Geothermal Communities

www.geothermalcommunities.eu

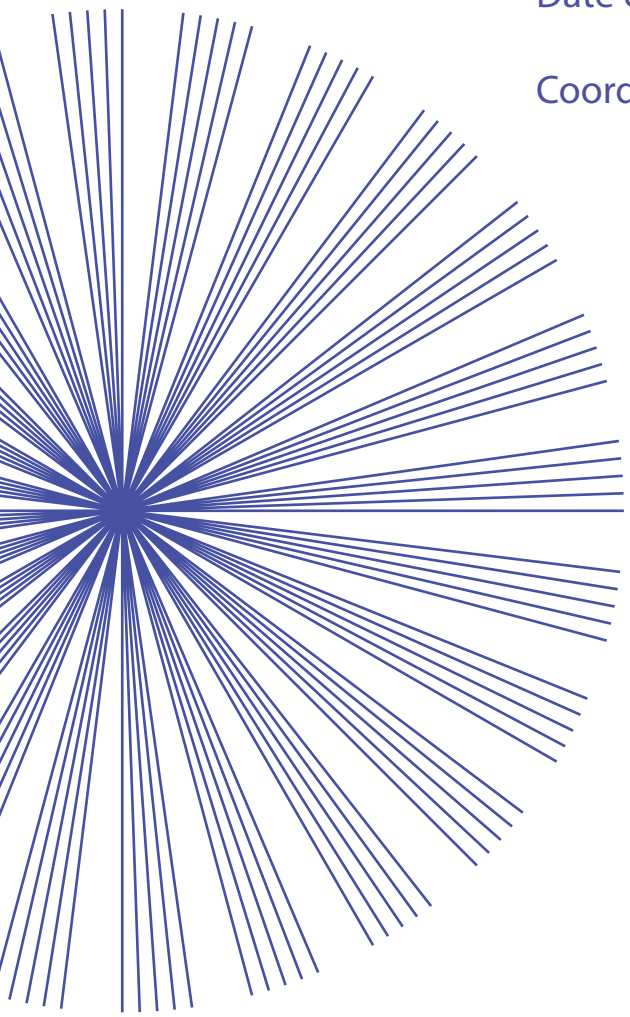
GeoCom – FP7 CONCERTO - 239515

Second Periodic Report

Final version

Date of Preparation: February 2012

Coordinator: Geonardo Environmental Technologies Ltd.



CONCERTO

SEVENTH FRAMEWORK PROGRAMME

PROJECT PERIODIC REPORT

Grant Agreement number: 239515

Project acronym: GEOCOM

Project title: Geothermal Communities – Demonstrating the cascading use of geothermal energy for district heating with small scale RES integration and retrofitting measures

Funding Scheme: Collaborative Project – Large Scale Integration Project

Date of latest version of Annex I against which the assessment will be made: 31/01/2012

Periodic report: 1st ☐ 2nd ■ 3rd ☐ 4th ☐

Period covered: from 1 January 2011 to 31 December 2011.

Name, title and organization of the scientific representative of the project's coordinator[1]:

Mr. Gabor Kitley, Managing Director of Geonardo Environmental Technologies Ltd.

Tel: +36/1/250-6703

Fax: +36/1/436-9038

E-mail: coordinator@geothermalcommunities.eu; istvan.pari@geonardo.com

Project website[2] address: www.geothermalcommunities.eu

[1] Usually the contact person of the coordinator as specified in Art. 8.1. of the Grant Agreement .

[2] The home page of the website should contain the generic European flag and the FP7 logo which are available in electronic format at the Europa website (logo of the European flag: http://europa.eu/abc/symbols/emblem/index_en.htm logo of the 7th FP: http://ec.europa.eu/research/fp7/index_en.cfm?pg=logos). The area of activity of the project should also be mentioned.

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2. Declaration by the scientific representative of the project coordinator

I, as scientific representative of the coordinator of this project and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

- The attached periodic report represents an accurate description of the work carried out in this project for this reporting period;
- The project (tick as appropriate) [3]:
  - X has fully achieved its objectives and technical goals for the period;
  - ☐ has achieved most of its objectives and technical goals for the period with relatively minor deviations.
  - ☐ has failed to achieve critical objectives and/or is not at all on schedule.
- The public website, if applicable
  - X is up to date
  - ☐ is not up to date
- To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 3.4) and if applicable with the certificate on financial statement.
- All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organizations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 3.2.3 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name of scientific representative of the Coordinator: Mr. Gabor Kitley, Managing Director / Geonardo Ltd.

Date: Budapest, 28/02/2012 (submitted on 29/05/2012, due to GA Amendment procedure)

For most of the projects, the signature of this declaration could be done directly via the IT reporting tool through an adapted IT mechanism.

[3] If either of these boxes below is ticked, the report should reflect these and any remedial actions taken.

Foreword

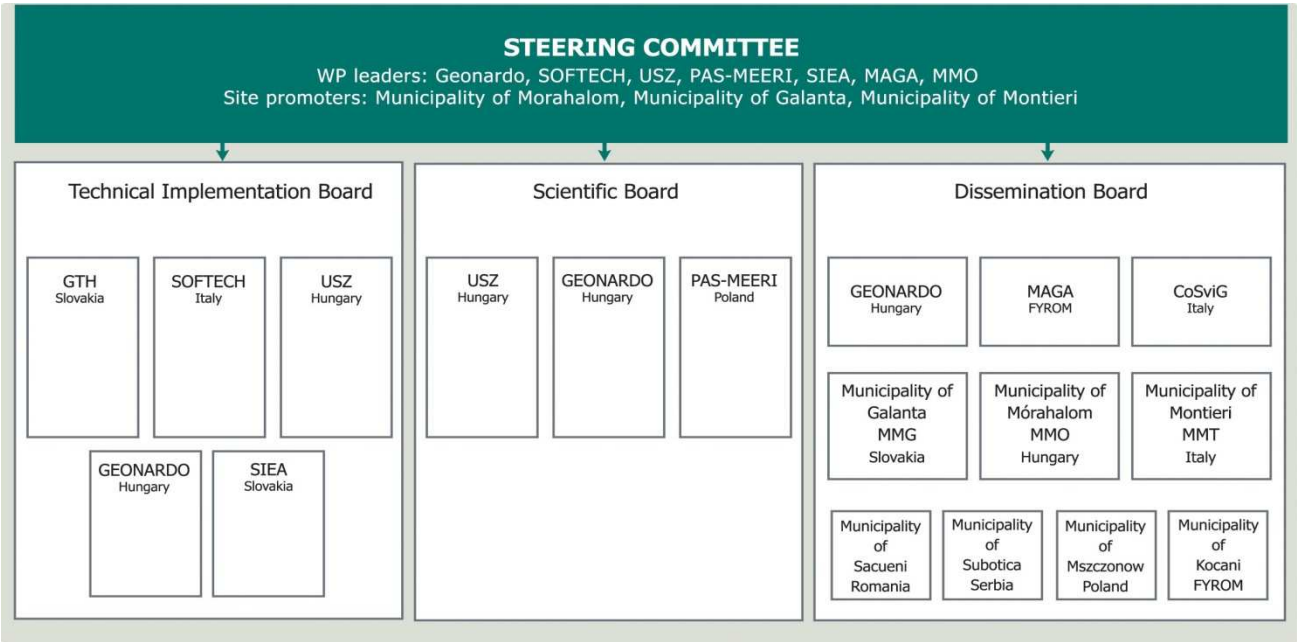
This 2nd periodic report of the GEOCOM project has been prepared in January-February 2012, and made ready within the 60-day contractual deadline. However, due to the ongoing Grant Agreement amendment procedure necessary for including the missing unit-scale flat-rate table (Annex D into the GA) as requested initially by the DG ENER Legal Unit (see e-mail of 28/02/2011), we have not been able to submit the report to the Commission until now. On the advice of Mr. de Royer-Dupré, GEOCOM's EC Project Officer, we are submitting this report and the relevant Form Cs without having completed the amendment procedure, for which reason financial reporting shows the current situation without the use of flat-rates. At the time of completion and submission of this report, we are still waiting for the approval of the Commission on the amendment for the inclusion of the unit-scale flat rates.

Budapest, 30th May 2012

3.1 Publishable summary (max. 4 pages)

3.1.1. A summary description of project context and objectives

The **Geothermal Communities** project is a CONCERTO Phase III action that started in January 2010.



The project's overall objective is to promote the utilization of geothermal energy and resources as a reliable renewable energy resource through demonstration actions in three cities involved in the project as CONCERTO Areas. Geothermal energy is the least known and least expanded RES in Europe, though its relevance and importance should deserve much more attention. **By using the practically unlimited internal heat of earth, geothermal energy has one of the highest potential of all RES.** When compared with other RES – like solar or wind – its main advantage is the practically constant energy and heat output it can provide. Besides the well known geothermal regions like Iceland or the region of Tuscany (Larderello) in Italy, **Central-Eastern European countries have exceptional geothermal resources.** These resources are either unexploited due to the lack of technological know-how or their use is carried out in an unsustainable way; geothermal district heating projects lack the energy efficiency component and the used thermal water is generally not re-injected but instead released to surface waters.

In line with the project's core objectives, the second year of implementation has also brought about tangible results keeping the planned work on track. After having finished the retrofitting of the multi-storey buildings at the Galanta demo site, focus has been shifted towards the additional buildings included in the local CONCERTO area such as the elementary school. Replacement of windows has been decided to be carried out in two-stages in order to maintain the full operational capability of the school. The first set of windows was replaced during 2011, while the second batch is planned to be installed before the end of 2012.

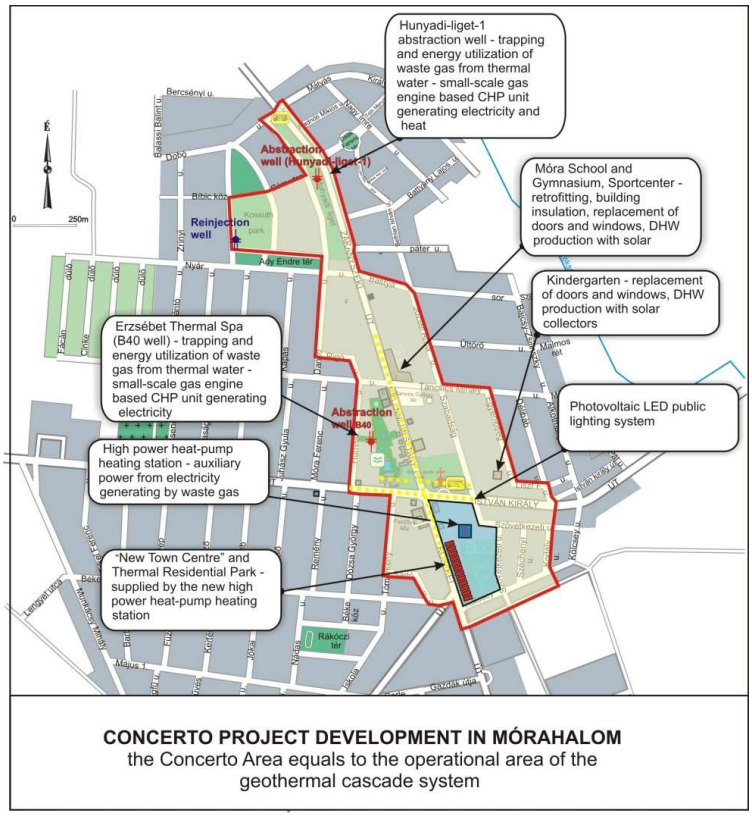
On the technological research side, SOFTECH has delivered their concept regarding the retrofitting of historical buildings, which is going to be applied on the homes and public buildings in the historic town centre of Montieri. The University of Szeged has also progressed with the trans-boundary geothermal energy utilisation topic while liaising with other relevant international

projects such as the TRANSENERGY[4] funded by the EU's Central Europe Programme co-financed by the ERDF.

Potential avenues to integrate geothermal energy with other renewable energy sources have also been explored. The compiled showcase (attached as D4.1 deliverable to this report) discusses best practices and novel ideas from all over the world promoting the combination of geothermal energy with other renewable and conventional sources of energy to achieve maximum output.

The project implements the following measures at the three demonstration sites:

MÓRAHALOM, HUNGARY:



The Geothermal Cascade System of Mórahalom (the core works were financed by the Hungarian Structural Fund *(„KEOP-4.1.0-2007-0006: Geothermal Cascade System of Morahalom (2008-) – EURO 2,147,000"*). According the plans the proportion of renewable energy within the energy utilization of public institutions will grow from 0% up to more than 80% - resulting in saving 14,441 GJ of fossil energy sources per year. 2620 kW heat capacity is calculated to be provided through the geothermal heat supply system. By replacing the amount of 481,907 m^3 of combusted natural gas per year; the annual emission of pollutants from energy utilization is expected to drop by 866 t of CO_2, 318 kg of N_xO_x and 605 kg of CO.

High power heat-pump station: The auxiliary power demand of 60 kW of the heat-pump heating station is going to be met by the trapping of methane production of the new abstraction well of the cascade system, while the electric power produced by trapping of the methane production of the B40 well at the spa will be used at the Thermal Spa. Currently this methane is directly emitted into the air (with a twenty-one times higher greenhouse effect than CO_2). Complex, so called combined energy utilization gas engine based CHP units are planned for the waste gases (CH_4: 65-98%) of the abstracted thermal water, which generates electric power, and supplies auxiliary power to the system. An average water amount of 30m^3/h with a temperature of 30 C° arrives to the area of the "New Town Centre" (after cooling down in the cascade system), which is able to produce a thermal power of 450 kW in a heat-pump system with an average efficiency of 5 COP. This helps the full utilization of the complete energy of the thermal water (including its gas content) abstracted for the supply of the cascade system at a temperature of 65-70ºC to a temperature down to 5-6 C° before reinjection. Currently there is no

[4] http://transenergy-eu.geologie.ac.at

thermal water and heat pump combined system with similar efficiency either in Hungary or elsewhere in Central-Eastern Europe.

Retrofitting and RES integration: The area concerned in the development of the Mora Cultural Centre, School and Gymnasium (built in 1935 and 1972 respectively) is 1430 + 560 =1990 m^2, and uses an annual amount of 130-140,000 m^3 natural gas for heating. By the GEOCOM measures, gas amount of approx. 122,000 m3/ year shall be replaced by geothermal energy.). A solar collector system of 175 m^2 of vertical plate collectors and the related engineering are planned to accompany the retrofitting measures of these buildings. The solar system is able to produce a hot water amount of 17,500 l/day. An intelligent control unit will optimize the use of solar-thermal and geothermal in the building taking into consideration the peak demands and the usual school cycle (45 minutes class/15 minutes break) for ventilation control. It needs to be mentioned that façade insulation and refurbishment measures will take into account the fact that the old building is part of the local cultural heritage and is under local protection. Wooden-framed custom made windows (triple glass with argon fills) will replace the old ones in a style that matches the building built in 1936.

GALANTA, SLOVAKIA:

City of Galanta has been operating a geothermal district heating system since the early ‘80s. The CONCERTO activities focus on the further utilization of the geothermal energy by retrofitting measures, connection of new areas to the district heating system and last, but not least by developing the possible reinjection techniques. The municipality’s effort is to use this green energy widespread in the city and assure this energy for the next generations.

Retrofitting of three old, concrete-panel based multi-level housing units and of the elementary school and RES integration by photovoltaic system and comprehensive renewal of the lighting system and RES integration also by photovoltaic system:

The refurbished buildings and the elementary school need less geothermal energy, which can be used for longer DHW producing on the other main part of the CONCERTO area. The retrofitting of the selected dwellings included:

- Facade insulation,
- Roof insulation,
- Change of the doors and windows at the common spaces,
- Reconstruction of the rising pipes
- Using of thermostats.

