

Market uptake of small modular renewable district heating and cooling grids for communities

Project No: 691679



***Feasibility Checks of small modular  
renewable heating and cooling grids:  
Letnjikovac & Nova Toplana***

**City of Šabac (Serbia)  
District heating in Šabac**

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## 1 Introduction

The heating and cooling demand in Europe accounts for around half of the EU's final energy consumption. Renewable energy policies often mainly focus on the electricity market, whereas policies for renewable heating and cooling are usually much weaker and less discussed in the overall energy debate. Therefore, it is important to support and promote renewable heating and cooling concepts, the core aim of the CoolHeating project. The objective of the CoolHeating project, funded by the EU's Horizon2020 programme, is to support the implementation of "small modular renewable heating and cooling grids" for communities in South-Eastern Europe. This is achieved through knowledge transfer and mutual activities of partners in countries where renewable district heating and cooling examples exist (Austria, Denmark, Germany) and in countries which have less development (Croatia, Slovenia, Macedonia, Serbia, Bosnia-Herzegovina). Core activities, besides techno-economical assessments, include measures to stimulate the interest of communities and citizens to set-up renewable district heating systems as well as the capacity building on financing and business models. The outcome is the initiation of new small renewable district heating and cooling grids in five target communities up to the investment stage. These lighthouse projects will have a long-term impact on the development of "small modular renewable heating and cooling grids" at the national levels in the target countries.

For each of the CoolHeating target municipalities one or two potential projects have been identified in which small modular renewable heating and cooling grids could be implemented. For these potential projects, reports were elaborated by the projects partners from the target countries in cooperation with experts from Austria, Denmark and Germany:

- D4.4 Report on the heat/cooling demand and technical concepts for the target communities<sup>12</sup> and
- D5.4 Target community business models- Letnjikovac & Nova Toplana<sup>3</sup>.

The current document on "*Feasibility Checks of small modular renewable heating and cooling grids: Letnjikovac & Nova Toplana in the City of Šabac (Serbia)*", presents the results of checking the feasibility of the technical concepts and individual business models of the potential following two projects:

- "Letnjikovac", smaller size implementation of biomass-based DH in an suburban area,
- "Nova Toplana", larger size implementation of biomass-based DH in an urban area

This feasibility check is based on the results from the Economic CoolHeating calculation tool "D5.2 The economic calculation tool<sup>4</sup>".

The results are summarized in the executive summaries in English and national language in order to be promoted among decision makers of the target municipalities.

Please note this is not a feasibility study (more costly and time-consuming task<sup>5</sup>), and that main purpose of this feasibility check is to provide a base for the activities of investment promotion, starting with an information day for attracting the investors, before the investment phase. It is likely that during the direct negotiations in the investment phase the modifications of the business model and this feasibility check will be needed.

All prices, costs and revenues in this document are without VAT.

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<sup>1</sup><http://www.coolheating.eu/images/downloads/concepts/Report-D4.4-technical-concept-Sabac-Letnjikovac.pdf>

<sup>2</sup><http://www.coolheating.eu/images/downloads/concepts/Report-D4.4-technical-concept-Sabac-toplana.pdf>

<sup>3</sup><http://www.coolheating.eu>

<sup>4</sup>[http://www.coolheating.eu/images/downloads/D5.2\\_CoolHeating\\_Economic-tool.xlsm](http://www.coolheating.eu/images/downloads/D5.2_CoolHeating_Economic-tool.xlsm)

<sup>5</sup> Source: Behrens, W., Hawranek, P.M., and Organization, United Nations Industrial Development (1991), Manual for the Preparation of Industrial Feasibility Studies (United Nations Industrial Development Organization).

## 2 Technology assessment

The technical assessment in City of Sabac included two potential projects in the municipality. For this project, a technical concept was elaborated that includes the heat generation, heat distribution, and the heat use.

This chapter summarizes the D4.4 Report on the heat/cooling demand and technical concepts for the target communities, which is based on the methodology for the calculations of the heat demand duration curve and the determination of the full load hours. The technical concept summary for the district heating investment project:

- "Letnjikovac", smaller size implementation of biomass-based DH in an suburban area
  - biomass base load boiler **1,500 kW** with  $\eta = 82\%$ , **2,592 full load hours**
  - fuel oil peak boiler with about **3,500 kW**, with  $\eta = 80\%$ , **84 full load hours**
  - buffer **storage** tank with **60 m<sup>3</sup>**,
  - **grid length of 7,656 m** with grid losses of 738 MWh/a
  - flow temperature 60°C-110°C
  - around **250** individual heating **substations** with **12.7 MWh/a** consumption, average connection power **15 kW**
  - Heat produced **4,274 MWh**

The assumptions on the location and technologies were made in discussion with local authorities. The assumption to exclude cooling demand was to have simplest technical structure, although its inclusion could have positive influence to the project profitability. Also, this assumption is driven by the assumption to use locally available biomass. The assumption to use biomass as a primary energy source turns toward selecting the boiler instead of CHP, and reduce the investment costs. The reduction of the investment costs was intentional due to high distribution network grid cost and small heat density in the grid. The flow temperature was selected assuming the existing parameters and existing locally available technologies, but other imported technologies could help in decreasing grid length and flow temperature. The use of 250 individual substations has been assumed having in mind billing by the consumption and own comfort selection. Based on this assumption, in future the individual consumers could take additional energy efficiency retrofit measures. This assumption is important having in mind the modularity of the project, because after this buildings retrofit step, the more consumers could be connected e.g. new public buildings or new industry buildings. The assumption to use fossil fuel peak load boiler, was to reduce the size of the renewable energy base load boiler and therefore the investment costs.

The technical concept summary for the district heating investment project:

- "Nova Toplana", larger size implementation of biomass-based DH in an urban area
  - **Three** biomass base load boilers with a capacity of **3 x 4.5 MW**,  $\eta = 85\%$ , **2,792 full load hours**
  - existing natural peak gas boilers up to **35 MW**,  $\eta = 92\%$ , **694 full load hours**
  - buffer **storage** tank with about **200 m<sup>3</sup>**,
  - connecting pipeline in the length of **2,240 m**
  - flow temperature 60°C-110°C
  - around 7,500 individual consumers with each **7.39 MWh/a** consumption, average connection power 10 kW
  - Total heat produced **61,953 MWh/a**.

The assumptions on the location and technologies were made in discussion with local authorities. The location was selected from the available locations to have good access for the biomass supply and proximity to the existing district heating infrastructure.

Cooling demand was excluded, due to low cooling needs of the consumers and high adaption costs. The idea was to use locally available biomass as in "Letnjikovac". The assumption to use biomass as a primary energy source turns toward selecting the boiler instead of CHP. The CHP option was not very attractive from the decision maker's perspective, probably due to existing low costs of electricity. The flow temperature was selected assuming the existing parameters, existing locally available technologies and consumer needs. The use of individual substations was not explored assuming the existing infrastructure. Also, this assumption has been reinforced having in mind that most of the consumers already took the energy efficiency retrofit measures. The use of individual substation could be important from the perspective of the legal obligations of this kind in the future. Having in mind the modularity of the project, first step, could be instalment of the first boiler on the location "Trkaliste", while in the second step, two boilers will be installed at location "Nova Toplana", in parallel with the connecting pipeline construction. During the first phase, the biomass storage could also be established to ensure the supplies for the smooth starting of the full operation. The assumption to use fossil fuel peak load boiler, was to keep the existing infrastructure, and having the additional reserve in operation.

Maps showing details of the technical concepts are given in the **Appendix**.

## 2.1 Similar case studies

The projects that can be found in "A map on the best practices for small modular renewable heating and cooling"<sup>6</sup> served as an inspiration for the two projects in Šabac. Thereby, the following two examples were important sources of information:

- "Letnjikovac", the smaller size implementation of the biomass-based DH in the suburban area

**Heating with woodchips in Güssing**, Austria, which has two biomass boilers in total 8 MW thermal using wood chips and residual wood pieces from wood floor production ~85 % and oil peak load boiler of 6 MW. It has a larger district heating grid (37 km) and no storage. It has about 550 consumers (heating of buildings, domestic hot water) and some industrial users.

- "Nova Toplana", the larger size implementation of the biomass-based DH in the urban area

**Thisted district heating and cooling**, in Denmark, which has a waste CHP, waste incineration 10.6 MW (2.9 MW<sub>el</sub>), geothermal 5 MW + 2.7 MW absorption heat pump, 10 MW boiler (high pressure hot water), biomass boiler straw 11.5 MW (92 %) and peak load units natural gas (fuel oil) with 46.5 MW (94 %) and CHP units with natural gas 1.9 MW (1.3 MW<sub>el</sub>) ( $\eta_{th}$  57 %,  $\eta_{el}$  29 %). Furthermore, it has cooling based on groundwater, absorption heat pump. The DH network is 113.9 km distribution with 107.2 km service pipes. It has a large storage of total around 4,400 m<sup>3</sup>.

## 2.2 Optimality of the technical concept

A smart municipal energy grid including electricity and heat production for the household and industry with the smaller size similar to the:

- "Letnjikovac", the implementation of the biomass-based DH in the suburban area

<sup>6</sup> <http://www.coolheating.eu/map/>

has been modeled using the HOMER tool in the case study for Šabac<sup>7</sup> with the aim of decreasing total yearly community energy costs. The technical concept showing the minimal energy costs included the following technologies: photovoltaics, combined heat and power units and wind generators, which have shown good operation in the electricity markets, due to their flexibility to utilize excess electricity production from CHP and variable renewable energy sources through heat storage. The investment costs of the technical concept were in the range up to 4,000,000 €, the internal rate of return in the range 6.87-15.3%, and CO<sub>2</sub> emissions in the range from net savings of 4,885 t/a to the net emissions of 5,165 t/a, number of hours of operation of combined heat and power plants obtained by simulations in the market conditions in the range of 2,410- 7,849 h/a.

Therefore technical concept presented in "Letnjikovac" feasibility check do not utilize all the possibilities, which may be checked, especially if the electricity prices are less heavily regulated.

### 3 Business assessment

The business assessment in City of Šabac included two potential projects in the municipality. For these projects the individual business models were elaborated in the report D5.4 Target community business models - Letnjikovac & Nova Toplana. The business model summary for the district heating investment project:

- "Letnjikovac", the smaller size implementation of the biomass-based DH in the suburban area is
  - Investment costs **2,095,000 €**, of which 1,845,000 € Equipment/Machinery
  - Financing with 370,000 € private equity, 1,450,000 € credit line, 150,000 € connection fees and 125,000 € investment subsidy
  - Public private partnership with possible consumers ownership and energy cooperative.
  - Connection fee 500 € - 5,000 €
  - Heat sold 3,536 MWh, of which 3,176 to private and 360 to public consumers.
  - Average yearly price **1,016 €**, of which fixed 410 € and variable 606 €,
  - Year to year price increase of 2%
  - Average yearly revenues of **326,141 €**
  - Contracts signed with customers for the period of 15 years (**2019-2033**)
  - Average yearly cost for **1,422 t** of biomass **91,559 €**
  - Average yearly cost for **46,106 l** of heating oil **53,033 €**
  - Average yearly O&M costs **36,671 €**
  - Average yearly management, insurance and lease costs **23,577 €**
  - Average yearly labor costs **1,729 €**
  - Average yearly avoided costs for biomass ( $\eta=20\%$ ) **349,830 €**
  - Equity internal rate of return **8.76%**
  - Payback time **9.05 years**

<sup>7</sup> I. Batas-Bjelic, N. Rajakovic, and N. Duic, "Smart municipal energy grid within electricity market," Energy, vol. 137, pp. 1277-1285, Oct 15 2017.

The investment costs include the equipment/machinery costs, building and construction works and project documentation, but not the plot which already exists, software that could be developed, patents since technology is mature (TRL=9) and at the moment there is no initial working capital. Operation and maintenance cost are obtained in discussion with project partners from their experiences with the equipment producers. The heat price has been obtained with the constraint of the project payback time and internal rate of return that will have smallest margin of resilience to the external financial disturbances. In comparison to the current heating practices of excluding the investment cost and work from the heating costs and minimization of the heating space to save the heat costs, average yearly price is above, which could be a barrier for the implementation. The financing mix includes different sources of international loans, grants, private equity and connection fees which will be a challenge to obtain without serious support from the citizens and high connection rate. The licenses for the heat production will not be difficult to obtain from the local self-government. The socio-economic benefits of the project are better living conditions and comfort with avoided inefficient biomass cutting and consumption in existing stoves ( $\eta=20\%$ ).

