



MÓRAHALOM

# Municipality of Mórahalom

## TREN/FP7EN/239515/GEOCOM

### Concerto



**Geothermal Communities – demonstrating the cascading use of geothermal energy for district heating with small scale RES integration and retrofitting measures**

Work programme topics addressed: FP7-ENERGY-2008-TREN-1 ENERGY.2008.8.4.1.: CONCERTO communities: the way to the future

## Mayor's Office of Mórahalom

**József Zoltán Pásztor**  
**Petroleum engineer, CEM**

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**21. 11. 2013.**







# FP7 GEOCOM Concerto demo site, Mórahalom 21-11-2013

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New high power heat-pump heating station installing in the New Town Centre and Thermal Residential Park

## Technical datas:

HP type: Aermec NXW0900, 418 kW

Thermic output/capacity: 418 kW, 52 °C

COP= 4,5 – 5,0 (primary thermalwater flow: 200 – 250 liter/min)

Heat exchanger: 338 kW 40/20,5 °C

Electric input: 90,045 kW, 0,4 kV, 50Hz

## Analysis:

**This heating season will be the first when the heat-pump heating station works. Therefore we don't have any datas.**

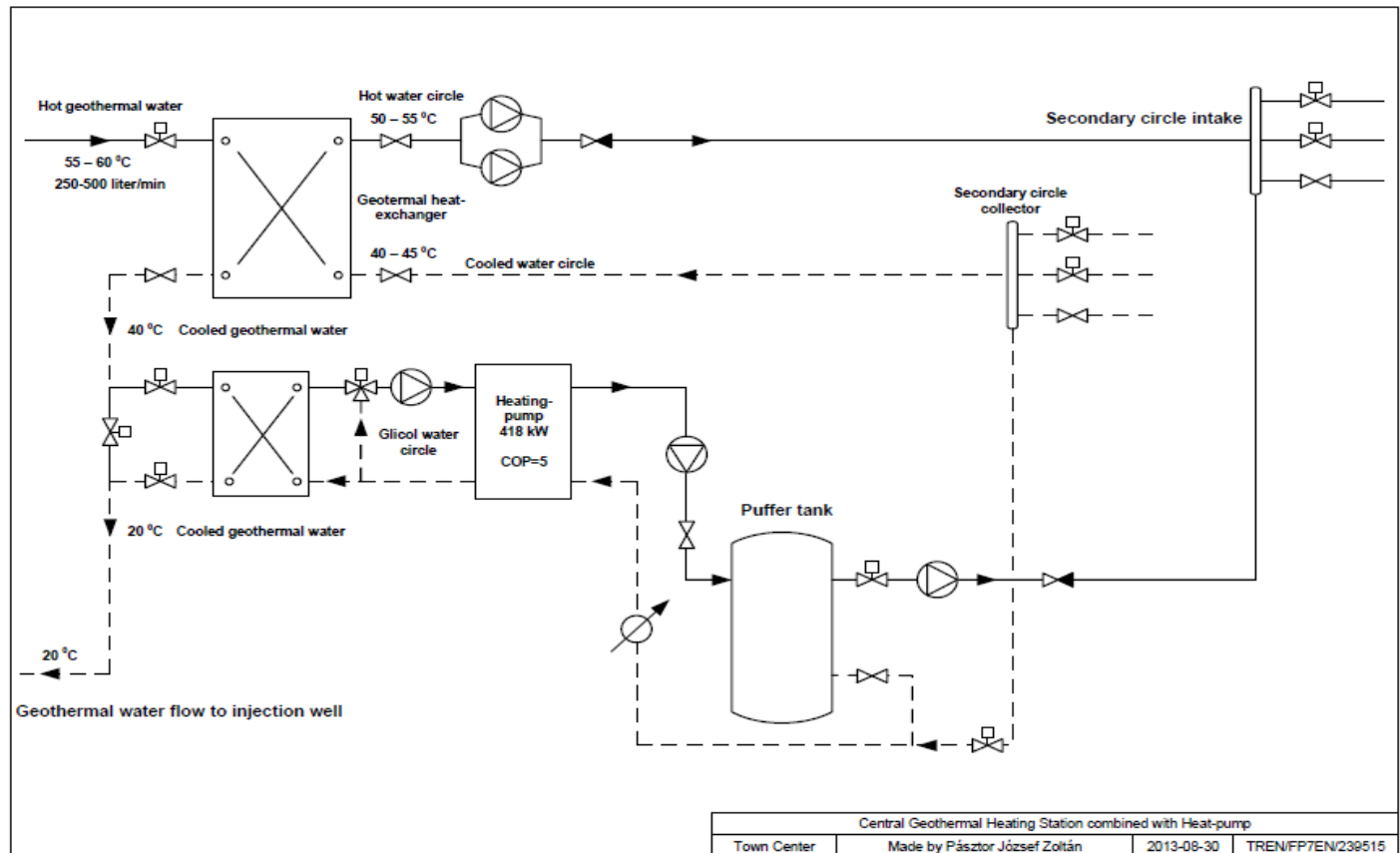




# FP7 GEOCOM Concerto demo site, Mórahalom 21-11-2013

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New high power heat-pump heating station installing in the  
New Town Centre and Thermal Residential Park





# FP7 GEOCOM Concerto demo site, Mórahalom 21-11-2013

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The Last Public Procurement:

- Photovoltaic solar cells installing on the roof-timbers of the New Town Center
- Photovoltaic LED public lightning system installing in the town centre
- Building contract: 21-08-2013
- Start of working: 26-08-2013
- Finished of working: about 30-11-2013





# FP7 GEOCOM Concerto demo site, Mórahalom 21-11-2013

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The Last Public Procurement:

- Photovoltaic solar cells installing on the roof-timbers of the New Town Center
- Photovoltaic LED public lightning system installing in the town centre

## Technical datas:

40 pieces ET Solar 250 W polycrystal solar cells on the new town market's roof-timbers,

1 pieces Fronius IG Plus 12 V-3 (10000W) inverter

