MUNICIPAL CLIMATE CHANGE ADAPTATION AND THE INSURANCE INDUSTRY

Harvard Law School
Emmett Environmental Law & Policy Clinic

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The Emmett Environmental Law and Policy Clinic at Harvard Law School is directed by Wendy B. Jacobs and is dedicated to addressing major environmental issues in the United States and abroad and to providing its students an opportunity to do meaningful, hands-on environmental legal and policy work. Students and clinic staff work on issues such as climate change, pollution reduction, water protection and smart growth.

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INTRODUCTION

The insurance industry can help municipalities adapt to the risks of climate change.

Over the past decade, the insurance industry has begun to recognize the potential impacts of climate change and to evaluate its likely effects on the insurance business. The largest international insurers have moved beyond merely recognizing the risks of climate change into developing new products and policies that have the potential to reduce greenhouse gas emissions and mitigate the impacts of climate change. In particular, the property and casualty insurance sector has been undertaking steps to better understand and curb the potential physical and economic losses from some of the predicted impacts of climate change, especially sea level rise, increased storms and precipitation, and increased storm surges.

Because of its risk management and modeling expertise, the insurance industry is uniquely positioned to assist in the development of creative solutions that address both climate change mitigation and adaptation for three main reasons. First, the industry understands the risks involved with climate change and has begun addressing the issue. Second, its risk management expertise has allowed the industry to spearhead research efforts to further understand and develop solutions to better predict and prevent losses from climate change. Finally, insurers have historically been known to be influential in shifting entire societies and incentivizing risk-reducing behavior. With the wide range of financial resources available to it and its efficient allocation of those resources, the insurance industry will be a paramount player in managing climate change risk.

Because many municipalities self-insure, they cannot address climate adaptation through negotiations over policy terms with their own insurers. Nevertheless, there are still several ways that municipalities can engage with the insurance sector to encourage actions that will promote climate adaptation. In particular, there are three major benefits to municipalities in developing a closer working relationship with the national and local insurance industry. Each of these benefits will be further discussed throughout this memorandum and incorporated into our recommended action plan.

The three benefits are:

- ***To understand*** the physical and economic risks to the local community;
- ***To participate*** in the development of innovative adaptation tools; and
- ***To ensure*** the future insurability of local communities.

The overarching goal for municipalities is to avoid and minimize potential losses and help their residents do the same. This goal coincides with the overall goal of the insurance industry. Because greater storm damage from climate change in the near future is likely, there is a significant incentive to retrofit those properties along coastal regions that are at greater risk of wind damage and flooding from more intense storms and increased storm surges, along with other weather-related catastrophes. It is in the best interest of municipalities—especially those on the coast—to work closely with the industry to better understand the risks and impact to the local community and to coordinate initiatives to improve municipal resiliency.

In particular, we recommend that Boston and other coastal municipalities take the following actions:

- Develop an open dialogue with insurers to encourage knowledge transfer from large national and international insurers to local insurers;
- Draw on the insurance industry's technical expertise to improve predictions of local climate change impacts;
- Advise and educate local builders and property owners; and
- Identify potential barriers to the development of products that promote climate change adaptation by the insurance industry.

THE INSURANCE INDUSTRY'S INVOLVEMENT WITH CLIMATE CHANGE

Awareness of Climate Change's Significance

Insurance leaders recognize that climate change will have a profound impact on their industry. For example, PricewaterhouseCoopers issued a report in 2007 that ranked climate change fourth among major risks to the industry from a survey of 100 industry representatives across the globe.[1] Ernst & Young performed a follow up survey in 2008 of over 70 international industry leaders and analysts and found climate change to be a top ten risk factor for the industry.[2] Specific insurance groups have come forth with statements that further indicate their acknowledgement of the risks involved. For example, the Chairman of Lloyd's of London has called climate change the number-one issue for his insurance group.[3] The industry is concerned about climate change because it is projected to increase insured losses from extreme events; one insurer, Allianz, has indicated that these losses could rise by nearly 40% within the next decade.[4] U.S.-based State Farm, one of the nation's largest property-casualty insurers, has indicated its concern "about the prospect of global climate change, its possible impact on severe weather patterns, and the challenges [climate change] presents to the business of insurance."[5] (See **Exhibits 1 and 2**).

As a result, in the past decade many insurers have started to offer "green" policies that promote energy efficiency and environmentally-friendly practices. Most of these green policies are focused on climate change mitigation, meaning that they are intended to reduce greenhouse gas ("GHG") emissions. Nevertheless, these policies provide potential models for adaptation-focused policies in that they insure against environmental risks as well as financial and operational risks, which are the same risks that are of interest from an adaptation standpoint.[6]

1 David Lascelles, "Insurance Banana Skins 2007: The CSFI's Survey of the Risks Facing Insurers," Centre for the Study of Financial Innovation and PricewaterhouseCoopers, United Kingdom, May 2007.

2 Ernst & Young, "Strategic Business Risk 2008: Insurance". EYG no. EG0015. http://www.ey.com/global/content.nsf/International/Media_-_Press_Release_-_Strategic_Risk_to_Insurance_Industry.

3 Lord Levene, "Catastrophe trends and climate change: A global insurer's perspective," speech given to the World Affairs Council at the National Press Club, Washington, D.C. , 12 January 2007.

4 Angela Mac-Donald-Smith, "Climate Change to Boost Insured Losses, Allianz Says," Bloomberg, 18 September 2007.

5 Evan Mills, "From Risk to Opportunity: 2008 - An Insurer's Response to Climate Change", Ceres, Boston, April 2009, p. 51.

6 For example, many green policies have financial and operational benefits for policyholders, such as protecting against fluctuating commodity prices (e.g., oil) and stabilizing a policyholder's income stream by promoting energy-efficient technologies and the use of renewable energy resources. Willis Holdings of London, for instance, offers policies that cover the unproduction of power by renewable energy sources. In addition, AIG has formed a Global Alternative Energy practice to develop new policies for clients that use alternative energy to offset GHG emissions.

