PILOT ACTION - AUSTRIA

1. Commercial research of the potential clients of the SSC

Most Austrian prospective customers come from the field of gastronomy and hotels. The main reason for effort of SSC in this field is, that both the electric and thermal demand for energy the whole year is given. The thermal constant load is the guarantor that SSC can be operated over long period and the efficiency of the unit increases strongly. For this reason, good experiences could be made too in the field of leisure centres with indoor swimming pools and sauna landscapes.

The natural gas grid in the area where hotel Matschner is situated is enlarged hardly so that the possibility of supply to liquid gas mostly only remains (disadvantage, that tank must become buried, is as a result higher-cost).

Reasons for selection of the plant sport hotel Matschner as a pilot project:

- efficiency is given (good occupancy of the hotel, great heat requirement linked to the altitude of the site)
- existing heating system (fuel oil) was out of date
- environmental thought (SSC guarantees decrease of emission)
- promotion of the plant through the Kommunalkredit Austria AG
- proximity of the plant to the supplier

The pilot action of hotel Matschner has been presented in task 7 as a case study for the technical and economical analysis of the typology of user “hotel and resorts”. In task 9, a much deeper analysis takes into account all elements of this pilot action.

Prosmaco pilot action, Hotel Matschner, Austria

The supplier and deliverer of the SSC unit is a company named Lackner GMbh. This company participated actively in the procedure of commercial research of the pilot action. Lackner Energietechnik Ltd. was founded in 2000 and currently counts 7 employees at the product site in Schladming (Styria, Austria). It emerged from another firm, the Solartechnik Lackner, which was founded in 1991. At the beginning the company had mainly been operating in the Solar Technologies (thermal solar collectors, solar electricity), since 1997 it has been specialising in the field of cogeneration. They are planning to install and operate cogeneration plants from 5 kW electrical up to 90 kW electrical, powered by either natural gas, heating oil or biodiesel. The company Lackner (which can be reached by office@lackner-bhkw.at) co-operates with companies such as:

- Senertec GmbH
- Oberdorfer Kraft-Wärme-Kopplung GmbH
- Primagaz GmbH (gas supply, contracting)
- Steirische Ferngas AG (gas supply, contracting)

2. Feasibility study of the SSC system

For the selection of the SSC the following aspects were used:

- Electric consumption of the last 3 years
- fuel oil consumption of the last 5 years
- measurement of electric load curve
- tariff of the STEWEAG for customers, which operates SSC
- heat supply of the municipalities indoor swimming pool near hotel Matschner
- possible enlargements of the hotel

After considering these factors, two liquid gas SSC at each 70 kWe have been selected.

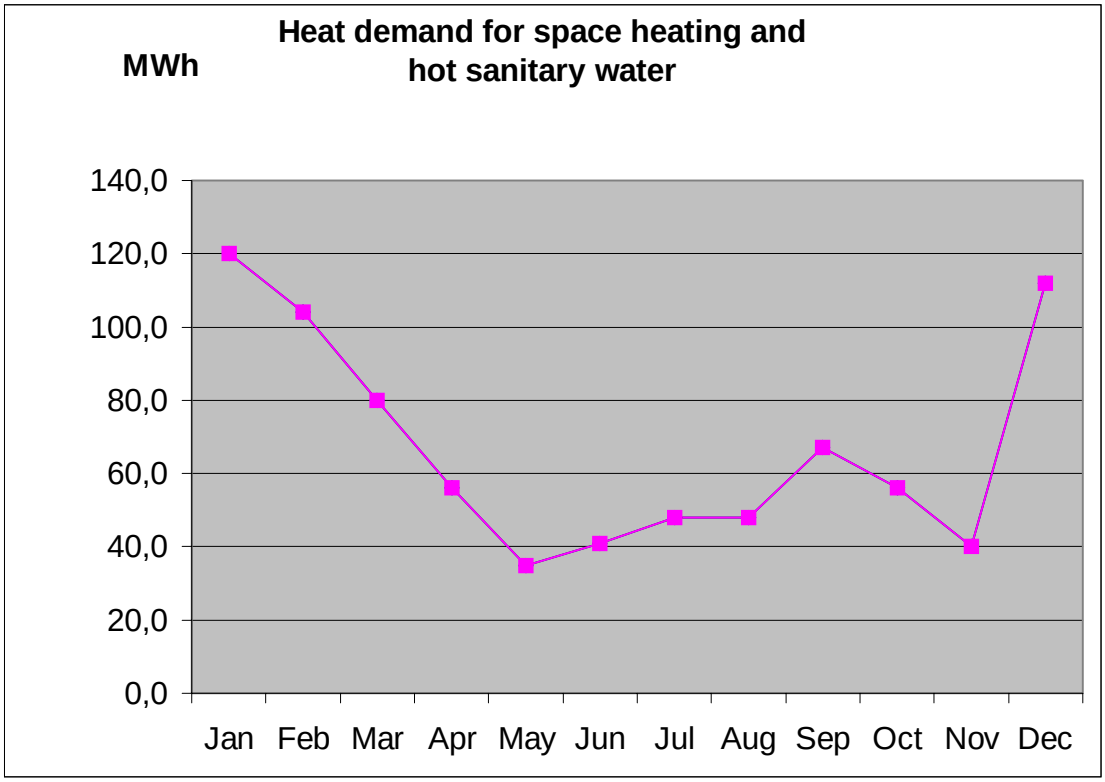
From the thermal supply point of view the power of the SSC is oversized.

