



BLACK SOLDIER FLIES CONVERTIBLE MINIBONDS

Fostering an efficient and sustainable source of high-quality protein animal feed by providing incentivizing financial capital and knowledge to farmers



INVESTMENT THESIS

Insects are becoming an increasingly crucial source of animal feed due to their higher nutritional levels and lower environmental impact. The Black Soldier Flies (BSFs) convertible minibond is a financial vehicle embedded in an operative framework that will incentivize the expansion of farming BSFs in Europe. This instrument is also designed to boost innovation and build economies of knowledge to lay the foundation for expanding a new market.

PROBLEM STATEMENT

Overpopulation

The global population reached 7.7bn in 2022 and is expected to reach 9bn by 2050. This surge in population demands increased food production and production efficiency. Indeed, as of 2022, 821m people are suffering from hunger worldwide. The meat production doubled over the recent three decades and is forecasted to reach around 500m tons by 2050.

Unsustainable and Inefficient Food Supply

80% of global farmland is dedicated to production of livestock feed

Meat production accounts for 21% of the global greenhouse emission

Faced with this population growth, the current meat production processes are unsustainable in terms of natural resources and ecological impact.

OPPORTUNITIES

BSFs as Stable and Circular Agriculture Feed

BSFs grow on organic waste and can be harvested within two weeks. They can breed throughout the year in a suitable climate. As the environment can be controlled, no seasonal effect applies to producing soy. Furthermore, BSFs procreate themselves in a circular cycle. This will lead to non-seasonal and regular cash-flows, reducing the risk on the underlying of the investment vehicle.

BSFs as Environmental Sustainable Agriculture Feed

1m ² FEED YIELD/YEAR	BSFs are x580 more efficient	Less water, land, and energy usage → Lower costs for animal feed
SOY 0.5 Kg vs. BSFs 292 Kg		
+ BSFs can be farmed locally, close to where the feed is needed		Less transportation → Lower air pollution
+ BSFs digest organic food waste and convert it into nutrients.		Introducing a circular economy in the feed industry

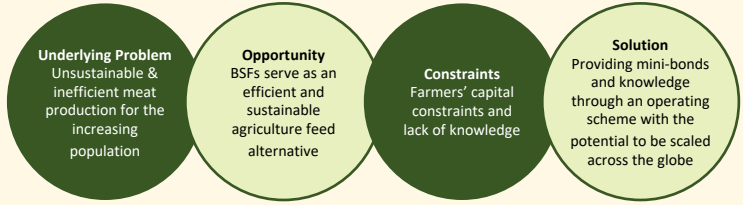
BSFs as Quantity- and Quality-Increasing Agriculture Feed

Revenue increase	Cost decrease	Increase of farm's net income and increased sustainability
A study in Kenya shows multiple advantages when replacing conventional feed with BSFs. Chicken and pigs are growing faster and better when feeding insect protein. A 53% increase in egg production has been reported. Simultaneously, the quality of the eggs improved → Earnings increased by +20%	When raising animals, the protein cost in feeds account for 60 - 70% of total costs. BSFs are more affordable than conventional feed	

- + BSFs can completely replace in a superior way soy in pigs, poultry, and aquaculture.
- + Additionally, fully grown BSFs do not transmit diseases. At the same time, BSFs kill bacteria and thus are sanitary.

SOLUTION OVERVIEW

The unsustainable and inefficient meat production for an increasing population demands a sustainable solution. BSFs imply multiple advantages over conventional feed, making them an efficient, sustainable, and superior feed alternative for agriculture animals. To overcome capital constraints and knowledge lack of farmers, we propose the provision of minibonds and knowledge sharing through an operating framework within the EU. Once successfully tested, our solution implies the potential to be scaled up across the globe.



CONTRIBUTION TO THE SUSTAINABLE DEVELOPEMENT GOAL 12

BSFs digest organic waste and procreate themselves in a cycle. Its larvae are more affordable, resource-efficient in production, and of higher quality than conventional feed (SDG 12.2). The BSF Convertible Minibonds will foster the adoption of insects as conventional feed (SDG 12.6). Moreover, insect farming circular economy reduces waste generation (SDG 12.5).

SUBSTITUTES ANALYSIS & BSFs LIFE CYCLE

	Fishmeal	Soymeal	BSF Larvae
EUR/ton	2'200	400	670
Price trend	Strongly Increasing	Increasing	N/A
Protein	<72%	<49%	<50%
Lipids	17%	2.4%	<49%
Amino Acids	29% more than soy	Same as BSF	Same as soy
Production	Centrally	Centrally	Locally
Prod. m ² /year	N/A	0.5kg	292kg

With each generation, the population of BSFs increases by the factor of 137.

