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 6: Decision Support System

Speaker: Dr.-Ing. Constanze Bongs
Fraunhofer ISE

Achievements of WP 6

Task 6.1 "Mathematical modeling of GAHP Appliance and System"

- TRNSYS type of GAHP model implemented
- TRNSYS System model implemented

Task 6.2 "GAHP System Seasonal Performance Simulations"

- Fast performance calculations tool developed
- Building model and load files developed
- Calculations indicate superior system performance

Task 6.3 "Development of Building Oriented Decision Support System"

- Agreement on platform TRNSYS/TRNSED

WP 6. Task 6.1

2 Approaches:

System Simulation

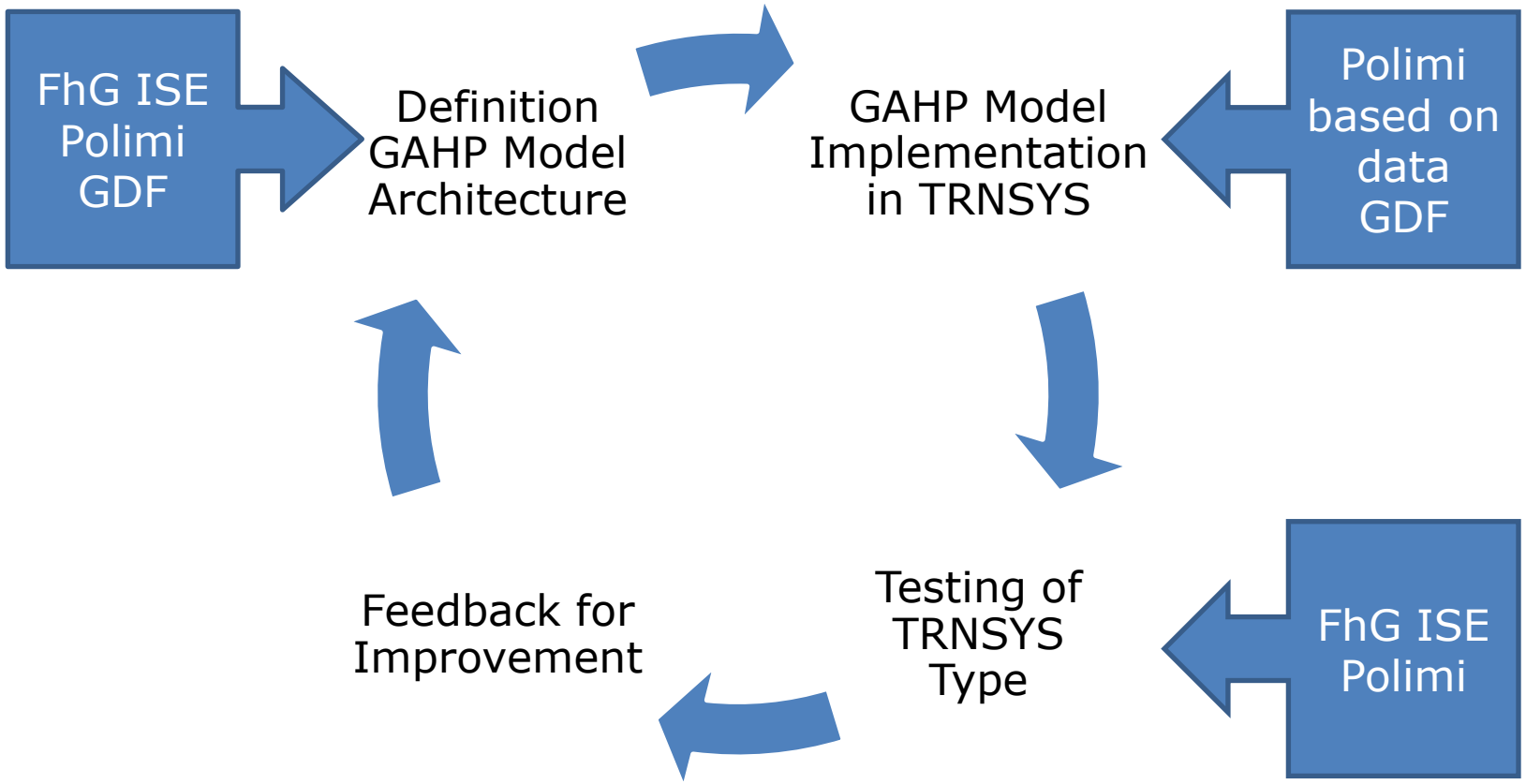
- Simulation platform TRNSYS
- TRNSYS GAHP type with physical inputs
- Flexible definition of system configurations
- Implementation of control strategies

