FIRST REVIEW MEETING HEAT4U PROJECT

July 19th 2013
Paris, GDF SUEZ

Gas Absorption Heat Pump solution for existing residential buildings

Under the EU's Seventh Framework Programme for Research

The Consortium

Project Coordinator

Project Partner

The Advisory Committee

First Review Meeting – 19th July 2013

WP 3: System Development and building integration

Speaker: Axel Albers

Achievement of WP 3

Target:	**Ensure GAHP is suitable for vast majority of retrofitting applications**
Task Task 3.1:	**Building interface, overall architecture and hydraulic schemes (GAHP System)**
Task Task 3.2:	**Development of GAHP System Control**

WP3 Task 3.1

Building interface, overall architecture and hydraulic schemes

Objectives

Definition of system architecture and set of hydraulic configurations: optimal GAHP system schemes for each local market, defining:

- building interface
- system architecture
- specific design, construction, installation and commissioning procedures

WP3 Task 3.1

Building interface, overall architecture and hydraulic schemes

Summary of progress towards objectives

Baseline of required GAHP system established with regards to:

- optimal, overall control architecture and hydraulic schemes
- building and construction industry standards and practices

The agreed baseline consider:

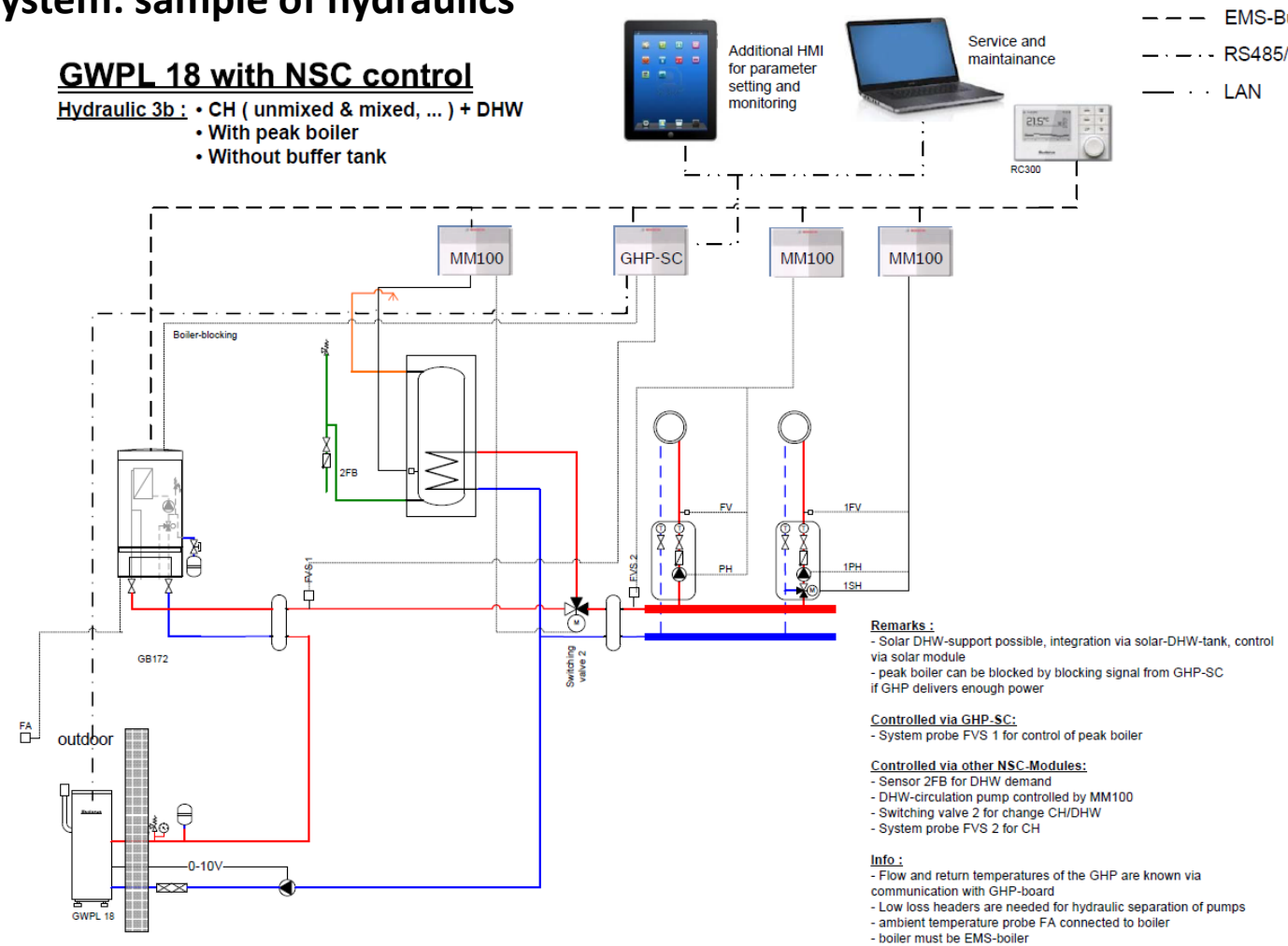
- Monovalent operation of GAHP systems
- Bivalent operation of GAHP appliance with existing heat source
- Control of mixed and unmixed heating circuits based upon radiators or multi-zone systems
- Control of indirectly generated domestic hot water with a storage tank
- Possible need for a heating water buffer to balance the heat generated and heat required from the central heating system

