View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by WestminsterResearch

UNIVERSITY OF FORWARD THINKING WESTMINSTER

WestminsterResearch
http://www.westminster.ac.uk/westminsterresearch

Eco city development in China: addressing the policy implementation challenge

de Jong, M., Yu, C., Joss, S., Wennersten, R., Yu, L.,Zhang, X., Ma, X.

NOTICE: this is the authors' version of a work that was accepted for publication in Journal of Cleaner Production. Changes resulting from the publishing process, such as peer review, editing, corrections, structural formatting, and other quality control mechanisms may not be reflected in this document. Changes may have been made to this work since it was submitted for publication. A definitive version was subsequently published in Journal of Cleaner Production in 2016.

The final, definitive version in the Journal of Cleaner Production is available online at:

https://dx.doi.org/10.1016/j.jclepro.2016.03.083

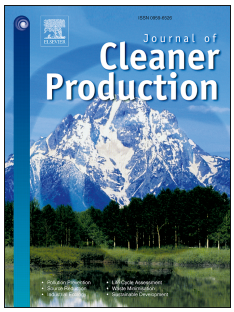
© 2016. This manuscript version is made available under the CC-BY-NC-ND 4.0 license
http://creativecommons.org/licenses/by-nc-nd/4.0/

The WestminsterResearch online digital archive at the University of Westminster aims to make the research output of the University available to a wider audience. Copyright and Moral Rights remain with the authors and/or copyright owners.

Whilst further distribution of specific materials from within this archive is forbidden, you may freely distribute the URL of WestminsterResearch: ((http://westminsterresearch.wmin.ac.uk/).

In case of abuse or copyright appearing without permission e-mail repository@westminster.ac.uk

Accepted Manuscript



Eco city development in China: addressing the policy implementation challenge

Martin de Jong, Chang Yu, Simon Joss, Ronald Wennersten, Li Yu, Xiaoling Zhang, Xin Ma

PII: S0959-6526(16)30152-4

DOI: 10.1016/j.jclepro.2016.03.083

Reference: JCLP 6932

To appear in: *Journal of Cleaner Production*

Received Date: 1 October 2015

Revised Date: 5 March 2016

Accepted Date: 9 March 2016

Please cite this article as: de Jong M, Yu C, Joss S, Wennersten R, Yu L, Zhang X, Ma X, Eco city development in China: addressing the policy implementation challenge, *Journal of Cleaner Production* (2016), doi: 10.1016/j.jclepro.2016.03.083.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Word count: 10062

Eco city development in China: addressing the policy implementation challenge

Martin de Jong [a, b,*], Chang Yu [c], Simon Joss[d], Ronald Wennersten[e], Li Yu[f], XiaolingZhang[g], Xin Ma[h]

a Faculty of Technology, Policy and Management, Delft University of Technology, Jaffalaan 5, 2628 BX Delft, the Netherlands

b School of International Relations and Public Affairs, Fudan University, No.220, Handan Road, Shanghai 200433, China

c School of Economics and Management, Beijing Forestry University, No.35, Tsinghua East Road, Haidian District, Beijing 100083, China

d Department of Politics and International Relations, University of Westminster, 32-38 Wells Street, London WIT 3UW, United Kingdom

e Institute of Thermal Science and Technology, Shandong University, 27 ShandaNanlu, Jinan 250100, China

f School of Planning and Geography, Cardiff University, CF 10 3XQ, United Kingdom

g Department of Public Policy, City University of Hong Kong, 83 Tat Chee Avenue, Kowloon, Hong Kong SAR

h School of Management, Harbin Institute of Technology, 92 West Dazhi Street, Nan Gang District, Harbin 150001, China

Email: w.m.dejong@tudelft.nl changyu@bjfu.edu.cn josss@westminster.ac.uk rw@kth.se YuL@cardiff.ac.uk xiaoling.zhang@cityu.edu.hk maxinhit@gmail.com

[*]Corresponding author: Tel: +31152788052

Abstract

Over the last few decades, China has seen a steep rise in diverse eco city and low carbon city policies. Recently, attention has begun to focus on the perceived shortcomings in the practical delivery of related initiatives, with several publications suggesting a gap between ambitious policy goals and the emerging realities of the newly built environment. To probe this further,

ACCEPTED MANUSCRIPT

in this article we examine – based on the policy network approach – how the gap between high-level national policies and local practice implementation can be explained in the current Chinese context. We develop a four-pronged typology of eco city projects based on differential involvement of key (policy) actor groups, followed by a mapping of what are salient policy network relations among these actors in each type. Our analysis suggests that, within the overall framework of national policy, a core axis in the network relations is that between local government and land developers. In some cases, central government agencies – often with buy-in from international architecture, engineering and consulting firms – seek to influence local government planning through various incentives aimed at rendering sustainability a serious consideration. However, this is mostly done in a top-down manner, which overemphasizes a rational, technocratic planning mode while underemphasizing interrelationships among actors. This makes the emergence of a substantial implementation gap in eco city practice an almost predictable outcome. Consequently, we argue that special attention be paid in particular to the close interdependency between the interests of local government actors and those of land and real estate developers. Factoring in this aspect of the policy network is essential if eco city implementation is to gain proper traction on the ground.

Keywords: eco city development; policy implementation; policy network theory; typology of eco cities; low carbon cities; China

1. Introduction

Perhaps more than anywhere else in the world, in China concepts of sustainable urbanization have proliferated among policy-makers, professionals and academics (Caprotti, 2014; de Jong et al., 2015; Joss and Molella, 2013; Wu, 2012). Yu (2014) and Liu et al. (2014) have provided overview analyses of the various initiatives launched by Chinese governmental bodies over the last couple of decades. Before 2000, the Chinese government (national and/or local) had already adopted programs to promote the ‘green city’, the ‘garden city’ and the ‘national environmental protection model city’. Post-2000, the ‘eco-city’, the ‘low carbon city’ and even the ‘low carbon eco city’ have been added to the list. The number of officially recognized demonstration and model cities across these programs has since risen to several

hundreds and keeps on growing. The Ministry of Environmental Protection (MEP) initiated an 'eco cities' program; the National Development and Reform Committee (NDRC) one for 'low carbon cities'; and the Ministry of Housing and Urban-Rural Development (MOHURD) one for 'low carbon eco cities'. In doing so, they have assumed the role of patrons of provinces, cities, districts and counties across the country wishing to become exemplars for sustainable urbanization (see Appendix 1). To date, 92 pilot cities, districts and counties have been recognized by MEP (MEP, 2013b; MEP 2015); NDRC has ratified six provinces and 36 cities (NDRC, 2012); while MOHURD has signed up two provinces and two cities, plus a further 15 cities through two cooperation programs (one Sino-American, the other Sino-European. These numbers exclude a plethora of additional initiatives and projects initiated directly by local governments without any official recognition or backing by Beijing.

Across these national initiatives, much attention has focused on formulating ambitious policy goals and establishing sophisticated indicator systems (e.g. MEP, 2007); this can also be seen reflected in the academic literature (Dong et al., 2015; Price et al., 2013; Li et al., 2009). More recently, however, attention has begun to shift towards perceived shortcomings, if not failure, in the delivery of various eco city[1] initiatives. Several analysts point to not insignificant hiccups and complications in the actual implementation of these policies; this lays bare a significant gap between, on one hand, ambitious policy goals and attractive design and development visions and, on the other, the emerging realities of the newly built environment (Alusi et al., 2010; Pow and Neo, 2013; Caprotti, 2013, 2014; Hult, 2013, 2015; Rapoport, 2014; Joss and Molella, 2013; Chang and Shephard, 2013; de Jong et al., 2013b). Similar critique has been raised concerning high-level eco city projects in other parts of Asia, such as South Korea (Shwayri, 2013; Yigitcanlar and Lee, 2014), Abu Dhabi (Cugurullo, 2013; 2015) and India (Joss and Cowley, 2016). And in Europe, too, the challenge of policy implementation has become apparent, as for example reported in the case of the English eco-town initiative (Tomozeiu and Joss, 2014) and the French national *Ecocité* program (Boxenbaum et al., 2011).

[1] In the context of this research, the term 'eco city' encompasses the variety of terminology adopted by the various national ministries, including 'low carbon city' and 'low carbon eco city'. See Appendix 1 for full list of initiatives.

Some analysts (e.g. Bluepath City, 2013; Yin, 2014; Zhou et al., 2014; EU-Asia dialogue, 2014; Yu et al., 2015) interpret the phenomenon of policy implementation gaps essentially as start-up problems to be fixed by perfecting eco city indicator systems, attuning and integrating the use of the various policy instruments deployed by government organizations, and supporting best practice sharing and capacity building. Other analysts take a more critical stance, viewing the new wave of eco city projects and their differently named cousins as not much more than the promotion of real estate and large engineering business interests while casting doubt on the prospects of significantly improving eco-efficiency within existing production modes (e.g. Chien, 2013; Caprotti, 2014; Bulkeley et al., 2014; Zheng et al., 2014; Rapoport, 2014; Xu, 2015). Both analyst groups agree that the promotion of sustainable cities through attractive terminology and their global mainstreaming is at least in part illustrative of a wider city branding practice aimed at attracting investors – including foreign ones – and a highly educated workforce (Joss et al. 2013; Shwayri, 2013; Yigitcanlar and Lee, 2014; Braun et al., 2014; de Jong et al., 2015), although their views may differ as to the sincerity of the political intentions underlying these sustainable urbanization initiatives and their potential to achieve significant change.

