

Beacon ECCO Bocholt, Landschapsenergie cvba so

Situation

Bocholt is a small municipality (13.000 inhabitants) in the North-east of Flanders, Belgium (see red star, figure 1).



Figure 1 Location of Bocholt

It has a small heat network, in which a secondary school, a primary school, a Kindergarten, a practice hall, a community hall and an agricultural test centre are centrally heated by a wood chip burner of 250 kW, which requires 220 tons of wood chips annually. The wood chips are locally coppiced from mostly municipality-owned hedgerows by local farmers. All the relevant stakeholders (i.e. farmers, municipality, schools, management organisations, ... see below) are part of a partnership which consists of two pillars: landscape management and heating. This combination of local landscape management with biomass heating in a cooperative setting is the unique selling point of this initiative.

Historical Background

Before WW II, the Flemish landscape was characterised by a lot of hedgerows and small coppice stands delineating fields and pastures. These hedgerows were cyclically coppiced for firewood, construction timber and tool-making. With the coming of cheap fossil fuels after WW II however, this economic use of hedgerows lost its profitability. As a result, a lot of them disappeared, making room for bigger fields, or their management was neglected. This enabled the hedgerows to grow into tall, mostly instable trees, without much undergrowth. With the neglected management, a lot of specific biodiversity disappeared. Hiding places for small meadow birds such as bushes and shrubs became rarer, and the landscape became more monotonous due to the neglect of cyclical, phased landscape management of hedgerows. This is the situation up until now, and farmers complain about big trees blocking the way for their machines and casting shadow on their fields. For these reasons, they would prefer to see the hedgerows being brought under strict management again, whilst environmental organisations are

afraid of losing them. Moreover, municipalities start having problems with instable trees which are hazardous for hikers and other users of the municipality roads.

To address these issues, an Interreg funded Project called Twecom, ran from 2013 until 2015. Its goal was to bring these hedgerows back into management, alleviating most of the municipalities' and farmers' problems and finding ways of valorising the harvested biomass, which would ensure the survival of the hedgerows at the same time. A definite win-win.

The perfect conditions to initiate such a project were at that time present in Bocholt. Part of the school campus was under construction and the heat network could therefore be easily incorporated during the construction works. Moreover a new heating system was needed in the community hall. At the same time, the municipality council was very interested in this project as they had (and still have) a voluntary commitment (the Mayor's covenant) to reduce their greenhouse gas emissions. For them too, combining neglected landscape management (which is for a large part their responsibility) with reducing greenhouse gas emissions and possibly even cheaper heating would be a definite win-win.

Start-up

To ensure a good cooperation in which everyone's commitment to the project was carved into stone, a partnership charter was signed by all stakeholders in which landscape management forms the first pillar and the heat network and heating the second (Figure 2).

All partners of this partnership with their respective responsibilities are listed below:

- Regionaal Landschap Lage Kempen (RLLK)
 - o Lead partner of Twecom. Their mission is to safeguard and manage the typical landscapes of the region, of which hedgerows are an example. Their concern for the preservation and management of these age-old landscape elements was the most important reason for them becoming the lead partner.
 - o Takes care of the management plans for the hedgerows in and around Bocholt in consultation with all the other partners and relevant stakeholders such as environmental organisations and farmers. They make inventory of the hedgerows and decide which ones are going to be coppiced when. Using DIPLA (see www.profsi.eu/www.diplalogin.eu), an innovative online tool for organising landscape management, this becomes much easier and clearer for the workers to execute.
 - o Applies for permits (e.g. to cut trees).

- Agrobeheercentrum Eco²
 - o Co-promotor of Twecom
 - o Takes care of good communication with farmers and Workers ('Werkers') and coordinates the local group of farmers (agromanagementgroup, or 'Agrobeheergroep') and the execution of the management operations
 - o Helps building support across all stakeholders, for example concerning the management plans of the hedgerows

- The municipality of Bocholt
 - o Owner of most of the hedgerows which are coppiced for woodchips
 - o Partly pays for the execution of the management works (1€/m hedgerow)

- Werkers (with local farmers of the local agromanagementgroup)
 - o Possesses the machines
 - o Executes the coppicing, chipping, storage and drying, sieving and delivery to the wood chip burner

- Landschapsenergie cvba

This cooperative which is different from, but forms part of this partnership, was founded in 2014. With subsidies of the province of Limburg, Interreg, an 'ecology grant' from the Flemish government and an additional loan, this cooperative bought and constructed the biomass heating system in the practice hall, storage bunker for wood chips of 100 m³ and heat network (Figure 3). It is therefore responsible for the second pillar, including the maintenance of the burner and heat network.