Reasons for oversizing were:

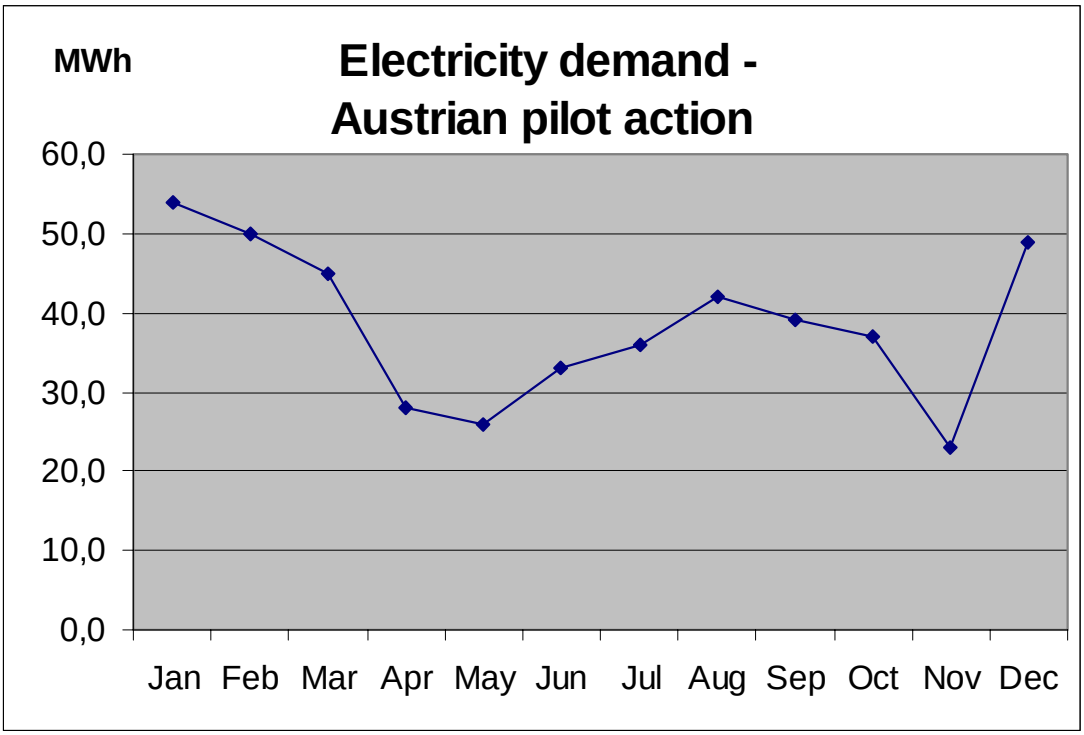
- loss reserve if one of the two plants breaks down,
- heat supply of the municipalities indoor swimming pool (planned in the near future)
- the STEWEAG charges a price of ATS 3,85 to kWh for customers mounting a SSC (including energy transfer, excluding tax). Therefore it is necessary to cover electricity demand with 2 units
- margin for possible enlargements of the hotel
- supply of bordering objects with electricity and heat (possibilities after market liberalisation expected)

Analysis of heat and electricity demand (real needs) of the PA end users for a standard year.