Insulation works included the change of windows and doors, which are in disrepair and in addition to poor thermal insulation attributes, are dangerous when handling them. The construction of windows is disrupted with cracks in the wooden frame. From the energy savings

point of view, taking into account the current technical condition, the windows are the structure, which has the greatest impact on the wasteful heating of the building.

Photovoltaic panels shall provide enough electricity for the lighting of the common areas of multi-storey buildings included in the project. Photovoltaics and a comprehensive renewal of the lighting system is hoped to significantly decrease the electricity consumption of the retrofitted elementary school heated from the geothermal source.

Reinjection borehole research and project works, including full documentation, studies, permits and assessments to secure the geothermal capacity for the next generation recent system needs a reinjection well, which is injecting the non-used or waste geothermal water back to the reservoir. Now this "waste water" is pumped into river Váh in amount more than 500 000 m^3 a year. The implementation of a reinjection borehole needs a feasibility study, research and a comprehensive project documentation to set the technical specification of the well.

Geothermal network improvement at CONCERTO Area I by connecting several newly build businesses and residential buildings to the existing geothermal loop.

Connection of newly developed urban areas to the geothermal district heating system

MONTIERI, ITALY:

Montieri is a small medieval village situated in the heart of the Tuscany Geothermal Region of Larderello, with 3 main CONCERTO activities:

Construction of a highly innovative geothermal district heating system by using high-enthalpy fluids: This may serve as a new, ambitious example for communities with similar geothermal characteristics (e.g. Central-Eastern European countries); In CEE higher temperature fluids (medium/high enthalpy) might also be recovered, though at significantly higher investment costs. Aided by innovative technological solutions the feasibility of tapping into medium enthalpy resources is going to be demonstrated here. This aspect of the project affects 425 dwellings which are to be connected to the district heating system. The total heated volume of these homes adds up to 110,000 m^3, while the output of the geothermal system is estimated to be approx 5,500 kW (20,000GJ)

Retrofitting of selected dwellings **by using integrated approaches and techniques**: Montieri represents a challenging site for defining and testing a qualitative architectural integration of renewable energy technologies and retrofitting measures. In such an architectural heritage the potential for intervention at the building envelope level is quite limited. Only natural materials and methods are acceptable that are in conformity with the medieval city structure. 20% of the total dwellings in Montieri are subject to be retrofitted during the project.

The Energy Retrofit Strategy which will be introduced over 425 residential dwellings is part of the geothermal district-heating plan. It aims at reducing energy needs in conjunction with

building renovation. In addition these buildings will make use of geothermal heating to become 100% fossil fuel free. The retrofitting demonstration will take into consideration the town's high cultural and artistic value.

RES Integration – on one hand a 8,5kW PV panels system will be installed to serve as the main power source of Montieri's renewed public lighting system. On the other hand a total of 42,5 m^2 solar thermal collectors will be set up to serve as primary heating and DHW source for dwellings too spread out to be linked to the district heating system.

The three CONCERTO cities in the project represent three completely different sites in terms of their climate, technological setting, population (Montieri: 1.200, Morahalom: 6.000, Galanta: 15.000), retrofitting techniques to be applied and the nature of the geothermal systems. This gives the project a unique added value where communities with different background can demonstrate the importance of geothermal energy.

In addition to the demonstration components through the **parallel implementation of three ambitious development works,** there is also a strong complementary research aspect to the project focusing on making geothermal projects more cost efficient and technologically sound. Research work includes:

- **Integration of the geothermal energy with other RES** to outline ways of more efficient and sustainable green-energy production (e.g. solar energy, biomass, wind) in Europe – with special emphasis on trapping CH_4 and other combustible gases and energy production;
- **Trans-boundary issues** of the utilization of geothermal energy (4D modelling of geothermal reservoirs along the Hungarian/Serbian border);
- **Socio-economic modelling** of geothermal investments, with special focus on the public perception and understanding of RES/RUE measures.

Results of the project activities have been widely disseminated via common dissemination channels combined with traditional and electronic training programs and workshops organized for municipal-level decision makers. Besides the dedicated dissemination work-package, the demonstration activities are expected to have a solid impact on the environmentally-focused thinking (i.e. by involving buildings of various educational institutions into retrofitting and system integration could helps the students studying there to meet with the RES/RUE measures and to understand their importance). Finally, the unique **Mayors' Geothermal Club** is planned to be set up to continue operating even after the project is over as a permanent network of city mayors and municipal-level decision makers who are interested in the sustainable utilization of geothermal energy. It is expected that with the help of such **high-visibility pilot actions** combined with the research and dissemination efforts investment into geothermal systems can be boosted in Europe and **these investments** are going to take place **in a sensible, environmentally aware and economically sound way**.

3.1.2 Description of work performed since the beginning of the project and the main results achieved so far.

Year 1

The planned duration of the project is 60 months (01/2010 - 12/2014). During the first 12 months of the project, mainly administrative, management and preparatory works have been done; however, the retrofitting measures in Galanta at the 3 multi-level dwellings were also implemented ahead of schedule.

The project's kick-off meeting was held on 27-29 January 2010 at Budapest, with site visits to the Morahalom and Galanta demo sites. An interim project meeting was held in June 2010 at Montieri, Italy, with most of the partners being present as well followed by several bilateral meetings between the coordinator and the demo sites representatives later on.

Galanta decided to bring the retrofitting measures forward by a year thus Bysprav Ltd had finished completing the retrofitting measures of the 3 multi-level dwellings in the primary CONCERTO area. This put the project quite ahead of schedule.

The project website was also launched at www.geothermalcommunities.eu. This website is frequently updated and all relevant information and results are available on it.

Year 2

Due to the very slow legislative procedures, most of the legal issues commenced in the first year of the project were still on during the last reporting period. Public procurement, tendering, compliance with local regulations presented major hurdles (and they still do) for the actual implementation of the proposed and funded actions.

The second interim meeting was held in the Kocani (Macedonia) on 27-28 April 2011. After a brief summary of the first-year activities (results achieved, deviations, delays and bottlenecks experienced) the upcoming tasks and deliverables were discussed. This section was followed by a detailed description of the first-year results of the three demonstration sites. Interim results of the relevant research WPs were also shared with the consortium.

The indoor sessions were complemented by site-visits related to the Kocani geothermal infrastructure (geothermal heated elementary school, greenhouses, abstraction well etc.)

At the demo-sites the municipalities have been working hard on overcoming all legal obstacles and obtaining relevant permits and documentation required to commence the investments. As a result of

all of these efforts, it is expected that many aspects of the GEOCOM initiative will start to get realized in 2012.

The preparatory works, energy audits, planning and public procurement procedures were also in the pipeline at the two other CONCERTO cities. The actual retrofitting and construction works started in 2011, as planned. (See Chapter 3.2.2)

Preliminary steps regarding the launch of WP7-Monitoring have been taken during bilateral talks between relevant partners.

3.2 Core of the report for the period: Project objectives, work progress and achievements, project management

3.2.1 Project objectives for the period

According to FP7 reporting requirements, a short overview of the project objectives relevant to the 2nd period of the project (year 2011) is given below. As mentioned earlier, the first and the second years of the project have been dedicated mainly to preparatory works especially at the demo sites regarding the investment aspects, however some of the demonstration tasks (retrofitting in Galanta) have started and partly finished while RTD and dissemination activities are on schedule.

In line with GEOCOM's Description of Work, during the second year of the project the following six WPs have been running:

WP1 – Management, Month 1 – 60
WP2 – WP3 – WP4 – Demonstration activities at the 3 CONCERTO Cities; Month 1-48
WP5 - Technological Research Month 1-36
WP8 – Dissemination. Month 1-60

(Although the relevant WPs last longer than the reporting period itself (12 months), a detailed description (from Annex 1) of each related WP for the entire span of their lifetime are given in this chapter – since some of the mentioned WPs are scheduled to terminate in 2012 for obvious reasons some of their set objectives have not been completed by the end of the second reporting period.

Though planned to start in 2012 only, some of the activities of research work-package **WP6 – Socio-Economic research** of Geothermal Issues have already taken place in 2010 and 2011 in parallel with WP5 – mainly in order to make the pilot-site case studies ready by the start of the DEMO measures, hence WP6's description among the list of ongoing WPs.

3.2.1.1. WP1: Management

Work-package leader: Geonardo

Objective: As of DoW

WP 1.1 Internal Consortium Affaires

- Effective communications and flow of information between partners, Preparation of Internal Consortium Agreement.
- To organize progress meetings: yearly management meetings and workshops.
- IPR Management, declaration of Background IPR, monitoring and management of Foreground IPR.
- Project reports (annual, mid-term and financial) as outlined in the Grant Agreement.
- To monitor Critical Paths, SWOT assessment, alternatives for crisis management. Identification and strategy for any correction of potential risks and dispute, which may occur.

WP 1.2 Liaison with External Parties

- Representing the Consortium towards the European Commission and the Scientific Officer.
- Liaising with other relevant Directorate Generals (including DG JRC) of the European Commission.
- Liaising with the CONCERTO Premium initiative and contact establishment with other CONCERTO projects.
- Monitoring other RES/RUE-related European initiatives (including EIE).
- Monitoring national and international initiatives liaising with International end-users and Stakeholders,
- Developing uniform guidelines for press and media appearance

WP 1.3 Geothermal Communities Engineering Project Office

- Supervision of design and implementation works at all test sites (WP2, WP3, WP4 and WP7). There are sub-teams responsible for each the relevant test site, lead by SOFTECH (for Montieri), USZ (for Morahalom) and MG (for Galanta)
- Keeping records and supervising of tendering procedures (lead by project engineering office)
- Help desk, consulting and engineering service for the involved municipalities (including associated cities).
- Supervising the compliance with standards and regulations.
- Acceptance and take-over of project works, in-situ supervision and documentation.
- Development of financial and legal conditions and elaboration of a plan for the sustainability of the project results.
- Identification and strategy for any correction of potential risks and dispute, which may occur.
- Maintaining and monitoring links with the industry ensuring that adequate competition is generated among the subcontractors.
- The project office is located in Budapest at Geonardo HQ, with input from 3+2 key partners who provide expert consulting and supervision of local activities: USZ (Morahalom site), SOFTECH ((Montieri Site); MG (Galanta site); and GEONARDO (WP1/4) and SIEA (WP7).

WP 1.4 Elaboration of a plan for the sustainability of the project results (also in WP 10)

- Development of financial and legal conditions description and technical guidelines for the long-term operation of the network
- Maintaining and monitoring links with associated cities and other interesting stakeholders

3.2.1.2. WP2-WP3-WP4: Demonstration activities at the CONCERTO Cities

Though the demonstration activities are split into three *separate work packagers (WP2 - Geothermal System Development, WP3 - Retrofitting and Energy Efficiency Measures, WP4 – System Integration), the objectives (and the achievements in the next chapter) of these WPs are discussed together, using separate description by* CONCERTO *Cities. These WPs are the main activities of* the *GEOCOM project, so special attention is paid on their introduction as well.*

CONCERTO City: Morahalom, Hungary – Objectives of DEMO WPS

WP 2.1 Within the framework of the CONCERTO element a heat-pump centre is planned. A gas turbine that is planned to utilize the methane content of the thermal water currently produced at the city's wells will power the heat pumps. Another element is the integration of a solar-thermal system providing DHW for the Mora Ferenc Primary School, Kindergarten and Sports Hall complex.

WP3.2 Two public buildings are subjects of retrofitting. The Mora Primary and Secondary school currently spends 82% of its annual budget on heating (natural gas) due to extremely poor qualities of the external walls and windows. For both buildings an intelligent system is to be installed in order to control ventilation and shading (during the summer). Higher-grade high-school students to be involved in the planning and implementation of retrofitting measures is hoped to raise awareness and understanding among young people regarding the principals of energy efficiency in general..

WP4.2 A combined solar-thermal and geothermal system taking into account cost-efficiency and reservoir management are assumed at the pilot site. The insulation techniques to be applied at the school and the sports hall are beyond national and EU standards. The intelligent ventilation systems will consider the usual school cycle. The combusted methane content of the Hunyadi-liget thermal well is going to power the heat pump centre producing heating and water for the new housing area in the city: At the same time energy generated by the same process at the B-40 thermal well is expected to be used at the thermal spa.

Scheduled for this reporting period at the Mórahalom demonstration site:

public procurement of CHP engine
detailed energy audit of the CONCERTO Area

CONCERTO City: Galanta, Slovakia –Objectives of DEMO WPs:

At Galanta, three local partners are involved in the project activities: P11 - Municipality of Galanta (Mesto Galanta), representing the Municipality, P6 - Galantaterm s.r.o, the company (owned by the municipality) representing the Geothermal district heating operator, and P17 Bysprav s.r.o, another municipal-owned company responsible for the retrofitting actions of the multi-storey buildings.

WP 2.2 Geothermal System Development

In order to improve environmental performance of the existing system full documentation and related studies of a reinjection borehole will be compiled. For further development of geothermal heating in Galanta, it is key to determine the viable options and their extent regarding reinjection into sandstone reservoirs. Such complexity must be preceded by a set of geological surveys, which happen to be also part of the project. From the perspective of sustainability and environmental suitability reinjection may prove to be an important step, due to the fact that nowadays over 500 000 m^3 a year of waste geothermal water is released to the nearby river Váh. According to preliminary estimates and studies, reinjection could return 60 - 80% of the abstracted water back into the reservoir (exact value to be determined by the proposed study). This activity aims on securing the complete research and project documentation required for the implementation of the reinjection borehole.

Since the start of the project certain conditions had changed which affect the implementation of the initial junction towards CONCERTO Area II, proposed in the Annex 1. In addition to three new housing estates, a biotechnical-accessories producing company and an elderly home are under

construction in close proximity to Galantaterm Ltd. creating a sufficiently dense heat market at CONCERTO Area I. The investors announced their interests to use renewable energy sources for heating of their properties. This presents a great opportunity for the GEOCOM project to provide a year-round heating and DHW supply from geothermal sources on the spot, instead of limiting such capacities only to produce DHW during the summer period on the initial CONCERTO II area. Request for changing the original work plan have been filed for the Commission and all necessary paperwork have been adequately prepared, in full compilation with the EC's regulations.

WP 3.3 – Retrofitting and Energy Efficiency Measures (Mesto Galanta)
Insulation works include the change of windows and doors, which are in disrepair and in addition to their poor thermal insulation attributes, are dangerous when handling them. The window structures are disrupted by cracks running in the wooden frame. From the energy savings point of view, taking into account the current technical conditions, the windows have the greatest impact on the wasteful heating of the building. Replacing them can achieve a saving up to 30 %.on the heating bill.

WP 3.3 - Retrofitting and Energy Efficiency Measures (Bysprav)
Three blocks of flats were selected for retrofitting where the applied external wall insulation technologies demonstrate the standard insulation systems often used in the country and which are in accordance with the dwellers' decision.. Further elements of retrofitting include insulated doors and windows at the common areas; fully renewed rising pipes and the use of thermostats in the apartments.

WP 4.3 – System Integration (Mesto Galanta)
The local elementary school has high electricity consumption due to the need of continuous lighting during the day. The project includes the integration of renewable energy sources through the installation of photovoltaic panels performing up to 5 kW with a total annual energy output of up to 5300 kWh (calculation based on the records of annual solar radiation in the Slovak Republic). Furthermore, to enhance the efficiency of this measure, a comprehensive upgrade of the school's lighting system is scheduled to be carried out, making it possible to achieve an average saving of up to 25% on the power bill.

