

Metro Solutions to Macro Visions: Partnerships between U.S.-China-India Cities Promote Efficient and Progressive Green Futures

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ABSTRACT

Cities are responsible for nearly 75 percent of world's energy consumption; expectedly, about 90 percent of future growth will occur in urban areas. However, we consider that cities will be at the forefront of implementing groundbreaking technologies and policies, as evidenced in the initiatives taken by many cities here and worldwide to resolve issues in energy and climate change. In addition to affording energy and environmental benefits, investments in energy efficient and renewable technologies have huge potential to boost local economies, as demonstrated by the recent Federal allocation of the Stimulus funding.

Cities with emerging economies in Asia are vitally important here because of their prospects for leapfrogging to advanced energy efficient production- and use-technologies and clean energy. Realizing the importance of this, the U.S. Department of Energy initiated a U.S.-China-India Cities Partnership on energy and environment wherein U.S. cities, paired with Chinese and Indian cities at various levels of city government, businesses, universities, and citizens, identify collaborations of mutual interest. Its purpose is to share the technologies and lessons-learned from every city's experience to augment the capability of other participating cities to identify and respond to a range of barriers limiting the establishment and management of sustainable urban energy practices and plans. These partnerships offer tremendous economic opportunities to U.S. cities and businesses, now emerging from the recession, in promoting products and services in Asian markets.

The Vision for New Economy

In his 2010 State of the Union Address, President Obama strongly proclaimed that America must export more goods; the more products we make and sell to other countries, the more American jobs we can support here. Doubling our exports over the next five years would ensure two million more jobs in America. We must seek new markets aggressively, as our competitors do. If America sits on the sidelines, whilst other nations sign trade deals, the chance to create jobs on our shores will be lost. That is why we must continue to strengthen our trade relations in Asia and with key partners, like South Korea, Panama and Colombia (The White House, 2010).

Leaders from the public sector, and the energy-, infrastructure-, finance-, and venture capital-communities argue that the shape of our next economy, transforming from the "Great Recession", must be an export-oriented, low-carbon, and innovation-fueled one (Herbert, 2010). Brookings Institution contends that metropolitan areas are the engines of national prosperity. They will lead the next economy as they are the hubs of trade, commerce, and migration, and the centers for talent, capital, and innovation (Katz and Wagner, 2010).

Urban Energy Linkages to National Concerns

Cities, national economic growth, energy demand, and environmental quality are interdependent. Rapidly urbanizing cities consume more than 75 percent of global energy, and account for more than 70 percent of global CO₂ emissions (CCI, 2010). As increasing energy demands outpace supply, it is critical for cities to provide sufficient reliable energy at prices that will not diminish economic growth.

Clean Technologies for Cities

Implementing energy efficiency and renewable energy options lessen the demand for fossil fuels and can mitigate the volatility in energy prices, support local economies, create jobs, and reduce GHG emissions and criteria pollutants (Awerbuch, 2006). Systematic urban initiatives hold the maximum promise to support national goals of energy security and environmental sustainability, including mitigating climate change. At the same time, lacking a comprehensive national or state policy, cities can be at the forefront of implementing groundbreaking policies and plans, as is evident from examples worldwide, where innovative accomplishments demonstrate that energy and environmentally smart strategies have taken root in every aspect of cities' operations (Bhatt, 2008). For an example, by November 2009, more than 1000 US mayors have signed the US Conference of Mayors' Climate Protection Agreement and taking action. Initiatives vary by size and scale (USCM, 2010).