In particular, insurers have developed new policies that encourage more climate-friendly behavior. For example, the automobile insurance industry has been able to successfully develop and target policies towards safer drivers while also incentivizing their existing auto-policyholders to drive more safely. These "Pay-As-You-Drive" insurance programs, now offered by at least 26 insurs worldwide, were established based on recognition that risk increases with higher distances traveled and based on traffic patterns in specific areas that are driven in various times of day.[7] The safer-driving policies are able to track driving behavior and premiums are adjusted based on an algorithm associated with the policyholder's actual driving pattern. The less often the policyholder drives in "dangerous" driving areas or the less he/she drives overall, the lower the premium.

Such auto policies have also been cited and marketed based on their environmental benefits through reduced emissions from fewer miles driven.[8] A study performed by the University of Sydney found that financial incentives do influence the behavior of drivers and that distance driven could be reduced by as much as 10% overall.[9] Additionally, "customers with a tendency to reduce climate vulnerabilities, e.g., drivers of hybrid cars, are being seen by companies like Farmers, Sompo Japan, and Travelers as 'good risks,' and rewarded accordingly through premium discounts."[10]

In the property insurance context, Fireman's Fund Insurance Company, a subsidiary of Allianz, has started offering lower premiums for buildings that are constructed to LEED standards. Such a program can produce climate change mitigation benefits because LEED-certified buildings tend to be more efficient and therefore result in lower greenhouse gas emissions. The program has also proved profitable for the insurer because LEED-certified buildings result in fewer and smaller claims than buildings that do not receive this certification. In a conversation with us, representatives of Fireman's Fund indicated that they believed these differences resulted both from the greater integrity of the heating and electrical systems in these buildings and from the greater

7 Mills, *supra* note 5, at 14, 24-26.

8 The Massachusetts Institute of Technology and Conservation Law Foundation found that switching all drivers in the state of Massachusetts to pay-as-you-drive insurance could reduce mileage, accident costs, and fuel consumption by 9.5% and cut two million tons of carbon dioxide emissions. See: Joseph Ferreira, Jr. and Eric Minikel, "Pay-As-You-Drive Auto Insurance in Massachusetts," Conservation Law Foundation and Environmental Insurance Agency, November 2010.

9 Stephen Greaves and Simon Fifer, "Analysis of a Financial Incentive to Encourage Safer Driving Practices," Institute of Transport and Logistics Studies, University of Sydney, 28 September 2011.

10 Mills, *supra* note 5, at 24.

attention to maintenance that the owners of such buildings tend to demonstrate. Furthermore, data points collected over the past five years by the Royal Institution of Chartered Surveyors and Maastricht University have also indicated that "green" buildings have financial advantages such as higher rents per square foot, higher occupancy, faster lease-up periods, and higher sales price per square foot.[11] (See **Exhibit 3**)

This example, however, highlights not only the creative potential of the insurance industry but also its generally conservative nature. For although Fireman's Fund continues to promote its policy of offering premium discounts for LEED-certified buildings, none of its competitors has yet adopted a similar policy. Representatives of Fireman's Fund told us that they believed that other companies would not adopt similar policies until more years of actuarial data were available to demonstrate the financial feasibility of such policies.

A more common type of property insurance program allows policyholders to pay a small additional premium in return for receiving environmentally-friendly upgrades after a loss event, even if the building did not include such upgrades prior to the loss event. Fireman's Fund first introduced this type of policy under the name Green-Gard in 2006. Other companies have now adopted similar policies. For example, the Lexington Insurance Company, an AIG subsidiary, launched an "Upgrade to Green Residential" policy in 2007. Adoption of such policies has perhaps been more widespread because the costs of "green" rebuilding are easier to model and predict than are reductions in claim frequency or magnitude in green buildings.

These insurance programs illustrate the insurance industry's ability to influence the behavior of policyholders and attract those who already exhibit low-risk behaviors. Similarly, insurers have the potential to drive significant changes in behavior towards greater climate change adaptation because they can induce behavioral changes through financial incentives.

11 Piet Eicholtz, Nils Kok, and John Quigley, "Doing Well by Doing Good? An Analysis of the Financial Performance of Green Office Buildings in the USA," Royal Institution of Chartered Surveyors and Maastricht University, March 2009, p. 37.

CHALLENGES FOR ADDRESSING CLIMATE CHANGE ADAPTATION THROUGH INSURANCE

A. Insurance Programs Promoting Adaptation

While insurers have adopted a number of policies that produce climate change mitigation benefits through reducing greenhouse gas emissions, there exists a relative lack of policies directed toward climate change adaptation in particular. States have created two such policies.

First, the Massachusetts Division of Insurance began in 2006 "encouraging insurance companies to reduce, eliminate, or credit" policyholders for wind deductibles if the policyholders took "steps to reduce the potential costs to their property in the event of a wind event."[12] In response, the Massachusetts Property Insurance Underwriting Association (also known as the "FAIR Plan")—the backstop property insurer in Massachusetts—implemented in 2007 a program that reduced or removed windstorm or hail deductibles for such policyholders, while concurrently providing premium relief.[13]

Second, the State of Florida's Office of Insurance Regulation stipulates that if policyholders carry out specified "hurricane loss mitigation" actions they are entitled by law to a reduction in their hurricane-wind premiums. Two of the cost-effective mitigation actions that are suggested under this code include: (a) securing roofs so that they are not blown off; and (b) protecting windows from flying debris.[14] Both of these state programs reward policyholders who take steps to reduce their vulnerability to hurricane- and tropical storm-force winds. Because such storms are

12 Kevin P. Beagan, Gerald B. Condon, and Caleb E. Huntington, "The Massachusetts Market for Home Insurance, 2010," State Rating Bureau, Massachusetts Division of Insurance, 2010.

13 James H. Pappas to All Massachusetts Producers, Memorandum regarding Dwelling Policy Program and Mandatory Windstorm or Hail Deductible Requirement Rule, October 31, 2007, Underwriting Division, Massachusetts Property Insurance Underwriting Association.

