

Speech

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The HEAT4U Project under the EU's Seventh Framework Programme for Research

The European challenge

The construction sector is the highest energy consumer in the EU (about 40%) and main contributor to greenhouse gas emissions (about 36% of the EU's total CO₂ emissions). The annual growth rate of new buildings added to the housing stock is currently estimated at around 1-1.5% of the housing stock. The number of refurbishments accounts for roughly 2% of the housing stock a year. Each year, heating systems are replaced in about 5% of the building stock.

Opportunities exist to improve the energy performance of most of the existing buildings, reducing the thermal energy demand and increasing the renewable energy production. A wide improvement in energy demand is possible, moving from more than 300 kWh/m² to 50 kWh/m² per year (a factor of 6!).

Residential buildings represent 60% of the overall European building stock and this is where most of the potential to drastically reduce energy use and CO₂ emissions lies.

The impact in terms of decrease of energy use and CO₂ will be strong, provided Europe can address such reduction in existing buildings.

Please consider that in Europe 80% of the 2030 building stock already exists and today 30% of existing buildings are historical buildings. In Europe most of the buildings are "dated" and often with severe architectural constraints to achieve major reduction by insulating the envelope.

Heat Pump has been clearly identified as a technology that features both the high density of power requested by heating applications and the reduced level of emissions in particular for mass deployment in urban areas.

Many innovative solutions are directed towards new buildings, but only a few are optimized for the existing stock. The result is a lack of energy efficiency and, in some cases, functionality once the buildings are refurbished. Solutions that take into account the various constraints of existing buildings and allow high energy efficiency need to be developed further.

To address the challenges that the European construction sector and its extended value chain are facing, the European Economic Recovery Plan ("Energy-efficient Buildings Public Private Partnership") will devote in the period 2010-2013 approximately € 1 billion (under the Seventh Framework Program for Research FP7) to research new methods and technologies to reduce the energy footprint and CO₂ emissions related to new and renovated buildings. European Commission emphasizes that it is not only a matter of "technology research": other aspects influence the overall efficiency of buildings. The outcome of research into understanding



barriers and drivers for technical aspects and non-technical (e.g. behavior of end-user) and into the development of appropriate solutions (e.g. intelligible heating controls, overall integration, comfort, aesthetic value...) will speed up the transformation of the market.

The call

On the basis of the above mentioned overall challenge, European Commission launched a call for proposals on how to address these issues. The call was published on July 20th 2010 and its title "*New efficient solutions for energy generation, storage and use related to space heating and domestic hot water in existing buildings*" sets a clear objective for participants. It focuses of the highest priority: space heating (and DHW) in existing buildings since this is the real challenge and the largest opportunity for maximizing the impact of new solutions.

The opportunity

At that time, several companies across Europe were already actively interacting and considering a larger use of the Gas Absorption Heat Pump (GAHP) technology in the residential market. These companies were very familiar with the absorption technology used in heating applications. They knew that GAHP technology had all prerequisites to favorably answer to the challenge posed by the European Commission.

The basis of the technology was already proven in the light commercial and medium sized applications (e.g. collective heating for residential buildings).

They needed to understand how to address the major obstacles that a successful introduction in the mass market imposes.

The "technical issues" to develop GAHP technology for the "small residential applications in existing buildings" will be analyzed in detail by Mr. Marco Guerra in the next speech. Just to anticipate new development will be needed for:

- performance improvement
- industrial design
- ease of use and installation

...but, as highlighted by the European Commission, many other significant issues lay in the "Non technical" area:

- definition of the specific features for each local European market
- preparation of norms for performance measuring
- creation of laboratories to measure GAHP technology
- acquisition of real feedback on end-user experience before moving into market launch (Field Test)
- documentation of benefits through Life Cycle Analyses,
- dissemination of benefits to energy policy makers for inclusion in norms and incentive schemes
- definition of training and certification schemes for planners and installers

