

# Appendix A: Summary of Adaptation Strategies

From the report ***Community-Based Climate Adaptation Planning: Case Study of Oakland, California***

from the Pacific Institute and in partnership with the Oakland Climate Action Coalition  
[http://www.pacinst.org/reports/oakland\\_climate\\_adaptation/index.htm](http://www.pacinst.org/reports/oakland_climate_adaptation/index.htm)

## A.1 Adaptation Strategies for Extreme Heat

### 1. Develop early warning systems for extreme heat events

- a. **Description:** Develop a system to identify and alert resident when projected heat conditions pose a health risk
- b. **Advantage:** Helps people prepare a plan for dealing with heat stress; allows cities to have additional EMT on call and activate other preparedness measures
- c. **Disadvantage:** Expensive to ensure efficacy and mass-dissemination
- d. **Equity Concern:** Must be designed to communicate effectively to all groups, especially the particularly vulnerable; may not effectively address their needs if they still have limited mobility
- e. **Policy Solution:**
  - i. Provide warnings in multiple languages
  - ii. Provide warnings through multiple culturally or economically appropriate/accessible information streams, e.g., TV, radio, telephone, TTY, SMS, people-delivered
  - iii. Establish a system of neighborhood outreach workers to disseminate information and check in on especially vulnerable residents
  - iv. Conduct reverse 911 phone calls to the elderly and those at risk
  - v. Increase day-time outreach to homeless

### 2. Incorporate public health objectives into city general plan

- a. **Description:** Develop a public health plan that improves overall health and takes into account extreme heat projects when considering local health needs
- b. **Advantage:** Wide benefits beyond climate adaptation
- c. **Disadvantage:** Resource constraints on meaningful implementation
- d. **Equity Concern:** Plan may not address the particular health and health service needs of all communities, especially low-income, communities of color, immigrants, and non-English speakers
- e. **Policy Solution:**
  - i. Conduct an assessment of community health issues, concerns, and needs in collaboration with local community groups and health providers
  - ii. Work in collaboration with local community groups to develop programs and services that address the needs of all residents, particularly those who have been historically under-represented

### 3. Deliver essential medical services and supplies to the homes

- a. **Description:** Collaboration between cities and health-care providers to transport water and essential medicines to the disabled, frail, or otherwise ill people bound to their homes in periods of extreme heat
- b. **Advantage:** Reduces risk of heat-related deaths or medical complications
- c. **Disadvantage:** Difficult to staff and coordinate

- d. **Equity Concern:** May be difficult to reach/identify the most vulnerable
- e. **Policy Solution:**
  - i. Conduct vulnerability assessments and pair with effective early warning systems, multi-lingual hotlines, and outreach
  - ii. Establish a buddy or neighborhood watch network

#### 4. **Open cooling centers during extreme heat events**

- a. **Description:** Establish and staff air-conditioned buildings open to community members during extreme heat events. Cooling centers can include existing public buildings, such as recreation centers, city hall, etc.
- b. **Advantage:** Free to use, shown to be effective (even a few hours in AC reduced heat-related illness)
- c. **Disadvantage:** Requires access to transportation or ability to walk to center
- d. **Equity Concern:** May not be accessible to residents with limited mobility or certain disabilities; undocumented individuals may not seek out government services
- e. **Policy Solution:**
  - i. Provide a free shuttle service from neighborhoods with identified vulnerable populations or from central public spaces (parks, libraries, etc.) to cooling centers
  - ii. Dispatch teams of mobile nurses or outreach workers to provide water and fans or other cooling equipment to residents or areas identified as being especially vulnerable
  - iii. Create neighborhood-level communication network to inform residents of location and directions to the nearest cooling center, and coordinate transportation to these centers for limited-mobility residents during extreme heat events
  - iv. Collaborate with community-based groups to identify suitable locations for cooling centers, develop effective messaging to notify residents, conduct outreach, and plan appropriate activities for residents at centers

#### 5. **Work with utilities to require that electricity and water are not cut off due to nonpayment during extreme heat**

- a. **Description:** Ensure that homes will have electricity to run air conditioners and water to stay hydrated during extreme heat events
- b. **Advantage:** Assist/protect economically vulnerable residents during extreme heat
- c. **Disadvantage:** May be difficult to negotiate and coordinate with relevant agencies
- d. **Equity Concern:** May not be properly implemented or monitored if historically under-represented groups are less likely to be considered in assessments of program efficacy or report failures in the program, e.g., if the rate payer is undocumented
- e. **Policy Solution:**
  - i. Work closely with utilities to ensure they have conducted user assessments and collected demographic information, and have developed programs to ensure rate-payer equity