The heat demand for space heating and domestic hot water is 807 MWh while demand for electricity for the hotel is about 460 MWh.

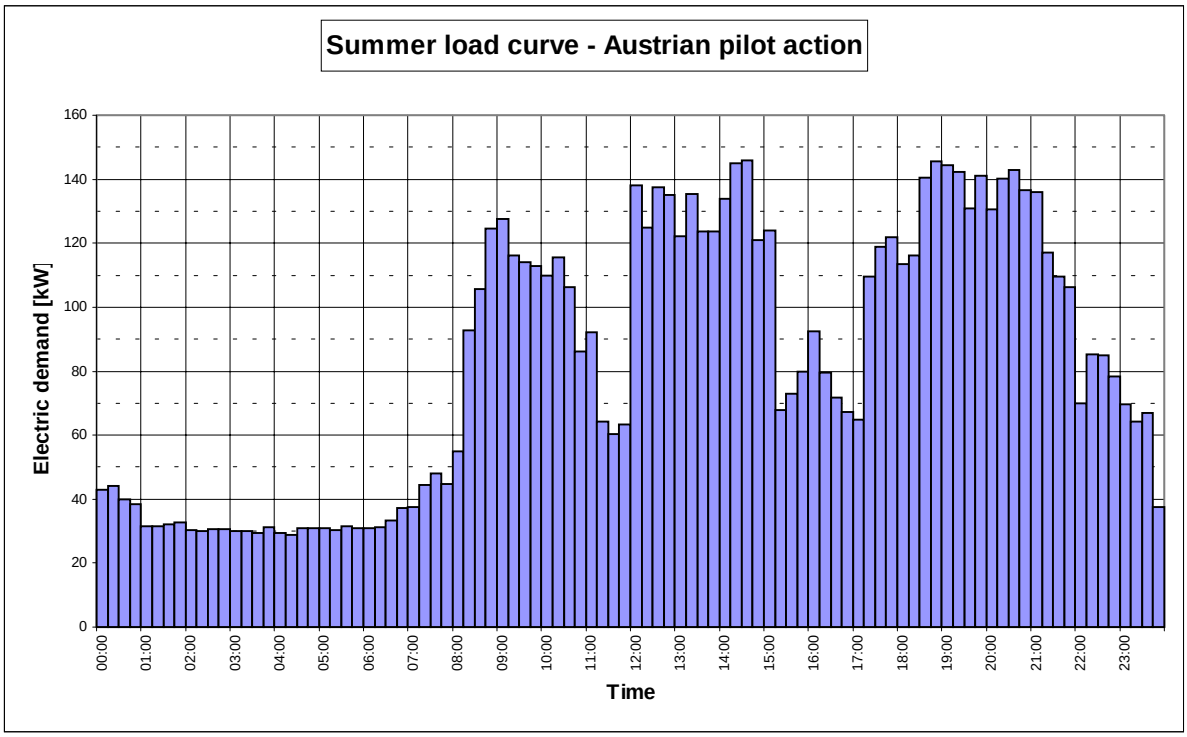


During summertime the heat demand is between 35 MWh and 67 MWh per month. The highest consumption in winter period is in January with 120 MWh. In low season in April, May and November the electricity demand is between 23 MWh and 28 MWh. The highest consumption in winter period is in December and January with up to 54 MWh.



Average load curve of a week day and for a week end day.