Pinpointing whether sustainable city projects are successes or failures is not straight forward. In some cases, failure is rather obvious, such as when projects are simply not realized, when ghost towns emerge and stay empty for extended periods of time, when projects run into financial difficulties, or when their (social, economic, environmental) sustainability credentials are evidently questionable. However, in other cases, evaluating success or failure is trickier; for instance, when development and construction activities take place largely according to plan yet some sustainability indicators are not met. In assessing contemporary eco city developments in China, some international analysts have highlighted perceived implementation gaps between original goals and actual achievements, such as in the case of Tianjin Eco-City concerning aspects of social sustainability (public housing), green transport, or biodiversity, among others (e.g. Caprotti, 2014). In response, some domestic commentators assert that the adoption of eco city initiatives and related indicator frameworks are in themselves a major step forward and that developments, such as Tianjin Eco-City, play an

important exemplary role in promoting more sustainable urbanization (Bluepath City, 2013). While such differences in assessment can only be expected given various analytical and professional perspectives, this debate nevertheless highlights the importance of policy implementation and related gap analysis. And if even Tianjin Eco-City, the national flagship among the growing number of Chinese eco city initiatives, prompts related debate, then questions about policy implementation success *vs* failure can be expected to be centrally important across the spectrum of contemporary Chinese eco city initiatives.

Consequently, in this contribution we seek to examine *how the perceived implementation gap between high-level national policy initiatives and actual policy and project implementation in various Chinese localities can be explained*. We approach this question not so much from an environmental engineering, urban planning or political geography perspective, as is the case with the majority of aforementioned publications; instead, we apply a more explicit governance perspective, with particular focus on policy implementation through policy networks. Ever since Pressman and Wildavsky (1984) explained why policy ambitions formulated in Washington DC were dashed in Oakland, implementation has remained a classical topic in public policy. And yet, its significance remains too often neglected in the discussion about why policy failure occurs, including in the case of sustainable urban development. Frequently, the organizational context in which urban sustainability projects take place is ignored; official and unofficial goals pursued by public bodies at various governmental levels are overlooked; the motives and interests of banks, developers, infrastructure builders, engineering consultants and architects are downplayed; the complexity of participation by international actors in local planning – a key feature of many eco city initiatives in China and beyond (Joss et al., 2013) – is underestimated; and the resources required for policy implementation, and which actors have these at their disposal, are not taken into account. In short, interdependencies among actors in policy networks do not get the attention they deserve (de Bruijn and ten Heuvelhof, 2008; Klijn and Koppenjan, 2015). Disregarding these interdependencies is bound to lead to disappointment, but this should be at least partly preventable if the alignment of national policy interests with those of other public and private actors is considered properly and upfront. Adopting this governance perspective,

ACCEPTED MANUSCRIPT

then, is intended to provide a useful complementary angle to the wider analysis of contemporary Chinese eco city initiatives; one, which seeks to shed light on how the perceived implementation gap comes about and what role policy networks play in this respect.

The article is structured as follows: the next section outlines an analytical framework based on the policy network approach, explaining how this helps to map the alignment of the interests of various actors involved in eco city development. In section 3, we summarize Chinese national policies for eco cities, low carbon cities and low carbon eco cities, and discuss to which extent they address the question of policy implementation[2]. Section 4 then presents four categories of Chinese eco city projects based on the degree to which national governmental recognition and international knowledge transfer come into play alongside local governance mechanisms. In Section 5, we apply our analytical framework to this eco city typology; this allows us to question the usefulness of dominant top-down policy approaches (apart from a few national flagship projects), and it provides for a better understanding of how actors' interest alignments shape policy implementation (gaps). The concluding section 6 offers some suggestions as to how the policy network approach can inform eco city development in China (and beyond) – namely, by shifting attention away from the prevailing technocratic policy perspective to one which better recognizes the importance of policy networks and related resource structures for successful policy implementation.

2. Policy networks and alignment of actor interests: an analytical framework

The policy network approach is a family of theories, rather than one singly theory; its various strands have in common that they consider policy-making as a process in which multiple players jointly make decisions and depend on each other for their implementation (Hill, 2013). This mutual dependency arises from the fact that no single actor unilaterally has sufficient legal, financial, organizational and knowledge resources to push through and

[2] The three programs analyzed here do not constitute the full range of national programs for sustainable urbanization, but they are the most comprehensive ones. Other programs, such as those for eco industrial parks, sponge cities, eco-civilization demonstration cities and smart cities are either more specialized in scope, and thus less suitable for a broader analysis of policy implementation, or more recent and thus lacking in sufficient analytical data.

execute decisions. Empirical description in these theories often emphasizes the multitude and diversity of policy actors, partially conflicting goals and complementarities of power resources. Prescription tends towards the acknowledgement that this interdependency should be considered upfront and accommodated through the design of interactive decision processes (Mayntz and Scharpf, 1975; Kickert et al., 1997; Scharpf, 1997; Koppenjan and Klijn, 2004; Sørensen and Torfing, 2009). Recently, attempts have also been made to apply this approach to the Chinese context (Zheng et al., 2010; Groenleer et al., 2012). In this article, we mobilize basic conceptual terms, such as 'policy actors' , 'goals' and 'resources' (also known as 'policy instruments' or 'tools of government'), 'interdependency', 'networks' and 'institutions'; while the more sophisticated notions of 'network management', 'network constitution', 'perceptions', 'deadlocks', 'decision-making rounds' and 'policy windows' are intentionally left out, since these can only be studied in detailed case studies.

A policy network analysis applied to the implementation of a given national policy program can proceed as follows:

1. Identifying the relevant policy actors involved in the implementation of the policy in question. These include governmental agencies at various governance levels; but they also entail public enterprises, non-governmental organizations and private entrepreneurs and – importantly in the context of (Chinese) eco city initiatives – international actors. The resulting network structure can then be compared with how the national program recognizes various actors and attributes related roles. A possible mismatch (between envisaged and actual network constellation) may well lead to implementation failure.
2. Establishing what are the formal and informal goals of the various policy actors. The formal ones normally refer to what is envisaged in terms of policy substance (immaterial goals), and the informal ones refer to their material stakes (increase in influence and budget). This can be used to analyze to which extent these goals are aligned with those of the national ministries; and in case where there is no or limited alignment, how this is considered and/or compensated for. Here, too, a possible mismatch suggests the likelihood of implementation failure.

3. Examining which resources (policy instruments/tools) actors have at their disposal to realize their goals. The most classical division is that of 'nodality' (knowledge/information), 'authority' (legal power), 'treasure' (funds), and 'organization' (Hood 1986; Hood and Margetts, 2007). This can be used to check to what extent and how the need for these resources (to enable national policy implementation) is recognized, considered and/or compensated for. This, too, can be considered a good indicator for identifying policy implementation gaps.
4. Analyzing how the actors depend on one another for the matching of their respective goals and resources, thus creating an 'interdependency map'; and examining how they deploy interactive strategies and practices to reach workable exchanges and compromises. This is used to check to what extent and how the national policies acknowledge, or even accommodate, the interactions that make such exchanges possible. Again, a mismatch is an indicator of potential implementation failure.

In the present analysis, we do not focus on the implementation process of individual eco city projects as such, but on how national eco city policy programs affect the policy network structures of eco city projects. (Where individual eco city initiatives are highlighted in the text, they can be found listed in Appendix 1 against the corresponding national programs.) Consequently, while the same basic concepts are used as the ones typically deployed to chart a policy network relating to an individual case study, here they are applied more broadly to policy network structures resulting from national eco city policy programs. Four different types of network structures for eco city projects with different actor positions will be identified; each has differential effects on how national eco city ambitions manifest themselves locally. This typology provides the opportunity to investigate the goals and resources of the various actors within each type of network structure; and to consider to which extent actors' attitudes and behaviors align with what is envisioned in the national policy programs – that is, how the national ministries foresee the role of other (international, national, and local) policy actors within the network structures and view the related implementation process. The typology, then, also prompts us to ask whether various 'local'

adopters of national policy might be guided by other, competing policy interests, with the effect of diverting their actions away from the national plans.