In addition to saving power, the upgrade of lighting fixtures contributes to the improved conditions of teaching, reduces the number of lamps, increases total light output (in terms of technical standards) and it will cast a less harmful shade of light for the eyes of children.

WP 4.3 – System Integration (Bysprav)
RES integration is committed through the future deployment of photovoltaic panels on the provision of electricity for lighting common areas of the housing units. On the top of each insulated housing unit a photovoltaic system with a total power up to 1.5 kW will be mounted, which is sufficient to cover the energy needs of the common areas at the 48-flat housing units.

Scheduled for this reporting period at the Galanta demonstration site:

- Recent developments and new investments near CONCERTO Area I resulted in a much denser heat market to be served by geothermal heat at a much reduced cost than the initially anticipated budget. The proposed change in plans has been filed to the EC for evaluation.
- First phase of the school retrofitting targeting two pavilions which are in the worst condition to be completed.
- Project documentations for all the photovoltaic systems to be done and to be approved prior installation.

CONCERTO City of Montieri, Italy – Objectives of DEMO WPs:

There are three legal entities involved in GEOCOM that are responsible for the demonstration actions at Montieri: P2 - SOFTECH Ltd, an engineering and architect-planning SME, responsible for the sensitive retrofitting measures of the medieval village of Montieri, P8 - CoSviG, a regional public body responsible for the geothermal district heating implementation and P12 Municipality of Montieri, the local government responsible for the implementation of all works, especially coordinating the retrofitting measures.

WP 2.3 Geothermal District Heating System of Montieri
The main objective is to set a new, ambitious example for Central-Eastern European countries, where higher temperature fluids (medium/high enthalpy) may also be recovered (although at significantly higher investment costs). With the help of innovative technological solutions the feasibility of tapping into medium enthalpy resources is demonstrated. Challenges include HPHT conditions (high pressure (15-20 bar) and high temperature (200-215 °C). Given the elevation difference between the steam/hot water heat-exchanger at 530 m above sea level and the central exchanger at 700 m a.s.l., in order to keep the circulating superheated water at a pressure of 2 bars it is sufficient to pressurize the circuit at the central exchange, where jars of expansion are subjects to be installed.

Plant Technical Features

- Total energy output: 19,800 GJ
- Total power output: 5330 KW
- A double primary and secondary circuit, with use of heat exchanger plates with two thermal plants (primary heat steam / water boiler and secondary overheated water / hot water) and intermediate pumping stations.
- Utilization system: based on heat exchanger plates
- Primary thermal plant location: geothermal well
- Central location secondary heat: municipality of Montieri
- Length of distribution network: 5600 m (times 2, return) of pipes, excluding the connection to users.
- Inlet primary circuit temperature: 200 °C
- Primary circuit overheated water temperature: 120 °C
- Secondary circuit water temperature: 80-90 °C

To maximize the economic efficiency a specific planning targeting the intervention was elaborated, without precluding any possibility of scattered units to be connected, where the distance and the cost is within the parameters of depreciation schedule. According to calculations, the total volumes to be heated were 110,000 m^3, while total power output reaches 4850 kW.

Having noted the almost **uniform architectural features of the selected buildings,** a building types-based calculation method had been implemented. This has allowed a careful assessment of the differences in energy requirements related to the heating demand of similar buildings. The development shows that the analytical energy requirements for the buildings shall be increased by 10%, and therefore it sums up to approximately 5330 kW.

WP3.4 Retrofitting at Montieri:
Montieri represents a challenging site for defining and testing a qualitative architectural integration of renewable energy technologies and retrofitting measures because in such an architectural heritage, the potential for intervention at the building envelope level is quite limited. Only natural

materials and construction methods are acceptable that are in conformity with the medieval city structure. The climatic conditions here are similar to that of the Western Balkan thus results are going to be directly applicable to South-Eastern European countries while taking into account the different socio-economic conditions.
20% of the total dwellings will be retrofitted, having an enormous effect on the energy balance and setting an example for similar future projects.

Energy audit of the 425 dwellings selected for retrofitting and micro-scale RES integration will be carried out. Retrofitting and RES integration comply with the special local conditions.

The innovative retrofitting technologies to be used at Montieri are as follows:

Day lighting:

-Central skylights opening;
-Careful selection of the skylights glass (light transmission/solar gains/light reflectance coefficient);
-Opening of skylights in order to allow the natural light to reach the lower levels of the building;
-Special care concerning the spatial distribution at each floor.

Building envelope:

-Application of thermal insulation at the roof levels and partition walls, and floors;
-Selective covering of the massive walls from inside in order to optimize comfort conditions and thermal inertia of the building;
-High quality double glass, wooden frame vertical windows;
-High quality skylight glass (low solar gains – low reflectance).

Natural ventilation:

-Utilization of of the buildings' high natural ventilation potential;
-Opening of skylights to increase the natural ventilation (free-cooling, night cooling in summer);
-Keeping infiltration rates at low levels, during winter.

WP4.4 System Integration at Montieri

A catalogue of applications, integrally estimated on each technological/typology crossing is suggested to be worked-out, in order to predict the most appropriate technology and configuration for any of the various building types. The result yields a matrix of technologies, components, equipments and materials to be tested in the whole town centre, qualified and quantified in terms of energy benefits, environment impact reduction, and gas emission control.

The main area of RES integration includes the modernization of the complete public lighting of the town centre by changeover to solar-powered LED lighting system. Photovoltaic modules will be adopted reaching a total amount of 8.5 kW to provide the electricity needs for street lighting. The current power demand for the public lighting is 15 kW and it is estimated that with the energy efficient street lighting system to be adopted by the Municipality, the 8.5 kW of PV output could cover the whole energy needs for such a public use. The use of central panels and closed circuit networks is planned. Apart from the occasional cleaning of the panels, the system does not require any maintenance. It is completely automatic with dusk-to-dawn solution. This system reduces the energy demand by 35-50%, and its utilization results in a 100% energy saving compared to the replaced system.

The other area of RES Integration is to use a total of 42,5 m^2 solar thermal collectors. Such a limited capacity derives from the population's uniform satisfaction over the community's thermal needs covered by the geothermal source. Only a few dwellings decided not to be served by the district heating (due to their distance from the pipeline), including domestic hot water. In such dwellings, at the periphery of the geothermal loop solar thermal panels shall be installed to provide solar hot water all year round.

Scheduled for this reporting period at the Montieri demonstration site:

- Additional legal framework regarding the investment, such as land use, finance, labor force
- Fundaments of the site specific energy efficiency measures to be laid by SOFTECH
- Draft plans for the new buildings to be erected as part of the geothermal heating network with special emphasis of the integration of renewable energies in their building envelope and other utilization of RESs.

3.2.1.3. WP5: Technological Research

Work-package leader: University of Szeged

Objective: As of DoW

WP5 is one of the two research work-packages of the project. Its main objective is to set-up a technological guideline on future geothermal energy investments and to give a clear and transparent picture on the possible outcomes of similar projects. It has four sub-WPs in order to cover all relevant research and horizontal topics. The leading partner is P9 – University of Szeged, with strong cooperation and involvement with all the project partners (local data input, research and legal issues, etc.)

WP5.1 Integration with other RES
The main scope of this sub-WP is to outline ways of integrating geothermal energy with other RES (e.g. solar energy, biomass) in Europe, and evaluation of integration methods.

In this WP, available experience on integrating different RESs into a cascaded facility is studied, with a special emphasis on environmental improvements and broadened operational time and spectrum of use for such facilities. At present most of the experience available is confined to general cascading utilization such as health spas, space and greenhouse heating in a low temperature geothermal environment. There are very few examples regarding the cascading other RES. The results will provide blueprints of innovative cost-effective solutions for geothermal investments in the enlarged Europe. The following activities are planned: 1) Investigation of the economic factors that influence the integration of GE into energy systems. 2) Investigation of other factors that influence the integration of GE into energy systems. 3) Identification of integrated systems potential layouts. 4) Studies for the improvement of geothermal energy utilization in CEE.

WP5.2 Trans-boundary issues of utilizing geothermal energy
The most significant thermal water resource in the Carpathian Basin resides beneath the Hungarian-Serbian border, in the Szeged-Morahalom-Subotica triangle. The abstraction for extensive and complex utilization is currently being started on both sides of the border. For the safe and sustainable abstraction, and its international monitoring, it is necessary to determine the hydrogeological-hydrodynamic features of the common thermal water base, and to elaborate a two-phase 4D model of the water base for the mapping of the water resource and its gas content.

Geology doesn't follow country borders, thus no surprise that the Upper Pannonian reservoirs of the Great Plain stretch to the mountains of Serbia and Romania. This strengthens the necessity of basic research, since the set up of international abstraction monitoring systems and abstraction agreements will eventually become a necessity targeting a reasonable and sustainable bilateral production.

WP5.3 Reinjection monitoring and modeling

Sandstone reservoirs in the Pannonian-basin and other similar sedimentary basins all over Europe pose a significant challenge for geothermal related reinjection. To comply with the mandatory reinjection procedure of the geothermal waste water back to the reservoir high performance pumps are necessary (with high power demand) – occasionally up to 50% of the total heat power of the source. That may destroy the whole economic viability of the geothermal system. Different methodologies are under investigation, which aim is to define technical solutions, partially or totally eliminating the problem and by doing so increasing the economy of such geothermal systems. The recently commissioned reinjection borehole in Morahalom is used for simulations, model calibrations and for detailed optimum reservoir management studies which enable reinjection with minimum energy consumption.

The aim of the work package is to collect data and information under production conditions that clarify the relation between wellbore construction and well-geophysical relations of abstraction-reinjection wells drilled into Upper Pannonian sandstone reservoirs as well as the actual abstraction-operation methodology. The research activity seeks answers to various questions such as: from which location how much water can be abstracted, what technological circumstances have to apply for successful reinjection to take place thus ensuring a sustainable, long-term water production.

WP5.4 Integrated utilization of waste gases of thermal wells

Waters abstracted from a large number of thermal wells of the Great South Plan Region have high gas (predominantly methane) content. During water abstraction (both in the case of spa uses and energetic utilization) novel technologies are available to separate and utilize the energy-content of these gases (as well as heat content of the CHP units while combusting these gases) reducing green-house effect and increasing system effectiveness through integration. In WP2.1 Morahalom serves as the first Hungarian pilot site for such action, as combined heat and power from the CHP units mounted on two abstraction wells shall be utilized in an integrated system. In Wp5.4 researchers of the USZ involving the leaders of the other test sites aim to carry out an in-situ study of the Morahalom site, to assess the results of integrated use, to do benchmarking, to analyze the needs and potential of other possible sites and to outline suggestions for wider applications.

The following activities are planned:

- Investigation of the economic factors that influence the integration of waste gas energy in RES.
- Investigation of other factors that influence the integration of waste gas energy in RES.
- Assessment of waste gas energy integration in RES potential and technologies for the South Great Plan Region.
- Building a database of South-Great Plan sites with potential in waste gas energy integration in RES.
- Providing technology transfer to projects proposing waste gas energy integration in RES.

3.2.1.4. WP6: Socio-economic research

Work-package leader: PAS-MEERI

Objective: As of DoW

WP6.1 Public perception of geothermal energy: This sub-WP aims to compile a cross-national, comparative analysis of public understanding and attitudes towards geothermal energy in general. The work targets the evaluation and assessment of the society's perception regarding the function and role of geothermal energy in energy systems and everyday use. Research includes both quantitative and qualitative methods (e.g. internet-based surveys, questionnaires, and analysis of statistical data that has been gathered for other purposes. Relevant project partners will gather domestic data that characterizes their home country).

WP6.2 Public perception and understanding of RUE measures (*pilot-site case studies*).
To determine user satisfaction (with the implemented measures, information, energy advice, feedback-systems on consumption) and user involvement related to the project activities analysis of different stakeholders / inhabitants perceptions about changes in the affected communities and acceptance of the CONCERTO measures will also be performed.

WP6.3 Overview of market drivers, fiscal measures and subsidies: Issues such as financial constraints (on capital investment, flow of capital, and other); environmental constraints; land concessions; water rights; taxation; etc. is planned to be thoroughly investigated in the aspect of their handling through the relevant existing legislative and administrative framework, as well as financial incentives, fiscal measures, market incentives, analysis of economic viability and cost-effectiveness in relation to reduction of CO_2 emissions, environmental and sustainability issues, reinjection, etc.

For the reported period, no activities within the frame of WP6 were originally planned (as included in Annex I to the Grant Agreement). The project partners decided to initiate additional works in WP6 much earlier that in M24. The following chapter lists the work completed so far.

3.2.1.5 WP8: Dissemination

Work-package leader: Geonardo

Objective: Dissemination of information about the project in general, its objectives, the approaches and results through electronic and traditional methods. All beneficiaries have important role in dissemination, like translations, publications, content developments, conference and workshop participation, etc.

WP8.1 The first task under dissemination was to develop the project's website available starting from the first month (January 2010.) and serving as the main platform of the project.

The website contains:

- Consortium structure, list of partners and contact points
- Private communication forum with a restricted access to the partners, for communication / discussion

- Links to stakeholders and other websites (e.g. other CONCERTO projects) with relevant information of interest
- Appropriate links to the Mayor's Club and Monitoring, as and when it becomes available

The website is regularly updated with:

- New versions of the brochures and newsletters
- Occurrences of dissemination of the project by its partners to conferences and meetings
- Announcements of relevant future meetings that a partner intends to attend
- Reports/Minutes of the kick-off, interim and final meetings (accessible only to partners)
- Results from each work package as they are released by the partners (accessible only to partners)
- Public presentation of final deliverables

WP8.2 Common Dissemination Activities

- Dissemination activities were planned in order to improve the market for development of geothermal energy and integrated geothermal/RUE/cascading RES projects in EU countries
- General dissemination of information about the project, its objectives, the approaches and results through publications and leaflets and the project Newsletter
- A project logo to be created and used in all publications and leaflets
- The first **brochure** (M3) was to contain the overall aim of the project and the planned actions (WPs) that would be undertaken to achieve this aim. Additionally, International and National Press and Media Releases from each partner within its home country are forecasted.
- Project **electronic newsletters** are planned to be issued on a yearly basis containing above all the information found in the most recent brochure the following:
- Summary of progress of all WPs, including all the deliverables produced since the last edition of the newsletter
- Reports of activities of each partner since the last edition of the newsletter
- Information on relevant forthcoming conferences / meetings, where GEOCOM is presented
- Announcement of forthcoming project meetings

WP8.3 Presentation and participation at high-profile events

Provisional activities planned in general and for the period:

- Presentations and publications in international conferences (such as the World Geothermal Congress 2010) that are related to the objectives of the project
- Participation at CONCERTO Plus/Premium meetings and activities
- International Press and media releases.
- National Press and Media releases from each partner within its country

3.2.2 Work progress and achievements during the period

3.2.2.1. WP1 – Management

According to the FP7 reporting guidelines, the achievement and progress of the Management WP is discussed in the next chapter ***(3.2.3 Project Management during the period)***.

3.2.2.2 WP2 – WP3 – WP4 activities for the 3 demonstration sites

Just like in the previous chapters, the periodic report of GEOCOM describes the achievements of the DEMO WPs as a whole, by splitting the actual results into three subchapters, according to the CONCERTO Cities.

