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Accelerating low-carbon development in Portland, Oregon and Kunming, Yunnan

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As urbanization continues across the globe, cities face significant challenges and opportunities to grow in ways that reduce carbon emissions while providing high quality of life. An EcoPartnership between the cities of Portland, Oregon, USA and Kunming, China is designed to accelerate the exchange of policies and strategies for low-carbon development. Kunming successfully implemented China’s first bus-rapid transit system (BRT); Portland is currently analyzing the feasibility of BRT. Portland relies on an urban growth boundary (UGB) as a key policy to guide growth management; Kunming is evaluating the feasibility of a UGB. Both cities are investing in infrastructure for bicycle networks. Key characteristics of successful collaboration include shared substantive priorities; familiarity with the institutional context and roles of the individuals involved; a good match in the responsibilities of the participating agencies and individuals; interpersonal rapport and trust; and the persistence of the collaboration over time. © 2015 AIP Publishing LLC.

I. WHY A CITY-TO-CITY ECOPARTNERSHIP?

The cities of Portland, Oregon and Kunming, Yunnan are renowned for the beauty of their natural surroundings and excellent environmental quality. Both cities are also experiencing rapid population and economic growth and are seeking to guide development in ways that support a high quality of life while minimizing carbon emissions.

In 2012, Portland and Kunming entered into an EcoPartnership to advance their respective commitments to low-carbon development and exchange urban planning principles, technologies, and experiences. The intent is both to exchange practical information and to provide mutual motivation to pursue ambitious and innovative initiatives. For Portland, low-carbon development is intended to reduce local carbon emissions 80% below 1990 levels by 2050, with an interim goal of a 40% reduction by 2030.

The EcoPartnership includes four related components: (1) an assessment of the urban growth boundary (UGB) as a potential growth-management policy for Kunming; (2) an exchange of technical staff; (3) three implementation projects related to transportation planning, development, and water quality; and (4) an exhibition illustrating low-carbon development policies, technologies, and strategies that have been implemented in Portland and Kunming.

The two cities share common priorities around transportation, growth management, and urban sustainability generally, and each has used strategies that are now under consideration in the other (such as bus rapid transit (BRT) and an urban growth boundary). The combination of shared interests but varied experiences makes a city-to-city exchange a powerful opportunity.

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II. NATIONAL RELEVANCE OF URBAN SUSTAINABILITY

The mounting urgency of climate change and continuing urbanization has made cities a key arena in the global response to climate change. National and local policymakers are seeking practical solutions and replicable models that will reduce carbon emissions while enabling economic development. In the United States, the City of Portland has differentiated itself by reducing carbon emissions even while experiencing substantial population and economic growth. As a result of urban planning, transportation investments, and sustainability policies and practices, Portland’s carbon emissions decreased 14% from 1990 to 2013 while the number of jobs increased by 20% and population grew 31%.1

This decoupling of carbon emissions from economic and population marks an important departure from the prevailing trends for much of the 20th century. Equally important, it was accomplished through many of the same investments and policies that have made Portland an appealing place to live and to do business.

As environmental issues—particularly air and water quality—attract growing attention from policymakers in China, Kunming’s exceptional air quality and proximity to its treasured Dianchi Lake position it to serve as a model of a rapidly growing city that preserves environmental amenities even while it grows. Kunming’s air quality routinely falls in the top quintile of Chinese cities for its low levels of particulate matter, sulphur dioxide and nitrogen dioxide.2 Kunming’s investments in public transportation—first bus rapid transit and now a subway system—illustrate its commitment to protecting air quality by reducing the need for private vehicle trips, and Kunming has expressed its intention to ensure that its built environment prioritizes low-carbon development.

By sharing the respective expertise and experiences in urban sustainability, Kunming and Portland are accelerating the shift to low-carbon cities, harnessing lessons learned, and avoiding the repetition of unsuccessful approaches. Portland’s three decades of experience with an urban growth boundary, for example, have produced lessons learned not just about how to establish a UGB but how to plan for the inevitable revision and adjustment of the UGB over time, as discussed below.4–6 All levels of government have roles to play, and by collaborating with peer cities, local governments can accelerate innovation diffusion in policy arenas of significant local control,7 such as land use and transportation systems.

III. DISCUSSION

Portland Mayor Charlie Hales visited Kunming in October 2013 to meet with Kunming Mayor Li Wenrong and affirm both cities’ commitment to the EcoPartnership, which was initiated by Mayor Li and Mayor Hales’ predecessor, Mayor Sam Adams. Mayor Hales’ visit laid the groundwork for the January 2014 visit of two City of Portland staff together with a Portland State University professor to provide initial technical assistance and scope next steps.

The core of the EcoPartnership collaboration lies in the substantive exchange of expertise around transportation system planning and design, water quality, low-carbon development, and the feasibility of an urban growth boundary for Kunming. For each of these topics, the type and extent of the exchange has taken a different form, ranging from sharing macro frameworks and principles to policy-making experience to project-level technical exchanges, workshops, and study tours.

