

## Ludzas Bio-Enerģija

### Business model description

#### Introduction

Ludzas Bio - energy is the local district heating company, which is situated in Ludzas town. The Ludza region and the local district company is unique from two aspects:

- It is the first region where the district heating has been developed based on public-private partnership principles together.
- Heat Production Company has developed unique flue gas condensation plant for Latvia case. The technique is patented and can ensure up to 20% of energy efficiency if there is appropriate biofuels quality; the capacity of the boiler and combustion conditions.

Ludza region is located on the east of Latvia and Latgale - 271 km away from Riga. Region has outer border with Russia – Pleskava region in length of 122,6 km, and with Byelorussia - Vitebska region 8,4 km. Within Latvia region has borders with Balvi, Krāslava and Rēzekne regions. The region size is 2412 km<sup>2</sup>. Inhabitant number at the beginning of year 2013 was 14 900 in Ludza region and 61,5% or 9184 are located in Ludza town.

In 1998 SIA Baltneko (Essent Baltic) started the development of an AIJ project in Ludza town, to replace of the boiler house fired by oil (mazut) fuel by a new one fired by biomass. Subsequently the projects turn around the unsatisfactory district-heating situation into a more commercial viable and environmental sustainable district heating in Ludza. The implementation of technology methods by which the abundant locally available fuel for firing in the form of wood residues approved as commercially attractive as well as environmentally the most sustainable.

The new boiler house and installations in Ludza started to operate in December 2000. The total capacity is 15 MW. The heat demand is about 30 GWh a year. The energy is sold to local municipality for heating and hot domestic water production.

There are installed two new boilers: one wood chip boiler with the capacity of 8 MW and one oil fired boiler with the capacity of 7 MW. The wood chip boiler is in use up to its maximum capacity. Oil fired boiler is operated only for covering of maximum loads.

The new boiler is fired by wood residues as primary fuel for environmental reasons. The project reduces the CO<sub>2</sub> emissions by changing heat production technological process. Oil (mazut), used at the old boiler house, initially has been replaced for about 75% by wood residues and for about 25% by diesel (to cover a peak load and during maintenance). Later fuel balance has been improved, increasing biomass proportion up to 99%.

## Key Partners

The project is unequal in the case of Latvia as it is one of the first projects based on public-private partnership principles. Initially key partners in the development and implementation in the business model were three investors:

- Local wood production and delivery company.
- Boiler house.
- Town as the maintain of the district heating network.

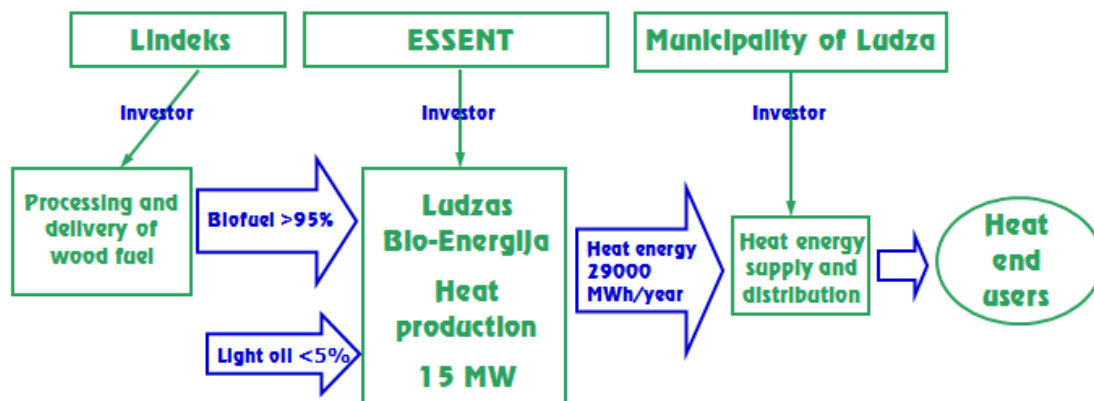


Table 1: "Business model"

There is showed description of the Ludzas Bio – energy working model till the year 2005 in the Table 1 "Ludzas business model". Nowadays there are several biomass suppliers ensuring wood residues biofuels for the heating company.

