



Low-Carbon Development Path for China's New-Type Urbanization: Challenges, Strategies and Practices

Buildings in Shenzhen ©cnsphoto

Executive Summary

The unprecedented pace and scale of China's urbanization has brought both development opportunities as well as serious challenges. While the urban population of China has increased from 18% to 52% between 1978 and 2012, China's urbanization rate is still increasing. According to the *National New-type of Urbanization Plan (2014-2020)*, the urbanization rate (based on urban resident population) of China is going to reach 60% by 2020. This rapid urbanization has brought many benefits to China, including increased consumption and employment rates, improved

living standards, and accelerated economic growth. Yet at the same time, this rapid change has brought environmental and socioeconomic costs. This report addresses the broad question of how China can avoid the "carbon lock-in" effect in its current stage of urbanization. To help facilitate an economically and environmentally sustainable urbanization pattern, this report focuses on three main fields: **effective land use, green transportation and efficient energy consumption.**

Urban Land Use

Analysis of Key Issues

It has long been known that the physical expansion of urban land in China has been faster than the growth in urban population. While arable land is a scarce resource, a large amount of arable land has already been converted to urban construction land, which has been used inefficiently as cities have developed. This report stresses that land-use patterns that optimize land use efficiency and development intensity are consistent with China's economic and environment goals.

This report also analyzes density using average population density and floor-area-ratio (FAR). Huge differences in both these indicators were found between city centers and “new towns” or “development zones” located in city outskirts. The latter is extremely low in both population density and FAR due to wasteful land use in industrial parks and college towns. Moreover, Chinese policy makers retain the typical mind-set that lower FAR represents better environment and living standards. The average FAR of Chinese cities is only 0.3. Even for megacities such as Beijing or Shanghai, the figure is smaller than 3.0, still much lower than big metropolises such as New York, Tokyo or Seoul. With careful planning of green spaces and public areas, low-density and high FAR could be achieved in Chinese metropolises.

Large scale land creation for urban development by transforming natural landscapes, such as relocating mountains or filling in the sea, is occurring in many Chinese cities. While most of these local governments have already accumulated debt, the billions of loans invested in land creation are expected to be returned through profits made on land-transfers. Essentially, this is a desperate continuation of the “Land Finance” model, which not only is a heavy financial risk for cities, but also makes them more prone to natural disasters. Analysis shows that the preliminary studies of such projects currently under operation are usually insufficient; cost-effective analyses for various involved stakeholders are also lacking. There are no estimations for the ecological and environmental losses, nor plans for coping with the potential risks.

Policy Recommendations

- **Increase the FAR carefully by featuring mixed land use in improved urban spatial structure.**
- **Increase land use efficiency through more flexible FAR transfer and grant policies.** Apply these policies to comprehensive urban renewal projects and provide a flexible FAR range for regulatory urban planning.
- **Improve urban structure through redevelopment of land in old city centers that is inefficiently used and has low value.**
- **Implement a top-down system that approves, regulates and guides the development of new towns.** The development of unused land should only be authorized using strict legal and political approval procedures. At the same time, the central government should provide guidance for unutilized natural land use that highlights the preservation of natural resources and environment, as well as careful arrangement of industrial facilities.
- **Redevelop brownfields.** In the complex brownfield redevelopment process, special attention should be given to establishing clear land replacement and transfer mechanisms that clarify property rights. Laws and policies for brownfield clean up responsibilities, and regulations and standards for pollution treatment must also be clearly defined. Moreover, since brownfield redevelopment projects include many specific and technical implementation plans, carefully designed project coordination is necessary for avoiding conflicts. The government should focus and coordinate multiple financing patterns to provide sufficient project funding.

Urban Transportation

Analysis of Key Issues

While many Chinese cities rely on large-scale investment for construction and expansion of public transportation, it is still difficult to avoid the plight of constant congestion. When it comes to light rail and BRT construction and planning, some cities embark on a blind pursuit of scale. They ignore the more moderate development that would be more appropriate for their own local conditions, along with improvements to public transit efficiency and services. In addition, Chinese cities must pay more attention to the integration of urban transportation systems so people can make transfers more easily. In most cities, the urban light rail is a very small proportion of public transportation. There are two reasons why public transit is often viewed as difficult – either the public transportation network planning, or conditions for making transfers and streamlined routes are irrational for typical commuting needs.

Negative impacts from motor vehicle traffic has become increasingly common, and motorized vehicle transportation demand management policies are limited to a few large cities in the form of administrative orders that restrict the general use or purchase right of private vehicle. Market mechanisms for addressing congestion, such as parking demand management and congestion fees, are yet to be fully developed. At the same time, construction of non-motorized transport in China still has a long ways to go. Many cities have begun to experiment with transportation planning and practices, but cities with a convenient and practical non-motorized transportation network are rare. Chinese cities lack non-motorized transportation infrastructure, guaranteed right of way for pedestrians and bicyclists, and awareness for green transport and other issues. According to the Natural Resources Defense Council's 2014 Chinese City Walkability Evaluation Report, a sizeable portion of urban walking environments should be improved for better livability.

