Stairway to Excellence
Cohesion Policy and the Synergies with the Research and Innovation Funds

Example of Synergies

Integrated energy system of the city Mórahalom

Hungary

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Executive Summary

The Local Government of Mórahalom Region launched in 2007 a feasibility study for the exploitation of geothermal energy produced from a geothermal public utility system. The feasibility study, the construction plans and the preliminary environmental impact assessment were finalized in October 2007 with the support of INTERREG IIIA programme. The objective of the project was to build a demonstrator to further develop the first Hungarian-Serbian cross-border water base and production monitoring system. Building on the results of the study, financed from Structural Funds, the construction and operation of the geothermal cascade system of Mórahalom have been realized. As a result of the project activities, the proportion of renewable energy in the energy utilization of public institutions increased from 0% to 80%.

The idea of the FP proposal lied on the novelties of the infrastructure built from Structural Funds focusing on demonstration activities complemented by applied research tasks on (1) the technological background of the geothermal resources including system optimisation and system integration; (2) and also on the socio-economic aspects of the current and future investments. The case study represents an upstream sequential funding where Structural Funds investments enabled FP7 participation.

Type of synergies
- Upstream activities
- Sequential funding

S&T field targeted by the synergies
- Energy, environment

The views expressed are purely those of the author and may not in any circumstances be regarded as stating an official position of the European Commission.
1. Introduction

The case presented in the following sections is one of the examples of synergies provided by the ‘Stairway to Excellence’ project in which different sources of funding have been combined to amplify the R&I investments and their impact on the economy and wider society.

As described in the guide 'Enabling synergies between European Structural and Investment Funds, Horizon 2020 and other research, innovation and competitiveness-related Union programmes', synergies can be achieved through:

- Sequential (or successive) funding that use funds in separate projects built on each other;
- Parallel funding that use funds in separate projects complementing each other;
- Simultaneous/cumulative funding that brings together Horizon2020 and ESIF funds in the same project aimed at achieving greater impact;
- Alternative funding that reorients FP7/Horizon 2020 projects that were positively evaluated, shortlisted, but not funded given the limited budget, towards Structural Funds impact.

The combination of sources of funding is used to address two types of activities:

- Upstream activities build the appropriate capacities to perform research. They can be capacity building in physical capital (construction or improvement of research infrastructures, purchasing equipment, (including IT equipment and connections, data storage capacities), innovation infrastructures (LivingLabs, FabLabs, Design factories, etc.) and social capital (assistance for building networks, clusters and consortia).
- Downstream activities are focussed towards the market and the creation of economic value. They can be applied to research, development and demonstration activities, technology transfer and adoption; technology and innovation audits to identify potential demand for RDI results; proof-of-concept funding; pilot lines for first production; and pre-commercial procurement projects. There can also be activities to support the improvement of the innovation eco-system in a territory.

2. Context

Mórahalom is located in the Southern Great Plain region of southern Hungary. The primary objective of the town is the improvement of competitiveness and tourism attractiveness. The concept of a geothermal cascade system emerged in 2007. The project was justified by the necessity of instant termination of deficiencies, wasting and unused energy outflow due to outdated system, bad system sizing, and operation with bad efficiency as defined by the energy audit of the heat supply system of Mórahalom, and by the demand for a cheaper and more efficient energy system. On the other hand, from the side of possibilities, the exploitation of geothermal energy in the region of Mórahalom was an obvious solution, after reviewing every other alternative energy solution.

The town leadership had the heating systems examined in 2002 - funded by INTERREG - , but finally decided for the tourism developments to enhance "manageable" energy expenses with moderate investment supports combined with own resources. The analysis of the replacement of natural gas was a major aspect of the audit proposals, which was justified by the anomalies of natural gas supply, the drastic increase of purchase prices, the harmful environmental effects, and the good geothermal features of the region. The Local Government decided – as a continuation and based on the reliable data, suggestions and ideas of the audit – to have a feasibility study made for the implementation of a geothermal public utility system in Mórahalom.

