



RESSECT

Towards a circular economy in Sub-Saharan Africa

Establishing a Black Soldier Fly (BSF)
biowaste treatment company in Nakuru, Kenya



Business Plan
2022-2025

Business Plan 2022-2025

Severin Spring
Co-Founder **SUSTAIN**
severin@sustain-aquaculture.com
+4176 446 36 75 (CH)

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Problem and the Opportunity

– Why did we initiate the project?

Sub-Saharan Africa (SSA) inhabits the world's fastest growing population: From approximately 1.1 billion people in 2020 to an expected 2.2 billion in 2050 – by then, two in every five children will be born in SSA (Figure 1).

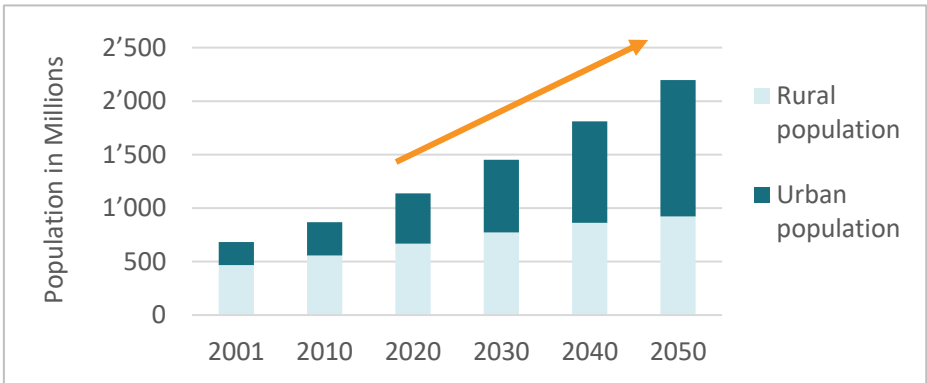


Figure 1: Population growth in Sub-Saharan Africa (World Bank, 2021)

Moreover, urbanization rate is steadily increasing, leading to more and more people living in cities. In the recent past this has led to a spike in municipal solid waste (“household waste”) production. Until mid of the century, the municipal solid waste is expected to nearly triple in SSA (Figure 2).

Waste management systems in SSA are still poorly developed and most of the waste is openly dumped. Apart from sanitary challenges this also leads to high greenhouse gas emissions, especially from the uncontrolled decomposition of the large proportion of organic waste (Figure 2).



Figure 2: Key insights on waste in SSA (adjusted numbers from Kaza et al. 2018)

Problem and the Opportunity

– Why did we initiate the project?

Biowaste treatment with black soldier fly¹ (BSF) is a possible solution to tackle the increasing organic waste piles in SSA. Over its life cycle the black soldier fly larvae (BSFL) consumes vast amounts of organic material.



Figure 4: BSF life cycle

Through an engineered life cycle the BSF can be used to process organic waste into high-valuable fertilizer and protein meal. Dried and processed BSFL are an excellent protein source for various livestock such as chickens, pigs and fish. The insect excretions leftovers from the digested organic waste (“insect frass”) is a highly effective fertilizer to boost crop growth (Figure 3).

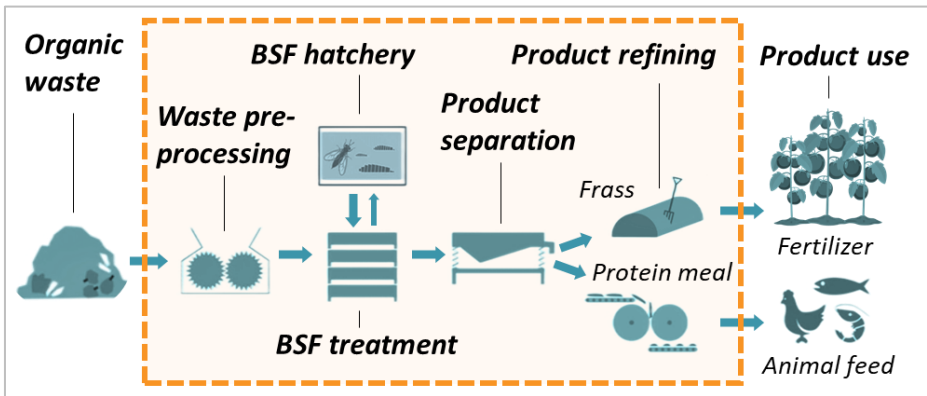


Figure 3: Black soldier fly biowaste treatment facility (adjusted from EAWAG, 2017)

The benefit of biowaste treatment with BSF is not only the upcycling of organic waste, but also the significant reduction of greenhouse gas (GHG) emissions that can be achieved: Compared to open dumping of organic waste the BSF treatment can reduce GHG emissions by 80-90%.

