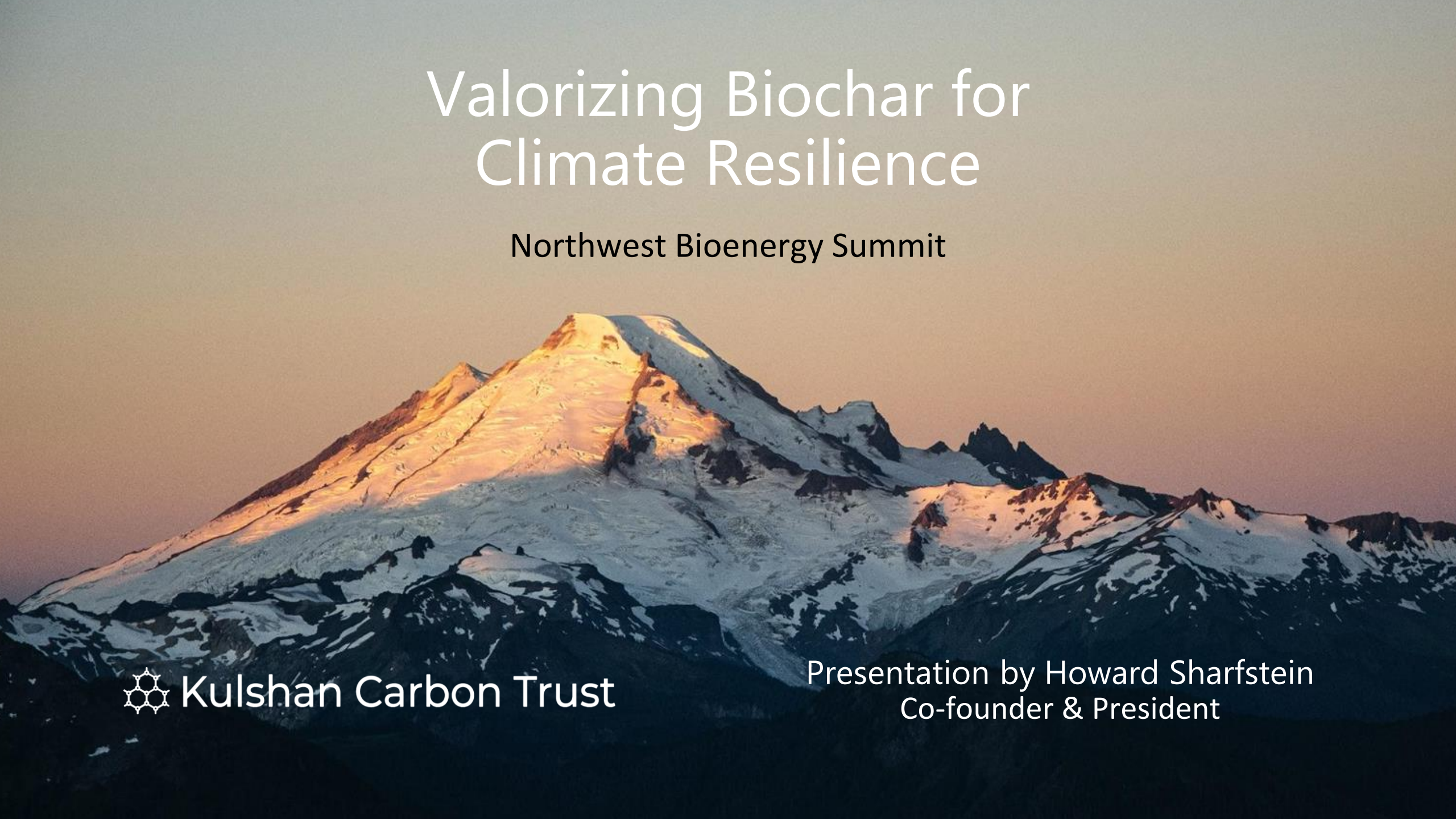
Valorizing Biochar for Climate Resilience

Northwest Bioenergy Summit



Kulshan Carbon Trust

Presentation by Howard Sharfstein
Co-founder & President

Land Acknowledgement

The Kulshan Carbon Trust humbly acknowledges that we reside in the sacred ancestral homeland of the Coast Salish Peoples, who have lived and thrived throughout the Salish Sea basin, San Juan Islands, and North Cascades watershed since time immemorial. We offer our deepest respect and gratitude to our Indigenous neighbors for their unwavering care and guardianship of the lands, waters, and skies.