Through initial exchanges of information, two specific transportation-related opportunities became clear: bikeway design and bus rapid transit. Kunming was in the process of developing an extensive network of bikeways and bicycle trails and could benefit from reviewing Portland’s design guidelines for bikeways, which Portland has been building since the mid-1990s.8 At the same time, Portland is designing a BRT system for a major arterial road and could learn from Kunming’s success with the first BRT system in China.9

Following an initial visit of Portland staff to Kunming, Portland adapted a variety of materials into a set of guidelines for bicycle/pedestrian trail design for Kunming (see Figure 1). Subsequently, a planner from Kunming spent two months in Portland to experience and evaluate the successes and challenges of Portland’s bikeway system. During that time, the Kunming...
transportation planner also shared detailed information about Kunming’s BRT system with Portland officials (see Figure 2). The Portland BRT system is still in development, and the ultimate impacts of this exchange will not be evident for several years;\textsuperscript{9} awareness of the design features of Kunming’s BRT during Portland’s early scoping and design stages, however, maximizes the opportunity for benefit.

The second implementation project, low-carbon development, took the form of a design charrette for a multi-block mixed-use development in Chenggong, Kunming’s “new town.” The charrette—a series of intensive, collaborative sessions to generate and assess design and technology options—was led by Gerding Edlen Development, a Portland-based firm. The project resulted in a series of recommendations to the developer, including high-performance building envelopes and a central plant geothermal system for heating and cooling. In contrast to many recent development projects in China, which have focused on minimizing initial costs to

FIG. 1. Cover of bicycle/pedestrian trail design practices prepared by City of Portland for Kunming (Source: Bureau of Transportation, City of Portland, Oregon).
achieve near-term financial benefits,10 these approaches can require additional up-front capital costs but lead to lower operating costs and a higher rate of return over the long run.

The third implementation project focuses on improving water quality in Dianchi Lake. Kunming has already begun implementing a variety of projects to reduce agricultural runoff and improve water quality, including restoring and constructing wetlands in ecologically sensitive areas adjacent to the lake. Portland State University Environmental Science Professor Yangdong Pan has worked extensively on the restoration of Oregon’s Klamath Lake, which experienced water quality issues similar to those facing Dianchi Lake. Dr. Pan met with counterparts in Kunming and provided details on the strategies used in Klamath Lake. One approach, reducing the nutrient inflows to the lake by curtailing nitrogen-based fertilizer in surrounding agricultural operations, is now being explored in detail. Although Kunming has not published a comprehensive inventory of local greenhouse gas emissions, it is likely that the agricultural sector—and specifically the nitrogen fertilizers that are used in Kunming’s sizable fresh flower industry—is a much more significant factor than for many urbanized areas. Nitrous oxide, a primary component of many commercial fertilizers, is both a greenhouse gas and can degrade water quality, which has been an issue in Dianchi Lake.11 The Climate Trust, a Portland-based not-for-profit organization, has helped secure international carbon funding for nitrogen-reduction projects and is engaging with Kunming officials to assess the feasibility of a similar project there.

Finally, over the course of the EcoPartnership consideration of establishing an urban growth boundary for Kunming emerged as a priority, reflecting new national policies in support of compact growth. Because of Oregon’s pioneering growth-management planning requirements from the early 1970s, the Portland region has long experience with urban growth boundaries.4–6 The City of Portland itself constitutes 36% of the land area of the urban growth boundary for its metropolitan region, which was first established in 1979 both to protect agricultural land and to contain sprawl by guiding efficient urban growth.5 In the three decades since the boundary was first established, the population inside the UGB has increased by 61%, while the land areas within the boundary have been expanded by 14%.12 The UGB has been credited with nearly doubling the number of household units that otherwise would likely have been accommodated in the existing urbanized area as well as reducing vehicle miles traveled.6 Key lessons have emerged that underscore the importance not just of the initial UGB but also of the need to have specific measures in place while the growth boundary is implemented to ensure that the location and type of development under the former planning framework does not continue.4,5 Similarly, it is critical to establish a clear, consistent process for monitoring, evaluating, and managing the growth boundary over time both by governmental and non-governmental institutions.5

FIG. 2. Slide from Kunming presentation of lessons learned from its bus rapid transit system (Source: Kunming Urban Transportation Institute).
The Kunming Urban Planning and Design Institute project manager for the UGB feasibility analysis spent two months in Portland in 2014, meeting with planners and analysts at the City of Portland, Metro (the regional government responsible for establishing the UGB for the Portland region), and Portland State University. Later, Robert Liberty, director of the Portland State University Urban Sustainability Accelerator and former Metro councilor, visited Kunming twice to share the technical, political, and practical lessons learned from Oregon’s experience with UGBs. During the second visit, he was joined by an analyst from a Portland-based firm, Fregonese Associates, which has developed a set of tools for analyzing growth-management called Envision Tomorrow. These tools enable planners to input current demographic development, and transportation system conditions and analyze the likely impacts of land use and development scenarios on environmental, economic, fiscal, and quality of life outcomes. For Kunming, Envision Tomorrow was used to illustrate how UGB scenarios can be modeled. By the spring of 2015, the KUPDI staff had prepared a report describing how and where a UGB for Kunming could be established (see Figure 3).

