Fall 2011 Newsletter

EPP *Environmental Policy and Planning Group*

The Environmental Policy and Planning Group is a group within the Department of Urban Studies and Planning at the Massachusetts Institute of Technology

http://web.mit.edu/dusp/epp

Message from Judy Layzer

Associate Professor of Environmental Policy
Head, Environmental Policy and Planning Group

As some of you may know, the department is in the midst of a multi-position hiring process. As part of that process, we have launched a two-year initiative called Reinventing the City @ MIT. As part of this initiative we will be hosting symposia, lectures, and other events that raise big questions about the future of the world's cities. In keeping with that spirit, this issue of the EPP Newsletter turns a spotlight on the work that EPP faculty and student researchers are doing, in the United States and globally, to help cities become more environmentally sustainable and resilient.

Inside This Issue

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WHAT WORKS AND WHY? THE URBAN SUSTAINABILITY (USA) PROJECT

written by Judy Layzer

Recognizing that environmental sustainability is highly correlated with livability, U.S. cities are currently competing for the title of "greenest" city. Newspapers and blogs are filled with reports of new urban sustainability initiatives: Philadelphia has adopted a citywide green-infrastructure plan; San Francisco aims to generate zero waste by 2020; and Washington, D.C. is installing 1,000 bike-share stations around the metropolitan area. But after the initial euphoria, which of these policies and practices actually survives and thrives, and which ones actually yield demonstrable reductions in cities' environmental impact? When it comes to urban sustainability programs, what works and why?

The Urban Sustainability Assessment (USA) project aims to both identify exemplary urban sustainability programs and practices, and provide a systematic analysis of how different approaches lead to different results in different contexts. To make this assessment, we focus on two types of attributes that are likely to affect a program's effectiveness: the design of the program itself and the way it has been implemented. Among the former are elements such as the extent to which the program relies on direct government action; whether it aims to change the behavior of a target (businesses or households) using rules, financial incentives, or voluntary self-regulation; and the financing mechanisms employed. Among the political factors that are likely to affect implementation are the nature of political or administrative leadership, the organizational or professional culture of the implementing agency, the quality of public engagement in program design and
implementation, the extent of partnerships with nonprofits and universities, the mobilization of a well-funded opposition, the use of an effective public rationale to justify the program, the existence of a state mandate or incentive, and the reliability of program funding.

The assessment of each program begins with a hypothesized logic model of how a program ought to work in theory; it concludes with a model that has been modified based on the data collected and analysis conducted. Importantly, the analysis includes cities that have tried and failed to adopt or implement a program, not just examples of "success." (This will give us more confidence that we have correctly identified the factors that are responsible for a program's effectiveness.) We will gauge program effectiveness (outcomes) differently depending on the program; rather than trying to reduce everything to a common metric, such as greenhouse-gas emissions, we will instead try to capture the multiple benefits of each program.

We recognize that a number of attributes make comparisons among cities challenging. Depending on the program, those attributes may include a city's environmental ethic; its climate and geography; the income/education of a city's population; its fiscal capacity; and its size, population density, and existing urban layout. For each program area, we will structure the analysis in a way that enables users to learn from cities that are similar to them on key variables.

Ultimately, we aim to produce a series of accessible, action-oriented summaries that present information in both prose and graphics (with links to more detailed supporting information). At the behest of users, we will also produce briefing papers that program officials can use to garner the support of elected officials for new sustainability programs. We will make these materials freely available on the Web and will also disseminate them through the Urban Sustainability Directors Network.

We are currently brainstorming the next phase of the USA project: building relationships between cities and local academic institutions for collecting information relating program outputs to environmental outcomes. We'll update you on that part of the project in the next newsletter.