The business plan summary for the district heating investment project:

- "Nova Toplana", the larger size implementation of the biomass-based DH in the urban area is
  - Investment costs **7,200,000 €**, of which 6,250,000 € Equipment/Machinery
  - Financing with 2,200,000 € private equity, 5,000,000 € credit line, with NO connection fees and with NO investment subsidy
  - Heat sold **55,758 MWh**, of which **55,398** to private and 360 to public consumers.
  - Average yearly price **423 €**, of which fixed 275 € and variable 148 €
  - Year to year price increase of 2%
  - Average yearly revenues of **3,487,766 €**
  - Contracts signed with customers for the period of 10 years (**2019-2029**)
  - Average yearly cost for **13,295 t of biomass 834,571 €**
  - Average yearly cost for **2,566,278m<sup>3</sup> of natural gas 1,020,249 €**
  - Average yearly O&M costs **160,208 €**
  - Average yearly management, insurance and lease costs **78,291 €**
  - Average yearly labor costs **93,073 €**
  - Average yearly avoided costs for fossil fuels **1,592,184 €**
  - Yearly avoided CO<sub>2</sub> equivalent emissions **7,540 t**
  - Equity internal rate of return **37.40%**
  - Payback time **2.69 years**

The investment costs include the equipment/machinery costs, building and construction works and project documentation, but not the plot which already exists, software that could be developed, patents since technology is mature (TRL=9) and at the moment there is no initial working capital. Operation and maintenance cost are obtained in discussion with project partners from their experiences with the equipment producers. The heat price has been obtained with the goal of reducing the consumer's costs and having the attractive project payback time and internal rate of return. The financing mix includes international loans and private equity. The license for the heat production is already obtained by the local utility. The socio-economic benefits of the project are decreased heat costs with avoided fossil fuels yearly costs and CO<sub>2</sub> equivalent emissions.



The detailed summary of the economic feasibility check for both business models is given in the **Appendix**, which includes:

- Calculation of projected revenues
- Costs and fixed assets calculation
- Current assets calculation
- Liabilities and equity calculation
- Income statement projection
- Balance sheet projection
- Cash-flow profile projection
- Assessment of the economic viability of the project (equity IRR, NPV...)

### 3.1 Similar business plans

The similar case studies that can be found in "A map on the best practices for small modular renewable heating and cooling"<sup>8</sup> in the case of:

- "Letnjikovac", the smaller size implementation of the biomass-based DH in the suburban area is

**Heating with woodchips in Güssing**, owned by the municipality, which has yearly cost of heating of 1,373 € for standard house 18.1 MWh (57.25 EUR/MWh).

while in the case of:

- "Nova Toplana", the larger size implementation of the biomass-based DH in the urban area is

**Thisted district heating and cooling**, owned by the consumers, around 5,057 consumers, with consumption of 7,500 MWh heat, which has yearly cost of heating of 1,230 € for standard house 18.1 MWh (47 EUR/MWh) excluding the capital costs.

### 3.2 Sensitivity analysis

The current annual heating costs under the current practices, which do not show the full costs, are estimated based on interviewed households to 350-600€<sup>9</sup>. But they are higher since it does not include costs for operation and maintenance and the depreciation costs.

The sensitivity analysis for the business plan

- "Letnjikovac", the smaller size implementation of the biomass-based DH in the suburban area

is shown at Figure 1.

<sup>8</sup> <http://www.coolheating.eu/map/>

<sup>9</sup> [http://www.coolheating.eu/images/downloads/CoolHeating\\_Survey\\_3.4.pdf](http://www.coolheating.eu/images/downloads/CoolHeating_Survey_3.4.pdf)

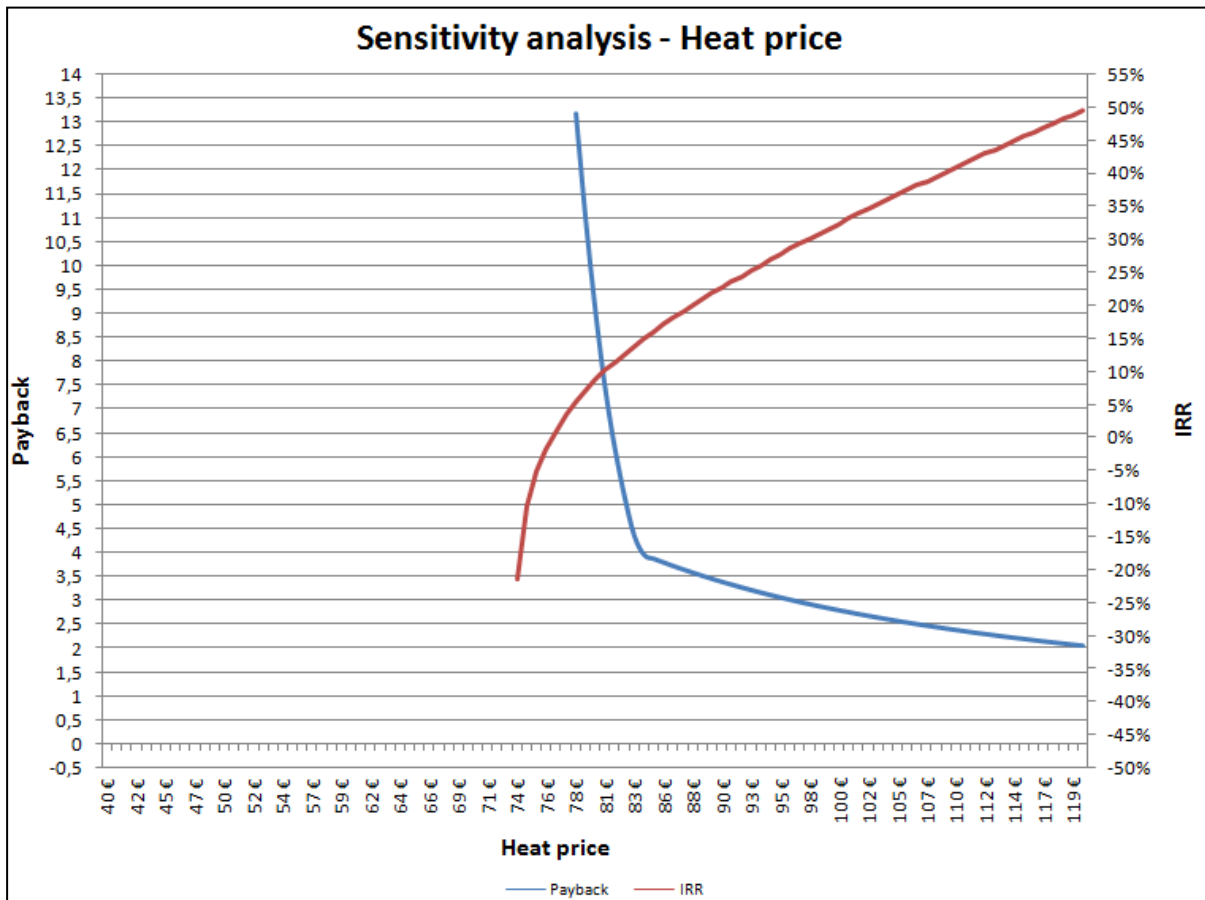
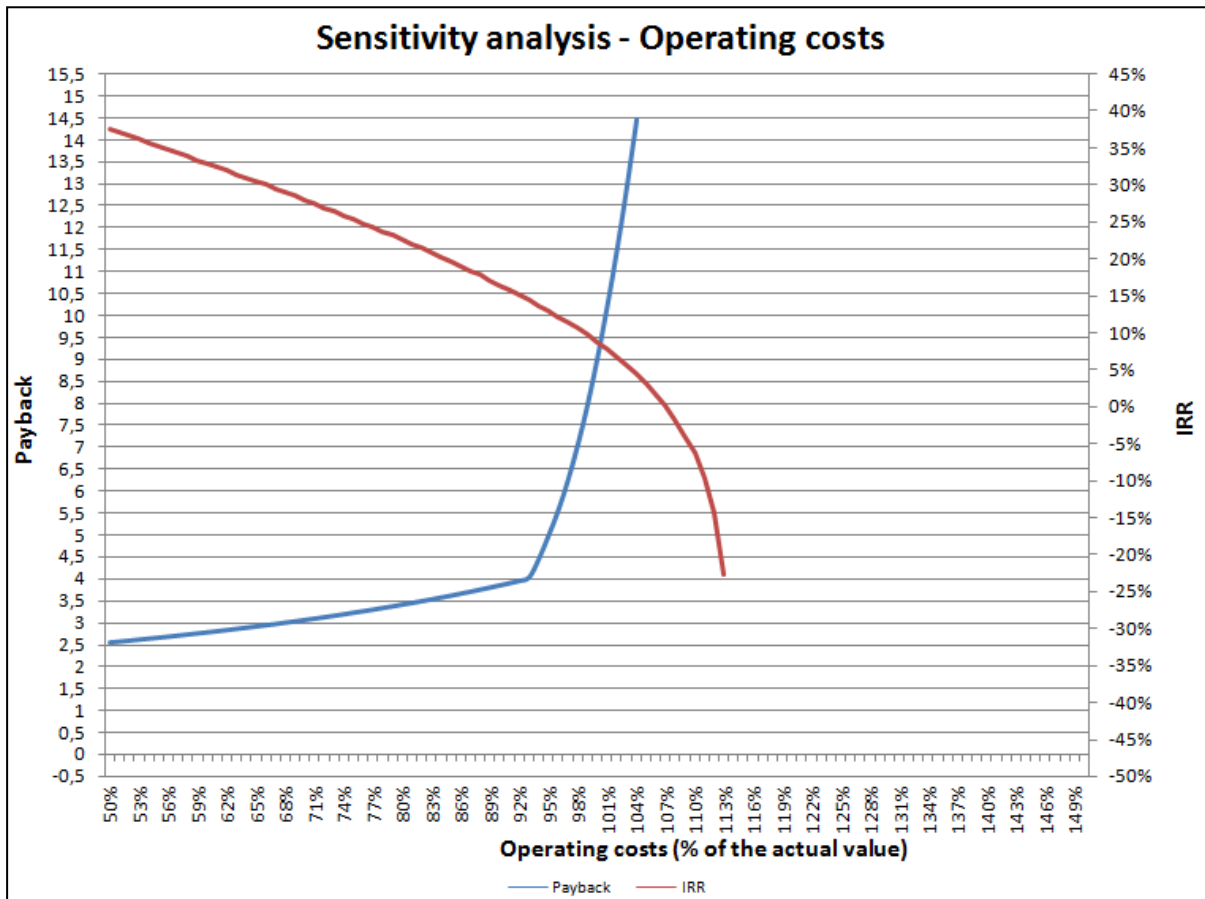


Figure 1 Sensitivity analysis for the business plan "Letnjikovac" on the operating costs and heat price

Sensitivity analysis for the business model of "Letnjikovac" on the **operating costs** shows that the increase of operating cost of 5% will significantly increase the payback time to **around 15 years** and, decrease the internal rate of return towards **unprofitability**. On the other hand, the decrease of operating cost of 5% will reduce the payback time to around **5 years** and slightly increase the internal rate of return to around **12.5%**. The business plan for "Letnjikovac" is more sensitive to the **operating cost increase** and more sensitive is its **payback time**.

Sensitivity analysis for the business model of "Letnjikovac" on the **heat price** shows that the increase of **average heat price** (including all customers and both fixed and variable part) to around **82 €/MWh** will significantly decrease the payback time to around **5 years** and, increase the internal rate of return to around **12%**. On the other hand, the decrease of **average heat price** to around **78 €/MWh** will significantly increase the payback time to **around 15 years** and decrease the internal rate of return towards **4%** (marginal profitability). The business model is more sensitive to the **heat price decrease** and more sensitive is its **payback time**.

The sensitivity analysis for the business plan:

- "Nova Toplana", the larger size implementation of the biomass-based DH in the urban area

is shown at Figure 2.