While an analysis of policy implementation at systemic level – rather than with focus only on single case studies – is certainly called for, there are nevertheless some methodological challenges involved. For one thing, given the large number of eco city initiatives of one kind or another across China, it is difficult to extract and distil common implementation trends and characteristics from the peculiarities of individual geographic, economic and administrative contexts, unless a large comparative study of multiple cases is undertaken. And for another, it may turn out to be hard to access relevant data, not least in a context where policy implementation is not as yet widely recognized and articulated as a feature of eco city development and where the possibility of implementation gaps or failures is rarely acknowledged. What is more, access to information and data is often severely restricted for those without 'guanxi' (personal networks). In response, the present research is based on the following three sources: (1) an analysis of key official policy documents and assessment reports relating to the three ministries' eco city programs, in terms of the extent to which implementation is a recognized feature (see four indicators above); (2) a review of recent academic publications which present analyses of specific Chinese sustainable city projects and discuss the contexts and reasons for observed implementational success and/or failure; and (3) three expert roundtables with leading academics, policy experts and practitioners to elaborate, focus group style, the topic of policy implementation. The workshops took place at the Institute for Building Research in Shenzhen (July 2013), Fudan University in Shanghai (June 2014) and Tsinghua Tongheng Urban Planning and Design Institute in Beijing (April 2015)[3]. Together, this complementary approach should provide a robust basis on which to open up and begin to analyze the phenomenon of policy implementation in relation to eco city development in China.

3. Approaches to policy implementation in three national sustainable city

[3] These workshops were coordinated by the *Tomorrow's City Today* international research network led by Simon Joss (3rd author) and organized and facilitated by Martin de Jong (1st author). (See acknowledgements for further details.)

ACCEPTED MANUSCRIPT

programs

This section summarizes the three main Chinese national programs for eco cities, and discusses how they address the issue of policy implementation. As national policies, these programs have an obviously important framing function (although as noted not all eco city projects fall under their direct guidance). In doing so, they point to the policy implementation challenge facing contemporary eco city initiatives in China, especially relating to the preponderance of a rather technocratic understanding of the policy process and, relatedly, a lack of proper recognition of actors other than local government and their respective attitudes and behaviors towards (sustainable) urban development.

The three central ministries dealing with, respectively, environmental protection (MEP), housing and urban-rural development (MOHURD), and overarching national development (NDRC), have each initiated dedicated programs for sustainable city development (see Table 1). While each program exhibits specific characteristics, they share one important feature: the responsible ministries promote a practice, whereby local governments are prompted to submit plans from which the ministries select those that fulfill the policy brief; the chosen initiatives are thus elevated to nationally endorsed demonstration projects.

[Table 1 here]

MEP's eco cities, eco districts and eco counties

The eco city program initiated by the Ministry of Environmental Protection was the first such program that integrated a tailor-made indicator system to define and assess performance (first issued in 2003; revised in 2007). The indicators for eco cities, eco districts and eco counties are divided up into three categories: economic development, environmental protection, and social development (MEP, 2007). Among the economic indicators are ones relating to energy intensity, and ratio of tertiary industry to GDP. Environmental indicators cover a broad range of measures, such as ecological conservation, forest coverage and the quality of water and air. Also included are the environmental performance of industrial activities (proportion of companies requiring mandatory cleaner production) and levels of urbanization. In 2005, MEP specified how the indicators were to be used, weighted and calculated; and it confirmed that

its appraisal method was to be applied by local governments themselves, as a means of assessing and tracking the performance of the endorsed initiatives (MEP, 2005). In 2006, the ministry issued further administrative guidelines concerning the evaluation of the *national* eco cities, districts and counties – that is, those projects singled out for special status as official nationwide demonstration projects – and declared their implementation mandatory. Local governments seeking to become model cities with demonstration project status were required to submit detailed proposals. The winners have since been required to submit annual monitoring reports to their respective provincial Environmental Protection Bureaus (EPB). Every three years, MEP reviews the progress of the designated eco cities, districts and counties. By 2015, 92 cities, districts and counties had been recognized under the scheme (MEP, 2013a; MEP, 2015).

NDRC's low carbon provinces and cities

The low carbon city program is managed by the National Development and Reform Committee. Its main aim is to reduce the emission of greenhouse gases (GHGs). In 2010, NDRC issued a note on the first phase of pilot low carbon provinces and cities (NDRC, 2010). This focused on the promotion of low carbon technologies and industries and explicated what policy interventions are deemed conducive to reaching this goal. NDRC encourages local governments to realize institutional innovation and employ incentives for reducing GHG emissions based on established market mechanisms. Local governments, bidding for status of 'national demonstrator project', are expected to show how they plan to deploy low carbon technologies to transform their industrial structure and promote low carbon buildings, transportation and renewable energy. Upon the initial launch in 2010, five provinces and eight cities were selected. However, the performance of this first batch of demonstrator projects was evaluated as 'not very significant' (NDRC, 2012). This evaluation suggests that these proposals had been prepared in a hurry, failing to take into account local specificities and conditions. Furthermore, due to the over-emphasis on economic growth in some pilot areas, the implementation of low carbon measures was neglected relative to what was promised in the original plans. Finally, the absence of any substantial financial support for the selected low carbon provinces and cities hampered the effectiveness of the new policy; as a

consequence, most governments of demonstration areas – especially those in less developed regions – were unable to initiate relevant projects. In 2012, NDRC extended the number of demonstrator projects, now comprising a total of six provinces and 36 pilot cities. According to its own evaluation, this second batch of proposals was significantly better prepared (NDRC, 2012). Furthermore, there has been a better geographic distribution leading to greater regional variety and allowing for the exploration of different approaches to control GHG emissions. Concerning the question of standardization for low carbon cities, according to Mu (2012) the set of indicators published by the Chinese Academy of Social Sciences (CASS) in 2010 is considered the most comprehensive one. It uses a classification of twelve indicators divided up in four groups: low carbon productivity; consumption; resources; and policies. According to this framework, a city can be considered low carbon on a given indicator if its carbon productivity is 20 percent lower relative to the national average. However, neither this nor any other set of standards has to date been officially recognized. This renders problematic performance evaluation, benchmarking, as well as the granting of demonstrator project status.

MOHURD's low carbon eco cities

On its part, the Ministry of Housing and Urban-Rural Development initiated its 'low carbon eco city' program in 2009 (Yu, 2014). The following year, MOHURD signed a framework agreement for cooperation with the cities of Shenzhen and Wuxi, as well as the provinces of Hebei and Guangdong, to jointly explore what incentives could be introduced to promote low carbon policies, green transport, green buildings and the circular economy. In 2011, MOHURD established a lead group charged with implementing the low carbon eco city program. It stipulated that only new cities or urban districts were eligible for applying to the program (MOHURD, 2011b). These cities or districts should be at least 3 km^2 in size and include minimal agricultural land; the new low carbon eco area should be no further than 30 km away from the adjacent new town development; and no further than 100 km away from the next larger city providing infrastructure. Furthermore, a special feature of the MOHURD program is the promotion of international cooperation: in 2013, six cities were included in the first round of Sino-American low carbon eco pilot cities in conjunction with the US Department of Energy; and in 2015, ten Sino-European low carbon eco pilot cities were

selected as part of a cooperation agreement with the European Commission. Both these agreements include co-funding measures, joint protocols, technology and knowledge exchange, and shared training and capacity development.

Policy implementation modes

How do the three (MEP/MOHURD/NDRC) eco city programs view policy implementation? In substantive terms, NDRC's program is the most narrowly defined among the three, with singular focus on GHG emissions; in contrast, MEP's policy is the broadest, encompassing a wide spectrum of sustainability issues, while MOHURD's initiative occupies thematic middle ground. What is arguably a more significant difference in their approach to policy steering is the use of eco-city indicator systems: MEP and NDRC impose their own indicators on local governments; they thus practically hand down the responsibility for evaluating pilot projects to local authorities, albeit against nationally set indicator criteria. MEP's indicator system and procedures have evolved into uniform standards, whereas NDRC has not fully standardized its approach to date. In the both cases, progress with, and the success of, policy implementation are mainly determined based on what local governments report themselves, resulting in varying local reporting practice. On its part, MOHURD does not deploy common indicators and standards, as a consequence of which policy implementation is even more devolved to, and reliant on the self-direction of, local governments.

Rather than providing complementarities between themselves and therefore a coherent overall national policy approach, the three ministries' programs appear to (be designed to) compete with one another. What is more, policy coherence is also undermined by the developmental status of the concepts and methods underpinning the policy programs (Li and Liu, 2011). Thus, in spite of the semblance of elaborate indicator systems (in the case of MEP and NDRC), practitioners often report that they still miss clear measureable targets or manuals which they can follow, or a standardized approach stipulating how local governments can implement eco city projects (Liu et al., 2014). The implication of this is that while quantification abound, assessment of implementational progress remains problematical:

ACCEPTED MANUSCRIPT

strictu sensu implementation success or failure can at present not be established in any reliable and transparent manner.