The actual investments, retrofitting, RES integration and system development measures are planned to be carried out in the 2nd (reported now) and the 3rd year of the project, while the 1st year was dedicated to the preparatory works. Despite the travails of the project steering committee (SC) to put extra efforts on the preparatory phases aiming to avoid delays and mismanagement in the demonstration activities some unforeseen circumstances regarding the legal framework of the investments hinder the on-time realization of certain aspects of the demonstration components, resulting in a minor lagging behind the set schedule,. However such hindrances provide the time and opportunity for certain aspects of GEOCOM to be improved within the bounds of the project aiming for an even more satisfying overall outcome at the end.

The initial momentum of the demonstration features provided by the part-completion of the retrofitting works at the Galanta multi-storey housing units before the end of the first project year has reduced to a more conventional pace and keeps going on. Partner activities related to each of the research work packages at the three demonstration sites are listed in the following subchapters.

<u>CONCERTO City of Morahalom</u>

WP2.1 – Geothermal System Development

07.13.2011. Detailed gas-composition study of the thermal water abstracted at the Hunyadi-liget B-45 well has been filed for completion. This document is required for the planned public procurement on the CHP engine. In the meantime the technical documentation package had also been compiled regarding the waste gas utilization of thermal wells in CHP-gas engines.
08.01.2011. The public procurement has been announced
08.09.2011. The detailed results of the required gas-composition study had been received. (full report attached)

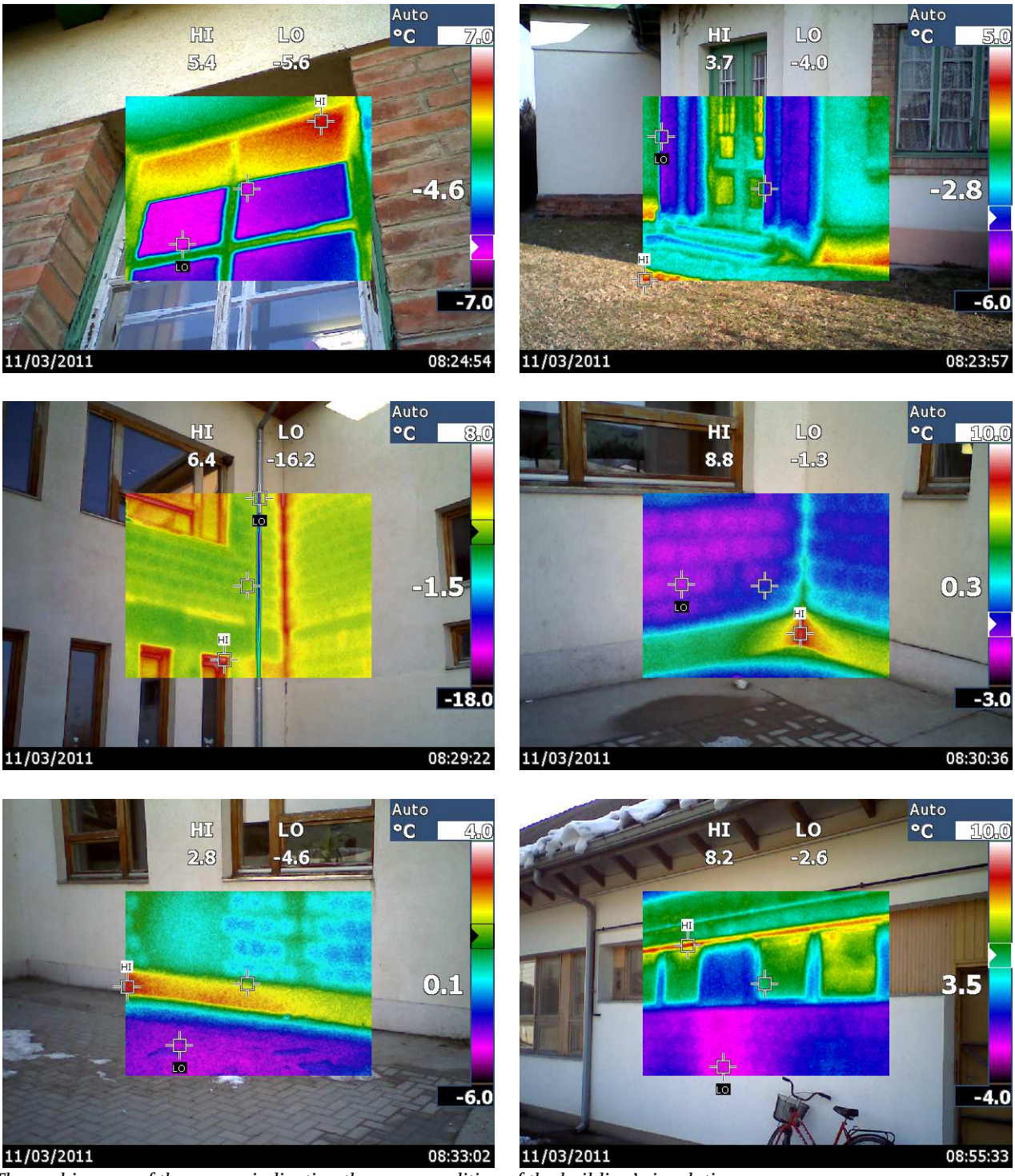
Separated gas content	*GVVs*	508	[l/m^3]	Separated methane content	*MVVs*	446	[l/m^3]
Dissolved gas content	*GVVd*	15,6	[l/m^3]	Dissolved methane content	*MVVd*	9,4	[l/m^3]
Total gas content	***GVV***	**524**	[l/m^3]	**Total methane content**	***MVV***	**455**	[l/m^3]

Gas separation device layout and procedure from thermal water at Morahalom

The public procurement documentation of the CHP gas engine has been purchased by only two bidders and only one of them had actually submitted his financial bid regarding the implementation. The price tag on this sole bid was way above the allocated budget for this project component. The maximum cost on this item the project would have been able to finance without jeopardizing other project elements was 200,000 Euro (equivalent of approx. 53 Million HUF). Instead, the received bid was about 89,9 Million HUF (340,000 Euro) which was considered to be far over not only the available budget, but over the actual market value of such a device too. Thus the public procurement procedure was considered invalid, and the planning phase of a new procurement procedure has been commenced.

WP3.2 – Retrofitting and Energy Efficiency Measures

During the reported period further progress has been made in terms of the required legal framework which is essential to carry out the investments. In the case of the Mora Ferenc Primary - Secondary School and the Kindergarten-Daycare Center complex the mandatory site visits and surveys had been conducted in order to submit the bids regarding the insulation of the building envelopes as well as the change of all the doors and windows. To conclude this phase bids were received and found reasonable.



Thermal images of the survey indicating the poor condition of the building's insulation

The planning phase is still on for the public lighting system and for the heat-pump heating station. Public procurement procedures have to wait until the execution plans will have been finalized regarding these project components.

The energy audit of the public lighting system of Morahalom covered the number and types of the street lights at the CONCERTO area, their installed capacity and the amount of energy they generally use in a calendar year. It also contains the operational costs of the system for 2010 and 2011. The document provides suggestions regarding the modernization of the system, too. The total amount of possible savings via the upgrade of the system (including the stand-alone PV modules on

the top of designated bus-stops in the area) may reach up to 3 Million HUF (approx 10,000 EUR) per year.

Total energy consumption of the public lighting system before (32.096 kWh/a) and after (18.637 kWh/a) the refurbishment. The total amount of energy saved is calculated to be up to **13.458 kWh/a.**

Two potential replacments for the current wasteful public lighting solutions.

However even having the energy audit for the public lighting system and the plans for the photovoltaic LED public lighting system ready its implementation had been de-prioritized over the replacement of windows and doors at the Mora School and Kindergarten. The reasoning behind this decision is that certain components (proper housing to accommodate the electrical parts) essential for a full realization of the public lighting system are still not available, and still need to be developed. Based on the latest update on the status of the research it is highly probable that it won't be finished earlier than the second half of 2012. Adding the amount of time usually required conducting a proper public procurement procedure it is clear that the upgrade of the public lighting system cannot launch before the last few months of the year. There is no need to explain that December is generally not the right time for delivering such outdoor improvements. Thus it will be realized in the first half of 2013.

Summary: All legal aspects, surveys and site visits related to the investments are coming to an end yielding the way for the actual implementation phase. It is envisaged that most retrofitting components will have been delivered by the end of 2012, but there are still a few issues left to be settled in 2013.

WP4.2 – System Integration

The system integration aspect at the Morahalom site cannot be separated from the features related to the geothermal system development part Thus for instance the waste gas utilizing CHP engines to be mounted on the abstraction wells could also be discussed under this sub-chapter.

Pre-bidding site visits for other project components, such as the intelligent ventilation system to be installed at the Mora School had been carried out, bids were received and evaluated. Detailed planning works needed for the public procurement procedure had been launched and are on schedule for delivery.

Also, all the licenses regarding the various units for the CHP-gas engine were received and their installation had been approved by the authorities.

From an administrative point of view it is worth mentioning that the project management duties at the Morahalom demo site have been transferred as of June 2011 from Mr. Tamas Medgyes to Mr Jozsef Pasztor, who have been working at the Municipality for years and has extensive knowledge about EU funded projects and other funding schemes on a domestic level.

Deviations from the initial submission deadlines for certain deliverables in Annex-I and the reasons:

D2.4 Due to the first unsuccessful public procurement procedure for the CHP engine carried out in 2011, a new one will be initiated in the first half of 2012. Once the tender is satisfactory for all parties involved, installation works will be commenced in 2012.

D2.5 The planning phase of the LED public lighting system and the heat pump heating station is due in March-April 2012. Public procurement is suggested to be carried out in May 2012, which implies a delivery month of September/October 2012.

D2.6, D3.5, D3.6 Planning works related to the change of doors and windows, building insulation and solar DHW are due this year with an implementation phase in 2013. Public procurement covering these aspects is expected to be initiated later on this year

CONCERTO City of Galanta

WP 2.2 Geothermal System Development

For the further enhancement of the geothermal heating capacity of Galantaterm, comprehensive project documentation is being prepared. A project change was submitted, which was aimed to changes in this WP, where instead of the former plan to connect a gas heating plant to the geothermal system, new building are planned to be connected to the recent system in order to broaden the circle of beneficiaries of the geothermal heating this way. The change of plans required the amendment of the original Grant Agreement, which was submitted to the European Commission on February 1, 2012.

In 2011 the connection of a set of new buildings had been launched via a new pipeline. Galantaterm will now provide DHW and heat for a new multi-storey building with 37 flats and for a microbiological-accessories producing company which is in the vicinity of the nearby county hospital already on the geothermal loop. The heat provided annually for the multi-storey house is up to 1668 GJ/y (pipeline length: 2 x 220 m) and for the microbiological company 386 GJ/y (pipeline length: 2 x 82 m).

In 2011 all the necessary negotiations were finished successfully with the future clients of the broadened geothermal system. These negotiations were crucial ensuring the future utilization of the geothermal energy by the customers. As a result of this process beside the above mentioned facilities there will be an **elderly home** (with a provided annual heat of 1870 GJ/y), a municipality owned **apartment house with 24 flats** and a **multi-storey apartment building with 37 flats** linked to the geothermal loop.

Planned actions for 2012 include the connection of the new 37 flats-multi-storey building and the elderly home to the geothermal system. The annual amount of heat transferred from the geothermal source is planned to increase by up to 3538 GJ/y.

The initially set timeline may suffer some delay due to this change in plans in the midst of the project. To carry out all mandatory legal steps required by the EC on this matter may put us slightly behind schedule; however the clear benefits related to this deviation are obvious. Reducing investment costs while serving a denser heat-market not just periodically but all-year-round justifies the consortiums decision filing for an amendment to the GA regarding the original CONCERTO Areas in Galanta.

WP 3.3 – Retrofitting and Energy Efficiency Measures (Mesto Galanta)

A comprehensive budget of the elementary school insulation was carried out by an architecture office and a public procurement for the first phase of the retrofitting was also realized. The first phase of the school retrofitting is aimed on two pavilions which are in the worst condition. The retrofitting works were launched in 2011 and almost the whole first phase was successfully realized. In this phase 303 pieces of insulated windows with double glazing and 88 insulated plastic parts between windows with plastic filling were mounted. Technical features of the new windows (retrofitting – GEOCOM measure):

- 6 cell plastic insulated frames with Uf = 1,1 $Wm^{-2}K^{-1}$
- Insulated double glazing 4 – 16 - 4 mm with Ug = 1,1 $Wm^{-2}K^{-1}$
- Overall U-value of the windows and doors: Uw = 1,3 $Wm^{-2}K^{-1}$

The multi-storey houses retrofitting works were successfully finished at the beginning of the year 2011. Most of the constructional work was done in 2010. Final payments for the vendors were realized in year 2011.

The public procurement and a second phase realization of the windows replacement at the elementary school are planned for 2012. The technical features of the windows will be the same as at the first phase.

The two-steps retrofitting in this case may help achieving better results during the second stage. Due to several factors which has an influence on various parameters after the replacement of doors and windows (like humidity, natural ventilation etc) experience on the already retrofitted wing of the school-building can provide information to adjust the original calculations regarding the parameters of the new windows if necessary.

WP 4.3 – System Integration

The system integration includes the deployment of photovoltaic panels on the provision of electricity for lighting common areas of the three, already insulated multi-storey housing units. All the contracts needed to connect the PV system to the grid were signed in the reporting period between the municipality, Bysprav and the local electricity distributor.
The project documentations for all the photovoltaic systems were carried out and approved by the electricity distributor.

The phase of the building permission request was launched, all the documents were approved by the local authority, but the permission was not issued as of the end of 2011.

The planned performance of the photovoltaics on each multi-storey house is estimated to be up to 2,16 kWp with annual energy gain up to 2,4 kWh while the performance of the photovoltaics on the elementary school will reach up to 4,86 kWp.

The building permission, public procurement and the delivery of the photovoltaic panels to be installed on the top of the elementary school are planned for 2012. The planned output is 4,86 kWp (data based on the project documentation).

For the photovoltaics to be planted on the rooftops of the multi-storey houses a building permission needs to be issued. Once obtained the installation is good to go later on in 2012. According to the lighting system renewal, the whole project documentation is scheduled for 2012.

Deviations from the initial submission deadlines for certain deliverables in Annex-I and the reasons:

D2.1 - due to the results of the project documentation and return of investment (ROI) study of the initially proposed junction, it was necessary to change the route, and to come up with a new plan closer to the source. The results of this decision influence the parameters of the future reinjection well, too. (postponed to 09/2013)

D2.2 - until sorting out the issue mentioned above, all reinjection related works had been put on hold. (postponed till 09/2013)

D3.3 - due to higher budget than appreciated, the retrofitting works on the elementary school were divided into two phases. Therefore, this deliverable will be submitted after the retrofitting works will be duly realized. Detailed energy audit was carried out prior the insulation works started on the 3 multi-storey housing units at the CONCERTO area. The post-retrofitting audit is anticipated to be done no later than 09/2012.

D3.7 - **Photovoltaics**: - rescheduled due to administrative obstacles with the local electricity distributor (delivery is forecasted by 6/2013

Upgrade of lighting: - Due to high complexity of the administrative tasks of the photovoltaics and the exceeded budget of the windows replacement, this activity is planned to be realized after the retrofitting works will have been finished, no later than the end of 2013.

Replacement of the windows: - Due to higher budget than appreciated, the retrofitting works on the elementary school were divided into two phases (second phase expected to be done by 12/2012)

D3.8 - 12/2013 Due to the high complexity of the administrative tasks and inconsistencies with the local electricity distributor, the distributor's approval time have been prolonged.