Fast Performance Calculation Tool (FPCT)

- Instantaneous load coverage
- Regression model of GAHP
- Fixed simple system configuration
- Control strategy not implemented

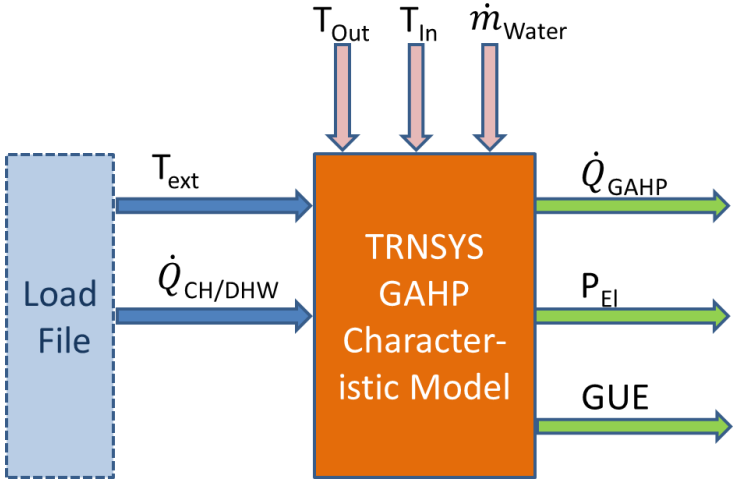
WP 6. Task 6.1

Iteration Process



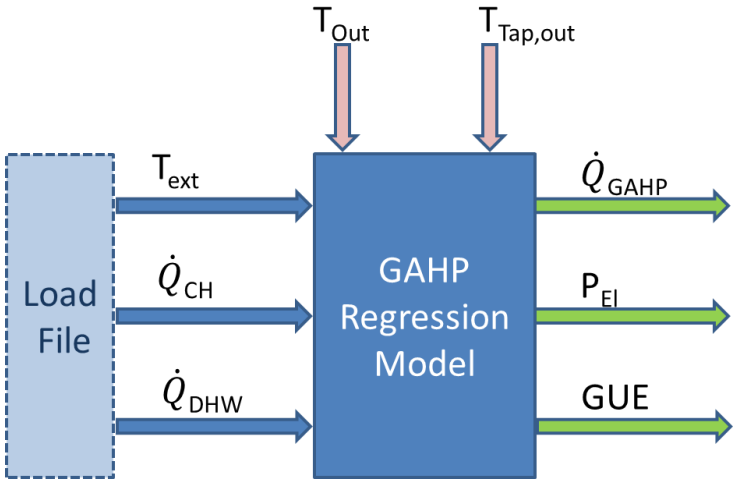
WP 6. Task 6.1

Model TRNSYS



Performance Interpolation by Matrix Lookup

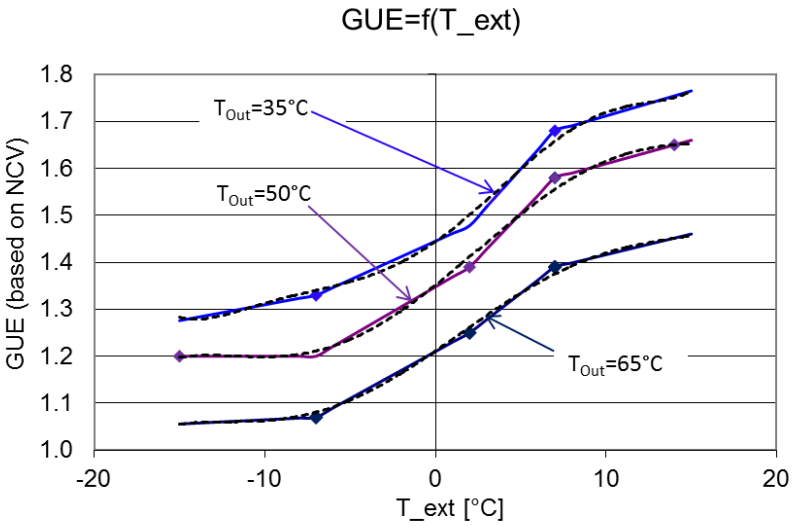
Model FPCT

