Biochar Business case and certification

Rob van Haren, Irmgard Starmann, Claudia Kammann, Bruno Glaser & Hans-Peter Schmidt
Kiemenkracht

- Is an alliance from Product Board Arable Products and InnovationNetwork from the ministry of Economy, Agriculture & Innovation and represents 18,000 arable farmers

- The objective is to develop and implement ground breaking concepts

- Kiemenkracht opens up new horizons for arable farming in Netherlands and NW-Europe
Business case: Is good quality Biochar feasible for European farmers and does it have its effects?

- Biochar can be produced from any (dry)biomass feedstock
- Biochar quality and potential toxicity depends on feedstock and production process.
- Biochar LCA shows transportation distances are critical
Farmers perspective

• Good quality feedstock: best material with no residues, no PAH and no heavy metal

• Good quality process: produces longlasting biochar with no contaminants

• Good quality product: Soil improver which improves soil quality, fertility, water holding capacity, biodiversity and sequesters carbon permanently
voor een appel
en een emmer klei
**Business case: Biochar for winter wheat**  *(price level 2007-2010)*

<table>
<thead>
<tr>
<th></th>
<th>Netherlands</th>
<th>Germany</th>
<th>France</th>
<th>Poland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield (kg/ha)</td>
<td>8240</td>
<td>7490</td>
<td>6890</td>
<td>3855</td>
</tr>
<tr>
<td>price (€ /kg)</td>
<td>0.22</td>
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<tr>
<td><strong>Gross Revenues €</strong></td>
<td>1813</td>
<td>1648</td>
<td>1516</td>
<td>848</td>
</tr>
<tr>
<td>Seed €</td>
<td>83</td>
<td>66</td>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>131</td>
<td>113</td>
<td>105</td>
<td>90</td>
</tr>
<tr>
<td>Crop protection</td>
<td>183</td>
<td>116</td>
<td>126</td>
<td>28</td>
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<tr>
<td>Rest</td>
<td>143</td>
<td>31</td>
<td>8</td>
<td>n.b.</td>
</tr>
<tr>
<td><strong>Total costs</strong></td>
<td>540</td>
<td>326</td>
<td>294</td>
<td>163</td>
</tr>
<tr>
<td><strong>Net revenues (own mechanisation)</strong></td>
<td>1273</td>
<td>1322</td>
<td>1222</td>
<td>685</td>
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<tr>
<td>Agricultural contractor</td>
<td>92</td>
<td>258</td>
<td>85</td>
<td>n.b.</td>
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<tr>
<td><strong>Net Revenues (contractor)</strong></td>
<td>1181</td>
<td>1064</td>
<td>1137</td>
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Biomass costs

- **Compost:**
  - GFT: 10-20 €/ton OM (2-5 € product base)
  - certified compost: 40-60 €/ton OM (10-15 € product base)

- **Wood chips:**
  - Clean wood chips 35 €/ton
  - Woodchips mixed with prunings 15 €/ton

- **BBQ coal:** 300 – 2000 €/ton

- **Biochar:** 450-1500 €/ton

- **Fossil coal:** 70-90 €/ton
Advanced Biorefinery Inc,
unit 50 tons/day 24/24

Yield: 50% bio-oil, 20% biochar, Plant costs 4,000,000 €
Advanced Biorefinery Inc, unit 50 tons/day 24/24

Yield: 50% bio-oil, 20% biochar, Plant costs 4,000,000 €

- 2 shift operation 16 hrs/day
- Operating days: 300

- Lease costs fixed: 385,000 €/year
- Variable costs: 64,000 €/year
- Transportation costs 10,000 €/year
- Personell costs: 80,000 €/year

- Total costs: 539,000 €/year
Advanced Biorefinery Inc, unit 50 tons/day 24/24

Yield: 50% bio-oil, 20% biochar, Plant costs 4,000,000 €

- 1 shift operation 8 hrs/day
- Operating days: 250

- Input: 250*8*2 ton/hr = 4000 ton/yr

- Output bio-oil: 2000 ton ≈ 2500 m³
- Output Biochar: 800 ton

- Input costs: 140,000 €
- Output revenues:
  - Bio-oil (0,24€/l) 600,000 €
  - Biochar (400 €/ton) 320,000 €
Costs & revenues