CONCERTO City of Montieri

Montieri hosts the most influential and impressive measures of the GEOCOM project including a brand-new geothermal power plant along with the integrated district heating system for the CONCERTO Aree of Montieri (incorporating much of the whole community). The majority of the total investment costs (approx 8 million EUR in total) is funded by the Tuscany Regional Development Fund (via Structural Fund), while the retrofitting, system integration and connection measures are to be financed by the FP7 CONCERTO.

- On 31/03/2011 the Municipality Council of Montieri approved the modifications of the urban and district plans allowing the system realization and started the land-expropriation

procedures in order to compile the primary district to host components of the district heating network.

The nature of the planned actions as public interest justifies the application of the local law of expropriation. About the procedure: A list of the lands to be indented has been composed while all the parties involved were informed on the conditions and on the sums of their financial remuneration, all of which they had agreed on and accepted. The reimbursements had been paid earlier; the Investment Manager in charge will divide the acquired area according to the project needs which will eventually be registered at Catasto (land register facility)
The land owners had been introduced to the draft version of the relevant notary document and it was unanimously approved.

- On 12/04/2011 Soprintendenza dei Beni Culturali (Superintendence for the Protection of the Cultural Heritage) approved the execution of the work-plan. This permit was essential to obtain the bank loan from Cassa Depositi e Prestiti in order to cover the Municipality's expenses. At that time the public tender for the general management aspect of the investment was still to be announced.

  On 11/05/2011 the municipality made the public tender for the "Management of works" which was concluded, despite the delay due to the summer holidays and to some problems during the tender, Ing. Piero Ulivieri was appointed for the task.

  The winner bid had to offer the most economically advantageous solutions, with special emphasis on certain guarantees regarding the technical aspects of the construction phase In addition implementation plans had to fulfil the criterion of "minimum interference" with the village's everyday life. This latter is due to the construction works, which require temporarily the total destruction of designated roads, some of which are part of the historical centre.

- On 23/11/2011 a public tender was announced to chose the contractor, but due to the strikes that affected Italy for many days at the end of 2011 the municipality had to extend the deadline and thus the tender is forecasted to conclude in the first half of 2012. Once the deadline will be up the adjudication committee is to decide on the tenders received. The winner bidder will have 35 days to prepare for signing the contract, which is envisaged to take place sometime in June 2012 with an estimated timeframe for completion of 10 months total.
  Public tender aiming the connection of individual dwellings to the district heating network is under way and will soon be published.

WP3 Retrofitting and energy efficiency measures (Softech)

During the first year of the GEOCOM project efforts of WP3 at the Montieri demo-site were focused on research activity about the study of appropriate technologies for retrofitting local traditional architecture. The town of Montieri represents a challenging site for the integration of energy saving measures because of the architectural relevance of the medieval buildings in the historical town centre. Documents of official local urban regulation and historical maps were analyzed to assess the historical value of the edifices and to establish the level of architectural integration of new technologies allowed for different building types.

By the analysis of building elements of local architecture a showcase of technologies for energy retrofitting was defined in which the proposed technologies respect the historical value of the buildings and mainly natural insulating materials are chosen. The aim of the retrofit design is to

reduce the energy performance values required by the Italian norm on building energy efficiency in 2006 by 50%. This goal can be achieved via the implementation of different technological measures and by the connection of buildings to the local geothermal district heating system implemented by the GEOCOM project.

In the 1st technological report seven Key Technologies were described to drive the design of the building retrofit in the town centre. Each technology was studied to be well integrated into the local architecture and was evaluated both from energetic and economical point of view.
Several so called case study buildings which represent the mean typology of buildings in Montieri were chosen to virtually test the technologies, in order to assess their real potential.

The energy saving estimated (in kWh/m2a) was compared to the present cost of natural gas per m3 in Italy, to show the effectiveness of the single technology integration on the building and its payback time. Only the extra-cost of the insulation material was taken into account because the technology proposed is considered as an upgrade of the existing refurbishment plan for the building analyzed.

Suitability, required competence and the level of care for architectural integration were also estimated based on previous experience regarding retrofit technologies design.

The table below summarizes the results achieved in the studies made for the 1st technological report.

Key technology	Energy saving	Payback time	Suitability
Loft insulation	23%	1,2 years	xxx
Pitched roof insulation	22%	4-5 years	xxx
Basement ceiling insulation	4%	4 years	xxx
Ground floor insulation	5%	8 years	xx
external insulation of walls	24%	5 years	x
Internal insulation of walls	24%	4 years	xx
windows substitution	7%	7 years	xxx

Four key examples were selected to study several scenarios of retrofit solutions for different typologies of buildings. In each scenario energy performance and payback time was estimated on the basis of material costs as described for Key Technologies. Results of the preliminary evaluations demonstrated that improving energy efficiency while preserving the buildings' historical character is possible and it leads to reasonable payback times for end users.

The retrofit design of the representative buildings listed in the following table yielded encouraging consequences. The first two are under monument protection by the local authorities while the third and fourth one represent common building typologies in the village and were built with traditional materials and technologies.

The table below summarises the adopted energy efficiency measures along with the retrofit design evaluations and the results achieved for each case study building.

The adopted retrofit solutions have improved the energy efficiency performance of the buildings from class F-G to class E of the Italian energy regulation. Since the main typologies of the historical town centre are represented by the analysed buildings, the proposed retrofitting solutions can be easily adopted elsewhere too. The set of chosen technologies is oriented towards the use of natural materials aiming to reduce the environmental impact of the project. Further developments of this study will show how those measures can be extended to every building in the village and which level of energy saving can be totally reached by adopting GEOCOM energy efficiency standards and retrofitting solutions.

Case studies	Retrofit technologies	Energy performance	Payback time
Town hall (High historical value)	- Loft insulation - Internal insulation of wall toward unheated space - Internal partition at ground floor	Present state: 207 kWh/m^{2}y Retrofit design: 118 kWh/m^{2}y	4,5 years
Casa Biageschi (High historical value)	- Loft insulation - Insulation of the basement's ceiling - Windows replacement	Present state: 177 kWh/m^{2}y Retrofit design: 100 kWh/m^{2}y	5,3 years
House in Via Dogana (Medium historical value)	- Loft insulation - Insulation of the basement's ceiling - Substitution of windows - Plastering on external façades	Present state: 173 kWh/m^{2}y Retrofit design: 95 kWh/m^{2}y	2,5 years
House in via Garibaldi (Medium historical value)	- Loft insulation - Insulation of the basement's ceiling - Substitution of windows - Plastering on external façades	Present state: 177 kWh/m^{2}y Retrofit design: 100 kWh/m^{2}y	2,6 years

WP 3.4 Retrofitting and Energy Efficiency Measures at Montieri

Montieri's building estate had been constantly developing from the medieval times till the XX century but didn't expand very much during the last hundreds of years, keeping the original urban structure undisturbed and the local traditional architectural characteristics of the buildings almost intact. The link between the village and the surrounding areas has always been very strong throughout history for reasons such as economical development and management of local resources covering the needs of daily life like food and fuel for heating.

Nowadays this situation is evolved in the presence of a variety of fuel types for residential energy needs that range from firewood (gathered from private sectors of wood that still are owned by the most of local population), through the connection to LPG and methane networks (few dwellings only), to the use of gas cylinders and gas stoves. According to data collected by the municipality most dwellings use wood burning stoves for heating and LPG and methane for cooking, while hot water is mainly provided either by CH4, or electric boilers. Public buildings are connected to both natural gas and LPG networks. Moreover, according to the same database half of the private buildings are vacant or function as holiday homes, and for the rest of buildings the combination of

fuel use for different needs is hardly uniform. Thus the difficulty of defining a proper energy audit by both analysis of energy bills or reading meters of fuel consumption in dwellings is obvious.

However, there is an attempt to estimate the current energy needs of the residential sector in Montieri. Analysis of the urban estate and the definition of selected case studies representing various common building types provide solid ground for this evaluation.

Three main residential building typologies are found in Montieri:

-Isolated buildings (both tower buildings, detached or semi-detached houses)

-Low density terraced houses (small building in line, characterised by 1 or 2 contiguous walls, three floors or less and max two dwellings in the same building)

-High density terraced buildings (larger buildings characterised by one or two contiguous walls, 3-4 floors, and more than two dwellings in the same building)

Each of these typologies derives from buildings characterised by different historical value ranging from being listed by the Monumental Authority to recent ones lacking any architectural value. According to the local survey and the analysis of local urban regulations the following classification matrix was determined and several case study buildings were chosen.

Table 1 Matrix of classification of building types

Montieri's building types	**Isolated buildings**	**Low density terraced buildings**	**High density terraced buildings**
High cultural value			
Average cultural value			
Low cultural value			
Distribution of building typologies in Montieri	10%	70%	30%

Table 2 below represents the selected case study houses chosen for the assessment of the current state and retrofit design energy performances of the buildings.

Table 2 Selected case studies

Selected case studies identified by census number		
n.115 	n.274 	n.269 
n.327 	n.380 	n.350 

The present energy performance of the selected case study buildings had been software-calculated for the energy certification process tested by CTI (Comitato Termotecnico Italiano - the Italian Committee for national standardisation of energy consumption norms). Some assumptions were made to supply the lack of specific information on each building, therefore the results cannot be considered representative regarding the real energy consumption of the selected buildings.

Table 3 Assumptions for energy performance calculation

Assumptions for energy performance of buildings assessment	
Occupancy	All dwellings are considered fully occupied for the whole year, as well as contiguous buildings
Horizontal structures	To first floor, roof and last ceiling towards unheated space the same structures are repeated in all buildings
Windows	Modular size of openings and single glazing system
Natural ventilation air changes	0,3 air changes/hour
Air changes by infiltration	0,5 air changes/hour
Heating and DHW systems	To each building is attributed a central heating system fuelled by methane gas that provides both heating that DHW, the efficiency of the system is always around $\rho \cong 0{,}7\%$

The current energy performance of each case study building was estimated as shown in Table 4

Table 4. Estimated building energy performances at present state

Case studies identified by census number	Heat losses through the building envelope [kWh/y]	Heating energy demand [kWh/m^{2}y]
115	42482	361
274	57415	118
269	30153	207
327	119998	340
380	16060	166
350	16681	181

The indoor comfort of 4 dwellings in the village is being monitored since the beginning of August 2011 to understand what is the level of comfort that characterise certain local building typologies prior to their connection to the geothermal district heating network. The duration of the planned monitoring is 1 year. Living rooms of four dwellings representing various building types were chosen to be equipped by a data logger each for measuring and recording indoor temperatures, natural light and relative humidity at increments of 15 min. A 5th data logger was set up in the town hall to collect the same set of data complemented by an additional sensor to monitor the outside temperature as well.

The reason for this monitoring activity is to assess the potential effects of 1) the connection to the geothermal district heating network and 2) the retrofit actions on the indoor comfort of dwellings. The monitoring can estimate the present use of the stand-alone heating system by the homeowners in comparison to the running time of the district heating system that will be adopted for the whole municipality. Indirectly it could give an idea of energy consumption in case of dynamic simulations of each building with its heating system are made and present condition are simulated.

The energy retrofit strategy for Montieri demo-site

The first public meeting was held in Montieri in November 2011 to introduce the local population the proposed retrofitting activities funded by the soon to be published "Public call for energy retrofitting of existent buildings, within the frame of Geothermal Communities project". During the meeting attendees were informed on the technological measures to be installed and the energy efficiency requirements to comply with in order to receive the GEOCOM financial contribution, established according to EC CONCERTO standards. The proposed energy efficiency measures (tailored to reach the energy performance prescribed by national standards) were evaluated by local professionals to assess the potential difficulties encountered while installing significant thicknesses of insulation on the local old building structures.

Therefore a revision of the GEOCOM retrofit standards was filed for, and otherwise it would have been difficult for a great number of dwellers and homeowners to answer the public call. After the meeting a new strategy was defined aiming the energy retrofitting of the existing buildings in order to include the largest possible number of dwellings and to ensure the complete exploitation of the available GEOCOM funding.

The new strategy is based on the concept that on the building envelope of old local architecture only minimal retrofit intervention is suitable due to various characteristics such as the small dimensions of indoor rooms, the large thickness of masonry walls and the restrictive local urban policies regarding the preservation of the historic town centre. Since this old-type architecture characterises the main part of the affected building estate, new energy efficiency standards were set enhancing the largely feasible retrofitting actions without limiting the thermal transmittance of the retrofitted structures but requiring a minimum thickness of the insulation material of defined thermal conductivity for each key technology. This is possible because the Italian energy norm states that on buildings which are part of city centres or historic nucleuses the fulfilment of national standards is not mandatory if the measures affect their cultural value. Funding for each retrofit action are tailored to these minimum retrofit standards and for all buildings in the village. This way the selected retrofit technologies are suitable for all building types and can be widely adopted. Newer constructions, which may meet the national energy standards, are subject of the same GEOCOM funding scheme as the rest of the village, but beyond this the owners can also submit demands for national funding regarding energy refurbishment that require the complete fulfilment of the energy regulation. Such option is not available for the owners of older buildings.

As explained previously, the GEOCOM project at the Montieri demo site covers a range of retrofit interventions which can be funded at neither national nor local level. Moreover locally the choice of building retrofitting is mainly motivated by the need of replacing deteriorated building elements (such as windows, roofs, facades) rather than by the will to improve energy efficiency of the building envelopes and to reduce heating costs, due to the high availability of low cost of energy in the area.

So, promoting feasible technological solutions on one hand is useful to improve the adhesion to the project, while on the other hand this approach limits the possibility of damaging the cultural character of the local architecture by keeping the architectural quality of retrofit interventions under control, too.

To conclude, the overall energy efficiency of the retrofitting measures along with the linked CO_2 savings in the case of the selected buildings an estimated calculation have been performed based on the proposed retrofitting strategy Results of the table below represent the installation of minimum technological measures suitable for each building type.

Table 5. Energy and CO_2 savings obtained by the integration of selected key technologies on case studies

Case studies identified by census number	Key retrofit technologies	Energy savings [kWh/m^{2}y]	Energy savings [%]	CO_2 savings t CO_2/y
115	installation of thermal plaster, loft insulation, first floor insulation	165	45%	4
274	installation of thermal plaster, loft insulation, windows substitution	42	35%	4
269	loft insulation, first floor insulation, substitution of windows	61	29%	2
327	loft insulation, first floor insulation, substitution of windows	127	37%	9
380	internal insulation of walls, substitution of windows	66	40%	1
350	loft insulation, first floor insulation, substitution of windows	55	30%	1

* Pictures of the selected case studies are reported at the end of the document

The proposed technological measures are therefore able to reduce uniformly the heat losses of the building envelopes and the winter energy demand of Montieri's building stock by approximately 30 to 46%. Also they help cutting CO_2 emissions (between 1 - 9 t/year) while upgrading the dwellings' indoor comfort at the same time.

