

Organization / Institutions / Governance

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Chair

Daniel Scholten

Presentation 1

Spatial planning measures for the urban energy transition

Developing energy strategies for cities to make the shift to more sustainable, efficient and clean energy systems

The Paris Agreement which entered into force in November 2016 recognizes the need for a 'cleaner and more efficient energy system' as a core policy goal. To this date, 170 countries have ratified the Paris Agreement and have committed to decreasing GHG emissions and adopting strategies to improve energy efficiency, promote renewables and incentivize residents to reduce energy demand. Although these strategies propose actions that will influence the urban fabric, they don't illustrate this impact or show where change will occur. Moreover, urban development plans don't explore the potential to reduce energy consumption through changes in land use, building form or public realm design. The organization of space in urban areas can contribute to the efficiency of energy systems and can help with the energy transition in cities. Spatial or urban planning is the main tool that governments use to influence urban form and development and must consider the energy question. Planning should set the policy tone to challenge current norms that are not energy efficient and facilitate a process for developers, urban designers and architects to work within. This paper puts forward spatial planning measures to make the shift to a low-carbon energy system in urban areas. These measures have been built by a literature review and a comparative analysis of the energy strategies and urban development plans of 4 cities – Vancouver, Oakland, Hong Kong and Oslo. The proposed measures are broadly classified in two categories – transportation and land use planning, and building form. This set of measures considers energy infrastructure and can be used by cities as a tool to develop an energy informed urban development strategy. Energy strategies should have a goal to not only reduce GHG emissions but also increase spatial quality and promote long term environmental sustainability. The conclusion of this paper emphasizes the need to link energy strategies with urban development plans and proposes a way in which this can be achieved.

Key words: Energy transition, comparative analysis, spatial planning process, energy strategy

This paper will be based on the research results of the graduation thesis for M.Sc Urbanism at the Faculty of Architecture and the Built Environment, TU Delft, completed in July, 2018 titled 'Spatial Planning for the Energy Transition'.

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Presentation 2

The Energy Transition beyond technology: Why designers and engineers should work together towards Climate-responsive Urban Design.

Abstract: The environmental crisis and the depletion of fossil resources have influenced our planet and our lives, from economic crisis to extreme weather conditions such as storms and floods, to name a few. This multifaceted crisis is rendering the transition towards sustainable energy inevitable. Scientists and technology experts have already been progressing immensely in renewable energy technologies. Prices are dropping and the fossil giants are investing in renewable technologies. As a result, there is a prevailing perception among practitioners that the current crisis will be resolved solely by technological advances. However the transition is more complex than simply the adaptation of new technologies, it is essentially a transition between different eras. The fossil era with its invisible and abundant energy supply shaped lifestyles and urban forms. It alienated users and practitioners of the built environment from the importance of climate and its pro-fossil link to energy generation and conservation. Therefore, there is a need to go beyond technology and explore the potential of a collaboration between urban designers and engineers. This collaborations needs to create the missing link between urban morphology, micro-climate and energy demand and conservation. Namely, parameters of urban morphology affect the behaviour of micro-climatic conditions which directly affects how much energy buildings will use to retain comfort within. Aim of this paper is to locate the points of intersection between parameters of urban morphology and building energy use, and using existing principles of physics and engineering to show how we can decrease the energy demand on the urban design level before even the design of a building takes place. In doing so, there is firstly the need of tracing the existing gap between the different disciplines. Then, within the overarching framework of Sustainable Urban Design, to provide with insights as to how and on which focus areas it should be bridged. Given the broadness of Sustainable Urban Design, a new framework of climate-responsive urban design is studied.

Keywords: urban energy transition, sustainable urban design, urban form, engineering, technology, transdisciplinary

Presentation 3

Cycling Valencia: The role of the new mobility policy in the city energy transition

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Urban areas are of increasing relevance when it comes to sustainability for the increasing population living in cities, for being responsible for high levels of resource consumption and waste generation and for being more vulnerable to disruptive events and to changes on the environment caused by climate change. However, because they concentrate key resources (political, social, cultural...) cities are also seen as strategic scenarios where to experiment and develop solutions to mitigate and adapt to the prevailing sustainability challenges driven by the major social and environmental transformations.

There are little doubts that the centrality of cities regarding sustainability is gaining attention as there is the “*belief that environmental issues are increasingly urban-based and that environmental issues are central to the urban condition*” (Benton-Short et al., 2013:17). Consequently, to achieve sustainability, far-reaching changes along different dimensions (technological, material, organisational, institutional, political economic and socio-cultural) have to occur. After the Club of Rome *Limits to Growth* questioning of the relationship between finite resources and growth (both economic and population), the Brundtland Report *Our Common Future* together with Rio Summit of 1992, frame the change in viewing cities not only as a problem but as part of the solution (Hodson and Marvin, 2014). As an example, the Local Agenda 21 established that:

Because so many of the problems and solutions being addressed by Agenda 21 have their roots in local activities, the participation and cooperation of local authorities will be a determining factor in fulfilling its objectives. Local authorities construct, operate and maintain economic, social and environmental infrastructure, oversee planning processes, establish local environmental policies and regulations, and assist in implementing national and subnational environmental policies. As the level of governance closest to the people, they play a vital role in educating, mobilizing and responding to the public to promote sustainable development. (28.1.)

