Business model description

Case Valtimo municipality in North Karelia

Introduction

Many municipalities have made plans to be free of using fossil fuels for heating. Business plan is made for Valtimo municipality in North Karelia. In this business model the focus was in Hiekkalahti industrial area, but also the whole municipality is involved. There are seven companies operating in Hiekkaharju area. At the moment they are using fossil oil or electricity for heating. In this business model, we have evaluated the options to replace the fossil oil and electricity with renewable energy. We have also look into opportunities to change the business model in the district heating plan in municipality. We have also made plans for four housing companies to replace the fossil fuel or electricity in their heating systems.

Business plan is divided in two sections.

1. Define the use of energy in Hiekkalahti industrial area in Valtimo, and improving the use of energy, future changes and profitability of local district heating plant in Hiekkalahti area.
2. Potential business models of district heating production for Hiekkalahti area and also for Valtimo municipality. Agreement procedures for different business models. Pellet heating opportunities for four housing companies in Valtimo.

Key actors

Decision makers

Politicians

Entrepreneurs (heat entrepreneurs, forest harvesting and chipping contractors)

Summary of energy use in Hiekkalahti

The use of energy in Hiekkalahti industrial area is too low to have profitable own (bio) district heating-plant. The use of energy is too low compared to the investment cost of new bio-heating-plant and seems that this is also the case in the future also. At the moment the use of energy in Hiekkalahti is 334 MWh and it should be over 650 MWh to have profitable district bio-heating-plant. Return time of investment, if the bio-heating-plant is done, is 13,3 (table 2) or 10,3 (table 3) years without or 20 % investment substitutes respectively. According to profitability calculations, Hiekkalahti area is not economically suitable for own district heating plant because of low energy use and scattered distribution of companies (Table 3). Because of that, business model for own small scale district heating plant was not done.

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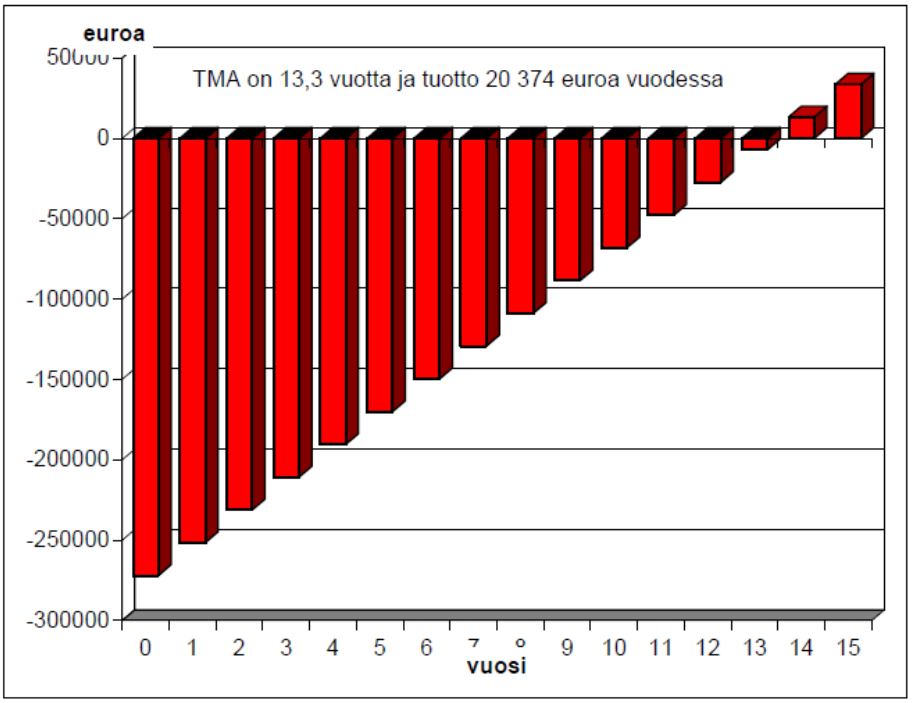

Table1. Return of investment to bio plant compared to oil (without substitutes).