One critical component in the value of the exchange has been the involvement of third-party organizations to advise and coordinate activities such as technical discussion, staff training, and private-sector participation. The Energy Foundation China, a Beijing-based organization that makes grants to support sustainable energy in China, facilitated communication between Portland and Kunming (arranging meetings, translating materials, and serving as interpreters in person and on phone calls) and provided funding for travel. Another key role was provided by Bill Nesmith, working on behalf of the EcoPartnership Secretariat, who helped both Portland and Kunming understand context and content. The third-party perspective and project management support from both the Energy Foundation and EcoPartnership Secretariat are essential to the success of the Kunming-Portland collaboration.

A second key element was the exchange of in-person visits. Portland representatives from city agencies, Portland State University, the Climate Trust, and private providers of low-carbon products and services made repeated visits to Kunming to meet with counterparts, observe issues first-hand, and develop the relationships and understanding necessary to provide useful technical information. Similarly, two planners from the City of Kunming visited Portland for two months in 2014 to examine the urban growth boundary and planning and design of bike-ways and greenways.

A third feature of the EcoPartnership was a Portland-Kunming EcoPartnership Sustainable Development Exhibition in Kunming in October 2014 (see Figure 4). The exhibition featured the specific products and outcomes of the EcoPartnership to date and also presented stand-out examples of low-carbon development in Portland and Kunming and the public policies and private firms that produced them. These included exchanging technical information about design

FIG. 3. Slide from Kunming presentation of its project to assess the viability of an urban growth boundary (Source: Kunming Urban Planning and Design Institute).
of bicycle, pedestrian and greenway systems, water quality, urban growth boundaries, climate action planning, and low-carbon buildings and district-scale development. Participants from Portland included a representative from the mayor’s office; technical staff from the Bureau of Planning and Sustainability and Bureau of Transportation; representatives from four private-sector firms and organizations; and the director of Portland State University’s Urban Sustainability Accelerator. For Kunming, key participants included the directors of the Planning Bureau, Kunming Urban Planning and Design Institute, and Kunming Urban Transportation Institute, as well as developers, students, and members of the public.

IV. GOING FORWARD

The October 2014 EcoPartnership Exhibition concluded with a pragmatic discussion of priorities to pursue in a next phase of collaboration. Officials from Kunming and Portland have expressed interest in continuing the partnership with a shift toward implementation projects and the intent to involve private-sector firms and organizations that offer the detailed knowledge required to design, provide expertise to, or supply technologies for specific projects. Priority initiatives continue to include the UGB, pedestrian, and bicycle system and design guidelines, the Dianchi Lake nitrogen reduction project, and sustainable stormwater management.

As in many arenas, public policymakers have an essential role in setting direction, adopting plans, and establishing regulations, but the eventual implementation lies largely with private-sector activity. With the cities having shared policy and planning frameworks during the initial
phase of the EcoPartnership, specific implementation projects will likely require a bigger role for private-sector firms and organizations. Relatively few firms both in Kunming and in Portland have experience working in the other city, and many practical details will need to be addressed to realize the full potential of city-to-city collaboration.

V. CONCLUSIONS

For centuries, city leaders have been inspired to make changes in their own cities after experiencing the outcomes of exemplary planning, transportation, and development initiatives in other cities. To capture the technical insights and understanding of the factors that made a given project succeed, however, requires sustained collaboration and personal connections that emerge over time.

The Portland-Kunming EcoPartnership has provided an effective framework to structure and focus peer-to-peer exchange of city-scale technical expertise. Transportation, water quality, and growth-management projects are now underway that draw on the combined experience of Kunming and Portland. Planning and development initiatives have long time horizons, and the ultimate impacts of the EcoPartnership may not be evident for years or even decades. The constructive engagement to date and next phase of implementation projects, however, are encouraging. Kunming is seriously considering a UGB and is drawing from Portland’s experience designing and building bikeways; Portland is evaluating Kunming’s BRT design features as it prepares to build its first BRT line.

Cities have a central role to play in shaping communities that thrive while minimizing environmental impacts, and the EcoPartnership offers a new addition to the tools available to accelerate the spread of successful approaches from city to city. Portland and Kunming seek to provide an example of the potential to accelerate, and we look forward to sharing our experience and findings with peer cities through networks like C40 and ICLEI—Local Governments for sustainability.

10Q. Yangfeng, “‘Most homes’ to be demolished in 20 years,” in China Daily, China Daily Group (August 7, 2010).