

# Talk of the city: engaging urbanites on climate change

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## Abstract

Climate change requires societal engagement on both mitigation and adaptation. With a growing majority of people living in cities, urban dwellers and municipal decision-makers will need to reduce their emissions and other impacts on the regional and global climate while dealing with the unavoidable near-term and potential longer-term impacts of climate change. To facilitate effective societal response to climate change, a busy, distracted, and so far only marginally interested public needs to be engaged on the topic. This poses significant challenges to communication and sustained outreach efforts. This letter draws on critical insights from a three-year multi-disciplinary project that involved academics and practitioners from various disciplines and sectors of (mostly US) society and explored how to communicate climate change in ways that facilitate societal response. The letter raises questions about key audiences, appropriate messengers, framings and messages, reception of climate change information, and the choice of communication mediums and formats to achieve different communication and engagement goals.

**Keywords:** climate change, communication, social change, urban residents

## 1. Introduction

A growing percentage of the world's population lives in urban areas. While developed nations are already highly urbanized, percentages of urban populations in developing nations are still much lower, but rapidly increasing (table 1). Cities are therefore major centers of energy use, waste production, and the generation of heat-trapping greenhouse gases (GHG); and due to their influence over energy supply, management, traffic control, waste management, and urban planning, they are also logical focal points for efforts to reduce GHG emissions (e.g., Bulkeley and Betsill 2003, 2005, UITP 2006). Moreover, cities are expected to be affected in numerous ways by climate change, requiring individuals as well as municipal decision-makers to identify and implement adaptation strategies to deal with the potential negative impacts of a warming climate (e.g., Scott *et al* 2001). Increasing hazards such as floods, storms, coastal erosion and inundation, landslides, fires, heat extremes and air pollution are among the expected impacts, all experienced in the context of multiple

other stresses and global changes (Tebaldi *et al* 2006, Sánchez-Rodríguez *et al* 2005, Haroy *et al* 2004). Indeed, more than 200 cities in the US, more than 130 in Europe, and more than 650 globally have made official commitments through the Cities for Climate Protection™ campaign of ICLEI—Local Governments for Sustainability to reduce their GHG emissions, and additional efforts are now underway to help these cities develop local adaptation plans (<http://www.iclei.org/index.php?id=800>). However, none of the mitigation and adaptation efforts can succeed without engaging urban residents to support the development or realization of such policies.

Clearly, individuals or even entire urban populations will not be able to 'solve' the climate problem through their own actions (e.g., Bulkeley and Betsill 2003, Moser 2006b). Yet individuals acting collectively do have two critical roles to play in climate policy and action: as a political force, they can mobilize for policy changes at local and higher levels of government, and as consumers of energy, material goods, and environmental resources, they can enact behavioral changes

**Table 1.** Percentage of urban populations in selected nations. (The midyear population of areas defined as urban in each country, as reported to the United Nations. Source: Globalis (2006), drawing on the UN Common Database (UN Population Division estimates); available at: <http://globalis.gvu.unu.edu/> (accessed 26 June 2006).)

Nation	Year									Rank <sup>a</sup>
	1950	1960	1970	1980	1990	2000	2005	2015 2030 (prognoses)		
Belgium	91.5	92.5	93.8	95.4	96.4	97.1	97.3	7.5	97.9	10
Australia	75.1	80.6	85.2	85.8	85.1	90.7	92.7	94.9	96.0	19
UK	79.0	78.4	77.1	87.9	88.7	88.9	89.2	90.2	92.0	30
Germany	71.9	76.1	79.6	82.6	85.3	87.5	88.5	90.0	91.9	33
New Zealand	72.5	76.0	81.1	83.4	84.7	85.7	86.0	87.0	89.0	39
Canada	60.8	68.9	75.7	75.7	76.6	79.4	81.1	84.0	87.2	48
United States	64.2	70.0	73.6	73.7	75.3	79.1	80.8	83.6	86.8	50
France	54.3	62.0	71.1	73.3	74.1	75.7	76.7	79.0	83.0	57
Japan	34.9	43.1	53.2	59.6	63.1	65.2	65.7	67.7	73.1	86
China	12.5	16.0	17.4	19.6	27.4	35.8	40.5	49.5	60.5	157
India	17.3	18.0	19.8	23.1	25.5	27.7	28.7	32.2	41.4	189

<sup>a</sup> Ranking for 2005 in global comparison of all nations for which data are available.

that are consistent with needed mitigation and adaptation measures. In addition, individuals in policy-making or public and private decision-making positions can have considerable influence over the actions and emissions-generating behaviors of many others. The best policy set in place at higher levels of government will fall short of its goals if not implemented on the ground. The best intentions by countless individuals may be insufficient, inefficient and create possible unintended outcomes, if not coordinated and guided by well-designed policy.

It is for these reasons that the question of how to effectively communicate climate change to engage people in the necessary policy and behavioral changes has attracted growing interest recently. Those most interested include experts deeply concerned about the potential dangers from unmitigated climate change (and frequently frustrated with the seeming lack of public concern). It is also of great interest to those inclined to take action to reduce GHG emissions in the US, Europe, Australia, Canada, and elsewhere. The British government, for example, commissioned research on the public understanding of climate change and related information needs, on the basis of which it developed an outreach campaign launched in 2006 (<http://www.climatechallenge.gov.uk/>). A newer British study on effective communication of climate change is underway at the Institute for Public Policy Research (Retallack 2006). The International Association of Public Transport’s European Union Committee recently requested concerted public outreach efforts to engage urban residents in behavior change related to transport modes and energy consumption (UITP 2006). Canada developed its own outreach campaign to engage citizens in reaching the country’s Kyoto Protocol commitments (<http://www.climatechange.gc.ca/english/onetonne.asp>). Several years ago, US non-governmental organizations working on climate change commissioned their own study on climate change communication (FrameWorks Institute 2001), and other communication related research and campaigns are currently underway in the US, the Netherlands, Australia, New Zealand, and elsewhere.