Preparing for Climate Change

written by Eric Chu

Minimizing the impacts that climate change will have on cities and their inhabitants requires that urban municipalities make concerted efforts to protect natural systems, the built environment, and human populations. This challenge is at the heart of the project, "Preparing Cities for Climate Change (PC3): An International Comparative Assessment of Urban Climate Adaptation Planning," led by Professor JoAnn Carmin. This project investigates approaches cities in both the Global North and South are pursuing to plan and prepare for the impacts of climate change. With funding from the U.S. National Science Foundation, the focus of this project is on three overarching questions: What types of climate adaptation plans are being developed and adopted in cities and municipal departments? What explains differences in the approaches municipalities are taking toward climate adaptation planning? In what ways are the efforts of intergovernmental, nongovernmental and community-based organizations complementing, circumventing, and replacing government adaptation initiatives? A special component of the project, supported by the Social Science Research Council with funds from the Japan Foundation Center for Global Partnership, focuses on adaptation planning in U.S. and Japanese cities. In addition to considering these overarching questions, this aspect of the project also examines how climate science is informing decision-making and the ways in which adaptation is linked to ongoing efforts to promote the mitigation of greenhouse gases, prepare for natural disasters, and achieve sustainability.

To understand these issues, case studies of adaptation initiatives are being conducted in cities around the world. Field research already has taken place in cities in Ecuador, England, Japan, Namibia, and South Africa, with new cases from Asia and Central America expected to be completed during the upcoming academic year. The case studies demonstrate how climate adaptation initiatives are motivated by local factors, such as the vision of local champions within city government, the desire to have the city be regarded as a climate leader, and the experience of an increase in natural hazards. In addition, the findings show how these nascent initiatives are sustained as a consequence of local actors taking advantage of opportunities that arise and creatively weaving adaptation into existing goals, plans, and programs.

To complement the cases, an international survey was completed last spring. The survey was sent to all member communities of ICLEI-Local Governments for Sustainability with the goal of examining why cities are initiating climate adaptation activities, the types of successes they have achieved, the challenges they are encountering, and the resources and support they need. The preliminary results of the survey were presented by Nikhil Nadkarni (MCP2) at the ICLEI Resilient Cities Congress held in Bonn last June. The presentation highlighted that many cities are working on adaptation, but most are in the earliest stages of learning about their options and deciding what approach they should take. Most cities report that they are encountering resource challenges, followed by difficulties in communicating the need for adaptation to different stakeholder groups, particularly the business community. These challenges were present in all regions, but amplified in developing countries. Similarly, while general concerns have been raised about the availability of scientific information, these were only rated as among the top challenges in Latin America, Africa and Asia.

As a means to bridge research and practice, a conference was organized last spring entitled,

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Preparing for Climate Change

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"Learning Among Urban Leaders: Peer Exchange on Adaptation to Climate Change." The conference, which was coordinated by EPP participants in the PC3 project in collaboration with international colleagues and partners, brought fourteen leading urban adaptation practitioners from Africa, Asia, Latin America, Europe, and North America to Bellagio, Italy for intensive discussions and collective reflection. Over the course of three days, the group shared experiences and insights. Among the issues discussed were how practitioners are working with scientific data and dealing with scientific uncertainty, modes of participation being tested, planning approaches being employed, and challenges encountered in initiating and sustaining adaptation programs. Through these exchanges, the practitioners were able to enhance their understanding of urban adaptation and place their experiences in context.

Undergraduate, MCP, and PhD students from EPP and IDG have been involved in most aspects of the PC3 project. This includes participation in international case study fieldwork, survey development and implementation, conference session coordination and facilitation, and quantitative and qualitative data analysis. Three students, Leanne Farrell (MCP, 2010), YeSeul Kim (SB, 2010), and Shoko Takemoto (MCP, 2011), developed their theses in the course of working on the PC3 project. In addition, Isabelle Anguelovski (PhD, 2011) and Eric Chu (PhD2) co-authored academic articles based on this research. Eric also is working on a report of the lessons learned from the Bellagio meeting for the Organization for Economic Co-Operation and Development (OECD), while Nikhil and Chris Rhie (MCP1) are preparing a report of the survey findings for ICLEI.