14 "Notice of Premium Discounts for Hurricane Loss Mitigation," Florida Office of Insurance Regulation, OIR-B1-1655 (Rev. 02/10), adopted by Rule 69O-170.0155.

expected to increase in frequency and/or intensity as a result of climate change, measures that promote resistance to storm winds can be properly classified as adaptation measures.

It is notable that neither policy, nor any other of which the authors are aware, has been voluntarily adopted by a private insurer. The Massachusetts program has been implemented only by the quasi-public backstop insurer. Nonnie Burnes, the former Commissioner of Insurance in Massachusetts, explained that the Division of Insurance attempted to convince private insurers to adopt similar policies, but that none of them were willing to do so.[15] While private insurers have adopted the Florida program, they have done so only pursuant to a regulatory mandate.

B. Private Insurers' Withdrawal from, and Raising of Rates in, Risky Areas

Although private insurers have not been offering policies that provide incentives to strengthen buildings and other structures in ways that promote their resilience, they have taken other significant actions that relate to the incentives of property owners to build in risky areas. In particular, private insurers have significantly increased their rates in areas that are vulnerable to hurricanes or coastal storm surges. In some cases, they have withdrawn entirely from areas that they consider too risky.[16] Thus Allstate is canceling or failing to renew policies in many Gulf Coast states because of the risk of hurricane damage.[17] Similarly, voluntary insurers have raised rates dramatically on Cape Cod or pulled out altogether because of concerns about wind and storm surge damage.[18] These actions have proven extremely controversial and have imposed considerable hardships on individual property owners. In the longer run, however, these actions can be seen as a crude way of promoting climate change adaptation, in that they discourage construction in areas that are likely to be increasingly vulnerable as a result of climate change.

C. Backstop Insurance Programs

With private insurers withdrawing from some markets, property owners in these areas have become reliant on backstop insurance programs, usually offered by public or quasi-public entities such as the Massachusetts Property Insurance Underwriters Association (FAIR Plan).[19] After the State of Florida saw a mass exodus of private insurers following repeated catastrophic hurricanes,

15 Interview with Nonnie Burnes (Nov. 10, 2011).

16 These withdrawals are also sometimes taken in response to regulatory limits on the insurers' ability to increase their rates.

17 Evan Mills, "Responding to Climate Change - The Insurance Industry Perspective," in Climate Action, Sustainable Development International (in partnership with the United Nations Environment Programme), 2007, p. 100.

18 Marjorie Nesin, Cape Leaders Push for Home Insurance Reform, Cape Cod Times, Sept. 14, 2011.

19 The FAIR Plan is the residual market for homeowners insurance operated by the Massachusetts Property Insurance and Underwriting Association ("MPIUA").

for example, it became one of the largest providers of residential insurance. With regard to flood insurance, the National Flood Insurance Program ("NFIP") plays a similar role. This reliance on backstop insurers creates many challenges for promoting adaptation to climate change.

Backstop insurance programs have the objective of providing communities with access to "reasonably-priced" insurance against losses from natural disaster damages. In areas with no or limited insurance options, policyholders receive considerable benefits from such backstop insurance programs. First, since these programs often cannot charge market rates, policyholders receive low premiums for properties that would otherwise be underwritten by insurers with higher rates. Second, policyholders are able to reside in coastal areas that would otherwise not be developed. In addition, an increase in real estate value is artificially created because coastal properties would be less valuable if owners had to pay market rates for insurance or if insurance were unavailable.

These benefits to local property owners create several risks, however. For one, the programs face threats to their own solvency due to their increasing inability to cover losses from natural disasters. For example, the NFIP is $19 billion in debt, a result that a 2010 report of New York University School of Law's Institute for Policy Integrity blamed on the below-market rate policies being issued in increasingly concentrated risk areas (mainly floodplains) and the increasing intensity and frequency of hurricane-related floods.[20] When backstop insurers like the NFIP cannot fully cover the loss claims, the costs are passed onto the government and, eventually, the taxpayers.

Another risk is that of increased environmental damage. Backstop insurance programs promote the risky behavior of building in vulnerable areas. Coastal zones often contribute substantially to natural ecosystems and are a vital part of an environment's sustainability. Benefits that can be drawn from natural coastal zones include "erosion control and weather mitigation, . . . improve[d] irrigation return flows for agriculture, . . . support [of] fisheries and other raw natural resources."[21] Backstop insurance programs incentivize construction in floodplains and other ecologically-sensitive areas because they charge below-market rates. By shouldering the risks of insuring development in coastal areas, backstop insurers are incentivizing environmental damage and transferring the risk and costs to taxpayers.[22]

20 J. Scott Holladay and Jason A. Schwartz, "Flooding the Market: The Distributional Consequences of the NFIP," Policy Brief No. 7, Institute for Policy Integrity, New York University School of Law, April 2010, *available at* http://policyintegrity.org/documents/FloodingtheMarket.pdf.

21 Ibid., p. 3.

22 These programs also raise issues of fairness and equity because "the benefits of the NFIP . . . are enjoyed largely by wealthy counties and by a significant number of owners of vacation homes," while the "financial risk and ecological damage are widely distributed to taxpayers and citizens across the country." Ibid., p. 1. Since "[t]he most expensive homes are those directly on the beach" and "[t]he value of property can often drop quickly with increased distance from the ocean," such backstop insurance programs "represent a significant wealth transfer from middle-income counties to relatively wealthy . . . counties." Ibid., p. 5.

From a climate adaptation perspective, these programs are problematic because they can make society as a whole more vulnerable to climate change. By subsidizing construction in the areas most prone to flooding, storms, or storm surges, backstop insurers enable more people and more buildings to be located in areas likely to be adversely affected by climate change in the coming decades.

Paradoxically, however, backstop insurance programs could play a leading role in promoting climate change adaptation. The wind-deductible program offered by the FAIR Plan provides an example. Given that many or most property owners in the riskiest areas will have policies with backstop insurers, any programs offered by backstop insurers that promote measures for adapting to climate change will reach a significant percentage of the highest-priority properties even if voluntary insurers do not adopt similar programs. In addition, backstop insurers may take a longer-term view since in markets where they are the only providers they are less likely to lose policyholders to other insurers at the end of the policy. Measures that incentivize policyholders to make their properties more resilient to climate change can greatly reduce the potential losses that affect those entities and that are ultimately passed onto taxpayers. If such programs were sufficiently successful, they might also encourage private insurers to return to areas that they previously abandoned and distinguish among low- and high-risk properties based on the degree of strengthening and resilience measures implemented by property owners.