This letter applies the insights gained in an independent three-year, multi-disciplinary project on the effective communication of climate change specifically to urban audiences. It draws on a significant, but mostly dispersed and heretofore poorly integrated body of literature as well as on the practical experience of communicators and social change agents in the private, public, and civic sectors of US society. While abstract in the sense that the findings are not applied to or empirically tested in one specific metropolitan area, the insights on which this paper rests emerged mostly from the highly-urbanized North American context and draw on several case examples.

Below, I first focus on the question of who the urban audience is that must be engaged on climate change in order to tailor outreach and communication efforts appropriately (section 2). Section 3 then lays out the fundamental challenge that communicators face and suggests multiple strategies and best practices. Section 4 concludes with a brief summary and suggestions for future research.

## 2. Who are we talking with?—The importance of identifying different urban audiences

To tailor communication and outreach appropriately, the first question should always be: ‘Who is the audience?’ If communication and outreach is part of a larger set of strategies to develop and implement GHG emission reductions or climate change adaptation actions, then the answer *must* consider what the communication effort is trying to achieve, i.e., what behavioral or social change is intended, and who actually has control over the relevant decisions. Scientists—historically key communicators in conveying climate change to the public—often feel uncomfortable, however, with such an overt linkage of communication and a desirable policy or social outcome. At the same time, communicators—including educators and experts in non-governmental groups—implicitly or explicitly hope for their outreach efforts to produce certain behavioral changes, and when do they not materialize, can become rather frustrated. It is then that fear appeals, hopes ‘for a

catastrophe or two', and other attempts to increase the sense of urgency become more prevalent (e.g., Blix 2004, Frohman 1996, Tickell 2002).

Even for those, however, who would rather avoid making normative statements, advocating a specific action, or being policy-prescriptive, it is important to think clearly about who their audience may be, in order to choose appropriate language and frames to talk about climate change.

Stereotypically, one could imagine the young to middle-aged parent, a middle-class professional with a 9-to-5 job and at least some college education, one or more young children, and a suburban home, which—in the typical American city—makes her car-dependent. Such an individual is busy, distracted by children, work, after-school activities, and other day-to-day responsibilities. Typically, she would exhibit average levels of environmental concern, may only have time to follow political debates peripherally, may have 'headline awareness' of global warming, yet feel great concern for her children's future and well-being.

Alternatively, one could imagine a stereotypical working-class, poorer audience, living in inner city housing, with or without personal cars and instead more frequently relying on public transportation; unemployment or low-wage employment may be high, educational attainment low. Such an audience may well be economically struggling and feel politically disenfranchised, and the immediate focus may be on day-to-day sustenance, matters of justice, and local community concerns (such as drug abuse, neighborhood violence, youth unemployment, or childhood asthma from local air pollution), rather than global affairs such as climate change.

'Yuppies' may constitute yet another stereotypical audience: single or maybe partnered individuals, highly educated, professional high achievers, upper middle-class, maybe with two homes, two cars. Such an audience might hold positions of responsibility and influence, may be business- and success-oriented, vary in their concern for the environment, the climate, or the community, yet maybe bring a cosmopolitan, politically more informed and strategic outlook to an issue such as global warming.

Finally, there may be the stereotypical civil servant in city government: married with grown-up children, middle-aged to older, well educated and professional, middle class, possibly a home owner or a renter and public transit commuter from home. Such individuals might bring considerable civic-mindedness and service-orientation to work and community life, typically be highly informed and interested in environmental, business, or community affairs, and may easily be engaged on climate change, if its causes or impacts touch on some of their job responsibilities.

Table 2 compares nine US cities—ranging from the multi-million metropolitan centers to mid-sized cities—against US average demographics. While this level of aggregation does not allow singling out these particular stereotypical sub-groups, the table does suggest very different urban environments, where communicators would have to design very different approaches to reach different subsections of the urban population as described above. For example, mid-sized Saratoga, Florida has an older, mostly white population, and

poverty is very low. For many, it is a place where housing is still affordable, hence one can own a home on a fixed retirement income. Compare the demographic indicators with a multi-million metropolis like New York city, or a smaller city, like Hartford, Connecticut. In New York, the population is far more diverse, a large proportion speaks a language other than English at home, housing prices are skyrocketing, hence the majority rents, people have long commutes to work, and poverty is substantial. Hartford by comparison, has an even greater proportion of the population below the federal poverty line (nearly a third), a different ethnic make-up, and comparatively low educational status. This suggests both a greater proportion of blue-collar workers and unemployment rates. Three quarters of the population rent, which implies lower levels of control over some housing-related energy use than, say, in San Jose, California, where six out of ten own their own home.

Clearly, the hypothetical audiences constructed above may differ in important ways from any particular real audience in these locations. However, even these imagined audiences illustrate some important implications: where and when to reach different audiences varies considerably; what matters to them in terms of their values, concerns, and aspirations differs in significant ways; the language that will resonate with them may be quite distinct; what people can actually do in terms of directly affecting emission-relevant decisions is constrained in important ways by the different personal, housing- and job-related, and other contextual opportunities and barriers they face; hence, their needs and interests in actively engaging with climate change also differ. In short, a one-size-fits-all communication strategy is unlikely to reach the different sub-groups of the urban populace. It is from this recognition that one can develop a context-sensitive approach to effectively link communication with behavior or social change among private and public actors.

