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URBAN CLIMATE CHANGE GOVERNANCE IN CHINA 2015

1. INTRODUCTION

Most urban responses to climate change worldwide have focused on climate change mitigation – the actions taken to reduce the impact of human activity on the climate system, primarily through reducing net greenhouse gas (GHG) emissions[1]. The objective of the United Nations Framework Convention on Climate Change (UNFCCC) is to achieve "stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system"[2]. The Intergovernmental Panel on Climate Change (IPCC) suggests that the plausible limit of "dangerous anthropogenic interference" set out in policymaking is beyond the work of science because normative judgments are inherently involved. The policy and scientific communities have basically agreed that a 2°C increase (from pre-industrial levels) in the global annual mean surface temperature is the maximum acceptable threshold of risk to the ecosystem[3].

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[1] IPCC, *Climate Change 2007: Mitigation of Climate Change*, (in:) B. Metz, O. R. Davidson, P. R. Bosch, R. Dave, L. A. Meyer (eds.), *IPCC Fourth Assessment Report – Working Group III*, Cambridge, New York, Intergovernmental Panel on Climate Change 2007; IPCC, *Climate Change 2013: The Physical Science Basis – (Approved) Summary for Policymakers. IPCC Fifth Assessment Report: Working Group I*, Stockholm, Intergovernmental Panel on Climate Change 2013.

[2] United Nations, *The United Nations Framework Convention on Climate Change*, Rio de Janeiro 1994.

[3] CEU 2005. *Presidency Conclusions – Brussels, 22 and 23 March 2005*, European Commission, Council of the European Union. Brussels, Belgium, at http://www.eu2005.lu/en/actualites/conseil/2005/03/23conseileuropen/ceconcl.pdf (visited Sept. 27, 2013); J. Hansen, M. Sato, R. Ruedy, K. Lo, D. W. Lea, M. Medina-Elizade, *Global Temperature Change*, Proceedings of the National Academy of Sciences 2006, No. 103, pp. 14288–14293; F. R. Rijsberman, R. Swart, *Targets and Indicators of Climatic Change*, Stockholm 1990.

While there is recognition that we are already locked into climate change due to past emissions, and that there is a need to adapt to stress and change and to build resilience, efforts remain focused on policies to measure and monitor emissions, set targets and develop action plans. This is also the case in China. The 2°C threshold requires nations to follow the 'common but differentiated' principle by which the reduction of emissions is offset by a country's current growth needs.

In the past three decades, government policies in China have created an 'energy-intensive' and 'high carbon' urban mode through their prescriptions to increase urbanisation and economic growth[4]. Although China's per capita GHG emissions remain the lowest among the BRICS countries and the global north, its total CO_2 emissions are on a rapid growth trend since economic reforms were launched in 1978.

In 2009, shortly before the Copenhagen Conference of Parties (COP15), China announced a national commitment to a 40–45% reduction in carbon dioxide (CO_2) per unit of GDP by 2020 from 2005 levels (17% for the 2011–2015 period). Moreover, the 12th Five-Year Plan, which charters the social and economic development of China from 2011–2015, states that the main priorities during this period are sustainable growth, industrial upgrading and the promotion of domestic consumption. These priorities explain why certain sectors, including energy, automotive, IT infrastructure and biotechnology, receive a high degree of focus[5]. In particular, *energy security and climate change mitigation* have emerged as key policy priorities. This demonstrates that the Chinese central government (CCG) is committed to carbon control and a low carbon transition, despite the fact that such transition challenges current development patterns and poses great implementation difficulties, such as changing production and consumption patterns, and generally altering what is currently considered by many in China as quality of life – the accumulation of material wealth. On 3 June 2014, He Jiankun, chairman of China's Advisory Committee in Climate Change, told a conference in Beijing that absolute cap on carbon emissions will be introduced in 2016.