- ii. Work with local community organizations and advocates to determine efficacy of programs if information cannot be collected directly from rate-payers or traditional monitoring strategies

## 6. Plant trees/increase green space

- a. **Description:** Plant trees and other vegetation to help cool urban environment by providing shade and increasing evapotranspiration
- b. **Advantage:** Provides multiple benefits, e.g., aesthetic, stormwater runoff reduction, energy savings on cooling, air quality improvements, carbon sequestration, etc.; generally have positive costs/benefit ratios due to co-benefits
- c. **Disadvantage:** Requires ongoing maintenance and, in some cases, water
- d. **Equity Concern:** Focused installation only in wealthier areas of the city; gentrification; displacement of homeless populations with the rejuvenation or ecological objectives of new green space; gentrification related to neighborhood greening efforts
- e. **Policy Solution:**
  - i. Prioritize neighborhoods with greatest need for tree planting programs
  - ii. Promote planting of native trees and plants to reduce water requirements.
  - iii. Ensure neighborhoods retain affordable or low-income housing options
  - iv. Develop mixed-use, mixed-income area with high levels of community input, engagement, and involvement in the planning process
  - v. Train Oakland youth and/or young adults to plant trees as part of the Oakland summer jobs program

## 7. Air condition and weatherize schools

- a. **Description:** Ensure schools are both energy efficient and equipped with cooling systems to respond to extreme heat events
- b. **Advantage:** Weatherization also acts as mitigation; measure to protect youth, who are often the most vulnerable
- c. **Disadvantage:** Expensive to install and run; additional greenhouse gas emissions
- d. **Equity Concern:** Initiatives may benefit or prioritize wealthier neighborhood schools in their implementation
- e. **Policy Solutions:**
  - i. Establish a rigorous system of self-evaluation to ensure that infrastructure is provided equitably and across a variety of socio-economic spaces in the city;
  - ii. Engage public in decision-making and implementation

## 8. Air condition homes

- a. **Description:** Promote air conditioning in homes
- b. **Advantage:** Effective in protecting against heat-related mortality; don't have to leave home
- c. **Disadvantage:** Expensive to install and run; additional greenhouse gas emissions
- d. **Equity Concern:** Expensive to install and run

**e. Policy Solutions:**

- i.* Establish a subsidy or rebate system to assist low-income residents in purchasing/installing air conditioning;
- ii.* Establish a system of reduced or sliding rates for low-income residents
- iii.* Prioritize limited mobility residents such as the elderly, those with preexisting medical conditions and disabilities, and heat sensitivity for installation of air conditioning

**9. Weatherize homes**

- a. Description:* Install attic insulation, radiant barriers, solar attic fans, and other measures in homes to keep them cooler and more energy efficient
- b. Advantage:* Weatherization also acts as mitigation; reduces energy costs
- c. Disadvantage:* Expensive
- d. Equity Concern:* Initial installation can be expensive; renters may not have control over building and retrofit decision-making
- e. Policy Solutions:**
  - i.* Support the Weatherization Assistance Program (WAP), which serves low income families at no cost
  - ii.* Support the Weatherization and Energy Retrofit Loan Program (WERLP), which provides zero-interest loans to help low-to-moderate income residence improve energy efficiency
  - iii.* Establish a low-income subsidy, or forgivable loan-funds to be repaid with anticipated energy savings to assist residents in weatherizing their home
  - iv.* Expand job training and placement of low-income residents in jobs generated by home weatherization programs

**10. Install cool roofs**

- a. Description:* Install roofing materials with high solar reflectance and thermal emittance to keep buildings cooler
- b. Advantage:* Reduce electricity use/costs on cooling
- c. Disadvantage:* Expensive, may make homes colder in the winter
- d. Equity Concern:* Initiatives may benefit or prioritize wealthier neighborhoods in their implementation; expensive to install
- e. Policy Solutions:**
  - i.* Establish a rigorous system of self-evaluation to ensure that infrastructure is provided equitably and across a variety of socio-economic spaces in the city
  - ii.* Engage public in decision-making and implementation

