

# P4 Reflection

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## (1) The relationship between research and design

This project follows the research-based design methodology. The research part - including problem statement, theoretical framework, and methodology framework - is the theoretical foundation of this project: the problem statement clarifies the present status and the main problem to be addressed; the theoretical framework chapter defines the position of this research in relation to existing theories; the methodology framework then discusses the steps and methods to be followed. The scenario building chapters are a combination of research and design. These chapters discuss the quantitative employment impact, as well as analyze and calculate the potential of existing renewable energy solutions. The analysis and calculation then supply a base, upon which quantitative and qualitative renewable energy scenarios are delineated. The scenarios are then transferred and combined as the basis for designing sustainable urban codes.

## (2) The relationship between my graduation (project) topic, the studio topic, my master track, and my master programme.

The topic of this project is investigating the potential of renewable energy in a certain post-petroleum oil city. The theme is directly related to the topic, urban metabolism, of my research group, in the aspect of energy flow analysis and renewable energy production. This project also agrees to another idea of the research group: 'spatializing urban metabolism'. The research object of urban metabolism, namely the energy and material input and output is rather abstract. This project then makes concrete spatial analysis and interventions based on urban metabolism research.

Master of science requires the spirit of exploration and academic attitude, while the role of urban planners and designers is investigating the spatial aspect of the built environment. This project explores these multiple roles during its research-based design process: it attempts to be both creative and evidence-based.

## (3) Elaboration on research method and approach chosen by me in relation to the graduation studio methodical line of inquiry, reflecting thereby upon the scientific relevance of the work.

In the initial stage of my research, my mentors helped me to understand the interrelationship among problem statement, theoretical framework, and methodology. These chapters demonstrate the results of the literature review: existing theories, methods and insights relevant to the research topic, as well as information on the present status of the selected city are investigated and summarized. My mentors' guidance also helped me clarify different schools of scenario building, which is introduced as a research method to deal with future uncertainties. The scenario building chapters collect and analyze secondary data from multiple sources. Mapping, as a common research technique, is used to track the spatial limitations, potentials, and suitabilities of renewable energy production. Regarding scientific relevance, this project studies the possible energy and economic transition of an oil city in the post-petroleum era, exploring the possibility of combining energy landscape theory and scenario planning in a post-petroleum urban plan.

(4) Elaboration on the relationship between the graduation project and the wider social, professional and scientific framework, touching upon the transferability of the project results.

The on-going energy transition is not only an energetic problem but also a social-economic challenge to an oil city like Daqing. This project discusses a common unfavorable condition that energy-exhausted cities are faced with: the city loses its pillar industry, which further leads to mass unemployment and population loss. The project explores the possibility of introducing renewable energy industries as a catalyst to a post-petroleum oil city; discusses the potential of triggering its economy while improving spatial quality. This approach also applies to other resource-based cities that are suitable for developing renewable energy. Such cities can properly use remaining resources to fund their transformation into renewable energy hubs.

(5) The ethical issues and dilemmas I have encountered in (i) doing the research, (ii, if applicable) elaborating the design and (iii) potential applications of the results in practice.

This project helps me realize the social inequality in the energy and economic transition: different income groups have different abilities to cope with the transformation. In the face of the economic deterioration, mid-class families and youngsters can simply avoid social problems by leaving the city; while low-income groups and seniors are more vulnerable and have less ability to improve their unfavorable situation. Furthermore, the market penetration of renewable energy can create new inequalities: high-income groups always have more choice to avoid the visual effects of renewable energy facilities. Urban design and planning play a minor role in solving such social and ethical problems without policy support.