Policy Recommendations

- **Prioritize differentiated public transit and promote appropriate construction of mass transit systems.** First, prioritize development of city bus routes that reflect the city's unique characteristics and address its needs. Secondly, full assessments of economic viability and environmental impact must be conducted for construction of large-scale public transportation systems. Additionally, integrated development of transportation and land use should be used to create a comprehensive transportation network plan.
- **Enhance the intelligence of public transport and make public transportation services more user-friendly.**
- **Develop differentiated and integrated public transit network, and strengthen construction of transfers within the transportation system.** Specifically, cities can integrate conventional public transportation with non-motorized transport networks, and also provide car and bicycle parking services at public transportation stations.
- **Implement multi-pronged motorized vehicle transportation demand management policies.** Specifically, this includes policies that decrease demand for transport through compact and mixed land use planning, encourage public transit and non-motorized transport with all kinds of economic instruments, control motorized travel through planning and management of parking facilities, create new mechanisms to improve travel efficiency, and travel efficiency and optimize vehicle time-space structure, establish “low emission zones” for vehicle management.
- **Build walkable and bikable cities.**
- **Encourage the use of new energy vehicles in the public and private transportation sectors.** Local governments should actively use central government drafted fiscal measures, implement multi-level subsidies for local car purchasing, car operation, and multi-level energy subsidy, encourage development of local new energy vehicle market, and encourage new energy vehicle research so the industry can continue to expand.

Urban Energy Consumption

Analysis of Key Issues

Cities are lacking in energy planning and development. In Chinese cities, energy development planning and energy infrastructure-specific planning are still mutually independent, making them difficult to coordinate and integrate. At the same time, existing specific energy planning still continues to focus on energy supply while energy demand is ignored in the old model, causing great waste in energy consumption. If cities want to solve these multiple intertwining urban energy consumption issues, they must assess, plan and coordinate at a higher level, combined with enhancing research on demand based energy consumption planning.

Cities are lacking in building energy consumption data. Even though various data energy consumption data collection platforms have been established by different levels of government under specific policy guidance, the effect of government provided data on the market is not clear, and does not raise enough public attention. The main reason for this is that public information and specifications are not unified, and the index formula is general and unintuitive. Due to concerns of public data quality and of business privacy violations, urban policymakers often lack the power to publicly promote data more effectively. Insufficient data is equivalent to energy waste. Accurate energy consumption data is extremely valuable, and can help mobilize the intellectual resources of an entire society to analyze or use the data.

Policy Recommendation

- **Accelerate the demand-side oriented energy planning and implementation. In the planning process, governments should be clear that the urban development must consider the limitations set by the energy consumption quota.** At the same time, comprehensive energy consumption planning should be coordinated with various energy project plans. Also, demand-side oriented energy planning should be prioritized and applied to all scales of planning, from city, district, development zone to community level. On top of this, the “top-down” and “bottom-up” approaches should be combined in the planning to define the total and the sub-district energy consumption goals.
- **Establish data-based building energy saving operations. China's administration system should utilize their capabilities to prioritize large-scale financial support for building an energy consumption data-collection platform, as data is the basis for energy consumption research to produce technical solution.** For this process, public announcements should start during the earliest stages to collect input on potential problems and improvement solutions. Cities should coordinate with utility companies to benchmark buildings in the same category and gradually improve the benchmarking standards and regulations.

Conclusion

China's urbanization over the past thirty years has been a universally remarkable achievement, but has brought with it huge crises and challenges. Given its environmental and resource constraints, China must achieve its "New type of urbanization" by developing in a people-oriented, ecological and low-carbon way.

In conclusion, mixed land use and land replacement strategies should be applied to optimize developed land. Brownfield redevelopment and the utilization of undeveloped land should also be strictly monitored. For urban transportation, differentiated and integrated transportation structures and multi-pronged regulation policies are recommended. Finally, to achieve clean energy consumption in cities, demand oriented energy planning and management and data-based building energy-saving operation consistent with the development of renewable energy are necessary.

Local practices in China in the report

Land use

1. "New Urbanism" practice in Chenggong
2. Redeveloping land without selling land in Shanghai
3. High-density urban development in Hong Kong



Urban transportation

4. Community "bus service index" and "public-opinion car" in Shenzhen
5. Public transit network optimization project in Chongqing
6. Parking demand management policy in Shenzhen
7. Multi-pronged approach to creating a city bike card in Hangzhou



Urban energy consumption

8. Demand side based energy planning in Taihu New Town;
9. Low carbon retrofits in Yangzhou's old town center