The aims of such cooperation project establishment were:

- To raise efficiency of energy production, supply and distribution.
- To ensure the use of local biofuels and independency from the foreign fuels.
- To reduce SEG emissions.
- To rise competitiveness of the energy prices.

The motivation of each stakeholder to participate in project was:

- Local wood production and delivery company:
  1. To ensure realization of woodworking residues close to producing company.
  2. To ensure wood biofuels production in the region – new working places; incomes and the taxes for the region.
- Boiler house:
  1. Reduce SEG emissions and environmental pollution.
  2. Develop competitive private heating plant using renewable energy.

- Town as the maintain of the district heating system:
  1. Competitive prices for the citizens. There was ensured 25% decrease of the heat production prices using local biofuel.
  2. There is no need for municipality to subsidized oil (mazut) purchase and the reconstruction of the technology of the old boiler house. The saved financial resources are used to reconstruct the heating system.
  3. There is ensured the possibility to purchase hot water all over the year in the town.
  4. As the biofuel is local, the supply is more reliable comparing to biofuel purchase from on other countries.

## Key activities

General activities to develop large scale new boiler house replacing fossil fuels with local biomass

- Set up long term agreement between heat installations owners – heat producer - biomass supplier (15 years).
- Strategic goal - fossil fuel free energy production and use of the local resources.
- Development of cost efficient fuel supply chain.
- Decisions attract investments to develop five times bigger capacity boiler house than the existing budget would allow.
- Decision to invest in the newest technologies and continuous evaluation of the potential technological improvements in the boiler house.
- Planning of activities on annual basis and budgeting. Finding the solutions of the payment scheme to ensure buyer higher ability to pay.

The key activities are to:

- Address industry and forest owners of the region to be able to set up annual contracts (with the possibility to prolong) for the wood biomass - woodchips. Volume and prices as well as time for outtake/delivery from forests and industries.
- Identify buyers respectively need and requirements of energy supply in terms of time period, ability to pay.
- Set up contracts with biomass suppliers based on fuel mix parameters, volumes and prices.

## Key resources

The key resources are the following:

- Renovated district heating system in the town.
- Two boilers one wood chip boiler and one diesel oil fired boiler with the changing heat production technology.
- Flue gas condensation plant for wood chip boiler ensuring up to 20% of energy efficiency
- Developed storage house for woodchips and underground tank for fuel.
- Suitable machinery for maintain of the boiler house.
- Established long term contract with Ludza town as the main energy consumer.
- Established good collaboration with the district heating installations maintaining company.
- Identify potential biomass supplier's chain and developed a good collaboration between them.
- Selected biomass suppliers and established contracts. Contracts are settled down for one year with the possibility to prolong it, if both sides are satisfied. The sustainability criteria's have been interested in the selection process – the quality; the amount of monthly supply; the price.
- Attracted high professionals for boiler house management.

The biomass supplier's chain has been developed in the 50 km radius around the boiler house. 50 km radius is the key criteria to ensure competitive biomass purchase.

## Cost structures

The cost structure for this business model involves:

- The costs of boiler house system development – the payment of the loan.
- The costs of the boiler house operation:
  - Technological improvements and repair.
  - Electricity for the boiler house running.
  - Transportation of ash and other domestic waste.
  - Water supply for flue gas condensation plant operation and daily needs.
  - Maintenance and fuel for frontal loader.
  - Purchase of special chemicals for heat exchangers cleaning.
  - Purchase of tools ware and consumables.
  - Administration expenses.

- Accounting expenses.
- Personal salaries.
- Taxes.
- Other.
- The costs of fuel.
  - Purchase of the biomass.
  - Purchase of the diesel fuel.

The most important of the above is the price of the biomass purchase.

## Value proposition

The value proposition, which has been provided for the buyers, is the one of the lowest heat tariff in the country. The use of local wood residues as the resource and the innovative technologies has been found as the optimal approach combination.

Innovative technologies ensure that's seasonal aspects doesn't affect the produced heat amount per certain amount of used resources, however the wood residues deliveries are carried out on just in time basis avoid storage and handling costs on site.

Large scale resource supplier chain and divarication of heating options reduces heating supply risks and ensures security of supply.

Value proposition for Ludza district is development of new businesses (fuel production, energy generation and trade).

