

# Climate Resilient Cities

## A Primer on Reducing Vulnerabilities to Disasters

### I/ CITY DESCRIPTION

King County and its largest city, Seattle, Washington, along with the Emergency Preparedness Bureau, have been deemed major contributors to the discourse on climate change impacts and cities.

King County is using 2050 as its target year to develop mitigation and adaptation plans. Importantly, it has set up working relationships with the Climate Impacts Group (CIG), a part of the Center for Science in the Earth System at the University of Washington's Joint Institute for the Study of the Atmosphere and Ocean. The County's leadership understands that action now on climate change impacts is really establishing and exercising good local government resource management practices to create and sustain resilient communities.

King County is implementing "no-regrets" policies to deal with potential climate change impacts. No-regrets policies are those that would make good sense to implement whether or not 2050 turns out to be as predicted. The strategies, plans, and activities are just good urban management.

King County's vision for reducing global warming includes large-scale positive outcomes as well as localized benefits, like healthier air to breathe, walkable communities, and more efficient energy consumption. Its new urban paradigm features a more concentrated, walkable development and active transportation infrastructure, such as bike paths. King County's vision includes locally based food supplies and sources, new green-movement jobs that support and promote clean energy, and energy-efficient products and appliances, construction, and water conservation.<sup>1</sup>

### Population

King County has a population of 1.835 million people, and Seattle has 578,700 (2006 data). Ranked the 14th most populous U.S. county, King County's population has grown by 22 percent since 1990, which reverses the downward trend of the 1990s when Seattle's population declined to 516,259. King County is expected to grow by 12 percent (214,000 persons) to 2.049 million by 2022. Projected growth figures have been useful measures for planning through the State's Growth Management Act. The King County population is 73 percent (non-



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Hispanic) white, 11 percent Asian or Pacific Islander, 5 percent African-American, 1 percent Native American, and 5.5 percent Latino.<sup>2</sup>

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### **Location**

King County is located on Puget Sound in Washington State and covers an area of 2,134 square miles. King County is twice as large as the average county in the United States. The geology that created King County and its attractive setting is also responsible for its vulnerabilities. Glaciers created a landscape of lakes and hills running north to south, making east to west movement difficult. The county dealt with this problem by constructing bridges and tunnels.

Seattle is the largest urban center in King County and the major marine port of the Puget Sound Region. Its 193 miles of waterfront include 53 miles of tidal waters. Seattle is built on the strip of land between Lake Washington and Puget Sound. Elliott Bay confines the congested central business district of the city to a narrow and vulnerable area.

### **The Built Environment**

In 1990 the State of Washington, concerned about urban sprawl, passed the Growth Management Act. Urban sprawl had increased the region's vulnerability to climate change impacts. In response to the Growth Management Act, Seattle developed its Comprehensive Plan, "Toward a Sustainable Seattle." The Comprehensive Plan sets targets for urban growth and promotes greater density through such strategies as the development of urban

villages. King County promotes "walkable" communities. These programs seek to reverse sprawling development and create a more concentrated urban growth pattern. The shift in planning precepts makes better use of limited areas for urban development and creates and protects natural reserve areas. The negotiated boundaries between nature reserve and urban growth areas have dramatically changed the settlement patterns of King County and the state of Washington.

Historically, Seattle developed on landfill and graded terrain. Seattle's complex topography increases its vulnerability to landslides, earthquakes, and floods. Its graded terrain can isolate communities in times of emergency. Seattle's development started in the 1890s, and over half of its housing was built prior to the adoption of building codes and seismic standards in 1949. Hospitals are concentrated in an area called First Hill; the downtown is a concentration of commerce, tourism, and government services known as the County Seat. Within the city limits, only six bridges connect north Seattle with the rest of the city, three bridges connect West Seattle to the surrounding city, and two bridges cross Lake Washington. Each of these bridges creates a bottleneck and, in a disaster, a serious hazard. The city's infrastructure is highly vulnerable, located on landslide-prone hillsides and liquefaction zones.<sup>4</sup>