### 3. Linking communication and social change: basic challenge and best practices

'Effective' climate change communication can be defined as any form of public engagement that actually facilitates an intended behavioral, organizational, political and other social change consistent with identified mitigation or adaptation goals. This definition implies a goal for communication that goes beyond a mere change in understanding of the problem, or a shift in people's attitude or concern about climate change. In fact, while a certain level of problem understanding is necessary, as are increased levels of personal concern and an intention to act on that information and concern, information or knowledge is demonstrably not enough to actually change someone's behavior (for more detailed discussion, see section 3.1). The key challenge of effective communication as defined here is to provide at once sufficient motivation to begin (and sustain) the desired social change *and* to help lower any existing barriers or resistances to making that change (Moser and Dilling 2006a) (figure 1). Each of these four 'ingredients'—improved communication of global warming, elevating motivation to change, lowering

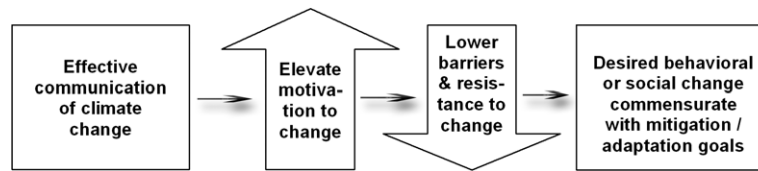


Figure 1. The basic challenge of effective climate change communication<sup>1</sup>.

Table 2. Selected US cities, population characteristics. (Source: US Census Bureau (2005) *American Community Survey*; available at: <http://www.census.gov/acs/www/index.html>.)

Population characteristic	New York City	Chicago, IL	San Jose, CA	Seattle, WA	Boston, MA	Sarasota, CO, FL	Minneapolis, MN	Durham, NC	Hartford, CT	US Total
<i>Total population</i>	7 956 113	2 701 926	887 330	536 946	520 702	359 783	350 260	191 731	111 103	288 378 137
Male (%)	47.5	48.1	51	50.3	48.4	47.7	50.5	48.5	45	49
Female (%)	52.5	51.9	49	49.7	51.6	52.3	49.5	51.5	55	51
Median age (years)	35.8	33.1	34.7	36.8	33.1	49.4	32.1	32.5	30.4	36.4
Under 5 years (%)	7.4	8	8.3	5.9	6.9	4.4	7.9	9	8.5	7
18 years and over (%)	75.8	73.7	73	83.6	79.1	83.1	78	74.8	70.1	74.6
65 years and over (%)	11.9	10.2	8.8	10.9	10.2	28.9	7.6	8.4	10.5	12.1
<i>Race/ethnicity (%)</i>										
White	44	38.6	50.4	68.9	55.3	90.7	65.2	43	27.5	74.7
Black or African American	25.3	34.9	3.3	8.2	24.6	4	16.6	40.6	40	12.1
Other	30.6	26.6	46.2	23	20.1	5.2	18.2	16.4	32.7	13.1
Hispanic/Latino (any race)	27.9	28.8	31.5	6.3	14.7	6.4	10.6	13.2	42.6	14.5
<i>Total housing units</i>										
Occupied housing units	92.4	87.2	96.2	93.9	91.9	79.1	91.5	88.3	84.3	89.2
Owner-occupied housing units	33.1	48.5	61	49.9	35.9	76.3	53.3	51.2	26.3	66.9
Renter-occupied housing units	66.9	51.5	39	50.1	64.1	23.7	46.7	48.8	73.7	33.1
<i>Housing characteristics</i>										
Owner-occupied homes										
Median value (dollars)	449 000	245 000	625 400	384 900	420 400	235 200	226 900	157 100	173 200	167 500
Median of selected monthly owner costs (in 2005 inflation-adjusted dollars)										
With a mortgage (dollars)	2062	1678	2409	1910	1997	1295	1469	1310	1321	1295
Not mortgaged (dollars)	623	518	439	557	605	448	461	375	483	369
<i>Social characteristics (%)</i>										
Population 25 years and over										
High school graduate or higher	79	77.6	81.5	91.9	84	89.1	86.6	84.6	63.7	84.2
Bachelor's degree or higher	32.2	29.9	36.1	52.7	40.9	29.1	43.2	44.5	14.9	27.2
Disability status ( $\geq 5$ years)	13.8	13.8	9.8	14.1	15.1	18.6	12.7	12.5	n/a	10.9
Foreign born	36.6	21.9	37.9	18.9	27.7	12.5	16.4	17.3	19.2	14.9
Speak a language other than English at home ( $\geq 5$ years)	47.4	37.4	55	21.7	35.3	14.3	21.7	19.5	22	12.4
<i>Economic characteristics (%)</i>										
In labor force ( $\geq 16$ years)	62	65.3	67.1	72.6	67.7	52.7	76	72.5	62.1	65.9
Mean travel time to work in minutes (workers $\geq 16$ years)	39	34	25	23	30	21	21	22	20	25
Income (in 2005 inflation-adjusted dollars)										
Median household income	43 434	41 015	70 921	49 297	42 562	44 505	41 829	42 321	26 032	46 242
Median family income	49 374	46 888	79 413	69 795	49 320	55 891	57 316	52 081	28 984	55 832
Per capita income	27 233	23 449	30 769	36 392	30 167	29 666	26 886	24 627	15 947	25 035
Families below poverty level (%)	16.7	18	7.5	6.6	17.8	5.7	14.6	11.1	31.2	10.2
Individuals below poverty level (%)	19.1	21.3	10	12.3	22.3	9.3	20.8	14.8	32	13.3

barriers to it, and leverage points for social change—are discussed below.