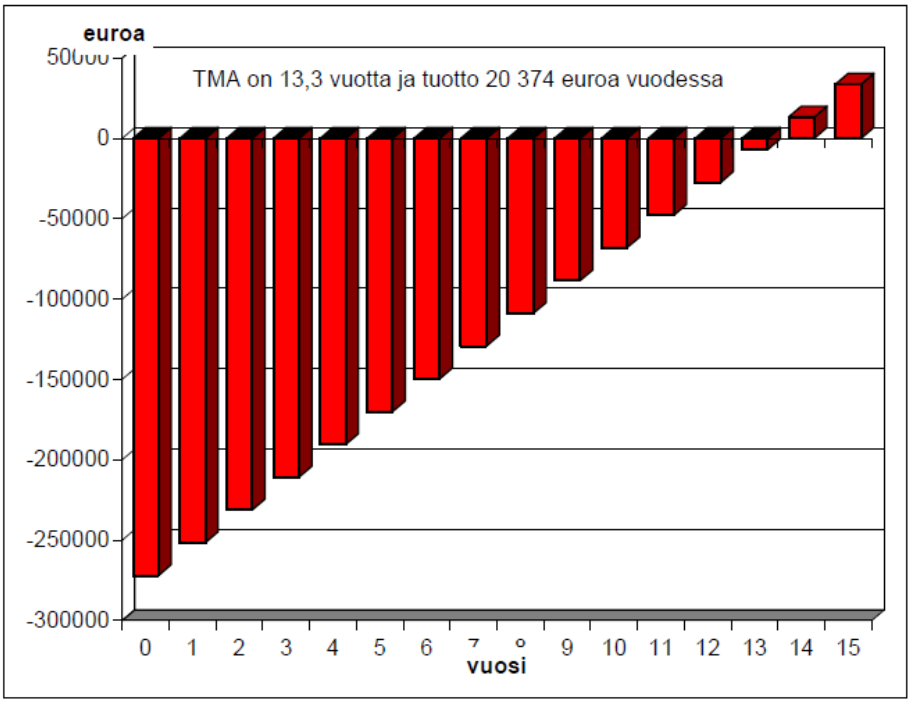

Table2. Return of investment to bio plant compared to oil (substitutes 20 %).

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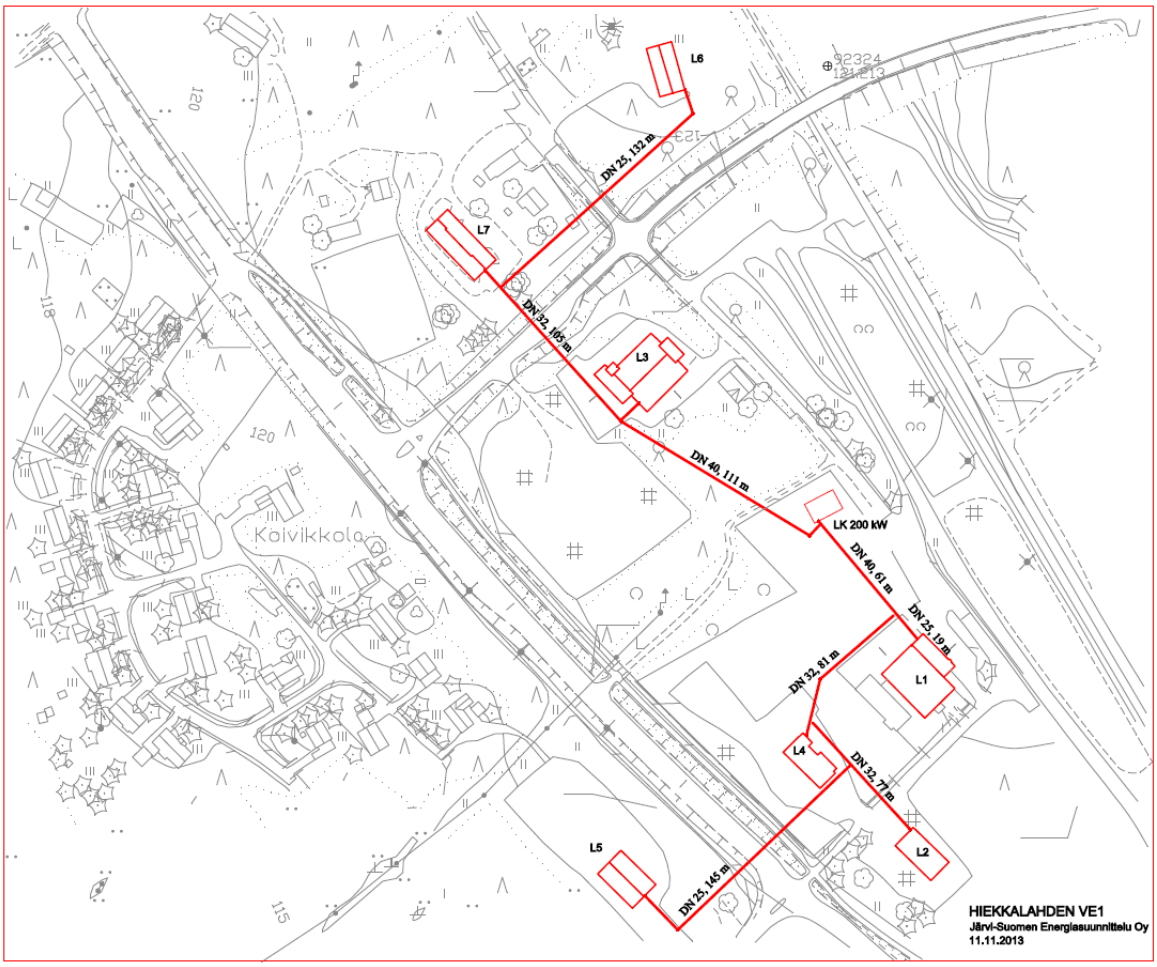