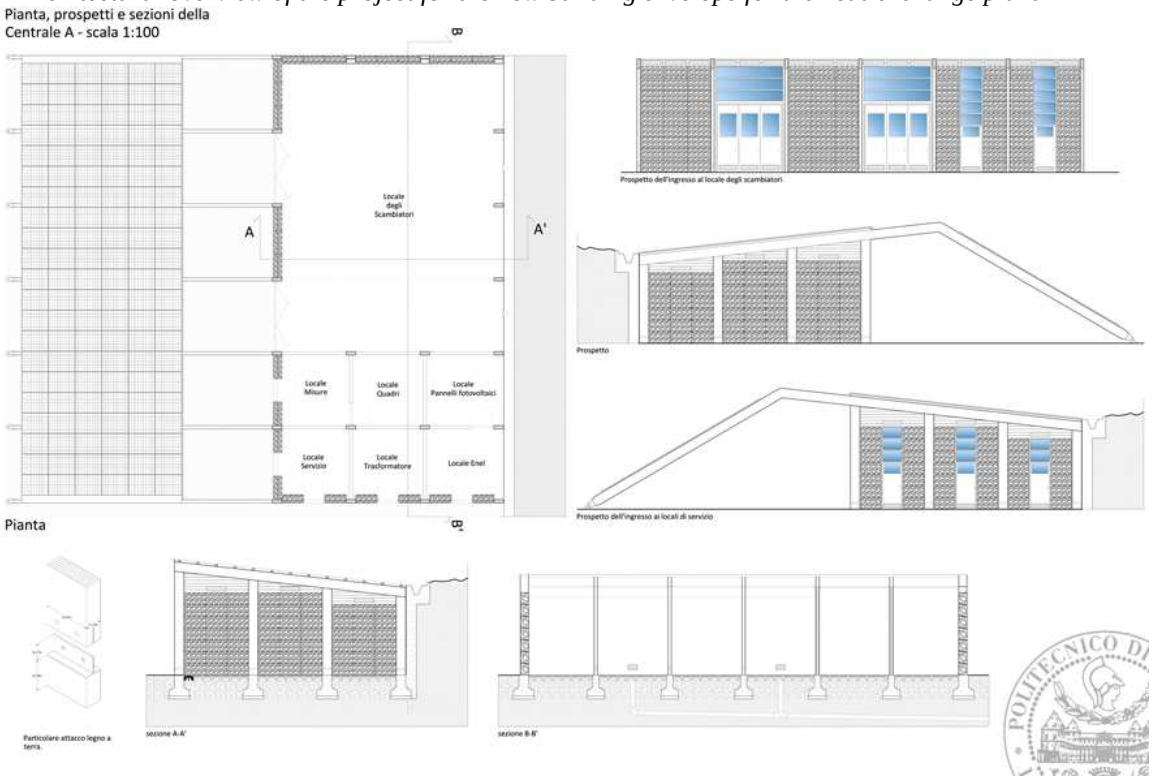
WP 4.4 Montieri's system integration

During the first year of the GEOCOM project Montieri decided to not install the readily available renewable energy technologies (such as photovoltaic panels and solar thermal collectors) on the rooftops of village's building stock in order to prevent the damage of Montieri's scenery and to keep untouched the units' original aspect.

In May 2010 attendees from the design workshop at the School of Architecture of Politecnico Torino studied an innovative building envelope which aims at a better integration of the two heat exchange plants provided for the geothermal heating network into the landscape and also hosts PV panels far from the historical town centre. During the dissemination event, held in Montieri, the group of students kept the original size and module designed for the building in the official project but reinvented the structure built of lamellar wood beams and the envelope made of stone-cages.

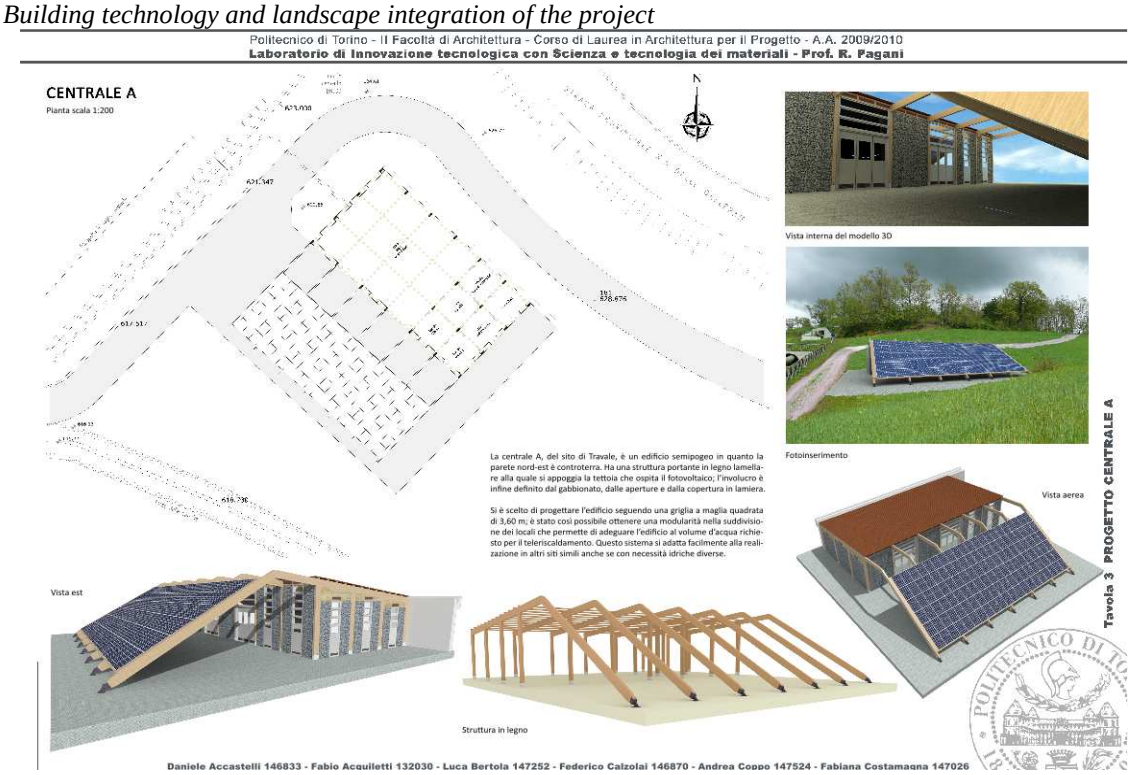
A tilted shed connects the building to the ground allowing the integration of PV modules facing the best possible orientation for maximum solar irradiation. Due to its originality and innovation, the students' project was shared with relevant municipality officials in order to enhance a control over the design of the new geothermal facilities' architectural quality. Images of the proposed project follow.

Architectural overview of the project for the new building envelope for the heat-exchange plant



In June 2011, after having finished searching for best practices in active solar system integration on existing buildings, SOFTECH proposed a preliminary project regarding the future integration of solar collectors on the rooftop of Montieri's sports facility. The solar thermal system is required to provide pre-heated water for the showers in the changing rooms throughout the whole season of soccer training and the local championship. An extract of the feasibility study of such a system is attached further below.

Building technology and landscape integration of the project



Feasibility study for the integration of solar-collectors plant in Montieri (extract)

1. Location and photographic survey of the building

The building that is part of the sport facility, located within the municipal territory of Montieri, far from the town centre, hosts changing rooms and lockers for the users of the soccer court. The building is situated on the NE side of the soccer court with SE orientation. Photographic survey confirmed that the architectural quality of the building looks poor despite it was erected in a valuable landscape.

South-east and north-east view of the building

2. Solar thermal system and hot water need

High efficiency evacuated tube collectors are chosen due to their minor seasonal efficiency reduction, even at low outdoor temperatures. The size of the water storage tank and the capacity of the power unit satisfy the hot water need even of the busiest days, when approx 2000 lt of hot water is required for the showers and sinks. The water storage system will contain two water tanks of 1000 lt each, connected to both solar thermal source and back up water heater fed by lpg.

Table 1 Hot water need [lt]

	Number of users	lt/person	Total of liters
Training	20	50	1000
Game	40	50	2000

3. System design

Two options were designed and assessed in order to define the best combination of architectural integration and system efficiency.

Tale 5. Position of the two solutions of solar thermal systems

Solar thermal collector	Orientation (azimuth angle)	Tilt
Option 1	20°	45°
Option 2	- (horizontal)	0° (horizontal)

The first option allows exploiting sun irradiation all over the year but the architectural integration of solar collectors is not taken into account.

Option 2 fulfils completely the architectural integration of the plant on the roof of the building however in winter time the collected solar radiation is low while during the summer days is too much totalling a high risk of system efficiency reduction for the whole year.

Plant size in both cases has been designed to meet at least 40% of the overall energy required to produce hot water in every month. This lead to an extra solar energy output during summer months which is more relevant in Option 2.

Option 1: 10 m^2 of solar collectors placed on a tilted structure, as indicated in Table 5. The amount of energy need met by the plant is never lower than 50% regardless of the month.

***Table 6**. Option 1: Energy production and monthly coverage of hot water need*

	Solar irradiation [kWh/m^2 d]	solar collector efficiency [%]	area [m^2]	kWh/day	kWh/month	monthly need [kWh]	coverage [%]	CO_2 savings [$kgCO_2$]
Jan	2.32	0.82	10	19.05	590	977	60	127
Feb	3.11	0.82	10	25.53	715	977	73	153
Mar	4.59	0.82	10	37.68	1168	977	120	251
Apr	4.75	0.82	10	39.00	1170	977	120	251
May	5.36	0.82	10	44.01	1364	977	140	293
Jun	-	-	-	-	-	-	-	-
Jul	-	-	-	-	-	-	-	-
Aug	5.24	0.82	10	43.02	1334	977	136	286
Sep	4.68	0.82	10	38.42	1153	977	118	247
Oct	3.34	0.82	10	27.42	850	977	87	183
Nov	2.38	0.82	10	19.54	586	977	60	126
Dec	2.02	0.82	10	16.58	514	977	53	110

Option 2:14 m^2 of solar collectors to be installed as indicated on Table 5. The lowest coverage of hot water need during winter time is 43% (in December) but in the summer production levels are too high which require additional volumes of water to prevent overheating of the plant in case this layout to be used.

***Table 7** Option 2: Energy production and monthly coverage of hot water need*

	Solar irradiation [kWh/m^2 d]	solar collector efficiency [%]	area [m^2]	kWh/day	kWh/month	monthly need	coverage [%]	CO_2 savings [$kgCO_2$]
Jan	1.38	0.82	14	15.86	492	977	50	106
Feb	2.22	0.82	14	25.52	714	977	73	153
Mar	3.71	0.82	14	42.64	1322	977	135	284
Apr	4.48	0.82	14	51.49	1545	977	158	332
May	5.77	0.82	14	66.32	2056	977	210	441
Jun	-	-	-	-	-	-	-	-
Jul	-	-	-	-	-	-	-	-
Aug	5.16	0.82	14	59.31	1838	977	188	395
Sep	4.11	0.82	14	47.24	1417	977	145	304
Oct	2.56	0.82	14	29.42	912	977	94	196
Nov	1.54	0.82	14	17.70	531	977	54	114
Dec	1.18	0.82	14	13.56	420	977	43	90

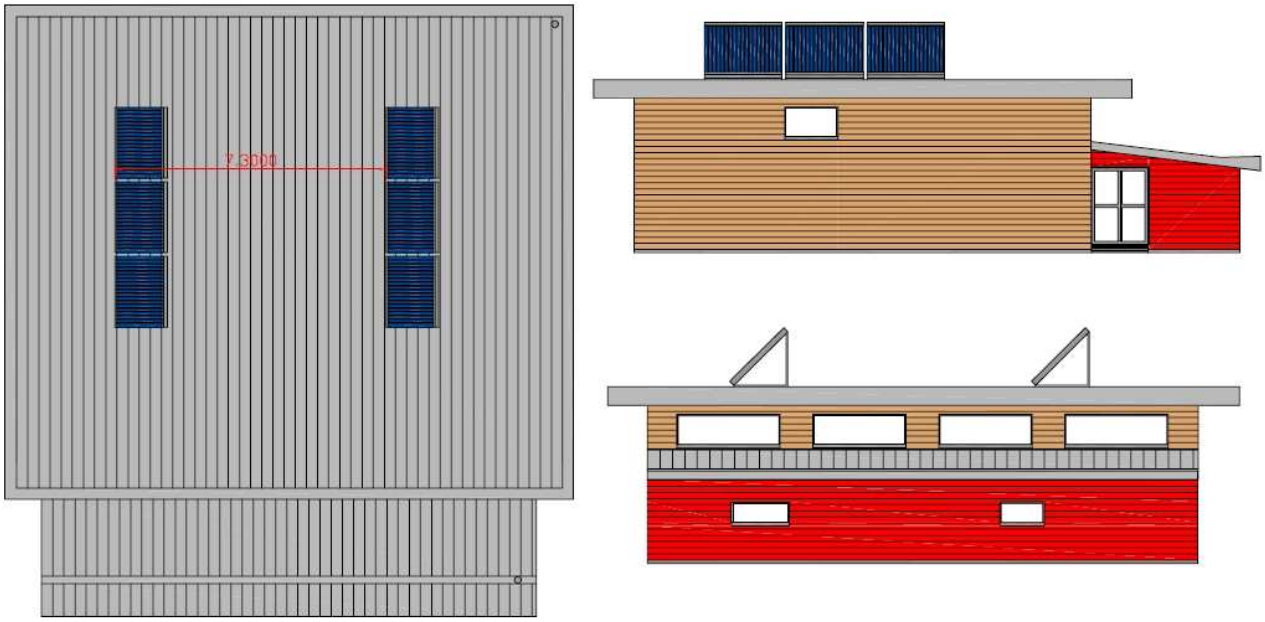
Option 1 is more effective from a cost/efficiency point of view but the second one the architectural integration is preferable, the choice of design had therefore been left to the municipality of Montieri. The Option 1 would save every year 2 t CO_2 while Option 2 would result 2,4 t of CO_2 savings.

4. Building refurbishment

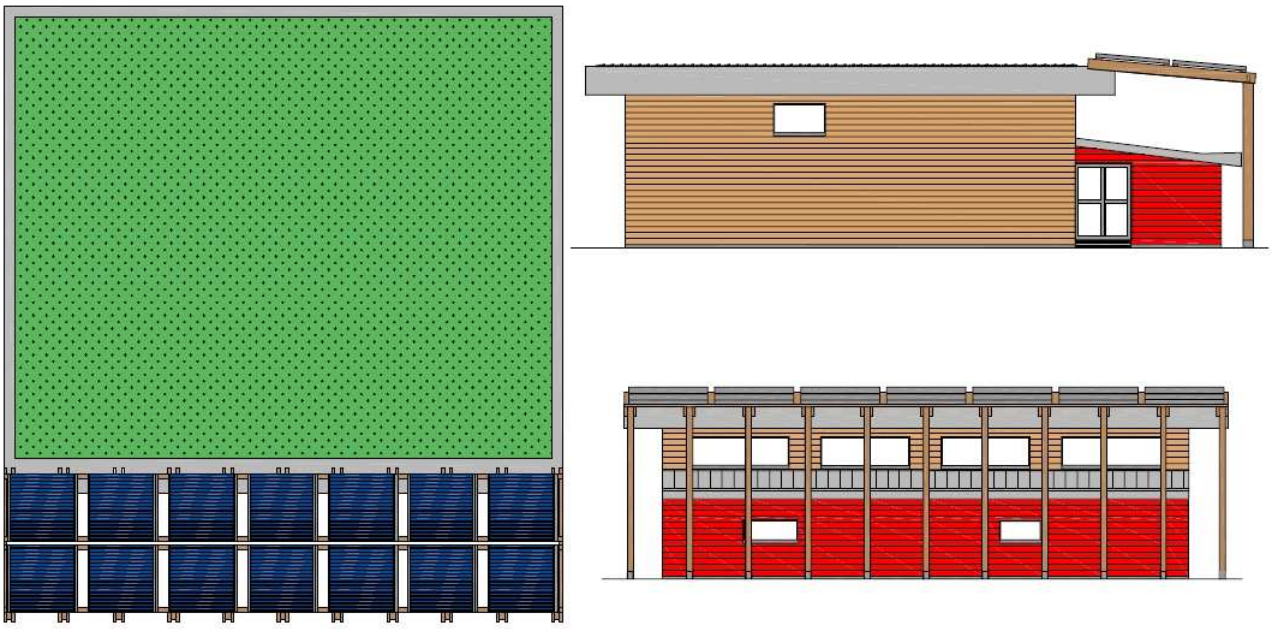
Renovation of the building envelope was proposed in order to improve the construction's architectural quality and its impact on the landscape, since it is located in a valuable natural environment. The use of wood for a ventilated facade, painted in red in the front volume of the building have been suggested. Rheinzink-like metal sheets to cover the roof in Option 1, while the second one offers the installation of green roof to avoid summer overheating. The two solutions of the solar thermal plant require two different architectural integration approaches:

- **Option 1:** solar collectors are installed on the existent roof supported by a 45°- tilted metal structure
- **Option 2:** solar collectors to be installed horizontally on a lamellar "beams and pillars" structure which overhangs the SE elevation.

