



The role of international actors in low-carbon transitions of Shenzhen's International Low Carbon City in China

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ABSTRACT

This study looks into one of the most promising low carbon city planning initiatives in China, namely Shenzhen's International Low Carbon City (ILCC). First as a collaborative project between the Dutch and Chinese partners, the ILCC's international partners have expanded to include other countries, such as Germany, Italy, France, Australia and the US. This paper investigates the influence of these international actors in the development process of the ILCC and their benefits in the long run, through knowledge transfer and accumulation of resource.

The paper first highlights a broad understanding of 'low carbon city' followed by detailed discussions on discourses of 'low carbon city', 'eco-city', and 'low carbon eco-city' in China. Then it provides insights on knowledge transfer in low carbon city development, and particularly the Sino-Foreign cases of China. The authors then introduce the case of study (ILCC) and highlight its visions, project planning, and partnerships. Using primary and secondary data, it then maps the ILCC's international actors and their roles, and then analyses their behaviours and impacts in the project's planning and development process. Next, the paper summarises the research findings with further updates on the case of ILCC. The authors conclude that the engagement between Chinese and international partners differ in three forms and they are (1) the type of involvement; (2) the level and timeframe of involvement; (3) the level of influence in the project's multiple stages. The paper concludes that the role played by an international partner evolves as the project proceeds.

1. Introduction: understanding 'low carbon city'

The Kyoto Protocol of 2002 which explicitly mandate carbon dioxide (CO₂) reduction and climate actions plan saw the inception of the concept of 'low carbon city'. Interpreted as part of the 'growing demand of carbon reductions and climate change alleviation of cities' (Tan et al., 2017, p. 1920), Low Carbon City (LCC) is seen as exemplifying urban sustainability by reducing environmental emissions such as CO₂ and promoting cleaner productions (Fu & Zhang, 2017). Regarded as one of the emerging modes of sustainable development through a more transitional process, the LCC opens up a variety of low carbon practices at multiple scales (Gomi, Shimada, & Yuzuru, 2010; Su et al., 2013). Therefore, the LCC model explores the methods of operation mechanism and setting the low carbon agenda, benchmark and target plans for decarbonisation of cities (Yao, Luo, & Zhang, 2013). It also benefits from sustainability certification guidelines that are utilised mainly for setting goals and promoting multifunctional compromise solutions to urban design processes (Jensen, Bjerre, & Mansfeldt, 2016). Moreover, low carbon approach such as the energy and carbon

modeling have been integrated in policy considerations in LCC development (Phdungsilp, 2010). Hence, LCC is seen as a good way to address the environmental problems incurred during the industrialisation and urbanisation process, and thus has been embraced in developing countries such as China.

The concept of LCC is linked to the idea of Low-Carbon Economy (LCE), a circular economy mode of development, which uses less fossil fuel and is aimed to provide a decarbonised mode of development. Similarly, Cheng, Zeng, and Fang (2012) also relates LCE with low carbon society (LCS) as methods that are put forward from the perspective of global action and national practice, which extends the relevance of low carbon agenda to multiple scales. Moreover, they refer to LCC as a 'space carrier' of the concept of low carbon, which provides a platform for LCE and LCS practices (*ibid*). Hence, many cities integrate low carbon development into their city planning agenda and have conducted a variety of low carbon experimental city planning projects. Many researchers refer to these projects as 'transition experiments', whereby a high potential of transition is expected from a business-as-usual scenario towards a low carbon development (Hu, 2017; Raven,

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Van den Bosch, & Weterings, 2008; Rotmans & Loorbach, 2006; Williams, 2016). These cases could differ from one another depending on the mode of development adapted by the specific government and stakeholders groups. Nevertheless, the determinants of LCC development remains central to the goals of ‘sustainable city’ thinking (Cheshmehzangi, 2016b). In this respect, such implemented ‘transition experiments’ create an opportunity for potential scaling-up projects that would then fulfil the goals of CO₂ reductions and creates sustainable built environments.

According to Climate Co-Lab (2015), the characteristics of LCC usually include five sectors as the main pillars of transition and adaptation strategy, namely: ‘Energy’, ‘Buildings’, ‘Transportation’, ‘Industrial’ and ‘others’. This strategy is utilised for the planning and regulating climate change adaptation and resilience. Apart from the involved sectors in LCC, we could summarise that LCC is comprised of three main dimensions, namely:

- I. Low carbon governance - which includes the institutional factors, planning ideas and any relevant management that comes under the low carbon practices and the idea of LCE;
- II. Low carbon energy - which mainly refers to the practice of decarbonisation process, reduction of carbon emissions, and optimisation of energy systems;
- III. Low carbon production and consumption - which mainly refers to low carbon lifestyles, educating the society and the idea of LCS.

Key Performance Indicators or KPIs, are often used to gauge if the practice of LCC fits into a sustainable framework, or a ‘Low Carbon City Framework (LCCF)’ (Tan et al., 2017). In their research on defining scalable solutions for carbon neutrality and climate stability, Ramanathan et al. (2016) propose a more comprehensive and scientific structure of what low-carbon city may represent, including several scalable solutions, starting with the central ‘carbon neutral’ or ‘low carbon progress’, and then into defining the major dimensions of: societal transformation, governance, market incentives, regulations, technology measures, and eco-system management. Here, the complexity of low carbon development or LCC is demonstrated from multiple sectors and actors, and how they may reflect on the actual progress over a certain period of time.

