Master Architecture, Urbanism & Building Sciences, 2013 – 2014
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TiSD certificate

Title: A Net Zero Energy Terminal for Schiphol

Student: Mira Conci 4242718
First mentor: Prof.dr.ir Andy van den Dobbelsteen
Second mentor: Ir. Joris Smits

Reflection

My motivation in architecture is sustainable use of resources. In order to follow this fascination, I decided to work on the topic of energy use in buildings. The choiche of method is an holistic, integrated approach, while the argumentation is both a moral and functional one. The moral motivation is an ethic choice of working for the well-being of present and future generations, while the functional motivation is because buildings that make better use of resources are usually cheaper, last longer and, because of the more intense planning, are more beautiful.

The holistic approach rejects the “triangular” approach in which only two out of three aspects can be fullfilled at the same time. For architecture, usually these aspects are cost, time and performance. For sustainability, people, planet and profit. The holistic approach proceeds from a broader framework inwards until finding a common meeting point, like in an “X” shape. It makes wide use of iterative feedback.

Aspect 1: the relationship between research and design.

Research and design stages influenced each other continuously during my graduation project. Even though I necessarily started in a research phase and ended in a design phase, both have been intermittent along the developement. This is due to the iterative feedback methodology.

Preliminary research has focused on what are Net Zero Energy buildings and why do they need to be implemented. This lead to research on current and foreseen energy generation, distribution and consumption in the built environment. At this stage I chose my location/object and analysed it from the perspective of my subject/study case, so how is the current, standard typology built and managed from the energetic point of view. This linear approach worked well and built strong foundations of knowledge on which to develope my project.

The second phase of research was coincident with the first phase of design. I researched site, climatic aspects and their influence and potentials for passive energy savings. This posed the framework for the holistic approach, it defined boundaries from which to begin “filtering” information and related design choices. During this phase, I applied the holistic approach to research, in order to prepare its application to design, which is more complex. I could already see that integrated strategies allow for a much broader understanding, but need discipline, focus and steadiness to be followed.

The third phase concentrated on architectural design, specifically passive strategies overview and selection, their relation to shape and volume, to architectural program and thermal zoning, to functions and systems, and their integration. During this phase, I mostly used an iterative feedback process along the different “axis” of aspects, until I found the conceptual meeting point. This approach needed a little more time to define and organize. Sometimes it was difficult to wait with some decisions in order to weight all aspects before taking them. When design choices are rushed, with the passing of time and new information arising, it can happen that timely/quality/aesthetically bad solutions have to be either taken care of, or somehow tolerated for the rest of the process. And they add up. It is difficult but rewarding to achieve a balance between giving oneself time to think and weight research and design choices, and working for fast seeking instant-satisfaction results.
The fourth phase was a natural continuation of the methodology for the previous phase. The design focused on technology, so active strategies overview and selection for low-energy systems, use of waste flows, generation of clean energy and their integration. Here again I used an iterative feedback process along the holistic approach of convergent pathways. During this stage following this approach felt easier because of two reasons, first, I had experience with it, second, the narrowing of area around the best solution thanks to discarding unefficient and uneffective choices and combinations of each aspect during the previous phase. This is specifically why an holistic methodology works well, because if you are on the right path, things fit better together, solutions emerge naturally and choices don’t have to be struggled upon but just allowed to happen. During this phase, I could see my building coming together like an organism, and I realized that the cooperation of some systems resembled biomimicry principles, without having specifically steered or forced them into the concept. These findings prove that my approach worked very well. During the third and fourth phase, research has been adding value and supporting decisions to the developement of the project, in such a way that it was difficult to tell where research ended and design started.
Because of the use of iterative feedback, it has been necessary to move back and forth between research,design and also different phases. I have needed steps back to refine and redefine the project, and the specific parameters of feedbacks had to be rewritten

while knowledge and expertise improved. I learned about how much weight to give to different aspects along the way, which meant some of my assumptions had to be revisited. This has been source of both frustration, satisfaction, and, in the aftermath, self-confidence.

Aspect 2: the relationship between the methodical line of approach of the studio and the method chosen by the student in this framework.

Another phase which has been present throughout the design and research is that of engineering, where I researched and apllyied the holistic approach to the structure of my building and its integration on site through physical connections. This added an extra challenge to the topic because engineering is usually not a problem of energy, but the point of chosing an integrated approach against all others is that of making things work together as one, whitout leaving half-solutions or unclear aspects open for the sake of a few pre-chosen ones. Holistic design stands opposite to that architectural trend which decides to focus on a specific characteristic of the building or reaching a specific, unique goal. This latter has the effect of delegating the task of making every other aspect and function work to a series of different professional figures, leaving room to all kind of unefficient wrap-ups.
More than once when meeting difficulties during the developement of my graduation project, I found myself thinking “it’s either doing it right, or not doing it at all”. It was a thought that reassured me that I was on the right track, and boosted my willpower. Sometimes, I stil had to leave out something that had been difficult to achieve, but if I hadn’t tried, I would not have know that it would not have worked.