D. Explanations for the Lack of Adaptation-Promoting Insurance Products

There are several possible explanations for the lack of adaptation-promoting insurance products from private insurers. One is that insurers lack the actuarial data necessary to make fine-grained distinctions among properties in high-risk areas based on their precise location or the strengthening projects undertaken by property owners. As data demonstrating such differences becomes available from backstop programs like those described above, private insurers might be more likely to make more subtle distinctions in their policy-making and rate-setting decisions.

More generally, a likely explanation for the relative lack of action by insurers specifically directed toward climate change adaptation is the temporal mismatch between property insurance policies and climate change risk. There is generally a significant difference in the life span of an insurance policy and of a policyholder's physical property. Generally, policies are written for one to three years, which means that insurers have little incentive to reward in the short-term actions by policyholders that might reduce losses 50 to 100 years in the future.[23] Policies that reward LEED certification, which can promote climate mitigation, can immediately lead to a reduced rate of claims. As a result, insurance companies can see a financial benefit from such policies in the short

23 Though not directly a function of the insurance market, another factor compounding this mismatch is that developers themselves frequently sell their properties soon after construction is complete, meaning that they also work within a time frame that is shorter than that of the significant risks posed by climate change.

term. Policies that reward climate adaptation measures, by contrast, might lead to reduced rates of claims only over a much longer time frame.[24]

Another issue relates to insurers' traditional use of historical probabilities, rather than future projections, to predict future risk in their proprietary actuarial models.[25] Historical records will not accurately predict future risk as the climate changes and will therefore not allow insurers to take into account climate change risks and climate adaptation measures in developing and pricing insurance products.

Insurers, however, are now becoming ever more adept at predicting and pricing future risk. The use of advanced modeling tools and actuarial science, in partnership with modeling firms such as AIR Worldwide, Risk Management Solutions, and Karen Clark & Co., has advanced the science of climate change prediction, helping insurers to understand the extent to which certain communities can be insured.[26] The riskiest coastal regions will undoubtedly be analyzed and with the information available, insurers have called for the increase in premiums or deductibles for protection against impacts from certain catastrophic risks such as flooding from hurricanes and nor'easters.

24 Some policies, however, such as improving storm windows and installing shutters in areas already at high risk for hurricanes and other windstorms, might both be profitable for insurers in the short term and help promote climate adaptation in the long term.

25 Alice LeBlanc and Megan Linkin, "New York City Panel on Climate Change 2010 Report," Annals of the New York Academy of Sciences, New York, 2010, Chapter 6: Insurance Industry, p. 114.

26 These companies are among the leading catastrophe risk modeling firms. They construct computer models to predict the likelihood that various catastrophes, including natural disasters such as hurricanes or nor'easters, will occur and estimate the damage that these disasters will cause. AIR Worldwide, founded in 1987 by Karen Clark after she developed the first hurricane catastrophe model, was one of the first such organizations.

POTENTIAL ADAPTATION-RELATED ACTIONS BY INSURERS THAT MUNICIPALITIES COULD ENCOURAGE

Until the life span of insurance policies can be fully aligned with that of properties (i.e., utilizing long-term insurance contracts based on long-term risk of a property), the temporal mismatch remains a major obstacle in addressing adaptation. Nevertheless, in certain circumstances, insurers (private and quasi-public backstop) might be able to adopt more adaptation-friendly policies. As discussed in the following section, one of our recommendations is that municipalities like Boston should facilitate discussions among national/international and local insurance companies. One focus for these discussions could be the development of policies that include the following characteristics:.

- Reduced premiums or deductibles – reducing premiums or deductibles for property owners and developers who implement resilient design changes or incorporate resiliency in the design process;
- Up-front funding – providing funding, that would be repaid over several years, for property owners to implement resilient design changes or incorporate resiliency in the design process; and
- Updated rates – updating insurance rates to more accurately reflect long-term risk.

With such strategies, the risk of climate change can be spread across a wider community, thereby minimizing the total costs to one particular community.

A. Legal Framework

Regulation of the insurance industry primarily takes place at the state level.[27] In Massachusetts, as in other states, there is an agency specifically tasked with administering the state's regulatory oversight of the insurance industry; in Massachusetts, this agency is the Division of Insurance. Regulation is generally directed at four main purposes: "1) protect the solvency of insurers; 2) guarantee the availability of coverage to the public; 3) ensure that consumers are charged fair and reasonable prices for insurance products, and 4) prevent unfair practices and overreaching by insurers."[28] The state subjects the insurance industry to requirements of periodic informational reports and maintenance of sufficient capitalization and reserves. In the case of homeowner's insurance, the state prohibits insurers from adopting rates that are "excessive, inadequate, or

27 Sarah M. Tran, "Updated Hurricane Models: A New Opportunity To Insure Against Climate Change," 14 Boston University Journal of Science & Technology Law 73, 2008, p. 77.

28 Ibid., p. 82.

unfairly discriminatory."[29] Finally, the state places limits on the types of activities the insurance industry can undertake: insurance companies may only engage in businesses that are either "related to the functions involved in the operation of the insurance business" or "reasonably complementary or supplementary to its insurance business."[30]

B. Reducing Premiums or Deductibles

Insurers can promote adaptation through reduced premiums and/or deductibles targeted at either retrofits of existing properties or new building design upgrades.[31] The FAIR Plan and Florida examples described above are examples of such programs. If policyholders are able to see that insurers are willing to "share" in the costs of adaptation upgrades through offsets in premium or deductible payments, then they may be more willing to pay the up-front costs themselves.