### **Economic Base**

The economy of King County and Seattle has recovered from several economic setbacks following the February 2001 earthquake. When Boeing (which remains one of several major employers in the area) moved its headquarters to Chicago, 26,000 jobs were lost. Despite the dot-com bust and the region's worst recession in 30 years, manufacturing industries, especially Microsoft and other computer and electronics firms, are slowly gaining back ground, though they have yet to reach their 2001 levels. Educational and health services have registered growth, but commerce in general and professional services struggles.

Employment distribution by sector across King, Kitsap, Pierce, and Snohomish counties include the following sectors:<sup>5</sup>

- Services (30.4 percent);
- Wholesale/Retail (23.7 percent);
- Government (15.2 percent);
- Manufacturing (13.1 percent);
- Construction (6.0 percent);
- Transportation/Public Facilities (5.8 percent); and
- Finance, Insurance, and Real Estate (5.7 percent).

## Governance Structure

The King County Executive Officer is elected to office and leads the County government. The Metropolitan King County Council is the elected legislative body of the County government. The Seattle Mayor is also an elected official.

King County provides regional services within its jurisdictions. The County's responsibilities and services relate to public transportation and sewage disposal as well as courts and legal services, public health services, the county jail, records and elections, property tax appraisals, the King County International Airport, and other regional facilities and parks.

Seattle has jurisdiction over emergency management for the City. The Emergency Management Section (EMS) is part of the Emergency Preparedness Bureau of the Seattle Police Department. The EMS has developed a knowledge base and mitigation and adaptation plans for the City. The principal documents that deal with mitigation of disasters and adaptation to changing conditions are the Seattle All-Hazard Mitigation Plan and the Hazard Identification and Vulnerability Analysis that reflect State Emergency Management Office policies and King County activities.

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Seattle has developed a mitigation program that features structural and nonstructural initiatives as well as outreach and training at the community and individual level.<sup>6</sup>

The 2007 King County Climate Plan presents the authorities under which it operates as a starting point for effective plan development and implementation. The authorities include:

- Implementing a role in regional land use and transportation planning and growth management that encourages communities to become more walkable and offers an urban development model with homes and services in mixed-use configurations within walking distances of services encouraging people to drive less;
- Calling on the region's largest transit fleet, several major wastewater treatment plants, and numerous buildings and facilities to create opportunities to reduce operational GHG emissions, produce clean energy from waste gases, and develop a new civic ethic regarding the environment;
- Offering public transit services promoting travel options to carpool and travel on public transit with free passes for public employees to reduce GHG emissions from personal vehicle travel;
- Advocating for and shaping future federal legislation on mandatory nationwide reduction of GHG emissions; and
- Applying its management prerogatives as the manager of a major bus transit agency, a sizable passenger vehicle fleet, and numerous buildings and facilities to stimulate markets through its example and purchase of clean energy fuels, innovative transport technologies, waste-to-energy innovations, and green building products.

## II/ PRIORITY HAZARDS AND VULNERABILITIES

According to the King County Climate Plan, scientists at the University of Washington predict that local temperatures will rise another 1.9°F by the 2020s and 2.9°F by the 2040s. For King County, this means that snowfall will

decrease and rain will increase, affecting the timing and volume of the snowpack and the spring melt. In some areas, the snowpack will decline by as much as 60 percent and water from melted snow will flow earlier and more rapidly into valleys and floodplains. This will affect water supply and the capacity of the installed infrastructure to manage the flows to ensure year-round availability; it will also have implications for flooding if the flows are not managed. The floods in November 2007 cost US\$34 million in damages. King County will need to meet the increasing frequency and intensity of extreme events. For Seattle, the priority hazards are earthquakes, landslides, and floods, with earthquakes being the most destructive.