Economic Benefits of Local Energy Initiatives

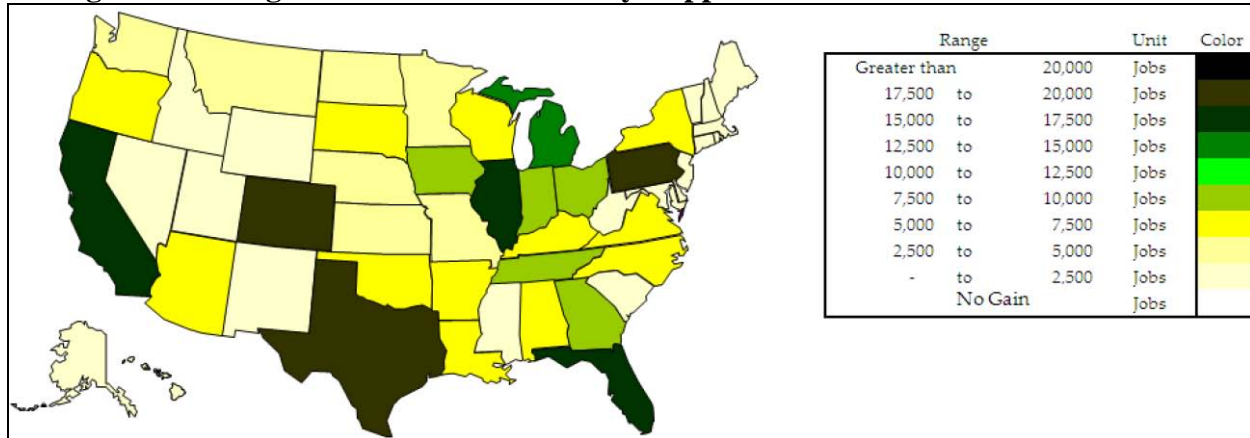
The largest 100 metropolitan areas that, after decades of growth, take up only 12 percent of the US landmass, encompass two-thirds of the population and generate 75 percent of our national gross domestic product (Katz and Wagner, 2010). The major factor driving local climate and green energy policies is the desire to capture the economic development benefits of investing in energy efficiency and renewable resources.

Studies predicted that the Colorado and Pennsylvania Renewable Portfolio Standards (RPS) laws respectively would generate 2000 and 3500 jobs (Pletka et al., 2004). Analyses of the economic impacts of energy-efficiency investments on South Carolina's economy suggest that an early program stimulus, driving a higher level of efficiency investments, can increase the robustness of its economy. An average of 16,000 new jobs from the 2010 through 2015 would be established, and would rise to an average of nearly 19,000 net new jobs from 2015 to 2025. Meanwhile, the annual savings in energy bills, beginning from a modest first-year gain of \$ 13 million, would reach \$ 2.1 billion by 2025 as more investments were directed towards purchasing energy efficient products (ACEEE 2009).

Evaluations of the U.S. Government's 2009 Stimulus bill by the economic research firms, IHS Global Insight, Macroeconomic Advisers and Moody's Economy.com estimate that it added between 1.6 million to 1.8 million jobs so far, and that its ultimate impact will be about 2.5 million jobs. The Congressional Budget Office, an independent agency, considers these estimates as conservative. The last year showed that aid to states and cities may be the single most effective form of stimulus (Leonhardt, 2010). Out of the \$ 787 billion stimulus money, nearly \$ 37 billion in appropriations, nearly \$ 100 billion in projects and \$ 5.6 billion in tax credits were awarded by the US Department of Energy, creating 22,841 jobs as of now (Rogers, 2010).

The implementation of a 25% National Renewable Electricity Standard (RES) by 2025 would support 274,000 more jobs in the renewable energy industry than without it (figure 1), and it would drive job growth beyond several short-term tax-credit extensions (Navigant, 2010).

Figure 1: Change in Renewable Electricity-Supported Jobs in 2025 with a 25% RES



Source: Navigant, 2010

Note: Plot shows the incremental cumulative increase in employment comparing a 25% RES by 2025 without one then.

A second targeted economic benefit lies in developing a new manufacturing capacity. By creating policy environments that encourage energy efficiency and renewable energy development, regional governments hope to attract new manufacturers and to provide new business opportunities for existing manufacturers (Sterzinger and Svrcek, 2004). In addition to the benefits that the sustainable energy industry might bring to cities, analysts also emphasize the local economic benefits. For example, locally sited renewable-energy projects can create significant revenues for landowners and local authorities; investments in such projects may entail a higher multiplier effect on local economies than comparable investments in fossil-fuel technologies (Hopkins, 2003).

Energy Business Exports from Cities Hold Key to Revitalizing the Economy

Accounting for just over one trillion dollars of value, the top 100 metropolitan areas (metros) generate 68 percent of U.S. goods and services exports, excluding agricultural products, and 80 percent of service exports. The investment base for the green economy is intensely concentrated; 94 percent of venture capital comes from the top 100 metro areas. Taken together, all of metros generate 86 percent of goods and service exports, excluding agricultural ones, and 92 percent of service exports (Katz and Wagner, 2010).

