

Reflection

My thesis is part of the sustainable design graduation studio of the master track building technology. This studio focusses on sustainability related topics in the built environment like structural design, façade design and climate design. For my thesis the main topic is energy flat multifunctional urban blocks with a second emphasis on governance implementations. Currently, when intermittent resources are used in an energy system and there is too much production than can be used, the system delivers energy back to the national energy grid. Within energy flat urban blocks all energy is produced using intermittent techniques like solar/wind and directly used within the same urban block as well without delivering back to the national grid. This research in particular investigated how multi functionality could be used to balance out the peaks in both supply and demand of energy to increase the effectiveness of renewable energy production/usage within one urban block. Initially, the aim was to investigate whether multi functionality can be used to provide an energy system with different user profiles and direct energy exchange between functions. With the focus on multi functionality the second emphasis of this research come into play, namely governance. With this focus we can come up with solutions to create an energy flat energy system and to gain knowledge what this implies for governance. Hence, the focus area of my research lies within the climate design emphasis of the sustainable design graduation studio.

At the beginning of my research I immediately decided to use a case study area which is part of the KoWaNet research program of the climate design department. With an actual case study area I was able to use the SUI method as a start for the energy analysis of the area. Moreover, extensive research is previously done on ways to reduce the energy demand within a building. For the balancing I could use a lot of this literature. As mentioned before multi functionality is a key component in my research. However, not much is known in literature about ways to use multi functionality in order to directly reuse energy of these functions and ways they could influence a demand shift. Therefore, I had to perform a lot of calculations/simulations with excel to find out what the impact is of multi functionality for energy flatness, by looking back this part actually took me too long. Moreover, because of the fact that I wanted to focus the governance components on my findings of multi functionality, I started rather late with this research. But by looking back, these calculations where an important aspect of my research.

In the design part of this research an energy system is designed and is based on already existing techniques to produce, store and consume thermal and electrical energy in an urban block. The design within this research is thus rather conceptual/abstract. The research behind this design is of more significant innovation. This research includes and described how the existing techniques could be used more effectively in order to create a more energy flat urban block.

This research does not only create an overview of ways existing techniques could be used more effectively, it also provides an overview of implications energy flatness has on the governance of an urban block. Thus, by reading this research the reader can learn about the technological aspects that they can implement in their own projects and provide the reader with knowledge about what energy innovation implies for governance.

Currently in society there is a problem with delivering back of intermittent renewable energy to the nation grid. The grid cannot handle the large peaks the intermittent resources create in the grid. With implementing the concept of energy flatness in more projects these peaks on the national grids will be reduced and therefore, this research can help society to become more future proof.