Topics for Today's Talk

In Scope

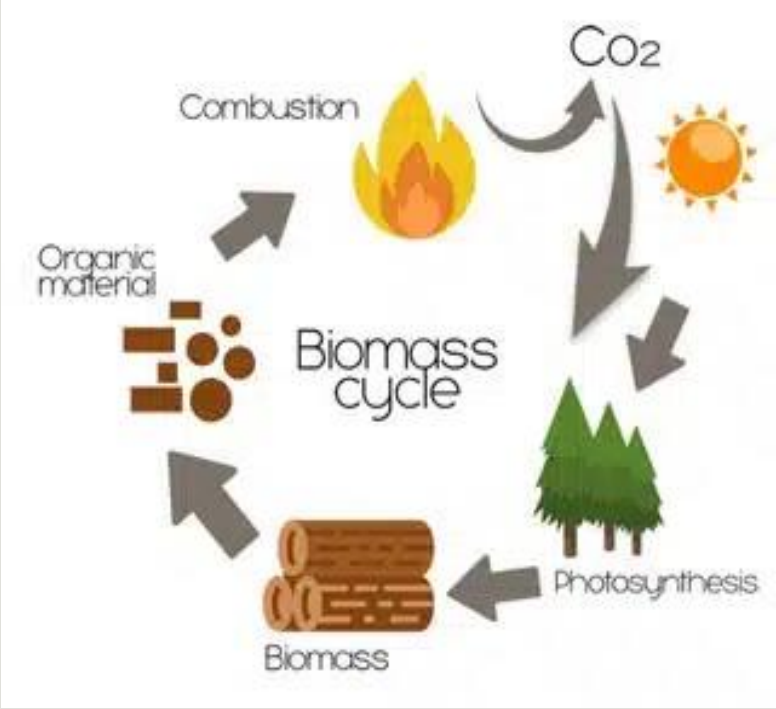
- Potential for biomass carbon removal and storage
- Differences between eco-credits and carbon credits
- Biochar production & application as a decarbonization strategy
- Crediting carbon removal plus co-benefits for nature-based solutions
- Bioregional regenerative finance

Another Time

- Developing bioenergy production facilities
- Survey of commodity carbon markets for bioenergy projects
- Role of renewable energy credits in project development
- Methodologies for bioenergy measurement, reporting, and verification

Biomass for Decarbonization

- Biomass refers to material from living things, including wood and tree bark, plant leaves or stems, aquatic plants, and animal manure.
- Properly managed biomass residuals remove and store atmospheric carbon as biochar and/or reduce emissions as a fossil fuel alternative.
- According to the World Resources Institute, using unsustainable purpose-grown plants can defeat the climate benefits of biomass as a carbon dioxide removal (**CDR**) strategy.
- Success depends on optimizing the carbon cycle to support CDR and other ecosystem services that support climate resilience while considering energy output a byproduct.



Size of the Prize

- Rocky Mountain Institute reports aggregate biomass carbon removal and storage from plants and algae has the potential to remove 5.5 gigatons of CO2 from the air globally each year.
- According to Lawrence Livermore National Lab, the U.S. can achieve 884 million tons of CO2 removal annually by 2050 with a sustainable biomass supply.
- The IPCC recognizes and prizes biochar as a climate solution with 'significant mitigation' potential.