**11. Install cool pavement**

- a. Description:* Install reflective and permeable pavement, which provides evaporative cooling when wet to reduce heath island effect in paved areas

- b. *Advantage:* Cooler urban environment; increased pavement life, resulting in less waste and government expenditure; quality of life benefits such as noise reduction and nighttime illumination
- c. *Disadvantage:* Higher upfront costs
- d. *Equity Concern:* Initiatives may benefit or prioritize wealthier neighborhoods in their implementation; expensive to install
- e. *Policy Solutions:*
  - i. Establish a rigorous system of self-evaluation to ensure that infrastructure is provided equitably and across a variety of socio-economic spaces in the city
  - ii. Engage public in decision-making and implementation

## **12. Install green roofs**

- a. *Description:* Install a vegetative layer on rooftops to shade surfaces and remove heat from the air through evapotranspiration
- b. *Advantage:* Stormwater management technique; reduced heat island effect; reduced cooling needs; increased biodiversity; lower cooling and heating costs; additional space for growing food
- c. *Disadvantage:* Higher upfront costs; requires maintenance
- d. *Equity Concern:* Initiatives may benefit or prioritize wealthier neighborhoods in their implementation; expensive to install
- e. *Policy Solutions:*
  - i. Provide zero interest loans or financial assistance for low-income residents to incentivize the investment and reduce financial risk
  - ii. Provide education about how to start and maintain gardens

## **13. Public outreach/education**

- a. *Description:* Educate at-risk groups and their caregivers to detect signs and symptoms and prevent heat-related illness. Emphasize importance of immediate medical assistance for heat-related illness
- b. *Advantage:* Reduces risk of heat-related deaths and medical complications
- c. *Disadvantage:* Expense, required city resources and staff time
- d. *Equity Concern:* Outreach may be linguistically, culturally, or otherwise inaccessible to vulnerable populations
- e. *Policy Solutions:*
  - i. Provide information in multiple languages
  - ii. Provide information through multiple culturally or economically appropriate/accessible information streams, e.g., TV, radio, telephone, SMS, people-delivered
  - iii. Establish a system of neighborhood outreach workers to disseminate information and check in on especially vulnerable residents
  - iv. Conduct reverse 911 phone calls to the elderly and those at risk
  - v. Increase day-time outreach to homeless

#### **14. Outreach to businesses/workers about state health programs and standards for heat illness and employees working outdoors**

- a. Description:* Ensure that legal protections for workers are known, respected, and enforced
- b. Advantage:* Reduces risk of heat-related deaths and medical complications; increase accountability and safety in the workplace for all employees
- c. Disadvantage:* Expense; required city resources and staff time; difficult to monitor and enforce
- d. Equity Concern:* Programs or standards may not be extended to those with poor job security, particularly undocumented individuals working outdoors
- e. Policy Solutions:*
  - i.* Prioritize stricter enforcement to ensure illness prevention to all workers, regardless of legal status
  - ii.* Ensure that employers are aware of the rights of employees with disabilities that involve sensitivity to heat to reasonable accommodation in the workplace, under the Fair Employment and Housing Act and the ADA.
  - iii.* Conduct state-wide traveling heat sweeps and local district actions during episodes of extreme heat

#### **15. Outreach to local schools and teachers**

- a. Description:* Ensure that school programs are in place to adapt to episodes of extreme heat during school hours
- b. Advantage:* Reduces risk of heat-related deaths and medical complications
- c. Disadvantage:* Expense, required city resources and staff time
- d. Equity Concern:* Outreach may be linguistically, culturally, or otherwise inaccessible or may not take into account limited resources of some schools
- e. Policy Solutions:*
  - i.* Provide information in multiple languages
  - ii.* Provide information through multiple culturally or economically appropriate/accessible information streams, i.e., TV, radio, telephone, SMS, people-delivered
  - iii.* Provide resources to the school for alternative programming and service provisions on days of extreme heat, such as low-intensity physical education classes

### **A.2 Adaptation Strategies for Floods**

#### **1. Limit development in flood plain**

- a. Description:* Limit new and redevelopment in floodplains
- b. Advantage:* Preventative approach protects both human life and economic damages
- c. Disadvantage:* May be politically or economically difficult to enforce due to development pressure

