

Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences



Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
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Studio	
Name / Theme	Complex Cities
Teachers / tutors	Vincent Nadin
Argumentation of choice of the studio	Complex cities studio researches spatial planning and strategic design within the built environment. This is related to the scope of my project. Furthermore, their expertise on comparative research aligns with the methodological framework of the study.

Graduation project	
Title of the graduation project	Laying the roadmap for Energy Transition in Dubai
Goal	
Location:	Dubai, United Arab Emirates
The problem field	Dubai's rulers envisioned the creation of a global center for trade and an international-quality tourism destination leading to rapid growth of the city since the late 1980s. The discovery of oil in 1970s brought about this pattern of development and construction boom in the city. However, the spread of the urban area was accompanied by high levels of resource consumption leading the United Arab Emirates (UAE) to becoming the 7 th highest consumer of energy worldwide ¹ . This is not surprising as economic sustenance and spatial expansion of the city is based on

¹ <http://oilprice.com/Energy/Energy-General/The-Worlds-10-Biggest-Energy-Gluttons.html>

	<p>profits from oil discovery. Today, 8% of the world crude oil reserves lie in the UAE² and a half of the exports of the country are contributed from petroleum products³. The economic contribution of carbon based fuels in UAE is central to the debate of transitioning to renewable energy.</p> <p>Sustainable infrastructure and environmental development are among the key factors addressed in the national agenda – The UAE Vision 2021⁴. The country has set targets to use cleaner sources of energy as a response to this vision and influence of global goals for sustainable development by international bodies such as the United Nations (UN), Organization for Economic Co-operation and Development (OECD) and most recently COP21 in Paris.</p> <p>In response to the UAE Energy Strategy 2050 revealed in January 2017, Dubai, the most populous city in UAE⁵, has pledged to make the shift to 75% clean energy sources with 44% being contributed from renewable sources of energy⁶. In the United Arab Emirates (UAE) and Dubai, sustainable development it is a part of the vision of every government body. For instance, Dubai Municipality – the main governmental body for planning and development in Dubai- projects a vision for developing a 'Sustainable and Happy City'⁷. The Roads and Transport Authority (RTA) of Dubai has one of its strategic goals as 'ensuring environmental sustainability for transportation'⁸. The Ministry of Climate Change and Environment, which is a federal body, describes its vision as 'assuring environmental sustainability for life'⁹. These are relatively</p>
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² http://www.opec.org/opec_web/en/data_graphs/330.htm

³ The Observatory of Economic Complexity (OEC), 2015 statistics.

<http://atlas.media.mit.edu/en/profile/country/are/#Exports>

⁴ <https://www.vision2021.ae/en/national-priority-areas/sustainable-environment-and-infrastructure>

⁵ <https://www.dsc.gov.ae/en-us/Themes/Pages/Population-and-Vital-Statistics.aspx?Theme=42>

⁶ <http://www.aljazeera.com/news/2017/01/uae-invest-163b-renewable-energy-projects-170110160613154.html>

⁷ https://www.dm.gov.ae/wps/portal/!ut/p/a1/04_Sj9CPykyssy0xPLMnMz0vMAfGjzOINPS1MDJ38Dbz8A41NDRyNzJ1NnT2CjN0tTIAKInErMHA3Ik6_AQ7gaEBIf3Bqnn64fhQ-ZWBXgBXgsaYgNzSijwNdEQAWLmmC/?1dmy¤t=true&uril=wcm%3apath%3a%2FDmContentEnglish%2FHome%2FAbout%2BDm%2FMission%2Bvision%2Bvalues%2F

⁸ https://www.rta.ae/wpsv5/links/RTA_Strategy_Plan.pdf

⁹ <https://www.moccae.gov.ae/en/about-ministry/mission-and-vision.aspx>

	<p>new goals which have been formed in the last decade (or even less). This illustrates that Dubai is trying to divert from its previous patterns of fast growth and envisioning a 'futuristic' or 'progressive' city.</p> <p>To complement the goals of the Energy Strategy 2050, the UAE announced that it would invest \$163bn in funding new projects that deliver renewable energy¹⁰. The new projects will focus on production of energy from alternative sources such as solar and nuclear power. This will reduce the need for energy to be produced entirely by fossil fuels. However, apart from making large financial investments in changing the energy mix, there needs to be an emphasis to change current consumption patterns. Currently, the UAE is ranked 7th amongst the countries that have the highest per capita consumption of energy¹¹. Shifting to renewable sources of energy, conserving energy use and increasing energy efficiency go hand-in-hand while addressing the energy transition¹². Thus, educating and encouraging local businesses and residents to reduce consumption and change their lifestyle choices is an inevitable part of a successful energy transition. Yet there is no announcement of investing in national projects to do the same.</p> <p>The public sector can successfully implement policies if there is an acceptance of initiatives among the private sector and the civil society. There are two primary aspects that the public sector needs to take into account for this; the economic implication of proposed initiatives and the involvement of residents in the decision making process¹³. People need to believe that they are the direct beneficiaries of financial gains or reduction in cost of these initiatives. Moreover, the likeliness of residents to participate in new projects/initiatives is higher if the public sector is consistently interacting with residents during the process of formulating initiatives. Currently, this is not</p>
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¹⁰ <http://www.aljazeera.com/news/2017/01/uae-invest-163b-renewable-energy-projects-170110160613154.html>