Size of the Prize

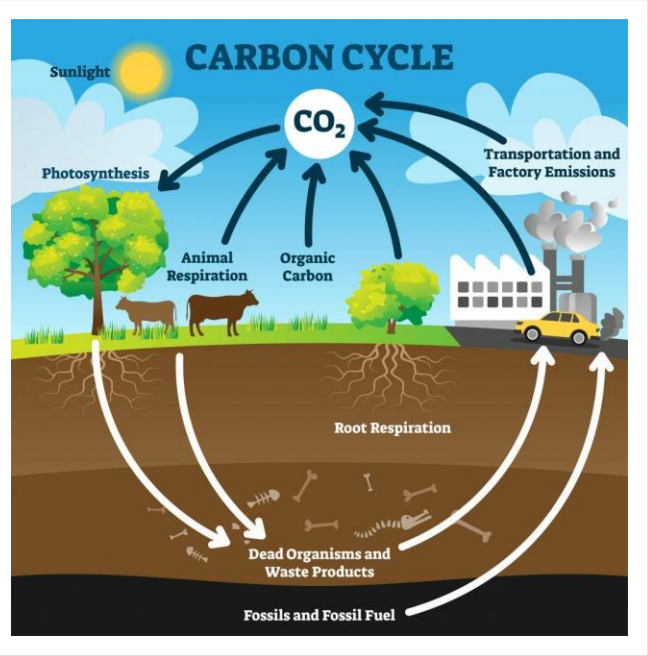
- A lifecycle assessment by Project Drawdown found that **biochar alone** can reduce CO2 emissions by 1.36–3.00 gigatons through 2050.
- Project Drawdown calculates the net cost of biochar implementation at US$123.54–244.94 billion, with lifetime operational savings of US$333.20–663.11 billion.
- In addition, Project Drawdown also believes that perennial **biomass power production** could displace fossil fuels and avoid 2.62–3.59 gigatons of CO2e by 2050 at a cost of US$56.48–69.24 billon.
- At the systems level, the ultimate prize is using **land sinks** to reduce and sequester 284.2–392.7 gigatons of CO2e between 2020–2050 using a variety of methods that are beyond our scope today.

Carbon Trust Context

- Our founding white paper regarded **land trusts** as the model for a new type of non-profit dedicated to carbon conservation.
  - We soon determined that conservation easements and covenants running with the land are costly to prepare and create substantial friction.

- We perceived **voluntary carbon markets** as a respectable way to incentivize landholders to take climate action.
  - Global carbon markets suffered significant reputational damage, making commodity credits inconsistent with our place-based organization's intention to build trust among key stakeholder communities.

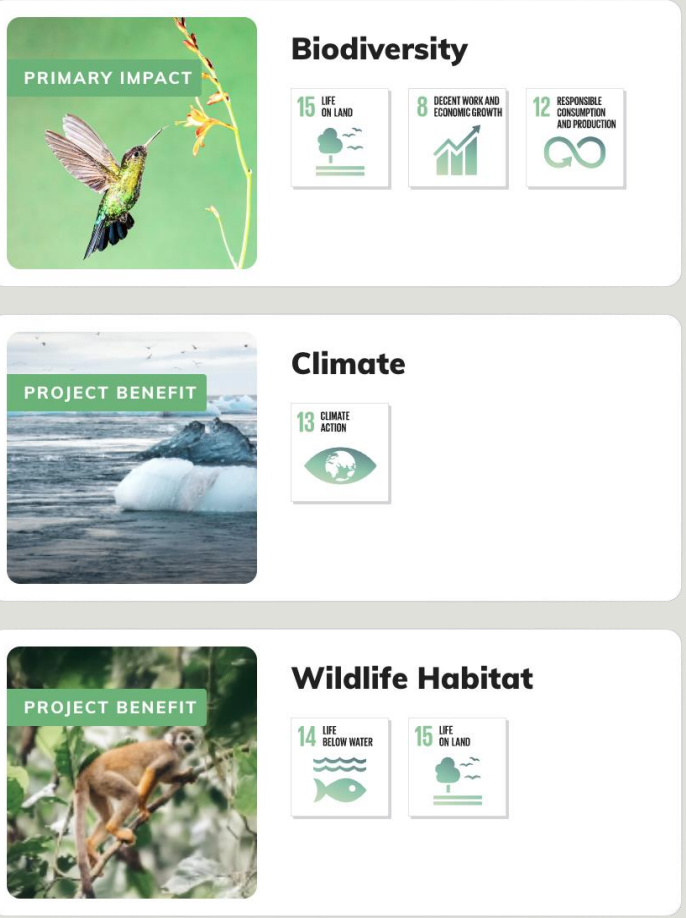
- In response, KCT has shifted to eco-credits in support of collaborative natural climate solutions **(NCS).**