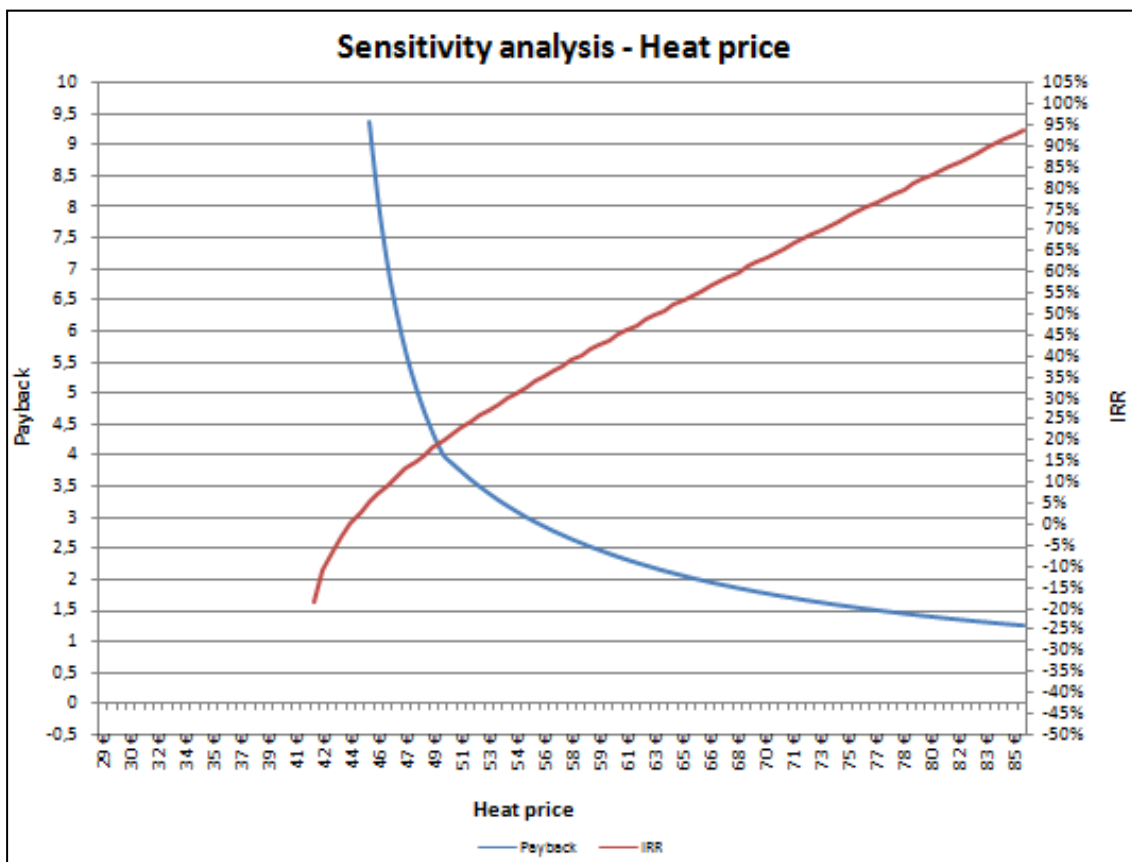
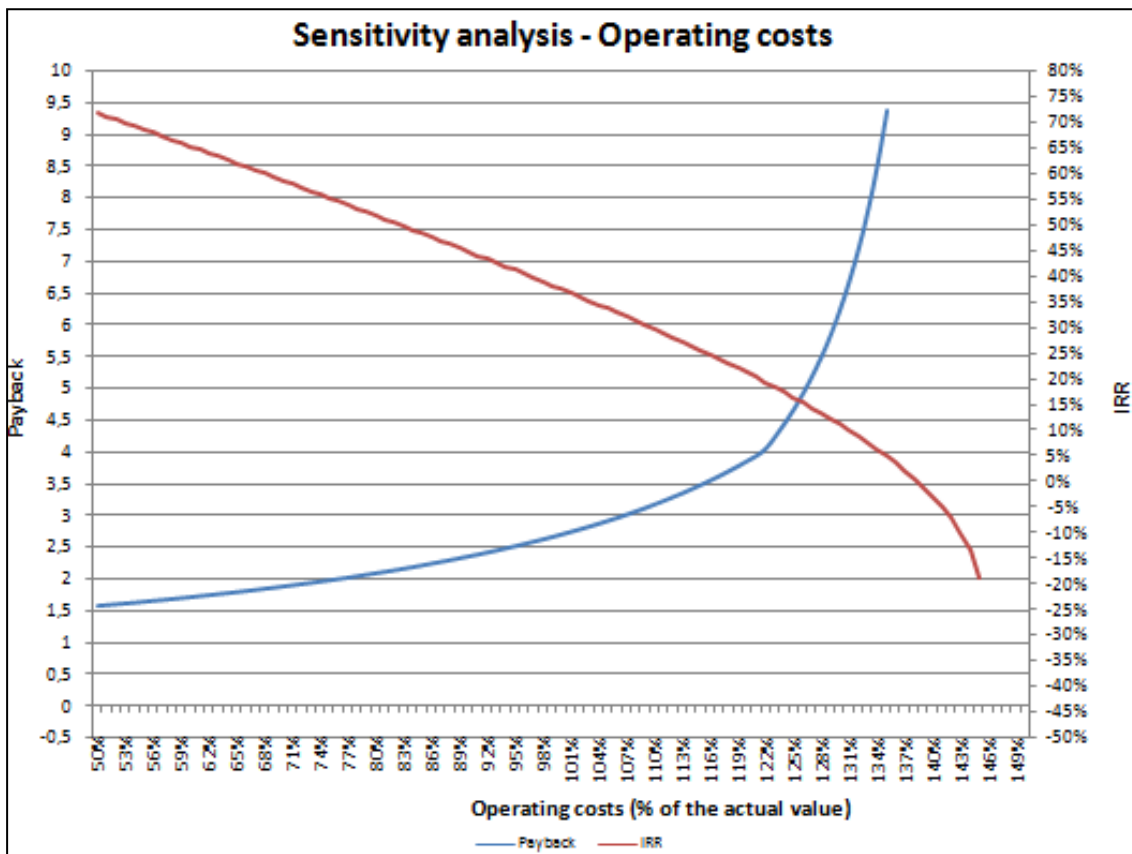


Figure 2 Sensitivity analysis for the business plan "Nova Toplana" on the operating costs and heat price

Sensitivity analysis for the business model of "Nova Toplana" on the **operating costs** shows that the increase of operating cost of 20% will increase the payback time to **4 years** and, decrease the internal rate of return to **20%**. On the other hand, the decrease of operating cost

of 20% will reduce the payback time to around **2 years** and increase the internal rate of return to around **50%**. The business plan is more sensitive to the **operating cost increase** and more sensitive is its **internal rate of return**.

Sensitivity analysis for the business model of "Nova Toplana" on the **heat price** shows that the increase of **average heat price** (including all customers and both fixed and variable part) to around **67 €/MWh** will decrease the payback time to around **2 years** and, increase the internal rate of return to around **55%**. On the other hand, the decrease of **average heat price** to around **47 €/MWh** will increase the payback time to **5 years** and decrease the internal rate of return to **15%**. The business plan is more sensitive to the **heat price decrease** and more sensitive is its **internal rate of return**.

Comparing two business models:

- "Letnjikovac", the smaller size implementation of the biomass-based DH in the suburban area
- "Nova Toplana", the larger size implementation of the biomass-based DH in the urban area

it has been shown that "**Letnjikovac**" is more sensitive to the operating costs and heat price change than "**Nova Toplana**", which is more indifferent to the operating costs and heat price change.

Having in mind that:

- "Letnjikovac", the smaller size implementation of the biomass-based DH in the suburban area

has the marginal payback time and rate of the return, and is more sensitive to the operating cost and the heat price. It has been advised trying to **reduce operation and maintenance costs** and to **increase average heat costs** to 81.55 €/MWh and therefore to make project less vulnerable to the unexpected negative external financial outcomes.

Having in mind that:

- "Nova Toplana", the larger size implementation of the biomass-based DH in the urban area

has very good project performance, and it is indifferent to the heat price change it has been advised trying to **reduce the average heat price** to 51.73 €/MWh and therefore have better offer for the consumers.

## 4 Executive summary for policy makers (in English)

The two district heating investment projects in City of Sabac, Serbia:

- **"Letnjikovac"**, the smaller size implementation of the biomass-based DH in the suburban area,
- **"Nova Toplana"**, the larger size implementation of the biomass-based DH in the urban area

are completely different realization paths regarding the ownership, investment, purpose, and profitability.

The investment project **"Letnjikovac"** is a small modular district heating system based in the suburban area consisted of **biomass boiler 1,500 kW, fuel oil boiler 3,500 kW**, producing **4,274 MWh** of heat, and buffer **storage tank with 60 m<sup>3</sup>**, replacing the existing heating oil boiler and the connection of **around 250 new customers** to the newly built distribution heating **grid length of 7,656 m**. Its total investment costs are **2,095,000 €**. Its realization is based on the involvement of the:

- citizens in all phases, private investment 320,000 €, paying the connection fee 500€ - 5,000€ with consumers ownership and energy cooperative,
- local-self government as the **regulator** and the guarantee for the **credit line of 1,500,000 €**, and
- national government **non-refundable grant of 125,000 €**.

For the minimal profitability of the project and equity internal rate of return **8.76%** the average yearly price of **1,016 €** has been calculated for the average household. The contract will be signed to a minimum period of **15 years (2019-2033)** which is longer than the payback time of the project (9.05 years).

The socio-economic benefits are targeted towards increased quality of life through better comfort, better air quality, and creation of the economic opportunities on the local level through avoided biomass cutting and costs for inefficient use of biomass of **349,830 €**.

The investment project **"Nova Toplana"**, is a larger modular district heating system in an urban area and consists of **three biomass boilers 3 x 4.5 MW**, existing **natural gas boilers up to 35 MW**, producing **61,953 MWh** of heat, buffer **storage tank 200 m<sup>3</sup>**, without connection of new customers (7,500 individual consumers already connected) and transmission grid extension in **length of 2,240 m**. Its total investment costs are **7,200,000 €**. Its realization is based on the involvement of the:

- private investor financing **2,200,000 €**
- local-self government as the guarantee for the credit line **5,000,000 €**, and
- national government as the **regulator**.

The heat pricing has been performed based on the decreased price to the **average yearly price 423 €** based on the **10 years contract (2019-2029)**, keeping the very attractive internal return rate of **37.40%** and short payback time of (2.69 years). The socio-economic benefits beside the decreased energy price for the citizens, are reductions in the national CO<sub>2</sub> equivalent emissions of **7,540 t** and increased energy security due to decreased dependency on imports of the natural gas for **1,592,184 €**. Furthermore, the beneficial for the local economic development will be the storage for biomass up to 90 days of yearly consumption of **13,295 t of biomass** which could establish regional biomass market at the level of **834,571 €**. Additionally, economic activity will be created in the biomass supply sector.

The successful realization of one of those projects will be indicative for the overall direction of possible energy transition in the heating sector of Republic of Serbia.

## 5 Executive summary for policy makers (in Serbian language )

Инвестициони пројекти даљинског грејања у граду Шапцу, Србија:

- **"Летњиковац"**, мања изведба модуларног система даљинског грејања коришћењем биомасе у приградском подручју,
- **"Нова Топлана"**, већа изведба модуларног система даљинског грејања коришћењем биомасе у урбаним срединама

потпуно су различити у погледу реализације, засновани на различитим власничким односима, инвестицијама, сврси те на крају и показују различиту профитабилност.