Recent market transformation for clean technology development, deployment and service sectors in cities coupled with significant government and private investments have established a new energy economy. With thousands of new workers and ground-breaking advanced technologies, cities have potential to revolutionize metropolitan low-carbon-economy solutions in to export-oriented national economy. President Obama's vision of creating clean technologies oriented export based economy can be supplemented by cities by providing; financiers to finance it, scientists and engineers to invent it, entrepreneurs to take it to market, and laborers to build and install new infrastructure, facilities, and products.

Potential International Markets

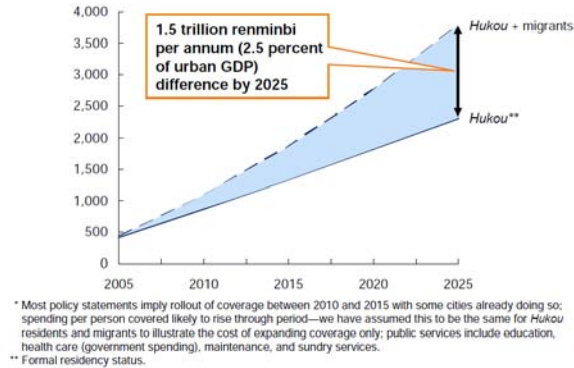
The world faces no greater challenge in the 21st century than arresting the rapidly increasing accumulation of greenhouse gases that cause climate change (PEW Center and Asia Society, 2009). The International Energy Association predicts that reducing greenhouse-gas emissions to acceptable levels will require an additional global investment of \$13 trillion by 2050. Potentially, significant amount of emissions can be reduced by promoting energy efficiency and conservation, and new investments in renewable energy, advanced clean-technologies, and efficient infrastructure in cities globally, since metropolitan economies drive significant demand for increased trade and commerce (Katz and Wagner, 2010). Half of the humanity now lives in cities, and, within the next two decades, 60 per cent of the world's people will reside in urban areas, where nearly 90 percent of future growth will take place (UN Habitat 2008).

Urban growth rates are highest in the developing world, absorbing an average of 5 million new residents every month, and are responsible for 95 per cent of the growth in the world's urban population (UN Habitat 2008). With large populations, ambitious development plans, and GDP growing between 5 to 10 percent, China and India are poised to consume enormous amounts of energy and resulting higher levels of greenhouse-gas emissions. Cities in emerging economies, like India and China, also are vitally important in addressing the globally pressing issues of energy security and environmental sustainability because they can rapidly deploy advanced energy systems and renewable resources, as they invest in new technologies and infrastructure. Indian and Chinese economic growth, coupled with an exacerbated energy shortage, presents unprecedented opportunities for U.S. cities to share best practices and technologies for creating jobs and manufacturing capacity locally and stimulate economy.

Urbanizing China's investment needs. China's economic progress and rapidly rising standard of living have resulted in historically unprecedented surge of urbanization, which if continues; nearly one billion people will live in urban China by 2025, out of which nearly half will be migrants. Urban economy will generate over 90 percent of China's GDP by 2025. Cities will face increased costs in providing services, including 1.5 trillion renminbi or almost 2.5 percent of urban GDP will be required to extend public services and benefits to migrants across China (figure 2) (Woetzel et al, 2009).

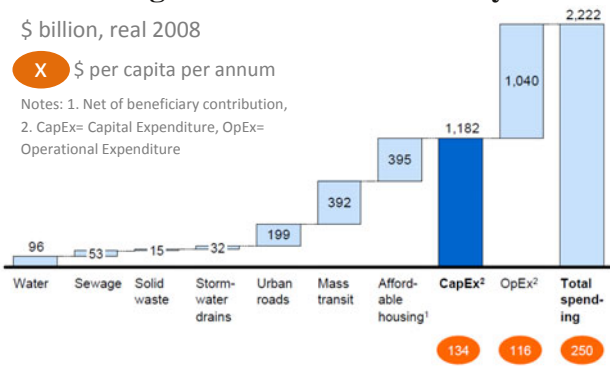
Indian urban potential. By 2030, rapidly growing Indian cities will become home to nearly 40% of Indians, growing from 340 million in 2008 to 590 million by 2030. Urban India will generate 70 percent of GDP by 2030. India will need to dramatically step up urban infrastructure to bridge the gap between service demands and availability, which will require \$ 1.2 trillion worth of investments in capital expenditure in cities over the next two decades (Figure 3) (Sankhe et al, 2010).