Table3. Blueprint of own district heating plant and heating network for Hiekkalahti.

District heating plant and connecting line in Valtimo municipality

There is a district heating plant in Valtimo which is using forest chips (2 MW/8900 MWh) and fossil oil (1,5 MW/1000 MWh). One option is to link the Hiekkalahti area to the existing district heating plant. However the calculations show that the connecting pipe line between district heating network and Hiekkalahti area would be too long to be profitable investment.

If Valtimo municipality wants to be fossil oil free in heating it has to invest in 0,5 MW Bio-boiler. Valtimo municipality is using 110 000 €/year for fossil oil. If they replace the oil-boiler with bio-boiler, the annual savings will be 78 000 €. Price of the bio-boiler is c.a. 300 000 €, so the return of investment is under four years.

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Business models for heat production in Valtimo

Business models for district heating in Valtimo municipality

At the moment District heating production is based on forest chips and light fuel oil. Heat plant and heat network is owned by municipality of Valtimo. The forest chips are supplied by local entrepreneur Karjalan Metsä ja Energia Ltd. Three different business models for heat production in Valtimo municipality is represented here.

District heating owned by municipality and outsourcing maintenance

Maintenance of heat plant is completely moved to outside company. Contract will include all maintenance works and forest chip supply. The ownership of the heat plant and heat network will remain with Valtimo municipality. Because Valtimo municipality is the owner, also the responsibility of possible repair investment remains. Pricing of maintenance could be based on the amount heat produced (including fuel and maintenance work).

Corporatization the district heating

Heat production, distribution and selling will be moved to established municipality owned corporation. Present staff from heat plant will be moved to new corporation, but administrative services will be bought outside. In this business model, the surveillance of the heat production profitability is clear.

Outsourcing the district heating

Outside corporation will by heat plant and heat network. Corporation takes care of investments, maintenance and fuel supply. Corporation can have multiple subcontractor, for example in wood fuel supply etc. Municipality is no longer in responsible of heat production. Other option is that municipality will own the heat network and be responsible of heat sales. Also in this case, municipality is responsible of maintenance and investments of heat network.

Pellet for housing companies

Housing companies could produce heat in their own pellet heat plant. In these cases the plant should be located as centre as possible to minimize the heat loss from channels. We made business plan for 4 housing companies in Valtimo to change their heating system into pellet. At the moment they are using oil or electricity for heating. In calculation next out put data was used.

- Price of pellets 190€/ton
- Price of oil 0,9€/liter
- Return of investment in equipment investment 15 years
- Interest rates 5 %
- Maintenance cost of pellet plant 3,00€/MWh
- Management costs 0,80 €/MWh
- Insurance costs 0,10 % of investment
- Price of electricity 0,12€/kWh
- Share of own electricity 10 kWh/MWh

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In these calculations the pellet heat plant is situated in container near the technical space and investment aid is 0 or 10 % and the price of wood pellets is assumed to raise 10 % or stay in same level.