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### Climate Change Impacts

Based on the work of the scientists, climate change impacts were identified, projected to the 2050 time horizon, and presented in the 2007 King County Climate Change (KCCP) Plan and Seattle's Hazard Identification and Vulnerability Analysis. The projections became the basis for the eventual plans. The impacts identified in the 2007 KCCP are as follows:

- **Temperature.** Average annual temperatures in the Pacific Northwest are projected to increase 2°F by the 2020s and 3°F by the 2040s across all seasons, with the largest increases in the summer season;

- **Precipitation.** Increases in the amount of precipitation and changes in the type of precipitation from snow to rain and or a mixture of both are possible in the Pacific Northwest, causing potential water supply issues and drought when demand may become the highest;
- **Extreme weather.** Climate change effects on extreme weather still reflect higher levels of uncertainty, but potentially there could be conditions giving storms more strength, leading to greater precipitation and wind storms;
- **Sea-level rise.** Relative sea-level rise is greatest in South Puget Sound, which could experience a 3.3 foot rise by 2100 and increase the rate and extent of coastal flooding, shoreline erosion, and near-shore habitat loss. Sea-level rise can damage existing equipment and result in higher operating costs and greater capital investments to replace equipment and add capacity to existing systems;
- **Snowpack loss and glacier melt.** Snowpack and glaciers in the Pacific Northwest mountains will suffer further loss—the most pronounced effect will be in the Cascade Mountains and the Snake River Valley. April snowpack could experience a 44 percent loss by the 2040s and a 58 percent loss by the 2060s; and
- **Streamflow.** Higher winter and lower summer streamflows with warmer temperatures might lead to increased loss of moisture from soil, vegetation, and water supply and storage.

Impacts per sectors are:

- **Public health and safety.** The frequency, intensity, and type of natural hazards faced by the Pacific Northwest will increase, including more intense weather, flooding, landslides, drought, and forest fires. These hazards will exacerbate existing threats and create new threats such as killer heat waves; respiratory ailments; pollen issues; diseases spread through animals; waterborne diseases; and adverse effects on the workforce, regional food systems, and health;
- **Land use, buildings, and transportation.** There is increased frequency of flood events;

impacts on dam operations and flood control systems; urban flooding on streams; and stream bank stability and erosion and silting. Flood duration will increase, causing damage to infrastructure and economic loss; it will affect shoreline resources and infrastructure, parks, and recreational facilities; and will threaten historic and cultural sites;

- **Water supply, management, and quality.** Increased frequency of drought events, decline in the region's water supply reservoirs, and a greater demand for water in summer and fall are made more difficult by reduced snowpack and wastewater operations. Flooding will tax existing infrastructure seasonally and cause backups and overflows, leading to health problems associated with new infectious diseases and heat stroke;
- **Forests.** Natural buffer zones and carbon sinks will be impacted negatively by insects, fire, and warmer temperatures; and
- **Economic impacts.** Economic impacts will affect the insurance industry with consequences for businesses, consumers, and industry. Agriculture may be affected by increased temperatures, precipitation, and type of crop, pests, and availability of water.<sup>7</sup>

## Disaster History

The disaster history of King County and Seattle has shaped many of today's vulnerabilities. Conversions of building codes after the great fire of 1889 militated for the exchange of wood for masonry construction, and unreinforced construction in an unknown earthquake zone. Seattle's growth patterns have created dependencies on bridge links in the transportation system that knits the City and County together and is only a reminder that the current strategy to use the best science available for planning and strategy decisions makes sense.

Seattle has suffered 10 earthquakes of 4.9 magnitude and higher on the Richter scale. Seattle has also received eight Presidential Disaster Declarations between 1990 and 2002 alone (seven for winter storms and one for the Nisqually earthquake).

