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Built-In Savings

A U.S.-India Partnership on Energy-Efficient Buildings

By Bracken Hendricks, Peter Ogden, and Ben Bovarnick March 13, 2014

A shared challenge: Inefficiency of buildings in the United States and India

In order to reduce their greenhouse gas pollution, enhance their energy security, and grow their economies, the United States and India should aggressively pursue opportunities to curb energy waste, particularly in the building sector.

There is clear evidence of inefficiency within the U.S. building stock. According to the U.S. Energy Information Administration, or EIA, residential and commercial buildings in the United States in 2010 consumed 40.3 quadrillion British thermal units, or Q-BTUs, of energy—22.1 Q-BTUs in residential buildings and 18.2 Q-BTUs in commercial buildings. Half of it, or 20.4 Q-BTUs, was lost to inefficiency. Buildings account for 41.1 percent of total U.S. energy consumption and a similar share of national greenhouse gas emissions. In 2010, this accounted for 2,267 million metric tons of carbon dioxide, or MMT CO_2—1,232 MMT CO_2 in residential buildings and 1,035 MMT CO_2 in commercial buildings. The United States must marshal substantial new public and private investments into this sector for retrofits and new appliances, including household electronics and heating and cooling units.[1]

On a national scale, such upgrades have enormous upfront costs: Reducing energy demand in buildings by 30 percent over the next 10 years would require a $279 billion investment. The payback over this period is far greater, however, as this same investment would yield more than $1 trillion in energy savings. Many of these investments would offer payback periods between two and eight years and support the creation of 3.3 million job years.[2]

India, meanwhile, has a similar opportunity to capitalize on energy-efficiency investments in its building sector. While the U.S. building stock will grow slowly in the coming years, India's is on pace to triple by 2030, and it will have to add 700 million to 900 million square meters of residential and commercial space annually to meet demand.[3]

This rapid building growth is having a significant impact on India's energy demand, creating infrastructure challenges and increasing the country's dependence on coal imports. In 2010, India imported 90 metric tons of coal—14 percent of the country's demand—at a cost of $9.3 billion;[4] the International Energy Agency projects that unless significant action is taken, this share will grow to 37 percent of Indian coal consumption by 2030 to 2035, even though domestic production is expected to triple.[5]

As in the United States, however, addressing the challenges in India's building sector presents an unrealized opportunity. By one estimate, enhanced efficiency would save India $42 billion per year and avoid 2,988 megawatts, or MW, of new generation capacity annually through 2030.[6] These savings would represent approximately 29 percent of the average annual capacity added during India's 11th Plan from 2007 to 2012.[7]

In spite of the differences in the make up and growth rates of their respective building stocks, the United States and India face some similar challenges that they can and should jointly address through new policies and partnerships. In both countries, for instance, energy-efficient products often have higher upfront costs, while their lower lifecycle costs are too often overlooked in investment decisions. Moreover, the relatively new nature of energy-efficient technologies means that many consumers and financial institutions are unfamiliar with the significant cost benefits of such products. The costs and savings of energy efficiency are also insufficiently quantified and are not made readily accessible for consumers and investors, who often lack clear information signals on the economic benefits of efficiency investments.[8]

Fortunately, a good platform already exists on which bilateral cooperation can be built: the U.S.-India Partnership to Advance Clean Energy-Deployment, or PACE-D. Through this initiative, the Indian Bureau of Energy Efficiency and the U.S. Agency for International Development, or USAID, are working together on the implementation of India's Energy Conservation Building Code, or ECBC, a voluntary scheme to promote the adoption of efficient standards.[9] The PACE-D Technical Assistance Program has also issued a joint report that recognizes the need for additional U.S.-India cooperation in the building sector.[10] To follow up on the work already underway in PACE-D, the United States and India should seek to explore new bilateral avenues for cooperation that create a two-way street of knowledge sharing on which to address building energy demands.