Инвестициони пројекат **"Летњиковац"** је мали модуларни систем даљинског грејања базиран у приградском подручју који се састоји од котла на биомасу **1.500 kW**, котла мазут **3.500 kW**, са производњом **4.274 MWh** топлоте и резервоаром за **складиштење топлоте 60 m<sup>3</sup>**, заменом постојећег котла на лож уље и повезивањем око **250 нових купаца** новоизграђеним дистрибутивним топловодом дужине **7.656 m**. Укупни инвестициони трошкови износе **247.210.000 дин.** (према курсу 118 динара/€). Његова реализација заснива се на учешћу:

- грађана у свим фазама, улагања физичких и правних лица од **43.660.000 дин.** , плаћање накнаде за прикључење **59.000 - 590.000 дин.** уз власништво потрошача и кроз енергетску задругу,
- локалне самоуправе као регулатора и гаранције за кредитну линију и износу од **1.450.000 € (171.100.000 дин.)**, и
- бесповратне средства обезбеђена на националном нивоу од **14.750.000 дин.**

За минималну профитабилност пројекта и интерну стопу приноса од **8,76%** израчуната је просечна годишња цена од **119.888 дин.** за просечно домаћинство. Уговор ће бити потписан на минимум од **15 година (2019-2033)** а што је довољно обзиром на времене отплате инвестиције (9,05 година). Социјално-економске користи су усмерене на повећање квалитета живота кроз бољи комфор, бољи квалитет ваздуха и стварање економских могућности на локалном нивоу кроз избегнуте губитке сечом шума и коришћењем квалитетне биомасе на неефикасан начин са трошковима у износу од **41.279.940 дин.**

Инвестициони пројекат **"Нова Топлана"** је већи модуларни систем даљинског грејања у урбаним подручјима који се састоји од **три котла на биомасу 3 к 4,5 MW**, постојећих котлова на природни гас до **35 MW**, са производњом **61.953 MWh** топлоте, резервоара за **складиштење топлоте 200 m<sup>3</sup>** без прикључења нових купаца (**7.500** појединачних потрошача већ **прикључених**) и продужетак преносне топловодне мреже дужине **2.240m**. Укупни инвестициони трошкови износе **849.600.000 дин.** Његова реализација заснива се на учешћу:

- приватног инвеститора, финансијера и износу од **259.600.000 дин.**
- локалне самоуправе као гаранције за кредитну линију у износу од **590.000.000 дин.**, и
- националног регулатора.

Цена топлоте одређена је на основу **смањене просечну годишњу цену од 49.914 дин.** на основу **уговора од 10 година (2019-2029)**, задржавајући врло атрактивну интерну стопу повраћаја од **37,40%** и кратко време отплате (2,69 године). Социјално-економске користи поред смањене цене енергије за грађане су смањење националних емисија еквивалентног угљендиоксида од **7.540 t** и повећана енергетска сигурност због смањене зависности од увоза природног гаса уз смањене трошкове за **187.877.712 дин.** годишње. Такође, корисно за локални економски развој биће **складиште биомасе до 90 дана** годишње потрошње од **13.295 t биомасе** којим би могло успоставити тржиште биомасе на регионалном нивоу од **98.479.378 дин.** Поред тога, економска активност ће бити створена у сектору снабдевања биомасом.

Успешна реализација једног од ових пројеката биће опредељујућа за укупан правац енергетске транзиције у сектору грејања Републике Србије.

## 6 Appendix

### 6.1 Map details

A map details of the two business plans:

- "Letnjikovac", the smaller size implementation of the biomass-based DH in the suburban area
- "Nova Toplana", the larger size implementation of the biomass-based DH in the urban area

are shown at Figures 3 and 4.



Figure 3: Map details "Letnjikovac", the smaller size implementation of the biomass-based DH in the suburban area



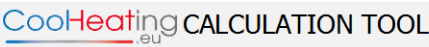
Figure 4 Map details the larger size implementation of the biomass-based DH in the urban area




## 6.2 Simulation results from Economic calculation tool for small modular district heating and cooling projects

**4% discount rate** is employed in the simulations of the economic performance of the projects. The following pages show detailed economic calculations are contained simulation results from Economic calculation tool for small modular district heating and cooling project:

- "Letnjikovac", the smaller size implementation of the biomass-based DH in the suburban area



ECONOMIC CALCULATION TOOL FOR SMALL MODULAR DISTRICT HEATING AND COOLING PROJECTS




Select language: English
Mode: ECONOMY: Financial module only
Project name: PROJECT 1
Project start year: 2019
Project life time: 15 years

PROCEED TO PROJECT


**Project description**

Letnjikovac



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691679.

Skupina FABRIKA d.o.o.  
info@skupinafabrika.com



Projected investment cost in €	Value	Share %
1. Buildings and construction works	200.000	9,5%
2. Plot	0	0,0%
3. Equipment/Machinery	1.845.000	88,1%
<b>A. PROPERTY, PLANT AND EQUIPMENT</b>	<b>2.045.000</b>	<b>97,6%</b>
<b>B. PROJECT AND INVESTMENT DOCUMENTATION</b>	<b>50.000</b>	<b>2,4%</b>
<b>C. INTANGIBLE ASSETS</b>	<b>0</b>	<b>0,0%</b>
<b>D. INVESTMENT COST (A+B+C)</b>	<b>2.095.000</b>	<b>100,0%</b>
<b>E. INITIAL WORKING CAPITAL</b>	<b>0</b>	<b>0,0%</b>
<b>F. TOTAL INVESTMENT COST (D+E)</b>	<b>2.095.000</b>	<b>100,0%</b>

Sources of investment cost financing in €	Value	Share %
<b>A. PRIVATE EQUITY</b>	<b>370.000</b>	<b>17,7%</b>
<b>B. BANK LOANS</b>	<b>1.450.000</b>	<b>69,2%</b>
<b>C. CONNECTION FEES</b>	<b>150.000</b>	<b>7,2%</b>
<b>D. INVESTMENT SUBSIDIES</b>	<b>125.000</b>	<b>6,0%</b>
<i>Bridging loan</i>	<i>125.000</i>	
<b>E. TOTAL FINANCING (A+B+C+D)</b>	<b>2.095.000</b>	<b>100,0%</b>

Source of revenue in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
1. ELECTRICITY REVENUES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. HEAT REVENUES	282.889	288.547	294.318	300.204	306.208	312.332	318.579	324.950	331.449	338.078	344.840	351.737	358.771	365.947	373.266
3. OPERATING SUBSIDIES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>A. GROSS OPERATING REVENUES</b>	<b>282.889</b>	<b>288.547</b>	<b>294.318</b>	<b>300.204</b>	<b>306.208</b>	<b>312.332</b>	<b>318.579</b>	<b>324.950</b>	<b>331.449</b>	<b>338.078</b>	<b>344.840</b>	<b>351.737</b>	<b>358.771</b>	<b>365.947</b>	<b>373.266</b>
1. INVESTMENT SUBSIDIES	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250
2. FINANCIAL REVENUES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3. OTHER REVENUES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>B. OTHER SOURCES OF REVENUES</b>	<b>6.250</b>	<b>6.250</b>	<b>6.250</b>	<b>6.250</b>	<b>6.250</b>	<b>6.250</b>	<b>6.250</b>	<b>6.250</b>	<b>6.250</b>	<b>6.250</b>	<b>6.250</b>	<b>6.250</b>	<b>6.250</b>	<b>6.250</b>	<b>6.250</b>
<b>C. TOTAL REVENUES (A + B)</b>	<b>289.139</b>	<b>294.797</b>	<b>300.568</b>	<b>306.454</b>	<b>312.458</b>	<b>318.582</b>	<b>324.829</b>	<b>331.200</b>	<b>337.699</b>	<b>344.328</b>	<b>351.090</b>	<b>357.987</b>	<b>365.021</b>	<b>372.197</b>	<b>379.516</b>

Cost type in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
1. Energy source costs	131.320	133.093	134.893	136.721	138.576	140.460	142.372	144.314	146.286	148.287	150.320	152.384	154.480	156.608	158.769
2. Operation and maintenance costs	30.675	31.442	32.228	33.034	33.859	34.706	35.574	36.463	37.375	38.309	39.267	40.248	41.254	42.286	43.343
<b>A. TOTAL OPERATING COSTS (1+2)</b>	<b>161.995</b>	<b>164.535</b>	<b>167.121</b>	<b>169.754</b>	<b>172.436</b>	<b>175.166</b>	<b>177.946</b>	<b>180.777</b>	<b>183.660</b>	<b>186.596</b>	<b>189.587</b>	<b>192.632</b>	<b>195.734</b>	<b>198.894</b>	<b>202.112</b>
1. Cost of management, insurance and lease	20.450	20.859	21.276	21.702	22.136	22.578	23.030	23.491	23.960	24.440	24.928	25.427	25.936	26.454	26.983
2. Cost of promotional activities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3. Cost of other services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>B. TOTAL COSTS OF SERVICES (1+2+3)</b>	<b>20.450</b>	<b>20.859</b>	<b>21.276</b>	<b>21.702</b>	<b>22.136</b>	<b>22.578</b>	<b>23.030</b>	<b>23.491</b>	<b>23.960</b>	<b>24.440</b>	<b>24.928</b>	<b>25.427</b>	<b>25.936</b>	<b>26.454</b>	<b>26.983</b>
<b>C. COSTS OF LABOUR</b>	<b>1.500</b>	<b>1.530</b>	<b>1.561</b>	<b>1.592</b>	<b>1.624</b>	<b>1.656</b>	<b>1.689</b>	<b>1.723</b>	<b>1.757</b>	<b>1.793</b>	<b>1.828</b>	<b>1.865</b>	<b>1.902</b>	<b>1.940</b>	<b>1.979</b>
<b>D. DEPRECIATION AND AMORTIZATION COSTS</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>
<b>E. FINANCIAL COSTS</b>	<b>3.125</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14.088</b>	<b>13.183</b>	<b>12.270</b>	<b>11.347</b>	<b>10.415</b>	<b>9.473</b>	<b>8.522</b>	<b>7.561</b>	<b>6.591</b>	<b>5.611</b>	<b>4.622</b>
<b>F. OTHER EXPENSES AND LOSSES</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>G. INCOME TAXES</b>	<b>0</b>	<b>625</b>	<b>1.172</b>	<b>1.731</b>	<b>0</b>	<b>250</b>	<b>1.029</b>	<b>1.823</b>	<b>2.631</b>	<b>3.455</b>	<b>4.295</b>	<b>5.150</b>	<b>6.022</b>	<b>6.909</b>	<b>7.814</b>
<b>H. TOTAL COSTS (A+B+C+D+E+F+G)</b>	<b>291.820</b>	<b>292.299</b>	<b>295.880</b>	<b>299.529</b>	<b>315.033</b>	<b>317.583</b>	<b>320.714</b>	<b>323.910</b>	<b>327.174</b>	<b>330.507</b>	<b>333.911</b>	<b>337.386</b>	<b>340.935</b>	<b>344.559</b>	<b>348.260</b>

Inventories in stock and resources needed in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
A. Average days of inventory	60,0														
B. Inventory turnover ratio	6,08														
C. INVENTORIES IN STOCK ON 31ST OF DECEMBER	26.629	27.047	27.472	27.905	28.346	28.794	29.251	29.717	30.191	30.673	31.165	31.666	32.176	32.695	33.224
D. RESOURCES NEEDED TO FINANCE INVENTORIES	4.377	4.446	4.516	4.587	4.660	4.733	4.808	4.885	4.963	5.042	5.123	5.205	5.289	5.375	5.461

Accounts receivable and resources needed in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
A. Accounts receivable collection period	30,0														
B. Accounts receivable turnover ratio	12,17														
C. ACCOUNTS RECEIVABLE ON 31ST OF DECEMBER	23.251	23.716	24.190	24.674	25.168	25.671	26.185	26.708	27.242	27.787	28.343	28.910	29.488	30.078	30.679
D. RESOURCES NEEDED TO FINANCE THE ACCOUNTS RECEIVABLE	1.911	1.949	1.988	2.028	2.069	2.110	2.152	2.195	2.239	2.284	2.330	2.376	2.424	2.472	2.522
E. LONG-TERM ACCOUNTS RECEIVABLE ON 31ST OF DECEMBER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Annual depreciation rates in %		Calculation of planned depreciation	
<b>A. INTANGIBLE ASSETS</b>			10,0%
<b>B. PROPERTY, PLANT AND EQUIPMENT</b>			
1. Buildings and constructions			5,0%
2. Equipment, plant, vehicles, mechanization			5,0%

Depreciation cost in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
<b>A. INTANGIBLE ASSETS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
1. Buildings and constructions	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000
2. Equipment, plant, vehicles, mechanization	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750
<b>B. TOTAL PROPERTY, PLANT AND EQUIPMENT (1+2)</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>
<b>C. TOTAL (A+B)</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>	<b>104.750</b>

