THE GARRISON INSTITUTE

Comprehensive Report on the 2011 Climate, Mind and Behavior Symposia

Climate, Mind and Behavior, March 2011
Climate, Cities and Behavior, April 2011
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March - May 2011, Garrison, New York

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Foreword

Dear colleagues:

As I write this, demographers have estimated that a baby born today will take the world's human population to more than seven billion. By mid-century, the human population will reach 9 billion. Most experts agree that the earth's ability to support such large numbers of people is limited to the short term, resulting in the depletion of many of the earth's resources. The demands of both population growth and unsustainable consumption practices have already diminished the regenerative capacity of the earth to meet our food and water needs and our demand for materials and energy. Moreover the loss of biodiversity we are causing only exacerbates the decline of the earth's carrying capacity gap.

These issues are a product of human behavior. And while human behavior has often been identified as a cause of environmental stresses – it is much less frequently identified as a source of solutions. But that is changing, and the Garrison Institute sits in the middle of the network of research and application, connecting emerging social and cognitive sciences with exactly the kind of people-centered solutions that we need. For example, the Garrison Institute's Climate Mind and Behavior Program Director, Karen Ehrhardt-Martinez, calculates that we can reduce current levels of energy consumption by at least 20-30% with simple, behavior-based strategies, saving money, buying us a little more time for cleaner technologies to reach the market, and simultaneously improving the quality of our lives. In addition, research by the NRDC and the Garrison Institute estimates that a simple suite of behavior changes by Americans could reduce our climate impact by a gigaton of carbon, or a behavioral "wedge".

The Garrison Institute's overall work draws deeply from the ever-deepening well of fascinating science about the nature of the mind and behavior. Through this work, it has become clear to us that we need to integrate the insights from the social and cognitive sciences into programs, policies and technologies aimed at improving environmental outcomes. By taking into account the human dimensions of environmental issues, we have the capacity to improve our own well-being as well as that of the planet, and this is precisely the aim of the Climate, Mind and Behavior Program. It seeks to foster a cultural shift toward the widespread adoption of sustainable behaviors and energy use practices, using social and cognitive research to strengthen pro-environmental programs and policies.

In this report you will read about findings from the 2011 Climate, Mind and Behavior symposia series. Our work has focused on connecting the science with environmental leaders and policy makers, the press and other influencers, and applying this work to help make cities and buildings more environmentally efficient. Our three primary gatherings have been the CMB symposium, the Climate, Cities and Behavior symposium, and the Climate, Buildings and Behavior symposium. You will also learn about CMB's research objectives and our vision for the coming years. In total, the three symposia convened more than 250 environmental leaders, including policymakers on the municipal, state and national levels, CEOs and executive directors from innovative companies and non-profits, communications specialists, big thinkers, funders, and high-level members of the press. Some participants reported that our symposia were the most interesting they have ever attended.

The CMB Initiative is filling a critical niche in the energy-behavior-climate field by connecting researchers with practitioners and helping key findings from the research inform real projects on the ground. This translational effort is enabling city leaders and building owners and managers to improve the sustainability outcomes of their policies and programs, and is supporting leading environmental organizations in their quest to achieve their missions as effectively and efficiently as possible. Key national and global organizations

such as the Urban Land Institute, the Urban Sustainability Directors Network and Enterprise Community Partners are now integrating our work into their solutions, and many of the nation's leading environmental writers now are citing behavior change as part of the solution. The Garrison Institute's work to grow this field has put many of these ideas on the map.

We hope you will enjoy reading about the Climate, Mind and Behavior Initiative and look forward to connecting with you on the next leg our journey. Planning for the 2012 symposia is underway and CMB regional hubs are active throughout the country. I encourage you to reach out to our program staff to get involved, and in the meantime we're excited to share with you some of the most fascinating findings from the past year.

Warmly,

Jonathan F. P. Rose
Chairman
The Garrison Institute

About the Garrison Institute

Founded in 2003, the Garrison Institute is a 501[c]3 non-profit, non-sectarian organization exploring the intersection of contemplation and engaged action in the world.

Our mission is to apply the transformative power of contemplation to today's pressing social and environmental problems, helping build a more compassionate, resilient future. To that end, we are seeding and leading an innovative movement for positive social and environmental change, animated by contemplative and scientific insights into the human mind and behavior.

Our program initiatives include Contemplation and Education, Transforming Trauma, and Climate, Mind and Behavior (formerly part of the Initiative on Transformational Ecology). They create rigorous, innovative, evidence-based tools and approaches to help teachers, caregivers, human service providers, environmentalists and others on the front lines of social and environmental engagement succeed.

We conduct innovative pilot programs to test these approaches in diverse settings from classrooms to domestic violence shelters. We refine, replicate, and adapt them to new settings and larger scales, and track results.

We nurture development of professional fields focused on innovative environmental and social change, breaking silos and opening dialog between frontline practitioners, scientists, thought-leaders, movement leaders and contemplatives.

At the same time, our contemplative retreat programs bring world-class teachers from diverse wisdom traditions to wide audiences, making accessible a broad range of ideas and practices that highlight contemplation as a force for social change.

Held in an authentic contemplative setting in a renovated monastery on the Hudson River an hour north of Manhattan, our retreats and programs pioneer ways of applying the power of contemplation in many settings and professional fields, from leadership development to human services to social action. Since we opened in 2003, the Garrison Institute has hosted hundreds of contemplative retreats and programs, attracting over 30,000 participants in diverse fields, each one an agent of positive change.

About the Climate, Mind and Behavior Program

The Garrison Institute's Climate Mind and Behavior (CMB) Program connects new insights from social and behavioral sciences about the drivers of human behavior with new thinking on solutions to climate change and other environmental issues. CMB serves as the hub of a growing learning network connecting science, policy, regulation and implementation to make practicable behavioral approaches available at various scales, from national policy to city government to the building sector.

CMB's approach is unique. It addresses the social and behavioral dimensions of energy use, carbon emissions, and environmental sustainability by working in strategic partnership with the thought leaders and decision makers who determine the policies and practices in buildings and cities around the country. CMB uses this approach as a means of both reshaping individual behavior on the ground and facilitating high-level policy thinking. As such, CMB's strategy doesn't simply work to effect change from the top down or the bottom up, but "from the middle out."

In 2011 the Garrison Institute held three high-level symposia for each of the three projects that make up CMB, including:

- "Climate, Mind and Behavior," working with scientists, environmental thought leaders and policy makers to explore and apply social, behavioral, and cognitive science principles to environmental policies and programs;
- "Climate, Cities and Behavior," working with city leaders to develop effective, low-cost, people-centered strategies for achieving more sustainable resource use practices; and
- "Climate, Buildings and Behavior," working with building owners, operators and managers to develop and implement climate friendly actions and decisions in multifamily residential and commercial buildings.

The following is a summary of some of the key content from these three meetings. Additional resources, including extensive media coverage and online video of many of the presentations from these meetings are posted on our website at www.garrisoninstitute.org/cmb.

2011 CMB Steering Committee

Dr. John Gowdy, Rittenhouse Teaching Professor of Humanities and Social Sciences, Department of Economics, Rensselaer Polytechnic Institute

Paul Hawken, President, OneSun LLC

Billy Parish, Founder, Energy Action Coalition

Dr. Dan Siegel, Executive Director, Mindsight Institute

Peter Lehner, Executive Director, Natural Resources Defense Council (NRDC)

Jonathan Rose, President, Jonathan Rose Companies

CMB Director Karen Ehrhardt-Martinez

Dr. Ehrhardt-Martinez joined CMB as the Program's Director in 2011. She has nearly 20 years of experience in applied and academic research with a focus on the social and behavioral dimensions of energy and climate change. In addition to directing CMB, she is a Senior Research Associate at Colorado State University . Dr. Ehrhardt-Martinez is a cofounder of the Behavior, Energy and Climate Change (BECC) Conference and served as the BECC Conference Chair in 2009. Prior to that she led the American Council for an Energy-Efficient Economy's (ACEEE) research program on the social and behavioral aspects of energy efficiency and environmental change.

Author and editor of numerous studies and articles on behavior, energy and climate change, in 2009 Dr. Ehrhardt-Martinez testified before the U.S. House Committee on Science and Technology's Subcommittee on Energy and Environment, explaining how insights from the social and behavioral sciences can help save energy in buildings, industry and the residential and transportation sectors through maximizing potential technology-based savings, improving decision making and facilitating smart energy behaviors. She is a Fellow of the Royal Academy of Arts and Manufactures and a member of the Climate Change Task Force Steering Committee for the American Sociological Association.

The 2011 Climate, Mind and Behavior Symposium

Background

In March, 2011 the Garrison Institute held its second annual Climate, Mind and Behavior symposium for about 100 invited leaders in climate change science and environmental advocacy, policy making, neuro- behavioral and evolutionary economics, psychology, social networking, social media and news media. Facilitated by Paul Hawken, it explored insights from neurological and behavioral sciences, the emergent behavior of social networks and how understanding them applies to designing effective climate solutions.

John Gowdy presenting at CMB

The Social Brain

So far in industrialized society's history, the dominant view of the brain and the role of rationality in human behavior has come from neoclassical economics, which sees human beings as atomistic, self-regarding "rational actors," pursuing selfish interests. This unidimensional view flattens the complexities of the human mind and behavior, to use Thorstein Veblen's arch phrase, into "homogenuous globules of desire." Thomas Hobbes also said we should view man as having sprung out of the earth like mushrooms.

Obviously, says behavioral economist John Gowdy, we're neither mushrooms nor globules. If we were simply rational actors, interested only in maximizing utility, people might respond to the raw information on climate change productively, by changing their consumption, passing legislation and drastically cutting emissions.

But we aren't. We often don't respond to climate change by rationally addressing the problem, but by scrambling to gain resources. From the Taliban to the Tea Party, says Gowdy, human beings tend to respond to information about threats and scarcity more viscerally rather than rationally[1]. Often we make decisions based not on what's best for the planet, says environmental decision-making expert Elke Weber, but on what's in front of us, including how we are being influenced by our social networks.

In his CMB presentation on social networks Jonathan Rowson, an expert on the social brain, cited a favorite book by Iain McGilchrist, *The Master and His Emissary*. It argues that we still have trouble shaking the rational-actor view because we have become accustomed to thinking only of what is measurable, abstract or controllable, even though none of what really matters to us falls into any of these categories. The dominant paradigm remains dominant because the alternative model that addresses such things as community, values or a sustainable future for our children is not yet clear enough to be viable. It is emerging, but in a pinch, we fall back on what we know. Some contemporary theorists speak of "zombie economics," a condition in which we know the old neoclassical model is dead, but it lives on nonetheless.

But meanwhile, behavioral economics, informed by contemporary neuroscience and behavioral sciences, is demonstrating that we are in many ways the opposite of the rational actor, says Gowdy. Instead, the evidence is we are other-regarding and socially conditioned, dependent on reference groups. Our preferences are not hard-wired

[1] In addition to videos of his CMB presentations, essays by Gowdy including his background paper for the 2011 CMB symposium, "The Social Brain and the Diffusion of Pro-Social Behavior," are posted on the Garrison Institute website at www.garrisoninstitute.org/ecology-reports

The 2011 Climate, Mind and Behavior Symposium - continued

Dan Siegel presenting at CMB

to monolithic pleasure-seeking, but can change drastically depending on social conditions.

As Rowson pointed out, humans have exposed whites in our eyes, and we're the only species to have them to such a degree. Their function is to better enable us to follow someone's gaze and read their facial expressions and social cues. Such social factors have profoundly impacted human brain evolution. Moreover, most neurons in the human brain are formed after birth, making us adaptable to environmental and cultural changes in our lifetimes, says Gowdy. Neuroscience is discovering more and more of these mechanisms, often positioned at the interface of emotional and cognitive processing. Research by Gowdy, Rowson, Weber and others suggests that these mechanisms of the social brain, while not strictly rational, are adaptive, often predictable and can have utility for responding to climate change effectively. Adaptive behavioral changes spread through social networks, through which new behavior is infectious, contagious and can have far-reaching ramifications.

To psychiatrist Dan Siegel, the mind is profoundly relational and has a strong intersubjective, social dimension. It arises from its physical conditions, especially the physiology of the brain. But the mind is distinct from the brain, and is not confined to the organ inside the skull, or even within our larger nervous systems. It is functionally involved with and in a sense determined by our relationships with other people and with the world around us. They too are part of the system of the mind, and they change the function and even the physical synaptic structures of the brain. Neuroscientific research proves such experiences as having a meditation practice or conducting relationships with people can change the way the brain grows and structures itself. So can other things the mind relates to, including the built environment or the natural world around us. The mind is affected, and in a sense defined, by what it chooses to do and to contemplate.

"The process itself," says Siegel, "can go back and affect culture and our relationships. Whether you work at the level of building cities, or changing public policy in the Congress, you are going back in a reentry loop where the emergent process in a sense takes on a life of its own and influences relationships and influences the connections in the brain."

If we view ourselves as "a singular noun," disconnected from one another and the world around us, Siegel says, "then the planet is cooked." That static, dis-integrated view would argue for consuming as many resources for ourselves and our families as fast as we can while they last. Health, says Siegel, is integration, whereas systems dis-integration is characterized by "chaos and rigidity," which underlie all diagnoses of mental illness (and also fairly describe the politics of climate change thus far).

On the other hand, if we learn to view the self as a "plural verb," if we learn to understand ourselves as part of a dynamic, interactive, emergent, integrated, complex system, then we have the basis for potentially massive, systems-level changes of mind and shifts in behavior that can massively impact climate change.

Communicating about climate change and designing climate change solutions in a neurologically and behaviorally literate way – one that appreciates and appeals to the dynamic, relational, complex-system aspect of mind – offers a path to greater flexibility, resilience and collective health that could motivate positive, adaptive responses to climate change on a large scale. "If children are raised to know 'I am more than me, I am connected to you, and a member of we,'" says Siegel, "we will have a different outcome."

Why Information Isn't Enough

The CMB symposium heard its share of raw information about climate threats. For example, climate change is already reducing agricultural output and access to water. Jerusalem is already depending on desalinization plants. 40% of our grains are grown on irrigated lands depending on declining

aquifers. Two billion of the world's poorest people live on dry lands, which are becoming increasingly arid and inhospitable. Two hundred million people worldwide, many of them with resource-based livelihoods, some living near seacoasts, are already profoundly affected by climate change. Increasingly, especially in equatorial regions, we're witnessing armed conflicts among groups that used to live in harmony.