In other respects, the governance approach in the three programs is remarkably similar. The existence and relevance of local governments is recognized: they are seen as loyal drafters of plans and reports working towards eco-civilization progress, rather than pursuing their own potentially conflicting goals as independent actors. Should they not measure or report their information adequately if at all, the national ministries have limited legal, financial, or organizational remedies at their disposal: local governments' compliant participation is assumed as a matter of course. And while the relevance of local governments for implementation is recognized – albeit as loyal adopters of national policy – that of other actors in urban development, such as developers, banks, consultants and residents, is barely addressed (Notably, foreign governments and high-tech companies enjoy a comparatively privileged position in policy implementation, as illustrated by MOHURD) . Since these other actors hardly appear on the radar as co-implementers, their having at their disposal additional resources necessary for policy implementation is a non-issue in all three national programs.

In summary, while the particular details in the governance approach for policy implementation may not be exactly the same for MEP's eco cities, NDRC's low carbon cities, and MOHURD's low carbon eco cities, in one crucial aspect at least they appear alike: they emphasize the role of local governments as executioners of national policy. Local authorities (and their international partners) are assumed to be diligent, cooperative and subservient to nationally defined eco city goals. Other policy actors do not appear to be recognized in any significant ways, nor do their goals and resources. Finally, the use of elaborate technical information systems is promoted through these policies (especially MEP and NDRC), as a main means of monitoring and evaluating progress towards implementation.

4. Policy implementation practices across eco city types

It should come as little surprise that the practical reality of eco city development is more complex than that envisaged by the aforementioned national programs. The effectiveness of policy implementation hinges on further key factors, including the interests and motives of

local authorities which are supposed to enact national policy, as well as other actors drawn into the policy networks, notably investors and developers. Therefore, the wider policy network and interest constellations need to be considered, too. To this end, the following discusses four types of eco city projects in China, which vary in terms of the degree of official government endorsement and in terms of international financial and technology input. According to Miao and Lang (2014) in their comparative analysis of Tianjin Eco-City and Dongtan eco city, our own previous analysis on the robustness of Sino-foreign organizational collaboration for eco city development (de Jong et al. 2013b), and the deliberation during the three expert round tables as part of this research, national government endorsement and knowledge transfer from abroad are seen as crucial inducements to high-quality and high-status eco city projects (also see de Jong, 2013; Hult 2013; Wu, 2015). Moreover, these two factors also tend to reinforce each other's impact, which is why they were adopted as components for our typology.

Type 1: Strong national government support, paired with structured foreign involvement.

A small number of eco city projects, typically ones with high profile and benefitting from strong structural international involvement, have been endorsed by the national government to be key projects where success is assumed almost a given. This implies not just acceptance as one of the many selected demonstrator projects, but also the allocation of significant central funding and support through a dedicated governance structure under close supervision by the Chinese government, and backed by bilateral support from a foreign government. Projects of this type can hardly be allowed to fail and so normally progress to implementation and become permanently established. Sufficient investors are attracted, important public facilities such as schools and hospitals are established, residential areas tend to become sold out over time and the bill of accounts can be shown to satisfy relevant economic actors. The Sino-Singaporean Tianjin Eco City is arguably the best known and most high profile exemplar. The Sino-Singaporean Suzhou Eco-Industrial Park, Sino-Singaporean Guangzhou Knowledge City and Sino-German Qingdao Eco City also fall into this category, although conceptually they are on the fringe of what is termed 'eco city' in this article.

These and similar initiatives are national status projects enjoying the commitment of top-level politicians from both national sides, co-funding from state-owned enterprises, investment companies and developers, and the sharing of know-how and expertise. As a consequence, public officials put in charge of project implementation tend to stay in their positions for extensive periods of time, performance monitoring concerning various eco city indicators is taken seriously. And the initial project scope may be extended to signal project success, since project size and success are seen as closely related in the Chinese context. Hence, for example the Sino-German Qingdao Eco City has been upgraded to province-level project (Shandong) and its area size increased from 10 to 17km^2. By comparison, for the Sino-Singaporean Tianjin Eco City an upgrade from currently 31km^2 to 143km^2 is considered, reflecting its high-profile national status.

Calling these projects the most successful does not imply that all about them is fine: on one hand, in terms of social and economic indicators, their project implementation may satisfy most expectations and requirements, and funding challenges are forestalled. On the other, however, environmental and planning commentators, especially Western ones, often find the ecological ambitions disappointing, raising critical questions about the dominance of motorways and the dearth of high-quality public transport facilities in these green-looking suburban neighborhoods situated dozens of kilometers away from central urban districts. Most Chinese analysts, however, emphasize the high livability of these new town areas, the key importance of providing public services (especially good healthcare and education facilities) to attract middle class residents, and the need for luring green tech companies to these areas to effect the upgrading of the industrial base. Furthermore, they argue for patience in moving towards the improvement of the ecological situation in the country.

Type 2: Limited national government support, paired with occasional foreign involvement

Whether International (formerly Sino-Swedish) Wuxi Eco-City and International (formerly Sino-Dutch) Shenzhen Low Carbon City will ever join the ranks of the type 1 remains to be seen; meanwhile they fall into type 2. Key to this category of Chinese eco city projects is that they are undertaken by financially relatively strong local governments, manage to attract the

attention of international engineers, consultants and architects and incorporate their expertise in their plans and designs. However, such international involvement does not enjoy bilateral governmental endorsement, as in type 1: (prime) ministers may pay a visit or two, perhaps as part of a trade mission, or vice premiers may send letters of support, but essentially type 2 projects are not governed by formal inter-ministerial arrangements. Consequently, foreign financial investments often remain limited, with government instead awarding contracts to domestic developers. Hence, these projects do not evolve into flagship national (or provincial) projects. This makes them significantly more susceptible to political and financial volatility, since national (or provincial) governments will not go to any particular length to render them successful: the projects essentially remain a local responsibility dependent on local resources.

As a result, some high profile eco city projects within this category with strong international involvement, such as Dongtan eco city, have officially been put on hold even before construction could commence. Such relative failure may occur for several reasons, including overly ambitious plans, policy and legal conflicts due for example to claiming agricultural land for urban development where this is not permitted, and forced resignations of politicians who have a central role in the projects (Wu, 2012; Chang and Shephard, 2013; de Jong et al., 2013b; Miao and Lang, 2014). Other reasons for failure may occur when construction is initiated but subsequently slows down or comes to a halt due to, for example, the bankruptcy of the developer(s), the departure of the involved foreign engineering and consultancy partners, the difficulties to integrate planning and coordinate management due to splicing up of plots of lands among multiple developers. Some of these reasons have been in evidence in the case of Tangshan-Caofeidian International (formerly Sino-Swedish) Eco-City (Joss and Molella, 2013). Yet another variant of type 2 is one where high levels of ambition exist, but where eventually the ‘eco’ vision and principles promoted by Western consultants are deemed overly utopian and economically unviable by local governments and Chinese developers, leading to permanent stalemate between the two sides. Of this subtype, Beijing-Mentougou is a characteristic case (de Jong et al., 2013b; VPRO, 2014).

However, not all examples of project type 2 in China fare badly: International (formerly Sino-Swedish) Wuxi Eco City and International (former Sino-Dutch) Shenzhen Low Carbon

City are currently under development and so far appear to be reasonably successful in terms of visible project management progress and delivering several tangible results. In both cases, local government is economically privileged and thus able to pledge considerable investments, while also making efforts to ensure quality control. International expertise and knowledge transfer have lifted the prestige of these projects, but also laid bare some significant misunderstandings between Chinese demand and foreign supply: European partners would hope for more effective influence on the actual outcomes of the planning process; and they would find it difficult to make a business case for their involvement, since generating revenues is often restricted to selling technological equipment while excluding earnings from consultancy. At the same time, the eco city concepts being promoted by these foreign partners are sometimes stylized and tactically repackaged versions of their homegrown (European) experience and practices, and as such ill-suited to the Chinese context. A case in point is 'SymbioCity', which the Swedish players promoted as core concept for both the Tangshan and Wuxi eco city projects.

In spite of type 2's significantly higher vulnerability to project failure, we should add here that even the supposedly 'unsuccessful' examples may be only temporarily stalled: local governments, developers, and prestigious international architects and engineers may have pulled out of Shanghai-Dongtan, Tangshan-Caofeidian and Beijing-Mentougou for the time being, but this does not necessarily imply a complete dead end. Potentially lucrative plots of available land remain open to future urban development and promising ideas developed by world-renowned architects and engineers can be resurrected and revamped. It is probable that for most of these projects, new efforts will eventually be made by different parties to re-launch the same projects, albeit often under a different label and with revised ambitions.