Figure 2: Spending on Urban Public Services in China



Source: Woetzel et al, 2009

Figure 3: Funding Needs for Rapidly Converting Urban Areas in India by 2030



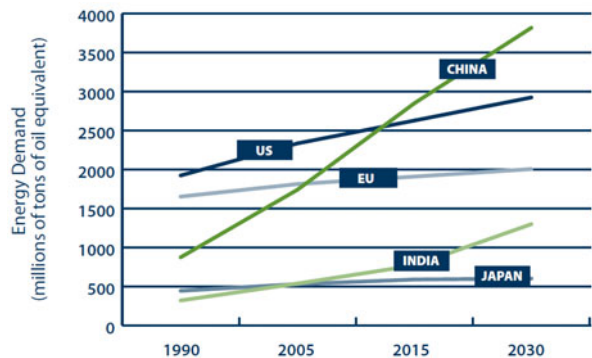
Source: Sankhe et al, 2010

Energy at Crossroads in China and India

Currently, China is the world's second-largest consumer of energy after the United States and will be the largest energy consumer soon, according to the International Energy Agency's (IEA) World Energy Outlook 2007 (WEO) (IEA, 2008). A Credit Suisse report from January 2010 indicates that Chinese energy consumption to GDP will surpass that of the U.S. by 2020 (Ives et al, 2010). However, significant efforts are needed to control the energy growth rates (figure 4). China's energy demand will rise from 1,742 million tons of oil equivalent (mToe) in 2005 to 2,851 mToe in 2015, and 3,819 mToe in 2030. Such an increase greatly will affect international energy-consumption patterns, as shown in figure 4 (IEA, 2008).

India currently ranks fourth in the world in primary-energy demand, and fifth when biomass is excluded. If its sustained economic growth persists, attaining 8-10% of GDP growth per annum through 2030, at a conservative estimate, its primary energy supply must grow by 3 to 4 times, and electricity supply by 5 to 7 times (Planning Commission, 2006). Accordingly, India might well emerge as the third largest consumer of energy after China and the United States (Sathaye et al, 2009).

Figure 4: Energy Consumption in China and India



Source: World Energy Outlook 2007, IEA 2008

Aggressive Energy Strategies in China and India

Realizing this energy challenge, China and India announced aggressive attempts to reduce their energy intensity and carbon intensity. During the diplomacy that preceded the meeting in Copenhagen in late 2009, China announced plans to reduce their carbon intensity by 40 to 45 percent by 2020 compared with 2005 levels (Wong and Bradsher, 2009). India's

Parliament proclaimed a similar measure, lowering carbon intensity by 20 to 25 percent by 2020 compared with 2005 levels (Yardley 2009).

Marching Towards a Low Energy Society

An analysis of 95 countries responsible for 97 percent of global economic activity has found that countries are pursuing distinctive climate mitigation strategies based on national priorities and strategies (figure 5). Climate accountability has significantly increased in 32 countries, including China, Korea and Germany, whereas 46 percent of the countries have demonstrated improvements in climate accountability, including India, Mexico, Kenya, the Philippines and Rwanda. Countries that have built coherent climate policies and consistently pursuing improvements have seen economic progress, here is still plenty of room for improvement among many of the competitiveness actors, including in China and India. (Lee et al, 2010)