¹Black soldier flies (*Hermetia illucens*) naturally occur across Sub-Saharan Africa.

Ressect

– What is the idea behind our project?

Ressect is a Kenyan startup with the goal to make biowaste treatment economically and ecologically feasible in Sub-Saharan Africa.

Our Mission: Our mission is to create an ecologically and socio-economically viable biowaste treatment process for SME waste businesses in Sub-Saharan Africa to upcycle organic waste into a sustainable source of protein – thereby we give everybody in the world the chance to be part of it.

Our Vision: We envision Sub-Saharan Africa as a place where organic “waste” does not exist.

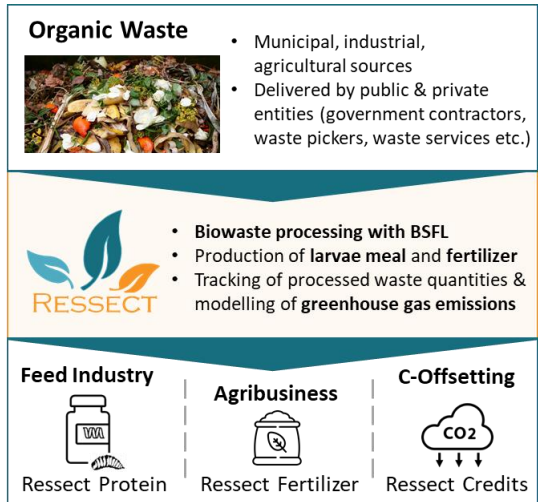


Figure 5: Business model of a Ressect BSF facility

Table 1: Current pilot facility of Ressect at Egerton University in Nakuru, Kenya

Waste Pre-Processing	Hatchery & Nursery	Treatment Facility
		
Shredder to process 80kg organic waste per hour into feed for the black soldier fly larvae	Holding 50'000 flies to produce ~100g of eggs per week which lead to ~1.5 million small larvae	115m ² greenhouse to process 1.6tons of organic waste & produce >100kg of BSFL per week

Team

– Who stands behind the project?

The People:



Mike is responsible for smooth operations of our model facility.

- Experience in bio-waste management using BSF
- BSc in animal science (Egerton University, KE)
- Passionate about music



Proscovia is responsible for business development.

- Experience in aquaculture industry and fishery sciences
- MSc in aquaculture (University of Stirling, UK)
- Passionate about conservation and social business



Dennis is responsible for research & development.

- Experience in animal nutrition & agri value chains
- MSc in animal nutrition (Egerton University, KE)
- Passionate about photography & videos and cooking



Severin is responsible for finance and international relations.

- Entrepreneurial experience in East Africa (5 years)
- Business development analyst with background in statistics
- Passionate about sustainable entrepreneurship (co-founder of The Spring Project and SUSTAIN)

Institutions & Partners:



Ressect was first established in Switzerland in 2017¹. The company focused initially on BSF production in high-tech environments. A project of the Swiss company together with Dennis & Mike led to the development of Ressect Kenya in Nakuru at Egerton University.

Since 2020 The Spring Project and SUSTAIN support the Kenyan team on their entrepreneurial journey.

¹As of Autumn 2020 Ressect GmbH is no longer operational in Switzerland.

The
Spring
Project

The Spring Project (TSP) is a Swiss association supporting young entrepreneurs in low-income countries with capacity building. The association's focus lies on socio-economically and ecologically sustainable agriculture.

SUSTAIN 

SUSTAIN is a Swiss venture builder company focusing on sustainable aquaculture value chains in East Africa.

History and Origin

– How did the project come about?