Housing company nr 1	Investment (€)	Heat €/MWh	Return time of investment (years)
Pellet basic	85 000	88,9	5
Inv. aid 10%	76 500	86	4,5
Pellet price +10%		93,8	5,6
Oil		115,1	
Housing company nr 2	Investment (€)	Heat €/MWh	Return time of investment (years)
Pellet basic	44 000	95,3	5,7
Inv. aid 10%	39 600	91,9	5
Pellet price +10%		100,3	6,3
Oil		119,3	
Housing company nr 3	Investment (€)	Heat €/MWh	Return time of investment (years)
Pellet basic	32 000	113,1	6,2
Inv. aid 10%	28 800	107,9	5,6
Pellet price +10%		118,2	6,6
Electricity		144,9	
Housing company nr 4	Investment (€)	Heat €/MWh	Return time of investment (years)
Pellet basic	185 600	105,8	7,2
Inv. aid 10%	167 040	102	6,4
Pellet price +10%		111,3	8,1
Oil		126,4	

Table 4. Heat prices with own pellet equipment (all prices without VAT)

As we can see in cases1-3 the return time of investment is relatively short. This is usually the case when chancing oil or electricity based heating systems to wood based (chips or pellets). Of course oil based heating systems are easier to change to pellets or wood chips because the water circulation systems already exist in houses.

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Availability and price of wood chips and pellets

In all cases the main supplier of wood chips would be Karjalan Metsä ja Energia Ltd. Forest chips are coming mainly from forest in the Valtimo municipality. There is also few other companies in the area that are producing forest chips, Vapo Ltd. and Anaika Ltd. Vapo Ltd. could provide chips in one year notice. Chips would come from Finland and Russia. Anaika Ltd. is importing mainly chips from Russia and their own side products from mechanical wood prosessing. The price of wood chips was 20,60 €/MWh in July 2013.

There is many Finnish and Russian suppliers who could provide the pellets. Domestic pellets costs approximately 190-204€/ton (40-43 €/MWh).

Conclusion

In Hiekkalahti industrial area, own district heating plant was not a economically reasonable solution. If the usage of heat would have been greater, then the own district heating plant would have been a good solution. This is not a uncommon situation in rural areas in Finland. Buildings are scattered in large areas which makes planning of district heating more difficult. Off course there are other options to replace fossil fuels in heating. Companies could have their own boilers or heating plants or make several improvements to make their operations more energy efficient.

In the case of Valtimo municipality the district heating plant is to be renewed in few years. So there will be large investments in the future. Traditionally municipalities have owned their own heating plants but more and more in the new investments municipalities are only the buyers of heat and the heat plant is owned by private entrepreneur.

Now a days when the price of oil and electricity is high every municipality and housing companies etc. should change their heating systems into renewable. Investment will pay itself back in few years.

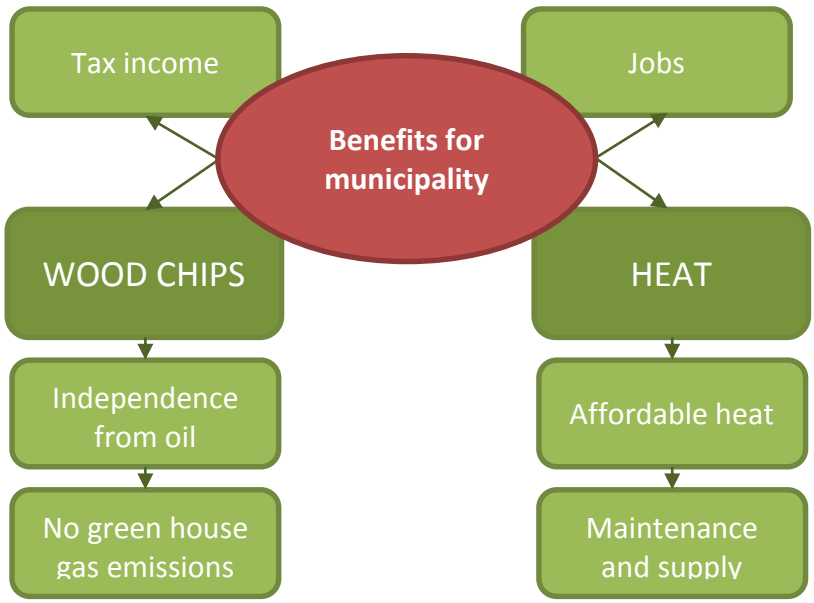

Table 4. Benefits to use renewable and domestic energy instead of fossil fuel.

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