In his CMB presentation on climate change as a national security issue, Bill Browning, a sustainability designer who consulted for the US Department of Defense, pointed out that Pentagon war planners believe we have already had the first climate conflict. It was Darfur, sparked by a drought that led to disputes over grazing lands. Water availability, sea level rise and internal and external population displacement are all risk factors for armed conflict. With global population projected to grow to 9 billion by 2050 as climate change worsens, these risks will only accelerate.

The great geoscientist Dr. Wallace Broecker, known as "the grandfather of climate science," explained to symposium participants how the Earth's hydrological system is a global, orchestrated system, and very susceptible to small changes in climate that produce large hydrologic effects. We had a much, much wetter climate as recently as the Medieval Warm Period, and past century-long droughts came on very suddenly. Future changes in hydrology are hard to predict, but it would be "incredible" to Dr. Broecker if the changes we will force in the next 100 years were not at least as great in magnitude. Unless current atmospheric carbon trajectories change dramatically, dry lands will get drier, water availability will change radically and food availability per capita may be cut in half.

All this is compelling information. So why don't more of us act on it?

Elke Weber is an expert on behavioral models of judgment and decision making under conditions of risk and uncertainty. As she told CMB symposium participants, behavioral research shows humans have cognitive, attentional and emotional limitations that interfere with our ability to translate this sort of information about long-term threats into an effective response. Almost all our cognitive biases[2] and behavioral

Matthew Lewis presenting at CMB

wiring tend to discourage us from implementing practices that are designed to counter long-term threats, or achieve uncertain future benefits, especially when they involve shifting habitual practices.

Raw information about the future threat of climate change is unlikely to overcome those tendencies for most of us. For one thing, humans are "cognitive misers." As communications expert Matthew Lewis of Climate Works told us, our brains' attention, working memory and ability to process information are surprisingly limited. With few exceptions, human beings can only entertain seven (plus or minus two) discrete "chunks" of information at a time. Attention is very finite, yet we are bombarded with negative information all the time. Most often, only especially salient information gets through.

Our attentional limits mean that we must be selective in what we think about, says Weber. So we often use simple "experiential proxy" clues to make complex judgments, based on what we have directly experienced, instead of reliable, objective data. Weather is an example of salient, direct experience. But a "local warming" study found people's belief, worry and willingness to act regarding climate change goes up and down with the temperature outside their door. Not only is local weather not any indication of the global pattern, studies show even local weather patterns get misperceived according to subjective biases.

[2] For a detailed discussion of cognitive biases, see Gowdy's 2010 paper, written as a baseline review for the Garrison Institute's 2010 Climate, Mind and Behavior symposium, "Behavioral Economics, Neuroeconomics, and Climate Change Policy" posted on the Garrison Institute website at www.garrisoninstitute.org/ecology-reports.

Weber also reminded us that after steadily climbing in the 1990s, in the wake of 9/11 climate concern among Americans dropped. It rose again in the 2000s, then flagged in the 2008-2009 economic downturn (just when climate legislation reached Congress). This points to limits in our emotional as well as our attentional capacity – there is only so much fear and worry to go around. Trying to scare people into action with frightening information, or emotional, fear-based appeals, such as a scary movie, may or may not work temporarily, but it's unlikely to work for long given the other immediate concerns vying for our limited attention and worry. It's not an effective strategy for motivating people to act.

Limited attentional and emotional capacity regarding climate change should not be mistaken for apathy. Sustainability communications expert Renee Lertzman told symposium participants that "apathy" the way we often use the term today is a myth. Our usage of it descends from a public opinion research firm in the 1940s explaining why a certain public information campaign failed to motivate people. It's potentially patronizing to call such failures "apathetic," as if the public, and not the campaign, was somehow deficient.

In fact, people are far from apathetic about climate change; we have profound feelings about it, though they may be hard to describe or access directly. Affect is a difficult thing to study, but researchers know that information on environmental threats like climate change makes us feel anxious, scared, threatened, drained. Harold Searles, a prescient researcher in the early 1970s, found that ecological deterioration evokes unconscious anxiety, consistent with the history of an individual's ego development. What may look like general apathy is based on largely unconscious defenses against these anxieties. Dr. Lertzman's own research suggests our response is more akin to the psychoanalytic definition of melancholia – experiencing loss and mourning without a clear object.

Virtually all CMB presenters who addressed these issues concurred that while human cognitive, attentional and emotional limitations pose obstacles to assimilating and responding effectively to information about climate change, they can also confer advantages or opportunities, once we take them into account and start working with them effectively.

Our Cognitive Biases Can Work for the Climate as Well as Against It

Behavioral economist Eric Beinhocker presented an overview of some cognitive biases discovered by his field, that tend to work against mounting an effective response to climate change. These include: attention to salience (the Cold War was not real or compelling for many Americans until Sputnik, whose signal they heard on their radios, but scientific information about climate change often lacks salience), the endowment effect (people value what they have now more highly than what they might have if they accepted change, but climate solutions are often perceived as asking people to give up what they have for a doubtful benefit) and reciprocity (people tend to cooperate for mutual gain within a group with which they identify and whose rules and norms they accept, and will also punish outliers and cheaters harshly; today many perceive climate advocates as outsiders).

Evolutionary biologists would say these biases are functional, even though they can sometimes lead us astray. We all have both selfish and pro-social values, and the above biases could feed into either value set. While on balance they currently tend to work against climate solutions, they could just as easily work for them.

Although specific weather events aren't directly attributable to climate change, our attention to salient events like heat domes, tornados, floods and wildfires could just as easily help us recognize and connect changing weather patterns to climate change. The endowment effect could just as easily work in favor of valuing the air, water and climate we already have and stand to lose. Reciprocity could just as easily apply to identifying and cooperating with those proposing and implementing positive measures to fight climate change, and viewing climate deniers or energy hogs as outliers.

Similarly, Elke Weber argues that there are strategic ways to work with our behavioral and emotional wiring to encourage pro-climate preferences and behavior, turning our behavioral "weaknesses" into strengths. For example, human beings have an emotional need to know that their actions make a difference before they'll be motivated to take them. Real-time feedback – for example demonstrating progress via metrics such as smart metering – can make use of that need to encourage energy savings, the same way dashboard displays

A plenary session of the CMB symposium

encourage Prius drivers to seek greater fuel economy by continually optimizing their driving habits.

We arrive at preferences through a process of inner deliberation, says Weber. She presented research in the field of "query theory," which studies how those preferences are constructed. The research finds the order of presentation of options matters greatly. Option A, the one suggested first, will always have a huge advantage over Option B and subsequent options as we form preferences and make choices. That's why choice architecture – making the best practice the default setting – is so effective. Defaults don't take choice away; the option to follow the old paradigm is still available if people make a point of chosing it. But once the default setting gets switched, one would have to actively opt into carbon-intensive practices and opt out of low-carbon ones. Since the default setting, whatever it is, always has an enormous advantage, many people would be content to stick with the low-carbon choice.

Our behavior is largely driven by habit, though choice architecture can help us develop positive ones. Our behavior is also imitative ("monkey see, monkey do") and can be influenced by peers and neighbors, respected authorities ("What would Jesus drive?") as well as by salience (e.g. celebrities: "What would Angelina drive?").

Given our attentional limits, any default setting of any kind will track us towards certain choices, says Weber. Since our choice environments are always influencing us for better or worse, we might as well design them for the best. Our cognitive "shortcomings," given the right choice environment, can enable, "via kind of social/psychological jujitsu, decisions which make us happier in the long run and lead to higher social utility."

In other words, there's nothing about the way human beings are wired that is deficient or intrinsically hostile to climate solutions. In fact, energy efficiency researcher Carrie Armel believes that it's not human behavioral tendencies that resist making better choices for the planet at all, it's our failure to get our program designs to work effectively with them. "If we want to realize the energy efficiency gains that are possible," says Armel, "It will take acknowledging that the problem is in intervention design failure, not people failure, and taking steps to fix this."

Attitudes Often Follow Behavior

The potential role of energy efficiency in addressing climate change is larger than many of us realize, says economist Skip Laitner. Energy efficiency has met 75% of new energy demands since 1970, while new generation and transmission have met only 25%. But the US is still at best only 13% energy-efficient, effectively wasting 87% of the energy we produce, and this constrains our productivity and well-being. Technology can improve the ratio, but we will never reach significantly higher efficiency without bringing people into the process.

Research and on-the-ground experience connote something counterintuitive about people's attitudes vs. our behavior concerning energy conservation. In her co-presentation with Laitner, Karen Ehrhardt-Martinez, an expert on the social and behavioral dimensions of energy and climate change who in 2011 became the director of the Garrison Institute's Climate, Mind and Behavior program, described research that shows that the relationships between attitudes and behaviors isn't always what we expect.

Issue advocates and policy makers often seek to change people's attitudes about a particular problem in order to get them to adopt a desired behavior. But in reality the relationship between attitudes and behavior isn't so simple. In some cases people recognize the need to change their behaviors but don't follow through, which opens up a gap between attitudes and behaviors. A recent Gallup poll found that 78% of Americans thought they should be spending thousands of dollars to make their homes more energy efficient yet roughly 2% reported having taken action during the past year. In other cases people may find themselves opposed to the idea of engaging in a new behavior (such as car pooling, composting or recycling) but after they are encouraged to try it for a day (or week or month) find that their attitudes have changed.

This suggests a need to rethink the assumption that changes in behavior arise from shifts in attitude and to recognize the opposite is often true: *if people first get engaged in the process of shifting behavior, a shift in attitude follows.*

This raises the stakes of behavioral approaches to climate solutions, because they can condition lasting, systems-level changes in individual and social attitudes. Using norms, networks, goals and commitments, social science insights can help us motivate and enable people to lower household

Karen Ehrhardt-Martinez presenting at CMB

energy consumption simply by adopting behavior shifts that involve little or no investment and no decrease in living standard, but that save vast amounts of energy. Laitner and Ehrhardt-Martinez conducted a research study[3] that found a people-centered approach that motivates consumers to shift behavior and take actions easily within their reach could save about 9 quads, or 22% of household energy use (9% of all US use). That's the equivalent of saving 600 gallons of gasoline per household, or 240 medium-sized coal-fired power plants, or all of the energy used by Brazil or by South Korea.

Achieving this requires removing barriers to action and empowering people. One key to doing that is to acknowledge that people are not autonomous actors working in a vacuum, says Ehrhardt-Martinez. Their needs and circumstances vary, and their choices are shaped by the existing norms and structures that surround them.

Feedback and metrics can help shape people's choice environments in positive ways. Devices such as enhanced billing and in-home energy displays enable people to perceive their consumption in new ways, making

[3] Ehrhardt-Martinez and Laitner, eds. (2010) *People-Centered Initiatives for Increasing Energy Savings*, available as an ebook on http://www.aceee.org/people-centered-energy-savings. See especially Section1, Chapter 3, "Examining the Scale of the Behavior Energy Efficiency Continuum."

consumption practices and patterns more visible, and giving households more control. One research study that documents this is a metareview[4] of 57 different feedback initiatives, which found that households were able to lower their energy consumption by 4 % to 12% on average, with some programs achieving average household savings as high as 20%.

Unfortunately, given our current system, most of us are still in the dark about our actual energy use. Even most climate advocates don't know how many kilowatt-hours they consumed last month. Making consumption more transparent can help us to be more mindful about our own energy use. Combining this with information about what other people have been able to conserve, and what new normative practices could accomplish, makes tracking our own consumption even more meaningful.

Choice architecture is another simple way to empower people and remove barriers to action. Ehrhardt-Martinez gave symposium participants an anecdotal example: Five to ten percent of participants in conferences run by the American Council for an Energy Efficient Economy (ACEEE) typically chose a (low-carbon) vegetarian lunch. But when the choice architecture was switched and the vegetarian meal was served as the default, 80 percent of conference-goers took the vegetarian option while 20% choose meat.

This is one of many observable examples. As Carrie Armel pointed out, we also know from voluntary 401(k) and organ donation programs that participation rates average 25% higher when people are put in a default program they must opt out of, as opposed to being offered a program they would have to opt into.

Energy choices can work the same way. If we want more people to adopt a low-carbon diet, we have to change the menu. We can empower people to make different choices by making targeted, effective, pro-climate practices the default option. Changing the default choices and the social context creates the conditions for better choices. Once those choices are within easier reach they become part of a "new normal." The path forward no longer looks so difficult and prevailing concerns and negative attitudes are more likely to change.

[4] Ehrhardt-Martinez, Donnelly and Laitner (2010), "Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review for Household Electricity Saving Opportunities."

We're Closer than We Think

By being smarter about program design and communications, we can make the most of existing behavioral tendencies. In fact, governments, utilities, research institutions, NGOs and others are already doing this successfully on multiple levels.

For example, under a federal Advanced Research Projects Agency - Energy (ARPA-E) grant, Stanford University is working on 20 related projects aimed at applying insights from behavioral research to optimizing a people-centered approach to energy conservation. The program involves various types of intervention strategies from smart metering and personalized feedback on energy consumption (an individual/technology intervention), to multiplayer online games that use real energy consumption data and characters competing to model and motivate energy conserving behavior (media and marketing), to a lottery that uses behavioral economics principles to encourage consumers to shift energy use from peak to off-peak hours (a policy intervention), to a program teaching Girl Scouts how to use sensors to cut energy use (tapping existing community-based networks).

A broad array of media and marketing techniques can help accelerate climate solutions by incorporating insights from social and behavioral science.[5] For example Carrie Armel described how in many countries serial dramas, something like US soap operas, are powerful forces for social change, because they help communicate new social norms, build confidence, and model expected outcomes. Characters in the dramas show positive, negative and transitional behavior in a way that educates as well as entertains.

Several CMB presenters gave examples of framing and communications strategies that work with our affinity for storytelling. Stories have always been and still are the primary mechanism for conveying ideas, values and feelings, says psychologist and political communications strategist Drew Westin. Effective messages tell stories, which activate feelings, which is what moves issues. The Latin root of "move," *movere*,

[5] For a discussion of climate communications techniques informed by social and behavioral science, see the Center for Research on Environmental Decisions publication *The Psychology of Climate Change Communication: A Guide for Scientists, Journalists, Educators, Political Aides, and the Interested Public*, downloadable at http://www.cred.columbia.edu/guide/

The 2011 Climate, Mind and Behavior Symposium - continued

Carrie Armel presenting at CMB

is also the root of the word "emotion." The best predictor for voting behavior is not knowledge of a candidate's policy positions; it's feelings. The substance of the issue does matter, but it's our gut-level feeling that motivates our behavior, says Westin. Most Americans believe climate change exists and is manmade, but don't like to connect it with their feelings or beliefs. The Right has been able to tell the climate story in a way that either avoids triggering values or strong feelings about the impacts, or else attaches negative feelings to climate leaders.