Fixes assets value on 31st of December in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
<b>A. INTANGIBLE ASSETS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
1. Buildings and constructions	190.000	180.000	170.000	160.000	150.000	140.000	130.000	120.000	110.000	100.000	90.000	80.000	70.000	60.000	50.000
2. Equipment, plant, vehicles, mechanization	1.800.250	1.705.500	1.610.750	1.516.000	1.421.250	1.326.500	1.231.750	1.137.000	1.042.250	947.500	852.750	758.000	663.250	568.500	473.750
<b>B. TOTAL PROPERTY, PLANT AND EQUIPMENT (1+2)</b>	<b>1.990.250</b>	<b>1.885.500</b>	<b>1.780.750</b>	<b>1.676.000</b>	<b>1.571.250</b>	<b>1.466.500</b>	<b>1.361.750</b>	<b>1.257.000</b>	<b>1.152.250</b>	<b>1.047.500</b>	<b>942.750</b>	<b>838.000</b>	<b>733.250</b>	<b>628.500</b>	<b>523.750</b>
<b>C. TOTAL (A+B)</b>	<b>1.990.250</b>	<b>1.885.500</b>	<b>1.780.750</b>	<b>1.676.000</b>	<b>1.571.250</b>	<b>1.466.500</b>	<b>1.361.750</b>	<b>1.257.000</b>	<b>1.152.250</b>	<b>1.047.500</b>	<b>942.750</b>	<b>838.000</b>	<b>733.250</b>	<b>628.500</b>	<b>523.750</b>

Accounts payable and deliveries financed by suppliers in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
A. Days payable	30,0														
B. Accounts payable turnover ratio	12,17														
C. ACCOUNTS PAYABLE ON 31ST OF DECEMBER	14.995	15.238	15.485	15.736	15.992	16.253	16.519	16.789	17.065	17.345	17.631	17.923	18.219	18.522	18.830
D. DELIVERIES FINANCED BY SUPPLIERS	1.233	1.252	1.273	1.293	1.314	1.336	1.358	1.380	1.403	1.426	1.449	1.473	1.497	1.522	1.548
E. LONG-TERM ACCOUNTS PAYABLE ON 31ST OF DECEMBER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Working capital requirements in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
1. Resources needed to finance inventories	4.377	4.446	4.516	4.587	4.660	4.733	4.808	4.885	4.963	5.042	5.123	5.205	5.289	5.375	5.461
2. Resources needed to finance the accounts receivable	1.911	1.949	1.988	2.028	2.069	2.110	2.152	2.195	2.239	2.284	2.330	2.376	2.424	2.472	2.522
3. Deliveries financed by suppliers	1.233	1.252	1.273	1.293	1.314	1.336	1.358	1.380	1.403	1.426	1.449	1.473	1.497	1.522	1.548
<b>A. WORKING CAPITAL SURPLUS (+) OR DEFICIT (-) (3-2-1)</b>	<b>-5.056</b>	<b>-5.143</b>	<b>-5.231</b>	<b>-5.322</b>	<b>-5.414</b>	<b>-5.507</b>	<b>-5.603</b>	<b>-5.700</b>	<b>-5.799</b>	<b>-5.900</b>	<b>-6.003</b>	<b>-6.108</b>	<b>-6.215</b>	<b>-6.324</b>	<b>-6.435</b>

Debt financing	Principal in €	Interest rate	Repayment starting year	Number of instalments
Loan 1	1.450.000	1,00%	2023	180
Loan 2	0	1,30%	2019	120
Loan 3	0	5,00%	2016	60
Bridge financing	Principal in €	Interest rate	Payment due after	Number of instalments
Bridge financing loan	125.000	5,00%	6 months	1
<b>TOTAL LOANS in €</b>	<b>1.575.000</b>			

Trend of loans and payment of principal and interest in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
<b>A. TOTAL LOAN BALANCE ON 31ST OF DECEMBER</b>	<b>1.450.000</b>	<b>1.450.000</b>	<b>1.450.000</b>	<b>1.450.000</b>	<b>1.359.950</b>	<b>1.268.995</b>	<b>1.177.127</b>	<b>1.084.336</b>	<b>990.612</b>	<b>895.947</b>	<b>800.331</b>	<b>703.754</b>	<b>606.208</b>	<b>507.681</b>	<b>408.164</b>
Annual Loan 1 payments	0	0	0	0	90.050	90.955	91.868	92.791	93.723	94.665	95.616	96.577	97.547	98.527	99.517
Annual Loan 2 payments	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual Loan 3 payments	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bridge financing loan payments	125.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>B. TOTAL ANNUAL LOAN PAYMENTS</b>	<b>125.000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>90.050</b>	<b>90.955</b>	<b>91.868</b>	<b>92.791</b>	<b>93.723</b>	<b>94.665</b>	<b>95.616</b>	<b>96.577</b>	<b>97.547</b>	<b>98.527</b>	<b>99.517</b>
Annual payments of interests on Loan 1	0	0	0	0	14.088	13.183	12.270	11.347	10.415	9.473	8.522	7.561	6.591	5.611	4.622
Annual payments of interests on Loan 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual payments of interests on Loan 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual payments of interests on bridge financing loan	3.125	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>C. TOTAL ANNUAL PAYMENTS OF INTERESTS ON LOANS</b>	<b>3.125</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14.088</b>	<b>13.183</b>	<b>12.270</b>	<b>11.347</b>	<b>10.415</b>	<b>9.473</b>	<b>8.522</b>	<b>7.561</b>	<b>6.591</b>	<b>5.611</b>	<b>4.622</b>

Shareholders equity in € on 31st of December	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
1. Owner's equity	520.000	517.319	519.817	524.505	531.429	528.854	529.853	533.968	541.258	551.784	565.605	582.785	603.385	627.472	655.109
2. Retained earnings	-2.681	2.498	4.688	6.925	-2.575	999	4.115	7.290	10.525	13.821	17.179	20.601	24.086	27.638	31.256
<b>TOTAL EQUITY (1 to 2)</b>	<b>517.319</b>	<b>519.817</b>	<b>524.505</b>	<b>531.429</b>	<b>528.854</b>	<b>529.853</b>	<b>533.968</b>	<b>541.258</b>	<b>551.784</b>	<b>565.605</b>	<b>582.785</b>	<b>603.385</b>	<b>627.472</b>	<b>655.109</b>	<b>686.365</b>

Acquisition and consumption of investment subsidies in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
1. Subsidies	125.000														
2. Subsidized fixed assets on 31st of December	2.095.000	1.990.250	1.885.500	1.780.750	1.676.000	1.571.250	1.466.500	1.361.750	1.257.000	1.152.250	1.047.500	942.750	838.000	733.250	628.500
3. Share of subsidies in subsidized fixed assets	6,0%														
4. Depreciation cost	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750
5. Other sources of revenues	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250
<b>LONG-TERM ACCRUED COSTS AND DEFERRED REVENUES ON 31ST OF DECEMBER</b>	<b>118.750</b>	<b>112.500</b>	<b>106.250</b>	<b>100.000</b>	<b>93.750</b>	<b>87.500</b>	<b>81.250</b>	<b>75.000</b>	<b>68.750</b>	<b>62.500</b>	<b>56.250</b>	<b>50.000</b>	<b>43.750</b>	<b>37.500</b>	<b>31.250</b>

Income statement in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
1. Total operating income	282.889	288.547	294.318	300.204	306.208	312.332	318.579	324.950	331.449	338.078	344.840	351.737	358.771	365.947	373.266
2. Investment subsidies	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250	6.250
3. Total cost of goods and services	182.445	185.394	188.397	191.456	194.571	197.744	200.976	204.268	207.621	211.036	214.515	218.059	221.670	225.348	229.095
a) Total operating costs	161.995	164.535	167.121	169.754	172.436	175.166	177.946	180.777	183.660	186.596	189.587	192.632	195.734	198.894	202.112
1. Energy source costs	131.320	133.093	134.893	136.721	138.576	140.460	142.372	144.314	146.286	148.287	150.320	152.384	154.480	156.608	158.769
2. Operation and maintenance costs	30.675	31.442	32.228	33.034	33.859	34.706	35.574	36.463	37.375	38.309	39.267	40.248	41.254	42.286	43.343
b) Total cost of operating services	20.450	20.859	21.276	21.702	22.136	22.578	23.030	23.491	23.960	24.440	24.928	25.427	25.936	26.454	26.983
1. Cost of management, insurance and lease	20.450	20.859	21.276	21.702	22.136	22.578	23.030	23.491	23.960	24.440	24.928	25.427	25.936	26.454	26.983
2. Cost of promotional activities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3. Cost of other services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4. Cost of labour	1.500	1.530	1.561	1.592	1.624	1.656	1.689	1.723	1.757	1.793	1.828	1.865	1.902	1.940	1.979
<b>EBITDA</b>	<b>36,38%</b>	<b>36,59%</b>	<b>36,80%</b>	<b>37,01%</b>	<b>37,21%</b>	<b>37,41%</b>	<b>37,61%</b>	<b>37,80%</b>	<b>38,00%</b>	<b>38,19%</b>	<b>38,38%</b>	<b>38,57%</b>	<b>38,75%</b>	<b>38,93%</b>	<b>39,11%</b>
5. Depreciation and amortization	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750
1. Intangible assets	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Property, plant and equipment	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750
2.1. Buildings and constructions	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000
2.2. Equipment, plant, vehicles, mechanization	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750	94.750
<b>EBIT</b>	<b>0,15%</b>	<b>1,06%</b>	<b>1,95%</b>	<b>2,82%</b>	<b>3,68%</b>	<b>4,53%</b>	<b>5,36%</b>	<b>6,18%</b>	<b>6,98%</b>	<b>7,77%</b>	<b>8,54%</b>	<b>9,31%</b>	<b>10,05%</b>	<b>10,79%</b>	<b>11,51%</b>
6. Revenues from financial activities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7. Financial costs	3.125	0	0	0	14.088	13.183	12.270	11.347	10.415	9.473	8.522	7.561	6.591	5.611	4.622
8. Other revenues and gains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9. Other expenses and losses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>10. INCOME BEFORE TAXES</b>	<b>-2.681</b>	<b>3.123</b>	<b>5.860</b>	<b>8.656</b>	<b>-2.575</b>	<b>1.248</b>	<b>5.144</b>	<b>9.113</b>	<b>13.157</b>	<b>17.277</b>	<b>21.474</b>	<b>25.751</b>	<b>30.108</b>	<b>34.547</b>	<b>39.070</b>
<b>EBT</b>	<b>-0,93%</b>	<b>1,06%</b>	<b>1,95%</b>	<b>2,82%</b>	<b>-0,82%</b>	<b>0,39%</b>	<b>1,58%</b>	<b>2,75%</b>	<b>3,90%</b>	<b>5,02%</b>	<b>6,12%</b>	<b>7,19%</b>	<b>8,25%</b>	<b>9,28%</b>	<b>10,29%</b>
11. Income taxes	0	625	1.172	1.731	0	250	1.029	1.823	2.631	3.455	4.295	5.150	6.022	6.905	7.814
<b>12. NET INCOME</b>	<b>-2.681</b>	<b>2.498</b>	<b>4.688</b>	<b>6.925</b>	<b>-2.575</b>	<b>999</b>	<b>4.115</b>	<b>7.290</b>	<b>13.821</b>	<b>17.179</b>	<b>20.601</b>	<b>24.086</b>	<b>27.638</b>	<b>31.256</b>	
13. Number of employees	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Balance sheet on 31st of December in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
<b>A. FIXED ASSETS</b>	<b>1.990.250</b>	<b>1.885.500</b>	<b>1.780.750</b>	<b>1.676.000</b>	<b>1.571.250</b>	<b>1.466.500</b>	<b>1.361.750</b>	<b>1.257.000</b>	<b>1.152.250</b>	<b>1.047.500</b>	<b>942.750</b>	<b>838.000</b>	<b>733.250</b>	<b>628.500</b>	<b>523.750</b>
I. Intangible assets and long-term deferred costs and accrued revenues	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
II. Property, plant and equipment	1.990.250	1.885.500	1.780.750	1.676.000	1.571.250	1.466.500	1.361.750	1.257.000	1.152.250	1.047.500	942.750	838.000	733.250	628.500	523.750
1. Buildings and constructions	190.000	180.000	170.000	160.000	150.000	140.000	130.000	120.000	110.000	100.000	90.000	80.000	70.000	60.000	50.000
2. Equipment, plant, vehicles, mechanization	1.800.250	1.705.500	1.610.750	1.516.000	1.421.250	1.326.500	1.231.750	1.137.000	1.042.250	947.500	852.750	758.000	663.250	568.500	473.750
III. Long-term accounts receivable	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>B. CURRENT ASSETS</b>	<b>110.814</b>	<b>212.055</b>	<b>315.489</b>	<b>421.165</b>	<b>427.296</b>	<b>436.101</b>	<b>447.114</b>	<b>460.383</b>	<b>475.961</b>	<b>493.898</b>	<b>514.247</b>	<b>537.063</b>	<b>562.399</b>	<b>590.312</b>	<b>620.859</b>
I. Inventories	26.629	27.047	27.472	27.905	28.346	28.794	29.251	29.717	30.191	30.673	31.165	31.666	32.176	32.695	33.224
II. Accounts receivable	23.251	23.716	24.190	24.674	25.168	25.671	26.185	26.708	27.242	27.787	28.343	28.910	29.488	30.078	30.679
III. Cash and cash equivalents	60.934	161.292	263.827	368.586	373.783	381.636	391.678	403.958	418.527	435.437	454.739	476.487	500.735	527.539	556.956
<b>TOTAL ASSETS</b>	<b>2.101.064</b>	<b>2.097.555</b>	<b>2.096.239</b>	<b>2.097.165</b>	<b>1.998.546</b>	<b>1.902.601</b>	<b>1.808.864</b>	<b>1.717.383</b>	<b>1.628.211</b>	<b>1.541.398</b>	<b>1.456.997</b>	<b>1.375.063</b>	<b>1.295.649</b>	<b>1.218.812</b>	<b>1.144.609</b>
<b>A. OWNER'S EQUITY</b>	<b>517.319</b>	<b>519.817</b>	<b>524.505</b>	<b>531.429</b>	<b>528.854</b>	<b>529.853</b>	<b>533.968</b>	<b>541.258</b>	<b>551.784</b>	<b>565.605</b>	<b>582.785</b>	<b>603.385</b>	<b>627.472</b>	<b>655.109</b>	<b>686.365</b>
<b>B. PROVISIONS AND LONG-TERM ACCRUED COSTS AND DEFERRED REVENUES</b>	<b>118.750</b>	<b>112.500</b>	<b>106.250</b>	<b>100.000</b>	<b>93.750</b>	<b>87.500</b>	<b>81.250</b>	<b>75.000</b>	<b>68.750</b>	<b>62.500</b>	<b>56.250</b>	<b>50.000</b>	<b>43.750</b>	<b>37.500</b>	<b>31.250</b>
<b>C. LONG-TERM LIABILITIES</b>	<b>1.450.000</b>	<b>1.450.000</b>	<b>1.450.000</b>	<b>1.359.950</b>	<b>1.268.995</b>	<b>1.177.127</b>	<b>1.084.336</b>	<b>990.612</b>	<b>895.947</b>	<b>800.331</b>	<b>703.754</b>	<b>606.208</b>	<b>507.681</b>	<b>408.164</b>	<b>307.648</b>
I. Long-term financial liabilities	1.450.000	1.450.000	1.450.000	1.359.950	1.268.995	1.177.127	1.084.336	990.612	895.947	800.331	703.754	606.208	507.681	408.164	307.648
II. Long-term accounts payable	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>D. CURRENT LIABILITIES</b>	<b>14.995</b>	<b>15.238</b>	<b>15.485</b>	<b>105.786</b>	<b>106.947</b>	<b>108.121</b>	<b>109.310</b>	<b>110.513</b>	<b>111.730</b>	<b>112.961</b>	<b>114.208</b>	<b>115.469</b>	<b>116.746</b>	<b>118.038</b>	<b>119.346</b>
I. Short-term financial liabilities	0	0	0	90.050	90.955	91.868	92.791	93.723	94.665	95.616	96.577	97.547	98.527	99.517	100.516
II. Accounts payable	14.995	15.238	15.485	15.736	15.992	16.253	16.519	16.789	17.065	17.345	17.631	17.923	18.219	18.522	18.830
<b>TOTAL LIABILITIES AND OWNER'S EQUITY</b>	<b>2.101.064</b>	<b>2.097.555</b>	<b>2.096.239</b>	<b>2.097.165</b>	<b>1.998.546</b>	<b>1.902.601</b>	<b>1.808.864</b>	<b>1.717.383</b>	<b>1.628.211</b>	<b>1.541.398</b>	<b>1.456.997</b>	<b>1.375.063</b>	<b>1.295.649</b>	<b>1.218.812</b>	<b>1.144.609</b>