Figure 5: Climate Competitiveness Index

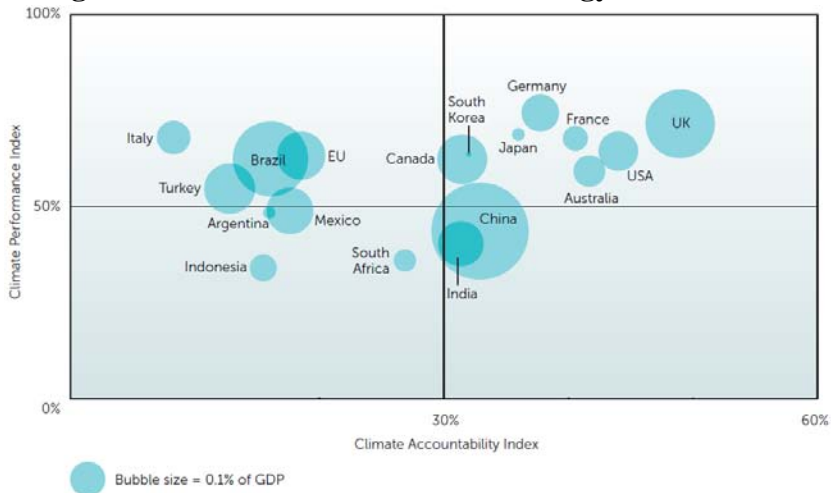


Source: Lee et al, 2010

Clean Energy Investments

Companies and countries are scrambling to win share in new markets. The clean energy sector, estimated to be worth US \$ 200 billion in 2010, has seen rapidly growing investment in recent years, with a moderate setback due to the 2009 downturn. Countries such as Turkey, Italy, U.S., India and China have all increased their investments in clean energy by over 100% in the last five years (figure 6). It is of concern that significant investments are being made in some countries with only moderate levels of climate accountability (Lee et al, 2010).

Figure 6: International Clean Technology Investment



Source: Lee et al, 2010

China energy market. China is seeking to dominate the race to a green environment, dedicating \$221 billion of their recent stimulus package on renewable energy and similar investments, compared to the \$94 billion in the United States (Katz and Wagner, 2010). The Chinese Government’s passage of the new Renewable Energy Law includes an ambitious renewable-

energy portfolio of at least 15 percent by 2020, which, paired with the industrial outlook, is likely to be higher. This law partly is responsible for the increase in new renewable-energy projects affording U.S. firms an important opportunity to supply proven, high-quality products and services in key areas. They would include solar photovoltaics, wind turbines, waste-to-energy, biomass, geothermal, biofuels, and energy service companies, energy-efficiency auditing, resource-mapping technologies and related services (ITA 2010).

Consumers are increasingly driving the corporate responsibility agenda in China, according to the Fortune/AccountAbility's latest Managerial Corporate Social Responsibility Survey. Chinese consumers rank third of 17 countries surveyed in the annual Greendex survey, illustrating significant awareness of and action on environmental issues and "green" products. 46 percent of respondents to the Greendex survey said they were intending to buy an energy efficient vehicle in the next year, sending an incredible market demand signal for environmentally responsible products. The continued attention paid to environmental issues also influence future markets, with 41 percent of respondent companies developing new low carbon products and services. (Ives et al, 2010)

India energy market. To spur the development of this nascent cleantech sector, the Government of India is poised to launch a series of policies that will kick-start nationwide the development of energy-efficient and renewable-energy projects. For example, India will invest over \$900 million in the solar sector over the next four years, according to the U.S. Commercial Service (USDOC, 2010). Under its new Solar Mission announced in December 2009, India plans to install up to 1,000 MW of solar energy by 2013, and 20,000 MW by 2022 (MNRE, 2009). Those targets, which would help India close the gap on solar front-runners like China, is part of an ambitious \$19 billion, 30-year scheme, according to Reuters (Mukherjee and Fogarty, 2009).

In August 2009, the Indian Prime Minister's Council on Climate Change approved the National Mission on Enhanced Energy Efficiency. Purportedly, this Mission will enable transactions worth several billion dollars in energy efficiency. For instance, the saturation of compact fluorescent lamps (CFLs) in an average urban household reached 2.3, primarily reflecting their low price, and the consumers' associated cost advantage. However, the governments' vision of sustainable development needs to be factored into the growing interest in energy-efficient products, and policies promoted encouraging the private sector to manufacture and implement plans for selling and using efficient products. The market for such products easily is of the order of tens of billions of dollars, and eventually might match that of the current IT industry (Sathaye et al, 2009).

Partnerships with China and India

The three large producers of greenhouse gases, the United States, China, and India, soon will become the three top emitters. Cooperation among them is essential to resolve the daunting challenge of climate change. Were the three countries to become active catalysts in bringing about a strategic transformation to a low-carbon, sustainable global economy, the world will take a giant step forward in combating climate change. Further, all three would edge closer to energy security, protecting their environments and assuring greater prosperity for their citizens. Equally important, they also will succeed in building a stable and cooperative foundation for collaborative development as a whole. (Pew Center and Asia Society, 2009)

U.S.-China Collaboration

The U.S.-China Joint Statement signed by the Presidents of both countries in Beijing, China on November 17, 2009, highlights various collaborative activities. Under section 5, Climate Change, Energy and Environment, of the agreement, the two agreed that a transition to a green- and low-carbon-economy is essential and that the clean-energy industry will provide vast opportunities for citizens of both countries in the years ahead (White House 2009a).