The implementation of these national carbon reduction policies is prescribed to take place at the municipal level through regular policy implementation avenues and through low carbon experiments (pilot projects) in metropolises such as Baoding, Shanghai, Hangzhou, Jilin, Zhuhai, Nanchang, Xiamen and 100 other cities. According to the official account, these localities have developed blueprints for building low carbon cities that are spontaneously initiated and

[4] S. Dhakal, *Urban Energy Transitions in Chinese Cities*, (in:) H. Bulkeley, V. C. Broto, M. Hodson, S. Marvin (eds.), *Cities and Low Carbon Transitions*, New York 2011.

[5] KPMG Insight Series, *China's 12th Five-Year Plan (2011–2015) – KPMG Insight Series*, at http://www.kpmg.com/cn/en/issuesandinsights/articlespublications/publicationseries/5-years-plan/pages/default.aspx (visited May 8, 2013).

experiment-oriented[6]. The approaches these cities have taken to the low carbon transition are determined by their own choice of pathways. For example, Shanghai used the building of the Expo Park as a means to implement a low carbon strategy through site selection, planning, design, construction and operation of the park and of the transport and accommodation infrastructures. Nevertheless, the city was unable to extend the same development pattern to other structures or to the whole city due to financial and land-use constraints. Baoding branded itself as China's Power Valley and devised its transition by investing in photovoltaic, wind, power-storage and power transmission, with 105 districts powered by solar energy, although it was unable to make the transition in other sectors of its economy[7].

While it is difficult to evaluate and determine the success of urban carbon reduction actions and activities and how much they contribute to absolute or relative GHG emissions in China, it is essential to recognise three intertwined *issues affecting carbon reduction in Chinese cities: municipal governance* (including the effects of decentralisation, personnel incentives for municipal authorities and their legitimacy/accountability), *policy design of development plans* (including financial resources and land concessions, urban planning and sectoral innovation)[8] and *urban contribution to energy consumption*[9].

2. MUNICIPAL GOVERNANCE

The CCG establishes broad national policies and targets for urbanisation, rural to urban conversion, energy saving and CO_2 emissions reduction. The CCG also reviews and approves urban master plans, large investment infrastructural and development projects and applications for rural to urban land conversion. In addition, it provides technical guidelines and standards for cities in specific areas

[6] G. Zhuang, *Towards a Low-Carbon Economy: International Experience and Development Trends*, (in:) W. Wang, G. Zheng, J. Pan, Y. Luo, Y. Chen, H. Chen (eds.), *China's Climate Change Policies*, Abingdon 2012.

[7] *Ibidem*.

[8] J. Wang, M. Tang, *The Romance of the Three Kingdoms in the Formulation of City Master Plan*, The Outlook Newsweek 2005, Vol. 45; B. Qiu, *Responding to Opportunities and Challenges: Key Issues and Policies for Urbanization Strategies in China*, Beijing 2008; World Bank, *The Spatial Growth of Metropolitan Cities in China: Issues and Options in Urban Land Use*, Washington DC 2009; Z. Liu, A. Salzberg, *Developing Low-Carbon Cities in China: Local Governance, Municipal Finance, and Land-Use Planning – the Key Underlying Drivers*, (in:) A. Baeumler, E. Ijjasz-Vasquez, S. Mehndiratta (eds.), *Sustainable Low-Carbon City Development in China*, Washington DC 2012.

[9] S. Dhakal, *Urban Energy Use and Carbon Emissions from Cities in China and Policy Implications*, Energy Policy 2009, No. 37, pp. 4208–4219.

such public transport and utility services. Direct financial support is limited to intergovernmental transfers to provincial and municipal governments, primarily in less developed provinces.

At the local level, municipal governments have functions that range from developing the local economy and employment to the provision and management of municipal services (waste collection, leisure and culture, etc.). This devolution of government functions puts Chinese municipalities in the enviable position of being able to make decisions and to implement them swiftly. One only needs to look at the past three decades of rapid urban development to ascertain Chinese municipalities' governing capacity. However, in the planning of urban low carbon transitions that require looking beyond short term economic growth towards longer term planning for sustainable development, this capacity is being driven by a combination of decentralisation, incentives for municipal authorities, questions about their legitimacy (accountability) and emerging forms of urban governance.