The feasibility study, the construction plans made according to the version chosen in the study, and the preliminary environmental impact assessment made and authorised according to the plans were finalized in October 2007 with INTERREG IIIA HUROSCG assistance. The project’s objective, beyond the making of the current project’s feasibility study and plans, was for the new production and reinjection wells to serve as sampling and measuring points for the first Hungarian-Serbian cross-border water base and production monitoring system. Partners involved in the making of the pre-feasibility study, planning and elaboration of the international water base monitoring were the experts of the Department of Mineralogy, Petrology and Geochemistry of the University of Szeged (SZTE), the South Great Plain Regional Office of the Hungarian Geological Service, and the Geothermal Innovation and Coordination Foundation.

Building on the results of the study, financed from Structural Funds, the construction and operation of the geothermal cascade system of Mórahalom have been realized. As a result of the project activities, the proportion of renewable energy in the energy utilization of public institutions increased from 0% to 80%. As an optional novelty of the proposal, the extracted thermal water – after the utilization of its heat – is used in the increasing number of pools of the local spa, and in the reinjection well, which is located on a Brownfield investment site, the new industrial park. The most important local government buildings from the point of view of heat market are connected through a 2.8-km-long insulated underground pipeline network. As another novelty of the project, heat pumps will supply the heating of new buildings getting only a low-temperature fluid from the primary thermal circle.

The idea of the Framework Program proposal lied on the novelties of the infrastructure built from Structural Funds focusing on demonstration activities complemented by applied research tasks on (1) the technological background of the geothermal resources including system optimisation and system integration; (2) and also on the socio-economic aspects of the current and future investments. The case study represents an upstream sequential funding where Structural Funds investments enabled FP7 participation.
3. IMPLEMENTATION

Figure 1 maps the project chronologically, the research activities of the organisation and the type of funding. It aims to give a picture of relations between projects revealing planned or unplanned dependencies (synergies) between projects and their source of funding.

**Figure 1: Diagram of chronology of the main projects involved in synergies**

**ERDF Project 1: INTERREG IIIA HUROSCG**
Feasibility study and plans, new production and reinjection wells to serve as sampling and measuring points for the first Hungarian-Serbian cross-border water base and production monitoring system. (235,000 Eur)

**ERDF Project 2: Building of infrastructure of Environmental and Energy Operational Program KEOP-2007-4.1. (1.75m Eur)**

**FP7 Project: Collaborative Project – Large Scale Integration Project; FP7-ENERGY-2008-TREN-1; Geothermal Communities (GEOCOM) (3.5m Eur)**

**Added value / complementarities created by the synergies**

Based on the infrastructure built from Structural funds, the FP7 project allowed socio-economic research, pilot scale implementation of geothermal energy applications, integration of geothermal resources, monitoring, training and dissemination.

**Mechanisms facilitating the synergies**

There has been a good relationship between the applicant of the FP7 project and the South Great Plain Geothermal cluster that provided the idea to the applicant to extend their portfolio based on the infrastructure build by the local government of Mórahalom. Therefore, mechanisms facilitating synergies in this case are rather information and personal contacts.
Main problems encountered in implementing the synergies

Given the timely difference of the execution of the two projects, no problems have been encountered.

Suggestions to improve the synergies

Not in this case, but in case of other FP7 proposals, Geonardo (lead applicant of the FP7 project) has submitted proposals for a nationally funded call named EUKP-12 (please see detailed description of the call in the national analysis). The call has financed proposals that were not provided funding but has reached the threshold and the call was financing salary, travel, fees of third parties.

Geonardo has considered these calls very useful and believes that it was an instrument that could significantly enhance H2020 participation of Hungarian actors, since despite rejection of project proposals, the resources invested in the preparation of proposals are reimbursed. Despite its facilitating nature for participation, the EUKP-12 call was considered by Geonardo immensely “circumstantial”, too bureaucratic that required a lot of time for exchanging letters, rectification and common misconceptions among the applicant and the intermediary body. Geonardo would suggest to simplify these types of calls and also to harmonize the financial tables. The national call has required applicant to submit costs with a decimal precision, which is not possible in case of an RDI project lasting for several years. The intermediary body has been very inflexible, the call was thought well through and even the contact person of the intermediary body could not answer the applicant’s requests and questions. The call required heavy reporting; therefore a better monetary audit of such calls would be advisable.