U.S.-India Collaboration

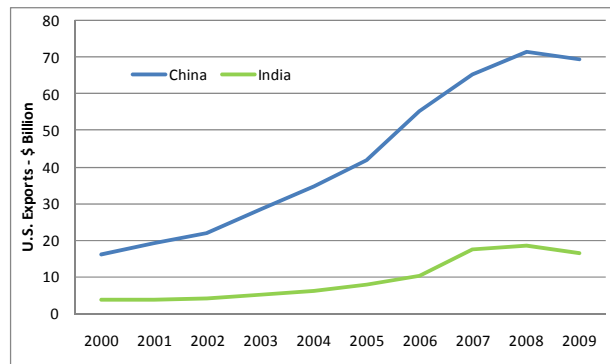
President Barack Obama and Prime Minister Manmohan Singh launched a Green Partnership on November 24, 2009 to strengthen U.S.-India cooperation on clean energy, climate change, and food security. The two countries agreed on a comprehensive Memorandum of Understanding to enhance cooperation on Energy Security, Energy Efficiency, Clean Energy, and Climate Change. Through this Memorandum, both will work jointly to accelerate the development and deployment of clean-energy technologies, and to strengthen cooperation on adaptations to climate change, climate science, and reducing greenhouse-gas emissions from cutting forests and land use. More than two dozen U.S. and Indian cities will collaborate in advancing and deploying clean energy (White House, 2009b).

U.S. Trade Prospects

U.S. exports to China increased by nearly 4-folds from 2000-2008 (figure 7), whereas exports of services in management, consulting, and public relations increased 36-folds from 2002 to 2008. US exports to India increased nearly 5-folds from 2000-2008, whereas exports of construction, architectural, and engineering services increased 39-folds from 2002-2008. U.S. exports to China outperformed exports to other markets during the global economic downturn, which was affected by 0.2% from year 2008 to 2009, while impact on exports to other major countries was in the range of 10-25% (USITC, 2010). For an example, GE's ecomagination products and services in China have seen a 50% increase in sales revenue (\$656 million) in the first three quarters of 2009, from a year ago (Businessweek, 2009).

However, Bosworth and Collins (2008) contend that U.S. underperforms as an exporter to China relative to a peer group of high-income European countries and Japan, whereas, clean technology imports both others. On the Earth Day in 2010, the Blue Green Alliance - a national partnership of labor unions and environmental organizations - proclaimed that billions of dollars are being invested to support the production of clean energy in U.S., but due to the lack of properly designed tax and

Figure 7: U.S. Exports to China and India 2000-2009



Source: USITC, 2010

investment incentives for clean energy generation, loan guarantees, and other policies, efforts to rejuvenate U.S. manufacturing base could be setback by subsidized imports from other countries (BGA, 2010).

U.S.-China-India Cities Integrated Partnership

The U.S. Department of Energy's (USDOE) Office of Energy Efficiency and Renewable Energy established the U.S.-China-India cities partnership for sharing best practices and technologies on issues of mutual interest in energy and the environment. Brookhaven National Laboratory (BNL) coordinating these partnerships for USDOE, systematically paired U.S. cities with Chinese and Indian cities, so as to enhance existing relations and structures of collaborations for initiating and maintaining dialogues on energy and environment at various levels of city governments, businesses and academic/research institutions. These partnerships persistently strive to identify projects of mutual interest for sharing technologies and lessons-learned from every city's experience to augment the capabilities of other participating cities in identifying and responding to a range of barriers limiting the implementation and management of sustainable urban-energy practices and plans (Bhatt and Ginsberg, 2009). These partnerships offer tremendous economic opportunities to U.S. cities and businesses, now emerging from the recession, in promoting energy products and services in Asian markets.

The Partnership involves U.S. cities like Atlanta, Chicago, Columbus, Denver, Edison, Los Angeles, Philadelphia, and San Francisco; the Chinese cities of Beijing, Guangzhou, Hefei, Kunming, Ningbo, Shanghai and Tianjin; and, Indian cities like Ahmedabad, Bangalore, Bhubaneswar, Chennai, Delhi, Mumbai, Surat and Vadodara.