## Vulnerable Populations

While the number of higher-income households (over US\$100,000 annual income) increased, so did low-income households (under US\$25,000). The 2000 census shows 142,500 people, or 8.4 percent of the population, were below the poverty line. And this number has increased, due to the recession, to 9.4 percent.<sup>8</sup> Seattle has a greater share of vulnerable populations than the rest of the County, and these groups are not evenly distributed across the City. Seattle's vulnerable populations include the elderly, poor, disabled, and linguistically isolated.

Seattle's special needs show that:<sup>9</sup>

- The number of elderly declined (13.5 percent) from 78,402 in 1990 to 67,807 in 2000;
- The linguistically isolated increased by 39.24 percent from 21,503 in 1990 to 29,940 in 2000;
- Individuals in poverty increased by 11.37 percent from 57,526 in 1990 to 64,068 in 2000;
- Persons with disabilities in 2000 totaled 90,999; and
- Those living in group quarters (shelters) increased by 28.72 percent from 12,260 in 1990 to 15,781 in 2000.

## Vulnerable Assets

Development of the floodplains in King County has created an industrial zone southeast of Seattle. This zone has become the site of hundreds of warehouses and light manufacturing plants. King County has invested more than US\$7 billion in development in its floodplains and has suffered eight federal flood-disaster declarations since 1990. It is not only the built environment that is threatened but the 65,000 jobs, including one-third of the County's aerospace industry's employment, that is vulnerable.<sup>10</sup>

## Historical, Cultural, and Natural Heritage Sites

Seattle's growth did not start until 1880. After the great fire of 1889, building codes changed to require brick construction, introducing a new vulnerability to the then-unrecognized risk of earthquakes. Seattle's early development filled pockets of the broken topography with neighborhoods. Starting with Pioneer Square and

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the surrounding areas, older and vulnerable structures were built throughout the city. Surveys have identified an estimated 500 unreinforced masonry structures that today need retrofitting.

Historic urban areas, cultural artifacts, and natural heritage sites are already vulnerable assets of local governments. With climate impacts intensifying, more heavy rains leading to floods, wind damage, and risk of fire increase the risks to the cultural value and economic potential of Seattle’s heritage. Local governments are just now coming to recognize the importance of their built and cultural heritages and the need to be proactive in their care and maintenance. Actions to retrofit these vulnerable structures, as well as bridges, levees, and other critical infrastructure, are a priority. The definition of urban infrastructure takes on an expanded definition to include mitigation and adaptation capital investment structures.

### III/ MITIGATION MEASURES

This section presents initiatives by King County and Seattle governments to address climate change in a sequence that builds credibility and commitment to the cause of sustainability impacts. The first step in the process is to go public with the intent of making King County climate resilient.

#### **Make Commitments**

King County started its efforts by making clear its intent to deal with climate change impacts. A bold goal for the

region was established—climate stabilization, or 80 percent reduction of GHG emissions below today’s levels by 2050. The County entered into commitments to deal with climate change and global warming that creates a record of intent and benchmarks for a roadmap to follow. The commitments include the following:

- King County is the charter partner for the *Center for Clean Air Policy of the Urban Leaders Initiative on Infrastructure, Land Use, and Climate Change*. The Initiative looks at projected climate change impacts in 2050 and “backcasts” to identify the necessary steps to reduce emissions and preempt vulnerabilities and to influence federal policies on infrastructure and emergency preparedness;
- The 2007 *King County Climate Plan* is the first response to the Executive orders on Global Warming Preparedness of March 2006 and King County Council Motion 12362 of October 2006, which provide an overview of how King County seeks to reduce GHG emissions and works to anticipate (mitigate) and adapt to projected climate change impacts, based on the best available science;
- A *Climate Change Team* was formed comprised of the Executive Office, Department of Development and Environmental Services, the Department of Executive Services, the Department of Natural Resources and Parks, the Department of Public Health, and the Department of Transportation. Interestingly the Department of Emergency Management was not included in the Team because jurisdiction for emergency management falls to Seattle;
- Executive Order FES 9-3 AEP of 2001 directed departments to adopt green building practices and to form an internal *Green Team* responsible for developing countywide green policies;
- King County is a founding member of the *Seattle Climate Partnership* set up to implement the recommendations of Seattle’s Green Ribbon Commission;<sup>11</sup> and
- Seattle guides its citizens through example and direction with its building codes based on the *Uniform Building Code* set out by the International Conference of Building Officials.