What Are Eco-Credits?

- **Encouraging NCS projects** such as biochar, agroforestry, and regenerative agriculture that mitigate climate disruption by cutting GHG emissions and achieving valuable CDR.

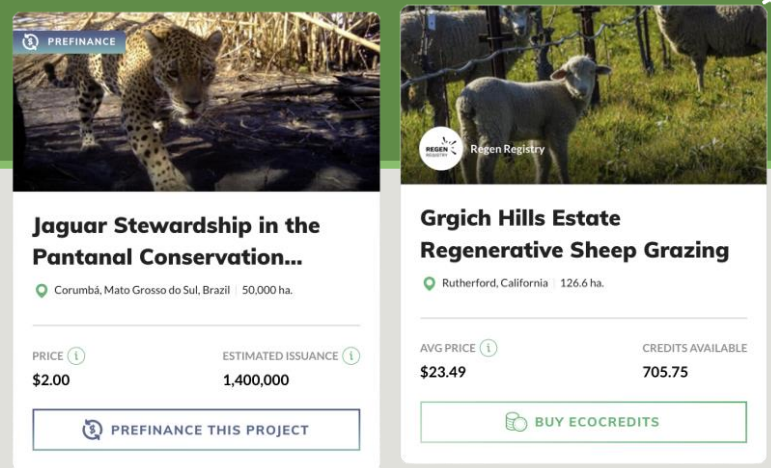
- **Promoting scientific methods** founded on indigenous practices that foster high-quality ecological assets able to sequester carbon and build local climate resilience.
- **Creating an open-source infrastructure** that allows cost-effective issuance and tracking of credits.

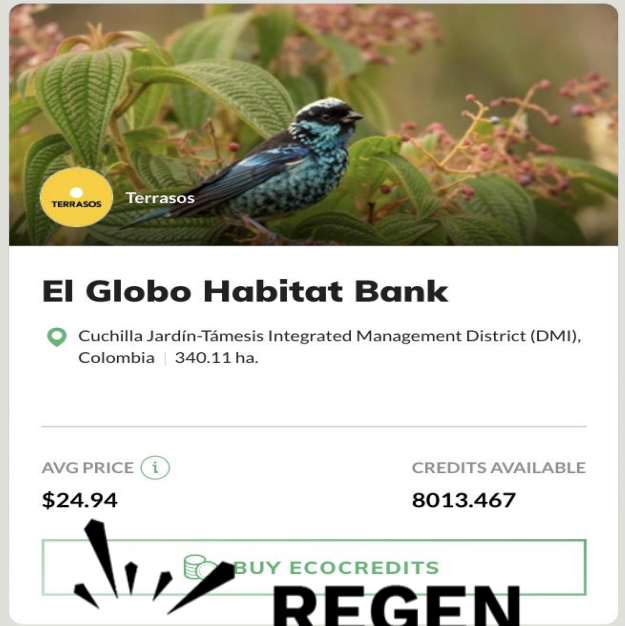


REGEN NETWORK

What Are Eco-Credits?

- **Operating systems that avoid double-counting** while providing payment, billing, and marketing functionality.
- **Supporting best practices** in project-level GHG accounting and measurement of ecosystem services by implementing sensible and innovative MRV practices.
- **Commercializing innovative carbon credit classes** bundled with valuable ecosystem services as co-benefits.
- **Enhancing public confidence** in market-based action for GHG removal and landscape regeneration.