Cash-flow statement in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
<b>A. CASH FLOW FROM OPERATING ACTIVITIES</b>															
1. Income before taxes	-2.681	3.123	5.860	8.656	-2.575	1.248	5.144	9.113	13.157	17.277	21.474	25.751	30.108	34.547	39.070
2. Depreciation and amortization	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750	104.750
3. Income taxes	0	-625	-1.172	-1.731	0	-250	-1.029	-1.823	-2.631	-3.455	-4.295	-5.150	-6.022	-6.909	-7.814
4. Decrease (- increase) in accounts receivable	-23.251	-465	-474	-484	-493	-503	-513	-524	-534	-545	-556	-567	-578	-590	-603
5. Decrease (- increase) in inventories	-26.629	-418	-425	-433	-441	-449	-457	-465	-474	-483	-492	-501	-510	-519	-529
6. Increase (- decrease) in accounts payable	14.995	242	247	251	256	261	266	271	276	281	286	291	297	302	308
7. Financial costs	3.125	0	0	0	14.088	13.183	12.270	11.347	10.415	9.473	8.522	7.561	6.591	5.611	4.622
8. Income related to long-term accrued costs and deferred revenues (subsidies)	-6.250	-6.250	-6.250	-6.250	-6.250	-6.250	-6.250	-6.250	-6.250	-6.250	-6.250	-6.250	-6.250	-6.250	-6.250
<b>Net cash flow from operating activities</b>	<b>64.059</b>	<b>100.358</b>	<b>102.535</b>	<b>104.759</b>	<b>109.335</b>	<b>111.991</b>	<b>114.180</b>	<b>116.419</b>	<b>118.707</b>	<b>121.048</b>	<b>123.440</b>	<b>125.886</b>	<b>128.386</b>	<b>130.942</b>	<b>133.555</b>
<b>B. CASH FLOW FROM INVESTING ACTIVITIES</b>															
1. Receipts (+) and disbursements (-) in intangible assets	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Receipts (+) and disbursements (-) in property, plant and equipment	-2.095.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Net cash flow from investing activities</b>	<b>-2.095.000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>C. CASH FLOW FROM FINANCING ACTIVITIES</b>															
1. Receipts from capital pay-in (+) and dividends paid (-)	520.000	0	-0	-0	0	0	0	0	0	0	0	0	0	0	0
2. Receipts (+) and disbursements (-) in financial liabilities and accrued costs and deferred revenues	1.571.875	0	0	0	-104.138	-104.138	-104.138	-104.138	-104.138	-104.138	-104.138	-104.138	-104.138	-104.138	-104.138
<b>Net cash flow from financing activities</b>	<b>2.091.875</b>	<b>0</b>	<b>-0</b>	<b>-0</b>	<b>-104.138</b>	<b>-104.138</b>	<b>-104.138</b>	<b>-104.138</b>	<b>-104.138</b>	<b>-104.138</b>	<b>-104.138</b>	<b>-104.138</b>	<b>-104.138</b>	<b>-104.138</b>	<b>-104.138</b>
<b>D. NET BALANCE IN CASH AND CASH EQUIVALENTS</b>															
1. Net cash flow	60.934	100.358	102.535	104.759	5.197	7.853	10.042	12.281	14.569	16.910	19.302	21.748	24.248	26.804	29.417
2. Cash and cash equivalents, beginning of year	0	60.934	161.292	263.827	368.586	373.783	381.636	391.676	403.958	418.527	435.437	454.739	476.487	500.735	527.539
<b>3. Cash and cash equivalents, end of year</b>	<b>60.934</b>	<b>161.292</b>	<b>263.827</b>	<b>368.586</b>	<b>373.783</b>	<b>381.636</b>	<b>391.678</b>	<b>403.958</b>	<b>418.527</b>	<b>435.437</b>	<b>454.739</b>	<b>476.487</b>	<b>500.735</b>	<b>527.539</b>	<b>556.956</b>

Profitability	Cash flow
Initial capital investment (discounted for received subsidies)	1.820.000,00
Private equity invested	370.000,00
<b>Equity net present value (NPV)</b>	<b>83.317,86</b>
<b>Equity internal rate of return (IRR)</b>	<b>8,76%</b>

CASH FLOW in €		Discount rate: 4,00%
Year	Cash flow	Discounted Cash flow
C0	-370.000	-370.000
CF1	60.934	58.590
CF2	100.358	92.786
CF3	102.535	91.153
CF4	104.759	89.549
CF5	5.197	4.271
CF6	7.853	6.206
CF7	10.042	7.631
CF8	12.281	8.973
CF9	14.569	10.236
CF10	16.910	11.423
CF11	19.302	12.538
CF12	21.748	13.584
CF13	24.248	14.563
CF14	26.804	15.479
CF15	29.417	16.334
<b>TOTAL</b>	<b>186.956</b>	<b>Payback: 9.05 years</b>

Project performance in €	2019	2020	2021	2022	2023
1. Total income	289.139	294.797	300.568	306.454	312.458
2. Total costs of goods and services	182.445	185.394	188.397	191.456	194.571
3. Cost of labour	1.500	1.530	1.561	1.592	1.624
4. Depreciation and amortization	104.750	104.750	104.750	104.750	104.750
5. Financial costs	3.125	0	0	0	14.088
6. Other costs	0	0	0	0	0
7. EBT	-2.681	3.123	5.860	8.656	-2.575
Balance sum	2.101.064	2.097.555	2.096.239	2.097.165	1.998.546
Cash Flow	60.934	100.358	102.535	104.759	5.197
Cost of MWh heat sold	83	83	84	85	89
Cost of MWh energy sold (heat + electricity)	83	83	84	85	89
Private equity invested	370.000 €				
Net present value (NPV)	83.318 €				
Equity internal rate of return (IRR)	8,76%				
Payback (discount rate: 4%)	9.05 years				

- "Nova Toplana", the larger size implementation of the biomass-based DH in the urban area

**CoolHeating.eu CALCULATION TOOL**  
ECONOMIC CALCULATION TOOL FOR SMALL MODULAR DISTRICT HEATING AND COOLING PROJECTS


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<b>Select language:</b> English
<b>Mode:</b> ECONOMY: Financial module only
<b>Project name:</b> PROJECT 1
<b>Project start year:</b> 2019
<b>Project life time:</b> 10 years

**PROCEED TO PROJECT**

**Project description**

Nova Toplana

  
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691679.

Skupina FABRIKA d.o.o.  
info@skupina-fabrika.com  


Projected investment cost in €	Value	Share %
1. Buildings and construction works	900.000	12,5%
2. Plot	0	0,0%
3. Equipment/Machinery	6.250.000	86,8%
<b>A. PROPERTY, PLANT AND EQUIPMENT</b>	<b>7.150.000</b>	<b>99,3%</b>
<b>B. PROJECT AND INVESTMENT DOCUMENTATION</b>	<b>50.000</b>	<b>0,7%</b>
<b>C. INTANGIBLE ASSETS</b>	<b>0</b>	<b>0,0%</b>
<b>D. INVESTMENT COST (A+B+C)</b>	<b>7.200.000</b>	<b>100,0%</b>
<b>E. INITIAL WORKING CAPITAL</b>	<b>0</b>	<b>0,0%</b>
<b>F. TOTAL INVESTMENT COST (D+E)</b>	<b>7.200.000</b>	<b>100,0%</b>

Sources of investment cost financing in €	Value	Share %
<b>A. PRIVATE EQUITY</b>	<b>2.200.000</b>	<b>30,6%</b>
<b>B. BANK LOANS</b>	<b>5.000.000</b>	<b>69,4%</b>
<b>C. CONNECTION FEES</b>	<b>0</b>	<b>0,0%</b>
<b>D. INVESTMENT SUBSIDIES</b>	<b>0</b>	<b>0,0%</b>
<b>E. TOTAL FINANCING (A+B+C+D)</b>	<b>7.200.000</b>	<b>100,0%</b>