WP3 Task 3.1

GAHP System: sample of hydraulics

GWPL 18 with NSC control

Hydraulic 3b : • CH (unmixed & mixed, ...) + DHW
• With peak boiler
• Without buffer tank



Remarks :
- Solar DHW-support possible, integration via solar-DHW-tank, control via solar module
- peak boiler can be blocked by blocking signal from GHP-SC if GHP delivers enough power

Controlled via GHP-SC:
- System probe FVS 1 for control of peak boiler

Controlled via other NSC-Modules:
- Sensor 2FB for DHW demand
- DHW-circulation pump controlled by MM100
- Switching valve 2 for change CH/DHW
- System probe FVS 2 for CH

Info :
- Flow and return temperatures of the GHP are known via communication with GHP-board
- Low loss headers are needed for hydraulic separation of pumps
- ambient temperature probe FA connected to boiler
- boiler must be EMS-boiler

WP3 Task 3.1

Building interface, overall architecture and hydraulic schemes

Significant results:

- Based upon the input from WP1, definition of a set of simple building interfaces, overall architectures and hydraulic schemes.
- Set up of a specifically dedicated lab facility for testing GAHP System control and the different possible schematics.
- Performance during initial tests in the lab on several hydraulic schemes built up in combination with the GAHP appliance yielded promising results indicating the correct definition of the systems and the suitability and good efficiency in a residential retrofit installation.

WP3 Task 3.2

Development of GAHP System Control

Objectives

Development of the optimal GAHP systems control algorithms for each system configuration defined.

Design and testing of hard- and software of appliance control, development of user interface, definition of accessories for environmental control and actuators.

WP3 Task 3.2

Development of GAHP System Control

Summary of progress towards objectives (I)

Definition of hardware requirements for the GAHP system control based upon definitions of each system configuration:

- Power supply
- Bus protocols for communication
- Required auxiliary interfaces for sensors, pumps, diverter valves etc.

Major effort shared by all partners involved!

Robur, Pininfarina, GdF Suez, Politecnico diMilano, Fraunhofer ISE and BTT

WP3 Task 3.2

Development of GAHP System Control

Summary of progress towards objectives (II)

Development of optimal GAHP systems control algorithms and software requirements:

- bi-directional communication between GAHP appliance and system control and GAHP System control and user interface
- calculation of target heat demand to GAHP including outdoor weather compensation and room temperature or domestic hot water.
- issuing of service request command to GAHP appliance with additional information which qualifies the type of service request (CH or DHW).
- monitoring of resulting performance of GAHP appliances, control and termination of service request command.
- diagnostics collection and alarm clearing.

WP3 Task 3.2

Development of GAHP System Control

Significant results:

- The expected functions and algorithms have been clearly allocated to either GAHP appliance control or GAHP system control.
- Development of the specific hardware and custom developed FW able to incorporate the above mentioned functions and algorithms.
- Bi-directional communication between GAHP Appliance control, GAHP System control will allow significant improvements to systematically obtain the nominal efficiency from the GAHP Appliance in the real field in retrofit installation in residential buildings.
- A first set of algorithms and functions established in a software development platform was able to suitably control the GAHP appliance and deliver heat into the system for generation of domestic hot water or central heating.

Future plans

Task 3.1: GAHP System

- Further detailing the overall architecture and hydraulic schemes
- Build up and test hydraulic schemes with the GAHP appliance to verify the suitability and efficiency in a residential retrofit installation.
- Verify if components defined are actually required, correct sizing, installation and control for optimum performance.

Task 3.2: GAHP System Control

- Further detailing and confirmation of requirements: algorithm and functions as well as hardware platform for the development of GAHP
- verify the suitability and efficiency in a residential retrofit installation.

Interaction with progress and results of other work packages, especially WP2, will enable BTT to complete the optimization of the tasks.

Future plans

- The WP3 activities are in time to support field trials for the heating season 2013/2014 and laboratory testing planned at the project partners
- Due to actual project start only basic definition and development of building interface, overall architecture, hydraulic schemes and GAHP System Control before Field Test start possible.
- BTT does expect further development will result into significant improvements to demonstrate that this technology is suitable for retrofit installations compared to current status.
- BTT therefore would like to investigate the possibility to extend the program by another six months in order to enable the above development, implementation and verification in a second heating season.
- Indeed during such season all the optimizations deriving from completion of interactions among the other Work Packages (WP2, WP4, WP5 and WP6) might deliver better information of the real potential of the GAHP system performance.