2.1. DECENTRALISATION

China has devolved a range of functional and fiscal responsibilities from the national to the subnational governments, particularly municipalities. Beyond the review and approval of master plans (including urban spatial plans, national socio-economic development five-year plans and state land utilisation plans), investment in large urban infrastructure projects, setting technical standards, providing policy guidelines and facilitating knowledge transfer and capacity building, the central (national) government's capacity to guide and control subnational governments is limited by the rapid economic and spatial changes at the local level and by the limited budget available for urban management (not development).

Spillovers from rapid urban development such as CO_2 emissions and energy security have been the concern of local governments. The co-benefits of transiting to a low carbon economy at the local level – such as energy saving, reducing the environmental and health risks posed by degradation and improving quality of life – are not sufficient incentives for cities to take action without central government support. Chinese mayors are held accountable not only for the provision of urban public services, but also for the performance of the urban economy, investment and employment. They face difficult choices between higher GDP growth and more sustainable urban development.

2.2. PERSONNEL, INCENTIVES AND ACCOUNTABILITY

Since the opening up in the 1980s, China's local authorities – Communist Party secretaries of provinces and cities, provincial governors and city majors – have been evaluated almost exclusively by their contribution to annual GDP

growth. This has created a culture of competition across time and space (with preceding and with neighbouring authorities), driven by a system that rates individuals on their technical competence and good economic performance. As such, local authorities focus on the single issue of economic development. Nevertheless, as we argue in this volume, this focus is now beginning to change due to the formation of climate collaborative municipal networks and policy directions such as 'green GDP' (2004) and 'people-centred development' (2003), which are starting to be implemented even if their effects are only just beginning to be felt.

3. POLICY DESIGN OF DEVELOPMENT PLANS

3.1. FINANCIAL RESOURCES AND LAND CONCESSIONS

Since 1994, China has adopted a tax sharing system that stipulates that the "ratio of subnational revenues to the total revenues averages 50 per cent, while the ratio of local fiscal expenditures to the total is at about 70 per cent"[10]. However, local governments do not have tax collection powers over residential property tax and land value incremental tax, although pilot projects were launched in Shanghai and Chongqing 2011. As such, local governments increasingly face the burden of rapidly increasing expenditures without the power to raise revenues at the required scale. This gap is filled by two sources of funds: revenue-sharing transfers and tax rebates[11] and specific purpose funds usually designated for poor and rural communities. These funds tend to be insufficient to meet capital expenditures for urbanisation and industrial development, given that most of these expenditures are overestimated as they are used to attract investments (FDI) and jobs. The gap is then filled using off-budget funds: revenues from land concessions, borrowing through municipal government-owned urban development investment corporations (UDIC), municipality-imposed surcharges, public-private-partnership (PPP) financial arrangements and build-operate-transfer schemes.

UDICs are established by local governments to bypass the constraints imposed by the Chinese Budget Law for municipalities to borrow from commercial banks. UDICS are given plots of public land as starting assets. With these as collateral, UDICs borrow on behalf of municipalities to fund infrastructure investments. Some UDICs are also created as majority shareholders for municipally owned urban utility companies (water supplies, central heating, town gas), thus generat-

[10] Z. Liu, A. Salzberg, *Developing Low-Carbon Cities in China*…, p. 103.

[11] A. Shah, C. Shen, *The Reform of the Intergovernmental Transfer System to Achieve a Harmonious Society and a Level Playing Field for Regional Development in China*, *Policy research working paper*, Washington DC 2006.

ing cash flows. Other UDICS are simply fiscally backed 'empty shell' companies able to borrow either commercial loans from commercial banks or policy loans from the China Development Bank. Despite these extra resources, municipal governments are under tremendous pressure to continue raising funds to deliver municipal services. The only way they can do this is through the appropriation of rural land within municipal boundaries.