- d. **Equity Concern:** May reduce availability of low-income housing; may deter redevelopment in economically disadvantaged areas
- e. **Policy Solution:**
  - i. Ensure that low- and mixed-income development projects are pursued in areas of the city at low risk of flooding
  - ii. Require mitigations that address flood risk in proposed developments within high risk areas
  - iii. Monitor regional, state, and federal programs and policies that might guide entities within city boundaries in undertaking climate adaptation projects (e.g., revisions of the Coastal Construction Manual by the Federal Emergency Management Agency, FEMA)

## 2. Install green infrastructure

- a. **Description:** Install permeable pavement, green roofs, rain gardens, and other green infrastructure promoting infiltration of water and reducing runoff and flooding
- b. **Advantage:** Multiple benefits, e.g., stormwater management, reduce heat island, reduce cooling needs, increase biodiversity
- c. **Disadvantage:** High installation costs, requires maintenance
- d. **Equity Concern:** Gentrification through new infrastructure and neighborhood rejuvenation
- e. **Policy Solution:**
  - i. Ensure neighborhoods retain affordable or low-income housing options
  - ii. Develop mixed-use, mixed-income areas with high level of community input, engagement, and involvement in planning process
  - iii. Prioritize areas at high risk of flooding with vulnerable populations for green design and infrastructure programs

## 3. Preserve or restore wetlands

- a. **Description:** Protect wetlands, which can act as a buffer to slow down and absorb flood waters
- b. **Advantage:** Multiple benefits, e.g., habitat restoration, groundwater infiltration
- c. **Disadvantage:** May be politically or economically difficult to enforce due to development pressure
- d. **Equity Concern:** May reduce availability of low-income housing if development forgone
- e. **Policy Solution:**
  - i. Ensure that forgone low- and mixed-income development projects are pursued in areas of the city at low risk of flooding
  - ii. Prioritize areas at high risk of flooding with vulnerable populations for wetland preservation and restoration programs
  - iii. Expand job training and placement of low-income residents in jobs generated by wetland preservation and restoration programs

**4. Raise existing structures above flood level**

- a. Description:* Raise transportation infrastructure and buildings above flood levels
- b. Advantage:* In some cases, more cost effective than building seawalls to protect infrastructure
- c. Disadvantage:* Expense
- d. Equity Concern:* Initiatives may prioritize minimizing predicted economic loss rather than protect the most vulnerable populations, leading to the prioritization of valuable city infrastructure and wealthier neighborhoods in their implementation
- e. Policy Solution:*
  - i.* Conduct vulnerability assessments and engage in community outreach when developing adaptation plan
  - ii.* Prioritize low-income housing and other developments with vulnerable populations for programs to raise existing structures above flood level

**5. Integrate climate change projections into new and existing stormwater and sewer infrastructure improvements**

- a. Description:* Include future sea level and precipitation projections into all stormwater and sewer improvements
- b. Advantage:* Allows for ongoing improvements in stormwater and sewer systems
- c. Disadvantage:* Expense
- d. Equity Concern:* Initiatives may prioritize minimizing predicted economic loss rather than protect the most vulnerable populations, leading to the prioritization of valuable city infrastructure and wealthier neighborhoods in their implementation
- e. Policy Solution:*
  - i.* Conduct vulnerability assessments and engage in community outreach when developing adaptation plan
  - ii.* Prioritize low-income housing and other developments with vulnerable populations for programs to raise existing structures above flood level

**6. Build and/or expand protective infrastructure, e.g., levees and seawalls, where appropriate.**

- a. Description:* Build seawalls and levees to protect structures from flood waters
- b. Advantage:* Protects structures in flood plain
- c. Disadvantage:* Expense, beach loss
- d. Equity Concern:* Initiatives may prioritize minimizing predicted economic loss rather than protect the most vulnerable populations, leading to the prioritization of valuable city infrastructure and wealthier neighborhoods in their implementation
- e. Policy Solution:*



- i. Conduct vulnerability assessments and engage in community outreach when developing adaptation plan
- ii. Monitor and advise projects to build seawalls to protect berths and runways from rising sea levels at Port and airport facilities to include a process for public participation (e.g., public notices and hearings) and ensure that they do not redirect climate change impacts to neighboring communities