Helping Cities in Massachusetts Respond to the Risks Posed by Climate Change

written by Lawrence Susskind

The MIT Science Impact Collaborative (SIC) is working with several Massachusetts cities and towns to help them reach agreement on how best to respond to the risks posed by climate change. Jenna Kay (MCP2) and Melissa Higbee (MCP1) are working with Professor Larry Susskind to organize public meetings in Newburyport and Amesbury. At these sessions, local officials, business representatives, environmental action groups and other residents will have an opportunity to participate in role-play simulations that teach them about the climate change risks facing their communities and introduce them to scenario planning, an important risk management tool that can be the basis of collaborative decision-making.

In the role-play simulation that will be used this fall, residents and officials in a hypothetical city must decide what to do in response to new information about increasing flood risks posed by climate change. Each participant receives both general background instructions that summarize the relevant scientific information along with confidential instructions that help them evaluate in political terms how the character they are assigned to play would thinks about the threats and how the community ought to respond. Embedded in this information is the final report of a scenario planning effort aimed at helping residents assess how various actions that might be taken are likely to respond to a range of forecasts.

The SIC team developed this and other role play simulations in conjunction with the city of Gloucester, Massachusetts in 2009 and 2010. One simulation deals with possible "heat island" effects (i.e. increasing numbers of very hot days in the summer and the challenges they might pose for inner city residents living in public housing) and the impact of sea level rise on water pumping facilities in a coastal city.

In the spring, the SIC hopes to be work with officials and residents in Fall River and New Bedford. By using before-and-after surveys the team will trace the impact of the "games" on community attitudes toward risk and risk management. And, by completing a series of in-depth interviews several months after each role play session, the team will try to detect changes in local policy or practice caused by participation in the games. In each community, SIC is working with local high school students to give them the same opportunity as their parents to learn about climate change risks and possible ways of responding to them. The ultimate goal of the project is to help cities and towns take climate change risk into account in on-going land use, infrastructure investment and development decisions. If the games stimulate sufficient interest, SIC is prepared to facilitate actual community consensus-building efforts that seek to transform the hypothetical story in the game into real-life community decision-making.

The SIC is engaged in a long-term effort to test the proposition that collaborative adaptive management (CAM) is the best way to deal with the complexity and uncertainty surrounding sustainable development efforts in cities and metropolitan areas. Through participation in client-based projects, MCP students can prepare for careers as Science Impact Coordinators, working at the intersection of science, policy and politics. For more information see scienceimpact.mit.edu.

ACHIEVING SYSTEMIC CHANGE IN URBAN ENERGY SYSTEMS

written by Stephen Hammer

For more than a century, cities have relied on a fairly straightforward energy services and infrastructure model. Electricity is typically derived from large power-generating facilities that may be located in or outside of the city, with the latter being more common. These facilities are based on different types of fossil fuels, renewable sources of energy, or nuclear power. Power generated at these facilities travels over a series of high voltage lines, and is converted into more usable voltage levels via a network of transformers. Electricity reaches the end user via a series of networked distribution wires. In some cities, the suppliers and distributors of electricity are one and the same; in others, the supply market is highly competitive, although the distribution system still remains in the hands of a single entity, reflecting the natural monopoly characteristics of this type of infrastructure.

In the case of thermal energy, the vast majority of buildings use on-site boilers or furnaces that rely on fuel oil, propane, or natural gas as their energy source. These fuels may be delivered or stored in standalone storage containers, or fed via a vast underground gas distribution network that links to large, high-pressure gas pipelines serving the country or region. These pipelines are supplied by natural gas deposits available in the region/country, or via imports from abroad.

Less commonly, some cities have hot water or steam networks that distribute waste heat captured from industrial facilities or power plants to buildings in selected neighborhoods or portions of the city. There may also be large energy facilities designed solely to produce steam or hot water to feed these so-called district energy (or heating) systems. Using a different set of technologies, this heat can be converted into chilled water that can cool buildings, creating a district cooling network. District heating systems tend to predominate in cities with long winters, while district cooling systems tend to exist in cities with lengthy or particularly acute cooling seasons. Ownership structures will vary from city to city and country to country, with many of these systems owned by local authorities. The past 20-25 years has also seen a wave of privatization, however, particularly as cities have found it difficult to afford the upgrades necessary for many older systems.