This sector is more or less driven by lower cost on fuel and maintaining a high operational output without wear and maintenance on boiler and fuel handling system. The value thus has to be able to ensure:

- Lower cost than the current alternative
- Same O&M level at customer

## Customer relationships

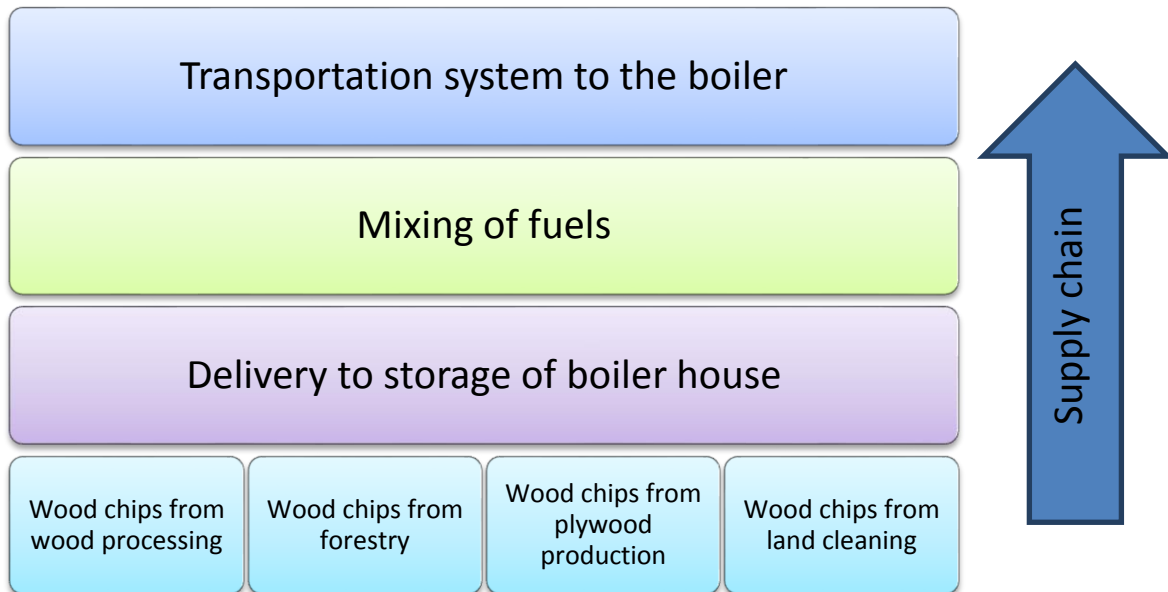
The customer relationships with the resource suppliers have to build on security of supply, quality assurance and cost effective principles. Thus the fuel has to be proven and demonstrated before agreements can be made.

The relationships with the energy buyer is linked to the specifics of the Ludza community and it defines situation where there is one costumer with large volume (district heating company, supplying heat to block residential houses and some administrative buildings).

Transparency of the entire supply chain is crucial. Both in terms of quality assurance in fuel supply as well as sustainability and environmental concerns.

## Channels

The distributions channels or supply chain is described in the illustration below.



Ludza Bio – Energija is responsible mostly for fuel storage on site, mixing of different types of biomass and delivery of fuel to the boiler transportation system. The resource supplier is responsible for the production and supply of the resource.

In addition ash recycling can be added as a further service to the user (heating plant).

## Customer segments

The customer segmentation is based on the following:

- Geographical distance between resource suppliers (approximately within 50 km).
- Connection to district heating system of Ludza town.
- Ability to use mixed energy and fuels (technical possibilities):
  - Wood residues.
  - Fossil fuels in peak hours.
- Ability to use the waste as fuel (flue gas condenser ensuring up to 20% of energy efficiency).

## Revenue streams

The revenue streams are based on the successful approaches buying energy resources and distribution produced heat to consumer.

The revenue streams from energy resources are based on dynamic pricing in terms of energy content within specified parameters of the fuel. The end price includes all cost for transport to boiler house storage.

Produced heat amount and the incomes are affected by the outdoor temperature as well as unplanned interruption woodchips boiler.

Revenues from fuel sales are distributed between fuel producers, revenues from the heat production goes to Ludzas Bio – energy and the revenue of the biofuels supply and realization - Ludzas maintain company (owned by Ludzas town).



Picture 1: "Ludza Bio Energy"