The conversion of rural land to urban use is undertaken through a land acquisition plan based on an urban master plan, a process that is closely monitored by the Ministry of Land and Resources (MLR). The MLR sets the price based on agricultural revenues and the cost of relocating farmers (usually very low in cost), services the land with urban infrastructure and then sells or auctions the serviced land to property developers. The revenues from land sales (concessions) are significant. According to the MLR, total revenue from land sales nationwide in 2010 amounted to RMB2.7 trillion or RMB2000 (US$300) per capita. The prospect of huge earnings continues to drive large developments on the understanding that the rapid growth of the urban population, incomes and property prices will maintain the demand for more flats and houses. Nevertheless, in the past few years, 'ghost towns' made up of empty but perfectly finished villas and towers of flats have become increasingly common. This relentless conversion of land and construction is also creating significant amounts of local debt.

Rural land is also converted into urban land by leasing rural land in suburban villages for residential, commercial or industrial development. This entails *in situ* urbanisation without relocation. Estimates based on the World Bank's Sustainable Development on the Urban Fringe study[12] suggest that *in situ* urbanisation accounted for almost 40% of the growth in China's urban population during the 1990s, of which 33% was attributed to natural population increase (births exceeding deaths). These developments occur outside of the urban land acquisition plan and outside of the supervision and monitoring of the municipal government. As such, the developments tend to be fragmented and unregulated with consequential inefficient land use[13]. In sum, local governments' excessive reliance on off-budget funds for development plans is creating a series of hidden financial liabilities that are the concern of the central government. More sustainable sources of local revenue such as property taxes, betterment charges and municipal access to loans are either underdeveloped or not permitted by law. Moreover, the rate of urban expansion that sustains such development plans cannot continue indefinitely. This financing system has a huge effect on the nature of urban development and, in turn, on the creation of planning and implementation strategies that can support carbon reduction and low carbon growth in Chinese cities.

[12] World Bank, *EAP Sustainable Development on the Urban Fringe*, Washington 2007.

[13] B. Qiu, *Responding to Opportunities…*

3.2. URBAN PLANNING PROCESS

Urban planning is another aspect of the policy design of development plans that impinges on China's ability to make the transition to low carbon development by mainstreaming it into the urban planning process. While the formulation of urban planning in China is rather rigorous, its implementation is less so. Most master plans are not fully implemented within their 20-year timeframe due to two interrelated issues. First, cities have been growing at an unprecedented rate and most are unwilling or unable to overcome the rigidity imposed by the master plans to enable them to accommodate the growing urban population and demand for urban services. While the urban planning process produces 20-year master plans, 5-year implementation plans and a number of associated sectorial master and implementation plans for a given jurisdiction, urbanisation has occurred so rapidly that the actual urban population often exceeds the planned population target for the entire 20-year time horizon of the master plan. Often, the urbanisation area goes beyond the delineated jurisdictional boundaries. Any amendment to the original master plan requires lengthy and cumbersome processes[14].

The second issue affecting the implementation of master plans is the lack of a system of checks and balances that hold municipal authorities accountable to provincial authorities, the People's Congress of the city and to citizens. While planners carry out their work, mayors often use the rapid pace of urban growth and demand for urban services as a reason to deviate from the master plan and to raise additional GDP growth[15]. The People's Congresses in many cities are increasingly playing a supervisory role by checking the actions of municipal authorities against urban master plans, but the lack of technical expertise and insufficient representation from all stakeholders diminish their effectiveness. There is also no established procedure for expert witness testimony over issues relating to the public interest in urban planning[16].