Main motivations in implementing the synergies

The project funded from SF sources has been already finalised at the time of the idea of the FP7 project and the initiative of the FP7 project may be considered independent from the project funded by SF. Still, the idea of the FP7 project would not have been developed if there would have been a need to finance the realisation of the geothermal infrastructure, which shows a causal relationship among the two projects introduced in the case study.

Facilitating mechanisms for the take up of the scientific results

The take up of scientific results has been financed from within the FP7 project itself. In relation to the dissemination of research result, there will be an event organised in October 2015 that will gather around 200 European mayors and will be centred around gathering a “geothermal community” to share results. The initiative is called ‘Mayor’s Geothermal Club’.

Impact on the regional / national economy

The project has a regional impact, given that the investment made in Mórahalom will influence the decisions of other mayors in the region, since the region is reach in geothermal energy. The local government of Mórahalom has used own resources – besides the SF fund – to finance the investment, but as of 2015 the usage of gas consumption of the public institutions involved in the project has decreased to 7-10%, which serves as a great light house project for other settlements (also to include revolving funds for financing).

Figure 2 aims to position projects according to the activities they cover; from upstream (infrastructures, equipment, research activities) to downstream related activities (innovation, knowledge transfer, access to market).
Figure 2: Diagram of the complementarities of the funds in the knowledge triangle / flow

ERDF PROJECT 1:  
**INTERREG IIIA HUROSCG**  
Feasibility study and plans, new production and reinjection wells to serve as sampling and measuring points for the first Hungarian-Serbian cross-border water base and production monitoring system.

**FP7 Project 1: Collaborative Project – Large Scale Integration Project**  
Call for proposal: FP7-ENERGY-2008-TREN-1  
Socio-economic research, pilot scale implementation of geothermal energy applications, integration of geothermal resources, monitoring, training and dissemination.

**Research**  
(Research Infrastructures, facilities, Research activity etc)

**Training**  
(Continuous professional training, PhD fellowships)

**Innovation**  
Knowledge dissemination, knowledge transfer events, funding of the KTOs etc.
4. RELATED PROJECTS

ERDF PROJECT: Revision of territorial environmental programs of Mórahalom
- SF funding scheme: HURO/0901/222/1.3.4 – INTERREG-ECO
- Budget: 235,000 Euro
- Time frame of the SF funded project: 2007-2008
- Main objectives and type of costs covered
The pre-feasibility study, the construction plans made according to the version chosen in the study, and the preliminary environmental impact assessment made and authorised according to the plans were finalized in October 2007 with assistance. The project’s objective, beyond the making of the current project’s feasibility study and plans, was for the new production and reinjection wells to serve as sampling and measuring points for the first Hungarian-Serbian cross-border water base and production monitoring system. The partners of the project during the preparation of the pre-feasibility study, planning and elaboration of the international water base monitoring were the experts of the Department of Mineralogy, Petrology and Geochemistry of the University of Szeged (SZTE), the South Great Plain Regional Office of the Hungarian Geological Service, and the Geothermal Innovation and Coordination Foundation.

FP PROJECT: Geothermal Communities (GEOCOM)
- FP funding scheme: Collaborative Project – Large Scale Integration Project; FP7-ENERGY-2008-TREN-1; ENERGY.2008.8.4.1.: CONCERTO communities: the way to the future
- Budget: € 3,513,703.80
- Time frame of the FP funded project: 01.01.2010 – 31.12.2015
- Main objectives and type of costs covered:
  o Type of costs covered: Research, Demonstration, Management, Other
  o Main objectives: The main objective of the project is to implement pilot-scale demonstration of the geothermal energy utilisation on the 3 selected demo-sites, Mórahalom (Hungary), Galanta (Slovakia) and Montieri (Italy). The demonstration activities are complemented by applied research tasks on (1) the technological background of the geothermal resources including system optimalisation and system integration; (2) and also on the socio-economic aspects of the current and future investments. One of the key elements of the project are the efficient dissemination and training activities that will both raise public awareness on RES application and help transferring the project technology and approach to other communities.
  • Pilot scale implementation of geothermal energy applications
  • Energy efficiency measures by means of retrofitting and optimalisation
  • Integration of geothermal resources with other Renewable Energy Sources, such as Combined Heat and Power and Photovoltaic
  • Developing and implementing an efficient monitoring system for the demonstration activities
  • Applied technological research on system integration, applications and optimalisation to help the demonstration activities of the project to be more efficient
  • Detailed socio-economic research and studies for the public perception and to ease the preparation of similar future projects,
  • Pro-active training and dissemination activities
  • Initiate and facilitate the networking of interested Communities by setting up Mayor’s Geothermal Club
5. ANNEX: DETAILS ON THE RELATED PROJECTS