In this paper, we look at Shenzhen International Low Carbon City (ILCC), a low carbon city experiment in southern China. The ILCC project has been selected here mainly due to its national status as a major ‘National Low Carbon Pilot City’ “project”, which exemplifies the country’s proliferating low carbon initiatives; and that it has attracted global attention and engaged with a variety of international actors. The latter makes the case of ILCC very unique among the Chinese LCC projects. It also has direct support from the central government in the project’s inception and in the promotion of the annual International Low Carbon forum held on the project site (last one was in September 2017 as the fifth annual event), which will be discussed in the later sections. In this paper, we question the role of global actors on how they could influence the development of the ILCC project. We do this by exploring (1) the roles and outcomes of the various international actors involved in the ILCC planning and development process; and (2) the approaches and modalities of their engagements. The methods are discussed in the methodology section and are summarised in Fig. 1.

The next section firstly provides an overview of ‘low carbon city’, ‘eco-city’, and ‘low carbon eco-city’ development in China. We mainly focus on how low carbon practices influenced - or are still influencing - the planning processes of the low carbon city pilot cases in China. Section three then analyses the ‘knowledge transfer’ between international and local actors in low carbon city development, a specific model that is seen across China for the past 10–15 years. Section four discusses the methods and approaches adopted in this paper. In section five, we then contextualise our case study of the ILCC, followed by a mapping study of various international actors in the project. Section six then

looks at the differing roles of these international actors through the temporal lens of five categories and three stages of development in the ILCC project. The paper concludes by providing an overview for the role of international actors in the ILCC’s development and transitions.

The main contributions of this paper are: (a) the mapping of the ILCC’s international actors and their low carbon initiatives of the project; (b) the analysis of actors’ engagement in the project and (3) a current update of the ILCC development. This paper contributes first-hand knowledge to the existing literature, by providing an extensive analysis of the ILCC project and adds value to knowledge gap on the multiple partnerships and international actors’ involvement in this on-going - but progressing - project in China.

2. ‘Low carbon city’, ‘eco-city’, and ‘low carbon eco-city’ in China

As cities are one of the leading emitters of CO₂, the need to decarbonize cities is undebatably placed in the forefront of climate change mitigation policy. The earlier concept of ‘eco-city’ has undergone significant change due to the climate change discourse, and is now framed by an increasingly strong ‘carbon discourse’ (Joss, Cowley, & Tomozeiu, 2013). This carbon discourse has entered the policy and public arena, and urban sustainability concepts and initiatives, with terms such as “low carbon city”, “low carbon zones/districts”, “carbon neutral city”, and “zero carbon city” (ibid.). Although the academic literature tends to demarcate “low carbon” and “eco” initiatives as some argue that “low carbon city” tends to be more on energy issues and show more rapport with engineering and economic thought (de Jong, Joss, Schiraven, Zhan, & Weijnen, 2015), many policy-makers see “low carbon city” and “eco city” as largely the same thing, and thus are interchangeable in practice. In China, the term “low carbon eco-city” has been coined to blend the low carbon planning and the eco-city initiatives (Yu, 2014). It is argued that low carbon eco-cities now are potentially a new approach and a mainstream strategy for future Chinese urbanisation and industrialisation process. As such, “low carbon city” as a related sister term of “eco-city” falls into the broader discourse of “sustainable development”.

As evidenced in the 11th, 12th and the current 13th five-year plan of China, there is a growing emphasis of the central government on actively promoting LCC development. Also, based on the findings of Cai et al. (2017)’s recent study on the general perception of LCC in China, the increase in awareness and popularity of LCC is significant in recent years (between 2010 and 2016), and the number of scholarly work and literature has developed immensely in China. The number of pilot projects, national initiatives and local agenda on low carbon city has increased significantly in the same period of time. Since 2010, cities have become a central attention to low carbon development in China is due to two reasons, first their vast administrative size with large concentrated populations, and second their impactful industrial nature and widespread redevelopment and infrastructure construction (Cai et al., 2017). This is mainly because cities contribute a large proportion of CO₂ emissions in China (Cai & Zhang, 2014) due to their consumption and production trends. Globally, a similar trend is also seen in other developed and developing countries (IEA, 2009). Consequently, cities became the main battlefield for the decarbonisation actions after the ‘Paris Agreement’, which is adopted with consensus in late 2015 (Cheshmehzangi, 2016a). Ever since, the attention to the discourse of ‘Low Carbon’ has grown further.

As early as the late 1990s, China has implemented Greenhouse Gas (GHG) emission reduction plans due to its rapid urbanisation rate and the subsequent negative impact on the environment. During the early 2000s, the global attention on CO₂ reduction reshape China’s perspective and role on this agenda. In 2007, after the initiation of the Asia’s proposal for Low-Carbon Model Towns (LCMTs), China began to play an even stronger role in low carbon initiatives, and particularly in low carbon city planning. This is evidenced by Meixi Lake Eco City project, an earlier national flagship project in Hunan Province, as it

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