3.3. SECTORIAL INNOVATION

Sectorial innovation is a crucial aspect of the policy design of development plans. Low carbon transition can be regarded as a system innovation, as it is a radical but gradual shift agglomerating various technological innovations across different socio-technical systems. A socio-technical system is a cluster of "technology, regulations, user practices and markets, cultural meanings, infrastructure, maintenance networks and supply networks" that encompasses "pro-

[14] J. Wang, M. Tang, *The Romance of the Three Kingdoms…*
[15] *Ibidem*.
[16] *Ibidem*.

duction, diffusion and use of technology"[17]. A system innovation is defined as a "large-scale transformation in the way societal functions such as transportation, communication, [and] housing (…) are fulfilled, which can also be understood as a change from one socio-technical system to another"[18].

Municipal governance and the design of development policies have implications for carbon emissions because the rapid growth of low density areas at the urban periphery (urban sprawl) increases GHG emissions (mostly CO_2) from a variety of sources such as density, land-use mix, transport, commuting distances, etc.[19]. Urban sprawl means longer journeys by public and private transport and more private vehicle ownership, all of which are sources of GHG emissions. It also means lower density (people per square metre), which leads to higher GHG emissions per person for home heating, cooling and power generation[20]. Low density development produces infrastructure that is less intensively used than that in denser core areas such as suburban access highways, thereby raising emissions per capita[21].

4. URBAN ENERGY CONSUMPTION

Examining the urban contribution to China's energy uses helps in understanding how important urban areas in China are for key ongoing national concerns such as improving energy security, mitigating climate change and substantially reducing the energy intensity of the Chinese economy. Dhakal estimated that the urban contribution to China's total energy use was 84% of the total energy consumed in 2006[22]. The International Energy Agency (IEA)[23] estimated that renewable sources contributed to 10.6% of total energy use in China in 2006, and this was assumed to be mainly due to the high use of biomass in rural areas. Taking these IEA figures and assuming that urban areas only use non-renewable energy

[17] B. Elzen, F. W. Geels, K. Green (eds.), *System Innovation and the Transition to Sustainability: Theory, Evidence and Policy*, Gloucestershire 2004; F. W. Geels, *From Sectoral Systems of Innovation to Socio-Technical Systems: Insights About Dynamics and Change from Sociology and Institutional Theory*, Research Policy 2004, No. 33, pp. 897–920.

[18] *Ibidem*.

[19] R. O'Toole, *The Myth of the Compact City: Why Compact Development Is Not the Way to Reduce Carbon Dioxide Emissions*, Cato Policy Analysis Series 2009.

[20] J. Norman, H. L. MacLean, C. A. Kennedy, *Comparing High and Low Residential Density: Life-Cycle Analysis of Energy Use and Greenhouse Gas Emissions*, Journal of Urban Planning and Development 2006, No. 132, pp. 10–21.

[21] L. Kamal-Chaoui, A. Roberts, *Competitive Cities and Climate Change*, OECD Regional Development Working Paper 2009, No. 2; M. A. Brown, E. Logan, *The Residential Energy and Carbon Footprints of the 100 Largest Us Metropolitan Areas*, *Working Paper 39*, Atlanta 2008.

[22] S. Dhakal, *Urban Energy Transitions*…

[23] IEA, *World Energy Outlook 2007*, Paris 2007.

sources, China's urban input to the total energy use in 2006 would have been about 75%. There is a huge gap in energy use between urban and rural populations: the ratio of urban to rural energy use per capita is 6.8, and that of urban to national use is 1.9[24].

Dhakal analyses data from cities that are highly urbanised and explicitly designated in China's National Plan as important cities for economic development, and concludes that there are 35 cities[25], including provincial capitals, provincial cities and special economic zones (including Guangzhou and Shenzhen), that are important for economic growth and infrastructure development in China. These are the places through which urban transition is forged. While this transition includes the growing energy intensity of urban life, it also includes the implementation of key policy measures for urban energy efficiency and climate change mitigation. The average carbon and energy intensity (energy/carbon per unit GRP) of the province to which the city belongs is used as a proxy for the city's energy and carbon intensity.