As urban sustainability and climate change become more prominent issues in urban planning and policy circles, new visions are emerging about how to reform urban energy systems, rethinking the technologies they should employ, the level of emissions they should generate, the fee structures they utilize, and the potential role they can play in facilitating job creation. These ideas have been articulated by cities large and small, and a variety of civil society organizations (ICLEI, C40, ISC, etc.) have rallied to help local authorities put both muscle and flesh on the policy bones.

A scan of many urban climate and energy plans makes clear that they are heavily influenced by local circumstances, including historic grid design decisions, locally available energy supply resources, market structures, political realities, and cost concerns. It is also clear, however, that many urban energy plans are very modest in their aspirations, adopting incremental strategies that do little to challenge old technology or market assumptions about what is possible or optimal from a cost or efficiency perspective. These shortcomings create significant opportunities for faculty and students at DUSP to contribute to improved policymaking and market practices, supporting system change in cities around the world.

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Areas where problems exist include:

- **Widely variable data availability or quality**, making it difficult to prioritize policy measures or fully assess the wisdom of a plan's policy priorities. One area where further research would be beneficial is how much information is actually necessary to craft effective local energy policies. There is also a question about how to balance customer privacy concerns with the policymaking benefits associated with greater data transparency. For example, understanding energy usage patterns at a granular level can create significant openings for entrepreneurs seeking to finance energy efficiency upgrades or other energy market innovations.
- Most plans provide little insight into how the **modest technology targets** they establish for the next 5-10 years link the massive system changes necessary to achieve long-term climate reduction targets. More research is necessary to understand how quickly (and what level of) change can be achieved by different policy or technology measures, allowing policymakers to assess with greater certainty when course changes are necessary. Attention must also be paid to new energy system models, such as microgrids which marry the benefits of the smart grid and district energy systems in ways that can significantly improve the carbon efficiency of central business districts or mixed use neighborhoods.
- A **limited spatial orientation**, focusing more on decades or century-old political boundaries than the geographic scale actually necessary to adequately address these issues. Areas as diverse as the Ruhr Valley in Germany and the suburbs of northern Virginia are experimenting with new regional energy policymaking approaches, and lessons there may create the foundation for exciting new technical assistance initiatives.
- A failure to account for any **energy system vulnerabilities** that may exist in a city in the coming decades due to climate change. Much work can be done to help policymakers and energy firms understand how major system change decisions must be made with both climate change mitigation and adaptation concerns in mind.
- Most plans pay little or no attention to the role energy regulators play in advancing or inhibiting the development of the optimal energy plan for the city of tomorrow. Market restructuring efforts of the 1980s and 1990s opened up many energy markets to greater competition, but given advances in technology and our knowledge of climate science, it may be time to revisit these restructuring efforts. This way we can assess whether our current regulatory schema are moving us in the proper direction, or facilitating change at the pace necessary to mitigate the most dire climate-induced changes predicted for the coming decades.

As these issues make clear, cities will benefit from a systems approach when considering their energy planning options and next steps. Technology options must be mapped with a full appreciation of local market, regulatory, and resource realities. Current market monopoly models should be compared to other options that facilitate greater innovation or risk-taking. Planners and utility officials must move beyond their traditional short-term capital budget time horizons to account for long-term climate change vulnerabilities.

DUSP is well positioned to provide support in all of these areas, working with the public and private sector alike to improve local energy planning. This work will provide students with career-launching research and internship opportunities, and as someone new to the DUSP community, I welcome your thoughts on how we can move forward on these interesting opportunities together.

Democratizing the Demand Side of the Energy Market

written by Harvey Michaels

Many studies have estimated that energy efficiency in homes and buildings could save more than 20% of all electric and gas use by 2030 while saving money, the lowest-cost option for large scale mitigation of carbon emissions. Finding ways to deploy deep efficiency across all homes, buildings, and communities has proven to be challenging, however.