But studies show it is quite possible to frame positive messages about fighting climate change that have greater appeal and garner greater support than messages about climate denial. Framing an environmental issue only in terms of environmental values is not resonant by itself for most Americans. But messages that activate associated values and interests – ending foreign energy dependence, spurring prosperity, stopping pollution and health damage – are replete with values that are motivating to a wide spectrum of Americans.

Yet America is not a monolith. Different communities of Americans have different viewpoints on climate change, and different stories resonate with different people depending on where and to whom they are told. Climate communications expert Matthew Lewis told us the story of his work with Colorado elk hunters dismayed by the opening of federal lands to gas drilling. In this deeply conservative heartland, people often perceive environmentalists negatively, and identify with conservative values. Yet they also have a powerful emotional connection with the land where they hunted with their fathers, and that's also part of their value system. Once they understood the policy, its consequences for their hunting grounds, the fact that the gas would be exported and that there were alternatives, their own values and strong feelings motivated them organize, build momentum and achieve results.

They helped Colorado become the first state to shut down active coal plants, and the first state to pass a ballot initiative on a real energy standard. A recent poll said 70% of Coloradans support EPA reducing emissions, as did two-thirds of Montana, New Mexico and Utah residents, as well as 56% in Wyoming. These are very conservative areas. Climate messages that engage the values and norms of diverse communities who hear them are effective.

That's not the same thing as saying climate advocates should be canny framers in order for "us" get our message across to "them." Listening is as important as talking; tapping the spectrum of people's experience and cultivating better understanding of diverse viewpoints on their own terms are mission-critical for communicating effectively and coming to greater social consensus on climate action. "There is a good chance we're closer to the people we're trying to reach than we think we are," says Lewis. "But the problem is that 'we' are trying to reach 'them,' as opposed to helping them understand they are already close to conservation and climate advocacy."

From Communities to Scalable Change

One lesson of the Colorado elk hunters is the importance of community-based approaches that meet people where they are and rely on community values and local leaders. They tap existing social networks to overcome anonymity and help convey a sense that "people like me" can adopt new ideas and practices. An early on-the-ground example Carrie Armel cited is the Hood River weatherizing project undertaken by the NRDC and local utilities in the late 1980s. Initially less than 10% of residents signed up, but when the project started relying on local leaders and speakers addressing churches and school groups, participation increased to 95%.

Other examples in this vein include the faith-based organizations such as Interfaith Power and Light, Green Faith, the Green Schools movement and the work of David Gershon and the Empowerment Institute (EI). Gershon described to CMB participants his two decades of pioneering and applying an organizing principle for community-based social innovation that he calls the social engagement network. It provides a platform for behavioral change, reengaging communities and reinventing cities, not with top-down policy interventions, but from the bottom up, relying on neighborhood leaders and teams to create surprisingly strong and scalable behavioral shifts.

The source or "social DNA" of behavioral change depends on effective neighborhood organizing, says Gershon. Working at the neighborhood scale offers people the chance to get to know their neighbors (often a missing component in our quality of life) through a shared endeavor that immediately benefits the neighborhood, and engages shared values such as improving our children's future. EI's methodology starts with a manageable cohort of five to eight households, and includes accessible, organized topics and action recipes, teams dedicated to tackling specific issues, a group process that involves peer support, accountability and feedback and an expectation of performance with measurable results.[6]

[6] Gershon describes this methodology in detail in his book *Social Change 2.0: A Blueprint for Reninventing Our World* (West Hurley, New York: Highpoint/Chelsea Green, 2009)

EI's track record of implementing these methods in diverse neighborhoods indicates that when all the above steps are followed, these group projects attain a 95% completion rate, and successful groups start replicating their efforts on other blocks. From this other social innovations grow: teams assess their neighborhood impact and generate new ideas for wider impacts, such as connecting people to public transit, encouraging biking and much else. Many who are active in these networks became government and civic leaders and social entrepreneurs.

In Portand, Oregon in 1999 the Empowerment Institute's methodology yielded a per-household CO2 reduction of 22% and a take-up rate of 41% per neighborhood block. In Philadelphia, it generated 101 neighborhood block teams, an overall 61% participation rate and about $4500 worth of volunteer time per block. In San Antonio, it increased take-up rates for recent federally funded retrofit programs from 2% to 41%. 300 US communities have since adopted similar programs, as well as towns in China, Korea, Japan, Canada and Australia. EI is currently aiming at implementing such programs on a citywide scale in five cities, starting with Ithaca, New York, and working on programs to scale up retrofitting.

"This is what's possible," says Gershon. "We can get behavior to change. We can get the blocks more liveable. We can begin to build citizen capacity. We can get government and citizenry playing together and we can start to build our community literally from the bottom up."

Rachel Gutter presenting at CMB

The 2011 Climate, Mind and Behavior Symposium - continued

The green schools movement, another example of a scalable, community-based approach, was presented to CMB symposium by its leader Rachel Gutter. The twenty-something director of the US Green Building Council's Center for Green Schools isn't much focused on the behavioral biases that discourage climate solutions – she's too busy implementing them and taking them to scale. But her movement is internalizing behavioral principles, and helping create a new generation whose built environment, choice architecture, norms, behaviors and attitudes are powerfully aligned with sustainability.

The movement is predicated on the idea that every student and teacher has the right to study and work in a healthy, clean environment conducive to learning. Green schools provide that environment while saving energy, resources and money. The goal is to make all American schools green schools in this generation, and so to educate a generation of what Gutter calls "sustainability natives, students who are fluent in the language of green and intuitively make decisions to live more sustainably."

All those who go to K-12 schools plus higher education campuses every day number 25% of the population. Greening these environments may be the biggest thing to innovate education since the introduction of computer technology to classrooms, says Gutter. The green schools movement has tailored its approach to each community and constituency, tapped the energy of kids who design their own dream schools, and demonstrated health, cost, and educational benefits as well as environmental ones.

Of the 20 largest school districts, 80% have committed to new green schools construction. The number of LEED certified buildings on college campuses across the US surpassed the number of campuses. Sixty-eight percent of prospective college students surveyed said that campus sustainability would impact their decision about which school to attend. The green schools movement has also sparked powerful dialogues on policy throughout the US, including Green Schools caucuses in 32 state legislatures which cut across party lines, and often get Tea Party and progressive members working together on a common goal.

Eric Beinhocker, Ruth Greenspan Bell, Nicholas Parker, Paul Hawken and Jonathan Rose at the CMB symposium

Conclusion

It is increasingly clear that we can't solve the climate dilemma without empowering all people to become part of the climate solution. Viable solutions will require a cultural transition to widespread sustainable practices that everyone can and does embrace. Behavioral approaches offer the promise of large, rapid and relatively inexpensive means of reducing carbon emissions. However, those engaged with climate change research, advocacy or policy have already learned from experience that downloading objective information about climate change threats, no matter how compelling, is not an effective way to motivate action, whether on the policy front, or in terms of changing people's behavior.

The social and behavioral sciences offer a body of evidence that challenges our traditional but flawed assumptions concerning human behavior and sheds light on the actual mechanisms at play. Such research is valuable in its ability to suggest more effective approaches to program design and communications that are resonant and motivating. At the same time, emerging knowledge from neuroscience and other research fields are revealing the ways our minds both help determine and are determined by our habits, perceptions, social relationships and interactions with the world around us.

Regarding climate change, the complexity of human cognition and behavior, which scientists are learning to appreciate more deeply, may be viewed as either an obstacle or as a powerful opportunity. Researchers concur that the characteristics of our minds and our behavior are not strictly rational in the neoclassical economics sense, but that doesn't mean we aren't able to respond to climate change effectively. On the contrary, human beings think and act in ways that are rooted in the social context in which they live. We are highly and uniquely adaptable in the face of changing contexts. This adaptability is one of our best assets for facing the challenges posed by climate change.

Behavioral research shows, somewhat counterintuitively, that attitudes don't always determine behaviors. Engaging people in new behaviors often shapes new attitudes. Choice architecture, metrics, feedback, storytelling, value activation, tapping social networks and community-based methodologies are all examples of approaches that respect the complexities of human behavior and can provide mechanisms for effectively shifting it. Such approaches are already being deployed across the US and globally, and form a body of research and fieldwork that is growing and percolating significant change, from the grass roots to the policy sphere.

About The Climate, Cities and Behavior Project

Climate, Cities and Behavior (CCB) is a project of the Garrison Institute's Climate, Mind and Behavior Program. CCB is the only program of its kind, seeking to leverage the organizational power of cities and build effective sustainability initiatives that are rooted in social science research.

Today, roughly 80 percent of Americans live in cities. Cities are a critical factor in how society responds to climate change, not only because of the scalability of innovations in technology or the built environment that can reach large urban populations, but also because of the massive opportunity cities represent to work with vitally important subjective, human dimensions, including community building and cultural evolution. Our cities have unique potential for engaging individuals, neighborhoods, and networks to evolve new, sustainable norms and behaviors, including new energy use practices.

There is a long way to go to fulfill this potential. Instead of norms and behaviors, many cities focus their greening initiatives on new technology, smarter infrastructure and new regulatory and investment strategies. These are all necessary and important. But recent research suggests that their benefits are often short-lived unless cities also address the social and behavioral dimensions of energy consumption.

At the same time, behavioral approaches to changing energy use practices and the choices of individuals, households and organizations can achieve energy and carbon reductions in less time and at lower costs compared with new technologies or policy-level changes. Transformative, lasting change requires a people-centered approach.

Lisa Orr presenting at CCB

The 2011 Climate, Cities and Behavior Symposium

Background

In April, 2011 the Garrison Institute held the first annual CCB symposium for some 50 urban sustainability directors, city planners, transportation directors and other urban leaders from major cities around the US and Canada. Facilitated by Uwe Brandes of the Urban Land Institute, the symposium presented current research and a range of successful implementation projects. It was significant in itself that the symposium gathered sustainability managers from many different cities and allowed them to compare notes and learn from one another. They had rich exchanges, and worked together to launch collaborations, including regional CCB hubs that continue to meet and collaborate. Key themes of the symposium included the role of high-level city leadership in creating environments conducive to new norms and behaviors, and strategies for building a broad base of community support.

Cities as the Frontier of a Sustainable Future

Cities are in many ways the crux of our ambitions for the future. By 2050 the global population will reach 9 billion people, and 70% of them will live in cities. If we don't get cities right, Uwe Brandes told symposium participants, it will be hard to achieve our other social goals.

Reducing energy consumption by sector is a conventional framework for thinking about urban sustainability. Yet steering cities towards sustainability is not simply a matter of ramping down GHG emissions in the transport or building sectors. The key decisions about the future of cities are more complex and more fundamental than that.

For one thing, no two cities are alike; each needs a different set of sustainability strategies and solutions. Nor will it be sufficient to introduce what we often think of as "best practices" into current urban environments. Discontinuous, fundamental changes, far beyond emissions reductions, will have to reshape cities in the next few decades.

By 2050, 2 billion more people globally, and least 100 million more in the US, will move to cities. Seattle will absorb the equivalent of entire current population of Portland. North Texas will need 30% more water, even with efficiency mechanisms. Los Angeles in business-as-usual mode will have to expand 834 more square miles.

As a result, we are learning to think of cities differently, with new goals, new metrics, and new answers to such fundamental questions as, 'why do we want to live in cities anyway?' and 'how do we view urban quality of life?' We used to plan cities, says Brandes; now we must operate them. We now think of cities as integral with nature, energy, water. We now think of mobility as moving people rather than cars.

The way we think of buildings is also changing rapidly. In particular as urban demographics change, as birth rates fall and lifespans increase, we need to rethink housing, including elderly housing. 2050 is only two investment cycles away, says Brandes. We also need fresh thinking today about how the planning and investment will deliver the fundamental changes cities will need.

In the future, we may look back on the present time as the beginning of the discontinuous, fundamental changes that Brandes foresees. Throughout our history, America's CO2 emissions have risen steadily – until 2009 when they peaked and started down. Since we began driving cars 75 years ago, vehicle miles travelled (VMT) have increased steadily – until the last couple of years, when VMT peaked, and now may be slowing. The same is true of energy use in commercial building construction. Brandes says we haven't fully taken stock of these possible turning points yet. But clearly, cities are in the vanguard of these deep trends, and will prove decisive in shaping our future.

Even more fundamentally, psychologist Dan Siegel sees cities as "the physical embodiment of cultural transmission," and a key influence on how our brains develop. Psychology a century ago settled on a model that assumed that brain physiology determined outward manifestations of behavior and culture. But that's changing, and there's growing awareness that culture shapes the brain, in addition to the other way around. Our brains contain 100 billion neurons, shaped partly by genetics and partly by experience, including the kind of experiences cities create.

Siegel's presentation on the mind, the brain and relationships was foregrounded by his presentation to the CMB symposium in April 2011, which emphasized the profoundly social, relational nature of the mind (see page 6). Flying in from London to the Garrison Institute to address the CCB symposium in May 2011, Siegel described his experience of trying London's on-street bicycle rental program and riding to work with other Londoners, and how it contrasted sharply with the enclosed, atomized car

culture of his home city of Los Angeles. "My brain, responding, reminded me I am part of a community," he said.

The London bike program is one example of how cities create the conditions for what Siegel calls "reentry," that reflexive movement whereby the things, people and places we relate to and interact with actually shape our minds. Mirror neurons are one of the mechanisms of this movement. "When you see someone doing a patterned behavior that becomes shared – drumming, dancing, singing together – mirror neurons kick in and allow you to do it too," says Siegel. He views cities as another kind of reflexive mechanism, "a place-based, emergent process," that shapes us. "The city can shape the embodiment and the relationality of how the mind works," says Siegel. "There is a sense of becoming part of a 'we' that *changes everything*."

Bricks and Mortar

The built environment is a critical aspect of how cities shape attitudes and behaviors – much more consequential than marketing efforts, says Sadhu Johnston, Deputy City Manager of Vancouver in British Columbia, who has also served as an official in several major cities in the US. A veteran of many urban sustainability campaigns, in general he has found long-term uptake rates low, and the ability of municipal workers to effect lasting behavioral change through marketing alone extremely limited.