### 3.1. Best practices in communication of climate change

Depending on what social change is intended, the choice of the audience for climate change communication is a critical and strategic one. Steemers (2003), for example, argues that even though energy use in urban buildings is much larger than

<sup>1</sup> Source: adapted from Moser and Dilling (2006b).

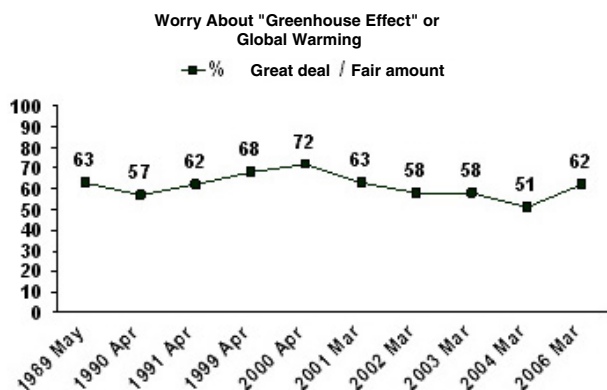


Figure 2. Americans' concern about global warming (1989–2006)<sup>2</sup>.

energy use in urban transportation, the latter sector is more amenable to emission reductions and likely to gain greater traction in public debate, thus the more important one to tackle first. To reduce emissions from urban transportation then, communicators might target the drivers (or any particular subsection of daily commuters), urban transportation planners, public transit authorities, automakers, or federal lawmakers setting fuel efficiency standards. Each one of these audiences would come with their preconceived notions about the reality and severity of climate change ('it is real', 'it is urgent', 'it is too uncertain', 'it is a hoax' etc), their correct or incorrect mental models for understanding the phenomenon, their personal and/or organizational interests, values, and concerns. To reach these different groups, communicators must first identify these 'pre-existing conditions', and then match message content, framing of the issue, with the audience's values, concerns, and information needs.

Unfortunately, common polls on the US population's take on climate change do not distinguish variations in opinions at the level of urban subpopulations. According to the most recent Gallup poll on the issue (conducted in Spring 2006), Americans feel more than ever that they understand global warming (74% say they understand the issue very or fairly well), and more than half believe it has already begun (58%) and is at least in part the result of emissions from human activities (also 58%).<sup>3</sup> And while worry is up considerably compared to two years ago (an 11% increase to a total of 62% who say that they worry a great deal or fair amount about global warming), concern is not significantly different from where it was in 1990 (figure 2). Just over a third of the population (35%) believe that global warming will pose a serious threat to them and their way of life in this lifetime. Moreover, when compared to other environmental problems, global warming ranks eighth out of ten (all figures from Saad 2006).

<sup>2</sup> Source: Saad (2006), based on serial Gallup poll data collected over 17 years. The survey question asked is 'I'm going to read you a list of environmental problems. As I read each one, please tell me if you personally worry about this problem a great deal, a fair amount, only a little, or not at all. First, how much do you personally worry about—[RANDOM ORDER FROM A LIST OF TEN ENVIRONMENTAL PROBLEMS]?'

<sup>3</sup> Figures are based on a national sample of 1000 randomly selected adults, 18 years or older, conducted 13–16 March 2006, with a ±3% error.

These national numbers can generally inform communicators as to where their audiences may be on this global, complex issue, which many still perceive as remote in time and place, not amenable to personal action, and hence often overwhelming (see e.g., Immerwahr 1999, Seacrest *et al* 2000). Leiserowitz (2005) provides finer insights by distinguishing specific 'interpretive communities' among the population—i.e., subpopulations of Americans who share similar perceptions, understandings, concerns, and emotional responses to global warming. For example, 'naysayers' or 'alarmists' are two of these interpretive communities at the opposite ends of the opinion spectrum from complete denial of the issue to extreme concern. While these national polls and characterizations provide important insights into people's thinking, they do not illuminate the local concerns and viewpoints held by the residents of any given urban area. The City of San Diego, California, may offer some unique experience in this respect. It conducted a survey of its residents on quality of life and sustainability (including a number of climate-related) issues, which enabled city staff to link their outreach efforts to empirically identified concerns that residents had (Pratt and Rabkin (2006); for the survey results, see City of San Diego (2004)).

These more detailed insights into residents' views allow communicators to make the global phenomenon of climate change 'local' in unique ways salient to a given audience, and hence overcome one important hurdle to people 'connecting' to the seemingly remote, impersonal issue. Urban transportation planners, for example, who professionally may be concerned primarily with efficient channeling of commuters and goods and services might be receptive to information that allows them to continue to meet those goals while also meeting the goals of reducing urban air pollution, traffic congestion, and their city's contribution to global GHG emissions. They might need to be educated about the causal linkage between transportation and climate change, and—for greater suasion—be given insights into how climate change might affect urban areas such as their own. Most importantly, however, they would require useful solution information, specific to their spheres of influence, rather than just an extended lesson in climate science to be persuaded to take action.