Source of revenue in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
1. ELECTRICITY REVENUES	0	0	0	0	0	0	0	0	0	0
2. HEAT REVENUES	3.185.256	3.248.961	3.313.940	3.380.219	3.447.823	3.516.780	3.587.115	3.658.858	3.732.035	3.806.676
3. OPERATING SUBSIDIES	0	0	0	0	0	0	0	0	0	0
<b>A. GROSS OPERATING REVENUES</b>	<b>3.185.256</b>	<b>3.248.961</b>	<b>3.313.940</b>	<b>3.380.219</b>	<b>3.447.823</b>	<b>3.516.780</b>	<b>3.587.115</b>	<b>3.658.858</b>	<b>3.732.035</b>	<b>3.806.676</b>
1. INVESTMENT SUBSIDIES	0	0	0	0	0	0	0	0	0	0
2. FINANCIAL REVENUES	0	0	0	0	0	0	0	0	0	0
3. OTHER REVENUES	0	0	0	0	0	0	0	0	0	0
<b>B. OTHER SOURCES OF REVENUES</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>C. TOTAL REVENUES (A + B)</b>	<b>3.185.256</b>	<b>3.248.961</b>	<b>3.313.940</b>	<b>3.380.219</b>	<b>3.447.823</b>	<b>3.516.780</b>	<b>3.587.115</b>	<b>3.658.858</b>	<b>3.732.035</b>	<b>3.806.676</b>

Cost type in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
1. Energy source costs	1.695.897	1.729.024	1.762.934	1.797.649	1.833.190	1.869.578	1.906.835	1.944.984	1.984.049	2.024.054
2. Operation and maintenance costs	143.000	146.575	150.239	153.995	157.845	161.791	165.836	169.982	174.232	178.587
<b>A. TOTAL OPERATING COSTS (1+2)</b>	<b>1.838.897</b>	<b>1.875.599</b>	<b>1.913.174</b>	<b>1.951.645</b>	<b>1.991.035</b>	<b>2.031.369</b>	<b>2.072.671</b>	<b>2.114.966</b>	<b>2.158.281</b>	<b>2.202.642</b>
1. Cost of management, insurance and lease	71.500	72.930	74.389	75.876	77.394	78.942	80.521	82.131	83.774	85.449
2. Cost of promotional activities	0	0	0	0	0	0	0	0	0	0
3. Cost of other services	0	0	0	0	0	0	0	0	0	0
<b>B. TOTAL COSTS OF SERVICES (1+2+3)</b>	<b>71.500</b>	<b>72.930</b>	<b>74.389</b>	<b>75.876</b>	<b>77.394</b>	<b>78.942</b>	<b>80.521</b>	<b>82.131</b>	<b>83.774</b>	<b>85.449</b>
<b>C. COSTS OF LABOUR</b>	<b>85.000</b>	<b>86.700</b>	<b>88.434</b>	<b>90.203</b>	<b>92.007</b>	<b>93.847</b>	<b>95.724</b>	<b>97.638</b>	<b>99.591</b>	<b>101.583</b>
<b>D. DEPRECIATION AND AMORTIZATION COSTS</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>
<b>E. FINANCIAL COSTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>48.579</b>	<b>45.460</b>	<b>42.309</b>	<b>39.127</b>	<b>35.912</b>	<b>32.666</b>
<b>F. OTHER EXPENSES AND LOSSES</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>G. INCOME TAXES</b>	<b>165.972</b>	<b>170.746</b>	<b>175.589</b>	<b>180.499</b>	<b>175.762</b>	<b>181.432</b>	<b>187.178</b>	<b>192.999</b>	<b>198.895</b>	<b>204.867</b>
<b>H. TOTAL COSTS (A+B+C+D+E+F+G)</b>	<b>2.521.369</b>	<b>2.565.975</b>	<b>2.611.585</b>	<b>2.658.223</b>	<b>2.744.777</b>	<b>2.791.050</b>	<b>2.838.403</b>	<b>2.886.861</b>	<b>2.936.453</b>	<b>2.987.207</b>

Inventories in stock and resources needed in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
A. Average days of inventory	60,0									
B. Inventory turnover ratio	6,08									
C. INVENTORIES IN STOCK ON 31ST OF DECEMBER	302.285	308.318	314.494	320.818	327.293	333.924	340.713	347.666	354.786	362.078
D. RESOURCES NEEDED TO FINANCE INVENTORIES	49.691	50.682	51.698	52.737	53.802	54.892	56.008	57.151	58.321	59.520

Accounts receivable and resources needed in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
A. Accounts receivable collection period	30,0									
B. Accounts receivable turnover ratio	12,17									
C. ACCOUNTS RECEIVABLE ON 31ST OF DECEMBER	261.802	267.038	272.379	277.826	283.383	289.050	294.831	300.728	306.743	312.877
D. RESOURCES NEEDED TO FINANCE THE ACCOUNTS RECEIVABLE	21.518	21.948	22.387	22.835	23.292	23.758	24.233	24.717	25.212	25.716
E. LONG-TERM ACCOUNTS RECEIVABLE ON 31ST OF DECEMBER	0	0	0	0	0	0	0	0	0	0

Annual depreciation rates in %		Calculation of planned depreciation	
<b>A. INTANGIBLE ASSETS</b>			10,0%
<b>B. PROPERTY, PLANT AND EQUIPMENT</b>			
1. Buildings and constructions			5,0%
2. Equipment, plant, vehicles, mechanization			5,0%

Depreciation cost in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>A. INTANGIBLE ASSETS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
1. Buildings and constructions	45.000	45.000	45.000	45.000	45.000	45.000	45.000	45.000	45.000	45.000
2. Equipment, plant, vehicles, mechanization	315.000	315.000	315.000	315.000	315.000	315.000	315.000	315.000	315.000	315.000
<b>B. TOTAL PROPERTY, PLANT AND EQUIPMENT (1+2)</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>
<b>C. TOTAL (A+B)</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>	<b>360.000</b>

Fixes assets value on 31st of December in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>A. INTANGIBLE ASSETS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
1. Buildings and constructions	855.000	810.000	765.000	720.000	675.000	630.000	585.000	540.000	495.000	450.000
2. Equipment, plant, vehicles, mechanization	5.985.000	5.670.000	5.355.000	5.040.000	4.725.000	4.410.000	4.095.000	3.780.000	3.465.000	3.150.000
<b>B. TOTAL PROPERTY, PLANT AND EQUIPMENT (1+2)</b>	<b>6.840.000</b>	<b>6.480.000</b>	<b>6.120.000</b>	<b>5.760.000</b>	<b>5.400.000</b>	<b>5.040.000</b>	<b>4.680.000</b>	<b>4.320.000</b>	<b>3.960.000</b>	<b>3.600.000</b>
<b>C. TOTAL (A+B)</b>	<b>6.840.000</b>	<b>6.480.000</b>	<b>6.120.000</b>	<b>5.760.000</b>	<b>5.400.000</b>	<b>5.040.000</b>	<b>4.680.000</b>	<b>4.320.000</b>	<b>3.960.000</b>	<b>3.600.000</b>



Accounts payable and deliveries financed by suppliers in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
A. Days payable	30,0									
B. Accounts payable turnover ratio	12,17									
C. ACCOUNTS PAYABLE ON 31ST OF DECEMBER	157.019	160.153	163.361	166.646	170.008	173.450	176.975	180.583	184.278	188.062
D. DELIVERIES FINANCED BY SUPPLIERS	12.906	13.163	13.427	13.697	13.973	14.256	14.546	14.842	15.146	15.457
E. LONG-TERM ACCOUNTS PAYABLE ON 31ST OF DECEMBER	0	0	0	0	0	0	0	0	0	0

Working capital requirements in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
1. Resources needed to finance inventories	49.691	50.682	51.698	52.737	53.802	54.892	56.008	57.151	58.321	59.520
2. Resources needed to finance the accounts receivable	21.518	21.948	22.387	22.835	23.292	23.758	24.233	24.717	25.212	25.716
3. Deliveries financed by suppliers	12.906	13.163	13.427	13.697	13.973	14.256	14.546	14.842	15.146	15.457
<b>A. WORKING CAPITAL SURPLUS (+) OR DEFICIT (-) (3-2-1)</b>	<b>-58.303</b>	<b>-59.467</b>	<b>-60.658</b>	<b>-61.875</b>	<b>-63.120</b>	<b>-64.393</b>	<b>-65.694</b>	<b>-67.025</b>	<b>-68.387</b>	<b>-69.778</b>

Debt financing	Principal in €	Interest rate	Repayment starting year	Number of instalments
Loan 1	5.000.000	1,00%	2023	180
Loan 2	0	1,30%	2019	120
Loan 3	0	5,00%	2016	60
Bridge financing	Principal in €	Interest rate	Payment due after	Number of instalments
Bridge financing loan	0			
<b>TOTAL LOANS in €</b>	<b>5.000.000</b>			

Trend of loans and payment of principal and interest in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>A. TOTAL LOAN BALANCE ON 31ST OF DECEMBER</b>	<b>5.000.000</b>	<b>5.000.000</b>	<b>5.000.000</b>	<b>5.000.000</b>	<b>4.689.483</b>	<b>4.375.846</b>	<b>4.059.058</b>	<b>3.739.088</b>	<b>3.415.904</b>	<b>3.089.473</b>
Annual Loan 1 payments	0	0	0	0	310.517	313.637	316.788	319.970	323.184	326.431
Annual Loan 2 payments	0	0	0	0	0	0	0	0	0	0
Annual Loan 3 payments	0	0	0	0	0	0	0	0	0	0
Bridge financing loan payments	0	0	0	0	0	0	0	0	0	0
<b>B. TOTAL ANNUAL LOAN PAYMENTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>310.517</b>	<b>313.637</b>	<b>316.788</b>	<b>319.970</b>	<b>323.184</b>	<b>326.431</b>
Annual payments of interests on Loan 1	0	0	0	0	48.579	45.460	42.309	39.127	35.912	32.666
Annual payments of interests on Loan 2	0	0	0	0	0	0	0	0	0	0
Annual payments of interests on Loan 3	0	0	0	0	0	0	0	0	0	0
Annual payments of interests on bridge financing loan	0	0	0	0	0	0	0	0	0	0
<b>C. TOTAL ANNUAL PAYMENTS OF INTERESTS ON LOANS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>48.579</b>	<b>45.460</b>	<b>42.309</b>	<b>39.127</b>	<b>35.912</b>	<b>32.666</b>

Shareholders equity in € on 31st of December	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
1. Owner's equity	2.200.000	2.863.887	3.546.872	4.249.227	4.971.223	5.674.270	6.400.000	7.148.713	7.920.709	8.716.290
2. Retained earnings	663.887	682.986	702.355	721.996	703.047	725.730	748.713	771.996	795.582	819.469
<b>TOTAL EQUITY (1 to 2)</b>	<b>2.863.887</b>	<b>3.546.872</b>	<b>4.249.227</b>	<b>4.971.223</b>	<b>5.674.270</b>	<b>6.400.000</b>	<b>7.148.713</b>	<b>7.920.709</b>	<b>8.716.290</b>	<b>9.535.759</b>

Acquisition and consumption of investment subsidies in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
1. Subsidies	0									
2. Subsidized fixed assets on 31st of December	7.200.000	6.840.000	6.480.000	6.120.000	5.760.000	5.400.000	5.040.000	4.680.000	4.320.000	3.960.000
3. Share of subsidies in subsidized fixed assets	0,0%									
4. Depreciation cost	360.000	360.000	360.000	360.000	360.000	360.000	360.000	360.000	360.000	360.000
5. Other sources of revenues	0	0	0	0	0	0	0	0	0	0
<b>LONG-TERM ACCRUED COSTS AND DEFERRED REVENUES ON 31ST OF DECEMBER</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

