

What is Solar Decathlon?

Solar Decathlon is an international student competition where students from universities from all over the world gather to design, build and operate an energetically self-sufficient house. The "Solar" is because the only allowed energy source is the sun and "Decathlon" is because the teams compete in 10 different categories.



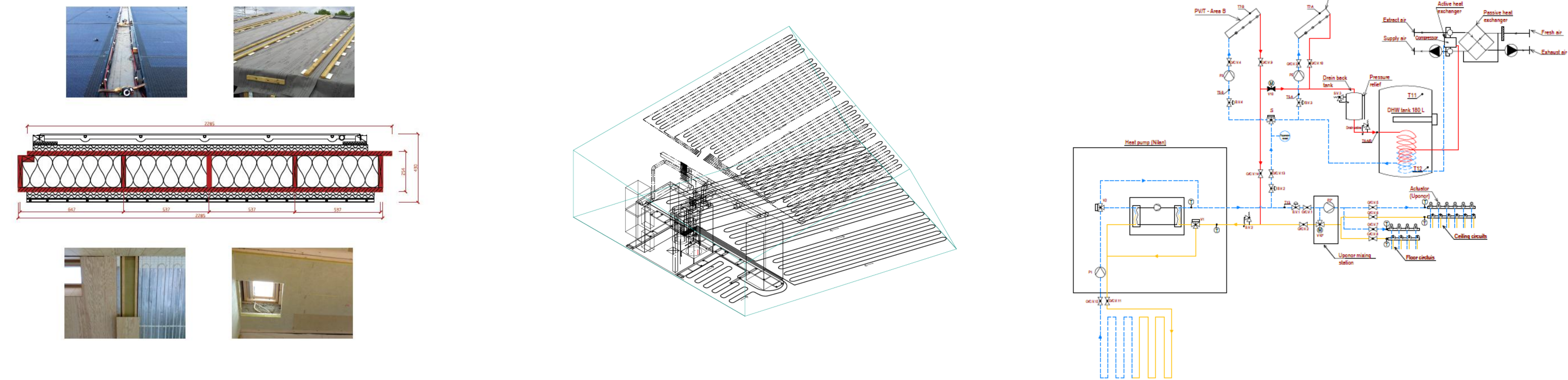
"Fold" from Team DTU

The house which Team DTU designed and competed in the competition is called "Fold". The name comes from the concept of folding a piece of paper, around the occupants. Folding strategy depends where the house is situated in the world. Folding is done in a such a way so that it assures minimum heat losses/gains and maximum output from the solar panels.