Vancouver, one of the world's greenest cities, is a notable exception. It has a clean energy portfolio that includes hydropower and district energy systems (capturing waste heat from sewage for local heating). It has lowest GHG emissions per capita in North America, already below 1990 levels, and is on track to meet and exceed Kyoto emission reduction targets next year. Vancouver has achieved all this despite a 27% increase in population since 1990 and an 18% increase in jobs – proof that robust growth is not incompatible with sustainability.

Johnston attributes Vancouver's success in inducing behavioral change not to marketing or cultural attitudes, but to its willingness to build sustainability into the design and infrastructure of the city itself. For example, Vancouver shifted priorities towards pedestrians and bike lanes, including removing traffic lanes – effectively changing the menu, and priming different choices by making driving less of a default option. This resulted in significant behavioral shifts, including a 180% increase in biking, a 44% increase in walking, and 50% increase in public transit ridership. "We can effect change," says Johnston. "But the shifts won't come from logos and ad campaigns [alone]. They come from creating beautiful, dynamic, exciting, transit-oriented places."

That's not to say marketing isn't an important component of achieving sustainability, or that every city is blessed with Vancouver's resources and infrastructure. For the many cities struggling to afford basic infrastructure projects, or to improve take-up rates in basic sustainability programs, campaigns to promote behavioral shifts are critical. Much of the discussion at CCB was focused the practical ways cities can leverage the vast potential that behavioral changes offers, even in tough economic times.

Narrowing It Down

There are literally hundreds of behaviors that city education and outreach programs might target to reduce emissions and improve environmental quality. Even in a city like New York, resources are limited, and the City only has the capacity to address a few. "At best we could focus on three or four behaviors a year, not 200," says Roya Kazemi, the Director of GreeNYC. "How do we choose?"

Initially, GreeNYC chose areas where there were gaps in policy. It partnered with NRDC to reduce car engine idling, and mounted a campaign to reduce emissions from residential lighting. These campaigns produced positive results, including a 111% increase in calls to 311 about engine idling, and an increase in compact fluorescent bulb sales. But Kazemi realized that she didn't know whether these behaviors were the right ones, or whether focusing on other behaviors would result in bigger impacts for the resources spent. She spent months working to find out.

A private funder underwrote a site-specific survey for New York City to find the most impactful behaviors for GreeNYC to target. Buildings and transportation are important for NYC CO_2 emissions. Buildings includes the commercial, industrial and residential sectors. Most residential energy use involves lighting, space and water heating, refrigeration, lighting and electronics. Within these areas, researchers identified 200 actions individuals could take to lower their energy consumption, and estimated the potential impacts of each, for example a potential 2% energy savings for changes to residential lighting, assuming 100% uptake.

To narrow it down, they made some initial assumptions about whether the behaviors listed cut across all New York residents or would just affect a subset, and about the likelihood of uptake, ranking lower those behaviors they considered more likely to be difficult for people to adopt. For example food changes, such as adopting a vegan diet, have high impacts, but very small uptake, so they ranked lower. Installing CFLs has a much higher uptake potential, because it is low cost and involves no

sacrifice in lifestyle, so it ranked higher. Those assumptions and other groupings according to types of impacts (including on CO2 emissions, non-CO2 environmental quality and impacts within vs. outside NYC) yielded 16 unique actions to test in a survey of NYC residents.

The survey results revealed something surprising: more New Yorkers than previously thought had already adopted some of these actions, so the margin for improving uptake turned out to be smaller than expected. That room-for-improvement criterion helped narrow the list of actions further.

Katherine Gajewski presenting at CCB

It also offered an opportunity to understand what motivates people to act. For example, 30% of respondents say 80% or more of their bulbs were already CFLs. The survey then asked the majority who hadn't installed them what conditions would prompt them to do so. The most common conditions respondents said would prompt them into action were if CFLs reduced monthly electricity bills, and if the upfront costs were comparable to incandescents. That margin between current use and intended future use, provided certain achievable conditions were met, was the most promising target area for GreeNYC campaigns.

With these criteria the survey identified other target areas for GreeNYC campaigns. Paper, for example, was the biggest recycling opportunity; the survey found 40% of paper that could be recycled isn't. Food was not a promising area, because while the main motivation for making changes, to improve health, is strong and universal, price is a strong deterrent for those who can't afford it, so an education campaign promoting shopping at farmers markets for example may not be ripe until prices come down. Green energy has lots of room for improvement: 25% of those surveyed didn't even know what it was. Making green energy widely available is a condition NYC is working to meet. Meanwhile, since it will involve a price premium, GreeNYC studied what premiums people would be willing to pay.

"Now we can be very targeted as to where we can have the biggest impact," says Kazemi. "We'll never get 200 actions, but if we focus on the ten actions that everyone says they are willing to do, it could be close to a 9% reduction in the city's carbon inventory."

Making it Affordable

Philadelphia, one of America's oldest cities, has the nation's oldest municipal water system. It also has inequitable distribution of green spaces and green assets, with fabulous parks in some neighborhoods, and very little green access in others. To rectify both problems, Philadelphia has proposed an ambitious program, Green City Clean Waters (GCCW), to build new green infrastructure across the city, costing $2 billion over the next 20 years – its largest works program in a generation. It is still seeking EPA approval to implement the full program, but if greenlighted, Philadelphia would become the first major city to take such a comprehensive approach.

Philadelphia doesn't have the economic growth or resources of Vancouver; 25% of the population lives at or below the poverty line. The full GCCW system is designed to accommodate 2 million people, more capacity than its tax base of 1.5 million can currently pay for. So making the system affordable is mission-critical – just as important, says Katherine Gajewski, Director of the Philadelphia Mayor's Office of Sustainability as getting the water where it needs to go.

To capture the first inch of rain after a major storm, GCCW's goal is to build catchments over 34% of the city's land area, creating and enhancing green spaces in streets, alleys, schools, public spaces, residential areas, wetlands, etc. That's an expensive proposition. To lower the costs, the city switched from a consumption-based billing system for water, where residents and businesses pay for the water they use at a set rate, to a parcel-based one that reduces rates for properties that install

catchments, and increases rates for those that don't. It also encourages and rewards efficient land use and dense urban spaces. Skyscrapers, for example, have a reduced water bill, while parking lots have a higher one.

The new municipal water service will cost more than the old one, and some residents will pay more for it than others. But GCCW has grants, loans, incentives and outreach programs to help people make the transition and achieve more equitable distribution of costs between wealthy and low-income neighborhoods. Some of the costs of the system are borne by the private sector, in return for which GCCW will help make Philadelphia a more attractive, competitive, sustainable and ultimately prosperous city. "We have to think in terms of multiple benefits," says Gajewski, "green space, jobs, development, transforming and greening neighborhoods – not just investing in underground pipes."

Getting the Incentives Right

As behavioral expert Elke Weber told CCB symposium participants, incentive structures for sustainability are one of the relatively easy things to fix, though we generally haven't gotten them right yet.

Richmond, Virginia struggles to improve take-up rates in its young recycling program largely because recycling still costs $50 more per ton than landfill waste disposal. On the other hand, San Francisco's Zero Waste program is thriving, nearing its goal of 100% waste diversion out of landfills, partly incentivized by a Pay as You Throw billing system for waste disposal. These are examples of how economic incentives, positive and negative, directly impact individual choices on a citywide scale.

This is easily demonstrated when it comes to low-cost or no-cost behaviors such as recycling. But energy efficiency has yet to be sufficiently incorporated into resale costs of houses or cars. Upfront costs loom large; many people give more weight to the extra $75 an efficient refrigerator costs than to the savings it will accrue, let alone the costs of installing solar panels, says Weber. The PACE (Property Assessed Clean Energy) program sought to eliminate upfront costs for everything from compact fluorescent bulbs to solar panels. The future of this program is uncertain; the Federal Housing Finance Authority moved to halt the residential version of PACE; court appeals have had mixed results; but a proposed law in Congress to overturn FHFA's policy of withholding mortgage insurance for residential properties with PACE assessments has some bipartisan support.

Yet it's important to recognize that financial incentives have limited impact. Studies (e.g. McKinsey and Company's 2007 report on curbing global energy demand or the 2010 "behavioral wedge" study produced by the Garrison Institute and National Resources Defense Council) show that the "low hanging fruit" of simple voluntary shifts – from installing compact fluorescent lighting to insulating water heaters to properly inflating tires – can result in very significant emissions reduction through low-cost, no-cost and even money-saving actions. Negative abatement costs mean that some pro-climate behavioral changes can actually make money. So why hasn't that financial incentive been sufficient to get people adopt them widely?

Financial incentives will only take us so far, says David Gershon who also presented his methodology for creating lasting behavioral change through neighborhood organizing to the CMB symposium (see page 11). Since we aren't rational actors simply maximizing utility, incentives often prove insufficient to overcome our biases against change. In terms of the sequence in which people are likely to adopt new behaviors, Gershon's "innovation diffusion strategy" segments populations into "early adapters" (15%), the "early majority" (35%), the "late majority" (35%) and "laggards" (15%). Enlisting one segment makes it easier to enlist the next, but incentives alone don't seem to be enough to motivate even that first 15%.

As Weber mentioned, it's also possible to legislate new incentives or even proscriptive requirements to force behavioral change. Some countries have outlawed incandescent bulbs, for example, or raised the price of energy through a carbon tax (with or without revenue return mechanisms that compensate consumers for higher costs while still encouraging them to conserve). But such command and control measures have costs. They require political will, and even when enacted and enforced, may not succeed in fundamentally shifting behavior.

Even interventions like federal grants to defray the upfront costs of residential retrofits for energy efficiency, while important, aren't the best way to activate large-scale behavioral shifts. They belong to a behavioral category of single-action steps, focused on one household at a time, instead of the whole web of actions and community in which our daily lives are embedded.

Weber described a "single-action bias," somewhat analogous to the so-called "Snackwell effect" whereby a dieter takes one positive step of choosing a low-calorie snack food, feels good enough to relax vigilance, and ends up gaining weight by eating too many of the snacks. Similarly, as soon as we do one thing to address a long-term threat like climate change, for example taking advantage of a federal grant to retrofit our house, we feel better, almost as if the threat has receded, regardless of whether we have effectively addressed it or not. As a result we may feel

A CCB roundtable with Gayle Prest, Melanie Nutter, Sadhu Johnston, Katherine Gajewski and Alice Kennedy

entitled to unbridled resource consumption in other areas, so the single action we did take ends up increasing our net carbon emissions.

Inspiring lasting, broad-based behavioral change requires a more holistic approach, says Gershon. The more deeply motivating question is not, "how do I pay for retrofitting my house?" but, "how do we envision and build a future that resonates with our values, hopes, fears, and dreams?" That's a much larger proposition than taking a single action as an individual or household; it is connected powerfully to our sense of community and community norms.

Community Leadership and New Social Norms

As CCB participants shared their experiences promoting sustainability, one recurrent theme was leadership, especially community-based leadership. In the case of San Francisco's Zero Waste program, important leadership came from government officials, but also from community residents, says Melanie Nutter, Director of San Francisco's Department of the Environment.

The State of California adopted a standard of 50% waste diversion out of landfills by 2020, and the San Francisco's Mayor and Board of Supervisers mandated an ambitious 100% waste diversion standard by 2020, including reaching 75% by 2010. The mandate helped create a robust recycling infrastructure, including dual compactors that reduce emissions and allow more frequent recycling collection and a workforce of 1000 people at Recology, the private company that processes 1200 tons of San Francisco's waste a day.

But beyond government command and control measures, and beyond the financial incentives of the Pay as You Throw rate structure for waste disposal, the fact that San Francisco's compliance rates are so astronomically high (77% waste diversion in 2010 and climbing) is due in significant part to community outreach and peer-to-peer influences.

The city used federal stimulus funding to hire unemployed parents, train them in the Zero Waste program, and send them door-to-door to distribute free recycling bins and show residents how to use them. The program was highly effective increasing recycling rates, in some areas by as much as 50%. Nutter also observed that neighborhood "peer pressure" helped create a kind of descriptive norm supporting recycling behavior. "When you see all your neighbors putting out bins, you know who's participating and who isn't."

Peer-to-peer communication was also key to the success of Baltimore's Neighborhood Energy Challenge (NEC), a public/private partnership with funding from the Baltimore Community Foundation, launched in 2009. Baltimore Sustainability Coordinator Alice Kennedy described how NEC used social marketing – door hangers, postcards, social media, tear-off cards, etc. – to issue a challenge to neighborhoods to reduce their energy use from baseline, then went into diverse neighborhoods and recruited 2900 neighborhood energy captains, ranging from seniors to teens as young as 13. NEC trained them in energy saving techniques and community organizing, and gave each a $1000 stipend for any use they saw fit, for example, gathering in basements for "Meet Your Water Heater" night.

The 2011 Climate, Cities and Behavior Symposium - continued

The captains drove the program, reducing energy use in some neighborhoods by as much as 12.8%. Some of the poorest neighborhoods, (e.g., Park Heights), saved the most energy. Surveys showing 77% of respondents talked to their friends and neighbors about the program. NEC demonstrated how peer communication helps convey a sense of adopting sustainable practices as a "new normal," instead of an outlandish departure from social norms.

The pilot phase (and the funding that went with it) now over, NEC is pursuing an ambitious expansion plan, using AmeriCorps volunteers and recruiting new energy coordinator volunteers to go into new neighborhoods, communities of faith, and schools. It works on multiple fronts: home energy savings, a weatherization outreach component and outreach to schools, including a weeklong intensive course on energy efficiency.

In Minneapolis, peer-to-peer mentoring helped establish commuting by bicycle as the new normal, including at night, and even in the winter. In the City of Minneapolis Bicycle Program, "Bike Walk Ambassadors," including kids, teach basic biking skills, and "Bike Buddies" will talk through first-timers' concerns about downtown riding, and if desired, will ride with them the first time or two. Usually, that's all it takes.

Marketing is geared toward portraying bike commuting as fun, but not novel or unusual – just an ordinary part of city life that all residents can embrace. "We never show people in spandex," says Gayle Prest, Minneapolis' Sustainability Manager. "The people we show tend to be women; the bikes are ordinary beater bikes. We are showing people it is normal to bike, not just recreationally but to work and errands. If mom and dad bike, and their kids bike, you have created a situation where biking is seen as normal."

In many European cities 30%-40% of urban trips are made by biking or walking. These cities instituted low-cost rules and interventions that make biking more of a norm or default option, giving precedence to bikers and pedestrians. US rates are lower, about 7% nationally, but that stands to shift as major cities promote biking and walking as a new norm. The Minneapolis program increased the number of bike commuters by 21% to the largest number of any US city except Portland.