New opportunities for U.S.-India cooperation in building efficiency

Federal standards and protocols

The United States and India have the capacity for strong federal action to influence building efficiency and smart power consumption. This will include policies to enhance appliance energy standards, building resiliency, and electric market reforms to support the growth of distributed generation and to manage the intermittency challenges associated with wind and solar power. A U.S.-India partnership to develop shared standards and protocols in clean and efficient energy technology would promote the growth of clean energy markets in both countries. This effort should include collaboration in the following areas:

Increasing uniformity and credibility in building efficiency audits. In both the United States and India, a major impediment to efficiency investment is the inability of homeowners and businesses to access credible energy audits that demonstrate the net worth of the financial savings associated with efficiency improvements and communicate these savings to lenders. The PACE-D joint report by the Indian Ministry of Power and USAID found that Indian lenders often do not have sufficient awareness of the value associated with clean energy loans.[11] Similarly, U.S. building efficiency improvements remain insufficiently accounted for in real estate markets, which discourages property owners from investing in long-term efficiency savings. A U.S.-India collaboration with private lenders and major financial institutions on efficiency audit standards would help lenders interested in expanding their loan portfolios include energy-efficiency loans and encourage property owners to cost-effectively invest in building efficiency.

Establishing shared distributed generation technical protocols. Energy efficiency, distributed generation, and advanced smart-grid technologies are becoming increasingly integrated with electric grids. There is an industry need to establish open-source protocols for data exchange and interoperability. A joint partnership could assemble leaders from the information and communications technology, clean tech, and traditional energy industries to accelerate development of shared standards and protocols for new technology deployment.

Improving local electricity market regulation. While the United States and India have very different local electricity market regulatory structures, there is much to be learned through technical exchange and dialogue on innovative market rules and policy structures to enable greater penetration of distributed generation, energy storage, and dispatchable energy efficiency on the energy grid. This collaboration will specifically focus on bringing together utility regulators and other regional energy market participants, companies, and governments to accelerate innovation in energy markets.

Long-term strategies for building resiliency. The impacts of increasingly severe climate change will be felt for years to come, so it is imperative that our building stocks be designed to cope with the associated risks of power disruptions and other consequences. The United States and India can partner to share best practices in integrating climate resiliency into building construction, retrofitting, and planning. As part of the rebuilding effort in the wake of Hurricane Sandy, for instance, the Department of Housing and Urban Development launched a program that provided federal resources for new and efficient building designs that could be utilized in the reconstruction effort.[12] Such a model could be expanded and replicated in a U.S.-India partnership project.

Sharing best practices from efficiency trading schemes. Launched in 2012, India's Perform, Achieve and Trade, or PAT, scheme allows certain energy-intensive industries known as "designated consumers" to trade energy-efficiency credits if they exceed energy-efficiency targets mandated by the Energy Conservation Act of 2001.[13] PAT's successful operation will provide important lessons for other countries, including the United States, on how best to structure efficiency-trading schemes and drive down the energy intensity of industrial sectors. Although the United States currently does not employ any industry efficiency-trading schemes at the state or federal level, 25 states employ Energy Efficiency Resource Standards designed to mandate energy-efficiency improvements by electric and gas utilities.[14] And as directed by its cap-and-trade program, commonly known as AB 32, the state of California has begun limiting the carbon dioxide emissions in energy-intensive industries such as cement production and refining.[15] More U.S. states may also look to develop flexible mechanisms for power plants and high-emissions industries that could potentially be used to support compliance with new carbon-pollution standards.

Strengthening efficiency standards for appliances. Appliance standards are critical to achieve greater efficiency in buildings. Technology-driven appliance standards have been proven to deliver sustained innovation, price reductions, and energy savings. Both the United States and India have programs that require efficiency standards on certain appliances, but these must be expanded in order to keep pace with growing demand and technological advances. Further U.S.-India collaboration—such as through the Clean Energy Ministerial, or CEM—could encourage the United States and other countries to strengthen their own standards and codes. The CEM's Super-Efficient Equipment and Appliance Deployment, or SEAD, co-lead by the United States and India, is one initiative that has had some success in promoting government-driven cost-effective appliance efficiency policies and programs.[16]

Support for private-sector innovation

To attract greater private-sector investment into clean and efficient building technology, the United States and India could launch a partnership to engage commercial banks, community development financial institutions, international aid and finance organizations, utility industry partners, major real estate investors, pension funds, and other institutional capital partners to focus on the following actions:

Improving public investment practices. The United States has had some success in shifting incentive programs away from the provision of direct grants and toward well-crafted credit enhancements that reduce risk to lenders and improve the ability of clean energy businesses to acquire affordable capital. A U.S.-India partnership could explore how to use existing public funds in both countries—as well as international assistance—to establish effective, transparent, and economically efficient credit enhancements and low-interest loans to support further use of energy-efficient technologies and new businesses within the sector.