2017-2019 First projects – a Swiss-Kenyan Collaboration

- 2017: Ressect GmbH was founded in Switzerland
- 2018: One year pilot operation in a trial BSF treatment facility in Switzerland, production of aquarium fish feed from black soldier fly larvae
- 2019: Start of Ressect in Kenya together with Dennis and Mike at Egerton University, established a small pilot treatment facility and focused on smallholder BSF production through an out-grower scheme, supported by REPIC (SDC & SECO)

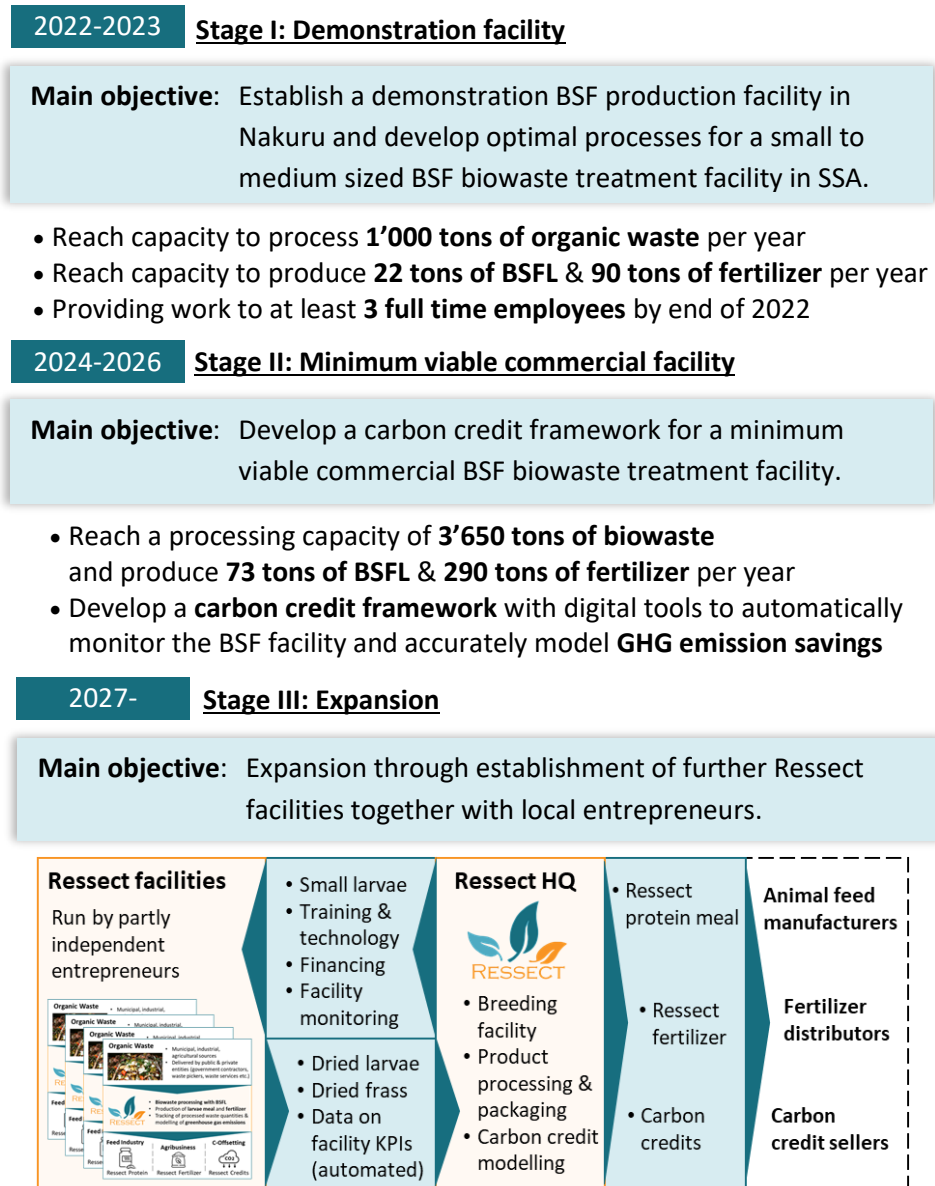
2020-2021 Reorientation – Ressect as a business

- Q1-20: High impact of COVID-19 pandemic due to closure of nearby markets, hotels, university which led to much lower organic waste stream
- Q2-20: Completion of REPIC project, showed that out-grower scheme is (not yet) feasible, reorientation to a more centralized approach
- Q3-20: Severin & Proscovia join the team
- Q4-20 to Q4-21: Biowaste treatment trials in the pilot facility to evaluate relevant key performance indices (KPI); product development of 'ressect protein meal' (BSF larvae), 'ressect fertilizer' (BSF frass & additives); registration of Ressect as a business in Kenya



Outlook

– What do we plan in the future?



Potential Impact

– What impact do we strive for?