USDOE has created significant opportunities for market transformation in Chinese and Indian cities for deployment of advanced clean technologies, by promoting a variety of partnerships based on green- and zero-energy buildings, building codes, energy efficiency in industries and infrastructure, green- and renewable-power, alternative-fuel vehicles, green government purchasing, consumer rebates, eco clubs, implementation plans, capacity building, consumer education, and awards/recognition. Cities have identified collaborative projects based on discussions via video conferences, teleconferences, and one-on-one workshops. The examples we give below from the ongoing US-China-India Cities partnerships reveal that the Cities cooperation is a win-win situation for all partners, as expectedly, the partnerships are interactive and mutual. Hence, they generate strong and diverse business prospects for energy-efficiency products, clean- and renewable- energy technology companies, and engineering, planning and management service firms in US cities. Further information is available at www.bnl.gov/est/icee.htm.

Atlanta-Ahmedabad Partnership

USDOE/BNL facilitated signing of a Memorandum of Understanding (MOU) between Atlanta, GA, and Ahmedabad, India in March 2008, initiating the first-ever U.S.-India cities partnership on energy and environment. Afterwards, delegations from both cities met to discuss mutual interests and to identify preferred short- and long-term action plans. Follow-up discussions take place every quarter. With technical assistance from Atlanta and USDOE/BNL, Ahmedabad legislated energy audit for public water supply and waste water systems in April 2008; they are developing Energy Plan 2030 and Green Guidelines for all new municipal buildings constructed by

the City. Ahmedabad city allocated funds (~ \$ 100,000) in the Annual Budget 2009-10 for implementing green guidelines and energy-efficiency improvements in three planned municipal buildings. They anticipate including green guidelines throughout the city's building codes.

Los Angeles-Mumbai Partnership

Mumbai requested technical assistance from USDOE/BNL and the city of Los Angeles in establishing a long-term strategy on deploying energy-efficient and renewable-energy technologies there, identifying the impacts of climate change on coastal cities, and devising strategies for adapting and implementing green- and near-zero energy concepts in commercial buildings and communities. Partnership dialogues among various entities include the Los Angeles Department of Energy and Environment's discussions with the Mumbai Metropolitan Regional Development Authority, the University of California Los Angeles and University of Southern California's talks with the Indian Institute of Technology, Bombay, and those of the Los Angeles Chamber of Commerce with the Mumbai Chamber of Commerce.

Hefei-Columbus Partnership

USDOE/BNL facilitated signing a MOU between the regions of Hefei, Anhui Province, P. R. China, and Columbus/Franklin County, Ohio, USA, on April 27, 2009. The MOU highlights collaboration on "green" initiatives, such as water, solid waste and landfills, alternative energy concepts and projects, as well as promoting co-ventures and technology exchanges that will reduce the greenhouse gas- and carbon-footprints of the respective communities. The Columbus/Franklin County delegation met the Hefei Bureau of Environment Protection to discuss issues of mutual interest, and identified two renewable technologies for collaboration, viz., converting solid waste/methane to compressed natural gas, and photovoltaics. Their first collaboration would be to establish collaborative project for solid waste/methane conversion to compressed natural gas for vehicle fuels.

Chicago-Shanghai Partnership

Chicago and Shanghai are in a process of establishing a partnership for collaborations on geothermal-, fuel cell, and solar-technologies. Academic institutions in both cities are setting up a hybrid geothermal/fuel cell project in each city. The Chicago project, coordinated by the University of Illinois at Chicago and the Illinois University of Technology, was completed in July 2009, with a knowledge transfer to Tongji University. The latter is identifying a suitable site, and with technical collaboration from Chicago universities, will replicate the project in Shanghai. The partners will transfer and utilize the knowledge gained from this collaborative work to the proposed development at the former Chicago American Iron and Steel Company plant in the South Lake.

Chicago is coordinating the Solar Energy Forum between the Midwest United States and China in establishing a roadmap for sharing knowledge, technology, and investment opportunities. Science and technology museums in Chicago and San Francisco are helping the Shanghai Energy Conservation Center in developing a world-class exhibition of nearly 3000 square meters, showcasing energy efficiency, for the World Expo 2010.

Market Transformation towards Green Communities in India

USDOE extensively partners with various ministries of the government of India for promoting advanced clean technologies and principles. Cooperative activities mentioned below are in the initial phases, but indicates the details of the market transformation initiatives towards achieving green communities and cities in India.