C. Up-Front Funding

Direct payment by insurers for adaptation retrofits for existing properties and adaptation design upgrades for new properties could be a significant source of financing to promote resiliency. Such payments could take two forms: the first would be an investment by the insurer in return for an expected decrease in claims in subsequent years; the second would be a loan that the policyholder would repay over several years. Each form faces significant challenges, however.

The first might not be financially feasible for insurers when policyholders are free to switch insurance providers every year. One way to deal with this problem would be for the industry to use multi-year contracts. The second is financially more advantageous for insurers, but likely faces regulatory barriers. Actions taken by insurers must be either "related to the functions involved in the operation of the insurance business" or "reasonably complementary or supplementary to its insurance business."[32] Arguably, loans to improve building resiliency to climate change do complement the insurance business. To the extent that regulators disagree, a legislative amendment would eliminate this problem.

29 Ibid., p. 93.

30 Mass Gen Laws ch. 175, § 47A.

31 Potential adaptation strategies for new properties include: setting floor elevations for new buildings at higher levels; placing mechanical and other sensitive equipment on higher floors; designing buildings to maintain structural integrity after flooding; using flood resistant materials on lower floors/basements; considering potential for water supply contamination; and planning for the potential need to store, manage, and/or pump seawater and/or contaminated water. The designing and planning stages of new developments are critical stages in a project's life where the inclusion of such adaptation strategies is less complicated and the costs can be minimized.

32 Mass Gen Laws ch. 175, § 47A.

Given these challenges, a more limited form of such a program—offering "upgrade to resilient" retrofits in the event of a loss event, like the upgrade to green programs described above—would be a promising option.

D. Updated Rates

Finally, insurers could address climate adaptation by adjusting rates to more accurately reflect long term risks. Although the insurance industry has shifted from relying on historical data toward using sophisticated catastrophe models to predict risk, these models have still been criticized for not accurately representing the true threats of climate change.[33] Because the models are based on backward-looking historical data, they do not incorporate or account for the growing trend towards more severe weather.[34] While more forward-looking models have been developed, they have not been widely put into use or submitted to rate hearings agencies for approval.[35] If used together with long-term contracts, these models could address the temporal mismatch challenge while incentivizing property owners and developers to implement adaptation retrofits and design upgrades.

If insurers begin to set rates in a way that is intended to internalize the changing risks, it is possible that these rates could come under fire as excessive. As stated above, state laws typically prohibit insurers from adopting rates that are "excessive, inadequate, or unfairly discriminatory."[36] Rates that do not fall within a "range of reasonableness" will be found excessive.[37] Opponents could argue that forward-looking models lead to excessive rates because they are not based on the historic data corresponding to a particular area. However, these arguments did not succeed in a recent case in Massachusetts challenging the use of hurricane models.[38] Similar challenges to catastrophe models should also fail.

First, there does not appear to be any requirement in Massachusetts that insurers rely solely on historical data, nor is there support for the proposition that forward-looking models are per se excessive. Indeed, the industry could argue that not using forward-looking models would itself run afoul of the state requirement that rates be adequate. In order to be considered adequate,

33 See Tran, *supra* note 27, at 88.

34 Ibid.

35 Ibid. at 90-91.

36 Ibid. at 93.

37 Ibid.

38 Attorney Gen. v. Comm'r of Ins., 450 Mass. 311 (2008). This case involved a challenge to the Commissioner of Insurance's approval of FAIR Plan rates based on hurricane models prepared by AIR Worldwide and Risk Management Solutions. The Supreme Judicial Court upheld the Commissioner's approval because the models "offered reliable evidence of the range of hurricane losses that might be experienced in the State." Ibid., p. 325.

insurer's rates must produce enough revenue to pay all losses and create a reasonable profit.[39] Because historically-based rates underestimate many climate-related risks, such rates might not provide sufficient revenue to pay losses.

Second, consumers benefit from several additional protections against unnecessarily high rates. Insurers must themselves pay for reinsurance based on the level of risk in their portfolio; the higher the risk, they more they will have to pay, which disincentivizes overestimations of projected losses.[40] Public Records Laws in Massachusetts also protect consumers by providing a confidential mechanism by which regulators can review proprietary information.[41] Thus it is unlikely that existing legal restrictions would prevent insurers from making use of models that more accurately reflected climate-related risks.

Insurers likely could not, however, begin to set rates based on expected risk over a time period longer than a year. While there is no explicit statutory requirement in Massachusetts that risk be evaluated on an annual basis, the general practice of the industry and the policy of the Insurance Commissioner has long been to evaluate risk based on the time period of the policy.[42] This time period is typically one year.[43] Setting rates based on more distant risks would require policyholders to pay for risks beyond those that the insurance is intended to cover. Rates that provide coverage for only a year but charge for risk over longer time periods probably would not be found to be within the range of reasonableness. Such rates could also impose different premiums on policyholders who present the same risk in the coming year; this result would likely be held to be unfairly discriminatory. Thus insurance companies that attempted to set rates based on risk over a longer time horizon would likely be found in violation of the legal requirements. However, as was also true in the context of up-front funding, a change in industry practice from single-year to multi-year contracts would grant the industry greater flexibility to set rates based on future risk.

E. Other Options

There are other options for new adaptation-related actions that the industry could implement simultaneously with those described above. First, the industry could help model local risks. "The sector's in-depth knowledge of risk assessment can be invaluable information for governments

39 Century Cab Inc. v. Comm'r of Ins., 327 Mass. 652, 663 (1951).

40 *See* Tran, *supra* note 27, at 89.

41 Ibid., p. 98-99.

42 Interview with Nonnie Burnes, former Massachusetts Insurance Commissioner (Nov. 10, 2011).

43 Ibid.

attempting to plan adaptive measures to prepare for the impacts of climate change."[44] Further, the industry could potentially spearhead or "encourage research aimed at focusing output from global climate models to be more useful to insurance underwriters and adaptation planners."[45] If the sector was able to share its knowledge and research on the potential future impacts of climate change, coastal municipalities will better be able to quantify the potential impact and better grasp the true risks involved. AIR Worldwide, for instance, claims to have the capacity to incorporate climate change scenarios into its various catastrophe models and layer on the effects of various adaptation measures, which could help predict which measures would be the most cost-effective.[46]

Additionally, the industry could promote education through programs that could be built into its existing business model. For example, very much like Fireman's Fund's use of inspectors during upgrades to commission "green" upgrades, inspectors and other insurance agents could be the first point of contact for policyholders to learn of adaptation measures. At the time of offering different policies, insurers could also transfer knowledge to potential customers about the adaptation strategies that are available and the various policies that cover adaptation expenses. Other options include conducting local seminars and training sessions about adaptation strategies and costs for property owners, business leaders, government officials, and the general public. These are low cost educational strategies to increase awareness about adaptation programs, while offering a broader range of products that can help the insurers minimize risks and potentially decrease loss claims.