- 1 shift operation 8 hrs/day
- Operating days: 250

- Input costs: 140,000 €
- Fixed&variable costs 539,000 €
- Output revenues:
  - Bio-oil (0,24€/l) 600,000 €
  - Biochar (400 €/ton) 320,000 €
- Nett return: 241,000 €
Biochar benefits for the farmer

• Crop yield increase: -5% -- +10%

• CO2 sequestration: 6-8 € ton CO2 ≈ 15-25 €ton biochar (voluntary market)

• Ecosystem services:
  – Biodiversity
  – Soil erosion prevention

• Bleu services
  – Water retention and water holding capacity
## Business case: winter wheat

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<td>Increase biochar (10%)</td>
<td>+181</td>
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<tr>
<td>CO2 credits</td>
<td>+75</td>
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mechanisation)           | 1273        | 1322    | 1222   | 685    |
| Agricultural contractor  | 92          | 258     | 85     | n.b.   |
| **Net Revenues (contractor)** | 1181   | 1064    | 1137   | 685    |
Farmers perspective

- Biochar additions must give significant Net Revenue increase
- Or by lowering biochar price
- Or by increasing crop yields
- Or by additional rewards for ecosystem services

- LOWERING BIOCHAR PRICE
  - Cost reduction feedstock (lower quality)
  - Lower ROI of investment
Safeguarding Biochar quality

European Biochar Foundation

The European Biochar Foundation

The European biochar foundation has the objective to promote sustainable biochar production and sustainable biochar application for environmental, agricultural and industrial use in Europe and the rest of the world.

The European biochar foundation achieves its objective by

1. Supporting and stimulating Biochar applied research and development in the domains of environment, agriculture, industrial applications, biochar production technologies and biochar feedstocks.
2. Promoting sustainable production and application of biochar by biochar knowledge dissemination by organising conferences, courses, masterclasses, summer schools workshops, and by the use of media (print and digital media) and any other means.
3. Advising authorities, enterprises, non-governmental organizations, educational institutes and biochar feedstock producers, biochar producers and biochar end users.
4. Developing and implementing biochar certification schemes for sustainable biochar production and biochar application.
5. Developing best practice advices and directives for the use of biochar in agriculture, for climate mitigation and optimising nutrient cycles.
6. Controlling biochar certification schemes by auditing and certification and by authorizing organizations to certify biochar feedstock, biochar production and biochar application.
7. Participating in (international) cooperations, enterprises, foundations and other organizations.
9. Any other legal means.

The European Biochar Foundation will be founded on 29th of August 2012.
European Biochar Foundation

- Founded August 2012

- Under patronage of Productschap Akkerbouw

- Supported by EU-COST action Biochar and EU-INTERREG IVb NSR Biochar

- The Foundation has as its object:
  - Promoting sustainable biochar production and sustainable biochar applications for environmental, agricultural and industrial use in Europe and the rest of the world; biochar is a carbon-rich product which is produced by thermal conversion of biomass in the absence of oxygen;
European Biochar Foundation

• Executive board:
  – Rob van Haren, Irmgard Starmann, Bruno Glaser, Claudia Kammann, Hans-Peter Schmidt

• Scientific advisory Board
  – To be appointed

• Committee of recommendation
  – To be appointed
Guidelines
European Biochar Certificate
for biochar production

© European Biochar Foundation (EBC)
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8. Quality assurance and certification
9. References

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10. Positive list of biomasses
11. Company declaration
12. Biochar production records
Pillars of the EBC-Certificate

1. Sustainable provision and production of biomass feedstock
2. Energy efficient, low emission pyrolysis technique
3. Biochar quality – low contaminant level
4. Low hazard use and application of biochar
5.8 The biochar's PAH content (sum of the EPA's 16 priority pollutants) must be under 12 mg/kg DM for *basic* grade and under 4 mg/kg DM for *premium* grade biochar.
Pillars of the EBC-Certificate

- Independent on-site control (governmental approved: q.inspecta)
- Unified analytical methods (authorized labs)
Pillars of the EBC-Certificate

- Independent on-site control (governmental approved: q.inspecta)
- Unified analytical methods (authorized labs)
- Annual revision of standard by the scientific board of the EBC
- Legally backed-up
- Economical viable
- Close to practice, understandable
European Biochar Foundation

• The foundation strives to implement the European Biochar Certificate in Europe

• Safeguard biochar production and applications in soil

• For reliable and cost effective biochar soil amendments