Type 3: Nominal support from national government

The third category relates to provinces, cities and counties that have managed to obtain the status of national eco city/low carbon city/low carbon eco city, but were subsequently unable to translate this into prestigious projects backed by international advisers and systematic reviews by committees to monitor the quality of work. In most cases, these are not the

ACCEPTED MANUSCRIPT

wealthier first-tier cities, but second, third or even fourth tier ones that do not have the resources to make substantial investments in costly environmental solutions. Their main goal is to enhance the visibility and reputation of their locality to investors, industry and future residents; and they try to achieve this by mobilizing an attractive brand name ('eco city'). This is not to say that the efforts to create new sustainable localities are necessarily insincere, but it normally does imply that: cities have fewer financial resources at their disposal; that concerted monitoring of (quality) performance is weak if not entirely absent; that insufficient know-how and expertise is available to boost eco-innovation; and, not least, that dependency on developers for generating public revenues through land-leasing is a primary driver of related eco city projects. Examples of type 3 sustainable city initiatives abound (see Appendix 1), but they tend to be less conspicuous and thus relatively understudied compared with types 1 and 2. Although their environmental performance is hardly ever impressive (see Introduction), their social and economic success rates vary. Some are barely distinct from regular urban construction projects and, as such, look alike. Others may evolve into something more notorious: ghost towns. While the latter are generally viewed negatively, some commentators have cautioned against considering failure too soon, as it may take some time for new urban developments to become inhabited with residents and businesses. Thus, ghost towns may not be the end, but the beginning, of urban development (Shepard, 2015). Nevertheless, more often than not these urban projects turn out to be rather faceless new towns with limited identity and social and cultural appeal (Li and Liu, 2011; Hulshof and Roggeveen, 2011). They end up not offering the attractive cosmopolitan feel originally promised, but become mediocre towns for up-rooted workers migrating into new urban centers from further afield (Hsing, 2010).

Type 4: Local initiatives without national government support

Many localities have developed sustainable urban development initiatives, but have not obtained any support, or strived for recognition, from national or provincial government. Their features do not differ much from type 3 projects, except that they have no official status anywhere beyond their own city or town, and that project progress is not systematically reported and monitored. They are, therefore, an even more complicated category to capture

than type 3, with little empirical research to go by. A small number of type 4 projects have attracted media attention in recent years, such as Huangbaiyu eco village and Kunming-Chenggong eco city. Collecting evidence can prove difficult, since information is typically removed from websites and official documents following apparent project failure. In the case of Kunming-Chenggong, it initially appeared as if it is evolving into a ghost-town, although more recently policy ambitions have been scaled down and housing sales have gone up (Miller, 2012). As to Huangbaiyu, it has become common knowledge that the designers and developers failed to address the wishes and needs of their future inhabitants (May, 2008; Ren, 2013; Chien, 2013). Initiated in 2005 by Huangbaiyu village, the project was designed by US architects, aiming to realize William McDonough's renowned 'cradle to cradle' concept. However, it failed due to the fact that housing and social amenities were both inconveniently located and inappropriate for local life styles. Since it was promoted as a technical project rather than embedded in established urban planning, and since it lacked support from higher government levels, the monitoring of quality and financial feasibility were compromised, too.

5. Implementation of eco city programs as interaction in policy networks

Given the central role of national programs in eco city development, it is tempting to see the national ministries as the dominant actors in sustainable urban development in China. They can assume if not claim hierarchical control over local governments by demanding the active application of and engagement with, their policy protocols and related indicator systems and procedural rules. However, such a narrative of policy centricity risks being overly simplistic and negligent of the complexity of the policy processes at work in Chinese eco city development. For a start, various national ministries compete with one another in their attempts to attract local government initiatives; and their different indicator systems have carved up the analytical scenery for eco city reporting into fragmented central-local silo systems. Furthermore, although at first sight it appears as if national ministries are in a strong steering position because they can select a few promising demonstrator cities from among many applicants and insist that local governments should apply their indicators as they stipulate, in reality those national ministries also need to prove that their programs are

successful. Hence, they depend on strong and reliable applicants able to develop eco cities that can be sold as 'world standard' demonstrator projects. The tendency of quite a few demonstrator initiatives to claim to develop and enforce standards without, however, properly doing so, coupled with the risk that data are manipulated ('gaming the system') in progress reports with little consequence, must be a serious concern for national ministries.

The question arises as to why many local governments seem reluctant to fully subscribe to eco city policies, and especially aspects relating to environmental sustainability, and why in practice they tend to perform below expectation. The question then also arises why the national government seems limited in its ability to redress this situation of relative implementation failure. The answer appears to lie in the tendency that eco city development is intricately caught up in the mechanisms governing real estate development: local governments promote urban development projects because these boost both local GDP growth and increase revenues from leasing out land to developers (Zheng, 2014). Doing so is seen not only as benefitting the careers of top officials, but is also imperative for generating much needed income: no less than half of local government revenues stem from land-leasing (Tao et al., 2010; Chien, 2013; Bai et al., 2014). Developers engage in building real estate with the help of soft loans from publicly owned banks responding to the trend of rapid urbanization in the country. Both residents and corporations are expected to respond with substantial in-migration to these new areas, although over fifteen percent of the housing stock in China is unoccupied according to some estimates (Wall Street Journal, 2014, based on Southwestern University of Finance and Economics).

It is within these broader institutional and networking contexts that the implementation of national eco city policy programs should be considered and analyzed. From the policy network perspective, the local context in which the ministerial policies are adopted – including its involved actors, their goals, resources and interdependencies – can now be considered in an integrated manner. This is done below in opposite order – from eco city type 4 to type 1 – reflecting the growing complexity of the network structure at work.

Type 4: Local initiatives without national government support

The simplest form of a policy network is seen in type 4 projects. A network here will typically consist of a city government taking the lead in attempting to develop into an eco city, and thus being the central player. Its formal goal is to create an attractive 'green' new town surrounded by an ecologically improved urban environment dominated by high-tech, low-carbon industries. Its informal goal is likely to be to earn substantial income from leasing out land to developers. Its main resources are arable land, over which it has legal competencies to decide whether it be opened up for urban development. Several other actors can become associated with such local government efforts to encourage eco city development including: national and provincial governments, which have higher-level jurisdiction over what may be turned into urban development and under what conditions; district governments, which come under the local government's authority and are responsible for managing the actual construction process; developers, which often team up with construction companies, engineering consultants and architects; and, not least, banks. City-level governments have primarily political and legal resources though limited financial ones, whereas the 'lower' district authorities have mainly implementation power and knowledge of the situation on the ground. The latter proves useful to city governments, but what they depend on more importantly are essential financial resources from developers.

It is not an exaggeration to state that the dependency on revenues from developers centrally defines what local governments are receptive to. Thus, it should come as little surprise that city governments in this category rather turn to developers than national ministries for realizing their initiatives and projects. Likewise, developers depend on the land issued by local government, alongside a dependency on banks to provide attractive loans and, of course, reliance on future residents and companies to create demand for real estate. In such a setting, it is highly unlikely that central government policy programs will fundamentally alter the orientation that local governments have in relation to the private sector. Environmentally friendly solutions are only likely to emerge if developers value them; and since environmental sustainability represents mostly a cost to developers, it is unlikely to become a voluntary priority. In short, type 4 projects find themselves in a comparatively disadvantageous policy network for ambitious eco city projects. Strictly speaking, the national eco city programs are

not concerned with this type of eco city project and can, therefore, not be expected to anticipate to what extent other policy actors have divergent goals or how they deploy their resources in ways contrary to national 'eco' progress ambitions.

Type 3: Nominal support from national government

In type 3 projects, the actor network is similar to that of type 4 initiatives, but with the crucial difference that the national government (one of the ministries) becomes involved through the awarding of eco city demonstrator status. This increases a project's relative attractiveness to developers as well as future occupants of the new urban space. The recognition status prompts more resources to go towards quality enhancement, because wealthier residents and cleaner high-tech companies are willing to pay a premium for green surroundings and lower pollution levels. Local governments have to put substantial efforts into promoting themselves as an eco city and being selected as a nationally recognized demonstrator city, but they seem content to do so: it adds to their status, and if the experiment succeeds it will even position them as 'best practice' exemplar which, in turn, can be used to spearhead sustainable urbanization elsewhere in the country (and beyond). Such awards are not only a vital instrument in promoting the city in question in the economic rat-race among cities, but they are also believed to be an essential asset for the senior political and administrative leaders when seeking promotion to higher positions. If previously it was solely GDP growth that mattered, in recent years the explicit 'eco' progress agenda has added some environmental indicators to the set of KPIs on which top officials in the CCP nomenclature are assessed.

However, in spite of the growing influence of the 'eco' discourse in the promotion of real estate assets in type 3 projects (as compared to type 4 ones), the actor constellation and the interdependencies have not been fundamentally altered: the official recognition granted by the national ministries only influences the distribution of resources at the margins.