44 F&C Investments, "In the Front Line: The Insurance Industry's Response to Climate Change," reoResearch, London, 2007, p. 11.

45 LeBlanc & Linkin, *supra* note 25, p. 115.

46 Interview with Jay Guin and Peter Dailey of AIR Worldwide (Nov. 9, 2011).

RECOMMENDED ACTION PLAN FOR BOSTON AND OTHER COASTAL MUNICIPALITIES

While much of this memorandum has focused on actions that the insurance industry has taken, or could take, to respond to climate change, the implementation of those recommendations can only go as far as the regulatory and political framework will allow. We recommend that municipalities take the following actions to promote climate change adaptation and to benefit from the insurance industry's expertise and financial resources. These actions implement the three-tier framework outlined in the first section of this memo (understand, participate, and ensure).

- Develop an open dialogue with insurers to encourage knowledge transfer from large national and international insurers to local insurers;
- Draw on the insurance industry's technical expertise to improve predictions of local climate change impacts;
- Advise and educate local builders and property owners; and
- Identify potential barriers to the development of products that promote climate change adaptation by the insurance industry.

Using Boston as an example: the City can promote a discussion among Massachusetts insurers to encourage the adoption of adaptation-friendly policies by local insurers. Many of the most innovative policies are being developed by large national or international insurers and reinsurers. By contrast, the Massachusetts insurance industry contains many small, local companies, which could benefit from Boston's promotion of a dialogue on adaptation issues. Boston officials could help organize a forum or workshop that would bring together these companies and thereby allow the transfer of experience and expertise to the local industry. A first step in this direction could be for Boston to participate in open forums that already take place on national and global scales. For example, the National Association of Insurance Commissioners has a working group specifically addressing climate change-related issues, which organizes periodic meetings and conferences. The Reinsurance Association of America, a trade group for reinsurance providers, also holds forums and conferences in which Boston can participate. Additionally, ClimateWise, a global collaboration of leading insurers focused on reducing the risks of climate change, proactively encourages insurers to help inform public policy making. Starting a dialogue with ClimateWise members may provide Boston with the opportunity to address issues with insurers that share similar objectives (see **Exhibit 4**).

Second, Boston could attempt to draw on the insurance industry's technical expertise to improve its modeling of future flood risks and other modeling of climate change risks. By doing so, Boston can more accurately predict its economic risks and assess the efficiency of different approaches

to addressing those risks. For example, AIR Worldwide has developed hurricane and storm surge risk models that are used by many insurers. AIR indicated to us that it can downscale these models to the Boston region, apply different climate change projections, and assess the cost-effectiveness of different adaptation measures based on these risk projections. Since the different risk scenarios may require different types of investments, the ability to analyze the relevant costs and benefits can help City officials to make more informed decisions. Additionally, this information will help City officials to adopt and enforce more effective zoning and land-use rules, thus guiding future investments by insurers, property owners, and developers. By leveraging the knowledge base of the insurance industry, Boston can make better choices about appropriate flood planning levels, and can better ensure that insurance-driven solutions will be more aligned with Boston's own goals.

Third, Boston can play a proactive role in educating and advising builders, developers, property owners, and the general public about climate change adaptation. Drawing again from the Fireman's Fund example, Boston's Building Department and Planning Department are usually the first lines of contact for new developments and renovations. Boston can use this early opportunity to offer guidance and detailed information on the risks of climate change and the mitigation and adaptation strategies that can be implemented to stem the potential risks. Most of the strategies that will be adopted by developers and owners will be the ones that can be proven to be cost-effective and value-creating. Throughout the development of a project, Boston's agents can work with the developers and property owners to ensure that the adaptation strategies are successfully implemented and to collect information to further improve the program.