**Promote Learning**

King County has made a serious effort to understand climate change impacts and hazard management issues that could potentially affect its well-being. To that end, King County has entered into working agreements and arrangements with technical groups to understand the potential impacts that may affect the County and translate those into actionable programs to mitigate and adapt to them.

Learning and a climate change knowledge base is key to knowing how to proceed and to setting priorities for action. To that end, working relationships have been established with the Climate Change Group of the University of Washington to be able to explain to its citizens and policy makers what climate is and what it means to the communities' safety and development.

The Climate Change Conference, organized by King County in October 2005, offered an opportunity to learn about projected climate change impacts. The learning event covered the following topics:

- **Hydropower.** Changes are projected in the annual pattern of electricity demand and in the annual pattern of electricity production. The Conference recommended strategies to (a) adjust reservoir operations for a changing climate; (b) conserve electricity to reduce overall demand; (c) use market forces to reduce electricity demand during critical periods; (d) increase capacity, diversity, and interconnectivity of hydropower generation; and (e) shift electricity production toward renewables, nuclear, or thermal generation;
- **Municipal/industrial water supply.** Changes in the annual patterns of stream flow will affect water supply and make more difficult the supply of summertime demand as the stream flows alter their patterns;
- **Stormwater and floods.** Changes to a warmer climate where precipitation falls as rain instead of snow and the increased loss of snowpack could increase winter flooding in transient river basins.
- **Forestry.** Changes in tree species that may mi

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grate or have trouble adapting as well as an increased threat of fire and insect outbreaks;

- **Natural environment, especially fish and shellfish.** Changes could occur in annual patterns of stream-flow that would be detrimental to salmon rearing, migration, and spawning; increased water temperatures may exceed tolerable limits for cold-water fish populations; and future changes in coastal and marine habitat are possible. Increased water stratification could decrease nutrient availability; and
- **Coasts.** Changes in sea level would increase coastal flooding and erosion, especially flat beaches and in areas of tectonic subsidence. Increased winter precipitation could increase the risk of landslides and coastal flooding. Changes in ocean circulation, which are important for coastal ecosystems, are uncertain.

King County decision-makers and planners receive regular climate updates. This puts King County in an excellent position to invest in capital projects that will make the region more resilient. Capital projects include the Brightwater Reclaimed Water Project to address water shortages and improvements to roads, bridges, and seawalls to deal with sea-level rise and flooding.

Seattle bases its mitigation programs on studies that detail conditions and vulnerabilities in structural and nonstructural activities. Seattle has prepared emergency management studies, especially seismic evaluations. The mitigation unit manages state and FEMA funds<sup>12</sup> for mitigation projects and works with other City departments to learn about and integrate mitigation into post-

disaster recovery initiatives. A program that has created awareness is the Seattle Project Impact, a proactive effort to make communities more resilient. Seattle Project Impact works with City stakeholders to take action before a disaster occurs for safer homes, schools, and businesses, and better mapping of earthquake and landslide hazards. Seattle also actively engages with the community through the Seattle Disaster Aid and Response Teams (SDART), a highly successful initiative to accomplish the goal of preparing people to be self-sufficient for three days following a serious disaster when assistance may not be available.

### **Set Priorities**

King County has set priorities based on its learning and established the following goals for each of the priority impacts it will confront:<sup>13</sup>

- **Transportation choices.** King County's biggest source of GHG emissions is the transportation sector.