Many communicators of climate change focus on simply educating their audiences about climate change by providing more understandable information about the science. Others focus on the possible and mostly negative impacts of climate change to motivate people into action. The unspoken underlying assumptions typically are that people do not act because they either do not understand or do not care about the issue. Extensive social scientific research on the 'information deficit model' provides ample evidence that some basic understanding of an issue may be a necessary, but typically not a sufficient condition for people to take action or change their behavior (e.g., Halpern and Bates 2004, Sturgis and Allum 2004, Bak 2001). Moreover, as the Gallup poll cited above and other surveys show, a majority of Americans now is convinced that climate change is real and underway, that the scientific case has been made (even if that conviction does not run very deep; most people simply lack the scientific understanding to independently evaluate scientific claims and counterclaims)

(e.g., ABC News, TIME Magazine, and Stanford University 2006, Brewer 2006). Similarly, psychologists have identified numerous conditions that must be met before fear appeals can have their intended effect (e.g., Ruiters *et al* 2004, Witte 1998). More commonly, the unsophisticated use of scary stories or images of the future just leads people to avoid feeling the unpleasant emotions such appeals evoke: fear, being overwhelmed, and lacking personal control over a situation (Moser 2006a). The implication for improved climate change communication therefore is to move beyond the exclusionary discussion of climate change science, reduce the emphasis on impacts to a level where people understand the implications of *not* acting, but avoid invoking denial or apathy, and instead focus much more on solutions, practical help, and realistic hope.

Cities are physically structured and socially divided agglomerations of people that can make it difficult for communicators to reach into various sub-audiences. Race, class, education, social status, religious affiliation and other demographic identifiers all can create social divides tall enough that members of one group never even encounter or meaningfully interact with members of another. These strong and persistent social identities matter to climate communication in so far as audiences can be more receptive to information from a member of their own group than from someone outside it. A scientist may be highly credible to a variety of audiences on climate science, but a ‘sub-urban mom’ may be more persuasive to other sub-urban moms when it comes to building a neighborhood ride-share program that gets kids safely to and from school, allows parents to take care of a myriad of daily errands, and manages a shuttle service for their children’s diverse after-school activities. An architect or designer experienced in ‘green buildings’ will be more persuasive to builders not yet using best practices in energy efficient design than an energy technology expert. A community organizer in a low-income neighborhood may have the right language to reach local residents, whereas a city official who did not grow up in that community may not.

The obvious implication for improved climate change communication is to match messengers with audiences, and to let trusted messengers recruit others into behavior change efforts. This principle underlies the design of so-called EcoTeams—now organized in numerous cities around North America and Europe—neighborhood-based groups that try to reduce their ecological footprint and greenhouse gas emissions (e.g., Devuyst *et al* 2001, Michaelis 2003, Rabkin and Gershon 2006, Staats and Harland 1995).

Employing whoever is a credible, persuasive conveyor of information *in the eyes of the audience* then also means that the circle of communicators has to be broadened beyond those who have traditionally played key communication roles on climate change—scientist and environmental advocates. Designers of outreach campaigns must identify those credible messengers and give them the necessary information, training, and tools to translate climate change into relevant terms to those not yet reached. Sometimes that may mean not talking about climate change at all, but about air pollution, energy and cost savings, technological leadership, the moral obligation to be stewards

of creation, or building a sustainable, safe, and livable city. In the example of San Diego mentioned above, the city’s survey revealed a number of misperceptions and concerns of several climate-relevant environmental issues—water availability, air quality, traffic congestion, and energy conservation, the city uses these insights now to tailor its climate-related outreach efforts to different audiences (Pratt and Rabkin 2006).

### 3.2. Motivating urbanites to take action

What could possibly motivate a city dweller to stop driving short distances, a commuter to switch from his personal vehicle to public transportation, a homeowner to install solar panels on her roof or to change the thermostat by a few degrees to reduce the amount of air conditioning and heating? Simply knowing about climate change or feeling scared by its consequences may help, but is unlikely to suffice to initiate and sustain such behavioral changes. For example, for decades, Americans have indicated in polls that they would like their products to be energy-efficient and their energy to come from renewable sources (Coburn and Farhar 2004, Farhar 1994), yet the products and services provided on the market, and the choices Americans make among them often do not reflect those preferences. Market failures and various structural obstacles can get in the way of acting on such declared preferences (for detailed discussion see Dilling and Farhar (2006)). However, most of our actions are also habitual: we do them because they are convenient and easy, they do not hurt most of us too badly in the pocket book, and because they give us a particular social status and identity. Any attempt made to end these engrained habits of thought and action, and begin and keep up new, unfamiliar behaviors, must not only address the structural context (see below), but also tap into deeper, sustaining motivation.

Effective climate change communication must tap into such deeper motivations. Abiding concerns—e.g., for the well-being of our children, the bottom-line, or social justice—and other deeply held values fall into this category. Individuals, being socialized into a particular society and culture (including local or regional sub-cultures), also require reminders of accepted and desirable social norms. A desired behavior change or proposed emission-reducing solution must reflect these social norms to be acceptable. As members of social and professional communities in which we exhibit certain social identities, we need to know that a new behavior is consistent with or augments our personal and social aspirations of who we want to be in these communities. Moreover, some cities have their own peculiar identities, sometimes explicitly marketed to appeal to visitors or new residents. Whether or not we can characterize the urban identity of, say, New York City, San Francisco, Boulder, Colorado or Austin, Texas, LA or Santa Fe—we know they are distinct, and some market an explicitly ‘green urban identity’ to be more attractive and competitive as urban centers (Solecki and Leichenko 2006). Communicators could link the desirable new behavior to these wider urban and personal identities.

But audiences differ in what is most motivational to them. Businesses and local governments have begun to reduce their

emissions because of bottom line arguments and the desire to reduce the risk of financial loss. The specter of climate change impacts on a city, economic sector, or industry, the failure to adopt emission-minimizing technologies in connection with missed market opportunities, or legal challenges from shareholders serve as incentive to those audiences (e.g., Arroyo and Preston 2006, Carey and Shapiro 2004). Faith communities have begun greening their houses of worship out of a desire to be stewards of creation and defenders of social justice (e.g., Bingham 2006, John Ray Initiative and Au Sable Institute of Environmental Studies 2002). Political leaders on the other hand may be motivated to take policy action if doing so involves political gain (or at least involves only minimal political risk). Yet others may only respond to legal mandates and sanctions for failure to comply with laws and regulations.