TARGET GEOGRAPHY AND AGRI-FOOD FINANCING LANDSCAPE

Our targeted market is due to beneficial regulatory changes from 2013 to 2021. The agri-food sector is considered risk-averse as the business involves a cyclicity affecting cash flows. Further, the industry is strongly asset-based and driven by fixed high-costs, hampering the birth of disruptive innovation. Action is needed to innovate the agri-food sector.

TARGET LENDERS

Target lenders are entrepreneurs interested in opening a large-scale insect farm.

TARGET INVESTORS

Target investors are institutional and professional strategic impact investors interested in achieving financial profit and making an environmental impact, and in converting their minibonds into equity. Examples are VC funds, investment firms, collective investment pools, impact investors, and other agri-food corporate entities. These may have a strong incentive in investing in alternative feed solutions as the businesses may be directly affected.

MARKET SIZING OF EUROPEAN MARKET

(in EUR bn)	Chicken	Pig	Fish
Feed Market Size ('21)	2.16	1.43	33.78
Feed Market Size ('26)	2.43	1.83	39.53
CAGR	5.77%	5.13%	9.43%
Replacement by BSF	100%	100%	10%
BSF Market pot. '21	2.16	1.43	3.38
BSF Market pot. '26	2.43	1.83	3.95

Est. market potential in Europe: EUR 6.97 bn by 2021 (7.8% of European animal feed market)
EUR 8.21 bn by 2026 (8.6%)

Est. global market potential*: EUR 36.24 bn by 2021
EUR 39.96 bn by 2026

Scale factor in 2026 by global expansion: **4.87x**

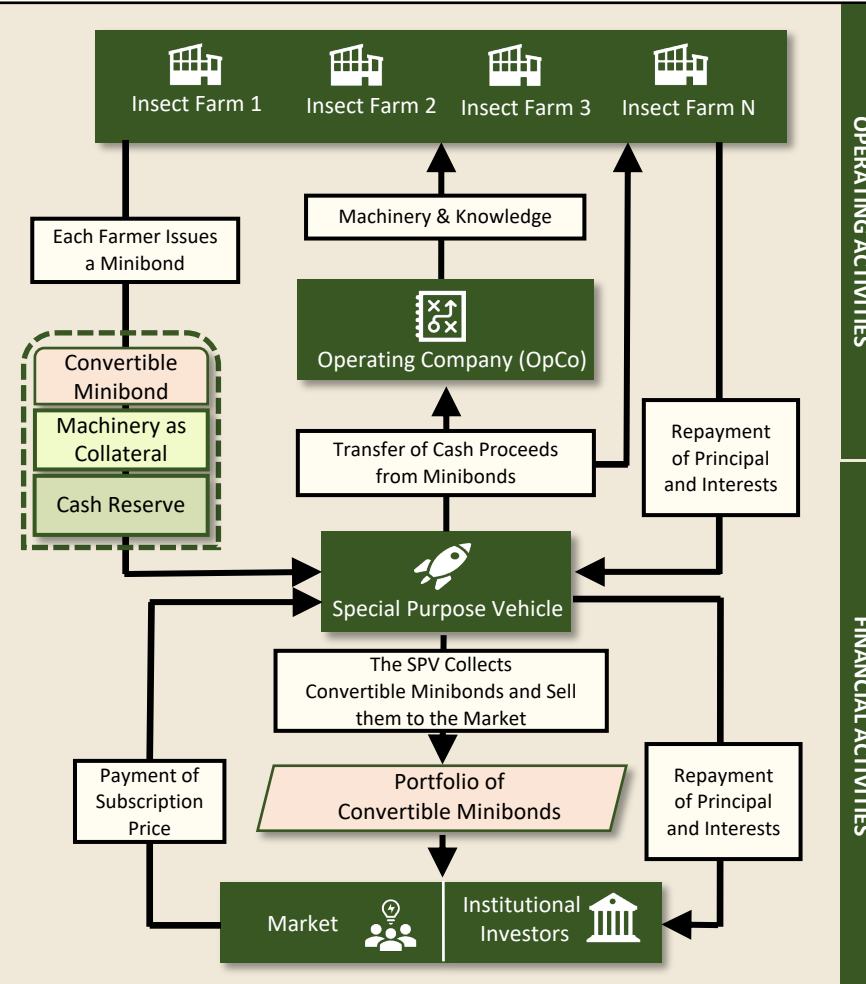
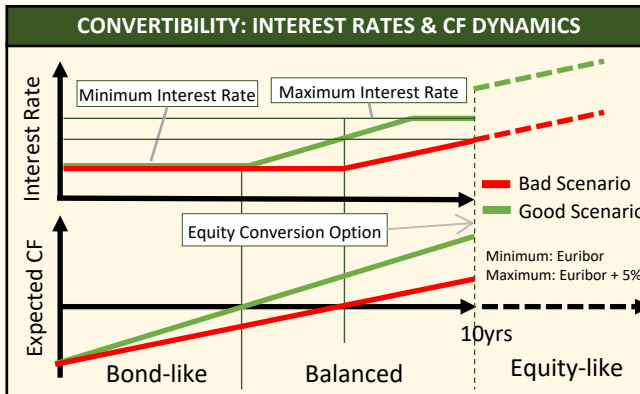
* Based on the % of the European market