Income statement in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
1. Total operating income	3.185.256	3.248.961	3.313.940	3.380.219	3.447.823	3.516.780	3.587.115	3.658.858	3.732.035	3.806.676
2. Investment subsidies	0	0	0	0	0	0	0	0	0	0
3. Total cost of goods and services	1.910.397	1.948.529	1.987.562	2.027.521	2.068.429	2.110.311	2.153.192	2.197.097	2.242.055	2.288.091
a) Total operating costs	1.838.897	1.875.599	1.913.174	1.951.645	1.991.035	2.031.369	2.072.671	2.114.966	2.158.281	2.202.642
1. Energy source costs	1.695.897	1.729.024	1.762.934	1.797.649	1.833.190	1.869.578	1.906.835	1.944.984	1.984.049	2.024.054
2. Operation and maintenance costs	143.000	146.575	150.239	153.995	157.845	161.791	165.836	169.982	174.232	178.587
b) Total cost of operating services	71.500	72.930	74.389	75.876	77.394	78.942	80.521	82.131	83.774	85.449
1. Cost of management, insurance and lease	71.500	72.930	74.389	75.876	77.394	78.942	80.521	82.131	83.774	85.449
2. Cost of promotional activities	0	0	0	0	0	0	0	0	0	0
3. Cost of other services	0	0	0	0	0	0	0	0	0	0
4. Cost of labour	85.000	86.700	88.434	90.203	92.007	93.847	95.724	97.638	99.591	101.583
<b>EBITDA</b>	<b>37,36%</b>	<b>37,36%</b>	<b>37,36%</b>	<b>37,35%</b>	<b>37,34%</b>	<b>37,32%</b>	<b>37,31%</b>	<b>37,28%</b>	<b>37,26%</b>	<b>37,22%</b>
5. Depreciation and amortization	360.000	360.000	360.000	360.000	360.000	360.000	360.000	360.000	360.000	360.000
1. Intangible assets	0	0	0	0	0	0	0	0	0	0
2. Property, plant and equipment	360.000	360.000	360.000	360.000	360.000	360.000	360.000	360.000	360.000	360.000
2.1. Buildings and constructions	45.000	45.000	45.000	45.000	45.000	45.000	45.000	45.000	45.000	45.000
2.2. Equipment, plant, vehicles, mechanization	315.000	315.000	315.000	315.000	315.000	315.000	315.000	315.000	315.000	315.000
<b>EBIT</b>	<b>26,05%</b>	<b>26,28%</b>	<b>26,49%</b>	<b>26,70%</b>	<b>26,90%</b>	<b>27,09%</b>	<b>27,27%</b>	<b>27,44%</b>	<b>27,61%</b>	<b>27,77%</b>
6. Revenues from financial activities	0	0	0	0	0	0	0	0	0	0
7. Financial costs	0	0	0	0	48.579	45.460	42.309	39.127	35.912	32.666
8. Other revenues and gains	0	0	0	0	0	0	0	0	0	0
9. Other expenses and losses	0	0	0	0	0	0	0	0	0	0
<b>10. INCOME BEFORE TAXES</b>	<b>829.858</b>	<b>853.732</b>	<b>877.944</b>	<b>902.495</b>	<b>878.808</b>	<b>907.162</b>	<b>935.891</b>	<b>964.995</b>	<b>994.477</b>	<b>1.024.336</b>
<b>EBT</b>	<b>26,05%</b>	<b>26,28%</b>	<b>26,49%</b>	<b>26,70%</b>	<b>25,49%</b>	<b>25,80%</b>	<b>26,09%</b>	<b>26,37%</b>	<b>26,65%</b>	<b>26,91%</b>
11. Income taxes	165.972	170.746	175.589	180.499	175.762	181.432	187.178	192.999	198.895	204.867
<b>12. NET INCOME</b>	<b>663.887</b>	<b>682.986</b>	<b>702.355</b>	<b>721.996</b>	<b>703.047</b>	<b>725.730</b>	<b>748.713</b>	<b>771.996</b>	<b>795.582</b>	<b>819.469</b>
13. Number of employees	10	10	10	10	10	10	10	10	10	10

Balance sheet on 31st of December in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>A. FIXED ASSETS</b>	<b>6.840.000</b>	<b>6.480.000</b>	<b>6.120.000</b>	<b>5.760.000</b>	<b>5.400.000</b>	<b>5.040.000</b>	<b>4.680.000</b>	<b>4.320.000</b>	<b>3.960.000</b>	<b>3.600.000</b>
I. Intangible assets and long-term deferred costs and accrued revenues	0	0	0	0	0	0	0	0	0	0
II. Property, plant and equipment	6.840.000	6.480.000	6.120.000	5.760.000	5.400.000	5.040.000	4.680.000	4.320.000	3.960.000	3.600.000
1. Buildings and constructions	855.000	810.000	765.000	720.000	675.000	630.000	585.000	540.000	495.000	450.000
2. Equipment, plant, vehicles, mechanization	5.985.000	5.670.000	5.355.000	5.040.000	4.725.000	4.410.000	4.095.000	3.780.000	3.465.000	3.150.000
III. Long-term accounts receivable	0	0	0	0	0	0	0	0	0	0
<b>B. CURRENT ASSETS</b>	<b>1.180.906</b>	<b>2.227.025</b>	<b>3.292.589</b>	<b>4.377.869</b>	<b>5.133.761</b>	<b>5.909.296</b>	<b>6.704.745</b>	<b>7.520.381</b>	<b>8.356.473</b>	<b>9.213.294</b>
I. Inventories	302.285	308.318	314.494	320.818	327.293	333.924	340.713	347.666	354.786	362.078
II. Accounts receivable	261.802	267.038	272.379	277.826	283.383	289.050	294.831	300.728	306.743	312.877
III. Cash and cash equivalents	616.819	1.651.670	2.705.716	3.779.224	4.523.084	5.286.322	6.069.201	6.871.987	7.694.944	8.538.339
<b>TOTAL ASSETS</b>	<b>8.020.906</b>	<b>8.707.025</b>	<b>9.412.589</b>	<b>10.137.869</b>	<b>10.533.761</b>	<b>10.949.296</b>	<b>11.384.745</b>	<b>11.840.381</b>	<b>12.316.473</b>	<b>12.813.294</b>
<b>A. OWNER'S EQUITY</b>	<b>2.863.887</b>	<b>3.546.872</b>	<b>4.249.227</b>	<b>4.971.223</b>	<b>5.674.270</b>	<b>6.400.000</b>	<b>7.148.713</b>	<b>7.920.709</b>	<b>8.716.290</b>	<b>9.535.759</b>
<b>B. PROVISIONS AND LONG-TERM ACCRUED COSTS AND DEFERRED REVENUES</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>C. LONG-TERM LIABILITIES</b>	<b>5.000.000</b>	<b>5.000.000</b>	<b>5.000.000</b>	<b>4.689.483</b>	<b>4.375.846</b>	<b>4.059.058</b>	<b>3.739.088</b>	<b>3.415.904</b>	<b>3.089.473</b>	<b>2.759.762</b>
I. Long-term financial liabilities	5.000.000	5.000.000	5.000.000	4.689.483	4.375.846	4.059.058	3.739.088	3.415.904	3.089.473	2.759.762
II. Long-term accounts payable	0	0	0	0	0	0	0	0	0	0
<b>D. CURRENT LIABILITIES</b>	<b>157.019</b>	<b>160.153</b>	<b>163.361</b>	<b>477.163</b>	<b>483.645</b>	<b>490.238</b>	<b>496.945</b>	<b>503.768</b>	<b>510.710</b>	<b>517.773</b>
I. Short-term financial liabilities	0	0	0	310.517	313.637	316.788	319.970	323.184	326.431	329.710
II. Accounts payable	157.019	160.153	163.361	166.646	170.008	173.450	176.975	180.583	184.278	188.062
<b>TOTAL LIABILITIES AND OWNER'S EQUITY</b>	<b>8.020.906</b>	<b>8.707.025</b>	<b>9.412.589</b>	<b>10.137.869</b>	<b>10.533.761</b>	<b>10.949.296</b>	<b>11.384.745</b>	<b>11.840.381</b>	<b>12.316.473</b>	<b>12.813.294</b>

Cash-flow statement in €	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>A. CASH FLOW FROM OPERATING ACTIVITIES</b>										
1. Income before taxes	829.858	853.732	877.944	902.495	878.808	907.162	935.891	964.995	994.477	1.024.336
2. Depreciation and amortization	360.000	360.000	360.000	360.000	360.000	360.000	360.000	360.000	360.000	360.000
3. Income taxes	-165.972	-170.746	-175.589	-180.499	-175.762	-181.432	-187.178	-192.999	-198.895	-204.867
4. Decrease (- increase) in accounts receivable	-261.802	-5.236	-5.341	-5.448	-5.557	-5.668	-5.781	-5.897	-6.015	-6.135
5. Decrease (- increase) in inventories	-302.285	-6.033	-6.177	-6.324	-6.475	-6.630	-6.789	-6.953	-7.120	-7.292
6. Increase (- decrease) in accounts payable	157.019	3.134	3.208	3.284	3.362	3.442	3.524	3.609	3.695	3.784
7. Financial costs	0	0	0	0	48.579	45.460	42.309	39.127	35.912	32.666
8. Income related to long-term accrued costs and deferred revenues (subsidies)	0	0	0	0	0	0	0	0	0	0
<b>Net cash flow from operating activities</b>	<b>616.819</b>	<b>1.034.851</b>	<b>1.054.046</b>	<b>1.073.509</b>	<b>1.102.957</b>	<b>1.122.334</b>	<b>1.141.976</b>	<b>1.161.882</b>	<b>1.182.054</b>	<b>1.202.491</b>
<b>B. CASH FLOW FROM INVESTING ACTIVITIES</b>										
1. Receipts (+) and disbursements (-) in intangible assets	0	0	0	0	0	0	0	0	0	0
2. Receipts (+) and disbursements (-) in property, plant and equipment	-7.200.000	0	0	0	0	0	0	0	0	0
<b>Net cash flow from investing activities</b>	<b>-7.200.000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>C. CASH FLOW FROM FINANCING ACTIVITIES</b>										
1. Receipts from capital pay-in (+) and dividends paid (-)	2.200.000	0	0	0	0	0	0	0	0	0
2. Receipts (+) and disbursements (-) in financial liabilities and accrued costs and deferred revenues	5.000.000	0	0	0	-359.097	-359.097	-359.097	-359.097	-359.097	-359.097
<b>Net cash flow from financing activities</b>	<b>7.200.000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-359.097</b>	<b>-359.097</b>	<b>-359.097</b>	<b>-359.097</b>	<b>-359.097</b>	<b>-359.097</b>
<b>D. NET BALANCE IN CASH AND CASH EQUIVALENTS</b>										
1. Net cash flow	616.819	1.034.851	1.054.046	1.073.509	743.860	763.237	782.879	802.786	822.957	843.395
2. Cash and cash equivalents, beginning of year	0	616.819	1.651.670	2.705.716	3.779.224	4.523.084	5.286.322	6.069.201	6.871.987	7.694.944
<b>3. Cash and cash equivalents, end of year</b>	<b>616.819</b>	<b>1.651.670</b>	<b>2.705.716</b>	<b>3.779.224</b>	<b>4.523.084</b>	<b>5.286.322</b>	<b>6.069.201</b>	<b>6.871.987</b>	<b>7.694.944</b>	<b>8.538.339</b>

Profitability	Cash flow
Initial capital investment (discounted for received subsidies)	7.200.000,00
Private equity invested	2.200.000,00
<b>Equity net present value (NPV)</b>	<b>4.748.629,68</b>
<b>Equity internal rate of return (IRR)</b>	<b>37,40%</b>

CASH FLOW in €		Discount rate: 4,00%
Year	Cash flow	Discounted Cash flow
C0	-2.200.000	-2.200.000
CF1	616.819	593.096
CF2	1.034.851	956.777
CF3	1.054.046	937.043
CF4	1.073.509	917.640
CF5	743.860	611.399
CF6	763.237	603.198
CF7	782.879	594.924
CF8	802.786	586.588
CF9	822.957	578.199
CF10	843.395	569.767
<b>TOTAL</b>	<b>6.338.339</b>	<b>Payback: 2.69 years</b>

Project performance in €	2019	2020	2021	2022	2023
1. Total income	3.185.256	3.248.961	3.313.940	3.380.219	3.447.823
2. Total costs of goods and services	1.910.397	1.948.529	1.987.562	2.027.521	2.068.429
3. Cost of labour	85.000	86.700	88.434	90.203	92.007
4. Depreciation and amortization	360.000	360.000	360.000	360.000	360.000
5. Financial costs	0	0	0	0	48.579
6. Other costs	0	0	0	0	0
7. EBT	829.858	853.732	877.944	902.495	878.808
Balance sum	8.020.906	8.707.025	9.412.589	10.137.869	10.533.761
Cash Flow	616.819	1.034.851	1.054.046	1.073.509	743.860
Cost of MWh heat sold	45	46	47	48	49
Cost of MWh energy sold (heat + electricity)	45	46	47	48	49
Private equity invested	2.200.000 €				
Net present value (NPV)	4.748.630 €				
Equity internal rate of return (IRR)	37,40%				
Payback (discount rate: 4%)	2.69 years				