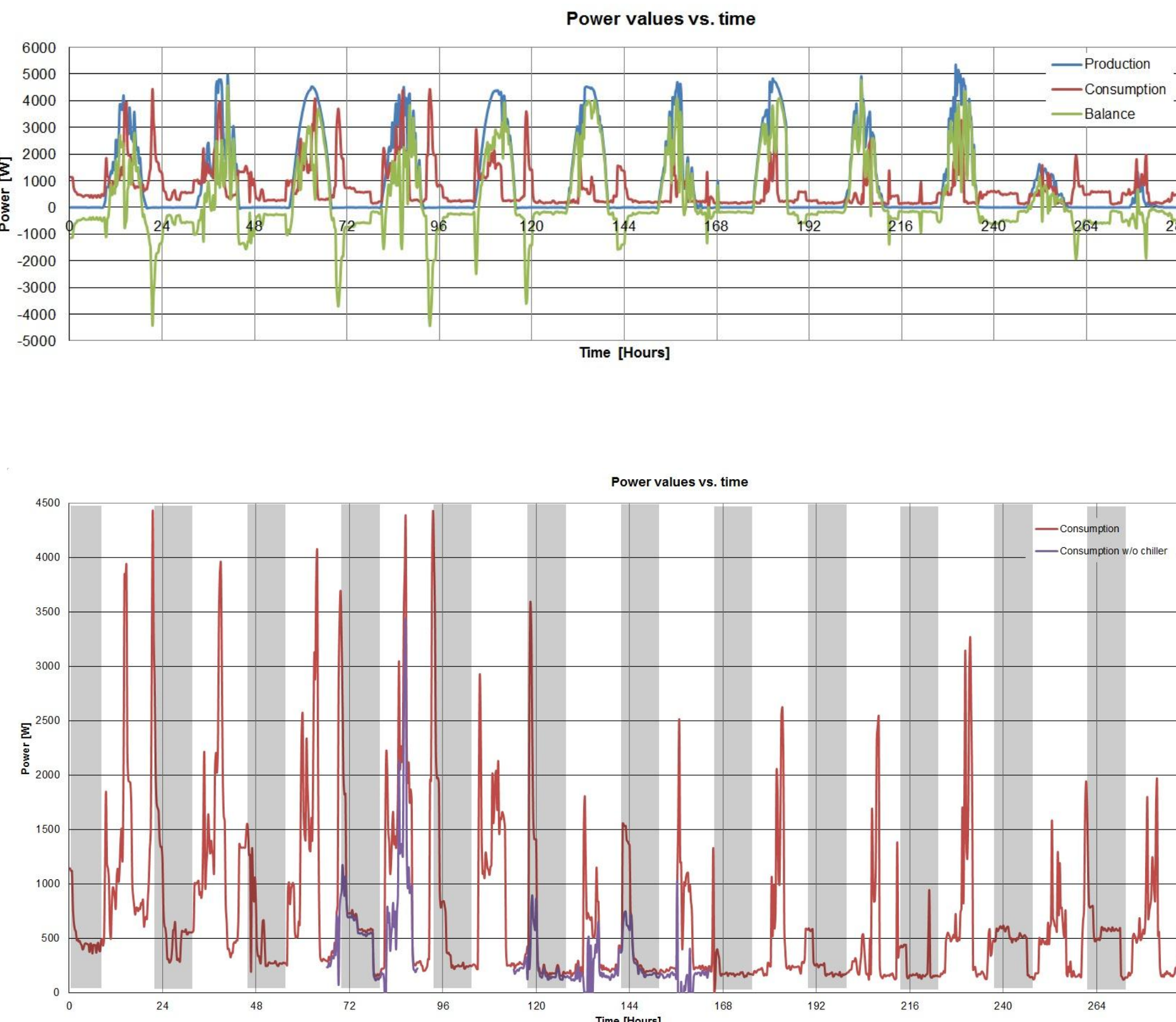
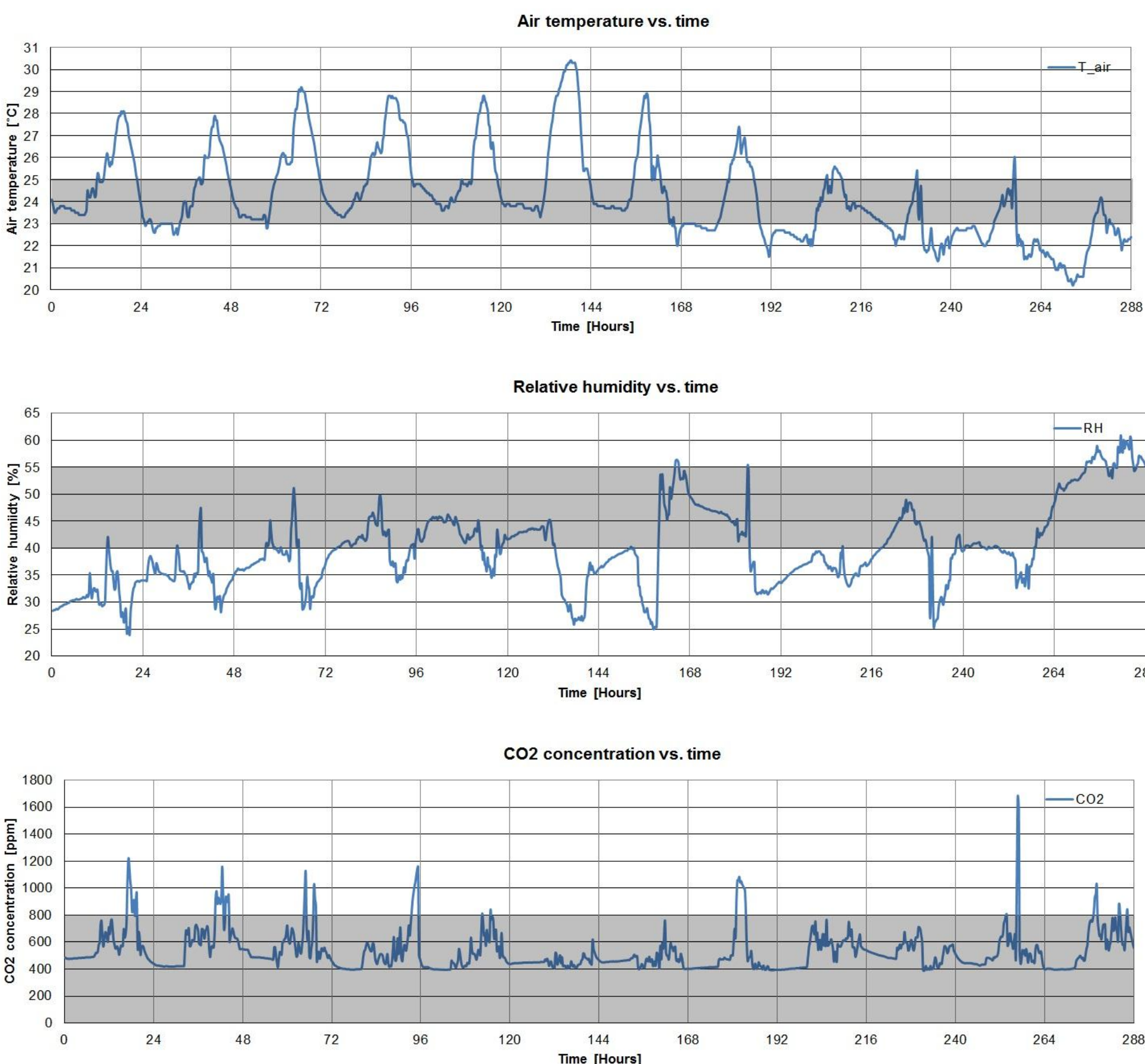
Energy strategy and details of the HVAC system of the Fold