Living with finite resources and the impact of climate change is also one of five basic challenges pointed out by Hall (2014) next to rebalancing urban economies, building new homes, linking people and places and bringing public and private agencies together. Some authors claim for a new model of cities:

“in an eco-city, it is believed that the environment will be properly protected and maintained while the society and economy develop smoothly, which promotes human development [...] humans must develop in harmony with nature to realize their own sustainable development.” (Su et al., 2013: 4-5)

There is however a considerable agreement about what needs to be done, but not in how to achieve it. As it has been pointed by Hall and Ward “*the problem is the next stage: to translate these objectives into workable strategic frameworks and plans for real places*” (Hall and Ward, 2014:144). In the same direction Beatley points when talking about United States that “*many cities have embraced the goals and visions of sustainability, but are not entirely sure how to reach them and are hungry for new ideas, tools, methods and models*” (Beatley, 2012:2). It is therefore clear that Ecological Urbanism “*has need of innovative conceptual models, design methods, professional alliances, environmental technologies and a much greater degree of articulation*” (Hagan, 2015:3).

In this work we focus on the role of cycling in city mobility transition as a case of governance of complex innovation systems where human activities, in their different dimensions, can be shaped in order to transform societies towards sustainable development. The innovation system and sustainability transitions approach identifies the agents and its connexions in different contexts such as territories, sectors or technologies allowing an improved understanding on how innovation

towards sustainability transitions function and how can it be achieved. This literature can, by adopting a multilevel systemic approach to the study of urban areas, provide an innovative approach to understand urban processes such as mobility, for the transition to a more sustainable future. As defined by Markard and col.:

“Sustainability transitions are long-term, multi-dimensional, and fundamental transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption” (Markard et al., 2012, pp. 956)

We therefore assume that: i) there exist limits to economic growth as it is understood in mainstream politics and mainstream economics; ii) an important part of the scientific community, together with other social actors, agree on demanding big changes on development strategies in order to reconfigure our societies according to sustainability; iii) to achieve sustainability, far-reaching changes along different dimensions (technological, material, organisational, institutional, political economic and socio-cultural) have to occur; iv) governance of urban areas can be conceived as complex and interrelated systems where their social, economic, political, cultural, physical and environmental dimensions can be analysed as innovation systems the performance of which can be analysed.

For this research a medium size city, Valencia in Spain, has been selected. Valencia, with 791.632 inhabitants in 2016, is the capital of a relatively populated and urban autonomous region in Spain, located by the Mediterranean Sea in the south-west of Europe. In line with Markard and col. (2012) we understand that cycling and transportation can be conceptualized as socio-technical systems (see for instance Gabaldón-Estevan & Kaufmann, 2016). For this research a mix method approach, including secondary data analysis and interviews, will be applied to analyse the important change in the mobility policy of local authorities in recent years.

In order to understand the role played by cycling in the city environment we focus our analysis in eleven areas. The first four (left-hand side of diagram) refer to the inputs needed for the city life with particular emphasis on energy consumption, air, land and water consumption. The second four (right hand side of diagram) are related to outputs – air, water and noise pollution, and soil pollution and waste generated in the city or because of city needs. The last three (bottom of the diagram) are related to contextual aspects affecting the innovation activity within urban sustainable development performance - the legal framework, the legitimacy of the initiatives, and market evolution regarding new or existing solutions. Environmental legislation, legitimacy and market evolution have been highlighted over other functions, because they are the most central in understanding innovation activity within urban sustainable development.

In order to structure the interviews for the field work we follow the technological innovation systems and sectoral innovation systems approaches.

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Presentation 4

Intelligent Transport Systems in urban China: driving decarbonisation?

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Keywords: decarbonisation, transport, smart city, intelligent transport systems, China

Addressing the drawbacks of mass automobilism is becoming increasingly pressing in Chinese megacities. *Intelligent Transport Systems (ITS) emerges as lucrative solutions for municipal governments, requiring little impact on citizen's daily activities and relatively low investments in physical infrastructure. This paper will review the growing body of literature on ITS in China and beyond. Against the backdrop of perspectives from Science and Technology Studies (STS) and sustainability transition perspectives, the paper explore recent trends in ITS development in China, through analysis of government web sites, existing literature and news reports. In particular, the paper utilizes the multi-level perspective (Geels, 2002) to understand the role of different actors in this development. The first set of actors, start-ups such as ride-hailing company Didi Chuxing and dockless bike-sharing company Ofo, that have grown from niches to capital incentive big data companies in few years. Recently, some of these start-ups have become partners in the municipal*

government's efforts to smarten transport systems through AI-systems. The second set of actors, ICT companies such as *Tencent* and *Alibaba*, are understood as *adjacents actors* from Internet retailing and social media, which enter the transport sector (focal sector) through heavy investment. ITS is highlighted as a promising niche with relatively high momentum for challenging unsustainable transport systems. However, whether these companies will challenge the automobility regime, or be swallowed up by it, remains an open question. The paper aims to question the space for decarbonisation between corporate strategies and municipalities' sociotechnical imaginary. As well as presenting initial considerations and reflections on what competing motivations exist to implement ITS, and to what extent these motivations may lead to decarbonisation through the timely increase in non-Western empirical contributions to the field. Thereby, also enhancing our understanding of digitalization through smart grid, artificial intelligence and blockchain technology.