In addition to achieving the nation's highest rates of bike commuting, Portland recycles 70-75% of its waste stream, has reduced GHG emissions 20% since 1990 and invested heavily in mass transit. But one sustainability credential it lacked five years ago was a strong solar program. Though famously rainy, Portland actually has about the same amount of sunshine as Germany, where renewables are now more than 20% of the national energy mix, including 3.5% photovoltaic solar. But despite the presence of technology firms such as Intel, and a couple of thousand of employees doing solar manufacturing in the city, as of 2006 Portland had only 25-30 photovoltaic installations a year.

To help change that, the City Council provided some upfront funding for a volume purchasing program for solar panels in

A plenary session of the CCB symposium

one neighborhood. But Portland's community organizers and its established network of neighborhood associations provided the organizing genius and drove the growth of the program. They held neighborhood events, signed up 600 people in just a few months, issued an RFP, and navigated their way through competitive contractor selection and pricing tiers.

The program, called Solarize Portland, has now expanded to neighborhoods throughout the city, tripling the solar installation rate in just two years, and has been taken up by surrounding towns inside and outside Oregon. According to Susan Anderson, Director of Portland's Bureau of Planning and Sustainability, and Jill Kolek, who manages the Bureau's Sustainability Education and Assistance Division, the main lessons they draw from the experience are about the importance of face-to-face communication, and identifying and getting behind community leadership. "People change behavior because everyone else is doing it," says Anderson. Since communities took the lead on solar installation, "it's the new normal in Portland."

Conclusion

Cities are the frontier of our ambitions for a sustainable future. They are the places that 70% of humanity will live in by mid-century, and the places from which new and more sustainable patterns of living will emerge, and in fact are already emerging. US cities are finding and implementing climate solutions today, even in the absence of strong national climate or energy policy.

Urban sustainability initiatives can succeed in unleashing pro-climate behavioral change on a large scale. Programs should be carefully selected for the highest impact according to criteria specific to each community. They also must be affordable and incentivized. Government leadership has an important role. It can set goals, conceive and promote programs, provide upfront funding and in some cases build infrastructure to support behavioral shifts. But driving programs forward and achieving high take-up rates requires peer-to-peer influence and community-based leadership to establish and spread new social norms for sustainable behavior.

Yet these are really just prerequisites. Realizing the vast potential of cities to become the locus of a sustainable future requires a more fundamental, holistic approach. It's more than a menu of best practices for ramping down emissions from certain sectors, and more than a matter of specific action campaigns, no matter how well designed and executed. City leaders need to envision and inspire, to think afresh about why people choose to live in cities, to model and build a future that resonates with our sense of community and connectedness, our values, hopes, fears and dreams.

Just as human beings are more than Veblen's "globules of desire," cities are more than just nodes of economic aggregation; they are also "the physical embodiment of cultural transmission," a force that for the majority of human beings, helps shape minds and patterns of thought in addition to being shaped by them, and which can help orient our world views towards "a sense of becoming part of a 'we' that *changes everything*."

About The Climate, Buildings and Behavior Project

Buildings account for 42% of US GHG emissions, an enormous carbon footprint. But do buildings use energy or do people use energy? Two identical buildings, occupied by the same number of people, can vary wildly in energy usage, depending what people choose to do in them.

People-centered, behavioral approaches to changing energy use practices can substantially reduce building energy consumption at little or no cost, and without policy or regulatory mandates. Metrics and feedback are examples of voluntary, inexpensive, behavioral approaches that can leverage significant energy savings. One study[7] found that simply giving office building occupants a web page to track their energy use led to a 15% reduction in their consumption. Another[8] showed that providing feedback helped college students reduce their energy use by between 12 and 40%.

The Climate, Buildings and Behavior (CBB) Project identifies and applies key social science insights that can help building professionals use behavioral approaches to meet energy and climate challenges and reduce their buildings' emissions. CCB works with real estate developers, building managers, and building owners. It provides a learning network connecting them to relevant research and to each other, and identifies effective mechanisms for changing energy use practices, from occupant consumption patterns to owner and manager investment decisions.

2011 CBB Steering Committee

Naomi Bayer, Vice President, National Initiatives and Innovation, Enterprise Community Partners, Inc.

Dana Bourland, Vice President, Green Initiatives, Enterprise Community Partners

Rachel Gutter, Director, Center for Green Schools

Mark Alan Hughes, Senior Fellow, University of Pennsylvania's School of Design and the TC Chan Center for Building Simulation and Energy Studies

Linda Mandolini, Executive Director, Eden Housing

John K. McIlwain, Senior Resident Fellow, Urban Land Institute

John Parkinson, Executive Director, New York District Council, Urban Land Institute

[7] "The Cost and Effectiveness of Policies to Reduce Vehicle Emissions," a discussion paper of the OECD/International Transport Forum Joint Transport Research Centre Rountable (2008).

[8] John E. Petersen, Vladislav Shunturov, Kathryn Janda, Gavin Platt and Kate Weinberger (2007). "Dormitory residents reduce electricity consumption when exposed to real-time visual feedback and incentives." *International Journal of Sustainability in Higher Education* Vol. 8 No. 1, pp. 16-33

Dennis Creech presenting at CBB

The 2011 Climate, Buildings and Behavior Symposium

Background

In May, 2011 the Garrison Institute held its third annual CBB symposium for about 100 for-profit and not-for-profit building owners and managers. They explored recent social and behavioral science research and its application to building energy savings. Social scientists offered insights into the technological, design and human dimensions of saving energy in the built environment. Real estate leaders shared their challenges, success stories and tools for facilitating behavior changes in their buildings and organizations.

Target, Inform, Motivate, Empower

Climate change is a complex, massive problem. Technological innovation and federal policy interventions need to be part of the solution, but won't be enough by themselves, CMB director Karen Ehrhardt-Martinez told the CBB symposium. Solving climate change requires social change, which requires creating and scaling up behavioral change.

Potential energy savings from behavior-related initiatives in residential buildings are enormous. The National Academy of Sciences[9] calculated the potential of 17 household actions and found their adoption could cut 20% of household direct emissions, or 7.4% of US national emissions, by year ten. As noted above, Dr. Ehrhardt-Martinez's own research showed shifting household behaviors could reduce household and personal transportation energy use up to 22% (9% of total US energy use) over a five to eight year period.[10] However, to realize this kind of potential savings, behavioral approaches need to meet four requirements for successful interventions, drawn from social science research:

1. **Target** particular people and actions. Behavioral programs should be designed according to an assessment of which actions are likely to be successful in a given community, which ones specific actors in a community must take, and how to address variation across groups.

2. **Inform** and engage people and communities about their energy consumption. Few of us know how many kilowatt-hours we are using. To change that, we need ways to track our energy use that are timely, meaningful and convenient, such as residential real-time feedback or data comparing our energy use with our neighbors'.

3. **Motivate** people. Economic incentives are often weak motivators for saving energy, whereas social norms and the desire not to stray too far from accepted behavior are often strong ones. A group of social science researchers found[11] that most respondents to a survey said they were most likely to be motivated to reduce their energy consumption if they knew what climate impacts it would have, or how much money they could save. But in actual field testing, it turned out that people cut consumption the most when they found out how much energy they used relative to their neighbors.

4. **Empower** people to save energy by removing barriers and providing better choices. Current default settings often pose obstacles to energy savings, even for those who are motivated to achieve them. Choice architecture – making the best practice the default setting (discussed on page 9) – is one way to provide a better choice environment.

False Perceptions

It turns out that many of our perceptions about energy savings are wrong, and often lead us to the wrong decisions. Dr. Shahzeen Attari presented her research[12] in this area to the CBB symposium, and it has far-reaching implications for policy and program design.

For example, objectively, the most effective way to reduce energy consumption is to increase the efficiency of the devices we use (for example, buying a more efficient refrigerator or car) as opposed to trying to curtail usage (for example, keeping the old refrigerator and the old car, but trying to use them less). Efficiency saves much more energy than curtailment, but most

[9] Dietz, Gardner, et al. (2009). "Household actions can provide a behavioral wedge to rapidly reduce US carbon emissions." *Proceedings of the National Academy of Sciences* 106(44): 18452-18456. http://www.pnas.org/content/106/44/18452.abstract

[10] Laitner and Ehrhardt-Martinez, 2009

[11] Nolan, Schultz, Cialdini, Goldstein and Griskevicious (2008). "Normative Social Influence is Underdetected." *Personality and Social Psychology* 34(7): 913-923.

[12] Attari, DeKay, Davidson and de Bruin (2010). "Public perceptions of energy consumption and savings," *Proceedings of the National Academy of Sciences* Vol. 107 No. 37 16054-16059

Shahzeen Attari presenting at CBB

of us get this wrong: 55% of respondents Attari surveyed said that curtailment is the most effective measure, while only 12% cited efficiency.

Most of us also overestimate the impacts of low-energy behaviors and underestimate the impacts of high-energy behaviors, so we have a mistaken idea of the impacts that a given new behavior will create. Those of us who have already adopted a pro-environmental behavior tend to have inaccurate perceptions of our general energy use, which may be a result of the "focusing effect," a cognitive bias that gives too much weight to one piece of information, trait, or habit.

Attari's research indicates that neither gender, age, income nor educational attainment predict whether we'll make these kinds of mistakes. Nor does it matter much whether or not we own a car or a home, subscribe to certain political views, have a particular opinion about climate change or use more energy than average. Regardless of these characteristics, we're still likely to misperceive our energy consumption across the board (though numeracy plus having a pro-environmental attitude in general are two traits that correlate better with more accurate perceptions about energy).

If the goal is to encourage most of us to adopt new energy behaviors, we should remember the fallibility of our perceptions, and keep it simple. Too many energy savings options are likely to confuse and overwhelm most of us. Program design should focus on a short list of behavioral changes that save the most energy. Attari's survey also showed that when we are motivated to make a change, most of us have a tendency to focus on easier behavioral changes ourselves, and leave the harder ones to others. So in addition to being high-impact, the ideal candidates for the short list of behaviors should also be easily achievable.

Dr. Attari is currently working on the Tapestry Project, studying the effectiveness of real-time feedback to correct misperceptions about energy use in a Jonathan Rose Companies mixed-income apartment building in New York City. Among the questions the project is trying to answer are whether perceptions of energy consumption improve after a year of monitoring plug load, whether such monitoring can result in sustained behavioral change over time, whether income bracket makes a difference in elasticity of consumption and perceptions of standby energy consumption, and what types of feedback people respond to best.

So far, preliminary results indicate that respondents prefer feedback focused cost savings rather than energy consumption in comparison with neighbors. But as in the oPower experiment, in practice, they might actually be more motivated by the comparison with neighbors. Energy is still relatively cheap in the United States, energy cost savings may appear small, and financial incentives are weak motivators of behavior change, whereas social norms are strong ones.

Tools for Engaging Residents

One approach to educating residents about the range and consequences of their choices comes from Enterprise Community Partners, a national non-profit organization providing expertise and financing for affordable housing and sustainable communities. Working with the most vulnerable populations underscores the human dimension of building impacts, says Dana Bourland, Enterprise's Vice President for Green Initiatives. It forces building managers to remember that people and behavior are critical components of building systems.

To help engage them, Enterprise has developed a unique Resident Engagement Toolkit. It contains customizable tools such as resident engagement cards with green living tips, training materials, exercises, discussion points, quizzes, illustrations, adaptable PowerPoint presentations , notes and videos. The materials are creative and adaptable, designed to teach residents about energy and water conservation, healthy living, waste and recycling, as well as how to facilitate a 30-minute session on each of these topics.

On Earth Day 2011, Enterprise named six grantees to help pilot aspects of the new toolkit and study the impacts of behavioral changes they prompt. One grantee will monitor how children teach their parents about green practices. Another will lead listening sessions to find out what green living and green behavior means to the people in their buildings. Each will use metrics to determine how behavioral changes are affecting the environment and building operating expenses. Preliminary findings will be posted to the Enterprise website and final results of the studies will be released on Earth Day 2012.

Tips for Creating a Market

Enterprise's toolkit is predicated on the idea that people, rather than buildings, drive energy demand. But another way to engage residents in adopting energy efficiency is to build it into the housing stock.

In metro Atlanta green homes are now 8% of the sales market. Compared to comparable standard homes, these green homes are selling for additional 4% of asking price, and spending 20% less time on the market. In metro Atlanta's affordable housing sector, 100% of new qualified application plans are green, with some projects integrating broader sustainable design principles, such as zero energy.

It wasn't always this way. Circa 1980, Atlanta was not poised to embrace green building. The regional market was characterized by poor building stock, low energy costs, high GHG emissions, and a dearth of funding for energy efficiency. Dennis Creech, Founder and Executive Director of the Southface Energy Institute, told CBB participants how his organization helped transform Atlanta's building practices over the past three decades.

Lacking the resources to fund a "market pull" strategy (using advertising dollars to convince customers to demand green building and energy efficiency), Southface used a "market push" strategy, for example conducting focus groups with builders and homebuyers to understand and bridge their needs and preferences.

The builders often complained about call-backs, which deplete their profits and pull them away from current projects. The homeowners often complained about poor building quality, and said they also associated green building with high quality. Southface recognized the complimentarity: green building could address both problems, raising quality and reducing call-backs, while also building energy efficiency into the housing market.

While there is no objective market standard to measure quality, there are objective standards to certify green building. Southfield identified and worked with companies that wanted to differentiate themselves as certified green builders, and therefore stand out as quality builders. Southface now offers a comprehensive toolkit and certification support for green builders, including Earth Craft, LEED, Energy Star and Enterprise Green Communities, and has set new standards for the region's building practice. This market-driven approach, combined with a lot of commitment and persistence, helped create a viable market for green building and energy efficiency in the region.

Linda Mandolini presenting at CBB

Twelve Steps to Greening an Organization

Transforming housing markets or changing residential behavior takes a lot of commitment and outreach, and so does creating organizational change. Eden Housing, a non-profit affordable housing developer based in California, has integrated green strategies into all its departments and is catalyzing a pro-environmental culture across its numerous properties, generating impressive energy and water savings and waste reductions. Preliminary study results show Eden properties' water use has declined 14-38% (a cost savings of 18-23%), energy use declined 14-65% (a cost savings of 15-17%), and trash pickup declined to one day per week per property (a cost savings of 20-25%).

