Business models behind bio-based good practices

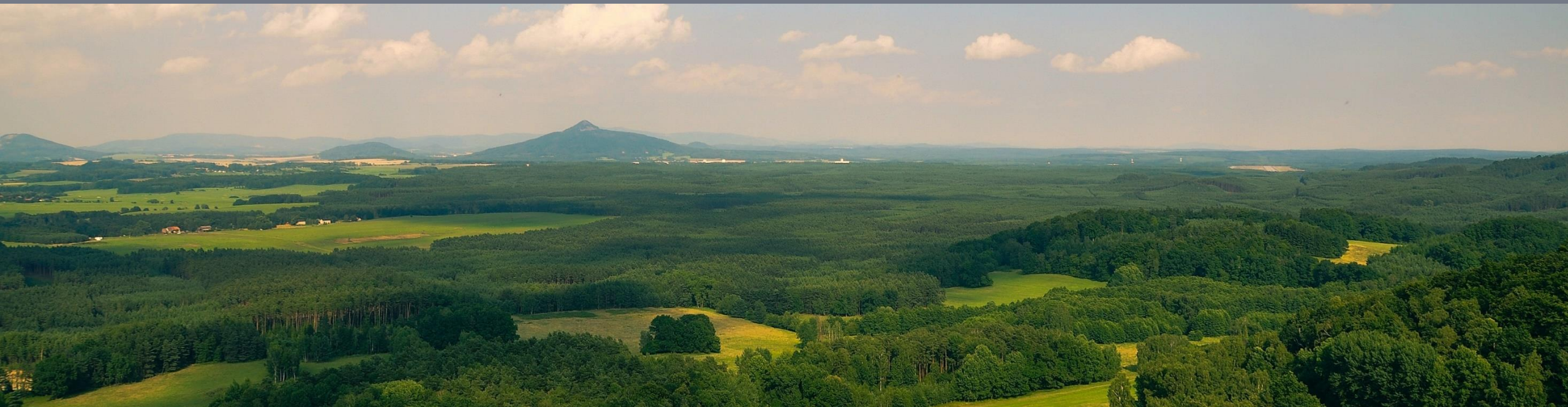
05. 03. 2021

Nora Hatvani – Bay Zoltan Nonprofit Ltd.

BIOECONOMY INNOVATION WEEK
FOR BOOSTING THE REGIONAL BIOECONOMY IN CEEc

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 818351

Business models in POWER4BIO project



Aims and context

- POWER4BIO project: supporting **regional bioeconomy development** by providing regional stakeholders with **tools, instruments and guidance** to develop and implement their bioeconomy strategies
- collection of **bio-based business models**
- deployed at **smaller scale in rural areas**
- Personal motivation: **high interest and positive feedback** received from company representatives and other stakeholders

Business modelling methodology

Methodology

- **Business Model Canvas (BMC)***
- 19 business models described using BMC in POWER4BIO

*Osterwalder, A., Pigneur, Y., Business Model Generation: A Handbook for Visionaries, Game Changers and Challengers (2010)

BMC - Value Proposition

- Company activities: products, technologies, services* offered to customers
- Values behind company activities*
- Ways how to address problems and/or needs on Customers' side
- What makes the solution* unique or innovative

* In our specific case: ***bio-based*** activities, solutions, technologies, products etc.

Internal building blocks of BMC

- **Key Partners**: network of partners that make the business model work
- **Key Activities**: most important things a company must do to make its business model work and deliver the Value Proposition to the customers
- **Key Resources**: physical, financial, intellectual, human etc. assets required to make a business model work

External building blocks of BMC

- **Customer Relationships**: to develop all experiences the customer has with the company and its product
- **Channels**: how a company reaches its Customer Segments
- **Customer Segments**: customers the Value Proposition can be delivered to

BMC - Finance-related building blocks

- **Cost structure**
  - capital expenditures (CAPEX)
  - operating expenditures (OPEX)
- **Revenue streams**
  - direct revenues: generated directly from customer segments
  - indirect revenues: from parties that have an interest in the customer segments and are therefore willing to provide a financial compensation

Good examples

Example 1: Production of feed quality protein meal by the bioconversion of residual organic streams using Black Soldier Fly Larvae