**Total photovoltaic output 10kW**

50 pieces LED light with 35 pieces lamp-post

4 pieces autonomous LED street light with solar cells and solar storage cell





# FP7 GEOCOM Concerto demo site, Mórahalom 21-11-2013

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- Móra F. Culture Centre, Elementary School and Dormitory - replacement of doors and windows
- Kindergarten and Day-care Centre Complex - replacement of doors and windows

## Technical datas:

**Windows: 295 plastic, 37 wood,**

**Doors: 24 plastic, 3 wood**

**Plastic: 6 cells profil, 1,0 k super Low-E Plusz Argon**

**Wood: Scotch fir  $U_g=1,0 \text{ W/m}^2\text{K}$  2 layer Climagard premium**





# FP7 GEOCOM Concerto demo site, Mórahalom 21-11-2013

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Retrofitted buildings:

- Móra F. Culture Centre, Elementary School and Dormitory

Analysing the natural gas utilization:

1. Before Geothermal Cascade system: 2009

Total: 82.484m<sup>3</sup>, 2.774GJ, 100%

(Heating: 64.838m<sup>3</sup>, 2.181GJ; DHW: 17.647m<sup>3</sup>, 593GJ)

2. With Geothermal Cascade system: 2011

Total: 18.718m<sup>3</sup>, 642GJ, 23%

(Heating: 4.415m<sup>3</sup>, 116GJ, 6,8%; DHW: 14.304m<sup>3</sup>, 526GJ, 81%)

3. After Retrofitting the building: 2012 - 2013

Total: 9.417m<sup>3</sup>, 325,6GJ, 11,4%

(Heating: 773m<sup>3</sup>, 29,2GJ, 1,2%; DHW: 8.644m<sup>3</sup>, 296,4GJ, 48,9%)







# FP7 GEOCOM Concerto demo site, Mórahalom 21-11-2013

**MÓRAHALOM** Retrofitted buildings:

- Kindergarten and Day-care Centre Complex

Analysing the natural gas utilization:

1. Before Geothermal Cascade system: 2009

Total: 28.444m<sup>3</sup>, 955,8GJ, 100%

(Heating: 20.722m<sup>3</sup>, 691,6GJ; DHW: 7.722m<sup>3</sup>, 264,2GJ)

2. With Geothermal Cascade system: 2011

Total: 9.579m<sup>3</sup>, 328,8GJ, 33,7%

(Heating: 4.585m<sup>3</sup>, 156,8GJ, 22,1%; DHW: 4.994m<sup>3</sup>, 172GJ, 64,7%)

3. After Retrofitting the building: 2012 - 2013

Total: 676m<sup>3</sup>, 23,4GJ, 2,3%

(Heating: 278m<sup>3</sup>, 9,6GJ, 1,3%; DHW: 398m<sup>3</sup>, 13,8GJ, 5,2%)





# FP7 GEOCOM Concerto demo site, Mórahalom 21-11-2013

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- Kindergarten and Day-care Centre Complex

