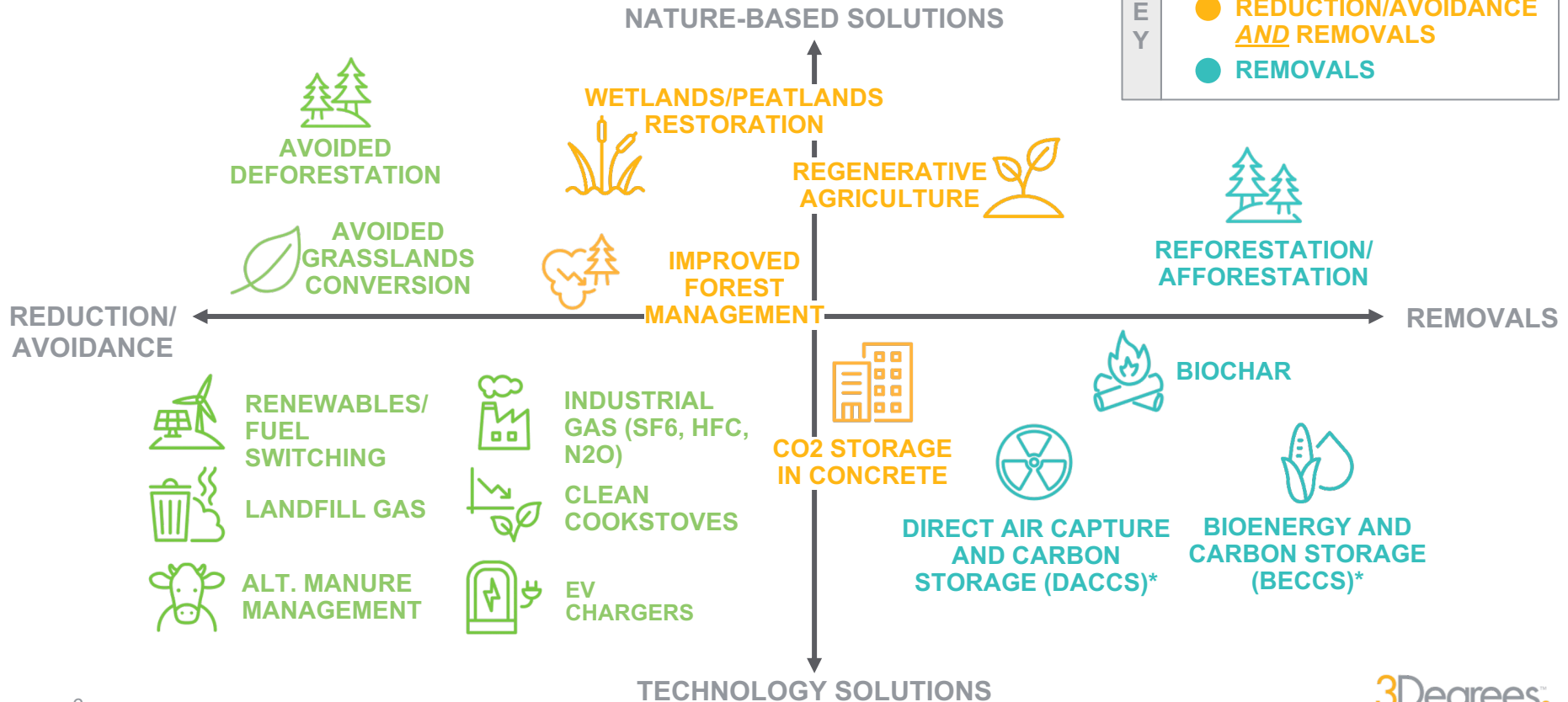
What is a carbon credit?



CARBON CREDIT:

Created when one metric ton of greenhouse gas is avoided, reduced, or removed in order to compensate for or neutralize equivalent emissions made elsewhere.

Carbon Credit Project Types



Important aspects of a Carbon Project

CRITERIA	DESCRIPTION
Additionality	Emission reductions that would not otherwise have occurred <ul style="list-style-type: none">+ Regulatory test: not required by law+ Financial test: would not have happened without carbon credit revenue+ Common practice test: demonstrating that the proposed project is not common practice
GHG Accounting	Emission reductions that are measured using a precise and conservative methodology that has been scientifically reviewed and tested
Monitoring	Clear evidence that the emission reductions have actually occurred
Permanence	Emissions reductions that are not “reversible” through an intentional or unintentional event (sometimes addressed by credit “buffers”)
Co-benefits	Carbon projects that provide other environmental or social benefits (e.g., poverty reduction, education, biodiversity, improved water quality, etc.)
Project participants	Who benefits from the sale of the credits?

Registries with Biochar methodologies



*Verra - Verified Carbon
Standard (VCS)*



*Climate Action Reserve
(CAR)*



Puro.earth (puro)

How to Demonstrate Additionality

Showing that the project would not have occurred without the Carbon Market

PERFORMANCE STANDARD/ POSITIVE LIST

Project meets specific requirements set forth by methodology/registry

LEGAL/ REGULATORY

Demonstrate project is not required by existing laws, regulations, etc.