Goals:

1. Achieve climate stabilization target in government operations by reducing GHG emissions 80 percent below current levels by 2050;
2. Reduce fossil fuel consumption, global warming emissions, and foreign energy dependence;
3. Encourage growth in the domestic clean-fuel industry; and
4. Strengthen infrastructure against the likely impacts of climate change.

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### ■ **Buildings and land use**

Goals:

1. Protect the historic built environment, agricultural land, forestry, and open spaces as ecological buffers against global warming impacts. Seattle is actively working to protect its historic urban areas through its Historic Preservation Program. The Program is responsible for the designation and protection of more than 230 historic structures sites, objects, and vessels, as well as seven historic districts throughout Seattle; and
2. Ensure efficient land use and development by densifying designated urban growth areas to make communities more "walkable" and healthier, and ultimately encourage people to drive less.

### ■ **Environmental management**

Goals:

1. Protect health, safety, and landscape from global warming impacts and related natural resource supply emergencies and threats; and
2. Capture methane emissions from landfills and sequester carbon dioxide emissions in forests.

### ■ **Renewable energy**

Goals:

1. Obtain 50 percent of nontransit energy use from renewable resources by 2012;
2. Obtain 50 percent of transit fuel by renewable resources by 2020;
3. Be a market catalyst for increased use and availability of renewable energy resources;
4. Cut pollution; and
5. Reduce dependence on foreign oil.

### **Emergency Management and Disaster Risk Management**

Seattle established a vision statement, goals, and objectives through its Hazard Mitigation Work Group. Emergency management is the jurisdiction of Seattle and, to that effect, it has worked to inform itself and its citizens of what to expect and how to deal with emergency situations. The community is an active participant in the response strategies of the City as with the County.



Seattle created a Capital Improvement Program to address the capital requirements of the local government including those identified in its disaster management plan. Seattle's department of finance allocates resources through the Capital Improvement Program, a six-year program, updated annually, to rehabilitate, restore, improve, and add to the city's capital facilities. The program is approved by the mayor and receives political backing from the city council through its adoption of the program in its proposed annual budget. The Capital Improvement Program is consistent with and supports the City's Comprehensive Plan. The program also provides information as required by the State's Growth Management Act.

Priorities as presented in the Capital Improvement Program are:

- Rehabilitation or restoration of existing facilities to avoid deferred costs of maintenance and to meet regulatory requirements;
- Improvements of existing facilities to meet growing demand and to improve efficiency; and
- Development of new facilities.

### **Taking Action**

The King County "no-regrets" policies are being applied to the vulnerable built environment, as well as other sectors that represent nonstructural vulnerabilities such as health. No-regrets policies are also applied to promoting the use of reclaimed water as a drought-proof source of summer irrigation water. The King County "no-regrets" policies are being applied to the vulnerable built environment, as well as other sectors that represent nonstructural vulnerabilities such as health. No-regrets policies are also applied to promoting the use of reclaimed water as a drought-proof source of summer irrigation water. Another initiative shored up the 199 miles of levees along the Green and Cedar rivers in King County, that dated from the 1930s and 1940s. The last maintenance of the levees was when Army Corps of Engineers shored up the levees in the 1960s. To finance the improvements, the County Council increased property taxes by 10 cents per US\$1,000 of assessed value to raise money for levee repairs and other flood-control projects.

## *The Seattle process established a vision statement, goals, and objectives through its Hazard Mitigation Work Group.*

For historic urban areas, and the cultural and natural heritage sites under threat, recommended actions include mapping the most valuable places and the potential threats from climate change. Other actions include building relationships between the regional scientific community and local decisions-makers; raising awareness about sites in danger; seeking solutions to reduce global warming emissions in the context of conservation of the areas' heritage assets, including (as applicable) green building principles; and retrofitting structures to resist earthquakes and wind damage toxicity of the air to control surface deterioration of historic buildings.<sup>14</sup>