Table

Key Indicators (Population, Energy and CO_2 for Key Thirty-five Cities of China, 2006)

	China	**Frontrunner cities**	**Cities' contribution**
Total population, million	1,314	237	18%
GRP (market price), billion US$	2,719	1,109	41%
Total commercial energy consumption, million TJ	65.7	26.2	40%
Commercial energy consumption per capita, MJ/person (registered permanent population)	50,000	110,771	2.2 times more
GDP/GRP per capita, US$/person (registered permanent population)	2,068	4,681	2.3 times more
CO_2 emissions (commercial energy-related), million tons	5,645	2,259	40%
CO_2 emissions per capita (commercial energy-related), tons/person	4.30	9.54	2.2 times more

Source: S. Dhakal, *Urban Energy Transitions in Chinese Cities*, (in:) H. Bulkeley, V. C. Broto, M. Hodson, S. Marvin (eds.), *Cities and Low Carbon Transitions*, New York 2011

Table shows that while these cities represent less than one fifth of the population, they produce a large share of the nation's GDP. Collectively, they consume

[24] S. Dhakal, *Urban Energy Transitions…*

[25] These cities are Beijing, Tianjin, Shijiazhuang, Taiyuan, Hohhot, Shenyang, Dalian, Changchun, Harbin, Shanghai, Nanjing, Hangzhou, Ningbo, Hefei, Fuzhou, Xiamen, Nanchang, Jinan, Qingdao, Zhengzhou, Wuhan, Changsha, Guangzhou, Shenzhen, Nanning, Haikou, Chongqing, Chengdu, Guiyang, Kunming, Xi'an, Lanzhou, Xining, Yinchuan and Urumqi.

40% of the total commercial energy of the nation and emit a similar proportion of CO_2. The wide disparity between these cities and the national GDP per capita, energy consumption per capita and CO_2 emissions per capita shows that their influence in shaping the national energy and carbon profile is disproportionate to their population.

There are also large differences within these cities. Shenzhen, a manufacturing centre and China's gateway to the Hong Kong financial centre, stands out as having an extraordinarily high GDP per capita (US$38,000 per person). There are three clear pathways in China's 35 key cities[26]: the low energy consumption and high economic output path adopted by cities such as Ningbo, Beijing, Guangzhou and Shanghai (eastern coast, with a strong presence of service industries, maritime warm climate); the high energy consumption and low economic output path adopted by cities such as Urumqi, Taiyuan and Hohhot (central and western region, with a strong presence of energy intensive industries and continental extreme climate); and the third somewhere in between these two. While these differences certainly affect the criteria by which one can compare and evaluate energy performance and prescribe energy policies, local authorities have little control over the criteria and indicators used in the ratings.

Following Dhakal[27], it is possible to evaluate the implications of urban energy consumption for CO_2 emissions by looking at the available data on total energy related CO_2 emissions (million tons) of three megacities: Beijing, Shanghai and Tianjin. The data show rapid growths in energy use and CO_2 emissions from each of these cities, particularly since the early 2000s. In Shanghai, emissions increased by 5 times between 1985 and 2006, in contrast to 2.6 times for Beijing and 2.8 times for Tianjin in the same period. In the 2000–2006 period alone, these cities increased their emissions by a factor of 1.5–1.7. In 2006, the gap in emissions among the three cities was large. In 1995, energy use in Beijing, Tianjin and Shanghai was equivalent to 2 tons of oil in each city, with 8 tons of CO_2 emissions per capita (registered population); however, by 2006, CO_2 emissions per capita for Beijing and Shanghai had reached 9 tons and 12.6 tons, respectively.