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# FP7 GEOCOM Concerto demo site, Mórahalom 21-11-2013

Retrofitting the Móra F. Culture Centre, Elementary School  
and Dormitory, and Kindergarten and Day-care Centre  
Complex

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# FP7 GEOCOM Concerto demo site, DHW production with Solar collector: Móra F. Culture Centre and Elementary School

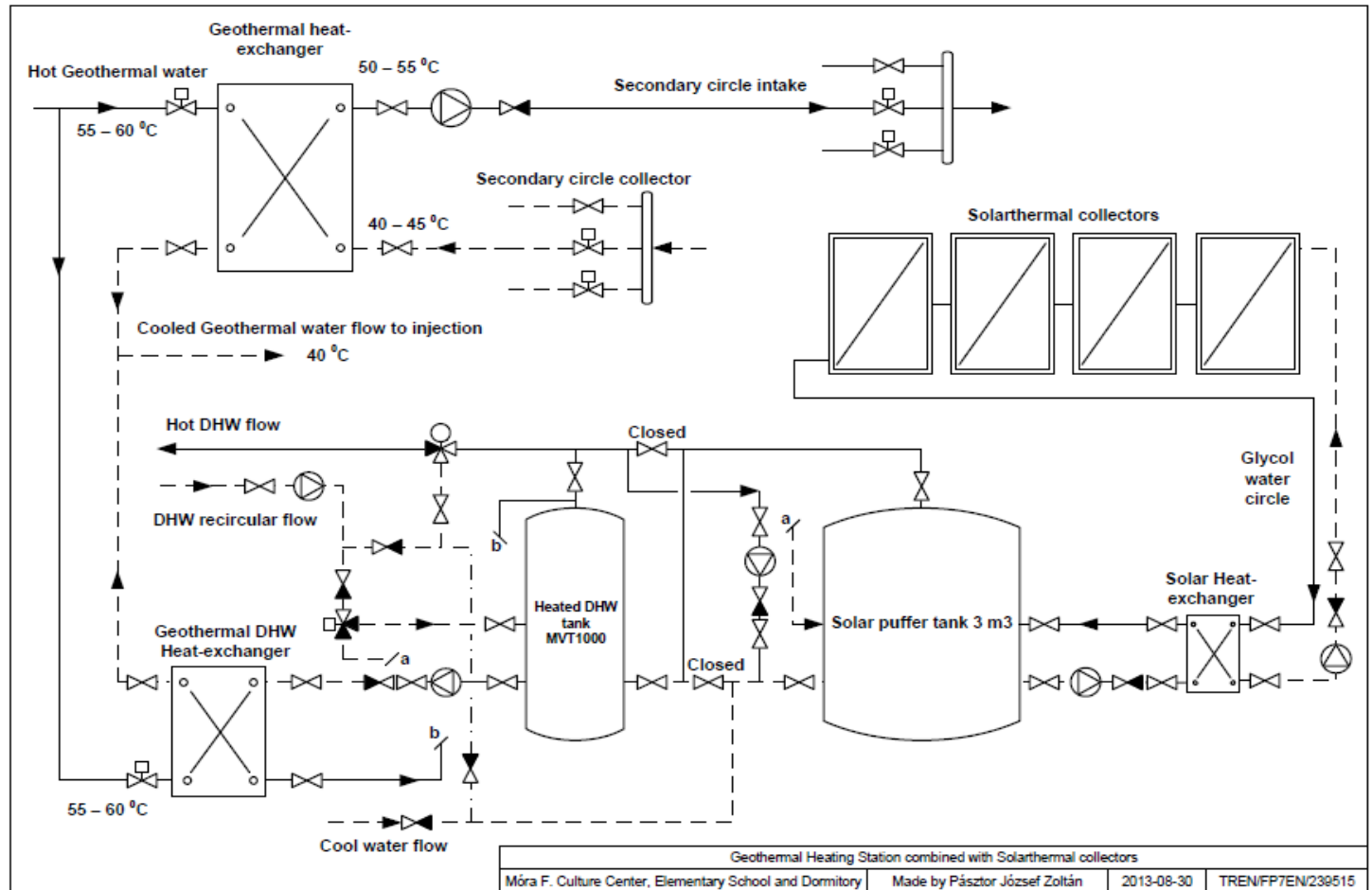
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# FP7 GEOCOM Concerto demo site, DHW production with Solar collector: Móra F. Culture Centre and Elementary School

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# FP7 GEOCOM Concerto demo site, DHW production with Solar collector: Móra F. Culture Centre Sports Hall