Eden's Executive Director Linda Mandolini is driving this process of organizational change. Many of the decisions she made in the past year were inspired by the personal action plan she drafted as a participant in the 2010 CBB symposium. Her sustainability motto for Eden emphasizes the importance of behavior: "It's not just about the buildings, it's how we live and work in them."

The 2011 Climate, Buildings and Behavior Symposium - continued

At the 2011 CBB symposium, she shared her twelve-step program for generating buy-in and sustaining environmental commitment throughout the organization, from tenants to the board of directors:

1. **Leadership**: Get the board and the executive team to care, and personally help steer the organization toward sustainability goals. Eden's board, middle level managers and directors quickly agreed that sustainability should be a priority. But senior managers were skeptical; they needed to see how sustainability efforts would improve performance. Mandolini hired a solar installer to audit 47 of Eden's older properties. His analysis didn't propose that Eden dive into installing solar panels on buildings that weren't ready for it; instead it showed how Eden could save half of its annual $2 million utility bill by starting with "low-hanging fruit" like caulking and insulating . After that, Eden's CFO got on board.

2. **Set a clear goal and keep it simple**: Once key players were committed to sustainability, Eden set a clear, simple company-wide goal: save ten percent per year in the next three years on water, energy and trash. Avoiding complex metrics and using simple language, the goal was understood by all. Organization-wide outreach encouraged all staff to think about how they could personally help meet it.

3. **Make the investment**: In addition to improving existing building functions for energy efficiency, Eden identified what they could do to retrofit their properties. Using stimulus funding from the Department of Housing and Urban Development, they are in the process of installing solar panels at 27 of their properties this year.

4. **Seed multiple levels of leadership**: Eden's middle managers tend to have the most enthusiasm for sustainability initiatives in general, but with too many people engaged in green planning in the past, few clear goals were set and few objectives achieved. Mandolini pared the committee down to six people and charged them with coming up with a 24-month schedule for improving and generating pro-environmental staff and resident behavior.

5. **... And more leadership**: Mandolini also trained field leaders to communicate sustainability efforts to tenants, maintenance teams and others on the ground. They invited the person in

A breakout session of the CBB symposium

charge of green maintenance at a local community college to talk with Eden Housing maintenance staff, which got more staffers interested in and committed to the organization's green initiatives.

6. **Engage everyone**: Everyone across the organization should feel they're contributing to the project's success. Mandolini asked the two accountants who pay the utility bills for all Eden properties to keep track of monthly energy use data. One of the accountants did a presentation in front of the whole company describing the findings. "This is my part in the green initiative," she said.

7. **Broadcast your commitment**: Mandolini and her team integrated messaging about the organization's commitment to the environment in Eden Housing t-shirts, tote bags and other paraphernalia, reinforcing it as an organization-wide value.

8. **Discuss progress and challenges regularly**: Make greening part of every staff meeting and company gathering. At a recent meeting Eden organized a panel of people from every department in the company to talk about their contributions to it, and a property manager told his conversion story from skeptic to supporter when he saw his energy bill drop.

9. **Institutionalize green knowledge and practices**: Eden put together a green operations training manual and developed an environmental component of the core staff training program. They trained nine of the property managers in environmental sustainability, a new in-company certification that holds cachet.

10. **Set standards and measure progress**: In addition to property scorecards comparing such things as occupancy rates, vacancy losses and time to complete work orders, Eden instituted a green score card. It makes progress easily visible to colleagues and encourages maintenance managers to keep up with one another on energy saving.

11. **Be accountable to others**: Eden uses transparency and external accountability to create extra motivation, telling partners like HUD about their environmental commitments in order to reinforce them. "If you tell people what you're doing, you're more likely to follow through with it," says Mandolini.

12. **Recognize success**: Eden won the 2010 California Sustainability Award for Multifamily Housing and brought their entire site staff to the awards ceremony in Los Angeles to experience the recognition firsthand. Eden properties regularly receive awards from city councils, and the site staff members accept them personally.

Conclusion

The building sector, especially the residential sector, is a particularly important field for the application of behavioral approaches to climate change. The footprint of buildings is enormous (42% of US GHG emissions) but so is the potential energy savings of changing residential energy use practices (20% of direct household energy use) and building investment, construction and management practices.

These are significant energy savings we can and should work for now, without waiting for government mandates, stronger climate and energy policies, or the next wave of technological innovation. We need new technologies and stronger policies, but they can only take us so far. Since people, rather than buildings, use energy, saving energy also requires a people-centered approach. Solving climate change requires social change, which requires widespread behavioral change.

There are significant barriers to behavioral change, such as the cognitive biases and behavioral tendencies discussed in the 2011 CMB and CCB symposia. But given the right choice environments, these tendencies can just as easily serve to promote pro-climate behavior changes. False perceptions and misunderstandings are another, related barrier. Research shows our perceptions of the impacts of energy use behaviors are often completely wrong. But those mistakes could also be corrected and/or obviated, through means such as feedback and monitoring data, good program design and choice architecture, creative education materials, game-like applications, competitions and other positive ways of engaging people. When people are empowered with constructive choices, accurate information and positive engagement in their communities, the barriers fall. And once the barriers are down and people start getting engaged in positive behavioral changes, their attitudes shift.

This is achievable. It might not be easy to overcome resistance and change resident behavior, or a real estate market, or an organizational culture. It takes a great deal of commitment and outreach, but it also yields benefits for everyone. Businesses can cut costs, become more cohesive and distinguish themselves in the marketplace. Workers can have the satisfaction and recognition that comes from contributing to a worthy organizational goal. Residential building quality can improve, and residents can make lasting changes that create significant positive impacts on their lives, their communities and the planet.

Beyond the CMB Symposia

Rather than technology-driven solutions, the Climate Mind and Behavior Program focuses on the human dimensions of sustainability, connecting emerging thinking on climate solutions with emerging scientific understanding of human behavior and the social forces that shape and constrain it. Recognizing the importance of engaging people in solutions, CMB draws on the work of sociologists, anthropologists, psychologists, cognitive and behavioral scientists to help identify effective, durable, scalable people-centered approaches to climate change.

In its first three years, CMB has gained traction, including in the policy sphere. For example, the Department of Energy is more actively considering how they might address the human dimensions of energy issues, and the National Science Foundation is funding a CMB-advised joint project of the Woodrow Wilson International Center for Scholars and Columbia University. It will harness ideas from social science to inform a wide variety of approaches to climate change and efforts to reduce greenhouse gas emissions.

CMB's series of annual symposia (Climate, Mind and Behavior; Climate, Cities and Behavior and Climate, Buildings and Behavior) are eagerly anticipated and highly visible events whose influence is reverberating across many fields. Among the 2012 CMB presenters will be environmental justice expert **Michael Dorsey**, social psychologist **Jon Krosnik**, an expert on climate perceptions, attitudes and polling; bestselling author **Bob Doppelt** on the practical keys to human and organizational behavioral change with respect to climate; sociologist **Juliet Schor** on consumption patterns and the emergence of a conscious consumer movement; **Alenka Brown** of the National Defense University's Institute for National Strategic Studies, studying ways of changing energy behavior on military bases; environmental literacy pioneer **David Orr** advancing multiple strategies to build sustainability at Oberlin; **Mary Evelyn Tucker**, founder of the Forum on Religion and Ecology on the intersection of religion and climate change; **George Marshall**, founder of the Climate Outreach and Information Network, on the psychology of climate change and climate denial; and many more.

But the symposia are just one aspect of CMB's ongoing work to apply insights from the social, behavioral and cognitive sciences to improve climate communications, programming, policies and technologies. Throughout the year, across many disciplines and in many locations, the CMB Program works in partnership with diverse nonprofit, for-profit and government organizations in four key areas:

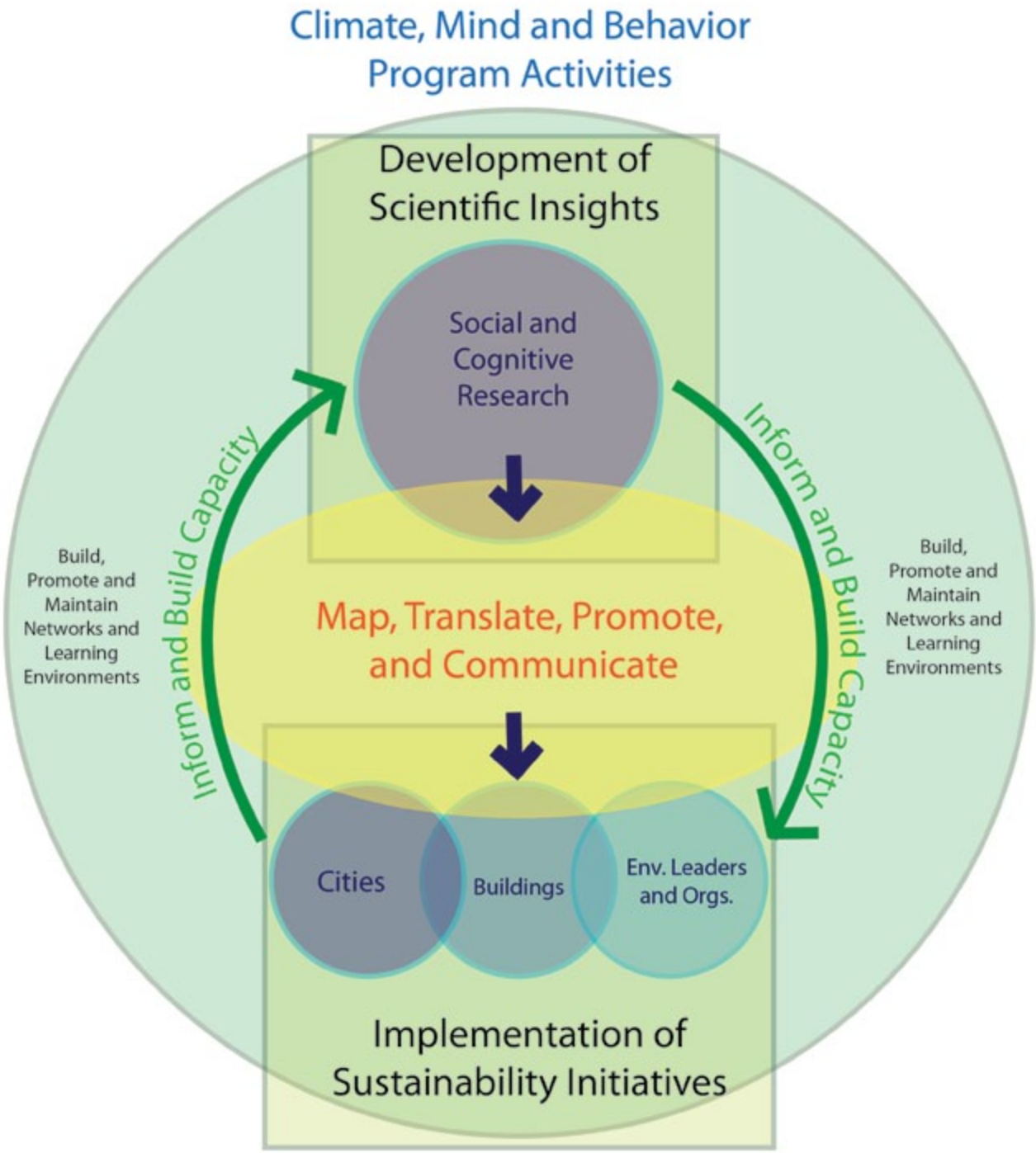
1. Mapping and synthesizing existing research in the social, behavioral and cognitive sciences relevant to energy and climate solutions, identifying and helping fill important research gaps, conducting meta-reviews and secondary research initiatives and working with partners on select primary research;

2. Translating and communicating relevant social, behavioral and cognitive research insights in a form that's accessible to people who aren't social scientists, and in a way that is conducive to applying them to people-centered climate and sustainability projects;

3. Assembling and helping develop tools and resources to help policymakers and program officers design and implement such projects at various scales, from buildings, to organizations, to cities and beyond (one example is the Enterprise Resident Engagement Toolkit discussed on page 26, another is a CMB online resource library);

4. Providing a range of convening and networking opportunities to promote knowledge sharing, collaboration and field development. In addition to the three annual CMB symposia, which are national events, several regional hubs have been formed to encourage the use of people-centered approaches in ways that identify and further develop regional resources and expertise. Regional hubs currently operate in New York, the Denver/Rocky Mountain region and the Pacific Northwest. Several other regional hubs are in formation now.

CMB is a learning network. Its essence is assembling and sharing research across disciplines, breaking silos, finding the most useful information for people in relevant fields, and sparking new collaborations to apply it. Climate change and the social sciences are both systems fields. CMB's goal is to broaden and deepen application of new knowledge and engage social systems in a way that creates systemic change. At right is a graphic representation of the key areas of CMB's work, the linkages between them, and the ongoing process by which research informs practice and practice informs research, generating new scientific insights and finding new ways to take sustainable practices and climate and energy solutions to scale.



The Climate, Mind and Behavior (CMB) Program serves as a bridge between social and cognitive science research and applied initiatives focused on creating sustainable behaviors and practices. CMB's work is to map, translate, promote and communicate research insights; build, promote and maintain networks; and facilitate the sustainability work of cities, building owners and environmental leaders and organizations.

Climate, Mind and Behavior Steering Committee

Dr. John Gowdy is the Rittenhouse Teaching Professor of Humanities and Social Sciences, Department of Economics at Rensselaer Polytechnic Institute. Holding a PhD in economics and degree in Anthropology, Dr. Gowdy has been a Visiting Professor at Universities of Barcelona, Leeds, Tokyo and Vienna. He published widely on environmental economics, energy and climate change. including on economics, In January 2010 he assumed the role of President of the International Society for Ecological Economics. He is co-author with Carl N. McDaniel of *Paradise for Sale*. His latest book is *Economic Theory Old and New: A Student's Guide*, published by Stanford University Press in 2010.

Paul Hawken is an environmentalist, entrepreneur and author. Starting at age 20, he dedicated his life to sustainability and changing the relationship between business and the environment. His practice has included starting and running ecological businesses, writing and teaching about the impact of commerce on living systems and consulting with governments and corporations on economic development, industrial ecology and environmental policy.

He has written seven books including four national bestsellers *The Next Economy*, *Growing a Business*, *The Ecology of Commerce*, and *Blessed Unrest*. He co-authored *Natural Capitalism: Creating the Next Industrial Revolution* with Amory Lovins. His books have been published in over 50 countries in 27 languages. He is currently CEO of OneSun Solar and co-founder of Highwater Global Fund. He has served on the board of several environmental organizations including Point Foundation (publisher of the Whole Earth Catalogs), Center for Plant Conservation, Trust for Public Land and National Audubon Society.