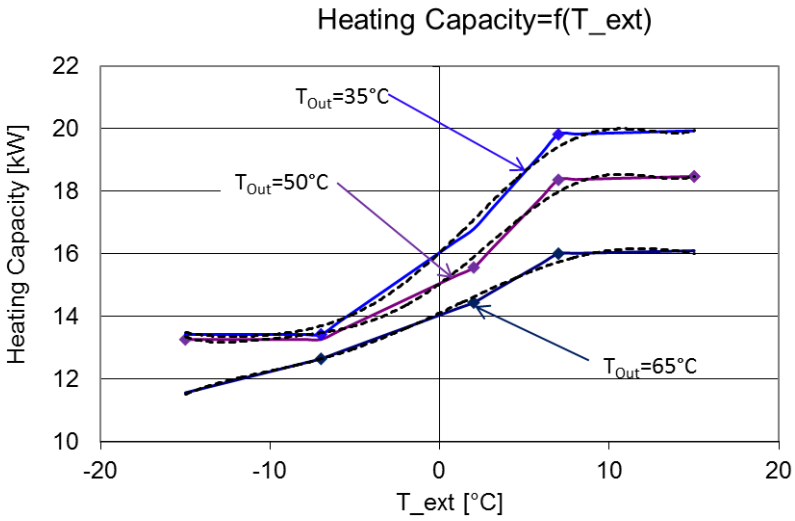


Regression Functions

WP 6. Task 6.1

Measurement Data and Interpolation Logic: input by GDF

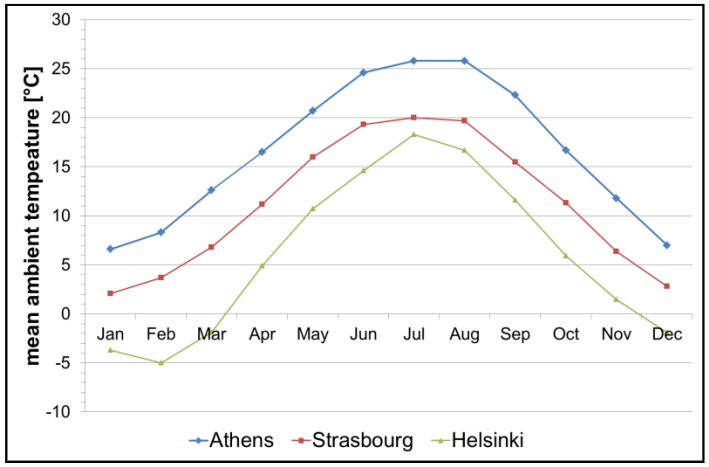


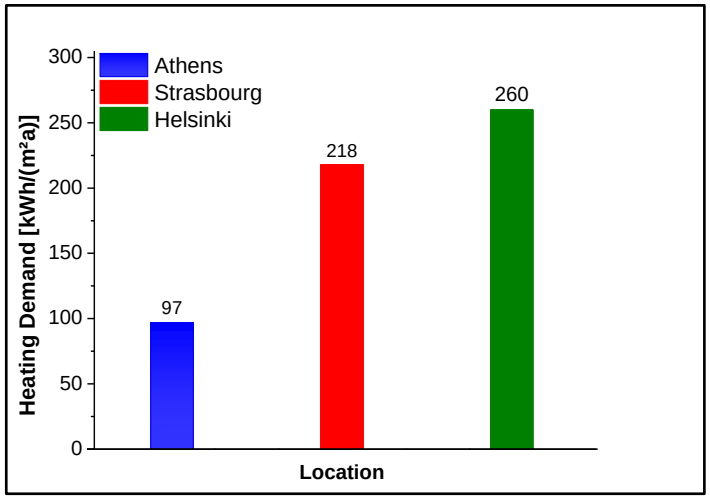


WP 6. Task 6.2

Building Simulation

- Old building standard
- Building model implemented in TRNBuild
- Single Family House: 140 m²
- Load files generated for cold, average and warm climate