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# FP7 GEOCOM Concerto demo site, DHW production with Solar collector: Kindergarten and Day-care Centre Complex

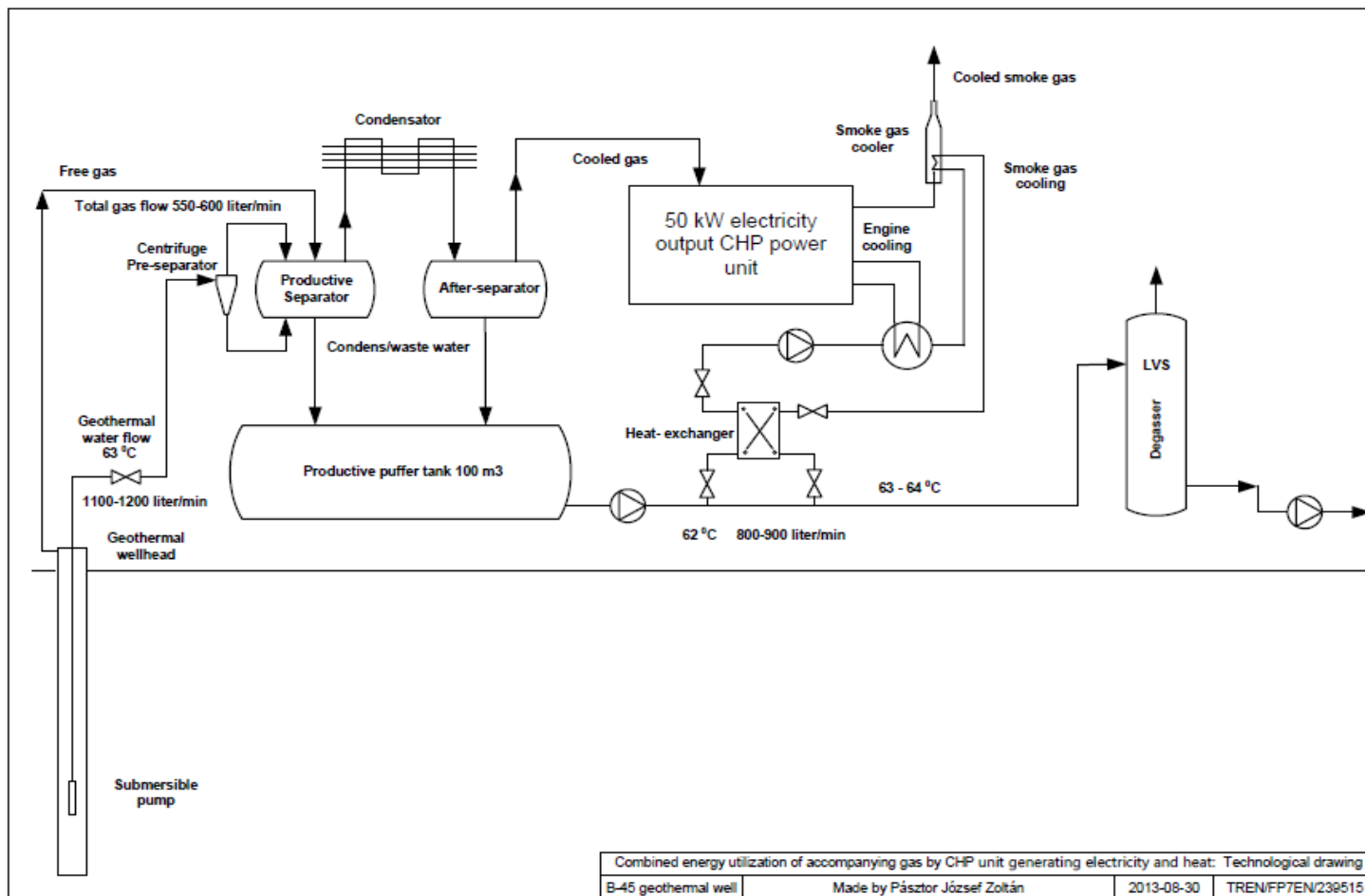




# FP7 GEOCOM Concerto demo site, Mórahalom 21-11-2013

Combined energy utilization of accompanying gas base CHP unit generating electricity and heat

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# FP7 GEOCOM Concerto demo site, Mórahalom 21-11-2013

Combined energy utilization of accompanying gas base CHP unit generating electricity and heat installing in Hunyadi liget grove: 50 kW electrical output CHP unit





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# FP7 GEOCOM Concerto demo site, Mórahalom 21-11-2013