The following images sketch up the proposed design solutions



Option 1:. Roof top view, south-east elevation and south elevation



Option 2: Green roof top view and location of solar collectors on lamellar wood overhanging structure, south-east elevation, north-west elevation

Deviations from the initial submission deadlines for certain deliverables in Annex-I and the reasons:

D3.4 Proper energy audit of the buildings through installation of monitoring devices or by reading energy bills with the objective of assessing the present average primary energy consumption have not been done because most of the buildings use wood stoves and fireplaces or independent heating systems fed by stand-alone gas cylinders. Moreover the current energy performance of the selected case study buildings has been calculated by software for the energy certification of buildings tested by CTI (the Italian Committee for national standardisation of norms on energy use). Some assumptions were made to supply lack of specific information on each building; therefore the results cannot be considered representative of the real energy consumption of the case study buildings.

In addition many of these buildings don't have a heating system installed uniformly in each dwelling. The only measuring tools installed up to now are some data-loggers located in 5 selected dwellings that are monitoring the parameters of indoor temperature, humidity and natural light in order to assess the indoor comfort of dwellings before the connection of buildings to district heating network. The monitoring started in August 2011 and it has a planned duration of 1 year.

The same data could be useful to indirectly measure the improvement of energy efficiency of heating system by the difference in indoor temperature before and after the connection of the buildings to the district heating network.

D3.1 The original energy retrofitting strategy for the Montieri demo site have been revised in order to plan a set of retrofitting measures that could largely be adopted by homeowners of the village. This new version of the strategy allows a wider application of CONCERTO Geothermal Communities' energy efficiency measures integrated with the connection to the geothermal district heating network, otherwise too restrictive for local historical architecture.

The change of the CONCERTO area at the Mórahalom demo-site has caused a delay in the collection of information needed to select appropriate retrofit technologies fulfilling the D 3.1 report.

Finally a wider study about Galanta's building typologies is required in order to provide a broader and more effective documentation on cost-effective retrofitting measures adaptable to different building types and useful for further retrofitting actions on eastern European towns.

3.2.2.3. WP5 – Technological Research

Leading Partner – P9 University of Szeged; main contributor: P1 – Geonardo, P5- PAS-MEERI

The main objectives of this research WP were identified in the previous chapter. The list of activities carried out within the bounds of the 2nd reporting period are specified below broken down to their relevant sub WPs.

WP5.1 – Integration with other RES
Activities started in 2010 continued with emphasis on the integration aspects of renewable energy use. This year we carried out the large scale GIS based comparison of biomass, solar, wind and geothermal potential of the target areas.

WP5.2 – Trans-boundary issues of the utilization of geothermal energy
We simulated a set of various outcomes ranging between best-case and worst-case scenarios of water outtake and recharge along the border area between Hungary and Serbia. We completed the planning of the monitoring system and outlined a structure based on 6 monitoring wells.

WP5.3 – Reinjection monitoring and modelling
We now possess the time-line data of water outtake and gas content of the majority of wells in the South Great Plain Region and carried out test measurements at 2 operating systems. We modeled and defined the optimal vertical and horizontal placement of production and injection wells.

WP5.4 – Integrated utilization of waste gases of thermal wells
Gas content data of all wells in the Szentes System have become available during 2011, and the completion of the database is in progress regarding the South Great Plain Region. The minimal gas content needed for an economically viable operation have been modelled and defined

The final versions of the relevant deliverables include a more detailed description of the briefly discussed issues of RES integration and are fully-fledged and ready to be submitted over the course of the oncoming months. Unforeseen complications related to acquiring crucial information from various foreign authorities as well as the inconsistent nature of received data resulted a substantial delay in the submission of the research deliverables D5.1 and **D5.2**. The submitted draft version of **D5.1** is subject of constant improvement as bits of data become available. Researchers currently work on a geothermal-water yielding capacity base map, based on a wide range of geophysical parameters (heat flux, GJ-capacity etc) to present the spatial distribution potential of various renewable energy sources combined with geothermal.
Delivering **D5.3** is also hindered by the extra work needed to smooth out incompatibilities of the acquired international geological and geophysical databases in order to compile a uniform model.

D5.4 is running slightly behind schedule due to the late realization of the source well, completed just recently, thus geophysical data obtained from that well have just started to be analyzed. All WP5 related deliverables are predicted to be submitted no later than M30.

3.2.2.4. WP6 – Socio-Economic Research

WP Leader – P5 PAS MEERI; main contributors: P1 – Geonardo, P9 University of Szeged, and DEMO CITIES representatives

As mentioned earlier in this report, WP6 activities are planned for the M25-48 of the project, thus no specific work package objectives were carried out for the reported period (as included in Annex I to the Grant Agreement), however some preliminary research commenced in 2010 continued at the demo sites during the reporting period..
However, following the study site visits in particular pilot sites (Galanta, Morahalom, Montieri) as well as discussions and common partners' decision taken during the First Interim meeting in Italy, June 2010, PAS-MEERI team – together with the concerned parties - prepared an additional Preliminary Questionnaire on socio-economic approach to RES and RUE (WP-6) measures before the start of the GEOCOM investment activities in demonstration sites (Galanta, Montieri, Morahalom).

It is expected that throughout project duration some evolution and changes in individual approaches shift therefore such a preliminary background is necessary for any comparisons, evaluations and descriptions of changes among local communities in social acceptance and growth of knowledge and awareness related to RES and RUE. These issues are of paramount importance for the GEOCOM objectives, WP-6 in particular.

In 2011 MEERI PAS continued the works on preliminary questionnaire survey on *"Public perception and understanding of RUE measures (pilot-site case studies)"* for the Galanta, Montieri and Morahalom pilot sites. The works initiated in 2010 were done in cooperation with project partners 11 (Municipality of Galanta), 2 (Softech Energia Tecnologia Ambiente), 12 (Municipality of Montieri), 9 (University of Szeged) and 10 (Municipality of Morahalom).
The Preliminary Questionnaire contained key questions and issues addressing some future beneficiaries of retrofitting and other RES installations planned in frame of GEOCOM in communities of Galanta, Morahalom and Montieri. The aim was to gain a general background and some orientation on local inhabitants – future beneficiaries' attitudes, state of knowledge on RES and RUE before start of investment works and before they would experience their positive results.

The issues and questions covered by the Preliminary Questionnaire were elaborated in cooperation with the GEOCOM partners from all three demonstration sites in order to make this questionnaire properly tailored to the specifics of each addressed site and to assure that it paints a true picture and brings representative answers.

In particular, in 2011 the questionnaire surveys were done for Galanta and Montieri (translation of questionnaires into national languages, selection and contacting potential respondents, municipal administrations, distributing and collecting back the questionnaires, translation them into English, brief summarizing by a local GEOCOM partner involved in this work). Next these raw data were sent to PAS MEERI for further general statistical elaboration, summary and concluding planned in the forthcoming period of WP6 and project duration. The sets of Questionnaires filled in by

individual respondents from Morahalom and Galanta pilot sites are given in attachments 1 and 2, respectively.

In case of Morahalom pilot site the questionnaire survey itself was done in fall 2010 while in 2011 a general statistical elaboration and summary was conducted by PAS MEERI. Some 50 respondents took part in this survey. The presentation of main results and some basic conclusions referring to the survey in Morahalom are given in attachment 3.
Further elaboration of data collected from Galanta and Montieri, as well as common analysis and interpretation for three sites in question are planned to be continued in the forthcoming period of project duration.

The experience, information and results of the preliminary questionnaire will help to prepare in proper and optimal ways the basic questionnaire surveys and other activities envisaged by WP6 (to start in 25th month of the project).

The above work Preliminary Questionnaire on socio-economic approach to RES and RUE (WP-6) meets the scope and objectives of socio-economic research *WP6.1 Public perception of geothermal energy* and contributes to achieve better progress towards WP6 objectives and details, as well as a sounder *D6.1. Study on public perception of geothermal energy* (delivery date month 34th).

The partners have found such a Preliminary Questionnaire as a useful and necessary tool starting much earlier than in M24 as originally envisaged in WP6).

The additional works on Preliminary Questionnaire did not cause any deviations between actual and planned person-months per work package and per beneficiary in Annex 1 (Description of Work);

Partner dissemination activities included:
- Distribution of GEOCOM brochure during some meetings and conferences dedicated to RES and RUE measures on a national level in Poland,

- Presentation of GEOCOM project assumptions and pilot sites as good examples of RES and RUE management to representatives of some local self-governments, students' groups, etc.,

- Preparation and publishing the paper on „*Increasing the effectiveness of geothermal energy use in integration with other RES – the EU project "Geothermal communities, GEOCOM*" (authors: A. Kasztelewicz, W. Bujakowski, G. Holojuch, B. Kepinska, L. Pajak, B. Tomaszewska) in periodical "Technika Poszukiwan Geologicznych. Geotermia i Zrownowazony Rozwoj" (Geological Exploration. Geothermics and Sustainable Development"), No. 1-2/2011 (in Polish, English abstract),

- Presentation „*Increasing the effectiveness of geothermal energy use in integration with other RES – the EU project "Geothermal communities, GEOCOM*" (authors: A. Kasztelewicz, W. Bujakowski, G. Holojuch, B. Kepinska, L. Pajak, B. Tomaszewska) at the III Polish Geothermal Congress, Ladek – Zdroj, 26 – 28 September 2011 (poster session).

3.2.2.5. WP7 – Monitoring

WP-Leader: P4-SIEA; Key contributors: P1, P8, P10, P11, P12, P17

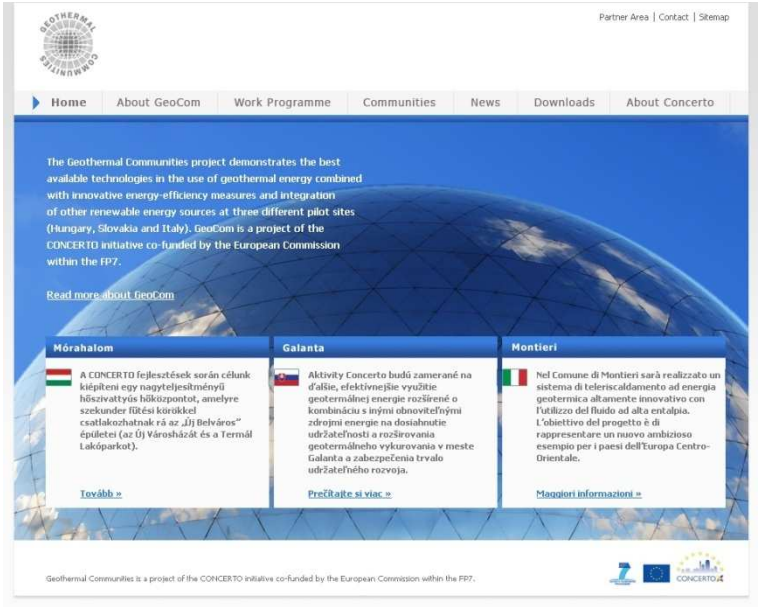
In April 2011 (during the 2nd Interim meeting in Kocani/ Macedonia), SIEA has informed partners that draft Methodology for monitoring and evaluation of energy consumption in block of flats is worked out. The document was sent to all interested partners for feedback, in May. SIEA asked for all monitoring data from all demo-sites, too. Since June there has been several meetings regarding the monitoring; we met with our colleagues from the Department of education, legislation and methodology of SIEA, which have very good experiences and knowledge in this field, and discussed the options for the on-line monitoring. SIEA also met with lead partner to inform him about planned activities. The partners agreed that in order to build an efficient and useful monitoring system for three demonstration sites, detailed discussion and planning of the system is needed already in 2011 taking into account the specific and unique needs of each site. Visit of demo-site in Galanta took place at the end of July. We had an opportunity to discuss ways of collecting data and see the current situation of monitoring data (number and type of measuring equipments, location etc.) in the individual buildings (apartment blocks, elementary school, geothermal system). In August, SIEA met with representatives of ESM-Yzamer in Trnava - the company for energy services and monitoring, which proposed a monitoring system for collecting and archiving data, including the measuring devices which should be added / bought or to replace existing ones. Partners agreed that the visits of other demo-sites (in Montieri and Morahalom) will take place next year (in 2012).

3.2.2.6. WP8 – Dissemination

WP leader – P1 GEONARDO, contributors – all partners

WP8.1 - Website:

www.geothermalcommunities.eu



New design and minor structural changes have been applied on the project's official website providing the proper outlook expected from such a high-profile project. Ever since its launch, the GEOCOM website has been providing information about the structure of the consortium, the project's research objectives (WP5/WP6/WP7), the description of the pilot sites (translated to Hungarian, Italian and Slovakian as well) and the associated cities. It is the main instrument to keep consortium and non-consortium members aware on the latest news related to the project as well as it functions as the primary source of public deliverables such as project brochures, posters etc. The website also serves as an instrument to keep partners in permanent contact, a separate part of the website is updated regularly (accessible for Consortium Members only by exclusive passwords) and ensures that in addition to the core services adequate links are established to latest relevant results. It is regularly updated with reports/minutes of meetings (accessible only to partners).

WP8.2 Common Dissemination Activities

General dissemination of information about the project, its objectives, the approaches and expected results have been carried out by all partners at numerous occasions via presentations, publications, news articles and company newsletters, etc. in order to improve the market for development of geothermal energy and integrated geothermal RES&RUE projects in EU countries.

A list of all related dissemination activities are given below.

GALANTA

Dissemination in Galanta was carried out by articles published in the monthly journal of the municipality in Slovak and Hungarian languages. Beside this activity, a section of the project was created at the website of the municipality (www.galanta.sk) to inform about the project and its results.

A new article in the local monthly journal is planned to be published in Slovak and Hungarian languages, informing about the project's progress in 2011 and the plans for 2012. The section of the project at the website of the municipality will also be updated by the latest results.

MONTIERI

The Municipality of Montieri, in cooperation with the other Italian partners, has carried out intensive dissemination activities with the purpose to involve and to inform the inhabitants about the GEOCOM project. In particular, our goals were to explain what the GEOCOM project is all about and inform inhabitants on the planned activities of the relevant partners within the limits of the village. The state of the art of the district heating network were discussed and the advantages while using it. Also the public tender on the work management and on the contractor has been disseminated. The second interim meeting held in Skopje was also talked about in details.

In November, we organized a meeting in Montieri for locals, surveyors, engineers, architects, and workers. The aim was to update them on the retrofit public tender, on the available technologies that can be applied and on the mode of their participation.

All documents about dissemination are available directly on the project website.

Beside the research activity the first attempt to involve local population in WP3 of the GEOCOM project was made through a design workshop held in Montieri in May 2010.