Billy Parish is the Founder of Energy Action Coalition. In 2003, as it became more apparent that significant national action was required to combat climate change, Mr. Parish decided to work full-time to build the youth climate change movement. He left Yale University in his junior year to start the Energy Action Coalition, which has since become the largest youth advocacy organization in the world working on climate change issues. Mr. Parish and the coalition have brought together 50 diverse organizations, raised nearly $10 million in four years, committed nearly 600 colleges to climate neutrality, trained and empowered tens of thousands of young people and built a base of 340,000 young voters who elevated climate issues in the 2008 elections.

Since early 2008 Mr. Parish has expanded his work beyond the Energy Action Coalition into a focus on building the green economy and creating good green jobs for young people. He has been a consultant for Green for All on "Green Jobs Now," a national day of action in September 2008 that involved more than 50,000 people in nearly 700 communities across all 50 states, and the Clean Energy Corps, a proposal that would create millions of new jobs and opportunities for community service. Mr. Parish currently serves on the boards of the Clinton Global Initiative, an annual meeting of philanthropic, corporate and nonprofit leaders; Brighter Planet, a carbon-neutral credit card company; Motor Excellence, an advanced energy efficient motor company; 1Sky, a national climate coalition; National Teach-In, an annual climate teach-in on over 1000 schools; Focus the Nation, a national climate organization; and Alliance for Climate Protection, Al Gore's climate organization. A 2007 Ashoka Fellow and 2005 *Rolling Stone* "Climate Hero," Mr. Parish was also named one of *Utne Reader*'s "50 Visionaries Who Are Changing Your World" in 2008.

Dr. Daniel J. Siegel received his medical degree from Harvard University and completed his postgraduate medical education at UCLA with training in pediatrics and child, adolescent and adult psychiatry. He is currently a clinical professor of psychiatry at the UCLA School of Medicine where he is on the faculty of the Center for Culture, Brain, and Development and the Co-Director of the Mindful Awareness Research Center. Dr. Siegel is also the Executive Director of the Mindsight Institute, an educational organization that focuses on how the development of mindsight in individuals, families and communities can be enhanced by examining the interface of human relationships and basic biological processes. He is the co-editor of a handbook of psychiatry and the author of numerous articles, chapters and the internationally acclaimed text, *The Developing Mind: Toward a Neurobiology of Interpersonal Experience*. His latest book is *Mindsight: The New Science of Personal Transformation* which offers the general reader an in-depth exploration of the power of the mind to integrate the brain and promote well-being. Dr. Siegel's ability to make complicated concepts exciting as well as easy to understand has led him to be invited to address local, national and international organizations where he speaks to groups of educators, parents, public administrators, healthcare providers, policy-makers, clergy and neuroscientists.

Peter Lehner is the Executive Director of the Natural Resources Defense Council (NRDC). He created and led the environmental prosecution unit for New York City Law Department early in his career. Subsequently, Mr. Lehner began his long association with NRDC, serving for five years as Director of NRDC's water program from 1994 to 1999. He left NRDC to become the Chief of the Environmental Protection Bureau of the New York State Attorney General's Office, a job he held for eight years. In addition to Mr. Lehner's leadership at NRDC, he teaches law at Columbia Law School, and serves on the boards of the Butler Environmental Protection Fund, the Columbia Journal of Environmental Law, New York Rivers United and the Center for Watershed Protection. He is also a member of the Council on Foreign Relations, serves on the advisory council of Harvard University's David Rockefeller Center for Latin American Studies, and is one of the founding members of the Environmental Law Reporter and Environmental Law Institute's Advisory Board.

Jonathan F.P. Rose's business, public policy and not-for-profit work all focus on creating a more environmentally, socially and economically responsible world. In 1989, Mr. Rose founded Jonathan Rose Companies LLC, a multi-disciplinary real state development, planning, consulting and investment firm, as a leading green urban solutions provider. The firm currently manages over $1.5 billion of work, much of it in close collaboration with not-for-profits, towns and cities. Its mission is to repair the fabric of communities. The firm draws on its human capital, financial depth and real estate expertise to create highly integrated solutions to real estate challenges. Its work touches many aspects of community health, working with cities and not-for-profits to build not only housing, but also civic, cultural, educational and infrastructure open space.

Jonathan Rose Companies has won numerous awards, including from the National Trust for Historic Preservation, the Natural Resources Defense Council, Global Green USA, the Urban Land Institute, the American Planning Association and the American Institute of Architects. A thought leader in the Smart Growth, national infrastructure, green building, and affordable housing movements, Mr. Rose is also the co-founder and board chair of the Garrison Institute. He was recently profiled in e^2, a PBS series on sustainable development.

Climate, Mind and Behavior Symposium Participants

Laurie Actman, Viridity Energy

Carrie Armel, Precourt Energy Efficiency Center

Susan Bass, Earth Day Network

Eric Beinhocker, McKinsey Global Institute

Wallace Broecker, Earth Institute, Columbia University

Bill Browning, Terrapin Bright Green LLC

Philip Bump, Green For All

Jack Byrne, Middlebury College

Jason Clay, World Wildlife Fund

Jad Daley, Trust for Public Land

Rick Diamond, Lawrence Berkeley National Laboratory

Jeffrey Domanski, Cushman & Wakefield

Bob Doppelt, The Resource Innovation Group

Brian Dumaine, *Fortune* Magazine

Karen Ehrhardt-Martinez, University of Colorado

Matt Eisenson, Natural Resources Defense Council

Kim Elliman, Open Space Institute

Anders Ferguson, Veris Wealth Partners

Cindy McPherson Frantz, Oberlin College

Mark Fulton, Deutsche Bank Climate Change Advisors

David Gershon, Empowerment Institute

James Gimian, Shambhala Sun Foundation

Wendy Gordon, Natural Resources Defense Council

John Gowdy, Rensselaer Polytechnic Institute

Ruth Greenspan Bell, World Resources Institute

Rachel Gutter, U.S. Green Building Council

Rosanne Haggerty, Common Ground

Fletcher Harper, GreenFaith

Paul Hawken, OneSun LLC

Cathy Higgins, New Buildings Institute

Tony Hiss, New York University

Robert T.P. Huang, Oram Foundation Board

Mark Alan Hughes, University of Pennsylvania

Eric Johnson, Columbia University

John Johnson, The Harmony Institute

Beth Karlin, University of California - Irvine

Daniel Katz, The Overbrook Foundation

Leslie Kaufman, *The New York Times*

Stacey Kennealy, GreenFaith

Kit Kennedy, Natural Resources Defense Council

Steve Kent, KentCom LLC

Keith Kloor, New York University

Fran Korten, *Yes!* Magazine

Cary Krosinsky, Trucost

Robert Kunzig, *National Geographic*

Skip Laitner, American Council for an Energy-Efficient Economy

Renee Lertzman, Portland State University

Matthew Lewis, ClimateWorks Foundation

Jon Love, The Pachamama Alliance

Bruce Lowry, Skoll Global Threats Fund

Michelle McCauley, Middlebury College

Carl McDaniel, Oberlin College

Bill McKibben, Middlebury College, 350.org

Don Melnick, Columbia University

Brian Merchant, TreeHugger.com

Michelle Moore, White House Council on Environmental Quality

Sam Mowe, *Tricycle*

Sabine O'Hara, Global Ecology LLC

Frank O'Keefe, Analect Benefit Finance LLC

Richard Oram, The Oram Foundation

David Orr, Oberlin College

Billy Parish, Energy Action Coalition

Nicholas Parker, Cleantech Group LLC

Mary Pearl, Garrison Institute

John Petersen, Oberlin College

Cara Pike, The Resource Innovation Group

Chris Pyke, U.S. Green Building Council

Andy Revkin, Pace University, dotearth.com blog for *The New York Times*

Seth Robbins, Seth Robbins Consulting

David Roberts, Grist.org

Jonathan Rose, Jonathan Rose Companies LLC, Garrison Institute

David Rothenberg, New Jersey Institute of Technology

Jonathan Rowson, Royal Society for the encouragement of Arts, Manufactures and Commerce (RSA)

Oliver Schaper, Gensler LLC

Kate Sheppard, *Mother Jones*

Debika Shome, The Harmony Institute

Adam Siegel, Retail Industry Leaders Association

Dan Siegel, University of California – Los Angeles, Mindsight Institute

Mary Evelyn Tucker, Yale University

Louke van Wensveen, Municipality of Brummen, the Netherlands

Gernot Wagner, Environmental Defense Fund

Bryan Walsh, *Time* Magazine

Marsha Walton, New York State Energy Research and Development Authority

Elke Weber, Columbia University

Drew Westen, Emory University

Keith Wheeler, International Union for the Conservation of Nature

Andrew Zolli, Z + Partners, Pop!Tech

Climate, Cities and Behavior Steering Committee

Rohit T. Aggarwala, is an environmental policy expert, transportation planner and historian. He currently serves as Special Advisor to Mayor Michael R. Bloomberg in his capacity as Chair-elect of the C40 Cities Climate Leadership Group. He lives in Palo Alto, California. From 2006 to 2010, Aggarwala was the Director of Long-Term Planning and Sustainability for the City of New York. In that role, he served as the chief environmental policy advisor to Mayor Michael R. Bloomberg, and led the development and implementation of New York City's sustainability plan, PlaNYC: A Greener, Greater New York. Mayor Bloomberg called him "the brains behind PlaNYC."

Aggarwala's achievements included the passage into law of a landmark set of mandates that will make all large buildings in New York City more energy efficient, by requiring benchmarking, periodic energy audits and operations tune-ups, widespread lighting retrofits, and submetering for commercial tenants. He also led the effort to make New York City's 13,000 yellow taxis convert to hybrids, clean up the heating oil used in New York City's buildings, and develop a greener construction code for New York. He was also one of the architects of Mayor Bloomberg's effort to bring congestion pricing to Manhattan, and served as the mayor's point person on Building America's Future, a coalition the mayor created with Governor Arnold Schwarzenegger of California and Governor Ed Rendell of Pennsylvania. He has testified before the New York City Council, the New York State Assembly, and the United States Congress.

Aggarwala holds a PhD in American History from Columbia University, where he studied under Professor Kenneth T. Jackson. His dissertation, "Seat of Empire: New York, Philadelphia, and the Emergence of an American Metropolis, 1776-1837", looked at the causes that led New York to surpass Philadelphia as the leading city in America. He also holds a BA and MBA from Columbia, and an MA in History from Queens University in Kingston, Ontario. He holds an appointment as a research scholar at the Urban Studies Program at Barnard College.

Uwe S. Brandes is Vice President, Initiatives at the Urban Land Institute (ULI) in Washington, DC where he leads ULI's Climate Change, Land Use and Energy (CLUE) and The City in 2050 initiatives.

Prior to ULI, Uwe was Vice President at the Anacostia Waterfront Corporation in Washington, DC and Associate Director of the DC Office of Planning where he managed the award winning Anacostia Waterfront Initiative, an unprecedented inter-governmental partnership between the District of Columbia, the U.S. General Services Administration, the U.S. Navy and the National Park Service to redevelop the shores of the Anacostia River in the nation's capital. Uwe is a Fulbright Scholar and has earned degrees in Engineering Science and Architecture from Dartmouth College and Harvard University respectively.

Martin J. Chávez, three-term former mayor of Albuquerque, is Executive Director of ICLEI-Local Governments for Sustainability USA, the nation's leading advocate for more than 600 cities, towns and counties that are taking action to combat climate change, save energy, create green jobs and improve the quality of life of residents and their communities.

Known for his passion and unremitting commitment to clean energy and the environment, Chávez has garnered worldwide recognition for his accomplished work on climate and sustainability during his twelve years as Albuquerque mayor. He received the World Leadership Award for Water and Utilities (London) 2006, the U.S. Conference of Mayors Climate Protection Award (first place) 2007, the EPA Climate Protection Award (first place) 2008, the U.S. Chamber of Commerce/Siemens Sustainability Award 2008 and the Renewable Energy Innovator of the Year Award/Association of Energy Engineers 2008, among several others.

Prior to becoming its Executive Director, Chávez was a member of the ICLEI USA Board of Directors and of the worldwide ICLEI Executive Committee. He also served as a Trustee of the United States Conference of Mayors (USCM), chaired the Urban Water Council, and was co-chair of USCM's Climate Change Task Force, which involved lectures around the country and in France and Mexico.

Sadhu Johnston, as Deputy City Manager, contributes to the overall management of the City of Vancouver. Sadhu oversees the environmental, emergency and economic development areas within the City Manager's Office. Vancouver has reduced greenhouse gas emissions by over 30% since 1990 levels in city operations and is on track achieve Kyoto Protocol reductions of over 6% by 2012 from 1990 levels for emissions from the broader community. Prior to moving to Vancouver, Sadhu served as Mayor Richard M. Daley's Chief Environmental Officer where he was responsible for the oversight of City of Chicago environmental initiatives. Sadhu served Mayor Daley in the development and implementation of the Chicago Climate Change Action Plan, which *Scientific American* referred to as one of the world's most comprehensive municipal climate plans. Under Mayor Daley's leadership, Sadhu was involved in the design and implementation of the City's blue cart recycling system increasing recycling rates, while making it easier for Chicago residents to recycle. He was integrally involved in the creation and oversight of a green jobs strategy for Chicago, assisting ex-offenders and disadvantaged populations in gaining access to opportunities of residential energy retrofitting, deconstruction, and renewable energy installation. He served a leadership role in the oversight of programs to engage Chicago's businesses and residents such as Earth Hour, Green Hotels, the Green Office Challenge, and Mayor Daley's GreenWorks Awards.

Julia Parzen is founding Coordinator of the Urban Sustainability Directors Network, a two-year old network of 90 North American municipal sustainability leaders. The Network has working groups for professional development, innovation, policy, sustainable economic development field development and fostering behavior change. Two years ago Julia was the External Project Manager for the Chicago Climate Action Plan process. Prior to 15 years in sustainable development consulting, Julia was a program officer for conservation and economic development (The Joyce Foundation); a triple bottom line entrepreneur (co-founder and Chief Executive Officer, Working Assets Money Fund); and a leader in renewable energy financing (State of California) and federal environmental financing programs (USEPA).