POWER4BIO
REGIONS FOR

Key Partnerships

- raw material providers ensuring biomass feedstock of appropriate quality
- industrial and academic partners to increase TRL and to find new applications for BSF larvae products and side streams

Key Activities

- feedstock reception and strict quality control upon receipt (dry matter content, free of pesticides/insecticides)
- primary production of dry insects (eggs, larvae)
- processing insects into concentrated protein meal, insect oil and natural fertilizer
- adapting the technology to fit into existing operations (scale-up of current process)
- continuous research and technology development for cost effective and higher quality production

Key Resources

- raw material feedstock of appropriate quality (very low content of insecticides) and uniform in physical and nutritional properties
- know-how on BSF eggs production and insects growing
- infrastructure for feedstock storage and quality control
- facilities comprising conditioned rearing cells and equipment for feeding of the insects
- equipment to isolate protein meal and insect oil
- sales competences

Value Proposition

- tailored sustainable solutions for growing and processing insects
- scalable solution to utilise residual and perishable excess biomass from potato industry, beer and alcohol industry into valuable feed-quality and storable protein and oil with high nutritional value
- substrate remaining after isolation of protein and oil has value as fertiliser
- automated processing secures consistent and safe products
- making food chain more sustainable

Customer Relationships

- Business to Business (B2B) and Business to Customers (B2C) sales strategies
- using a sales force of 3-5 persons in Europe

Channels

- company website
- social media and YouTube channels
- conferences and presentations in fairs
- interinstitutional cooperation projects

Customer Segments

- pet food industry
- aquaculture
- feed industry (farm animals)

Cost Structure

- CAPEX is in the range between 3-5 MEUR (estimated by WR in POWER4BIO);
- main long-term expenses: plant and equipment purchases, building and improvements, instrumentation and automation of the process;
- OPEX is in the range of 3-5 MEUR/year, with the following distribution: 1/3 labour, 1/3 raw materials and 1/3 utilities;
- most important operational expenses: feedstock, energy and labour costs

Revenue Streams

- main revenue streams come from the sales of dry insects for animal feed and pet food.
- prices of the most important products are in the range of 1-3 EUR/kg for dry BSF larvae as animal feed and 15-40 EUR/kg for pet food

Example 2: Converting vegetal oils and lignocellulosic material derived from grape marc into coated technical textile

POWER4BIO
REGIONS FOR BIOECONOMY

Key Partnerships
- raw material providers: farmers and winemakers
- partners for transporting feedstock and products
- research and development partners

Key Activities
- feedstock transport and storage
- innovative manufacturing process steps (drying and purification of the grape marc, vegetal oil polymerisation and spreading)
- product transport
- continuous technology development for more cost effective and higher quality production

Key Resources
- estate for the buildings and feedstock storage
- buildings and machinery for processes listed under Key Activities
- feedstock (grape marc from wine production) with proper qualities
- vehicles for transport and handling of feedstock and products
- know-how and optimization based on own experience
- specific-skilled workforce

Value Proposition
- → production of coated technical textile from vegetal oils (rapeseed oil, grape seed oil) and lignocellulosic material derived from grape marc
- → innovative, cost-effective and eco-friendly process producing low-impact, cruelty-free biomaterial
- → substitution of synthetic and animal leather in all kinds of applications
- → new value chain for agricultural wastes, such as the grape marc

Customer Relationships
- close cooperation with interested companies, which can implement the technology
- only B2B sales strategy

Channels
- marketing: website, Facebook, LinkedIn, Twitter
- exhibitions, presentations and workshops to inform stakeholders

Customer Segments
- textile industry companies
- companies interested in applications in fashion, furniture, packaging, automotive & transportation

Cost Structure
- private and public investment received
- investment cost of the launch of the company was estimated at 900°000 EUR, according to the description of the SME Instrument Phase 2 project it was financed by
- the most important OPEX costs: feedstock, energy, transport, administrative and labour costs
- labour costs are relatively low, because the technology process requires only 10 workers

Revenue Streams
- → selling of coated technical textile

FOR BOOSTING THE REGIONAL BIOECONOMY IN CEEc

Example 3: Production of high-purity renewable platform chemicals via hydrothermal carbonization (HTC)