## 7. Develop early warning systems for flooding

- a. *Description:* Support meteorological forecasting and early warnings about possible flood conditions
- b. *Advantage:* Allows residents more time to take proper action to protect their health and property
- c. *Disadvantage:* Expensive to ensure efficacy and mass-dissemination
- d. *Equity Concern:* Must be designed to communicate effectively to all groups, especially particularly vulnerable groups; may not effectively address their needs if they still have limited mobility
- f. *Policy Solution:*
  - i. Provide warnings in multiple languages
  - ii. Provide warnings through multiple culturally or economically appropriate/accessible information streams, i.e., TV, radio, telephone, SMS, people-delivered, etc.
  - iii. Establish a system of neighborhood outreach workers to disseminate information and check in on particularly vulnerable residents
  - iv. Conduct reverse 911 phone calls to the elderly and those at risk
  - v. Increase day-time outreach to homeless.

## 8. Develop and support local food systems

- a. *Description:* Grow food locally to reduce impact of disasters by supporting local, diverse, and resilient food systems
- b. *Advantage:* Cultivates local skills and knowledge, build local economy, can save money and generate income
- c. *Disadvantage:* Requires skill and time for ongoing labor and maintenance
- d. *Equity Concern:* Local or organic food frequently very expensive; farmers markets often do not accept food stamps; pesticide use can be hazardous and can cause severe health problems for neighbors with certain respiratory and neurological conditions
- e. *Policy Solution:*
  - i. Partner with the city and local organizations to refund produce vendors for food stamps in order to double the value of produce purchased in order to encourage and enable the purchase of locally produced health foods
  - ii. Subsidize local agriculture to keep down consumer costs

- iii.* Support food local food systems that do not involve the use of chemical pesticides.

## **9. Promote home insurance**

- a. Description:* Encourage residents to purchase home insurance to recover from disasters such as a flood
- b. Advantage:* Builds resilience by building capacity to recover from flood disasters
- c. Disadvantage:* Expensive
- d. Equity Concern:* Insurance may not be affordable or accessible for many residents
- e. Policy Solution:*
  - i.* Establish a system to subsidize insurance, particularly for low-income families

## **10. Develop evacuation, emergency response, and recovery planning**

- a. Description:* Develop comprehensive community-based plans for emergency evacuation, response, and recovery in the event of a flood disaster
- b. Advantage:* Builds resilience by building community capacity to prepare for, respond, and recover from flood disasters
- c. Disadvantage:* Require long-term multi-stakeholder engagement in planning and implementation as well as interagency coordination
- d. Equity concern:* Planning efforts may be focused in more affluent and politically enfranchised areas instead of those with the greatest need
- e. Policy solution:*
  - i.* Prioritize areas of high flood risk with concentrations of vulnerable populations for community-based planning efforts
  - ii.* Require interagency task force to partner with and resource community-based organizations to develop and implement planning process
  - iii.* Prioritize evacuation planning and drills in neighborhoods with mixed industrial and residential land uses with the involvement of hazardous materials specialists
  - iv.* Involve public transit and paratransit providers in evacuation route planning to ensure access to transportation for residents with limited mobility
  - v.* Provide temporary housing for low-income residents and other vulnerable populations impacted by floods
  - vi.* Provide financial assistance programs to repair flood-damaged homes and rental units for low-income residents

## **A.3 Adaptation Strategies for Wildfires**

### **1. Vegetation management**

- a. Description:* Replace flammable vegetation with less-flammable vegetation; remove dead trees, keep grass short, and prune and thin trees
- b. Advantages:* Preventative approach protects life and property