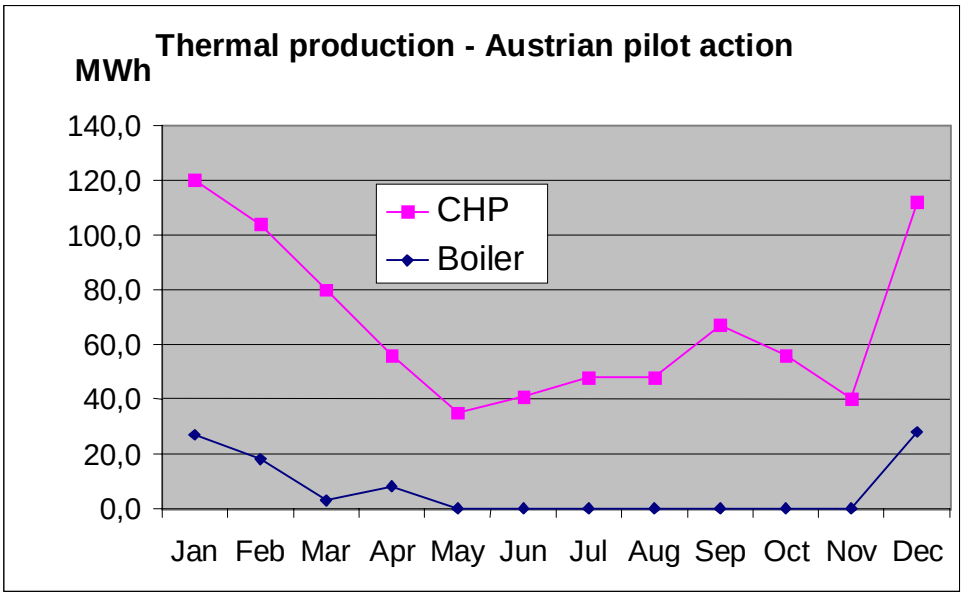
In the main season there is no real difference for the load curve of a week day and week end day. Between 24,00 and 7,00 o' clock the electrical load is between 30 kW and 40 kW. After 7 o' clock the electrical load is rising up to 150 kW. Between 15,00 and 18,00 o'clock is a decrease of electrical load to 60 kW. Domestic hot water is stored in a 2000 l storeroom.

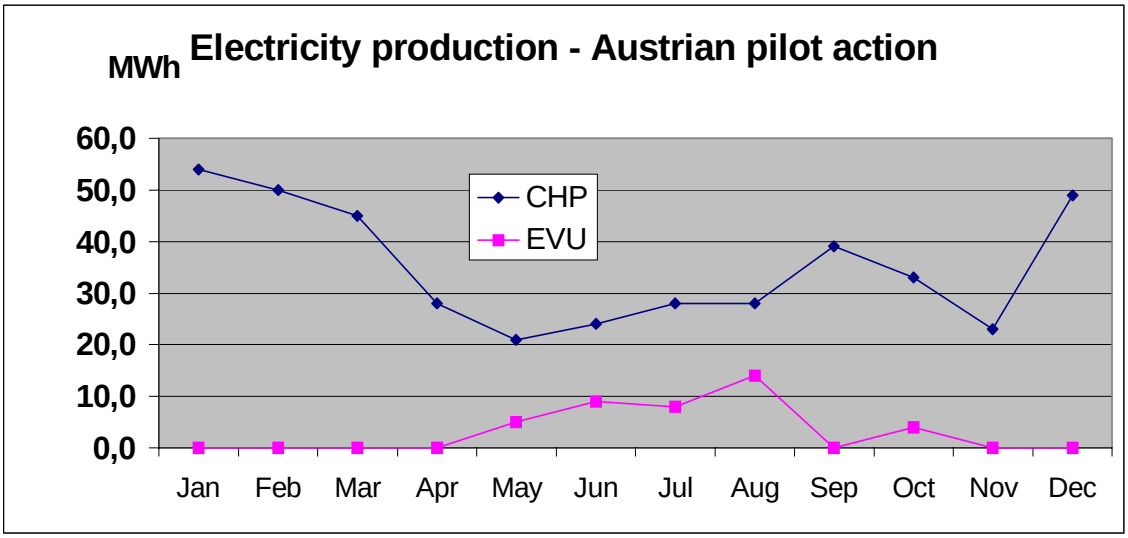


Reconstitution of the electrical and thermal load duration curve.