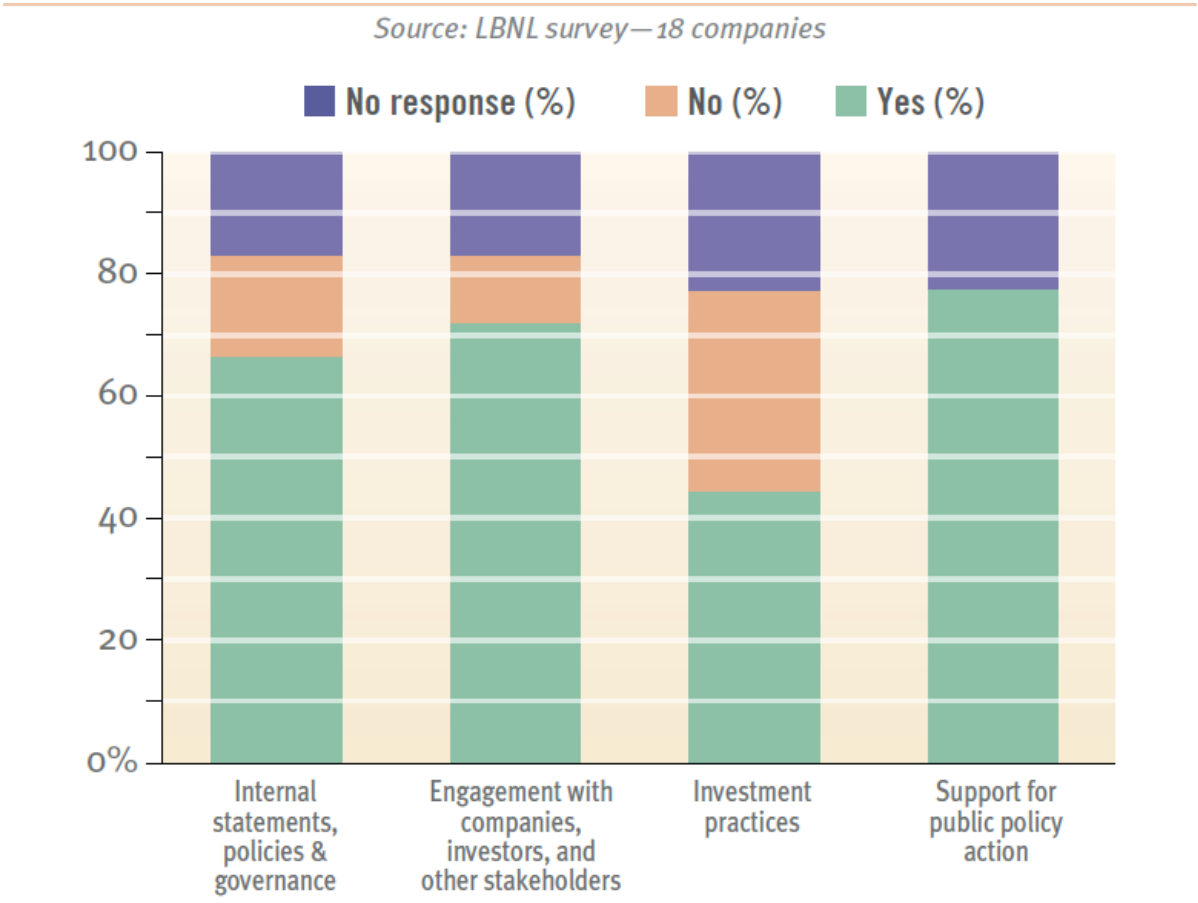
Finally, Boston could be at the forefront in identifying the potential barriers that will prevent the insurance industry from implementing any of their proposed solutions. After having estalished relationships with the major players and understanding what can and needs to be done, City officials would be better prepared to identify – and work to overcome – the regulatory, legal, and political obstacles that could potentially hamper the development of insurance products that promote adaptation. With a clear framework of what is practical, the industry may be better positioned to develop the solutions that can be successfully implemented in the most cost and time effective ways. Overall, this barrier-identification process will help the City of Boston better protect against the risks of climate change by also ensuring the future insurability of Boston by private insurers.

CONCLUSION

The time is ripe for coastal municipalities and the insurance industry (public and private) to work together to develop and deploy tools for facilitating and incentivizing climate change adaptation in communities at risk.

EXHIBIT 1

Survey of Strategic Climate Change Activities Among Reporting Insurers

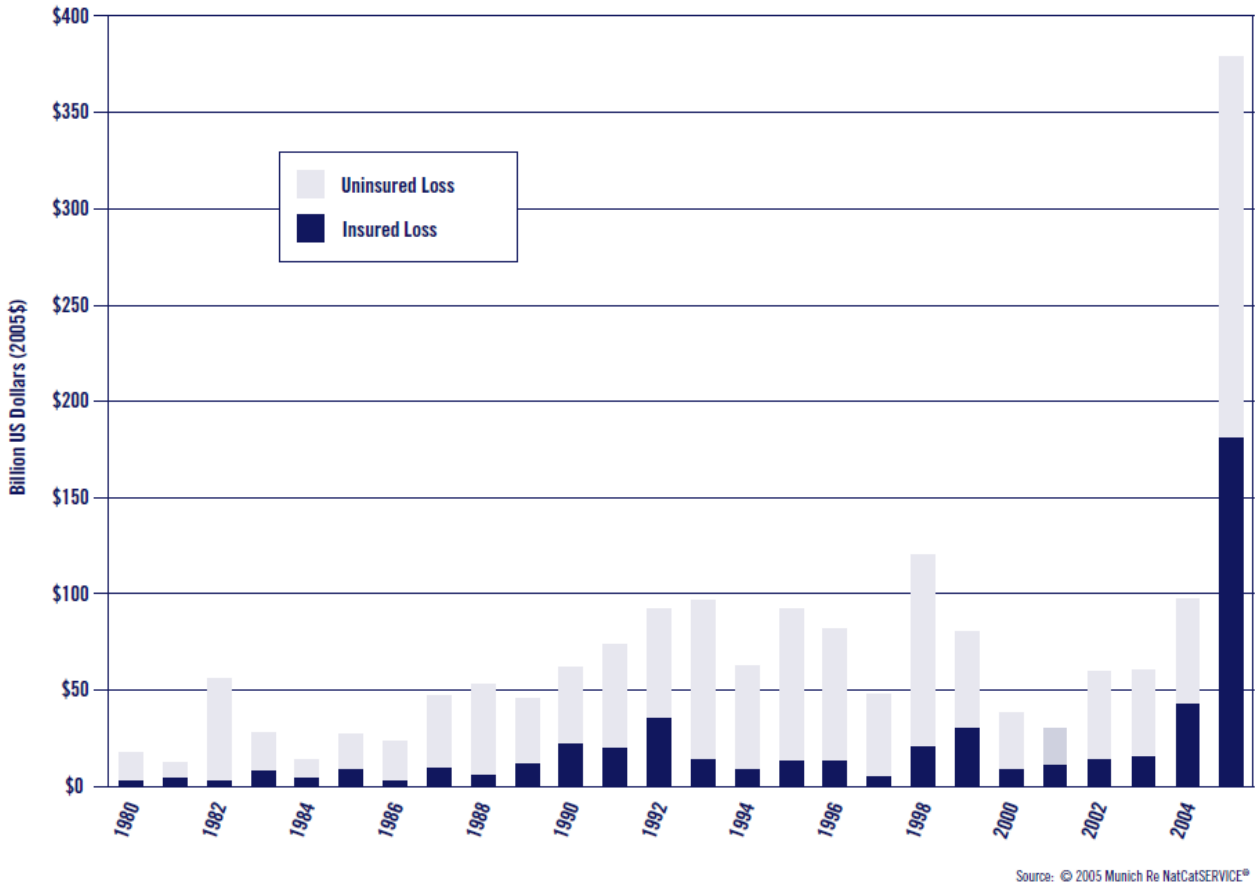


Source:
Evan Mills, "From Risk to Opportunity: 2008 - An Insurer's Response to Climate Change", Ceres, Boston, April 2009, p. 12.