- c. **Disadvantage:** Requires time and resources for ongoing management
  - d. **Equity Concern:** Management may occur only in areas where local residents have high levels of political representation or resources
  - e. **Policy Solution:**
    - i. Establish rigorous system of self or 3<sup>rd</sup> party evaluation to ensure that management is implemented equitably across all regions
    - ii. Prohibit the use of toxic chemicals in vegetation control
- 2. Land use planning**
- a. **Description:** Limit development in fire prone areas, when possible
  - b. **Advantages:** Preventative approach protects life and property
  - c. **Disadvantage:** May be politically or economically difficult due to development pressure
  - d. **Equity Concern:** May reduce availability of low-income housing
  - e. **Policy Solution:**
    - i. Ensure the neighborhood retains affordable or low-income housing options;
    - ii. Develop mixed-use mixed-income area with high level of community input, engagement, and involvement in the planning process
- 3. Ensure adequate shelters are in place as part of wildfire emergency response plans**
- a. **Description:** Provide a health and safe temporary shelter for those displaced by fires
  - b. **Advantages:** Free to use, shown to be effective
  - c. **Disadvantage:** Requires access to transportation or ability to walk to center
  - d. **Equity Concern:** Some residents may have limited mobility which would hinder them from seeking shelter
  - e. **Policy Solution:**
    - i. Provide free emergency transport to shelters
    - ii. Conduct reverse 911 calls to ensure immobile residents are not trapped in their homes
- 4. Identify high fire risk areas that would allow for the safe burial of existing power lines to avoid interruptions due to wildfire events**
- a. **Description:** Prevent energy infrastructure damages/outages during wildfire by burying power lines
  - b. **Advantages:** Increase community and infrastructural resilience to wildfires
  - c. **Disadvantage:** Expense
  - d. **Equity Concern:** Burial may occur only in areas where local residents have high levels of political representation or resources
  - e. **Policy Solution:**
    - i. Establish rigorous system of self or 3<sup>rd</sup> party evaluation to ensure that management is implemented equitably across all regions

5. **In high fire risk areas, require new construction builders to bury utilities during the construction phase**
  - a. *Description:* Prevent energy infrastructure damages/ outages during wildfires
  - b. *Advantages:* Increase community and infrastructural resilience to wildfires
  - c. *Disadvantage:* Expense, difficult to regulate
  - d. *Equity Concern:* May not be equitably implemented in every community due to less strict regulation or monitoring in low-income and communities of color due to institutionalized racism
  - e. *Policy Solution:*
    - i. Establish rigorous system of self or 3<sup>rd</sup> party evaluation to ensure that management is implemented equitably across all regions
  
6. **Develop air quality warning system**
  - a. *Description:* Develop system to alert residents when air quality is poor due to wildfire smoke, and actions that should be taken, e.g., restrict outdoor exercise
  - b. *Advantages:* Allows residents to choose to take measures to protect their health
  - c. *Disadvantage:* Expense, required city resources and staff time
  - d. *Equity Concern:* : Must be designed to communicate effectively to all groups, especially the particularly vulnerable; may not effectively address their needs if they still have limited mobility
  - e. *Policy Solution:*
    - i. Provide warnings in multiple languages
    - ii. Provide warnings through multiple culturally or economically appropriate/accessible information streams, e.g., TV, radio, telephone, SMS, people-delivered, etc.
    - iii. Establish a system of neighborhood outreach workers to disseminate information and check in on particularly vulnerable residents
    - iv. Reverse 911 phone calls to the elderly and those at risk
    - v. Increase outreach to homeless
    - vi. Provide evacuation transportation for immobile residents and other residents who need such transportation for health reasons
  
7. **Public education/awareness**
  - a. *Description:* Educate the public about the potential risk of wildfire and, in the case of a wildfire disaster, what protective measures to take
  - b. *Advantages:* Increase community awareness of potential adaptive measures that can be taken to reduce vulnerability to wildfire
  - c. *Disadvantage:* Expense, required city resources and staff time
  - d. *Equity Concern:* Outreach may be linguistically, culturally, or otherwise inaccessible to vulnerable populations
  - e. *Policy Solutions:*
    - i. Provide warnings in multiple languages

- ii.* Provide warnings through multiple culturally or economically appropriate/accessible information streams, e.g., TV, radio, telephone, SMS, people-delivered, etc.
- iii.* Establish a system of neighborhood outreach workers to disseminate information and check in on particularly vulnerable residents
- iv.* Reverse 911 phone calls to the elderly and those at risk
- v.* Increase outreach to homeless
- vi.* Provide evacuation transportation for immobile residents

## 8. Home Insurance

- a. Description:* Purchase home insurance to assist in recovery from a disaster such as a wildfire
- b. Advantages:* Increase resilience of residents and decrease financial burden of emergency relief on city
- c. Disadvantage:* Expensive for individual households
- d. Equity Concern:* Insurance may not be affordable or accessible for many residents
- e. Policy Solution:*
  - i.* Establish a system to subsidize insurance, particularly for low-income families
  - ii.* Ensure that insurance mandates account for the household's ability to pay

