SUTAINABLE BUSINESS MODEL CANVAS WORKSHOP- ASTE ENERGY

Introduction and business idea:

At the beginning and until the middle of the 19th century, people used wood or coal ash as insulation material. The ash was used between the wooden beam ceilings or as a ceiling covering. In addition to good thermal insulation, the ash also served as sound insulation and fire protection, as it is a non-combustible material. The measurements on the thermal conductivity of the ash were carried out in the construction laboratory of the FH Carinthia. The ash required for the experiments was taken from the biomass plant of BC Regionalwärme Krumpendorf GmbH in Krumpendorf/Carinthia. Only wood material was used for the combustion process (Sereinig, 2016). According to measurements, the ash (0.172 W/mK) is in the range of porous or cellular concrete, expanded clay or wood fiberboard compared to the thermal conductivity of other materials. The use of ash as a raw material for insulation is therefore a possibility.

Currently, Kandstone (lightweight building block) is already being produced, which is industrially manufactured from ash, cement and water in a mixing and pelletizing process. It is intended to change the raw material composition in the new project to increase the insulating properties of the product and improve its sustainability (reuse of wood ash instead of fly ash).

Figure 1: Wood pellets from ash - Kandstones

The business idea to be discussed in this workshop was taken from a project proposal. The business idea to be investigated: "Thermal insulation of buried district heating pipes using wood ash". The following economic, technical and ecological/social goals are pursued:

<u>Economical:</u>

- Economic reduction of heat losses of buried district heating pipelines by special pipe bedding while fulfilling the soil mechanical tasks of the sand bed (ÖNORM EN 1394)

- Low production and transport costs, ex-site costs < 30 €/m³

Technical:

- Optimization of the production process with regard to stability and reproducibility
- Conditioning of the wood ash to optimize the free CaO content
- Thermal conductivity of the pipe bed Lambda < 0.33 (slightly damp) W/m°K

Ecological/Social:

- Sustainable production based on wood ash from biomass heating plants
- Enabling decentralized production (container plant)
- Development of additional application possibilities
- In line with the UN Sustainable Development Goals 7 and 9

Vorteile:	**Nachteile:**
Cost-effective production - construction site or directly in the heating plant possible (container construction of the mobile production plant)	Use of secondary raw materials with determination of the end of waste status according to the Waste Management Act required
Recycling of raw materials instead of landfilling	No homogeneous composition of the wood ash
Sustainable processing	

During the workshop, the business model canvas was created, which is shown below. The most important results are now briefly described.

1) Customer segments:

The following customer segments were identified: Landfill operators, District heating operators, Heating plant operators, Public sector and Construction companies.

2) Value proposition:

Value proposition was seen primarily in terms of the additional sustainable value that is created. First, bio-based materials are (re)used, which has a positive impact on the climate. In addition, biomass is reused as ash, which can lead to a closing of loops and thus a reduction in landfilling. Furthermore, an indirect price reduction takes place and CO2 emissions are avoided by relieving disposal companies and thus saving transport (costs).

3) Social/environmental benefits:

The following social and environmental benefits have been identified: reduced scrap, waste and losses, resource efficiency, material savings, more sustainable inputs, circular economy, reduction in transportation, rehabilitation of forest roads, new collaborations, mineral recovery and reduced need for landfill space.

4) Channels:

Since the customer segments are B2B, the touch points are mainly found in direct and indirect communication (e.g., by phone, face-to-face, etc.). For the public sector and for awareness raising in general, channels for knowledge generation among the population have also been considered.

5) Customer relations:

Regarding customer relations, especially relations with waste collection companies, "sandstone producers" and construction companies were considered essential. However, these companies are only in contact hierarchically, so a potential for improvement was taken here by bringing all partners together to create a common understanding.

6) Revenue streams:

The following revenue generation opportunities were discovered: selling the "Kandstone" product, increasing efficiency, and reducing shipping costs.

7) Key Activities:

The following key activities were identified: ash collection, processing and application, marketing, certification, research, and decoupling of waste legislation.

8) Key resources:

Ash, concrete, water, chemicals, business management expertise, logisticians, production and storage facilities, and subsidies were identified as key resources.

9) Key partners:

At the current stage, the key partners are mainly research and development partners.

10) Cost structure:

The following costs were identified: Research and development costs, costs associated with the leaching process, production costs, ash costs, and transportation costs.

11) Social Impact/Environmental Impact:

Potential social or environmental impacts identified were transportation emissions, other general emissions during the production process, land use, potential shorter life, heavy metals, and inability to use all ash produce

Figure 2. Business model canvas für Aste Energy

Next steps and unanswered questions:

- Research to eliminate negative impacts
- Identification of technical parameters
- Research project with verification of technical and environmental characteristics
- Creation of a common understanding of the process
- Change of the legal framework for wood ash
- Cooperation network from the planner to the collector
- How do construction companies and waste management companies come into contact?