## **IV/ OUTCOME/IMPACTS**

King County leadership takes the position that local governments and their communities will be required to deal with the increasingly extreme conditions, floods shortages, and health concerns, as well as guide responsibly the future growth for resilient cities. King County and Seattle have laid out their accomplishment in the outreach materials that describe building a more resilient County and City:<sup>15</sup>

### **Transportation Choices**

- Built a green fleet of hybrid buses and cars;
- Led a regional consortium to purchase heavy-duty trucks;
- Used 20 percent biodiesel, along with other clean fuels, to run Metro and other diesel-powered county vehicles;
- Developed intelligent transportation systems that support climate-friendly community planning and transportation choices;
- Expanded regional parks and trails systems; and
- Established first mass transit system in the Unit-

ed States to join Chicago Climate Exchange, a voluntary market committed to reducing global warming emissions.

## Buildings and Land Use

- Protected 125,000 acres of open space, including 100,000 in the last eight years, and slowed suburban sprawl;
- Expanded and linked regional trail systems; and
- Established ordinances providing increased protection of sensitive shorelines, wetlands, lakes, and natural vegetation.

## Environmental Management

- Increased protection of shoreline, wetlands, lakes, and natural vegetation;
- Completed salmon recovery plans;
- Created nation's leading flood hazard management plan; and
- Safely used reclaimed water.

## Renewable Energy

- Enacted major energy and resource conservation management programs;
- Hydrogen fuel cell demonstration project;
- Converting waste to energy at the wastewater treatment facilities; and
- As a large consumer of biodiesel, King County supported significant expansion of the market.

## Notes

This “City Profile” is part of *Climate Resilient Cities: A Primer on Reducing Vulnerabilities to Disasters*, published by the World Bank. The analysis presented here is based on data available at the time of writing. For the latest information related to the Primer and associated materials, including

the City Profiles, please visit [www.worldbank.org/cap/climatecities](http://www.worldbank.org/cap/climatecities). Suggestions for updating these profiles may be sent to [climatecities@worldbank.org](mailto:climatecities@worldbank.org).

- <sup>1</sup> King County Climate Plan, 2007, <http://www.metrokc.gov/exec/news/2007/pdf/climateplan.pdf>.
- <sup>2</sup> AGR 2006; The 2006 Annual Growth Report, <http://www.metrokc.gov/budget/agr/agr06/index.htm>.
- <sup>3</sup> Seattle All-Hazards Mitigation Plan, <http://www.seattle.gov/emergency/library/Haz%20Mit%20Plan%20Feb%2004.pdf>.
- <sup>4</sup> Seattle All-Hazards Mitigation Plan, p. 2–4.
- <sup>5</sup> Hazard Identification and Vulnerability Analysis, p. 9, <http://www.metrokc.gov/prepare/programs/hiva.aspx>.
- <sup>6</sup> The Seattle Emergency Management Section maintains a website for detailed information on the programs it is carrying out. [www.cityofseattle/emergency\\_mgt](http://www.cityofseattle/emergency_mgt).
- <sup>7</sup> 2007 King County Climate Plan, <http://www.metrokc.gov/exec/news/2007/pdf/climateplan.pdf>.
- <sup>8</sup> AGR Report, p. 5.
- <sup>9</sup> Hazard Identification and & Vulnerability Analysis, p. 14.
- <sup>10</sup> *The Seattle Times*, December 18, 2007.
- <sup>11</sup> <http://www.seattle9.gov/climate/report.htm>.
- <sup>12</sup> FEMA funds: Federal Emergency Management Agency at the U.S. Department of Homeland Security is providing assistance and funds in areas affected by natural disasters.
- <sup>13</sup> From the King County Climate Plan and the information brochure on “Global Warming and King County.”
- <sup>14</sup> Municipal World, February 2007.
- <sup>15</sup> From the King County Climate Plan and the information brochure on “Global Warming and King County.”



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