Type 2: Limited support from national government paired with occasional foreign involvement

ACCEPTED MANUSCRIPT

In type 2 projects, which are generally managed by wealthier cities with significant financial resources, the influence of professional expertise and prestige through leading international engineering and architecture firms becomes significant; these firms transfer knowledge from projects they have done elsewhere in the world. This results in a further strengthening of the effect of national recognition – namely, higher quality and higher prestige through leading expertise and advanced technology, as well as higher market value. Most of the proposed projects are developed to large scale and with the expectation of eventually accommodating residents into their hundreds of thousands. And the demands put on them have increased in recent years. In response to heavy traffic congestion, worrisome air quality and lack of greenery in a majority of urban environments, these initiatives strive for cleaner and greener urban areas where high-quality social amenities for education and healthcare are available. This is currently still the exception rather than the norm for new town developments in China; it requires concerted planning, serious quality control and extensive funding from local governments. The resource availability of cities involved in type 2 projects ensures that neighborhoods with good public facilities and embracing an environmental agenda can be created. The level of investment required is considerable, but the cities in question are willing to back these projects – as do new residents hoping for premium real estate value – based on the prospect of a markedly higher quality of urban life. As a result, the projects' promoters can afford to be selective concerning the kinds of companies and residents (typically ones with higher levels of education and purchasing power) they wish to attract.

Overall, the essential exchange relation in this network type remains focused on that between the city government and developers; however, other actors, in particular national ministries and foreign firms, play a fairly central role, too, and can be seen to influence policy implementation processes and outcomes. Nevertheless, while public facilities and urban space may be superior in comparison with conventional developments, advanced environmental sustainability as such may not be much of a priority.

Type 1: Strong support from national government paired with structured foreign involvement

In comparison to type 2 projects, the network dynamics in type 1 projects shift decidedly towards top-down steering: national and foreign government agencies, through bilateral agreements, become directly involved in decision-making and act as powerful assurers of eco city projects. They exert direct political, legal and organizational influence through supervisory committees. Local governments must secure their approval as condition for implementing projects on the ground. The dealings between cities and developers are no longer a local matter, but are subject to close direction and scrutiny on the part of national government (and their foreign national counterparts). As such, central government itself becomes a *quasi*-local player deploying not only legal and political resources, but also organizational and financial ones. The relationship between local and central government then also becomes decidedly more symmetrical (than is the case in types 2-4) in terms of knowledge and information ownership and management.

By entering into a formal relationship with a foreign government – typically ones with an acclaimed track record of sustainable urban development – and facilitating the involvement of related developers, constructors and consultants, the Chinese central government seeks to secure and warrant success. In doing so, the supported projects are rendered more prestigious, comprehensive and consequently more expensive than comparable projects of types 2-4. Systematic quality control becomes essential to the credibility of type 1 projects, resulting in detailed indicator frameworks, matched with systematic monitoring and reporting systems with the possibility of taking corrective action if deemed necessary. Yet, here again, economic priorities can be expected to trump environmental ones, since these eco city projects still essentially constitute real estate development and the main incentive for future residents is likely to be on superior public services and amenities (top-level schools and hospitals, along with attractive neighborhoods and ample green space) promoting urban well-being. Environmental innovation, thus, comes to depend heavily on the willingness of governmental actors to invest specifically in environmental sustainability measures.

In summary, the core axis in policy networks for eco city development in China is that between local governments and developers exchanging land for revenues, which others have described as ‘local growth coalitions’ (Zhu, 1999) or ‘local growth machines’ (Wu, 2015). In

most cases, the term ‘eco city’ and related sister terms are used more for city branding purposes than fundamentally to promote an environmental agenda. This phenomenon takes place in an unfettered way in type 4 projects. In types 3 and 2, central government organizations attempt in varying degrees to influence the choices that local governments make, by providing incentives to make sustainability a serious consideration. However, this is mostly done in a top-down manner, which overemphasizes a rational planning mode and the technocratic application of analytical methods; conversely, it underemphasizes actor interdependencies. The relevance and necessary involvement of local governments to implementing national policies is recognized, but the conflicting nature of their goals and the importance of their resources are not. The role and legitimacy of private and commercial policy actors barely register on the radar of policy programs. This makes the emergence of a substantial implementation gap in eco city development an almost predictable outcome. The likelihood of type 1 projects avoiding such implementation difficulties is far higher, because here the relevance, legitimacy and involvement of public and private parties at various levels is taken as an essential ingredient for decision-making, investment and quality-control. However, realistically, how many local eco city projects around the country can the Chinese central government commit itself to in terms of active, hands-on involvement?

6. Conclusions and implications

The Chinese national eco city, low carbon city and low carbon eco city programs enacted by three different ministries in Beijing have set in motion a country-wide process whereby local governments volunteer to become officially endorsed demonstrator cities. Such recognition is bestowed on them in exchange for the responsibility to implement national policy locally, and the expectation to apply variously defined indicator frameworks as an essentially technocratic means of assessing and controlling how much social, economic and environmental progress is made with selected demonstrator projects.

Unfortunately, most local governments fail to meet key sustainability standards, and many do not (or only inadequately) measure and monitor the performance of their demonstrator projects at all. What we have attempted to show in this article is that most policy frameworks undertaken by the national ministries do not sufficiently recognize the constellation of the

ACCEPTED MANUSCRIPT

policy networks in which their eco city programs are implemented. Since local governments have different goals and their compliance is not something that can be assumed as automatic, central government tends to underestimate its dependence on collaboration with local governments and developers. While China's tax sharing system obliges local governments to obtain revenues from leasing out land to developers and, therefore, require them to be primarily receptive to third-party funders, national ministries act as if local governments will voluntarily establish and apply eco city frameworks without financial compensation. Should they not do so, stricter enforcement practices will follow. Recently, national programs, such as those for eco civilization demonstration cities, sponge cities and smart cities, embrace the same top-down steering mechanism and are, therefore, likely to incur the same implementation problems as the ones analyzed in this article. These newer initiatives only add to the fragmentation of the eco progress policy the Chinese government has come to adopt over the last decade or two.

A more effective way of encouraging local governments in China to engage actively in the implementation of ecological cities would be to change the calculus of their institutional incentives (Similar conclusions are drawn in a recent urban policy review for China by OECD, 2015; see in particular Chapter 3 therein.). Since the need for land revenues defines much of their current eagerness to issue large volumes of land and embark on sizeable urbanization projects, unsustainable practices is *de facto* ingrained in China's institutional structure for urban development. And since turning all eco city projects into type 1 developments is practically hardly realistic, minimizing local government dependency on land use revenues may be the only feasible way forward to achieving more effective policy implementation and high-quality outcomes for eco city development in China. This may in fact also be a necessary counter measure against the considerable oversupply of real estate in recent years. It is likely, then, that the (re-)configuration of multi-level and multi-lateral governance arrangements, and related questions of policy implementation, will surface and occupy the political agenda in China in years to come.

Acknowledgements

ACCEPTED MANUSCRIPT

The authors are indebted to Shanfeng Dong (Bluepath City Foundation) and Tao Zou (Tsinghua Tongheng Urban Planning and Design Institute) for their inputs to this article. We are grateful to the Institute for Building Research (IBR), the Global Research Forum for Sustainable Production and Consumption (GRFSPC), Fudan University and Tsinghua Tongheng Urban Planning and Design Institute for hosting the series of three expert roundtable discussions in 2013-15. This research has been generously supported with grants from the Delft Initiative for Mobility and Infrastructures (DIMI), the Leverhulme Trust (*Tomorrow's City Today* International Research Network, grant IN-2012-102) and Shandong Province (Soft Science research project, grant 2014RKA10003).

References

Alusi, A., Eccles R., Edmondson A., Zuzul, T., 2010. Sustainable cities: oxymoron or the shape of the future? (accessed 29.09.15). http://ssrn.com/abstract=1726484.

Bai, L., Qiao, Q., Yao, Y., Guo, J., Xie, M.H., 2014. Insights on the development progress of National Demonstration eco-industrial parks in China. J. Clean. Prod. 70, 4-14.

Bluepath City Consulting, 2013. Beautiful China: eco-city indicators guidebook. Tongxin Press, Beijing.

Boxenbaum, E., Acquier, A., Pinheiro-Croisel, R., Garza de Linde, G., 2011. Processes of institutional innovation: Reference tools for eco-cities in France and Denmark. PUCA, Jun 2011, France. 1-36.

Braun, E., Eshuis, J., Klijn, E.H., 2014. The effectiveness of place brand communication. Cities. 41, 64-70.

Bulkeley, H., Castan-Broto, V., Hodson, M., Marvis, S., 2012. Cities and Low Carbon Transitions. Rouuledge, London.

Caprotti, F., 2013. Critical research on eco-cities? A walk through the Sino-Singapore Tianjin Eco-City, China. Cities. 36, 10-17.

Caprotti, F., 2014. Eco-urbanism and the eco-city, or, denying the right to the city? Antipode. 46 (5), 1285-1303.

ACCEPTED MANUSCRIPT

Chang, I.-C. C., & Sheppard, E., 2013. China's eco-cities as variegated urban sustainability: Dongtan eco-city and Chongming eco-island. J. Urban Technol. 20 (1), 39–55.

