



ACP SCIENCE & TECHNOLOGY PROGRAMME

BIOCHAR PLUS - Energy, health, agricultural and environmental benefits from biochar use: building capacities in ACP Countries

Knowledge and use of biochar will be promoted, a promising and environmentally-friendly technology which offers several benefits in terms of energy access and efficiency, health, agriculture, environment, and socio-economic development. Seizing the opportunity offered by the widespread availability of feedstock (agricultural bio-wastes), the simplicity of converting biomass into biochar through pyrolysis with ELSA stoves, the low level of economic investment required, the high demand for charcoal as cooking fuel and the increasing demand for smoke-free cooking stoves, the production of biochar will be channelled - around energy clusters - into a sustainable and eco-friendly business opportunity for local communities.

Grant
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Co-ordinator
Università degli Studi di Udine, Italy

Partners
ECOWAS Centre for Renewable Energy and Energy Efficiencies (ECREEE), Cape Verde
STARTER, Italy
ASA Initiative, Ghana
Université de Lomé, Togo
Counterpart in Rehabilitation and Development in Sierra Leone (CORD SL), Sierra Leone
Jimma University, Ethiopia
Bindura University of Science Education, Zimbabwe

Project duration
36 months
1/2/2014 – 31/1/2017

EU grant
EUR 999.756,80

ACP regions and countries involved
Eastern Africa – Ethiopia, Zimbabwe
Western Africa – Cape Verde, Sierra Leone, Ghana, Togo, Guinea Bissau

Technical Assistance Unit

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Challenge

Growth in demand for wood fuel, coupled with a lack of alternative resources, has contributed to ecological decline (i.e. a decrease in forest area, increase in savannah, loss of biodiversity), soil erosion and health side effects. In Ghana, for instance, there is high consumption of wood (c.15 kg of wood per day per person) with the highest wood fuel consumption (charcoal or wood fuel) at the largest households, which may be related to wood fuel collection carrying no financial cost to households. People do not value energy conservation and this habit is seriously threatening the availability of fuel: it is estimated that in Togo there will not be any wood available in 20 years' time. Some available options to change the fuel use need to be explored:

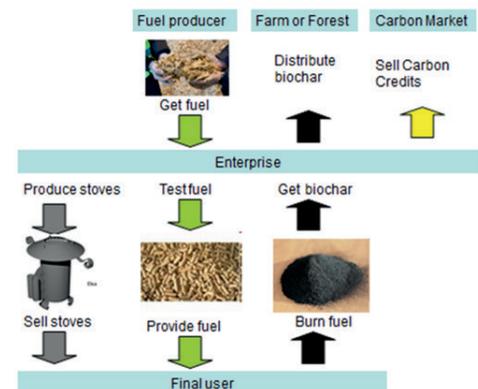
- Using other available biomass as feedstock.
- Improving cooking stoves to reduce the daily amount of charcoal or wood used per family.
- Improving feedstock characteristics (i.e. pellets).
- Studying, developing and applying sustainable forms of forest management.

Focus

Biochar Plus improves the capacities of developing countries to absorb and use biochar technology, a readily available knowledge, and promotes socio-economic development of families and communities. It also stimulates the development of specific biochar-related policies and incentive schemes, and builds the technical, entrepreneurial and scientific capacities of all stakeholders involved. The development of four energy clusters is expected to reduce anthropogenic pressure on forested areas and increase the soil fertility of cropland:

- Producing and selling biochar stoves.
- Producing and selling the fuel produced with locally available feedstock (pellets).
- Collecting and distributing the biochar.

- Receiving carbon credits and selling them in the international carbon markets.