The HVAC system of Fold consists of a combination of well-known technologies and less mature technologies in order to achieve innovative, efficient and sustainable solutions, such as coupling of radiant heating/cooling systems with ground, utilization of photovoltaic/thermal panels, natural ventilation, and direct utilization of hot water in dishwasher, clothes washer and dryer.



Performance of the Fold and conclusions

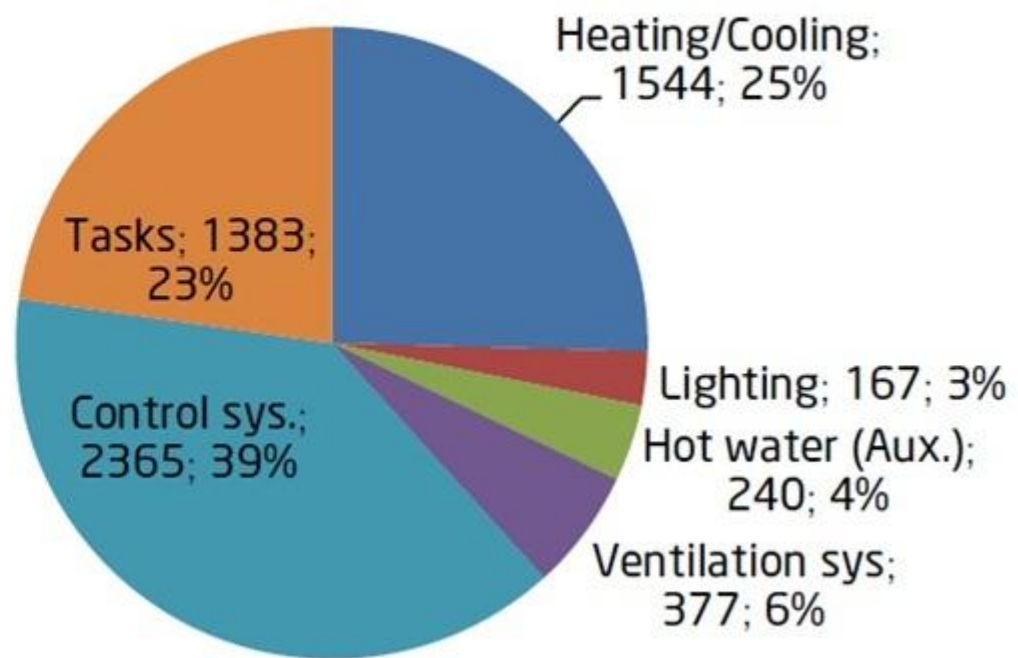
During the competition, indoor climate conditions fulfilled the requirements most of the time and the house produced more energy than it consumed. The simulations show that the house performs as a plus-energy house on annual basis, in Copenhagen and in Madrid. The entire design process led to many different experiences and to many different issues to be investigated. Currently the house is located in Bjerringbro, being hosted by Grundfos, and it is being used as a full-scale test facility. Results from further investigations will be used to improve the next house that Team DTU will design for the next edition of Solar Decathlon in Paris, in 2014.



Annual el. loads division

Madrid [kWh]

Heating/ Cooling	1544	25,4%
Lighting	167	2,8%
Hot water (Aux.)	240	3,9%
Ventilation sys	377	6,2%
Control sys.	2365	38,9%
Tasks	1383	22,8%



Consumption [kWh/m²]/Location	19° to West CPH	19° to West Madrid
Heating	32,6	20,7
Cooling	0,5	1,0
Ventilation	0,7	5,2
DHW	7,2	3,8
Other	5,7	4,4
Total electricity consumption	46,7	35,1
Total primary energy consumption	116,8	105,2
Surplus electricity	65,6	137,0