Chien, Shiun-shen, 2013. Chinese eco-cities: a perspective of land-speculation-oriented local entrepreneurialism. China Inform. 27 (2), 173-196.

Cugurullo, F., 2013. How to build a sandcastle: An analysis of the genesis and development of Masdar City. J. Urban Technol. 20 (1), 23–37.

Cugurullo, F., 2015. Urban eco-modernization and the policy context of new eco-city projects: Where Masdar City fails and why. Urban Stud. 52, 1-17.

de Bruijn, H., ten Heuvelhof, E., 2008. Management in Networks: On Multi-actor Decision-making. Routledge, New York, USA.

de Jong, M., 2013. China's art of institutional bricolage: Selectiveness and gradualism in the policy transfer style of a nation. Pol. Soc. 23, 89-101.

de Jong, M., Wang, D., Yu, C., 2013a. Exploring the Relevance of the Eco-City Concept in China: The Case of Shenzhen Sino-Dutch Low Carbon City. J. Urban Technol. 20, 95-113.

de Jong, M., Yu, C., Chen, X., Wang, D., Weijnen, M., 2013b. Developing robust organizational frameworks for Sino-foreign eco-cities: comparing Sino-Dutch Shenzhen Low Carbon City with other initiatives. J. Clean. Prod. 57, 209-220.

de Jong, M., Joss, S., Schraven, D., Zhan, C., Weijnen, M., 2015. Sustainable-smart-resilient-low-carbon-eco-knowledge cities: Making sense of a multitude of concepts promoting sustainable urbanization. J. Clean. Prod. http://dx.doi.org/10.1016 /j.jclepro.2015.02.004

Dong, L., Fujita, T., Dai, M., Geng, Y., Ren J.Z., Fujii, M., Wang, Y., Ohnishi, S., 2015. Towards preventative eco-industrial development: an industrial and urban symbiosis case in one typical industrial city in China. J. Clean. Prod. http://dx.doi.org/10.1016/j.jclepro.2015.05.015.

EU-Asia dialogue, 2014. Eco-Cities: Sharing European and Asian Best Practices and Experiences, first ed. Singapore.

Groenleer, M., Jiang, T., de Jong, M., & de Bruijn, H., 2012. Applying Western decision-making theory to the study of transport infrastructure development in China: The case of the Harbin metro. Polic. Soc. 31(1), 73–85.

Hill, M., 2013. The Public Policy Process. Routledge, London.

Hood, C., 1986. The Tools of Government. Chatham House, London.

Hood, C.C., Margetts, H.Z., 2007. The Tools of Government in the Digital Age: Second Edition (Public Policy and Politics). Palgrave Macmillan, New York.

Hsing, Y.T., 2010. The Great Urban Transformation: Politics of Land and Property in China. Oxford University Press, New York.

ACCEPTED MANUSCRIPT

Hulshof, M., Roggeveen, D., 2011. How the City moved to Mr.Sun. Sun Publishers, Amsterdam.

Hult, A., 2013. Swedish production of sustainable urban imaginaries in China. J. Urban Technol. 20, 77-94.

Hult, A., 2015. The circulation of Swedish urban sustainability practices: To China and back. Environ. Plann. A. 47 (3), 537-553.

Joss, S., Cowley, R., Tomozeiu, D., 2013. Towards the "ubiquitous eco-city": An analysis of the internationalization of eco-city policy and practice. Urban Res. Pract. 6 (1), 54-74.

Joss, S., Molella, A., 2013. The Eco-City as Urban Technology: Perspectives on Caofeidian International Eco-City (China). J. Urban Technol. 20, 115-137.

Joss, S., Cowley, R., 2016. National policies for local urban sustainability: a new governance approach? In Eames, M., Dixon, T., Lannon, S., and Hunt, M. (eds.) *Retrofitting Cities for Tomorrow's World.* New Jersey: John Wiley & Sons.

Kickert, W., Klijn, E.H. Koppenjan, J., 1997. Managing complex networks, Strategies for the public sector. Sage publications, London.

Klijn, E.H., Koppenjan, J., 2015. Governance networks in the public sector. Routledge, Oxon.

Koppenjan, J., Klijn, E.H., 2004. Managing Uncertainties in Networks. Routledge, London.

Li, F., Liu, X., Hu, D., Wang, R., Yang, W., Li, D., Zhao, D., 2009. Measurement indicators and an evaluation approach for assessing urban sustainable development: A case study for China's Jining City. Landscape Urban Plan. 90, 134-142.

Li, X., Liu, Y., 2011. The current situations, problems and solutions of Chinese eco-cities development (in Chinese). Journal of Urban Planning. 4, 23-29.

Liu, H.L, Zhou, G.H., Wennersten, R., Frostell, B., 2014. Analysis of sustainable urban development approaches in China. Habitat Int. 41, 24-32.

May, S., 2008. Ecological citizenship and a plan for sustainable development: Lessons from Huangbaiyu. City. 12 (2), 237-244.

Mayntz, R., Scharpf, F.W., 1975. Policy making in the German federal bureaucracy. Elsevier, Amsterdam.

MEP, 2005. Appraisal program for establishing eco village and eco city (accessed 29.09.15). http://www.zhb.gov.cn/gkml/zj/bgt/200910/t20091022_173935.htm.

MEP, 2006. Procedures for evaluating national eco village, eco city and eco province (accessed 29.09.15). http://www.zhb.gov.cn/ztbd/rdzl/stwm/sfcj/ghzb/201209/t20120920_236526.htm.

MEP, 2007. Indicators for constructing eco village, eco city and eco province (revised) (accessed 29.09.15). http://www.zhb.gov.cn/gkml/zj/wj/200910/t20091022_172492.htm.

Measures for applying low carbon eco cities (on trial), 2011.

MEP: Indicators for constructing eco village, eco city and eco province (2003, revised in 2007).

Suggestions for further promoting ecological demonstration zones, 2010.

MEP, 2013a. List of national eco cities, districts and villages (accessed 29.09.15). http://sts.mep .gov.cn/stsfcj/mdl/201301/t20130122_245393.htm.

MEP, 2013b. List of national eco cities, districts and villages (accessed 29.09.15). http://sts.mep.gov.cn/stsfcj/mdl/201301/t20130122_245393.htm.

MEP, 2015. Announcement of award of 48 areas as national eco cities (districts and counties), 8 May 2015 http://sts.mep.gov.cn/stsfcj/mdl/201505/t20150508_301316.htm (accessed 5 March 2016)

Miao, B., Lang, G., 2014. A tale of two Eco-cities: experimentation under hierarchy in Shanghai and Tianjin. Urban Policy Res. 33, 247-263.

Miller, T., 2012. China's Urban Billion: The story behind the biggest migration in human history. Asian Arguments, Zed Books, London/New York.

MOHURD, 2010. Cooperation framework agreement on promoting low carbon eco cities between MOHURD and 4 pilot areas.

MOHURD, 2011a. Establish leading group in MOHURD for low carbon city development (accessed 29.09.15). http://www.mohurd.gov.cn/lswj/tz/jk201116.htm.

MOHURD, 2011b. Measures for applying low carbon eco cities (on trial) (accessed 29.09.15). http://www.mohurd.gov.cn/zcfg/jsbwj_0/jsbwjcsgh/201107/t20110711_203738.html.

Mu, Z., 2010. First Standard of Low Carbon City Published in China. Shanxi Energy Conservation. 3, 94-95.

NDRC: Notice regarding pilot low carbon provinces and low carbon cities (2010).

NDRC, 2010. The notice regarding pilot low carbon provinces and low carbon citie (accessed 29.09.15). http://www.gov.cn/zwgk/2010-08/10/content_1675733.htm.

NDRC, 2012. Second batch of national low carbon pilot areas (accessed 29.09.15). http://www.zjdpc.gov.cn/art/2012/12/7/art_791_445983.html.

OECD, 2015. *OECD Urban Policy Reviews: China 2015*. Paris: OECD Publishing (accessed 29.09.15). *http://dx.doi.org/10.1787/9789264230040-en*.

Pow, C.P., Neo, H., 2013. Seeing red over green: Contesting urban sustainabilities in China. Urban Stud. 50 (11), 2256-2274.

Pressman, J.L., Wildavsky, A., 1984. Implementation (Third Edition Expanded). University of California Press, Berkeley.

Price, L., Zhou, N., Fridley, D., Ohshita, S., Lu, H., Zheng, N., Fino-Chen, C., 2013. Development of a low-carbon indicator system for China. Habitat Int. 37, 4-21.

Rapoport, E., 2014. Utopian visions and real estate dreams: the eco-city past, present and future. Geography Compass. 8 (2), 137-149.

Ren, X., 2013. Urban China. Polity Press.

Scharpf, F.W., 1997. Games Real Actors Play. Westview Press, Boulder.

Shepard, W., 2015. Ghost Cities of China. Zed Books, London.

Shwayri, S., 2013. A model Korean ubiquitous eco-city? The politics of making Songdo. J. Urban Technol. 20 (1), 39–55.

