



International Gas Union
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**IGU Gas Efficiency Award :
a new generation of Gas-fired-Heat-Pumps**

The efficiency of Gas-using Boilers is limited at 110% (lcv) and the condensing boiler market is starting to approach its maturity phase. A possibility to reach higher efficiency's with gas-using appliances is to develop gasfired-heatpumps as possible successor.

Interesting for dwellings is the Diffusion Absorption principle, which makes no noise, has no moving parts, and is well known from the refrigerators. The efficiency can go up to approx. 170%.

Configuring it in 2004 as a bivalent system with a 4kW heat-pump and a condensing boiler in parallel, to deliver the peak-load and domestic hot water, we learned that this solution was too expensive.

We had a double system with too much components. The appliance worked well, but the consumer price was too high compared to the price of the condensing boiler.

The best option would be to develop a monovalent system in which the heat-pump takes over the functions of the condensing boiler.

So it must be redesigned for modulating, delivering a peak-load and for working with higher supply temperatures to produce domestic hot water.

We found the solution by adding an extra condenser to the diffusion absorption cycle which is working in parallel with the generator, the so-called bypass-condenser. This bypass-condenser is leading back a part of the NH₃ to the input side of the generator. This delivers the peak load and makes it possible to work at higher supply temperatures.

Till 6kW the system behaves like a heat pump, and when the bypass-condenser is switched on (> 6kW), it behaves like a boiler with a heat-pump in parallel. It makes also the production of domestic hot water possible at much

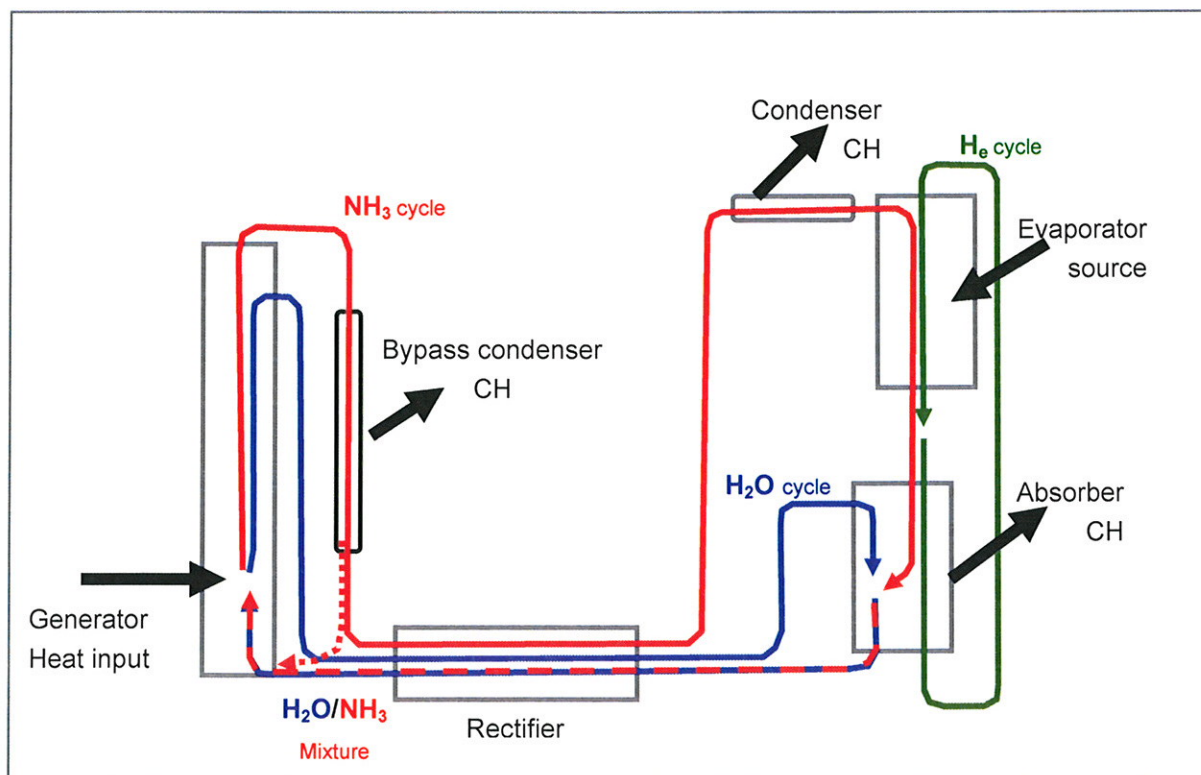
higher efficiencies than the condensing boiler.

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The advantages comparing to the previous bivalent system are:

- No need for a "peak-load boiler".
- Higher savings, especially on domestic hot water.
- Lower investments and higher savings, so a better pay-back time.
- Smooth change-over from GHP alone to GHP + peak-load.
- Smaller dimensions and volume (-20%)

The process layout is shown below (the bypass-condenser is the new element). We closed the feasibility phase and started a project to come to market introduction, tentatively in 2010.



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