The sectorial analysis indicates that the industrial sector has dominated CO_2 emissions in these cities. In particular, Beijing and Shanghai underwent rapid transformations between 1985 and 2006, characterised by a rapid decline in the industrial sector's share of total CO_2 emissions – 65–43% for Beijing and 74–64% for Shanghai – and increasing shares for the commercial and transportation sectors. These figures indicate a rapid urban transition. The residential sector (buildings) has also grown tremendously in energy use and carbon emissions. However, due to the rapid growth and expansion of other energy consuming sectors, the residential sector's proportion of energy use and carbon emissions has

[26] S. Dhakal, *Urban Energy Transitions…*

[27] *Ibidem*.

remained more or less unchanged over the past two decades in Beijing, Shanghai and Tianjin. Although the transportation sector's share in 2006 was relatively small – 7% for Tianjin and 16% for Beijing – its growth rate has been very high due to the rising car ownership rates in these cities. Despite strong control over vehicular ownership in Shanghai, CO_2 emissions from the transportation sector increased eight-fold between 1985 and 2006. Beijing registered close to a seven-fold increase in the same period. In the past decade alone, CO_2 emissions in Tianjin have increased by a factor of almost 3.5.

Fuel usage has brought a rapid change in CO_2 emissions. A rapidly declining trend in the contribution of coal burning to both energy consumption and CO_2 emissions is evident. Between 1985 and 2006, coal's share of CO_2 emissions declined from 58 to 26%, 51 to 18% and 61 to 33% in Beijing, Shanghai and Tianjin, respectively, thus indicating a rapid transition. In contrast, the contribution of electricity and oil to CO_2 emissions and energy consumption is rising, which is compensating for the declining share of coal burning.

5. THE MISSING LINK

What these factors do not fully reflect is that urban responses to climate change in Chinese cities is experiencing a governance transition – from the traditional state-centric mode of governing to a more pluralistic and collaborative approach. Through the theoretical lenses of different conceptual streams in the governance paradigm (i.e. network governance, collaborative governance and interactive governance), there is a need to further examine how such transition dynamics – involving interactions of state and non-state actors – are leading to changes in China's climate governance and in the overall evolution of the Chinese environmental state. Scholars of the Study Space are committed to continue contributing to these and other challenges of metropolitan growth in the 21st century.

URBAN CLIMATE CHANGE GOVERNANCE IN CHINA 2015

Summary

In the last 30 years, China has experienced rapid economic development and urbanisation, which has resulted in high levels of environmental degradation and considerable pressure on the country's infrastructure and natural resources. While China's rate of development may be slowing down, China's continuing commitment to considerably lowering the carbon intensity of its economy will still have a significant

impact on the world's quest to curb the proportion of climate change that is due to human induced-greenhouse gas emissions. This paper puts into context the governance challenges the nation encounters in achieving its carbon reduction goals. It identifies the characteristics of China's municipal governance, policy design and development, and urban energy consumption as having the highest impact on the governance of climate change. It concludes there is a pressing need to further research on urban governance transitions to ascertain enabling and constraining factors to climate governance.

ZMIANY KLIMATYCZNE NA OBSZARACH ZURBANIZOWANYCH W CHINACH W 2015 ROKU

Streszczenie

W ciągu ostatnich 30 lat Chiny doświadczyły gwałtownego rozwoju ekonomicznego i urbanizacyjnego. Spowodowało to degradację środowiska i znaczne zużycie infrastruktury oraz surowców naturalnych. Podczas gdy chiński poziom rozwoju może spowalniać, kraj ten będzie dalej dążyć do obniżenia emisji CO_2, ponieważ jego gospodarka wciąż będzie znacząco przyczyniała się do wzrostu efektu cieplarnianego. Niniejszy artykuł skupia się na wyzwaniach związanych z obniżeniem emisji dwutlenku węgla przez Chiny. Praca analizuje cechy charakterystyczne dla gospodarki miejskiej Chin, kształt polityki rozwoju i konsumpcję energii miejskiej jako czynniki mające największy wpływ na zmiany klimatyczne. W konkluzji autorki stwierdzają, że istnieje pilna potrzeba prowadzenia dalszych badań nad zmianami w zarządzaniu miast w celu określenia tych czynników, które mają największy wpływ na zmiany klimatyczne.

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KEYWORDS

governance, climate change, low carbon transitions, Chinese cities

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zarządzanie, zmiany klimatu, niskie emisje dwutlenku węgla, chińskie miasta