Sørensen, E., Torfing, J., 2009. Making Governance Networks Effective and Democratic through Metagovernance. Public Admin. 87 (2), 234–258.

Tao, R., Su, F.B., Liu, M.X., Cao, G.Z., 2010. Land leasing and local public finance in China's regional development: Evidence from prefecture-level cities. Urban Stud. 47 (10), 2217-2236.

Fung, E., 2014. More Than 1 in 5 Homes in Chinese Cities Are Empty, Survey Says. The Wall Street Journal, June 11 2014, retrieved at. http://www.wsj.com/articles/more-than-1-in-5-homes-in-chinese-cities-are-empty-survey-says-1402484499.

Tomozeiu, D., S. Joss., 2014. Adapting adaptation: the English eco-town initiative as governance process. Ecol. Soc. 19 (2), 20.

VPRO 2014, Ecomania in China, documentary broadcast 20 April 2014 (accessed 29.09.15). http://tegenlicht.vpro.nl/biografieen/p/eero-paloheimo.html.

Wu, F.L., 2012. China's eco-cities. Geoforum. 43, 169-171.

Wu, F.L., 2015. Planning for Growth: Urban and Regional Planning in China. Routledge, New York/London.

Xu, J., 2015. Environmental discourses in China's urban planning system: A scaled discourse-analytical perspective. Urban Stud. 1-23.

Yigitcanlar,T., Lee,S.H., 2014. Korean ubiquitous-eco-city: A smart-sustainable urban form or a branding hoax? Technol. Forecast. Soc. 89, 100-114.

Yin, Y., 2014. Environmental Integration in Sustainable Urban Planning from an Institutional Perspective: a Study of Swedish and Chinese Eco-City Development. Royal Institute of Technology, Stockholm.

Yu, C., Dijkema, G.J., De Jong, M., Shi, H., 2015. From an eco-industrial park towards an eco-city: a case study in Suzhou, China. J. Clean. Prod. 102, 264-274.

Yu, L., 2014. Low carbon eco-city: New approach for Chinese urbanisation. Habitat Int. 44, 102-110.

Yu, L., 2014. Chinese City and Regional Planning Systems, Ashgate, London.

Zheng, H., De Jong, M., Koppenjan, J., 2010. Applying policy network theory to policy-making in China: The case of urban health insurance reform. Public Admin. 88, 398–417.

Zheng, H., Wang, X., Cao, S.X., 2014. The land finance model jeopardizes China's sustainable development. Habitat Int. 44, 130-136.

Zhou, G., Liu H., Yin Y., Frostell, B., 2014. Towards low carbon cities in China: integrating greenhouse gas management in urban planning, paper presented at the 20th Annual International Sustainable Development Research Conference: Resilience-The New Research Frontier, Trondheim, Norway.

Zhu, J.M., 1999. Local Growth Coalition: The Context and Implications of China's Gradualist Urban Land Reforms. Int. J. Urban Regional. 23, 534-548.

ACCEPTED MANUSCRIPT

Ministry	**Program**	**Key elements**	**Pilot initiatives** (status: 2015)
MEP	Eco cities, districts & counties	• Indicators for establishing eco provinces, cities and villages (2003; revised 2007) • Evaluation program for establishing eco eco cities and eco counties (2005) • Guidelines for evaluating eco provinces, eco cities and eco counties (2006) • Promotion of ecological demonstration zones (2010)	• 27 cities • 33 districts • 32 counties
MOHURD	Low carbon eco cities	• Cooperation framework for low carbon eco cities, initially with 4 pilot areas (2010) • Dedicated ministerial unit for low carbon city development providing advice on planning/policy, indicator systems and technological applications (2011) • Support for piloting low carbon eco development for new cities and new districts within existing cities (2011)	• 2 provinces • 2 cities • 6 cities under Sino-American initiative • 10 cities under Sino-European initiative
NDRC	Low carbon provinces & cities	• Notice regarding pilot low carbon provinces and cities to (a) promote low carbon technologies and industries, (b) explore policy interventions and incentives; (c) set up GHG data collection and management system (2010) • Low carbon city standard, published by Chinese Academy of Social Sciences (2010)	• 6 provinces • 36 cities

Table 1: Eco city programs by MEP, MOHURD and NDRC. (See Appendix 1 for full list of participating provinces, cities, districts and counties. Sources: MEP, 2005, 2006, 2007, 2013a, 2015; MOHURD, 2011a, b; Mu, 2010; NDRC, 2010, 2012)

ACCEPTED MANUSCRIPT

ACCEPTED MANUSCRIPT

Highlights:

1. Adds public policy as a new perspective to eco city development, in addition to political geography, urban planning and environmental engineering.
2. Identifies factors why implementation of many eco city projects in China fails.
3. Proposes policy network theory as a promising approach to understanding policy success and failure in eco city development.
4. Develops a typology of eco cities in China.
5. Establishes that local government's dependency on land use revenues makes it less susceptible to policy incentives administered by central government ministries.

ACCEPTED MANUSCRIPT

ACCEPTED MANUSCRIPT

Appendix 1: Three Chinese national eco city programs & related pilot initiatives.

MEP Eco cities, districts & counties	**Cities (27):** Annan; Changle; Changshu; Changzhou; Chongzhou; Fuqing; Jiangyin; Jintan; Kunshan; Linan; Liyang; Nanjing; Nantong; Ningguo; Rongcheng; Rushan; Suzhou; Taicang; Wendeng; Wujiang; Wuxi; Yiwu; Yixing; Zhalantun; Zhangjiagang; Zhongshan; Zhuhai
	Districts (33): Huzhou Wuxing District; Karamay District; Minhang District; Nanchang Wanli District; Nanjing Jiangning District; Nanjing Liuhe Districit; Nanjing Pukou District; Nanshan District; Nantong Tongzhou District; Qipanshan Development Area; Quanzhou Luojiang District; Shenbei New District; Shenyang Dongling District; Shenyang Sujiatun District; Shenzhen Futian District; Shenzhen Luohu District; Shenzhen Yantian District; Suzhou Wuzhong District; Taizhou Hailing District; Taizhou Jiangyan District; Wuxi Binhu District; Xiamen Haicang District; Xiamen Jimei District; Xiamen Tongan District; Xiamen Xiang'an District; Xi'an Chanba Ecological District; Xi'an Qujiang New District; Xiangcheng District; Xiqing District; Xishan District; Yuhong District; Zhuhai Doumen District; Zhuhai Jinwan District
	Counties (32): Anhui Huoshan County; Anhui Yuexi County; Beijing Miyun County; Beijing Yanqing County; Fujian Anxi County; Fujian Dongshan County; Fujian Yongtai County; Henan Xinxiang County; Hunan Changsha County; Inner Mongolia Hulun Buir Erwenke County; Jiangsu Gaochun County; Jiangsu Jinhu County; Jiangxi Fuliang County; Jiangxi Jingan County; Jiangxi Tonggu County; Jiangxi Ziyuan County; Jilin Tonghua County; Lioning Liaozhong County; Shanghai Chongming County; Shanxi Feng County; Sichuan Pi County; Sichuan Pujiang County; Sichuan Shuangliu County; Zhejiang Anji County; Zhejiang Kaihua County; Zhejiang Ninghai County; Zhejiang Panan County; Zhejiang Qingyuan County; Zhejiang Tonglu County; Zhejiang Xiangshan County; Zhejiang Xianju County; Zhejiang Xinchang County
MOHURD Low carbon eco cities	**Provinces (2)**: Hebei; Guangdong
	Cities (17): Shenzhen; Wuxi -*Sino-American cooperation* (6): Hebi; Hefei; Jiyuan; Langfang; Rizhao; Weifang -*Sino-European cooperation* (10): Changzhou; Fenxi New District; Guilin; Hefei; Liuzhou; Luoyang; Qingdao; Weihai; Zhuhai; Zhuzhou
NDRC Low carbon provinces & cities	**Provinces (6)**: Guangdong; Hainan; Hubei; Liaoning; Shaanxi; Yunnan
	Cities (36): Baoding; Beijing; Chizhou; Chongqing; Daxinganling; Gangzhou; Guangyuan; Guanzhou; Guilin; Guiyang; Hangzhou; Huaian; HulunBuir; Jinchang; Jincheng; Jingdezhen; Jinlin; Jiyuan; Kunming; Nanchang; Nanping; Ningbo; Qingdao; Qinhuangdao; Shanghai; Shenzhen; Shijiazhuang; Suzhou; Tianjin; Urumchi; Wenzhou; Wuhan; Xiamen; Yan'an; Zhenjiang; Zunyi

MEP = Ministry of Environmental Protection; MOHURD = Ministry for Housing and Urban-Rural Development; NDRC = National Development and Reform Committee. (Sources: MEP, 2005, 2006, 2007, 2013a, 2015; MOHURD, 2011a, b; Mu, 2010; NDRC, 2010, 2012)