Chartering innovative clean energy financial institutions. Some of the greatest successes in U.S. clean energy deployment in recent years have come as a direct result of the establishment of new institutions designed to link policy and public investment tools with private investment. In the past two years, for instance, Connecticut and New York have launched semi-autonomous nonprofit institutions called green banks to streamline the management of public incentives and leverage significant private capital investment. In its first year, Connecticut's Clean Energy Finance and Investment Authority has used small amounts of public money to leverage $180 million in private investment to finance energy-efficiency retrofits and loans for rooftop solar installations. The United Kingdom, Germany, Australia, and China have also established banks with these lending authorities.[17] The PACE-D program has identified green banks as a prime opportunity for India to leverage private capital through public funds at national or subnational levels.[18]

Promoting innovation in service delivery contracts for clean energy. Efficient market structures and creative contractual arrangements between property owners and investors can allow for rapid deployment of private investment into publicly beneficial projects that advance climate and energy security. For instance, power purchase agreement, or PPA, structures can enable distributed renewable energy or energy-efficiency providers to offer long-term contracts to supply energy through assets they invest in, own, and lease to property owners.[19] Similarly, the development of long-term Energy Savings Performance Contracts, or ESPCs, allows Energy Service Companies, or ESCOs, to make capital investments in buildings that are subsequently repaid through energy savings backed by performance guarantees.[20] A U.S.-India partnership in this area could facilitate the sharing of best practices and policy tools, promote the direct engagement of Indian and American companies to help deliver these services, and advance these innovative business models directly within communities.

Enabling new investment vehicles through policy. The United States is developing a wealth of experience in promoting energy-efficiency investments through new policies to streamline repayment and improve the security of private debt investments. For instance, Property Assessed Clean Energy, or PACE, financing enables the repayment of clean energy loans using property tax bills, and on-bill repayment allows utility companies to collect energy-saving investments through utility bills alongside payment for delivery of energy services.[21] This is an opportunity for India and the United States to share best practices, promote government collaboration, and drive policy innovation in this area.

Leadership in multilateral forums

Beyond bilateral cooperation, the United States and India should work together to provide leadership in the establishment of ambitious building efficiency goals within the Major Economies Forum, CEM, G20, and other multilateral bodies. The United States and India should also promote global progress on building efficiency by jointly supporting an ambitious building efficiency target in a major multilateral setting. More than 20 percent of total global greenhouse gas emissions come from the building sectors of the 17 major developed and developing economies, so a collective target would have substantial climate benefits.[22] For more than a year, there has been active discussion in the Major Economies Forum on Energy and Climate, or MEF, to launch a new building efficiency initiative. The United States and India could work together to champion such multilateral cooperation by advocating for a collective MEF building efficiency target.

The CEM and the G20 would also be effective forums in the establishment of such targets. Through the SEAD initiative within the CEM, India has established the Super-Efficient Equipment Program, or SEEP, which offers incentives for highly efficient ceiling.[23] The program is expected to save 2 billion kilowatt hours annually by 2017. This work could be augmented by jointly launching a track within the CEM to support building efficiency and resiliency more broadly. Such a track does not yet exist as the majority of work concerning building energy consumption has been limited to appliance efficiency. The United States and India could propose a CEM track or subproject that specifically focuses on improving the energy efficiency and resiliency of building shells in new construction and through retrofits. Such an initiative could explore opportunities to develop and widely deploy less-expensive and more-efficient building materials and better insulate new and existing structures while protecting them from extreme weather.

Conclusion

By building significantly on existing bilateral efforts to promote building efficiency through the initiatives we have proposed, the United States and India can jointly reap the benefits of enhanced economic growth, greater energy security, and reduced greenhouse gas emissions. It is an opportunity we cannot afford to miss.

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Endnotes

1 Energy Information Administration, *Annual Energy Outlook 2012: with Projections to 2035* (U.S. Department of Energy, 2012), p. 133 table A2, p. 166 table A18, available at http://www.eia.gov/forecasts/aeo/pdf/0383(2012).pdf.

2 Mark Fulton, Jake Baker, and Heather Grady, "United States Building Energy Efficiency Retrofits: Market Sizing and Financing Models" (Frankfurt: Deutsche Bank AG, 2012), available at http://www.rockefellerfoundation.org/uploads/files/791d15ac-90e1-4998-8932-5379bcd654c9-building.pdf.

3 Shirish Sankhe and others, "India's urban awakening: Building inclusive cities, sustaining economic growth" (Washington: McKinsey & Company, 2010), available at http://www.mckinsey.com/insights/urbanization/urban_awakening_in_india.