POWER4BIO REGIONS FOR ...OMY

Key Partnerships

- raw material (fructose) providers (farmers and dealers)
- technology development partners and B2C companies
- industrial partners in the chemical industry
- partner for export promotion
- partner in scaling up
- chemical and biochemical networks to reach clients

Key Activities

- biomass input is processed to fructose
- HTC technology implementation to produce 5-HMF from fructose
- industrial production of biochemicals: operation of the commercial plant
- identifying partners to ensure bio-based feedstock supply (e.g. food or ethanol production plant)
- dabbling in the use of cellulosic biomass and by-products of the food industry
- local training of the employees

Key Resources

- aqueous–organic biphasic continuously stirred tank reactor to produce 5-HMF
- bio-based feedstock (around 10-20 t dry matter/year fructose to produce 5--10 t DM/year of 5-HMF)
- fructose purity of at least 95% is needed
- financial support
- technological advancement
- specialized and qualified employees

Value Proposition

- economically affordable and renewable production of high-quality 5-Hydroxymethylfurfural (5-HMF) platform chemical convertible to at least 150 relevant chemicals, and
- serves as a replacement of carcinogenic formaldehyde
- active ingredient for food or feed applications
- building block for furan-based monomers (e.g 2,5-furanedicarboxylic acid, FDCA), with possibility to be further processed into polyethylene furanoate (PEF)
- fostering the industrial transition from petro-based to bio-based chemistry
- all cellulosic biomass is suitable for conversion technology

Customer Relationships

- creation of an operative group by founding a company to cooperate with all participants in the value chain
- supporting open innovation

Channels

- direct contact with potential partners
- participation in bio-chemical and chemical companies' networks to reach clients
- access to worldwide markets via science industries' networks
- trade fairs and conferences
- presentation on company´s website and in trade journals

Customer Segments

- downstream chemistry manufacturers, willing to use the renewable 5-HMF in their production processes.
- research institutes
- pharmaceutical industry
- food and feed industries

Cost Structure

- → Main CAPEX items: development and building of a large commercial-scale plant and payments for intellectual property protection and registration of novel projects
- → Installed equipment costs are estimated as approx.100 million USD (supposing processing capacity of 300 metric t/day of fructose a 20 years long operating time)
- → OPEX items, from most costly to less are feedstock procurement (50%), daily operations (including payment of wages) and research
- → Possible challenges for revenue streams are due to REACH Regulation as well as prices for biomass feedstock and oil prices, which influence market competitiveness of 5-HMF product.

Revenue Streams

- → Direct revenue streams are related to the biochemical product sales (minimum selling price for 5-HMF is estimated as 1,33 USD/litre)
- → Indirect revenue streams from stakeholders and diverse EU funding projects

BIOECONOMY INNOVATION WEEK
FOR BOOSTING THE REGIONAL BIOECONOMY IN CEEc

Technology Readiness Level (TRL) vs. Business / Market Readiness Level

- External (customer-related) building blocks are less elaborated in BMCs
- TRL9 ≠ technology ready for market
- "TRL level as commonly used in H2020 can be used to define if a technology is ready to go to market or not, but it does not capture properly how "ready" is the business based on such technology to go to market." (Access2EIC report)
- Need for a practical framework promoting economic viability and taking into account business-related aspects

- exclusive focus on TRLs have to be adjusted by **introducing levels reflecting business or market readiness**

Conclusions

- An easy-to-understand business model is a great tool for purposes that are essential in implementing bioeconomy strategies:
  - bringing the successful projects and good practice cases closer to the stakeholders;
  - awareness raising in different sectors;
  - support bioeconomies in rural areas;
  - involving primary producers
- Clusters related to bio-based industry, organisations in regional development and individual experts can apply BMC as a service provided for interested farmers (as producers of bio-based wastes or by-products), companies, investors, policy makers

POWER4BIO website and social media

www.power4bio.eu

@power4bioproject

@power4bio

@power4bio

Thank you for your attention!

Nora Hatvani

nora.hatvani@bayzoltan.hu

POWER4BIO
REGIONS FOR
BIOECONOMY

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 818351