BLACK SOLDIER FLIES CONVERTIBLE MINIBONDS

Convertible minibonds allow farmers to secure funds, reduce financing risk, and obtain financing at lower costs. For investors, these convertible **minibonds represent a long-term high risk/reward investment that fosters innovation and sustainability in the livestock industry. It is less risky than a VC investment as bonds are collateralized by the machines provided by the OpCo.** The proceeding is as follows:

1. Entrepreneurs want to start a large-scale, competitive insect farm and **issue a minibond worth EUR 2m** to buy the whole insect farm system and access expert knowledge.
2. After borrower DD, **funds are provided by the SPV. Most funds directly flow to the OpCo partner** (a suitable partner is Bühler AG, a global leader in the food processing machines industry), who produces the machines and knows how to operate them. As our orders are large, we expect a significant reduction in the purchase price, so farmers get their machines cheaper. **The other funds flow directly to the entrepreneurs** to pay for the variable costs of the insect farm. **For the investor, the machines are collateral, reducing the investor's risk.**
3. The interest rate premium over Euribor depends on the CF, with a cap at 5% to foster the use of an innovative solution. The discount in the first few terms is offset by the **lower risk (collateralized), the higher premium in the later years, and the option to convert their debt to equity of selected portfolio borrowers.** There will be a fair minimum equity price set, and in an **auction process**, the highest offer of the investors will get min. 10% equity stake. **Hence, this product is attractive for return-focused investors.**
4. After maturity, **the lender decides whether to convert the bond into equity** to buy an insect farm that has completed its ramp-up phase and generates steady cash flows.
5. The chart **"Convertibility: Interest Rates & CF Dynamics"** describes the scenarios.

TERM SHEET	
Total Commitment	EUR 2.4m per plant / EUR 120m target raise
Min. Lender Size	5 Plants (400 BCUs), EUR 12m
Use of Proceeds	Mostly hardware and set-up costs
Debt Term	10 years
Interest Rate	Euribor (min. 0%) + CF premium (max. 5%)
Fees	1.0% p.a. on deployed capital



CASH FLOW & RETURN CALCULATION (kEUR)	
BSFL Income	3,600
Operating Expense	(2,160)
Labor Expense	(240)
Margin	1,200
Administrative Expense	(700)
Cash Flow	500

INITIATION INVESTMENT REQUIREMENTS FOR PLANT (kEUR)	
Bioconversion Unit (BCU)	1,600
Dryer	224
Sifter	80
Container	96
Utilities	400
Total	2,400

INVESTOR IMPACT MATRIX	
Environm.	BSFs advance the resource efficiency , e.g., it is 580x more efficient in land usage and egg production of chicken increased by 53%.
Financial return	BSFs serve as more affordable agriculture feed than conventional feed, increasing the farmers' earnings (+20% in Kenya). Hence, our minibonds generate more interest (max. Euribor +5%) compared to green bonds , which tend to return less than the average of regular bonds of 3.77%. While initial loans are needed, the underlying investment is promising today and will further increase efficiency and return over time due to the learning curve effect.
Risk/DD	+: The harvesting of BSFs is fast, easy, and not seasonal . The resulting stable and regular cashflows in combination with the favorable regulatory landscape enable an attractive risk/return profile . DD: Every entrepreneur must submit a business plan , which the SPV personnel will screen. -: The yield of a debt investment for an innovative solution entails risks that are not easy to manage, requiring deep know-how of the specific industry. → Convertible minibonds are suitable for professional investors.
Scalability	BSF Convertible Minibonds are easily scalable to other regions , leading to worldwide market potential. At first, the European market potential has an expected size of EUR7.0bn by 2021. The growth rates of the markets are promising with an estimated CAGR of 38% (2020-2030). By expanding globally, the potential can increase by around five times to EUR39.96bn in 2026.

FUTURE OUTLOOK – MARKET EXPANSION & COMMODITIZATION OF BSFs

The BSF Convertible Minibonds **accelerates the expansion of the insect farming industry in Europe**. After piloting in the EU, global growth can be considered.

This will help **spread the knowledge** about insect farming and contribute to **innovation** with an overall benefit for the market players.

As insect-based animal feed gains traction, it is possible to **commoditize BSFs and standardize the sale of BSFs**. This will change the market dynamics and lead to a globalized market **where farmers can secure their revenues long-term by going short. Commoditization and stable returns will reduce risk and thus reduce financing costs.** If the market is commoditized, this financial vehicle helped establish a new market, has served its purpose, and needs to be re-engineered.

Overall, increasing the efficiency and quantity of agricultural feed will make the meat **more accessible and produced with less impactful processes.**



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References