The four biochar energy clusters

Rationale

Biochar Plus is a follow-up on a previous ACP S&T project ('BeBi - Agricultural and environmental benefits from biochar use in ACP Countries'). Biochar is a fine-grained substance, similar in appearance to charcoal, produced by the natural burning of bio-wastes or in kiln during pyrolysis. It is also a highly porous, chemically stable, carbon-based soil additive that retains water, nutrients, and micro-organisms, enhancing crop yields. BeBi designed an improved cooking stove using pyrolysis (ELSA stove), achieving benefits in terms of energy efficiency and safety: it can be tailored to different feedstock and adapted to produce the energy necessary for households. The added value of this stove, compared with others available in the market, is its accessibility and affordability for local communities: it is cheap and easy to build and use. ELSA is an 'open' product that can eventually be modified and adapted to any need. Biochar Plus will capitalise on the previous experiences with the start-up of community-based energy clusters based on the production and use of biochar.



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Producing an ELSA stove in Afiaso, Ghana (February 2013).

Pellets produced with local biomass and used for cooking in Afiaso, Ghana (February 2013).



Traditional dishes cooked with ELSA stove in Afiaso, Ghana (February 2013).

Programme theme(s)

Energy access and efficiency
Agriculture and food security

Sector

Higher education
Health education
Energy policy and administrative management
Power generation / renewable sources
Biomass
Energy education / training
Agricultural policy and administrative management
Agricultural development
Agricultural land resources
Agricultural inputs
Food crop production
Agricultural extension
Agricultural education / training
Forestry policy and administrative management
Fuel wood / charcoal
Forestry education / training
Small and medium-sized enterprise (SME) development
Environmental policy and administrative management
Environmental education / training

Keywords

biochar
pyrolysis
clean cooking stoves
economic energy clusters
fuel
carbon footprint and mitigation pellets
sustainable energy
biomass residues

Project contact

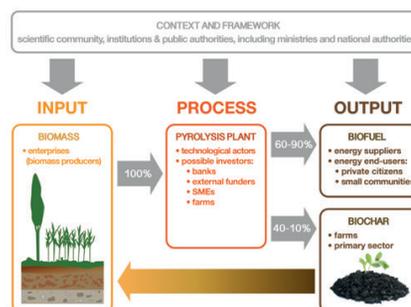
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Method

The sustainable production of energy through the ELSA stove and the implementation of environmental-friendly soil management practices will be promoted. The know-how to produce, distribute and use these stoves will be shared with small- and medium-sized enterprises (SMEs), to take up the technology and start businesses involved in stove manufacturing, fuel production and biochar distribution. Farms and landowners will be involved in gathering the agricultural residues and other available biomasses for fuel production and the application of biochar to soil: the collection of biomass remnants (crop residue, non-commercial wood, wood waste, manure, solid waste, non-food energy crops, construction scraps...) will be promoted. Communities, particularly women, will be encouraged to adopt the pyrolysis plants and the biochar ELSA burners for their households.

Scientific organisations will have opportunities to advance the scientific knowledge on biochar and start networking in Africa with biochar-related international initiatives. Education systems can develop curricula and know-how on the ELSA burners and on the pyrolysis plants. Decision makers will advance the policy framework and endorse biochar energy production as a friendly technology that provides multiple benefits in the fields of energy, health, agriculture, environment and socio-economic development. They can also promote the sustainable and improved energy access aspects of the technology.



The pyrolysis/biochar lifecycle



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The project is organised around two main pillars:

- Scaling up the technology by developing capacities both for small-scale biochar plants (ELSA stove) and for large-scale biochar production plants along with the development of the energy clusters;
- Ensuring the local ownership of the technology and the commitment of the stakeholders through a participatory approach.

Results

- Institutional capacities to formulate, manage, monitor, evaluate and disseminate biochar-related activities reinforced.
- Energy clusters developed, based on pyrolysis / biochar and providing an impetus for the growth and socio-economic development of local communities.
- The application of biochar to soil promoted, improving soil productivity of cropland.
- Energy access and efficiency ensured for local communities, achieving at the same time health and environmental benefits.
- Reduced impact on the local environment through the sustainable use of available bio-wastes as biofuel.
- Enhanced participation of the African scientific and educational community in biochar-related networks.