EXHIBIT 2

Losses from Global Weather Catastrophes, 1980 - 2005

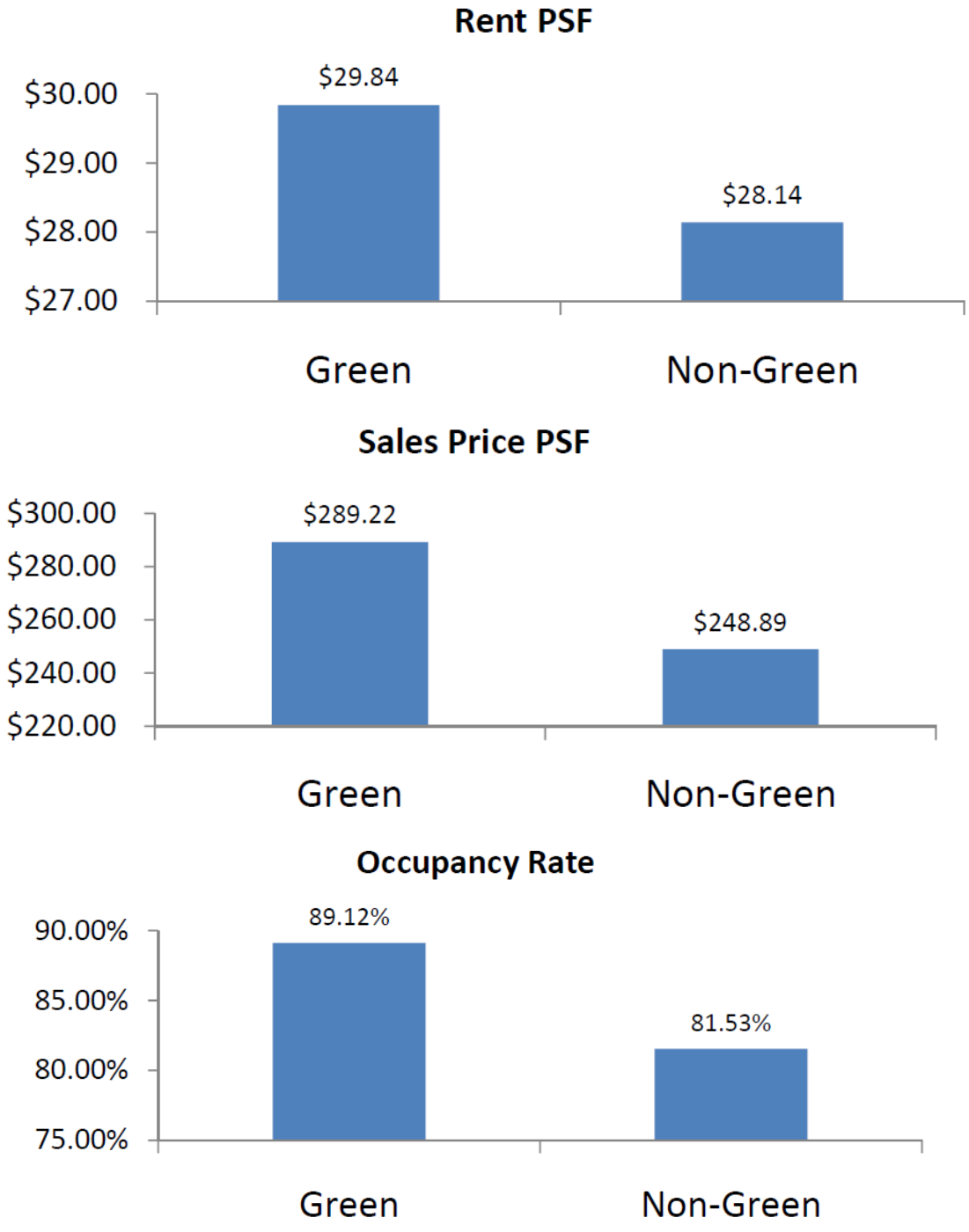
Adaptation strategies can help bridge the gap between the insured and uninsured weather-related losses.



Adapted from:
Ian Burton, Elliot Diringer, and Joel Smith, "Adaptation to Climate Change: International Policy Options," Pew Center on Global Climate Change, Arlington, November 2006, p. 4.

EXHIBIT 3

Comparison of Green-Rated Buildings and Nearby Control Buildings



Source:
Arthur Segel and Justin Ginsburgh, "Rose Smart Growth Investment Fund," Harvard Business School Case 9-210-033, April 26, 2010, p. 17.

EXHIBIT 4

Top 25 Insurers in Massachusetts and Members of ClimateWise

Top 25 Massachusetts home insurers based upon overall direct written premiums for calendar year 2010:	
Allianz Insurance Group	Metropolitan Group
American International Insurance Group	New London Country Group
Amica Mutual Group	Norfolk & Dedham Group
Andover Group	Plymouth Rock Insurance Group
Arbella Insurance Group	Preferred Mutual Insurance Company
Barnstable Group	Providence Group
Blackstone Financial Group	Quincy Mutual Group
Chubb & Son Group Inc. Group	Safety Group
(The) Hanover Insurance Group	Tower Group
Harleysville Group	Travelers Group
Liberty Mutual Group	United Services Automobile Association Group
Main Street American Group	Vermont Mutual Group
Mapfre Insurance Group	

Source:
Kevin P. Beagan, Gerald B. Condon, and Caleb E. Huntington, "The Massachusetts Market for Home Insurance, 2010," State Rating Bureau, Massachusetts Division of Insurance, 2010, p. 5.

Members of ClimateWise

Source:
ClimateWise website, http://www.climatewise.org.uk/member-signatories/, accessed 13 December 2011.

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