4 Sun-Joo Ahn and Dagmar Graczyk, "Understanding Energy Challenges in India: Policies, Players and Issues" (Paris: International Energy Agency, 2012), available at http://www.iea.org/publications/freepublications/publication/India_study_FINAL_WEB.pdf.

5 International Energy Agency, "World Energy Outlook 2010" (2010), available at http://www.worldenergyoutlook.org/media/weo2010.pdf; McKinsey & Company, "Environmental and Energy Sustainability: An Approach for India" (2009), available at http://www.indiaenvironmentportal.org.in/files/India_Environmental_Energy_Sustainability_final.pdf.

6 Srinivas Chary Bedala and others, "Constructing Change: Accelerating Energy Efficiency in India's Buildings Market" (Administrative Staff College of India and Natural Resources Defense Council, 2012), available at http://www.institutebe.com/InstituteBE/media/Library/Resources/Energy%20and%20Climate%20Policy/india-constructing-change-report-NRDC.pdf.

7 Government of India, "National Electricity Plan (Volume 1)" (2012), p. 23 table 2.4, available at http://www.cea.nic.in/reports/powersystems/nep2012/generation_12.pdf.

8 Dilip R. Limaye and Prima Madan, "Financing Energy Efficiency in India: A review of current status and recommendations for innovative mechanisms" (New Delhi: U.S.-India Partnership to Advance Clean Energy – Deployment, 2013), available at http://www.pace-d.com/wp-content/uploads/2013/08/EE-REPORT.pdf.

9 USAID India, "Energy Efficiency in Buildings: Energy Conservation Building Code (ECBC)," available at http://www.eco3.org/ecbc/ (last accessed March 2014).

10 Limaye and Madan, "Financing Energy Efficiency in India."

11 Ibid.

12 Anne Hampson and Jessica Rackley, "Guide to Using Combined Heat and Power for Enhancing Reliability and Resiliency in Buildings" (Washington: Department of Housing and Urban Development, 2013), available at http://portal.hud.gov/hudportal/HUD?src=/program_offices/sustainable_housing_communities/chpguide.

13 Center for Clean Air Policy, "The Perform, Achieve, and Trade Scheme for Industrial Energy Efficiency," available at http://ccap.org/assets/CCAP-Booklet_India_PAT.pdf.

14 American Council for an Energy-Efficient Economy, "State Energy Efficiency Resource Standards (EERS)" (2013), available at http://www.aceee.org/files/pdf/policy-brief/eers-07-2013.pdf.

15 California Environmental Protection Agency, "Air Board passes two major building blocks in state's effort to Fight Global Warming," Press release, December 6, 2007, available at http://www.arb.ca.gov/newsrel/nr120607.htm.

16 Clean Energy Ministerial, "Fact Sheet: Super-Efficient Equipment and Appliance Development (SEAD)," (New Delhi: Clean Energy Ministerial, 2013), available at http://www.cleanenergyministerial.org/Portals/2/pdfs/factsheets/FS_SEAD_April2013.pdf.

17 Bracken Hendricks and Ben Bovarnick, "Banking on Clean Energy: State Leadership in Financing a Greener Future," Center for American Progress, January 17, 2014, available at http://www.americanprogress.org/issues/green/news/2014/01/17/82355/banking-on-clean-energy-state-leadership-in-financing-a-greener-future-2/.

18 Limaye, and Madan, "Financing Energy Efficiency in India."

19 U.S. Environmental Protection Agency, "Solar Power Purchase Agreements," available at http://www.epa.gov/greenpower/buygp/solarpower.htm (last accessed March 2014).

20 U.S. Department of Energy, "Energy Savings Performance Contracts," available at http://energy.gov/eere/femp/articles/energy-savings-performance-contracts (last accessed March 2014).

21 Database of State Incentives for Renewables & Efficiency, "PACE Financing," available at http://www.dsireusa.org/solar/solarpolicyguide/?id=26 (last accessed March 2014); American Council for an Energy Efficient Economy, "On-Bill Financing for Energy Efficiency Improvements" (2013), available at http://www.aceee.org/files/pdf/toolkit/OBF_toolkit.pdf.

22 Directorate of Global Energy Economics, "Cutting Emissions from Buildings" (2013), p. 3, figure 1.

23 Clean Energy Ministerial, "Fact Sheet."