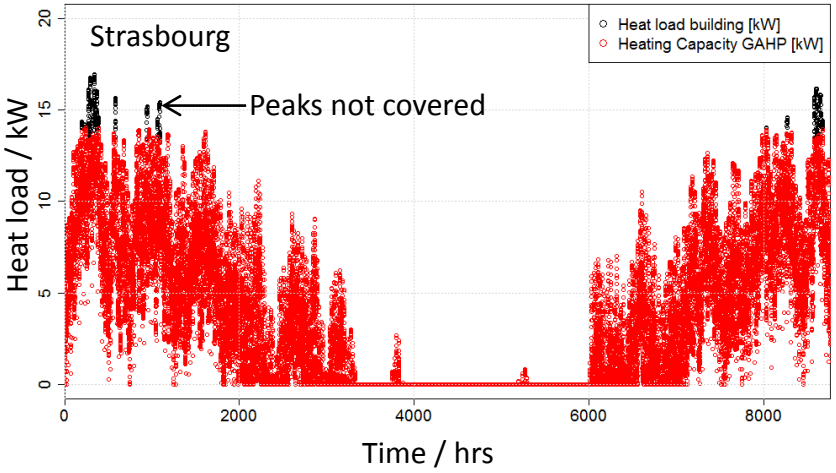


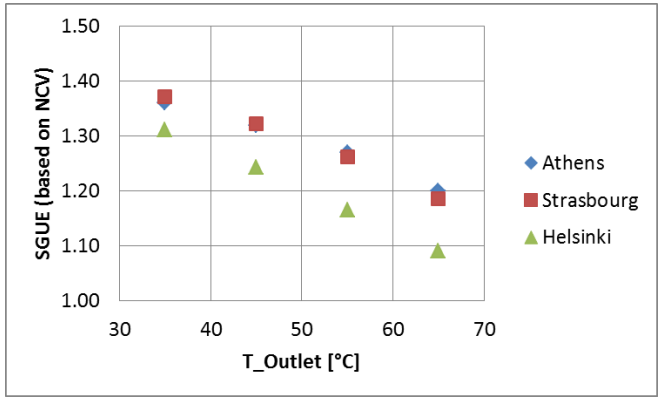
	Qh_max	Total load (CH + DHW)
	kW	kWh
Athens	15,9	13560
Strasbourg	16,9	30560
Helsinki	16,7	36400

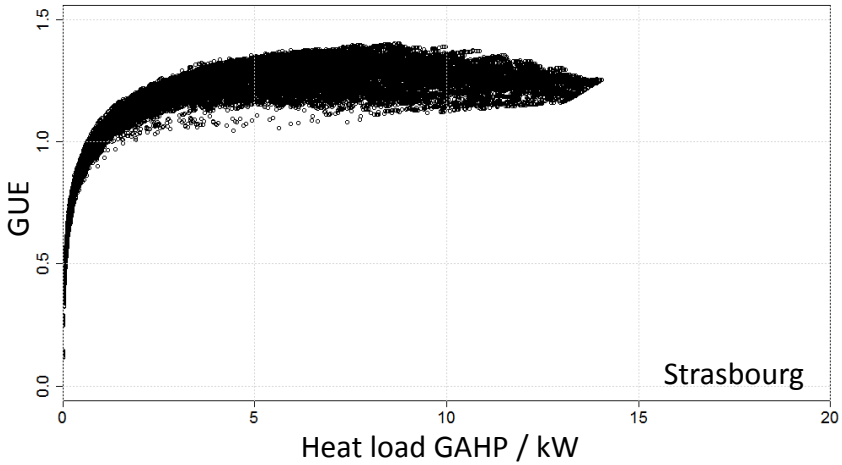
WP 6. Task 6.2

Results FPCT

- Clear benefit of lower temperature emission systems
- GUE (based on NCV) > 1 for most of the time
- SGUE lower in cold climate



