Where Do We Go From Here?  
Ways Forward for the Biochar Community

Tom Miles  
T R Miles Technical Consultants, Inc.  
Northwest Biochar Working Group

USBI Biochar Symposium 2013  
Amherst, October 13-17, 2013
Community Goals

• Global
  – food security-hunger, climate, soil fertility, environment

• Business
  – sustainable biochar businesses

• Organization
  – sustainable US Biochar Initiative
The Eight Fold Path

- Marketing: Products, Markets, Sectors
- Research and Demonstration
- Government
- Finance
- Innovative technology
- Strategies for business
- Regional Resources
- Organizational Strategy
Marketing Biochars and Biochar Systems

1. Too many benefits - don’t confuse the market
2. Trim and focus the message
3. Repeat the same message
4. Learn, Educate, Demonstrate
5. Don’t lead with climate change
6. Engage youth as agents of change
Market Positive Goals for Biochar

• Food Production
  – Increased food production through fertile soils

• Carbon Smart Farming
  – Fertile soils through carbon negative processes

• Clean environment
Make Biochar Products to Suit Applications

• **Biochars** (fines, chips, chunks, pellets)
• **Formulated biochars** for growing media
  – Biochars + compost/compost tea + minerals + nutrients
  – Inoculated biochars (microorganisms, compost)
  – Granulated char formulations (manures, prill)
• **Conditioned biochar**
  – bio - (composted chars – *terra preta*)
  – steam or chemical activation
• **Biochar enhanced** products (1%-50%)
  – Specialty mulch – roadside vegetation
  – Seed coating
  – Filtration products (stormwater)
  – Manure conditioning or composting
  – Odor control for manure or composts
Products Suited to the Market

Conichar/Miller Soil
www.conichar.com

Garden Char/Blue Sky Biochar
www.internationaltechcorp.net

Biochar Supreme
www.biocharsupreme.com

BioLogical Carbon LLC
www.linkedin.com/pub/john-miedema/8/93/a32

www.idachar.com

Ecofeed
5-2-3 Organic Fertilizer
ecotracorganics.net

CarbonCultures
www.carboncultures.com
Engage Markets and Sectors That Will Support Biochar

- Local market opportunities, local food
- Liquid fuels (carbon negative fuel)
- Retail gardening
- Organic or specialty agriculture
- Conventional agriculture
- Environmental protection and soil remediation
- Water quality
- Organics recycling
- Existing carbon markets
Agriculture: Cool Food
Agriculture: Biochar Products, Markets and Research

• Products and Markets
  – Retail Garden Markets
  – Soil conditioning
  – Organic Growers – DIY Biochar
  – Vermicompost/Vermichar
  – Specialty crops – primarily organic
  – Anaerobic Digestion and biochar
  – Manure management – litter odor and nutrients
  – Turf management

• Research and Demonstration
  – Soils
  – Seed coating
  – Seed screenings char
  – Crops and Soils

Biochar Supreme
www.biocharsupreme.com

Garden Char/Blue Sky
www.internationaltechcorp.net
Biomass Heat and Power and Organics Recycling
Biomass Energy and Organics Recycling

Products and Markets
- High carbon wood ash
- Char co-products CHP
- Combined Heat and Char
- Soil Conditioning
- Compost Enhancement
- Thermal Recs

Research and Demonstration
- Soils
- Remediation
- Water Quality
- Odor
Storm Water Filtration, Erosion Control, Remediation
Stormwater, Erosion Control: Products, Markets and Research

• Products and Markets
  – Erosion/revegetation
  – Industrial filtration
  – Filter socks
  – Bio-bags
  – Green Roof Media
  – Mine reclamation
  – Corporate water quality reduction

• Research and Demonstration
  – Low Impact Design Bioretention
  – Water Quality Cu
  – Green Roofs
  – Stormwater Media Trials
Forestry: Opportunities and Challenges

• Products and Markets
  – Post Fire Seeding
  – Erosion control
  – Seedling out-planting
  – Slash Conversion

• Research and Demonstration
  – Forest Soils
  – Seed coating
  – Stream
  – Charring slash piles
Ecosystem Services – carbon, sustainability, wildlife, climate.

Products and Markets
Verifiable Carbon Offsets and other monetized carbon benefits
Sustainability
Biological diversity
Corporate carbon footprint reduction
Biochars as Best Available Control Technology

Research and Demonstration
Biochar Carbon Protocol

**Ecosystem services** “benefits that human communities enjoy as a result of natural processes and biological diversity.”