EPP is home to a growing research program that seeks to add to the state of the art in energy efficiency, with a focus on *community engagement as a transformative path*, called the MIT Energy Efficiency Strategy Project (EESP). Seed funding is being provided by the National Renewable Energy Lab (NREL), NSTAR Electric and Gas, Duke Energy, CISCO Systems, and the Edison Foundation.

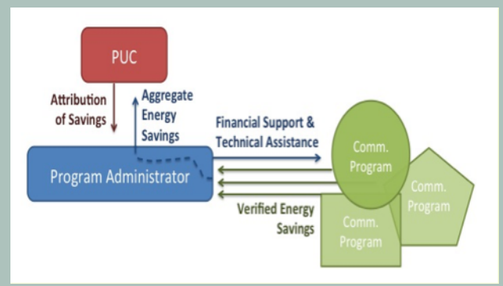
Unlike traditional energy-efficiency programs run by program administrators that target customers individually, over the last year we have examined and evaluated 14 community-managed programs that target whole communities, discovering how community-managed programs can build upon existing social networks within a community and leverage social pressure and community spirit to increase participation rates, drive greater investment into energy-efficiencyservices, and help communities achieve broader community goals with the money saved through reduced energy bills.

Several student research projects have investigated the availability and effectiveness of energy and carbon data, as well as attempts to open the efficiency market to new and innovative community entrants.

This semester, we have begun to build this research into a new paradig: *democratization of the demand side of the energy market,* with a focus on community-based energy efficiency, GIS-enabled energy efficiency visualizations, micro-commerce, and collaborative carbon-emissions reduction.

We are proposing that the electric distribution industry take a central and unambiguous role as the provider of a free system that serves as the official *game board* for cities, community groups, and new businesses seeking to create efficiency. To help envision this game board, we have begun experiments with)GIS depictions of customer energy information, enhanced with additional data layers that add inferential power (including assessor records, satellite-based building characteristics, weather, and street-view infrared scans). The system could provide an effective framework by which efficiency innovations would be measure, and then rewarded based on results.

We have open meetings on alternate Mondays from 3 to 4:30 PM. If you are interested in exploring the *Energy Efficiency Strategy Project*, or our new theme of *Democratization of Energy Demand*, please join us! Contact Harvey Michaels hgm@mit.edu or Amy Stitely astitely@mit.edu for more information, or visit: http://web.mit.edu/energy-efficiency



What Works and Why? The Urban Sustainability (USA) Project

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For the past 2.5 years, more than a dozen DUSP students have contributed to the USA Project, including Kim Foltz, Ingrid Heilke, Patrick Lynch, Sarah Madden, Stephanie Stern, Andrea Christensen, Angela Hadwin, Brendan McEwan, Justin Bates, Dominick Tribone, Alexis Schulman, Keith Tanner, Cara Ferrentino, Katherine Buckingham, Caroline Bird, Brian Daly, and Adi Nochur. This past April, seven students presented early project results at the APA meeting in Boston to a packed room that included two of our former team members. We look forward to involving the next wave of student researchers; we also hope that alums who are currently working on sustainability planning will get in touch with ideas for moving the project forward.

Alumni News

Isabelle Anguelovski received The Marsha Ritzdorf Award for the Best Student Work on Diversity, Social Justice and the Role of Women in Planning, for her dissetation "Understanding the dynamics of community engagement of corporations in communities: The iterative relationship between dialogue processes and local protest at the Tintaya Copper Mine in Peru".

Ronilda Co has published her thesis, Free, Prior And Informed Consent (Fpic), Does It Give Indigenous Peoples More Control Over Development Of Their Lands In The Philippines?
You can find it at http://www.get-morebooks.com, with ISBN 978-3-8443-9543-3.

Pia Kohler is now working as an Assistant Professor in Environmental Policy at Williams College.

Nathan Lemphers received the DUSP Public Service Award for his work with oil sands development in Canada. Nathan was also promoted to Senior Policy Analyst at the Pembina Institute, a not-for-profit sustainable energy think tank in Alberta, Canada.