Depending on the requirements of heat unit 1 will be in operation 4000 hours per year (referring to peak load 120 kW e). Unit 2 will be 3000 hours per year in operation.

Between May and August the boiler is not in operation. In this time period there is no respectively less electricity consumption from the community.

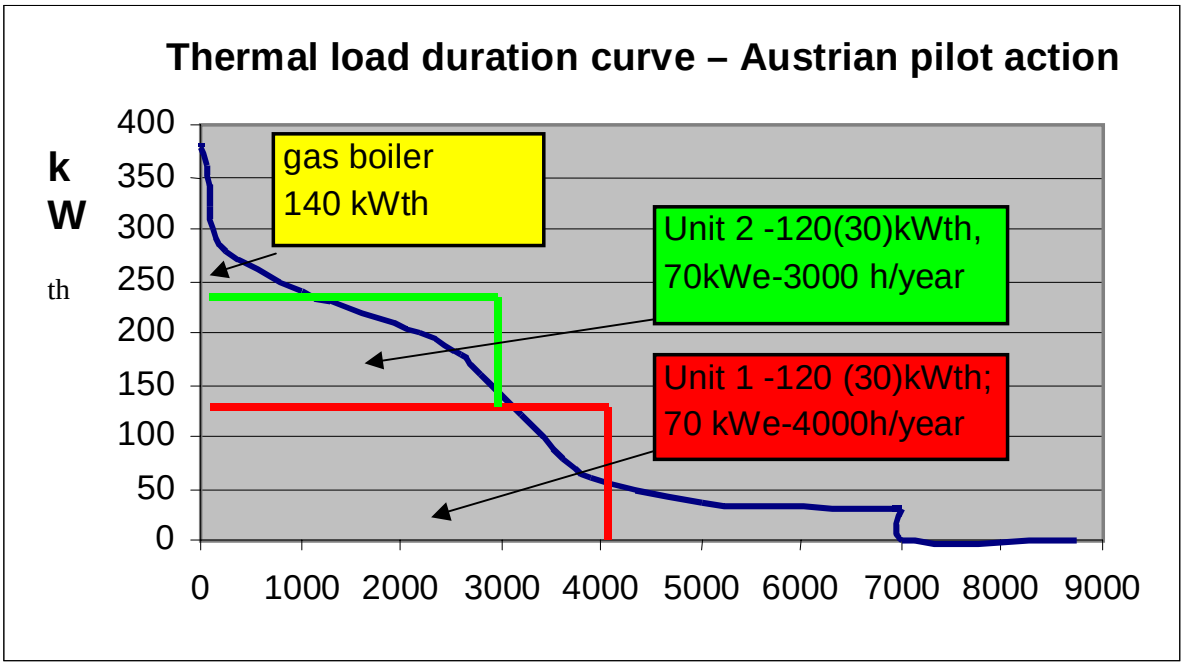




Both SSC units may be controlled according to the electric requirement. Via current transformer, the required electricity of the hotel is registered and produced. From a required output of 20 kW to 70 kW one unit is in operation. Over 70 kW both units are in operation. Below 20 kW and above maximum output of 140 kW the required remaining electricity is supplied by the public net. For this reason an electric overproduction is not possible .

The thermal output of the two SSC is sufficient for supply to the hotel

On very cold winter days the required thermal peak is covered by means of a gas boiler with 140 kW. At the transitional periods and in the summer, the gas boiler is taken out of operation.



Payback period of Austrian pilot action

The economical analysis for the Austrian pilot action is summarised in the table below, taking into account the following conditions.