SF funded project

**Project title:** Geothermic cascade project of Mórahalom

Weblink: n.a.
Beneficiary (name of the institution): Local Government of Mórahalom

Type of institution: Local government

Budget:
- Total Investment: 1.75m EUR
- EU contribution: 876,000 EUR
- Other contributors: Local Government of Mórahalom


Time frame of the project: 2008-2010

**Main project objectives:**

A fluid with good quality and of medicinal quality of approx. 70 oC can be produced from the 1,300-1,400-meter-deep thermal well in the northern part of the town. As an optional novelty of the proposal, the extracted thermal water – after the utilization of its heat – is used in the increasing number of pools of the local spa, and in the reinjection well, which is located on a Brownfield investment site, the new industrial park. (Until the water is classified as medicinal water – according to relevant regulations – the total quantity of used water will be reinjected). The most important local government buildings from the point of view of heat market are connected through a 2.8-km-long insulated underground pipeline network. As another novelty of the project, heat pumps will supply the heating of new buildings getting only a low-temperature fluid from the primary thermal circle.

The construction and operation of the geothermal cascade system of Mórahalom are the results of project activities; the proportion of renewable energy in the energy utilization of public institutions increased from 0% to 80%, resulting in a fossil energy source (natural gas) saving of 14,441 GJ (gigajoules) per year both on project and national economy levels.

**Specific goals**

A heat capacity of 2,620 kW will be installed in the geothermal system, at a very favourable market price of 550 EUR/kW.

Throughout the system’s 25-year lifetime, an annual amount of 481,907 m3 of combusted natural gas will be replaced; the annual emission of pollutants from energy utilization will be reduced by 866 t of CO2, 318 kg of NxOx and 605 kg of CO. The system reduces the CO2 emission on a specific cost of HUF 16,636.46.

The public institution system became largely independent from supply and price formation anomalies of gas import. The operating wells of the geothermal system – designed with INTERREG funding – will be part of the Hungarian-Serbian water base protection monitoring system, and will serve as practical training site for the launch of a geothermal technician and engineer training at the University of Szeged.

With the geothermal development of the public institution system and the “New Town Centre”, the emission of pollutants were reduced by 70-80% (by an annual amount of CO2 equivalent to 1054 t of GWP). The system with cheap heating is not only be the installation factor for the spa, but for the new “Colosseum” hotel as well, which will promote the competitiveness of the service sector based on regional tourism, and will create new jobs for the system operation. The secondary target group of the project are the students of
SZTE studying geology, geography, or participating at trainings in the fields of regional development and geothermal technician.

**Collaborative work within the project**
The local government is the sole applicant of the project.

**Type of costs covered**
Building of infrastructure

**Main Results**
According to its geothermal development objective, the town of Mórahalom had the energetic condition of its buildings examined, a feasibility study made, and applied successfully for assistance for the realization of its thermal heating system. The project was carried out in 2009-2010, the production and reinjection wells are up and running, the pipeline is operating, and the heating of the public institutions has started.

In the current FP7 project an exemplary RES integration development was being carried out.

First, a detailed energy audit took place for the buildings to be retrofitted / refurbished, public lighting system with an overall estimation of energy consumption of all buildings within the Concerto area but not directly affected by project activities.