Near-zero energy satellite towns. USDOE is working with the Indian Ministry of Urban Development (MoUD), for showcasing near-zero energy community planning and implementation for eight satellite towns, under the Scheme of Providing Infrastructure in Satellite Towns of the Jawaharlal Nehru National Urban Renewal Mission. BNL and Bill Browning conducted a workshop on creating near-zero energy communities on December 16, 2009 during the Ministry organized launch of the Scheme.

Near-zero energy special economic zones. The Indian Ministry of Industries and Commerce requested DOE to review Green SEZ Guidelines in the quest of taking them towards near-zero energy SEZs. USDOE will work with a couple of the SEZs recommended by the Ministry to incorporate concepts of near-zero SEZs in the planning and development process. BNL organized a one-day workshop in New Delhi on December 18, 2009 in collaboration with the Jones Lang LaSalle Meghraj, highlighting near-zero energy concepts in large real estate and SEZ developments, with participation from developers and SEZs.

Near-zero energy community guidelines and city planning. USDOE is developing the near-zero energy community guidelines for MoUD and the Ministry of New and Renewable Energy. BNL will showcase implementation of these principles in the cities of Ahmedabad, Surat and Mumbai, by creating long-term energy efficiency and renewable energy plans and implementation guidelines.

Integrated and adaptable green building guidelines. In response to a request from MoUD to develop comprehensive and easily adaptable and implementable green building guidelines for cities, USDOE has integrated the Bureau of Energy Efficiency's Energy Conservation Building Code, the India Green Building Council developed Leadership in Energy and Environmental Design India Green Building Rating System, MNRE developed the Green Rating for Integrated Habitat Assessment and the Eco-Housing Assessment Criteria developed by the International Institute for Energy Conservation with support from the United States Agency for International Development. BNL is adapting these guidelines for the cities of Ahmedabad and Surat for all new city owned construction.

Training program for urban decision makers on energy efficient and green cities. BNL trained 15 trainers of the All India Institute of Local Self Government (AIILSG) for a week in December 2009. AIILSG will conduct a self supported training on energy efficiency and renewable energy for mayors, local government officials and elected members, in various cities of India. The training will bring local and international experts from the India Green Building Council, the Bureau of Energy Efficiency, the Ministry of New and Renewable Energy, the Ministry of Urban Development, and Universities with live case studies and technology exposure.

Developer/community outreach. USDOE is collaborating with the Times Business Solutions (TBSL) to increase energy/green agenda awareness at the consumer and developer level. The project has been working to expand the Green Agenda section on BrixResearch.com (real estate portal) related to green issues, incentives, surveys, buildings, codes. USDOE also partners with TBSL in organizing various conferences and workshops.

Green curriculum in schools. BNL is working with a school in Ahmedabad for making energy smart schools, by including energy efficiency and renewable energy knowledge in curriculum and designing student activities around the energy patrol and eco clubs.

Concluding Remarks

China and India face three big challenges, while dealing with energy and environment concerns - development of new science-based technological advances to satisfy growing middle- and upperclass populations, technology adaption and application to alleviate great poverty, and institutional change to sustain economic progress. Because of their great size, how well India and China succeed in this endeavor will have a great bearing not only on their own populations' welfare but also on global economic welfare (Merrill et al, 2010). Heightened consumers and companies' interest in cleaner advanced energy options, and improved social and environmental performance promises cities and governments deploying more strategies promoting sustainable practices and plans.

City-to-city cooperation, peer-to-peer learning and other forms of decentralized cooperation are among the most effective ways of expanding local capacity. Such approaches, practiced by local authorities with the support of trade associations for more than half a century, emerged in the past decade as the new technical-cooperation paradigms, emphasizing the demand-led sharing of operational experience among practitioners, rather than the traditional provision of ready solutions (UN Habitat, 2003).

Significant potential exists in US-China-India working together to provide the scale, standards and technology transfer necessary to make a handful of promising but expensive new clean-energy technologies successful, momentum to curb global warming could stall and maximize gains for the countries in terms of new economic ripple effects, environmental sustainability and energy security. Metro America has been the engine of manufacturing, service delivery, logistics, exports, finance base, research and academic institutions and the magnets of talent. The low-carbon economy primarily is invented, financed, produced, and delivered in the metros. Exporting the knowledge and technologies developed by US cities to the cities in India and China through the networks of governments, businesses, academia, and research institutions can generate substantial green jobs, manufacturing capacity and catalyze our national economy, signifying a metro solution to President Obama's macro vision.

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