And finally, the vision of a desirable urban (or even more broadly, national or global) future may play a critical role in future climate change communication. Because of the long time-lags in both the climate system and the human systems that underlie our emission-generating actions, there is no reasonable or feasible way to reduce anthropogenic emissions quickly and to stabilize, much less reduce, atmospheric GHG concentrations soon. Population growth, urbanization trends (see table 1), consumption patterns, the life time of transportation technologies and market penetration of alternatives, the turn-over time of infrastructure and building stocks, as well as the underlying values, norms, and behavioral patterns all point to the need for a long, sustained emission-reduction campaign. Meanwhile, the impacts of climate change will manifest in all regions of the planet and disproportionately affect urban populations. It will be challenging to sustain engagement in mitigation actions if people cannot see positive outcomes from their actions—either because the climate situation is worsening or because vast portions of the world's population (or even just of the local urban population) are not on board (yet) with taking action.

It is against the backdrop of this quite possible scenario that a positive vision able to sustain people through hard times becomes essential. To date, grand visioning has been largely neglected as part of climate change communication, with one notable exception maybe being the Boston Scenarios Project (see the brief overview in Vergragt (2006)).

### 3.3. *Overcoming barriers to change*

The primary obstacle to overcome in reaching people is widespread disinterest, apathy, and filters against an overabundance of information. Any communication, especially communication of an easily overwhelming, global, complex, uncertain, politically charged, and difficult-to-solve issue such as climate change, will have to contend with these barriers. It is precisely for this reason that communicators often reach for yet-scarier, more sensational news, for catastrophes and other human interest stories that might be connected to climate change, or for cultural icons and celebrities to convey the message. While they may reach momentarily through the reception filters, they are also 'more of the same'—familiar approaches that may entertain and distract at best but not

necessarily actively engage or mobilize. Surprising approaches (e.g., with humor), unusual spokespeople, or unexpected venues and mediums (e.g., through story-telling or the arts) may be more noticeable and memorable.

Even individuals who are highly motivated to write climate policy or take a personal emission-reducing action may fail to carry through with it because of obstacles they encounter. Such obstacles may be external or internal. For example, if a person is inclined to take public transportation to work rather than drive by herself, but the connections are inconvenient enough to make the commute significantly longer, going by bus or train may just become unfeasible. Retrofitting existing infrastructure or building stock may be more expensive than individuals or city governments can afford. Innovation in building design may be constrained by codes and regulation. ICLEI's City for Climate Protection campaign, for example, regularly holds conferences and provides information to local governments to share innovative ideas, creative financing solutions, and practical solutions implemented by other communities to help overcome just such obstacles (Young 2006). Similarly, The Climate Group in the UK recently compiled the experience and innovative emission-reducing actions of fifteen cities worldwide to help yet-to-be-engaged or hesitant urban centers to overcome their skepticism and real-life barriers (The Climate Group 2005).

Alternatively, people may face internal obstacles. For example, the still common misunderstanding that 'global warming is caused by the ozone hole' predisposes people toward thinking of making wrong or ineffective personal behavior changes (e.g., Bostrom and Lashof 2006). Having been scared enough by previous climate change communication may have created emotional barriers and resistances to engage on the issue again. A sense of isolation or futility may prevent individuals from taking personal action, and any action perceived as running counter to one's adopted social identity may be rejected. Preferring energy efficient appliances is one thing; not knowing how to read energy labels or not finding appliances at the level of efficiency desired is another (Banerjee and Solomon 2003). Not knowing what difference a compact fluorescent light bulb makes or where to buy one, how to prioritize actions one might take to reduce energy use and emissions, or simply not having the technical expertise or social support to make a change and sustain it, could all prevent a good intention from turning into actual climate-friendly behavior (Rabkin and Gershon 2006).

Communicators thus must recognize the sometimes substantial costs involved—not just financial—in people changing habits of thought and behavior. Neighborhood, organizational and other small-scale community approaches (such as the EcoTeams mentioned above) to support behavior change provide more adequate forums for engagement and the necessary social support and accountability to change. Communicators must also recognize that while Americans have heard repeated news about the state of the science and potential impacts from global warming, and about the Kyoto climate treaty, typically presented as insufficient, unfair, or economically unfeasible, they know far less about what personal actions they could take, what solutions are available

and what their costs, effectiveness or other implications may be (FrameWorks Institute 2001). Without concrete and actionable solutions knowledge, it seems even less likely to actively and constructively engage people on the issue.

### 3.4. Leverage points for social change in urban areas

Given the local-to-global interconnectedness of cities with not only their direct hinterlands but also far away global markets, it is quite obvious that there is no one scale or sector on which to focus emission-reduction efforts (Solecki and Leichenko 2006, Bulkeley and Betsill 2005, Sánchez-Rodríguez *et al* 2005). Instead, there are countless leverage points to initiate social change. Bottom-up changes—while often small in environmental impact—can plow the ground for larger changes by sending symbolic messages, testing and modeling alternative technologies and behavior, building political pressure, or changing the social and political climate for action at higher levels (Carley *et al* 2001). Often, small commitments successfully implemented can also help build the necessary willingness and expertise to make bigger changes later on.