Aspect 3: the relationship between the theme of the studio and the subject/case study chosen by the student within this framework (location/object).

The theme of the studio is Zero Energy Buildings, which implies aspects of use of resources and climate. The location/object is a satellite terminal for Schiphol Airport. I have read extesively about an innovative idea for an airport terminal and was inspired by their complexity, by the amount of functions that they allocate, the design parameters they have to conform to, and still their need for an iconic value and the most comfortable experience. Zero Energy Building status are yet uncommon but relatively easy to achieve for dwellings, while commercial buildings have a more complex and wider range of opportunities to meet the challenge, and, by far, not all of their categories have been researched in this light. There is at this time no built Zero Energy Terminal worldwide. I was convinced that this was the right challenge to face for my graduation project.

Aspect 4: the relationship between the project and the wider social context.

Reading about the aviation industry, its parts and how each one foresees to meet the future challenge of depleting resources and environmental impact, raised in me contrasting feelings about the thought that it doesn’t matter how damaging or controversial something is, if it’s a pleasure, we will try anything to keep hold on it as long as it’s allowed. It happens with intercontinental flights, heating up our houses, smoking. I also read about Schiphol and found an interesting study case to use for my graduation project, because they are currently in need for an expansion. Since my argumentation also bases on the assumption that buildings that make better use of resources are cheaper, I made a rough profit extimation against a standard solution, using a very linear, matematical approach, and my findings support this assumption.
The wider social context of the environment and its citizens would profit from a building which produces all the energy that it needs, therefore it doesn’t add that source of pollution to the current emissions. Professionists and other figures which are interested in the developement of zero energy buildings will gain knowledge from a case study dealing with an until now non-researched commercial category, especially in sight of the 2020 deadline, from which on all new buildings in the Netherlands will have to be energy neutral. Schiphol Group would gain profits related to increased traffic, even in a larger proportion than for a “standard” non-energy neutral solution, and corporate image.

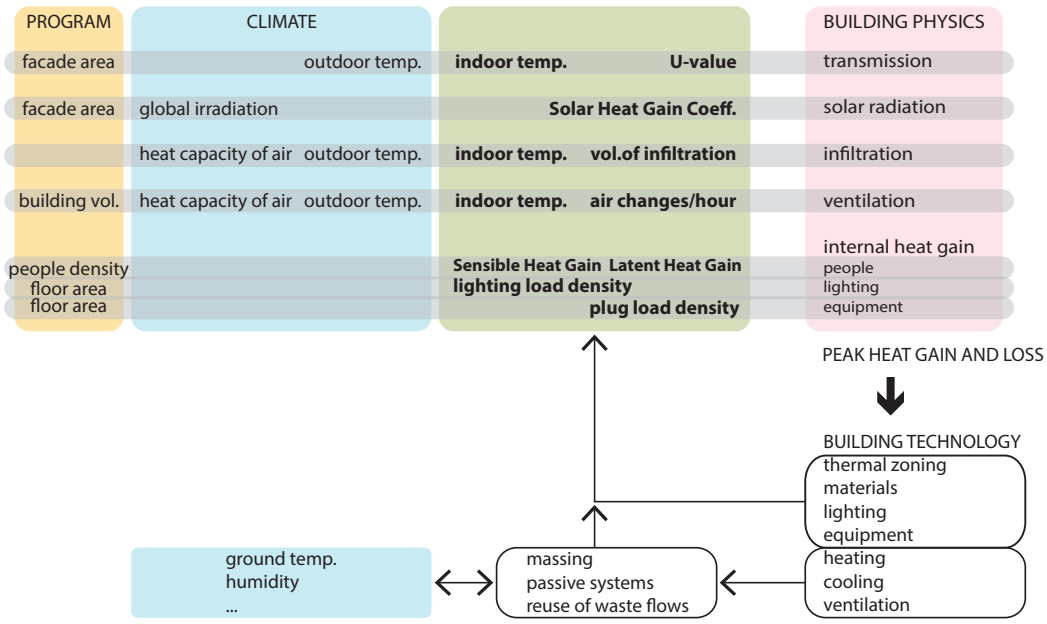

Fig.01: an example of feedback methodology I used in my graduation project