FINANCIAL ADDITIONALITY

Demonstrate that removals are result of carbon finance

Eligibility requirements for a Biochar Carbon Project

- Must be produced from sustainable biomass (can either be **purpose grown or not purpose grown**)
- Biochar produced be used in applications that preserve its carbon storage, meaning it can't be burned for fuel (this is referred to as “end use”)
- Biochar usually needs to meet quality standards of local jurisdiction or if there is none, comply with latest version of “[IBI \(International Biochar Initiative\)](#) Biochar Testing Guidelines” or the “[EBC](#) Production Guidelines”
- Location of the biochar facility matters
- Each methodology has their own list of eligible feedstocks, but all incorporate the usual suspects like woody biomass, forest thinnings, etc.
- Biochar must have molar H/C ratio equal to or lower than 0.7
- Biochar facility needs to be relatively new because, if it was already producing for a while, did it really need carbon financing?

Emissions Reductions Calculations

$$\text{Carbon Removals} = \text{Carbon sequestered in Project} - \text{Project emissions}$$

This is calculated by each methodology a bit differently, but they all must consider the below variables:



Emissions from the operations and distribution of biochar facility

Quantity (in tons) of biochar produced, on either wet/dry basis

Permanence of biochar - a value that demonstrates biochar stability

Organic carbon content of biochar

Methodology Comparison

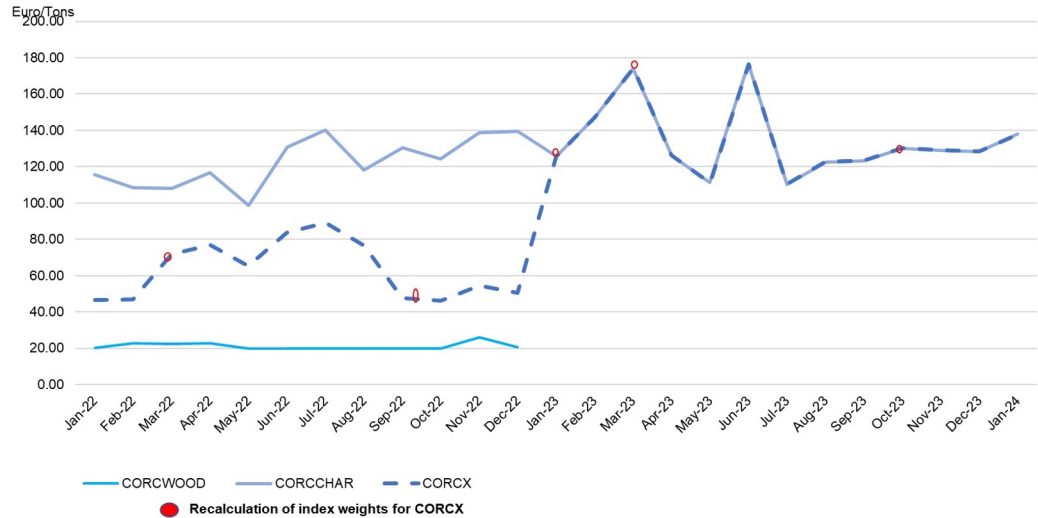
CAR	Verra	Puro
Biochar can be purpose grown	Biochar cannot be purpose grown	Biochar can be purpose grown
Does not assume soil end use in calculations. Different end use results in different permanence factor	Assumes soil end use in calculations Allows project proponents to propose a different permanence value for non-soil use applications	Assumes soil end use in calculations. Even for non-soil use applications, must use same calculations
Stability/ Permanence of Carbon - If soil end use - dependent on temperature of soil If other end use - default value for each eligible instance	Stability/ Permanence of Carbon - dependent on temperature of pyrolysis	Stability/ Permanence of Carbon - dependent on temperature of soil at end use

The Rise of Carbon Removals

Value of Biochar in the Carbon Markets

- + PURO CORC Carbon Removal Indexes
~\$140/MT
- + Relative Small Volumes and Large Range in Pricing
 - + Geography
 - + Sustainability of Feedstock
 - + Duration of Purchase Agreement
 - + \$80-525/MT
- + Rang of 1.5-3 MT of CO₂e Removal per 1 Ton of Biochar

CO₂ Removal Certificate Weighted Index Family (CORCX)



Considerations of Credit Buyers

+ Relevant Certifications

- + Forest Manage Certification (FSC)
- + Sustainable Forest Initiative (SFI) Chain Of Custody
- + Programme for the Endorsement of Forest Certification (PEFC) chain of custody (CoC)
- + Roundtable on Sustainable Biomaterials (RSB)

+ Carbon Direct Buyer's Guide Principles

- + Signatories: Microsoft, Shopify, Stripe, Watershed
 1. Source with operational integrity and oversight through strong governance, standards, and supply chain transparency
 1. Source for which operations minimize negative impact on Indigenous Peoples, workers, and local communities
 1. Sources where biomass can be produced without threatening protected areas or reducing original carbon stock
 1. Source that do not distort markets for agriculture or forestry products

Additional Credit Opportunities from Biochar



- + **U.S. Low-Carbon Cement Protocol adopted Oct. 2023**
- + Biochar used as supplementary cementitious materials (SCM) instead of portland cement (PC) creates additional avoidance credits.
- + Credits are issued based on the amount displaced portland cement and the emissions associated with portland cement (PC) production which varies on a project by project level.
- + **Alternative Manure Management Program (AMMP)**
- + Biochar-composting reduces CH₄ by 83.9%, compared to composting without biochar*
- + Potential grant opportunities (CDFA AMMP and Dairy Plus Awards) and voluntary carbon credits for food and beverage supply chains

**Dairy Manure Co-composting with Wood Biochar Plays a Critical Role in Meeting Global Methane Goals, Harrison et al, Aug. 2022*