Combined energy utilization of accompanying gas base CHP unit generating electricity and heat installing in Hunyadi liget grove: 50 kW electrical output CHP unit

## Technical datas:

**CHP type: NRG MINI SP50 NG**

**Motor type: NRG 50 G4LTi (Perkins 1004 G)**

**4 cycle, lined 4 cylinder motor with turbo charger**

**Electric output: 50 kW, Thermic output: 66 kW, Total: 116kW**

**Generator: Mecc-Alte Eco 32-1L/4 0,4 kV, 50Hz**

**Electric efficiency: 34%, Thermic efficiency: 50%,**

**Total efficiency: 84%**

**Gas : 13,9 Nm<sup>3</sup>/h, 25-50mbar**

**Emission: N<sub>2</sub>O 490mg/Nm<sup>3</sup>, CO<sub>2</sub> 640mg/Nm<sup>3</sup>, CH 140mg/Nm<sup>3</sup>**

**Total electricity output in 2012, between Oktober and December:**

**95.664kWh, 8.661,34EUR (2.535.096HUF), average power 46,4 kW**

**1.039,83kWh/day, 93,41EUR/day (27.555,4HUF/day) on heating season**

**Total electricity output between 2012 Oktober and 2013 Sept:**

**267.681kWh, 23.645,14EUR (7.093.541HUF), average power 47,0 kW**

**733,37kWh/day, 64,78EUR/day (19.434,36HUF/day)**

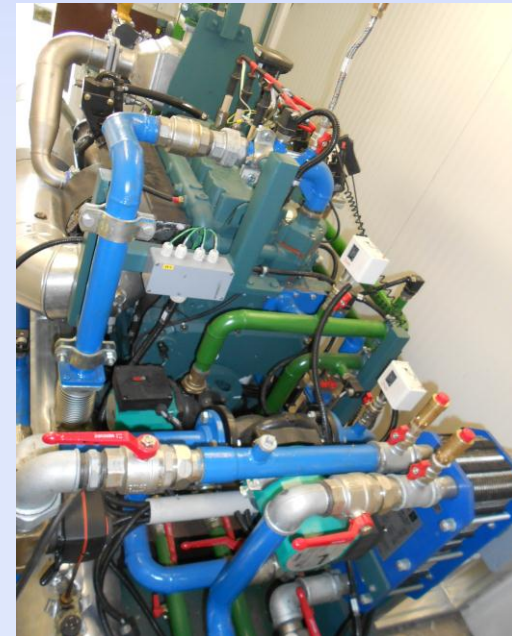




# FP7 GEOCOM Concerto, Mórahalom 21-11-2013

Combined energy utilization of accompanying gas base CHP units generating electricity and heat installing in Hunyadi liget grove:

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# FP7 GEOCOM Concerto demo site, Mórahalom 21-11-2013

Combined energy utilization of accompanying gas base CHP unit generating electricity and heat installing in Szent Erzsébet Spa: 30 kW electrical output CHP unit





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# FP7 GEOCOM Concerto demo site, Mórahalom 21-11-2013

Combined energy utilization of accompanying gas base CHP unit generating electricity and heat installing in Szent Erzsébet Spa: 30 kW electrical output CHP unit

## Technical datas:

**CHP type: NRG MINI P30 SP NG**

**Motor type: NRG 30 G4LTi (Perkins 1004 G)**

**4 cycle, lined 4 cylinder motor**

**Electric output: 30 kW, Thermic output: 60 kW, Total: 90 kW**

**Generator: Mecc-Alte Eco 32-3S/4 0,4 kV, 50Hz**

**Electric efficiency: 30,3%, Thermic efficiency: 60,61%,**

**Total efficiency: 90,91%**

**Gas : 10,5 Nm<sup>3</sup>/h, 25-50mbar**

**Emission: N<sub>2</sub>O 490mg/Nm<sup>3</sup>, CO<sub>2</sub> 640mg/Nm<sup>3</sup>, CH 140mg/Nm<sup>3</sup>**

**Total electricity output in 2013, between March and Sept:**

**123.075kWh, 10.536,92EUR (3.101.490HUF), average 28kW**

**337,19kWh/day, 48,31EUR/day (14.492,94HUF/day)**





# FP7 GEOCOM Concerto, Mórahalom 21-11-2013

Combined energy utilization of accompanying gas base CHP units generating electricity and heat installing in Szent Erzsébet Spa:



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# Thank you very much!

**József Zoltán Pásztor**  
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**21. 11. 2013.**