**Market** - providers of ecosystem services access financing to protect, restore and maintain ecological values
Research, Demonstrate, Educate

• Discovery, Education, Validation
• Voluntary producer standards and product specifications using IBI protocols
  – Lack of standards for biochar and biochar systems will limit growth
• Definition of biochar in state, local and industry specifications and regulations
• Resolve consumer legacy problems with biochar
• Innovative research e.g electrical properties of biochar
• Train youth through research and education
• Train markets in biochars and biochar systems
Educate and Demonstrate

• Educate farmers and resource managers
  – Documentation, training on appropriate use

• Educate food consumers
  – Brand biochar like organic: Cool Food, Carbon Stable farming

• Educate contractors – tree service, erosion control, landscape

• Make biochar known in local regional and federal government

• Suit education to consumer needs:
  – Farm- materials, tools, methods, probiotic production

• Use Cooperative Extension infrastructure to educate and demonstrate
**Find Partners in Government**

- Who will push the policy decisions? Agriculture, Environment, R&D
- Cultivate biochar advocates
- Enable agencies to permit biochar for appropriate uses
- What is the ask?
Ask: Target Specific Federal Policies

• Link conservation compliance with crop insurance
• Add Biochar to Environmental Quality Incentives Program (EQIP)
• Allow Conservational Reserve Program (CRP) land to be harvested for energy
• Continue CRP, EQIP, and Conservation Innovation Grants (CIG)
• Promote Thermal Energy from Biomass in Rural Energy for America (REAP) program
• Fund USDA Agricultural Research Service (ARS)
Access State Incentives, Policy and Permitting

• Access RPS or TRECs
• Revise heat input and efficiency definitions to include pyrolysis and gasification.
• Educate state agencies: economic development, energy, agriculture, environment
Who Will Fund Biochar Entrepreneurs?

- How do we make biochars credit worthy? No char contract – no char financing
- Off-take Contracts – Power purchase, energy
- Define Cost/benefit – reduced input, increase yield
- Biochar-Liquid Fuels as Profitable Business
  - Cool Planet cost/benefit
  - Biochar Now – 20 markets
- Solve growers problems that limit production – soil fertility, water etc.
- Co-production: biochar, activated carbon and energy (pellets, heat, power)
  - Phoenix Energy distributed energy and biochar
  - Related industries – biomass energy, organics recycling
- Biochar only
  - high value products, limited demand
  - DIY Biochar
Develop Innovative Technologies
Pyrolysis, Gasification, Combustion

- No “drop in the cart” tech
- Many low cost are labor intensive, low production.
- High cost, automatic
- Limited Number of Producers at Scale
- No 3 x 3 plants (3 commercial plants operating 3 years)
- Need safe, reliable, maintainable system
- Match tech with product quality.
- There are promising small industrial technologies
COOL GRASS SEED: Open burning in the Willamette Valley 1940-1980 sanitized fields, improved seed quality, sequestered carbon and polluted air.

Open Field Burning 1938 to 1977
- Burned straw and stubble to control blind seed disease
- Disease controlled by 1948
4 tons/acre, 100 acres/hr
270,000 acres/year

Benefits
- Seed quality
- Reduced disease w/o chemicals
- Returned nutrients and carbon
- 1%-2% or 80-160 lb C/acre
- Carbon 20,000 t/y C

Costs (2012)
- $4/a (w/o fee), $50/tC
- Air quality, health, safety
  Respirable particulate (<10µm)

Consequence
- Black Tuesday (1969)
- Regulation (1969ff)
- Phase Out and Termination (1980s)
COOL GRASS SEED: Mobile Field Sanitizers removed straw, burned stubble to sanitize fields, reduced emissions, increased carbon, retained nutrients but were not economically feasible.

- Development /Field Testing 1969-1977
  - 3-6 acres/hr 1.5t/a, 4-8t/h
- Benefits
  - Efficient
  - Clean Emissions
  - Part. 90%>100µm
  - Nutrients on Field
  - Good regrowth/yield
  - ~200-300 lb C/acre
- 550 acres/machine/year (80 tC/yr)
- Costs (2012)
  - Capital $125,000-$300,000
  - Labor – two drivers
  - Operation – two tractors
  - Remove and sell 2 t/a straw
  - 20-30 acres/day
  - $138/a
  - $1000-1,400/t C
Strategies for Sustainable Biochar Businesses

• Select bankable products: biochar, compost, dried or densified products, heat, cooling.
• Make a range of products. Work the markets.
• Support research and analysis.
• Set high standards for performance and consistency.
• Consider existing CHP. High marginal cost for kWe.
• Capital costs will equal to a biomass plant with similar production.
• Stationary plants vs. mobile? Small ~ high cost.
• Production must meet financial/cash needs.
• Local production use local resources (30 mi radius) at scale
• Visit biomass plants with similar production capacity.
Local conversion 30 mile radius, 5 Mwe.

150,000-300,000 tpy

http://goo.gl/maps/kR0La
Organization: Support Regional Organizations

- Carbon creates community
- Collective product experience
- Educate consumer, farmers and resource managers
- Demonstrate effectiveness
- Find partners in government
- Support Biochars in Community Supported Agriculture (CSA)
- Benefit from local Cooperative Extension services
Organization: US Biochar Initiative

• Created 2010 (Rio)
• 6 Board Members
• Funding:
  – Mostly funded by host organization (SOS)
  – No member, corporate or grant funding
• Conferences produced by local hosts (U Colorado, Iowa State University, Sonoma Biochar Initiative, Pioneer Valley Biochar Initiative)
• Need to organize for sustainable funding and future growth: e.g. association of regional organizations
• Need supporting biochar trade association
Design and development of energy and environmental processes

Industries
- Biomass energy
- Pollution control
- Materials handling
- Feed, Food and Fuels