¹¹ <http://oilprice.com/Energy/Energy-General/The-Worlds-10-Biggest-Energy-Gluttons.html>

¹² IPCC Fourth Assessment Report, 2007

¹³ Jan Zoellner, Petra Schweizer-Ries, Christin Wemheuer. 2008. Public acceptance of renewable energies: Results from case studies in Germany.

how the public sector in UAE is choosing to project these ideas. Also, the current planning system does not accommodate for resident engagement while framing policies.

Another layer of complexity is added to the problem due to the fragmented system of governance. For example, there are at least 13 government organizations apart from the Dubai Municipality administrating about 60% of the urban area¹⁴ (fig 1). Each institution owns the development rights to the area they administrate and coordinate with the Dubai Municipality only on regulations related to food, public safety, food control and environment¹⁵. Each governmental body adopts its own policies towards 'sustainability'. This disintegrated spatial governance poses a big challenge to develop a unified roadmap to achieve the set targets in the latest Energy Strategy.

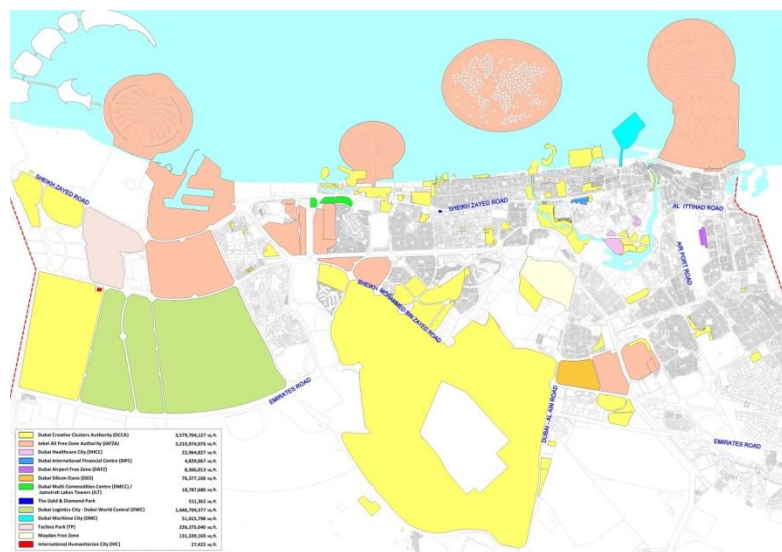


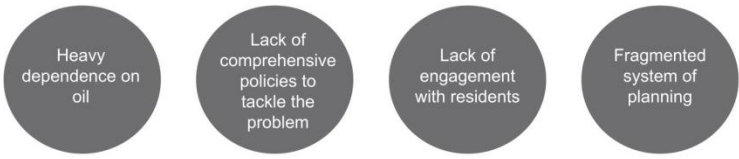
Figure 1 - Administrative jurisdiction of different institutions in Dubai. Source: DCCA

Problem Statement

The long standing economic dependency on fossil fuels as a driver of growth in the UAE is undeniable. The fragmented system of governance and lack of resident engagement in the process of devising energy initiatives to make the shift to renewables, poses a big threat to the successful implementation of these policies. To achieve

¹⁴ Information from Dubai Creative Clusters Authority (DCCA)

¹⁵ Law no. (15) 2014 concerning Creative Clusters in Dubai, UAE

	<p>the targets as set by the latest energy strategy (UAE Energy Strategy 2050), recognizing this dependency and lack of integrated planning has never been more urgent.</p> 
<p>Research questions</p>	<p><i>Main research question:</i> In the context of spatial planning, what processes can Dubai government improve to advance the energy transition in the UAE?</p> <p><i>Sub-research questions:</i> <i>(Theoretical Research Question)</i></p> <ul style="list-style-type: none"> • What is the relationship between spatial planning and the energy transition? • What are the criteria for 'good' spatial planning policies to facilitate the energy transition? <p><i>(Analyzing Dubai)</i></p> <ul style="list-style-type: none"> • With respect to energy production, consumption and distribution, how does the existing spatial planning in system in Dubai work? • What are the existing national (UAE) and municipal (Dubai) policies related to the energy transition? <p><i>(Comparative analysis questions)</i></p> <ul style="list-style-type: none"> • What are the spatial planning policies in other cities that are already on the path of moving away from fossil based energy? Are they good? • What lessons can we learn from urban energy policies in other cities and transpose them to the context of Dubai?
<p>Design assignment in which these result</p>	<p>Designing a process that can be adopted by different stakeholders, and lies at the intersection of spatial planning and energy technology is an envisioned end product.</p>

Process

Method description

Figure 2 (next page) shows the proposed methodological framework. Divided into three parts, each step responds tries to answer the above research questions.