REGEN NETWORK

Why Biochar?

Biochar is made from waste biomass.

- Forestry and crop residues provide feedstock.
- Wildfire fuel reduction yields woody biomass.

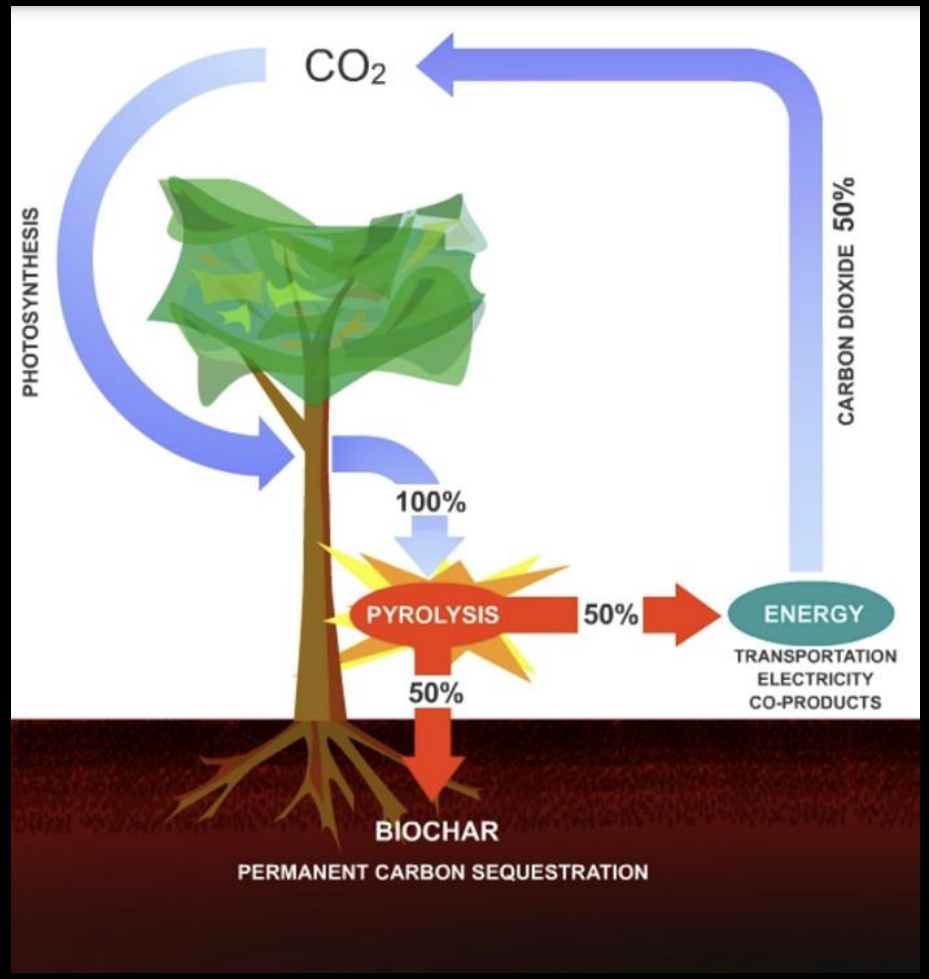
Heating organic material in a low-oxygen environment creates biochar.

- The pyrolysis process converts biomass into a highly porous and stable form of carbon.
- When buried, the carbon can be sequestered for centuries.

Biochar is valued as a soil amendment.

- Biochar captures CO_2 from the atmosphere for sequestration in the pedosphere.
- Inoculated biochar can improve soil health and crop yields.

How Biochar Removes Atmospheric Carbon



- Drawing on insights from indigenous practices and informed by modern pyrolysis technology, KCT is helping develop projects that turn forestry and agricultural residues into biochar.
- Biochar's valuable attributes include durable carbon sequestration, enhanced soil vitality, improved water retention, local economic development, and better climate resilience.