She is author of numerous publications on community development banking, self-employment, transit-oriented development financing, green chemistry and economic development, and other subjects. She co-authored *Credit Where It is Due: Development Banking for Communities* (Temple University Press, 1990); co-edited *Enterprising Women with Sara Gould* (OECD, 1990); and co-authored *Financing Transit Oriented Development* with Abby Siegel, a chapter in *The New Transit Town: Best Practices in Transit-Oriented Development*, edited by Hank Dittmar and *Gloria Ohland* (Island Press, 2004).

Harriet Tregoning is the Director of the Washington DC Office of Planning, where she works to make DC a walkable, bikeable, eminently livable, globally competitive and sustainable city. Prior to this she was the Director of the Governors' Institute on Community Design and co-founder, with former Maryland Governor Glendening, and Executive Director of the Smart Growth Leadership Institute. Tregoning developed her expertise in state-level action in the State of Maryland where she served Governor Glendening as both Secretary of Planning and then as the nation's first state-level Cabinet Secretary for Smart Growth. Prior to her tenure in Maryland state government, Tregoning was the Director of Development, Community and Environment at the United States Environmental Protection Agency. Tregoning's academic training is in engineering and public policy. She was a Loeb Fellow at the Harvard University Graduate School of Design for 2003-2004.

Climate, Cities and Behavior Symposium Participants

Laurie Actman, Viridity Energy

Rohit Aggarwala, New York City

Nathaniel Allen, U.S. Green Building Council

Geoffrey Anderson, Smart Growth America

Susan Anderson, City of Portland, OR

Alec Appelbaum, urban sustainability journalist

Stuart Baker, The Oram Foundation

Beth Bingham, Pratt Institute

Jill Boone, County of Santa Clara, CA

Barry Boyce, Shambhala Sun Foundation

David Bragdon, New York City

Uwe Brandes, Urban Land Institute

Thomas Bregman, Town of Bedford, NY

Beth Conover, Econover, LLC

Dorian Dale, Town of Babylon, NY

Mary Downes, State of New Hampshire

Lauren Dunn, White House Domestic Policy Council

Jennifer Ewing-Thiel, ICLEI

Rebecca Feldman, Town of Morristown, NJ

Mark Fischetti, *Scientific American*

Ben Flanner, Brooklyn Grange

Ben Fried, Streetsblog.org

Katherine Gajewski, City of Philadelphia, PA

Raman Gardner, University of Pennsylvania

Brian Geller, Seattle 2030 District

David Gershon, The Empowerment Institute

James Gimian, Shambhala Sun Foundation

Sarah Goodyear, Grist.org

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Regina Gray, U.S. Department of Housing and Urban Development

Alan Greenberger, City of Philadelphia, PA

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Nate Gronewold, ClimateWire

Rachel Gutter, U.S. Green Building Council

Karrie Hanson, AT&T

Tyler Harshman, Frederick County, MD

Daniel Hernandez, Jonathan Rose Companies

Rita Mukherjee Hoffstadt, Franklin Institute

Mark Alan Hughes, University of Pennsylvania

Sadhu Johnston, City of Vancouver, BC

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Roya Kazemi, New York City

Alice Kennedy, City of Baltimore, MD

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Laurie Kerr, New York City

Jill Kolek, City of Portland, OR

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Matthew Lister, Jonathan Rose Companies

Richard Liu, Natural Resources Defense Council

Mike Lydon, The Street Plans Collaborative

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Brian Merchant, TreeHugger.com

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Nils Moe, City of Berkeley

Melanie Nutter, City of San Francisco, CA

Akua Nyame-Mensah, University of Pennsylvania

Richard Oram, The Oram Foundation

Jonathan Orcutt, New York City

Lisa Orr, Frederick County, MD

Christa Orth, OpenPlans

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Charles Perry, Perry Rose Companies

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Janette Sadik-Khan, New York City

Brendan Shane, Washington, DC

William Shutkin, Rocky Mountain Land Use Institute

Dan Siegel, University of California – Los Angeles, Mindsight Institute

Tanya Snyder, Streetsblog.org

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Gregg Thomas, City of Denver, CO

Karen Thompson, University of Pennsylvania

Mary Tucker, City of San Jose, CA

Christophe Tulou, Washington, DC

Debi Tulou, Washington, DC

Desa Van Laarhoven, Marion Institute

Celia VanDerLoop, City of Denver, CO

Hilari Varnadore, Frederick County, MD

Meg Walker, Project for Public Spaces

Ann Fowler Wallace, Funders' Network for Smart Growth and Livable Communities

Bryan Walsh, *Time* Magazine

Elke Weber, Columbia University

Darryl Young, Summit Foundation

Alicia Zatcoff, City of Richmond, VA

Climate, Buildings and Behavior Steering Committee

Naomi Bayer is Senior Vice President of National Initiatives and Innovation at Enterprise Community Partners, Inc. She oversees Enterprise's high-impact affordable housing and community development operations in eleven key markets. She also provides valued programmatic direction for Enterprise's strategic priorities: enabling environmentally sustainable development, stabilizing communities and expanding housing opportunities for the most vulnerable. Prior to joining Enterprise, Naomi served as the director of Fannie Mae's New York Community Business Center, working with partners to increase affordable rental and homeownership opportunities for low-, moderate- and middle-income families and first-time home buyers.

Previously, Naomi served as Senior Vice President of Housing with the New York State Housing Finance Agency and the State of New York Mortgage Agency (SONYMA), where she was responsible for the overall management of housing programs of the combined state housing finance agencies. Naomi also was employed at the San Antonio Development Agency as Manager of the Rehabilitation Department and was Director of Housing and Community Development with the Baltimore Regional Planning Council. She serves on the boards of SONYMA, the National Housing Trust and on the steering committee for the National Community Stabilization Trust. She holds a master's degree from Rutgers University and a bachelor's degree from Barnard College, Columbia University.

Dana Bourland is Vice President of Green Initiatives for Enterprise Community Partners and leads environmental strategy for the national organization. Bourland directs all aspects of Enterprise's national award-winning Green Communities® program from strategic planning and program development to evaluation and public policy advocacy. Currently, she is leading the second phase of Green Communities to specifically address retrofits of existing buildings and the comprehensive provision of community-based green services. Bourland works with Enterprise's financial affiliates to package and integrate the delivery of various forms of project financing to Green Communities developments, including equity investments and predevelopment loans. A returned Peace Corps volunteer, Bourland holds a master's degree in planning from the Hubert H. Humphrey Institute of Public Affairs, University of Minnesota, and is a graduate of Harvard University Graduate School of Design's Program in Real Estate. She is a certified planner through the American Institute of Certified Planners (AICP), a LEED Accredited Professional and a member of the first Leadership Forum organized by the National Association of Affordable Housing Lenders (NAAHL).

When the Center for Green Schools at the U.S. Green Building Council was established in 2010 to serve as the driver for green schools dialogue, policy development and innovation, USGBC appointed **Rachel Gutter** to take the reins.

Rachel came to USGBC in 2007 to oversee the launch of LEED for Schools, a version of USGBC's popular green building certification program that facilitates the design, construction and operations of high-performance, green schools. To accelerate market transformation, USGBC launched the National Green Schools Campaign to engage students and teachers, parents and school superintendents, elected officials and other policymakers in a national conversation about the relationship between high-performance educational facilities and high-performing students.

Rachel's professional experiences in the fields of green building consulting and interior architecture and her time with the Green Building Program of Montgomery County Public Schools have contributed to her in-depth knowledge of green schools. However, it is her six years of teaching experience that fuels her commitment to educating a generation of sustainability natives. Rachel received her BA

degree from Tufts University. A competitive figure skater throughout her childhood, today Rachel finds balance through a daily dose of yoga. She lives in Washington, DC.

Mark Alan Hughes is a Distinguished Senior Fellow of the University of Pennsylvania's School of Design and the TC Chan Center for Building Simulation and Energy Studies. He is also Associate Director for Policy, Markets & Behavior at the DOE's Greater Philadelphia Innovation Cluster at the Philadelphia Navy Yard, a Faculty Fellow of the Penn Institute for Urban Research, a Senior Fellow of the Wharton School's Initiative for Global Environmental Leadership and a Distinguished Scholar in Residence at Penn's Fox Leadership Program. He was the Chief Policy Adviser to Mayor Michael Nutter and the founding Director of Sustainability for the City of Philadelphia. Hughes joined the Princeton faculty in 1986 at the age of 25, has taught at Penn since 1999, and has been a columnist at *The Philadelphia Daily News* since 2001.

Linda Mandolini has served Eden Housing as a Project Developer, as Director of Real Estate Development, and since 2001, as Executive Director. Eden Housing is one of California's oldest non-profit housing development companies and has developed or acquired over 6300 units throughout California. Linda oversees affordable housing production, resident support services and property management components of the organization, their combined annual operating budget of over $48 million and a staff of 200 employees. She is guided in her work by Eden's active volunteer board of directors.

Linda held various community development positions in Boston prior to moving to California in 1996. She served as Director of Transportation and Land Use Development at the Silicon Valley Manufacturing group in Silicon Valley. Linda received her BA degree from Wheaton College in Massachusetts, and earned an MBA at Boston University.

Linda serves on the Board of Directors of the California Housing Consortium and The Housing Trust of Santa Clara County. She also serves on Board of Governors for the National Housing Conference as well as the Advisory Board for Enterprise Communities Network. In 2008, Linda was named a "Woman of Distinction" by *East Bay Business Times* and in 2011, she was recognized by *San Francisco Business Times* as one of the "Bay Area's Most Influential Women in Business."

John K. McIlwain is the Senior Resident Fellow and holds the J. Ronald Terwilliger Chair for Housing at the Urban Land Institute in Washington, DC. Mr. McIlwain leads ULI's research efforts to seek and promote affordable housing solutions, including development and housing patterns designed to create sustainable future environments for the nation's urban areas. Prior to joining the ULI staff, Mr. McIlwain served as Senior Managing Director of the American Communities Fund for Fannie Mae and as President and Chief Executive Officer of the Fannie Mae Foundation. Mr. McIlwain has also served as Executive Assistant to the Assistant Secretary for Housing/ Federal Housing Commissioner at the U.S. Department of Housing and Urban Development.

John Parkinson is the Executive Director of the Urban Land Institute's New York District Council. A strategic initiative of the New York District Council is the "Sustainable Building Council" which is focused on the 'greening' of existing buildings in New York. Prior to joining the staff, he was a member of ULI, where his prior work included providing technology and services to the real estate industry. Those experiences included founding and running a business that provided document and drawing imaging services, as well as an on-line property management marketplace providing the economic advantages of electronic commerce. He has 25 years of professional leadership and management experience in organizations ranging from start-ups to Fortune 200 firms, not-for-profits and the public sector.

Climate, Buildings and Behavior Symposium Participants

Jeffrey Abramson, Tower Companies

Laurie Actman, Viridity Energy

Shahzeen Attari, Columbia University

Jeffrey Barg, Penn Institute for Urban Research

Naomi Bayer, Enterprise Community Partners, Inc.

Robert Bennett, Portland Sustainability Institute

David Block, The Community Builders, Inc

Steven Bluestone, Bluestone Organization

Dana Bourland, Enterprise Community Partners, Inc.

William Braham, University of Pennsylvania

Lane Burt, U.S. Green Building Council

Patricia Connolly, RREEF

Alice Cook, Time Equities, Inc.

Dennis Creech, Southface

Darien Crimmin, WinnCompanies

J. Matthew Dillon, Massey Knakal

Jeffrey Domanski, Cushman & Wakefield

Elizabeth Dunn, National Trust for Historic Preservation

Greg Dwornikowski, Jonathan Rose Companies

Karen Ehrhardt-Martinez, University of Colorado

Wendy Fleischer, Pratt Center for Community Development

Anne Fletcher, Zyscovich Architects

Bob Fox, Cook + Fox

Paul Freitag, Jonathan Rose Companies

Raman Gardner, University of Pennsylvania

Mirele Goldsmith, Green Strides Consulting

Rachel Gutter, U.S. Green Building Council

Damon Hemmerdinger, ATCO

Bennett Hilley, University of Pennsylvania

Mark Alan Hughes, University of Pennsylvania

Jana Humphries, Perry Rose Companies

Bomee Jung, Enterprise Community Partners, Inc.

Geoffrey Klein, University of Pennsylvania

Ariel Krasnow, Supportive Housing Network of New York

Sally Larsen, Supportive Housing Network of New York

Shai Lauros, GreenHomeNYC

Linda Mandolini, Eden Housing

Mucsoe Martin, m2 Architecture, University of Pennsylvania

John McIlwain, Urban Land Institute

Kim Morque, Spinnaker Real Estate Partners

Valerie Neng, WHEDco

Alison Novak, Hudson Companies

Richard Oram, The Oram Foundation, Inc.

JoAnne Page, Fortune Society

Mira Panek, U.S. Green Building Council

John Parkinson, Urban Land Institute

Philip Payne, Gingko Residential

Mary Pearl, Garrison Institute

Darren Port, State of New Jersey

Catherine Poulin, Spinnaker Real Estate Partners

Jennifer Reed, Eden Housing

Lauren Riggs, U.S. Green Building Council

Jonathan Rose, Jonathan Rose Companies, Garrison Institute

Rachel Jacoby Rosenfield, Jewish Greening Fellowship

Amit Sarin, Jonathan Rose Companies

Greg Searle, Bioregional North America

Erin Sherman, Princeton University

Troy Simpson, Columbia University

Nathan Taft, Jonathan Rose Companies

Laura Tavormina, West Side Federation for Senior and Supportive Housing

Jason Twill, Vulcan Inc.

Russell Unger, Urban Green Council

Jamie van Mourik, U.S. Green Building Council

Haley Van Wagenen, University of Pennsylvania

Mijo Vodopic, MacArthur Foundation

Johanna Walczyk, Supportive Housing Network of New York

Bill Walsh, Healthy Building Network

Shelley Weintraub, Greyston Foundation

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- Lostand Foundation
- The Oram Foundation, Inc.
- The Summit Foundation
- Surdna Foundation

How to Get Involved

If you are interested in supporting Climate, Mind and Behavior, please contact Bridget Connors at bridget@garrisoninstitute.org. To receive monthly updates about this project, subscribe at www.garrisoninstitute.org/email. If you would like to get involved, please contact Meredith Cowart at meredith@garrisoninstitute.org. Additional information about the CMB project and symposium can be found on the Institute's website at www.garrisoninstitute.org/cmb. Videos of select presentations can be seen at www.garrisoninstitute.org/cmb-video.

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