Top-down approaches—while typically harder to come by in a federal system such as the United States—can be more efficient in affecting the emissions of many administrative units or individuals. Examples may include Renewable Portfolio Standards, building codes, or energy efficiency standards for vehicles and appliances. A number of cities in the United States such as Portland, Oregon or Santa Monica, California have committed to purchasing 100% renewable energy to power their city operations.

Once demonstrated as achievable and affordable by pioneer communities, innovative solutions spread from one to another, and in the process also distribute know-how and create markets for increasingly economical new technologies. Existing networks of government officials within and across states (e.g., national conference of mayors, associations of city planners, environmental specialists, or public works engineers, or networks such as those offered through ICLEI) constitute important channels through which relevant information about climate change and solutions options is being spread.

The recognition that all types of social change can usefully contribute to the transformation of urban centers toward low-emitting human settlements should not obscure the fact that some types of change may be more profound in the long term in terms of environmental impact than others. At the same time, many of these deeper social changes may not yield quick emission reductions, and hence may be neglected for those that yield more immediate or visible return. Given the profound and long-lasting impact of values and aspirations on human behavior—typically instilled early in life, one may view the education of environmental values and instilling climate awareness and understanding from childhood on as one such lever of deep social change (Bateson 2006). Any decision that has long-term implications—such as constructing buildings and roads, heavy investment in a particular kind of technology, or even the creation and maintenance of a particular political or electoral system—may directly or indirectly affect the

opportunities and barriers individuals may face in changing their 'climate footprint'.

## 4. Conclusions

Past climate change communication efforts have employed mass communication approaches, typically not tailored to particular audiences, and heavily focused on the science and impacts of climate change. While they have slowly built awareness of the dangers of unmitigated climate change and gained some traction primarily in the more liberal political states and municipalities in the US, past communication efforts have failed in important ways to touch the American public more deeply. Understanding of the climate issue is weak and superficial, the sense of urgency to act is only slowly emerging, and most Americans have yet to meaningfully engage on the issue, both in terms of altering their own behaviors and choices and in making climate change a political issue.

This paper applied the collective insights from a multi-disciplinary, multi-collaborator project on climate change communication and social change specifically to urban audiences. Its key conclusion is that climate change communication can be made more effective in facilitating societal response by using best practices and the insights from a variety of social sciences to help elevate the motivation to change and simultaneously contribute to lowering the barriers and resistances to change. The project did not develop one or several specific communication campaigns to test in a real urban setting, but aimed to develop basic principles for improved practice. Given the critical importance of an increasingly urbanized world, cities can and must play an important role in reducing local and global GHG emissions. The principles offered here now require tailoring to and testing in specific urban contexts. Confirmation and refinement from such empirical testing in specific contexts will advance our understanding of how to effectively engage urban residents in municipal emission-reduction and adaptation efforts.

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References

ABC News, TIME Magazine, and Stanford University 2006 *ABC News/TIME Magazine/Stanford Poll: Global Warming* (Washington, DC: ABC News)

Arroyo V and Preston B 2006 Change in the marketplace: business leadership and communication *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change* ed S C Moser and L Dilling (Cambridge: Cambridge University Press) at press

Bak H-J 2001 Education and public attitudes toward science: implications for the 'deficit model' of education and support for science and technology *Social Sci. Q.* **82** 779–95

Banerjee A and Solomon B D 2003 Eco-labeling for energy efficiency and sustainability: a meta-evaluation of US programs *Energy Policy* **31** 109–23

Bateson M C 2006 Education for global responsibility *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change* ed S C Moser and L Dilling (Cambridge: Cambridge University Press) at press

Bingham S 2006 Climate change: a moral issue *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change* ed S C Moser and L Dilling (Cambridge: Cambridge University Press) at press

Blix H 2004 Global warming as big a threat as WMD *New Perspectives Q.* **21** 32–3

Bostrom A and Lashof D 2006 Weather it's climate change? *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change* ed S C Moser and L Dilling (Cambridge: Cambridge University Press) at press

Brewer T L 2006 *US Public Opinion on Climate Change Issues: Update for 2005* available at: <http://faculty.msb.edu/brewert/documents/USPublicOpinionupdatefor2005.doc> (accessed 12 January 2006)

Bulkeley H and Betsill M 2003 *Cities and Climate Change: Urban Sustainability and Global Environmental Governance* (London: Routledge)

Bulkeley H and Betsill M 2005 Rethinking sustainable cities: multilevel governance and the 'urban' politics of climate change *Environ. Politics* **14** 42–63

Carey J and Shapiro R 2004 Climate change—why business is taking it seriously *Business Week* (August 16) 60–9

Carley M, Jenkins P and Smith H 2001 *Urban Development and Civil Society: The Role of Communities in Sustainable Cities* (London: Earthscan)

City of San Diego 2004 *Which Way Do We Grow: A City of San Diego Public Survey Analysis* (City of San Diego)

Coburn T C and Farhar B C 2004 Public reaction to renewable energy sources and systems *Encyclopedia of Energy* **5** 207–22 available at <http://www.sciencedirect.com/science/referenceworks/012176480X> (accessed 6 February 2006)

Devuyt D, de Lannoy W and Hens L 2001 *How Green is the City? Sustainability Assessment and the Management of Urban Environments* (New York: Columbia University Press)

Dilling L and Farhar B C 2006 Making it easy: institutionalizing energy efficiency and renewable energy into everyday consumer practices *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change* ed S C Moser and L Dilling (Cambridge: Cambridge University Press) at press

Farhar B C 1994 Trends in US public perceptions and preferences on energy and environmental policy *Annu. Rev. Energy Environ.* **19** 211–39

FrameWorks Institute 2001 *Talking Global Warming (Summary of Research Findings)* (Washington, DC: FrameWorks Institute)