As a major part if RES integration a small scale gas engine was planted on the new Hunyad-liget-1 well which will generate electric current and heat, and supply the high power heat-pump heating station of the “New Town Centre” with auxiliary power (60kW). It was also providing extra heating for the abstracted thermal water. According to gas sample analyses and technical feasibility studies prior the project, 2-2.5 kW electric energy and 6-7 kW thermal energy can be produced in the CHP unit from 1 m3 trapped gas. Heat from the CHP unit is used to further heat the thermal water (by ~ 4°C degrees). Parallel to this development a CHP unit is constructed on the B-40 well which generate electric current that will supplies the Erzsebet Thermal Spa. – heat (90-120 C) generated is used at the DHW production and heating of the Spa. The waste gas thermal value is planned at 8.48 kWh/Nm3, the usable electric power at 35 kW (el.) and the usable thermal power at 70 kW, the total combined efficiency: 86.74%.

The modernization of the complete public lighting of the town centre (Szent Laszlo Park, Millenneum Alley, Central Bus Station, and the public transportation stops in the Concerto Area) also takes place with a changeover to solar-powered LED lighting system. The current lighting of the public area is provided by 36 W strip lights (consumption: 42W/piece), and by 70W sodium lamps (consumption: 90W/piece). The government wishes to replace them with 10-12W and 30W LED lighting units, with consumptions of 15 W and 38 W, before it was provided by photovoltaic cells.

Establishment of the heat-pump heating station for the energy supply of the “New Town Centre” and the “Thermal Residential Park” will take place in 2011-2012 to produce a thermal power of 450 kW in a heat-pump system with an average efficiency of 5 COP. The total heated ground space of the “Thermal Residential Park” to be heated by that will consist of 12 big dwelling houses (431 m2 heated floor area/estate), and was constructed in two stages.

In order to increase the efficiency of the developments. insulation of walls, replacement of doors and windows with an expected heat demand decrease of 12-21% took place at the Móra ÁMK as well as at the Kindergarten and Day-Care Centre

Finally, in order to guarantee the multiplier effect of the activities carried out in the Concerto area an on-line, real-time energy measuring system accessible to the professionals (including those participating in on-site practical trainings at the University of Szeged) as well as the general public will be established.
**Difficulties encountered at the stage of drafting the proposal**
The main difficulty identified at the stage of the draft proposals was the too complex administrative paperwork that could have not been performed internally by the applicant, given that there is no internal capacity (and know-how) within the applicant institutions to draft and to manage such complex projects. Professional consultants have to be entrusted to perform such tasks. Furthermore, due to the lack of clarity and the frequently changing rules of applications and/or eligibility criteria, there is even a bigger necessity to involve external professionals. Regarding the financial settlement of RDI projects, financial rules are considered to be inflexible by stakeholders. In the last years, the publication of RDI calls became completely unpredictable, having had calls published on Friday afternoon and closed on the following Monday giving low chance for potential applicants to apply.

**Concerns regarding the evaluation:**
Stakeholders interviewed did not express any concerns regarding evaluation, neither in relation to evaluation criteria, nor to the procedure or the evaluators themselves.

**Difficulties during the implementation of the project**
Regarding the difficulties encountered during the implementation of the project, only the heavy administrative burden has been highlighted by the applicant; regarding eligibility of costs, frequent changes of regulations, and complex procedures; regarding payment, no difficulty was highlighted.

**Facilitating mechanisms during the draft proposal/implementation**
The applicant considered that involvement of the professional consultancy company for the drafting and management of the proposal was the main strength of the proposal and the project itself to become successful. To policy makers, the applicant would suggest to enhance the adequate timing of calls in order to facilitate participation.
FP7 FUNDING

Name of the FP project: Geothermal Communities
weblink  www.geothermalcommunities.eu


Beneficiary: Geonardo Environmental Technologies Ltd. (coordinator)
Type of institution SME

Budget: € 3,513,703.80

FP funding instrument
- Funding scheme: Collaborative Project – Large Scale Integration Project
- Call for proposal: FP7-ENERGY-2008-TREN-1

Time frame of the project: 01.01.2010 – 31.12.2015

Main project objectives
The main objectives achieved in the frame of the project are as follows:

- Pilot scale implementation of geothermal energy applications
- energy efficiency measures by means of retrofitting and optimalisation
- integration of geothermal resources with other RES, such as CHP and PV
- developing and implementing an efficient monitoring system for the demonstration activities
- applied technological research on system integration, applications and optimalisation to help the demonstration activities of the project to be more efficient
- detailed socio-economic research and studies for the public perception and to ease the preparation of similar future projects,
- pro-active training and dissemination activities
- initiate and facilitate the networking of interested Communities by setting up Mayor’s Geothermal Club

Specific goals (expected output)
- Achievements to be applicable on a European scale by involving a high profile stakeholders and implementing a comprehensive demonstration of geothermal district heating applications coupled with RUE measures,
- To contribute to the creation and extension of the European Research Area into the New Members by pursuing the cooperation of a wide range of partners from academic, business and public organizations,
- To help bridging the gap between the EU countries in terms of geothermal research and development,
- To contribute to the reduction of GHG emission and climate change policies by assisting to achieve the Kyoto commitments and giving policy recommendations in order to eliminate barriers of geothermal energy utilisation,
- To contribute to the security and diversification of energy supply by enhancing geothermal energy utilization,
- To increase the municipal use of renewable energies.

Collaborative work within the project – Main Results
The main results achieved throughout the project are related to international exchange of know-how regarding technological research results on trans-boundary utilisation of geothermal resources, reinjection into sandstone reservoirs and the integrated utilisation of waste gases have been exchanged with the
consortium partners for their future benefit. There have been four international conferences and workshops, which were:

- European Geothermal Congress 2013,
- Renewable heating and cooling platform meeting 2013;
- GEOELEC workshop Potsdam 2013;
- World Geothermal Congress 2015

**Difficulties encountered at the stage of proposal drafting**

Regarding the difficulties encountered at the stage of drafting the proposal, the applicant highlighted the lack of available time to prepare the proposal due to high regular workload given that there was a lot of effort needed to meet the submission deadlines; drafting and writing the proposals were primarily after office working time.

**Concerns regarding the evaluation:**
The applicant did not express any concerns regarding evaluation.

**Difficulties during the implementation of the work:**
Concerning difficulties in relation to implementation of the project, the applicant has highlighted the delay of payments. It occurred that the original Grant Agreement had to be amended due to the change of the applicable financial rules. The amendment procedure is a long legal process that needs several months to be sorted out and implemented. Until the amendment process is over the project is "on hold" meaning that the beneficiaries will not receive their instalments until it is back on track (approval of the amended GA) of payments.

**Facilitating mechanisms during the draft proposal/ project implementation**
The applicant did not highlight any facilitating mechanisms during drafting the proposal or during project implementation.

**Other push – pull factors that may affect the R&I performers in applying/ being successful in FP calls**
Concerning lack of awareness in relation to FP calls, the applicant has highlighted that there is a wide general knowledge and public awareness that Hungary has excellent geothermal capacities however the available funding to exploit these resources do not reflect this huge potential. On a European scale, renewables such as solar PV and wind energy are much more significantly represented in the various R&I, R&D programmes than geothermal that could be due to the lobby power of the relevant industry or it reflects the general lack of understanding how geothermal energy works.

Regarding other motivational factors that affect FP participation, lack of capacities or lack of detailed know-how about the specific rules and requirements of writing Framework Programme proposals have been mentioned by the applicant. There is a lack of upfront available funding to hire professional proposal writing companies to tackle these challenges.

**Which were the strengths of the proposal to become successful**

Complex approach covering many aspects of the field that made it easy for a wide range of target groups to associate their needs with the achievements (scientific results, demonstration results, training results etc); applied advanced technologies; covering the field of geothermal among the many other renewable (solar, wind) focused proposals.

**Suggestions to policy makers to facilitate the participation of national R&I performers in H2020**
Back in 2013 there was a nice initiative announced by MAG Zrt (EU_KP_12) which was about to reimburse those costs that were generated in relation with the preparation of a Framework Proposal if it reached a certain evaluation score. Such an initiative would boost the willingness to apply for such funding especially for SMEs.