Biochar Industry Market Report

- Biochar remains the leading way of delivering durable CDR.
  - In 2023, global production was >350,000 metric tonnes of CDR from biochar.
  - That is a 91% increase over reported 2021 production.
  - Currently, biochar accounts for over 90% of CDR credits.
- From an economic perspective, revenues from biochar producers, distributors, value-added producers, and equipment manufacturers reached $600 million in 2023
- Biochar revenues are projected to reach nearly $3.3 Billion by 2025.
- While CDR markets for biochar credits are robust, a majority of biochar producers do not generate biochar CDR credits for the voluntary carbon market.

GLOBAL BIOCHAR MARKET REPORT

International Biochar Initiative

USBI

Biochar Industry Market Report

- Within and between global regions, biochar producers use a wide range of production technologies and business models.
- The leading biochar trade associations have identified the following priorities to accelerate industry growth:
  - Developing end-use markets and standards for physical biochar.
  - Advocating for biochar in the CDR markets and public climate policy.
  - Supporting biochar companies to improve access to capital and grants.
- KCT started by piloting low-tech biochar demonstrations.
- We now recognize that achieving meaningful scale requires aggregating biomass feedstock and developing mid-tech or high-tech pyrolysis supported by robust financing facilities.

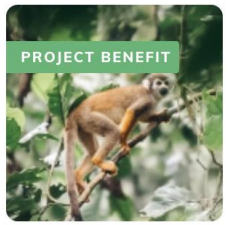
Ideas for Bioregional Financing

Biodiversity

15 LIFE ON LAND · 8 DECENT WORK AND ECONOMIC GROWTH · 12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Climate

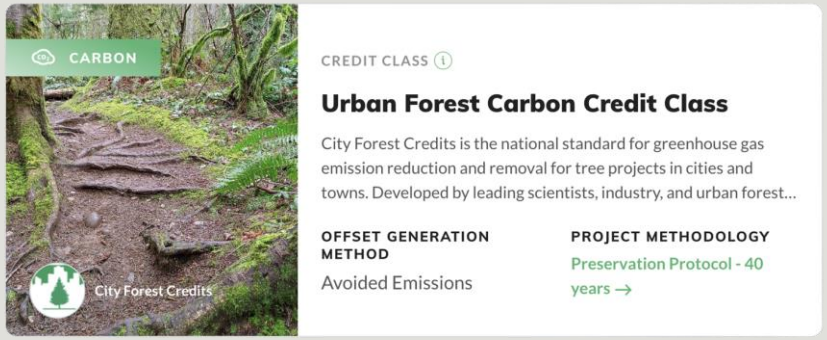
13 CLIMATE ACTION



Wildlife Habitat

14 LIFE BELOW WATER · 15 LIFE ON LAND

- Issue and market **eco-credits** through the Regen Network to fund biochar and other NCS projects.
- Support **regenerative finance** transactions by measuring, documenting and valuing ecosystem services such as CDR and soil carbon renewal into legally divisible interests.
- Manifest blockchain-based eco-credits with elegant, eco-friendly **physical tokens** to stimulate local trade and provide proof of investment.



What Does a Carbon Trust Do?

- We use collaboration tools to find mutual interests and promote regeneration and climate resilience:
  - Reduce GHG emissions and regenerate degraded landscapes.
  - Create value using biochar and other NCS to remove CO2 emissions and sequester soil carbon.
  - Restore damaged ecosystems, grow biodiversity, and adapt landscapes to anticipated climate disruption.
  - Revitalize rural economies and create healthier communities by organizing local businesses into a circular economy.

KCT's Guiding Principles

- We respect scientific **knowledge** and indigenous **wisdom** in finding best practices.
- We uphold **accountability** and **transparency** with data-driven goals.
- We foster **pro-social business** relationships with win/win agreements.
- We **embed reciprocity** into viable and resilient NCS value chains.
- We encourage inclusion with ongoing **stakeholder engagement**.