During the academic year of 2009-2010 a group of students of the 3rd year of the 2nd Faculty of Architecture of Politecnico di Torino were invited to think about viable technological solutions helping to achieve the set project objectives in Montieri. They closely studied the buildings taken as case studies and shared their conclusions with the local population and with the council.

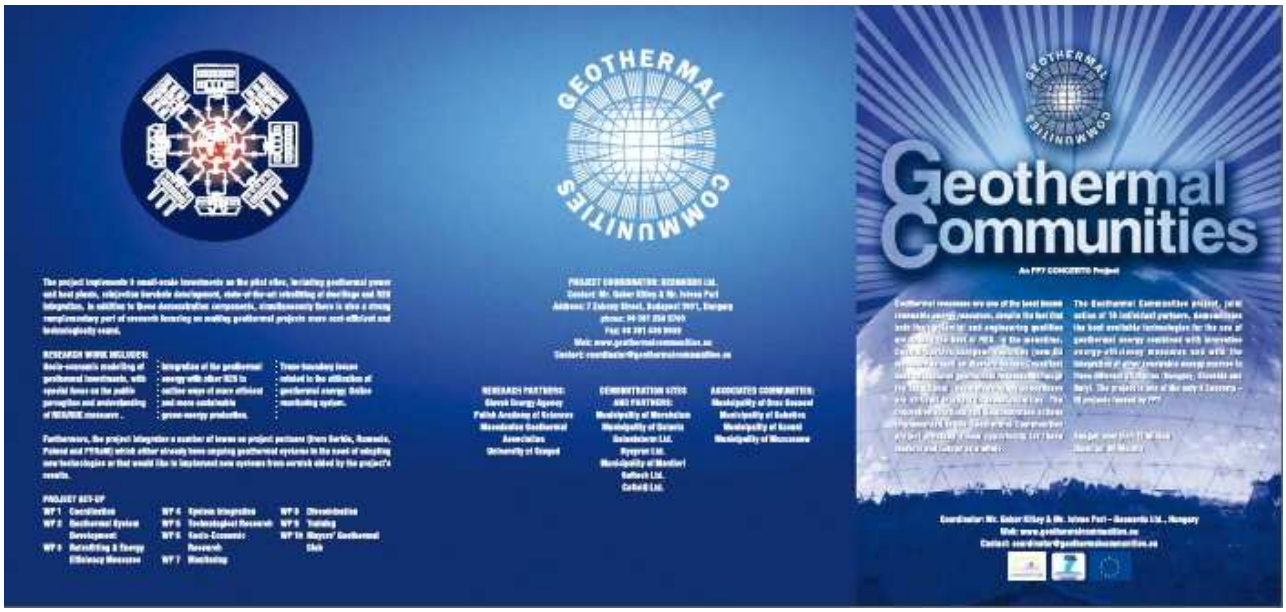
A group of students chose to analyse the buildings of the two heat exchange plants required to bring the geothermal energy from the nearest heat extraction point (Travale) to Montieri. They presented an innovative building envelope which can be easily integrated into the landscape. All other students focused their attention on the public and private building stock of the town centre.Each group summed up their results on a poster and an exhibition was set up in Montieri's main square, Piazza Gramsci. The objective was to involve local population on the event to raise awareness among them on energy efficiency issues and the possible feasible solutions to face them, within the frame of CONCERTO GEOCOM project. Quite a number of people visited the one-day exhibition and there were significant inquiry on the various possibilities regarding the retrofit possibilities to be applied on the buildings of the city centre. The event raised awareness among the population especially on the building retrofit aspect of the GEOCOM project and gave them the opportunity to see preliminary studies and possible solutions to energy performance issues.

MORAHALOM

A networking event introducing the project's objectives and results was held in Budapest in mid-June 2011. Organized by the Coordinator, almost 30 mayors and high level municipal representatives were presented at this half-day workshop. After the introduction of the project's general targets and the potential of the geothermal resources, round-table discussion was held in order to discuss the future possibilities of Hungarian municipalities similar to Morahalom.

D8.3 Brochure #2

The second brochure (ready in M23 – November 2011) contains the overall aim of the project, introduces the consortium (list of participants) and the demonstration activities planned in three demonstration sites. It was updated with the achievements of the project performed mainly in the reporting period as well as including the successful retrofitting works at the multi-storey housing units at the Galanta demo-site. Its translation is still in progress. The Italian, Slovakian and Macedonian copies are available for download not only at the project's, but the relevant partner's website as well. The Hungarian, Romanian, Serbian and Polish versions are still to come. Having found the initial number of 2000 printed copies excessive, the second brochure have been printed only in the limited number of 200 in English mainly to be distributed at the various high profile events (such as the EC's Innovation Convention in Brussels, or the GeoTHERM Conference in Offenburg , Germany) in late 2011 and March 2012 respectively.



D8.3 Newsletter #2

The second newsletter has not been compiled by the end of the reporting period but it is envisaged to present the latest features of the project sometime in the first half of 2012 by distributing the second newsletter. Though major investment components are still to be realized, there are several topics, such as the amendment of the GA which is worth mentioning in the upcoming issue.

WP8.3 Presentation and participation at high-profile events

- The Coordinator (P1 Geonardo) presented GEOCOM at the European Commission's first **Innovation Convention** held in Brussels on 5-6th December 2011. Our project was selected from among 450 applications and was **one of the 50 projects** on display in the exhibition area. It was also featured as the sole representative of the CONCERTO initiative. The GEOCOM stand was located at the "Reliable, clean, efficient energy" theme of the Research and Innovation Projects section. Several posters, leaflets and brochures were distributed, and many bi-lateral meetings with research and industry representatives were held.

The GEOCOM stand was located at the Reliable, clean, efficient energy theme of the *Research and Innovation Projects* section at the IC 2011

Mr. Kitley (CEO, Geonardo) briefed a number of journalists about the project's goals.

Mr. Pari (GEOCOM Coordinator) on the official IC photo.

- GEOCOM was presented in Milan at **the GeoPower 2011** conference on the 6-7th December 2011. Mr. Kitley represented the Coordinator at this event where leading companies of the geothermal industry were informed about the project results, and many municipal representatives all over Europe were met. Copies of the updated brochure were distributed among the interested parties.

GeoPower Europe Green Power conferences

- National Press and Media releases from each partner within its country have been carried out. For the detailed list please refer to the table below.

3.2.3 Project management during the period

GEOCOM implemented an efficient and reliable internal management system during the first period of the project. The activities in the 2nd period followed this best practice, and were strictly in line with the Grant Agreement and with the Consortium Agreement (submitted in February 2010 as deliverable D1.1). In principle the project has been completed the following way:

The Coordinator's responsibilities:

- Monitoring progress. Encompassing general coordination activities, devoted to keeping the project on track and on schedule, and the exploitation related activities.
- Collection and review financial and technical reports from all partners. Each team has been directing their own work, but discussed all administrative and technical aspects with the Coordinator. Individual financial reports have been the responsibility of the administrator of each partner, but for the overall management the Coordinator has been in charge.
- The first instalment (received in late August 2011) from the Commission had been forwarded to the partners without delay according to the rules laid down in the FP7 Grant Agreement and in the Consortium Agreement.
- Organization of the theoretical aspects related to the objectives of the particular Work Packages and of the project as a whole.
- Supervising the information provided to the partners through the website. The website serves as the main platform of the project, but it is also an instrument to keep partners in permanent contact.

All Work-Packages except WP9 and WP10 were active during the reporting period. WP managers have been selected based on their past experiences with the management/coordination of EC initiatives at a similar scale. They have been responsible for the technical/administrative co-ordination of the work within the assigned work package and also responsible for all the specific WP results being available on time.

The Steering Committee has continuously monitored the project's progress, defined project standards and agreed on project policies. This period of the project did not see any event that would have required the intervention of the Steering Committee.

The GA Amendment Procedure - unit-scale flat-rates

In February 2011 the Project Officer informed us that legal unit of DG ENER wishes to amend GEOCOM's GA, since - due to technical and legal issues - the unit-scale flat-rates table of ANNEX D was left out from the GA. The coordinator had a phone-meeting with the PO where we agreed to start this amendment procedure once the first period report is accepted and the payment arrived.

Another meeting was held in Brussels, at the PO's office in November 2011, where Mr. Kitley of Geonardo and the officers (Mr. de Royer-Dupré and Mr. Vitucci) agreed to start the amendment process, in which we shall include the unit-scale flat-rates into the GA, as ANNEX D. The NEF was opened mid-December.

Due to some technical problems, the updated DoW and GPFs were submitted only end of January 2012. The official request to approve the amendments was sent to the Head of Unit. At the moment, we are still waiting for the Commission's final approval.

Meetings and Communication

The communication between the consortium members has been excellent with regular updates and communications via e-mail, Skype, telephone, and personal meetings during the various (joint) events. One project meeting took place during the reporting period where all consortium members were represented (except for the Municipality of Oras Sacueni):

- **27-28 April 2011, Skopje and Kocani, (FYRoM)**. *Second Interim Meeting* and site visits to Kocani Representatives of the CONCERTO Premium initiative as well as most of the project partners' key personnel were present. The meeting was organized by the Macedonian Geothermal Association (MAGA, P7) and all eligible costs (excluding the partners' related travel and accommodation costs) were paid by the lead partner. The agenda of the meeting and the minutes of the meeting are published on the project website
- February 2011 - Brussels - Bilateral meeting with the newly appointed project officer Mr. Sylvain de Royer-Dupré, introducing the projects, its results so far and discussing the special reporting requirements
- 20th June 2011 - Brussels - Bilateral meeting with the financial officer Mr. Michel Vitucci to discuss the problems about the financial report. At the end of this meeting the suspension on the 1st interim payment was lifted.
- 14-15th November 2011 - Brussels - CONCERTO Coordinators meeting. Introduction of GEOCOM, discussion of experiences so far, meeting with all CONCERTO projects' coordinators. In the afternoon a bilateral meeting with the PO and the FO was held at the DG ENER (topic - unit-scale flat-rates)
- 5-6th December 2011 - Brussels - Innovation Convention (see WP8 description)
- 6th-7th December 2011 - Milan - GeoPower 2011 (see WP8 description)
- *Several bi- and tri-lateral meetings* were held between the Demo-site representatives and the project's EO staff during the first year of the project.
- ***There are two meetings scheduled for 2012. The third interim meeting is scheduled on 29-31st May 2012, in Budapest, Hungary. The following general meeting will be hosted by the Municipality of Montieri during the fall 2012. It will focus on the newly constructed geothermal district heating network expected to be delivered by the end of the third quarter of the year.***

Overall status of project management: the project has been on track with minor delays of initially set targets and deliverables related to these targets. The partner performance and commitment have exceeded all expectations. The consortium did not experience any problems concerning project management and implementation and no changes occurred in partnership or partner status during the reporting period.

3.3 Deliverables and milestones tables

TABLE 1. DELIVERABLES DATED FOR THE REPORTING PERIOD #2

Del. no.	Deliverable name	Version	WP no.	Lead beneficiary	Nature	Dissemination level[5]	Delivery date from Annex I (proj month)	Actual / Forecast delivery date	Status	Contractual	Comments
D1.3.	Minutes of the Project Meeting #2	Final	1	P1	R	PP	14		Submitted	Yes	Submitted in February 2010
D1.7	Progress reports, financial reports #1	Final	1	P1	R	PP	14	14	Submitted		
D2.3.	Pipe line & junction Galanta	N/A	2	P6	D	PP	12		Not submitted	Yes	Contract modification, refer to the amended DOW
D3.3	Detailed energy audit for Galanta's CONCERTO Area Buildings	N/A	3	P11	R	PP	18	29	Submitted		Draft version
D4.1	Systems Integration Strategies		4	P1	R	PP	24	29	Submitted		Submitted in May 2012
D8.1.	Website	N/A	8	P1	O	PU	3	1	Available	YES	Frequently updated
D8.3.	Brochure #2	Final	8	P1	O	PU	18	23	Submitted	YES	
D8.3.	Newsletter #1	N/A	8	P1	O	PU	3	16	Submitted	YES	Joint issue, submitted in 04/2011

Milestones

TABLE 2. MILESTONES FOR THE REPORTING PERIOD #2							
Milestone no.	**Milestone name**	**Work package no**	**Lead beneficiary**	**Delivery date from Annex I**	**Achieved Yes/No**	**Actual / Forecast achievement date**	**Comments**
M2	Second Progress Meeting	1,2,3,4,5,8	P1 (Hosts: P7/15)	M 13 (January 2011.)	Yes	27-28 April 2011. (M16)	Second interim .meeting to be held in M16 at Kocani, FYROM. Detailed Implementation Plans for the three demonstration sites were approved

3.4 Explanation of the use of the resources

All costs reported by the partners to the project were needed for the implementation of the activities of the 2nd period. The Coordinator established an efficient and transparent financial reporting system at the kick-off meeting of the project, where all partners were trained to the special accounting criteria of the FP7. Frequent updates on the financial rules were communicated internally. Though the Consortium consist of many partners from all over Europe, some of them from new member states, many never participated in any Community Programs, all of them understood the reporting requirement and the requested proofs of costs.

The GA amendment procedure of including the unit-scale flat-rates (Annex D) into the project has not finished yet. There was no official communication from the EC that it has been legally approved. Therefore, the Beneficiaries opting to use it in the project had decided to report the ACTUAL DIRECT COSTS OF THE DEMO ACTIVITIES, instead of the flat-rates. Once the GA amendment will officially be approved by the EC, the particular entities will adjust their relevant Form Cs accordingly.

The Coordinator hereby declares, that all direct costs reported in the Form Cs of GEOCOM Year 2 are actual costs, no flat-rates of unit-scale was used yet!.

The first instalment arrived to the Coordinator's bank account in late August 2011, then was forwarded to all concerned parties within the period set by the CA

During the second year of the project the main cost items at each partners were the following:

- Personnel costs (based on time-sheets and actual salaries) related to WP1, WP2/3/4, WP5/6 and WP8
- Travel costs to project meetings (2nd interim meeting in Skopje and several bi- and tri-lateral meetings, and to relevant conferences, meetings
- Other costs – dissemination, printing of general and local publications, webpage development, etc.
- Other costs – participation fee at certain conferences and events
- Subcontracting – costs related to the retrofitting actions at Galanta, and to the preparatory works (planning, audits, etc) at Morahalom and at Montieri

Some of the partners (mainly the associated cities bodies) decided to cover their personnel costs fully from their own budget and not charging it to the project due to administrative issues. The Coordinator discussed these issues with all relevant partners in details and finally accepted their standpoint at this.

Partner 13 - Municipality of Ores Sacueni charged no costs at all to Period 2, due to leck of activities and internal financial managerial issues. The Coordinator was informed on this, and P13 understood the consequences of not charging costs to the project

The exchange rates published by the ECB (www.ecb.eu) of the first day following the end of the reporting period for each Beneficiary outside the Euro-zone was used. The spending rate of the project is in line with the workplan and with the budget foreseen in description of work (DoW). All costs reported by the beneficiaries were needed and justified in reports to achieve the project's objectives. At this point there were no ***budget reallocations*** at partners' level or at project level

ANNEXES

D1.3 Minutes of the meeting #2 – final version
D3.1 Technology Showcase for Retrofitting - Final Version
D3.3 Detailed energy audit for Galanta's CONCERTO area – draft version
D4.1 System integration strategies – final version

Preliminary Questionnaire, 2010 – 2011 General preliminary results – the case of Morahalom pilot site

GEOCOM_dissemination_activity_table 2011