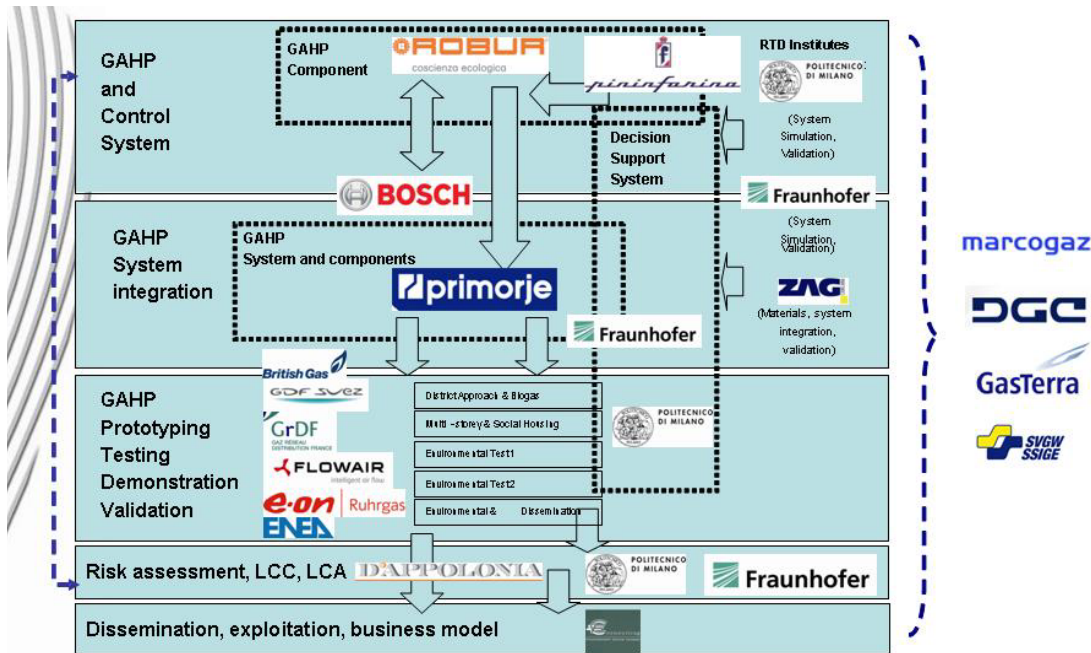
The 7th Frame Program call represented an opportunity to coordinate across Europe several initiatives concerning GAHP technology development and deployment.



We strived to create a Project able to fill the gap between “having a demonstrated and solid physical principle” and “having a technology ready for mass deployment” that Europe could use to contribute and address the environmental challenge.

Work Package list

We therefore started creating a list of activities needed to succeed. These activities were grouped together in Tasks. The picture in the background summarized the macro activities that the HEAT4U project will cover.



Tasks are highly interdependent and the Project is as ambitious as the challenge imposed.

Consortium

The expertise needed could not be found in one single organization in Europe. We created a coalition of entities which could successfully complete each of the tasks defined above.

For each area of expertise we needed the highest possible level of contribution available in Europe and in each individual country.

We covered the need of the GAHP Appliance and GAHP System development by involving the most qualified partners in the industry: Bosch TermoTechnology, Pininfarina, Primorje Construction and Robur. These companies will take the lead in addressing the “technological barriers” and creating the “GAHP platform” for deployment in the residential market.

The most remarkable and prestigious Universities and Research Centers across Europe have promptly and favorable contributed to the definition of the work program for the activities



required for the Laboratories and Field Test assessment; namely we enjoy the partnership of ENEA, Fraunhofer Institute, Politecnico of Milan and Zag.

The European utilities with the largest experience of Development and experimentation of solutions were brought onboard to ensure appropriate management of the Field Test phase in several European countries: GdFSuez and GRDF for France, E.ON for Germany, BGas for the UK. For the specific requirement of the testing in extreme cold conditions the support of Flowair from Poland was identified.

In addition, to ensure the optimal dissemination, reporting of all the benefits of the GAHP technology and documenting the activities undertaken in the Project, two of the most prominent consultants with consolidated experience at European level have been selected to jointly work in the HEAT4U project: CF-consulting and D'Appollonia.

These organizations are determined and committed to deliver the results by dynamically interacting between them to bring to completion the above mentioned Tasks.

Strategic Advisory Board

In order to attract to the Project the largest possible level of contribution, the Consortium have further extended the cooperation to an additional group of relevant players with expertise in the industry and in other European regions not yet covered directly by the direct presence of the Participants.

Organizations like Marcogaz (European Association of Gas Companies), Gasterra (leading gas company of the Netherland), SVGW (Swiss association of gas industry) and DGC (Danish Gas Center), who have expressed their interest in actively participating to the program, have been grouped in a Strategic Advisory Board.

They will represent a valuable input panel for reviewing the outcome of the Project and will support the adoption of the technology in their respective countries and organizations.

Deliverables

HEAT4U plans to deliver the solid evidence of the potential of GAHP technology when applied to residential market.

As an expression of the latitude of benefits that the technology offers and the overcoming of technological barriers, the Consortium committed to develop all R&D activities that lead to a set of demonstration installations across Europe to assess the use of GAHP technology in several peculiar conditions.