Theoretical Framework

This step forms the theoretical backbone that links spatial planning to the energy transition in cities. A review on key concepts, definitions and ideas substantiates the role played by spatial planning to address the energy transition in an urban environment. Theory is also the base for defining what aspects are 'good' about urban energy policy making.

Analysis

The first part of the analysis looks into the existing spatial planning system in Dubai through the lens of energy production, consumption and distribution. It lays out the context of the project area and scope of study. The comparative analysis of energy policy making in different cities will result in learning lessons for Dubai. The policies will be evaluated against the criteria derived from the evaluation framework in the theoretical framework.

Transpose

The learning lessons from the comparative analysis will be transposed to the context of Dubai to give recommendations for the energy transition in Dubai.

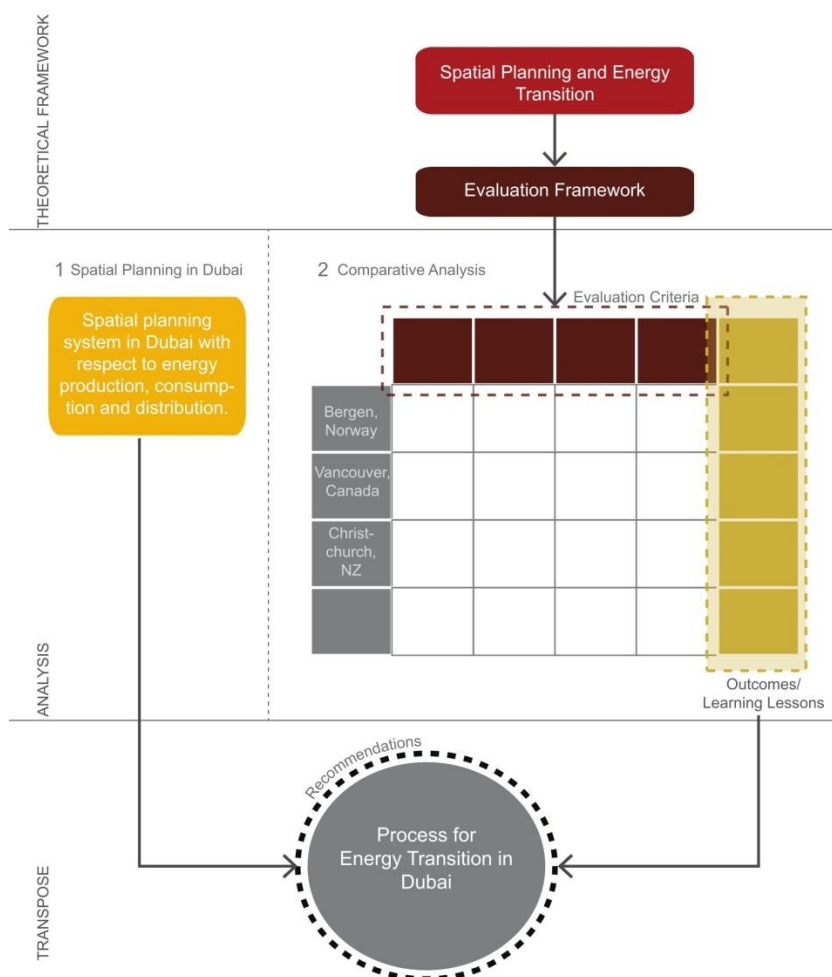


Figure 2 – Proposed methodological framework

Literature and general practical preference

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Reflection

Relevance

Societal Relevance

Societal response is crucial for the realization of initiatives to shift from fossil based energy in Dubai. Apart from moving to renewable sources to produce energy, energy efficiency and conservation of energy are critical. This involves shifting resident's mindset and lifestyle choice to leave a smaller carbon footprint for the collective good of the city. This cannot be

achieved without engaging and educating residents and local businesses to make better choices. The current policy making system does not accommodate for resident engagement in the policy making process. Once finalized, regulations and laws are presented to the public for implementation. In the case of implementing green energy initiatives, this lack of engagement leads to lack of awareness and disinterest amongst people to follow through. Since a big part of energy conservation and energy efficiency efforts are dependent on resident behavior, it is important for urban planners to be able to address this in spatial planning initiatives.

Scientific Relevance

Energy systems are closely related to urban environments. The influence of spatial planning to change existing energy systems is a growing field of research since the last few decades. Through my thesis, I want to contribute to this discourse about spatial planning frameworks that impact the process of this change.

Different cities have responded to the challenge of shifting energy systems and implementing energy efficiency schemes in different ways. The governance system, citizen engagement, local culture, climate and decision making process, impacts the outcome of spatial interventions. To be able to influence change it is important to understand the performance of these systems, and to be able to differentiate between what worked and what didn't. A strong evaluation framework based on thorough literature review will contribute to deriving learning lessons for Dubai through international comparative analysis.

Time planning