Maintenance cost [€/kWhe]	0,012
Functioning cost [€ /kWhe]	0,06825
Value of elec. [€ /kWh] for the grid	0,03
Value of elec. [€ /kWh] for the user	0,0655
Value of heat [€ /kWh]	0,029

Economical analysis of SSC installation for the Austrian pilot action

Parameter	**unit**	**1st. SSC**	**2nd. SSC**
thermal output	[kWth]	120	120
electrical output	[kWe]	70	70
number of hours of operation	[h/year]	4000	3000
maintenance cost	[€ / year]*	4070	3052
functioning cost - SSC fuelled by propane	[€ / year]	23720	17790
total functioning cost	[€ / year]	27790	20842
electricity produced by SSC	[kWhe/year]	280000	210000
value of electricity produced by SSC	[€ / year]	30523	22892
thermal energy produced by SSC	[kWhth/year]	480000	360000
value of thermal energy produced by SSC	[€ / year]	19186	14389
total value of energy produced by SSC (thermal + electricity)	[€ / year]	49709	37281
savings	[€ / year]	29919	19491
SPBT (simple pay back time)	[years]	3,4	5,2

The simple payback time for unit 1 is 3,4 years and for unit 2 it is 5,2 years.

3.Technical characteristics of the different components of the installation

The following technical characteristics of the SSC unit are given with the energy correspondence for propane of 12,7 kWh / kg.

SSC load		**100%**	**75%**	**50%**
Input Propane:	kW	220	176	131
Mechanical output	kW	75	56	38
Electrical output	kW el.	70	53	35
Usable thermal output:				
~ Mixture	kW	2	0	0
~ Cooling water and oil	kW	55	50	41
~ exhaust with 120°C	kW	62	48	34
Sum usable thermal output	kW	119	98	75
Sum output	kW total	189	151	110
Specific. consumption	kWh/kWh	2,93	3,14	3,45
Lubricating oil	kg/h	0,02	~	~
Electric efficiency	%	32,00%	29,90%	27,10%
Thermal efficiency	%	54,10%	55,70%	57,30%
Overall efficiency	%	86,10%	85,69%	84,30%

4. Research of Third Party Financing consortium for the Austrian pilot action

For this project with an invest volume of 3,7 Mio ATS only outside financing came into consideration. The following solutions have been discussed:

- Leasing: financing of the plant by Hogast purchase association in co-operation with Leasing West in Kufstein
- Credit: environmental credit of Bank Austria
- Third Party Financing over gas company Primagaz: financing in the form of a rent purchase where a moving payment amount is charged to the normal gas price

The 3rd variant developed by Lackner and Primagaz was finally chosen since it turned out to be the best financing solution for the end user. Therefore the SSC plant was financed by the company Primagaz, the pay back occurs with delivery bills for propane where a moving payment amount is charged debt to a fixed gas price.
This impact was chosen starting from the annual gas consumption to be expected that would have to be completely the plant after 7 years paid.
Within the environment promotion there was asked for a subsidy from the Kommunalkredit Austria AG. In this case, 25% of total capital expenditures (with the exception of the gas tank and the gas installation) are supported as a bar subsidy.

5. The installation of the SSC unit of the Austrian pilot action

The planning of the installation of the SSC unit for this pilot action is summarised by the following steps:

Planning	**Step of SSC installation**
May 2000	Planning heating, electric distribution
	Supporting request to Kommunalkredit AG
	Meeting and negotiation with utility STEWEAG
	Rebuilding of existing heating house
	Installation of long-distance heating pipeline
June 2000	Integration of long-distance heating pipeline in heating system
	One of the both ones dismantling existing boiler and embarrassed into the new heating house
	Excavation works respectively transfer of the required electro cables for new energy central

July 2000	Construction of new boiler room: heating distributor with thermal Flank &. Pump group for connection of the two SSC units, exhaust fume systems for the two SSC units

Boiler room and SSC unit, Austrian pilot action, Hotel Matschner

September 2000	Placing the liquid gas tank
	For SSC units and boiler entire gas conduit installation
	Incorporation of the two SSC units and connection to heating and gas system

Delivery of tank, Austrian pilot action, hotel Matschner

October 2000	Establishment of the new electro distributor
	Connection of the SSC units to electro distributor
	Change of burner and take in operation.
	Dismantling the second boiler in the old heating house
November 2000	Change the old electrical main feeding on the new electric distributor with mounting the necessary new measure equipment with utility STEWEAG
	Operation of the two SSC units (9.11.2000)

Austrian pilot action, installation of tank