As far as the non-technological barriers, these demonstrations will be complemented by a background development work that will encompass: reports on GAHP technology, guidelines and documentations for installers and planners, dissemination activities, Web-seminars training and Project Web sites.



Resources

The overall Consortium is planning to invest in excess of 9.5 Million Euro in the 36 months of duration of the Project.

The *person/months* involved in the HEAT4U activities exceed the 800 units. As indicated in the picture almost 80% of resources will be for research and development and demonstration purposes, with clear evidence of reduced management expenses. This is much more than having 25 people working full time on the Project for 3 years.

It is cherry-picking highly competent professionals from the most prominent heating and gas industries, universities, research laboratories and consultants to create the basis of a "technological step forward".

Most of the envisaged costs that the Consortium will bear are related to personnel (53,2%) (i.e. Researchers, Engineers, Technicians, Installers, Managers, etc.). These professionals will have the possibility to work in a multidisciplinary international environment, on a technology that will benefit Europe and will rely on a base technology "Made in Europe".

Time line

Due to the high motivation of the Consortium and the high level of urgency in bringing this technology to the small residential market as early as possible, the HEAT4U Project was formally started by Participants on 1st November 2011, even before "paperwork" was finalized by European Commission. This "unconventional procedure" is an evidence of the interest that all Parties involved are showing for the early introduction of GAHP technology in the lower segment of the market.

Of the many milestones that HEAT4U will encompass, we would like to mention:

- feasibility of technical solutions within 6 months and
- availability of early units for field test within 24 month

This implies that we plan to have by fall 2013 units installed for the multi-site and multi-purpose demonstration phase. It is possible to envisage that market intro will happen in 2014.

Impact

HEAT4U impact will be perceived in several different areas and it will largely depend on the deployment rate or speed of adoption of the technology. The benefits will be perceived by:

End users

- Cost effective solution to integrate renewable energy in heating and DHW function in existing or retrofitted buildings
- Reduction of the heating cost



Heating Equipment Manufactures and Service Organizations

- Installation/service requirements substantially identical to regular gas condensing boilers
- Investing on a European based technology

Planners and Installers

- Easier and safer installation
- Cost effective way to achieve high percentage of renewable energy

Utilities

- Natural gas as an “enabler of the renewable energy”
- Synergies with increased level of Biogas distribution
- Compatibility with existing gas distribution grid

Energy policy makers, institutions, Member states and European Commission

- It does not require upgrades to the grids
- Reduce energy dependency from extra EC countries
- European based R&D and Manufacturing

Call results

The call “Energy-efficient Buildings” – 2011 received more than 120 proposals by European Consortiums. Proposals were assessed according to the 7th Frame Program standards procedures by a group of independent and accredited experts.

Proposals were ranked on the bases of consistency with strategic objectives and research priorities of the Call of 7th Frame Program and on their capability of driving innovation and high impact. Only 23 of the proposals presented to the European Commission were funded. In that specific call HEAT4U was awarded with the largest grant for R&D purposes.

In recognition of the level of expected impact and the complete strategy for deployment of the technology, the European Commission has awarded the HEAT4U Project with a total grant of 6,25 Million Euro. It is important to observe that European Commission Grant substantially met the anticipated proposal from the Consortium.

European Commission’s Evaluation

Besides these impressive figures, it is of particular importance to share with you today the opinions that the European Commission formally expressed at the time of the final ranking and formal evaluation of the project, endorsing the opinion unanimously formulated by the group experts.

“The proposal addresses real needs in the sector for more efficient energy systems for heating and domestic hot water. It shows clear impacts on competitiveness in terms of a new product in the market (GAHP).”



INTERNATIONAL CONFERENCE HEAT4U PROJECT

The project supports many EU priorities such as reducing energy consumption, increasing Europe value chain and increasing market potential with export of technological products.

These impacts are expected to increase the competitiveness of EU industry.

It is quite convincing that the adoption of GAHP will provide large savings of primary energy in comparison to boilers. On the residential market electrical heat pumps are penetrating the market rapidly for replacing existing space heating systems; however electrical grid constraints may limit further penetration. GAHP does not have electrical network constraints; it is more efficient and consumes less gas than a gas boiler”.

In conclusion, these statements reinforce our belief that GAHP technology will contribute in adapting the current energy system into a more sustainable one, less dependent on imported fuels and based on higher contribution of renewable energy.

The HEAT4U Project will help in adopting the GAHP technology, offering to European citizens an effective way to improve energy efficiency of existing buildings and increasing the competitiveness of Europe's industries.