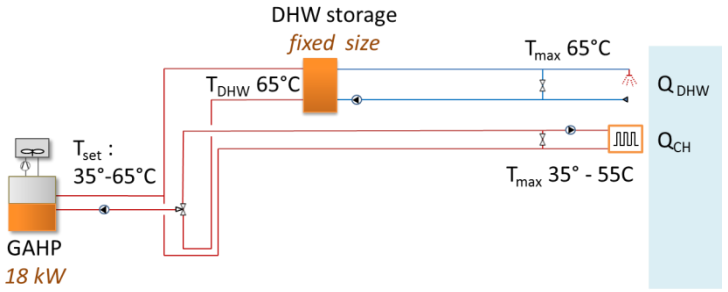




WP 6. Task 6.2

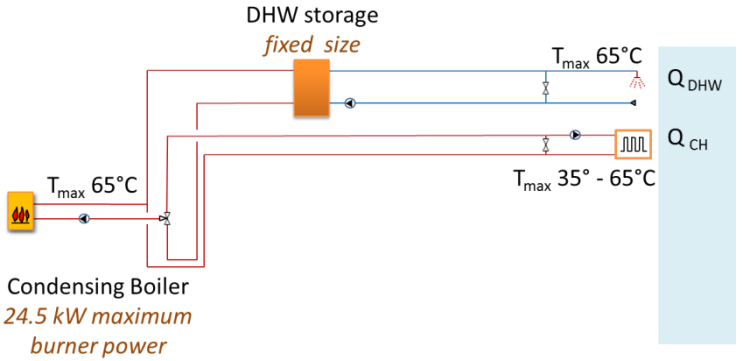
Comparison TRNSYS vs. FPCT

Location	Tool	T_{Out} [°C]	Heat Load [kWh]	DHW Load [kWh]	Gas Utili-zation [kWh]	SGUE [-]
Stras-bourg	FPCT	55	30560	3940	27345	**1,26**
Stras-bourg	TRNSYS	55	30560	3490	26973	**1,26**



<u>Preliminary</u> Comparison to Reference Technologies

Location	System	T_{Out} [°C]	Heat Load [kWh]	DHW Load [kWh]	Gas Utili-zation [kWh]	SGUE [-]
Stras-bourg	Gas Boiler	55	30560	3480	34350	**0,99**
Stras-bourg	Gas B. + Sol. DHW	55	30560	3570	32835	**1,04**



WP 6. Task 6.2

Building coupled simulation by POLIMI

- Yearly dynamic simulation of building from different ages (according the Italian building code)
- Older buildings have higher heat demand because poorer insulation
- Emission system: radiator (55°C) for all the buildings
- Two system types: with and without buffer tank

	Qh_max	Heating demand	Specific heating demand
	kW	kWh	kWh/m^2
1961-75_55 °C	12,3	21160	138
1976-90_55 °C	8,8	12660	83
1991-05_55 °C	8,1	10700	70

WP 6. Task 6.2

Building coupled simulation by POLIMI

- A higher seasonal performance is reached in the older buildings because of the higher heat demand
- The use of buffer tank improves the seasonal performance
- The use of lower temperature emission system (radiant floor) improves the seasonal performance

	GUE without buffer	GUE with buffer
1961-75_55 °C	1,23	1,31
1976-90_55 °C	1,17	1,29
1991-05_55 °C	1,15	1,28

Future plans

- Implementation of a Heating Curve (shown so far: T_{sup} 55 °C constant) => higher SGUE expected
- Design of System Control
- Electricity Consumption (especially during part load)
- Startup Behavior (especially for Summer DHW preparation)
- More detailed modeling of GAHP based on more specific information on appliance and system control
- Model update with measurements performed within WP 4
- Validation with data from WP 5 – Demonstration Activity
- TRNSED application for final setup of Decision Support System (Task 6.3)