Frohman M A 1996 Unleash urgency and action *Ind. Week* **245** 13–6

Globalis 2006 *Indicator—Urban Population* available at: <http://globalis.gvu.unu.edu/> (accessed 27 June 2006)

Halpern D and Bates C 2004 *Personal Responsibility and Changing Behaviour: The State of Knowledge and its Implications for Public Policy* (London: Prime Minister's Strategy Unit)

Haroy J E, Mitlin D and Satterthwaite D 2004 *Environmental Problems in an Urbanizing World* (London: Earthscan)

Immerwahr J 1999 *Waiting for a Signal: Public Attitudes Toward Global Warming, the Environment and Geophysical Research* (Washington, DC: American Geophysical Union) 19pp

John Ray Initiative and Au Sable Institute of Environmental Studies 2002 *Oxford Declaration on Global Warming, July 2002* available at: <http://www.climateforum2002.org/statement.cfm>

Leiserowitz A 2005 American risk perceptions: is climate change dangerous? *Risk Anal.* **25** 1433–42

Michaelis L 2003 Sustainable consumption and greenhouse gas mitigation *Climate Policy* **3** (Suppl. 1) 135–46

Moser S C 2006a More bad news: the risk of neglecting emotional responses to climate change information *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change* ed S C Moser and L Dilling (Cambridge: Cambridge University Press) at press

Moser S C 2006b *Communicating Climate Change—Motivating Civic Action: Opportunity for Democratic Renewal? (Canada Institute Occasional Papers)* Woodrow Wilson International Center for Scholars available at: <http://www.wilsoncenter.org>

Moser S C and Dilling L (ed) 2006a *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change* (Cambridge: Cambridge University Press) at press

Moser S C and Dilling L 2006b Toward the social tipping point: creating a climate for change *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change* ed S C Moser and L Dilling (Cambridge: Cambridge University Press) at press

Pratt L G and Rabkin S 2006 Listening to the audience: San Diego hones its communication strategy by soliciting residents' views *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change* ed S C Moser and L Dilling (Cambridge: Cambridge University Press) at press

Rabkin S and Gershon D 2006 Changing the world one household at a time: Portland's 30-day program to lose 5000 pounds *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change* ed S C Moser and L Dilling (Cambridge: Cambridge University Press) at press

Retallack S 2006 *Ankelohe and Beyond: Communicating Climate Change* available at: <http://www.opendemocracy.net> (accessed 27 June 2006)

Ruiter R A C, Verplanken B, De Cremer D and Kok G 2004 Danger and fear control in response to fear appeals: the role of need for cognition *Basic Appl. Social Psychol.* **26** 13–24

Saad L 2006 Americans still not highly concerned about global warming *Gallup News Service* 7 April 2006

Sánchez-Rodríguez R, Seto K C, Simon D, Solecki W D, Kraas F and Laumann G 2005 Urbanization and global environmental change: science plan *IHDP Report No 15* International Human Dimensions Program (IHDP) (Bonn, Germany)

Scott M, Gupta S, Jáuregui E, Nwafor J, Satterthwaite D, Wanasinghe Y A D S, Wilbanks T, Yoshino M and Kelkar U 2001 *Climate Change 2001: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change* (New York: Cambridge University Press) chapter 7 (Human Settlements, Energy, and Industry) pp 381–416

Seacrest S *et al* 2000 Global climate change and public perception: the challenge of translation *J. Am. Water Resources Assoc.* **36** 253–63

Solecki W D and Leichenko R M 2006 Urbanization and the metropolitan environment: lessons from New York and Shanghai *Environment* **48** 8–23

Staats H J and Harland P 1995 The Ecoteam program in The Netherlands. Study 4: A longitudinal study on the effects of the EcoTeam program on environmental behaviour and its psychological backgrounds *Summary Report, E&M/R-95/57* Centre for Energy and Environmental Research, Faculty of

- Social and Behavioural Sciences, Leiden University, The Netherlands
- Stemmers K 2003 Energy and the city: density, buildings and transport *Energy Build.* **35** 3–14
- Sturgis P and Allum N 2004 Science in society: re-evaluating the deficit model of public attitudes *Public Understanding Sci.* **13** 55–74
- Tebaldi C, Hayhoe K, Arblaster J M and Meehl G A 2006 Going to the extremes *Climatic Change* at press (doi:10.1007/s10584-006-9051-4)
- The Climate Group 2005 *Low Carbon Leader: Cities* Surrey, UK
- Tickell C 2002 Communicating climate change *Science* **297** 737
- Union Internationale des Transports Publics (UITP) 2006 The role of public transport to reduce greenhouse gas emissions and improve energy efficiency *Position on the European Climate Change Programme and the Green Paper on Energy Efficiency (UITP Position Paper)* (Brussels: UITP)
- US Census Bureau 2005 *American Community Survey* Washington, DC, available at: <http://www.census.gov/acs/www/index.html>
- Vergragt P J 2006 Visioning sustainable urban transport—case studies for Boston and Bangalore *IHDP Update, Newsletter of the International Human Dimensions Programme on Global Environmental Change* **2/06** 20–2
- Witte K 1998 Fear as motivator, fear as inhibitor: using the extended parallel process model to explain fear appeal successes and failures *Handbook of Communication and Emotion: Research, Theory, Application, and Contexts* ed P A Andersen and L K Guerrero (San Diego, CA: Academic) pp 423–51
- Young A 2006 Forming networks, enabling leaders, creative financing action: the Cities for Climate Protection™ campaign *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change* ed S C Moser and L Dilling (Cambridge: Cambridge University Press) at press