Its consists of:

 - o Schools (kindergarten, primary school, secondary school (biotechnicum), practice hall)
 - o Agricultural test centre (PVL)
 - o Community hall
 - o Municipality (delivers chairman)
 - o RLLK
 - o Werkers

Landschapsenergie buys wood chips from Werkers and sells heat to the schools, PVL and community hall (Figure 4). It brings producers of wood chips (Werkers) together with users (schools etc) and others to guarantee a continued broad support across all stakeholders. It is interesting to bring both ends of the chain together, so they know each other and have opportunity to arrange fair prices which reflect the local and ecological added value.

Figure 2 shows the partnership schematically:

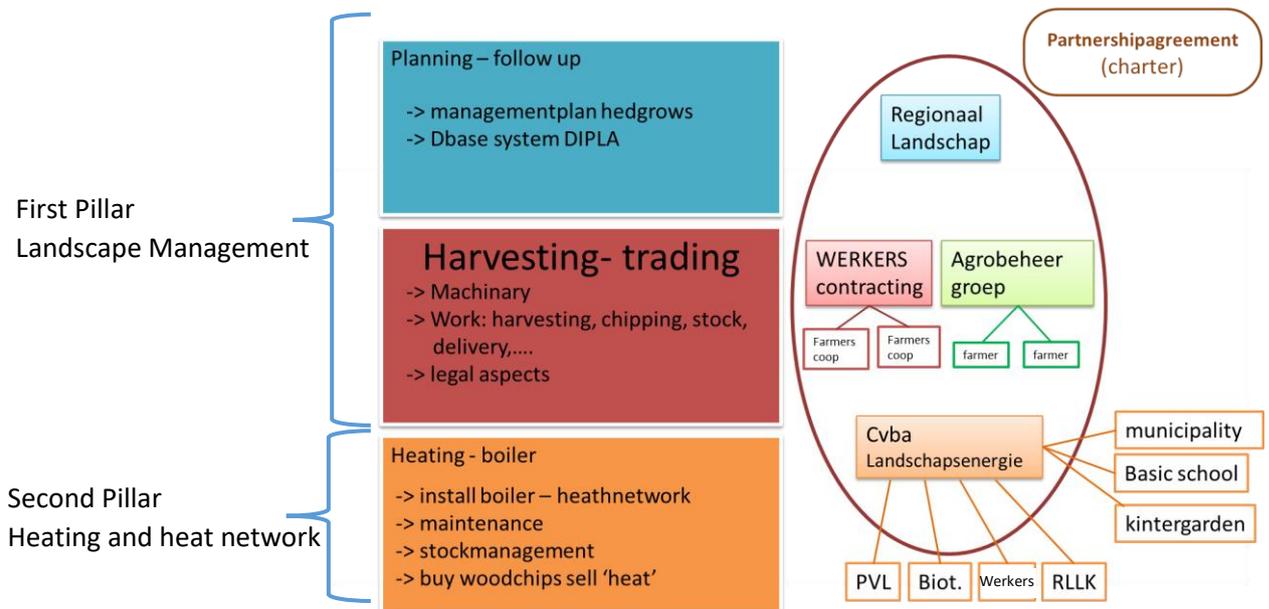


Figure 2 Flowchart of partnership Bocholt

An overview of the heat network and biomass burner is given in Figure 3:

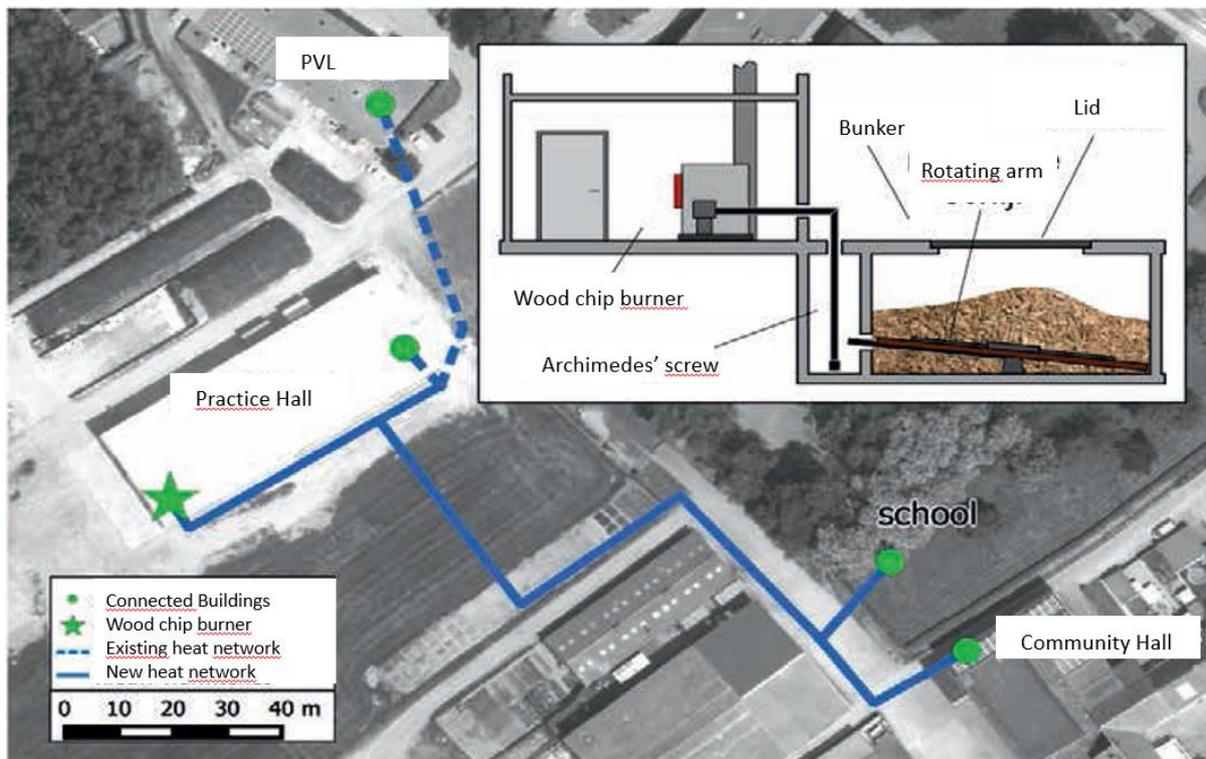


Figure 3 Site map Bochoolt

Financially, the cooperative is structured as follows:

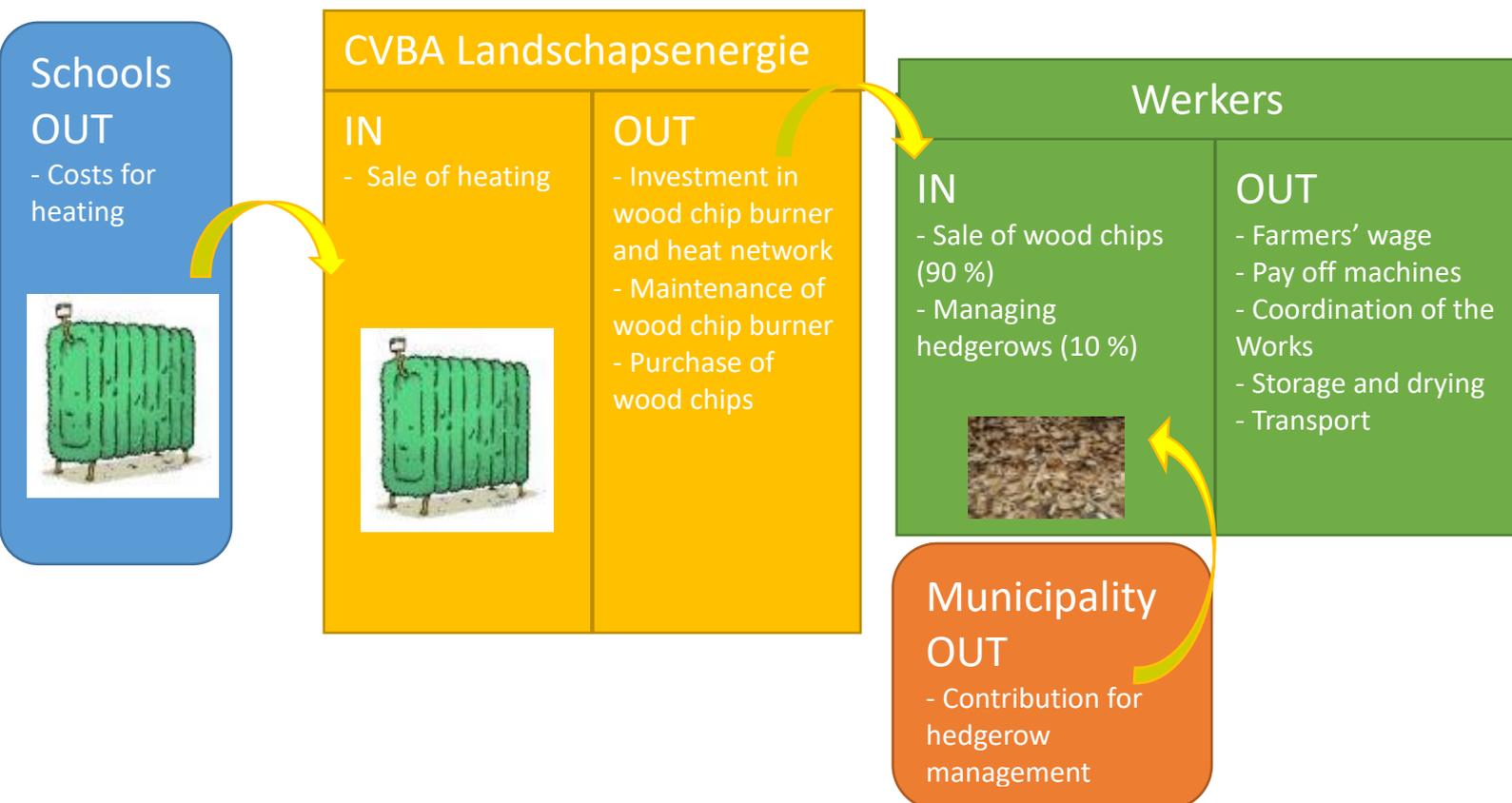


Figure 4: Financial structure of Landschapsenergie cvba

Overview of the process

- 1) Building support across all stakeholders: farmers, municipality, environmental organisations, citizens
- 2) Developing generic management plan with all relevant stakeholders
- 3) Finding out who owns what (property rights)
- 4) More detailed inventory of the hedgerows
- 5) Fighting invasive species
- 6) Compiling management plan
- 7) Coordination and execution of the management operations
 - a. Cutting
 - b. Chipping
 - c. Storing
 - d. Drying (open air)
 - e. Sieving
 - f. Transport to bunker of wood chip burner
 - g. Planting extra seedlings if gaps of more than 4m without seedlings in the hedgerow
 - h. Additional maintenance (of big trees, pruning, watering,...)

Results

Although the cost of the management operations (without sieving and planting) has dropped from around 100 €/ton dry chips in 2015 to 84€/ton in 2017 due to more efficient practice and volume wood present per meter hedgerow, it still remains too high to cover the selling price of 80€/ton (sieving included). That is why the municipality has to top up some of the management costs. However, this should not be seen as a con, because the hedgerow management has to be done anyway (cf. i.e. safety hazard). Rather, it should therefore be seen as a (big) reduction of costs for the municipality.

Without the sieving and the transport, around 12,5 litres of fuel on average were used to harvest and process a ton of wood chips. Energy-content wise, and when using values of 36,78273 MJ/litre for the fuel and 12,324 MJ/kg for the wood chips (FOD Economie, Belgium), this means that for each unit of energy that is used, 27 units are harvested. Put differently: for every litre of fuel used, 27 litres are produced. This is much better than the processing of crude oil, which has a ratio of about 1:20 to about 1:4 (and dropping, because it becomes increasingly difficult to access the remaining oil reserves, thus requiring more energy). When we consider that 220 tonnes of wood chips are needed a year, this means that on average 73711 litres of burning fuel for heating for one year stays below ground.

Future Outlook and recommendations

Landschapsenergie cvba has not faced many internal structural problems so far, although continued consultation of all parties remains an absolute necessity to avoid misunderstandings and/or internal tension.

The biggest challenge for Werkers remains to produce wood chips at market price, without a need of additional government money. However, this is no reason to say that there is a structural problem in the value chain, because in addition to the local economic value that is created, ecosystem services (increased biodiversity) and social value (community building) constitute a large part of the reason to continue to do this. You could say that this non-monetary value is paid for by the public sphere, i.e. the municipality. It continues to be a goal though to become at least break-even, so that the operational costs do not exceed the revenue. Further fine-tuning of the management operations is the most straight-forward way to do this. Partly because this endeavour does not make money, it remains

important to continue to consult all stakeholders so that everyone stays committed and wants the same.

On the practical side, the storage bunker could have been built better. It accumulates moisture in the bottom and the rotating arm does not reach all of the wood chips.

The drying of the wood chips remains difficult too. Methods of forced drying in which residual heat of pocket digesters or household waste incinerators is used, are being investigated. This would decrease the drying time from a few months (natural, open-air drying) to a few days. However, the residual heat of the pocket digesters is too unreliable and is not sufficient when truly needed (i.e. in the winter months, when the harvesting is done). The residual heat of the household incinerators is not available when needed either.

There have been problems with the calibration of the wood chip burner in the past, so the wood chips did not burn well, although they complied with the relevant ISO size norms provided by the manufacturer. After recalibration, this is not a problem anymore. Sieving of the wood chips only to get the good size of wood chips is therefore not necessary, as the chips are good size already straight out of the chipper. However, contamination of stone, metal and the like should be avoided at any cost, as this might cause contraction of the Archimedes' screw. Careful harvesting, chipping and storing is therefore absolutely necessary. In Bocholt, sieving is done anyway to be certain contamination is absent and to investigate if and how it can be done at low cost.

In conclusion, most of the problems are technical and not organisational. This is due to the good set-up of the partnership and cooperative in which everyone knows their responsibility and in which everyone agrees on what is planned and needs doing. The creation of this broad support among all stakeholders along with a clear management plan of the hedgerows on which everyone agrees might be the most important factors in the success of this project.