	Stage I Demonstration Facility	Stage II Commercial Facility	Multiplication / Sector Potential 2050	SDGs
	Avoiding Green House Gas (GHG) emissions of 350 tons CO₂e per year compared to landfilling of organic waste <i>1 passenger flight from Zurich to Nairobi emits ~1 ton CO₂e</i>	Avoiding GHG emissions of 1'250 tons CO₂e per year <i>This equals the average annual GHG emissions of >260 people in Switzerland</i>	Avoiding GHG emissions of 20-60 million tons CO₂e per year <i>Total GHG emissions of Switzerland accounted to 46 million tons CO₂e in 2018</i>	  
	<ul style="list-style-type: none"> Upcycling of 1'000 tons of organic waste Production of 22 tons of high-quality BSFL protein meal for animal feed 90 tons of fertilizer 	<ul style="list-style-type: none"> Upcycling of 3'650 tons of organic waste Production of 73 tons of high-quality BSFL protein meal for animal feed 290 tons of fertilizer 	<ul style="list-style-type: none"> Upcycling of ~60-160 million tons of organic waste in SSA Production of 1.2-3.3 million tons of BSFL protein meal per year BSF sector of 1.5-4b USD 	 
	<ul style="list-style-type: none"> Direct employment for 3 people Indirect employment for waste pickers 	<ul style="list-style-type: none"> Direct employment for 10 people Indirect employment for waste pickers 	Direct employment of 80'000 to 230'000 people in the BSF waste treatment sector in SSA	 

Figure 7: Potential environmental and socio-economic impact of Ressect at stage I (3 tons of organic waste per day) and stage II (10 tons of organic waste per day) and the BSFL biowaste treatment sector potential in SSA by 2050.

Finance/Budget

– Are we a money-making machine?

Ressect is a private venture and will therefore operate on a self-financing basis in the long-term.

Sales of our first commercially viable facility are expected to reach 111k USD by 2025 (Year IV) at an EBIT-margin of 24% and EBIT of 27k USD (Figure 8). This is excluding the potential sales of carbon credits.

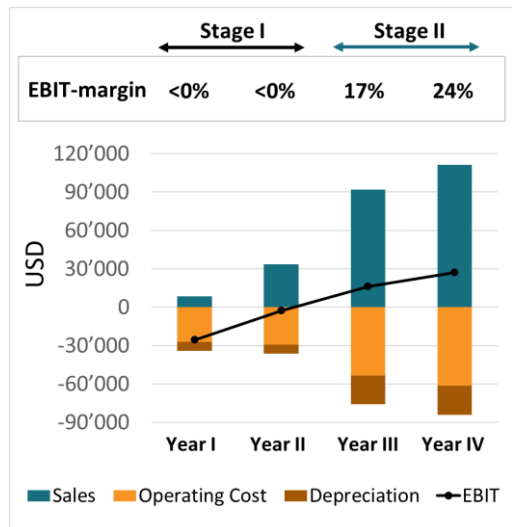


Figure 8: Financial plan Year I-IV

The ongoing pilot project is financed through private investments (TSP & SUSTAIN and Co-Founders of Ressect).

The overall needed investments to expand the pilot project in stage I and the establishment of a minimum viable commercial facility in stage II accounts to ~250k USD (CAPEX 134k USD, OPEX 117k USD).

Ressect’s primary target is not the maximization of profits, but rather the creation of positive impact in the socio-economic and environmental context. The company’s focus is on the long-term and still unmet potential of the BSFL sector in Sub-Saharan Africa. The initial operation of a minimum viable commercial facility is expected to reach solid profitable levels on a net profit basis. However, the internal rate of return (IRR) of Ressect will stay negative and reach around -4% for the first 6 years of operations.

After the establishment of our first commercial BSF facility and the development of the carbon credit offsetting framework, further commercial facilities will be established in stage III. Six-year IRR of a newly established facility will then reach >10% per year.

Table 2: Ressect budget Year I-IV

Stage I (Year I-II)	
CAPEX	USD 48'447
OPEX	USD 30'463
TOTAL Stage I	USD 78'910
Stage II (Year III-IV)	
CAPEX	USD 85'501
OPEX	USD 86'520
TOTAL Stage II	USD 172'020

Contacts

– How can you reach us?

If you are interested to invest in our projects or want to collaborate with us, feel free to contact us and request further information.

Email: info@ressect.com

Phone/WhatsApp: +254 792 791 692

Email: info@ressect.com

Phone/WhatsApp: +254 792 791 692