## 9. Wildfire response and recovery

- a. Description:* Develop comprehensive community-based plans for emergency evacuation, response, and recovery in the event of a wildfire
- b. Advantage:* Builds resilience by building community capacity to prepare for, respond, and recover from wildfires
- c. Disadvantage:* Require long-term multi-stakeholder engagement in planning and implementation as well as interagency coordination
- d. Equity concern:* Planning efforts and financial resources may be focused in more affluent and politically enfranchised areas
- e. Policy solution:*
  - i.* Prioritize areas of high wildfire risk with concentrations of vulnerable populations for community-based planning efforts
  - ii.* Require interagency task force to partner with and resource community-based organizations to develop and implement planning process
  - iii.* Prioritize evacuation planning and drills in neighborhoods with mixed industrial and residential land uses with the involvement of hazardous materials specialists
  - iv.* Involve public transit and paratransit providers in evacuation route planning to ensure access to transportation for residents with limited mobility

- v. Provide temporary housing for low-income residents and other vulnerable populations impacted by wildfires
- vi. Provide financial assistance programs to repair wildfire-damaged homes and rental units for low-income residents
- vii. If property tax assessments are used to pay for wildfires, account for ability to pay in covering the costs of wildfire response

#### A.4 Adaptation Strategies for Rising Utility and Food Costs

##### 1. Provide incentive programs to promote installation of water/energy efficient appliances and fixtures

- a. *Description:* Promote use of water- and energy-efficient appliances and fixtures to help keep energy costs affordable as water and electricity become more expensive;
- b. *Advantage:* Mitigation strategy, reduce utility bills
- c. *Disadvantage:* Expensive,
- d. *Equity Concern:* Affordability; renters may not have control over building and retrofit decision-making; may be more expensive than the less-efficient alternatives and thus not a viable adaptive option for low- or fixed-income residents; rebate-based programs place risk and upfront cost burden on households, unduly burdening or excluding low-income residents
- e. *Policy Solution:*
  - i. Develop low-income direct install programs
  - ii. Provide rebates at point-of-sale for the purchase of efficient fixtures and appliances
  - iii. Design model tenant-landlord agreements so that all parties can equitably share in the costs and benefits of efficiency programs
  - iv. Develop zero-interest loan programs to help low-to-moderate income residents install efficiency measures
  - v. Establish a low-income subsidy, or forgivable loan-funds to be repaid with anticipated water and energy savings to assist residents in installing efficient appliances and fixtures

##### 2. Provide home weatherization programs

- a. *Description:* Install attic insulation, radiant barriers, solar attic fans and other measures in homes to keep them cooler and more energy efficient
- b. *Advantage:* Weatherization also acts as mitigation; reduces energy costs
- c. *Disadvantage:* Expensive
- d. *Equity Concern:* Initial installation can be expensive; renters may not have control over building and retrofit decision-making; existing weatherization programs do not typically cover expensive improvements that can result in the greatest energy savings

- e. **Policy Solutions:**
  - i. Develop assistance programs that provide weatherization to low-income families at no cost
  - ii. Develop zero-interest loan programs to help low-to-moderate income residents weatherize their residence
  - iii. Establish a low-income subsidy, or forgivable loan-funds to be repaid with anticipated energy savings to assist residents in weatherizing their home
  - iv. Develop programs so that direct revenues collected by utilities can fund energy efficiency programs

### 3. Install water catchment and grey water use/water recycling

- a. **Description:** Install water catchment and grey water systems on buildings and residential homes
- b. **Advantage:** Reducing water demand would both reduce residents' water bills as well as conserve precious water and energy resources
- c. **Disadvantage:** High initial installation cost; potential public health concerns if not properly implemented/maintained
- d. **Equity Concern:** Affordability: high initial installation cost; favors homeowners, i.e., little incentive for renters or landlords to install; users must be given appropriate and accessible education on proper use of captured and grey water to prevent health issues
- e. **Policy Solution:**
  - i. City provides assistance designing model tenant-landlord agreements so that all parties can equitably share in the costs and benefits of water efficiency

### 4. Develop and support local food systems

- a. **Description:** Grow food locally to reduce impact of disasters by supporting local, diverse, and resilient food systems
- b. **Advantage:** Cultivates local skills and knowledge, build local economy, can save money and generate income
- c. **Disadvantage:** Requires skill and time for ongoing labor and maintenance
- d. **Equity Concern:** Local or organic food frequently very expensive; farmers markets often do not accept food stamps; pesticide use can be hazardous and can cause severe health problems for neighbors with certain respiratory and neurological conditions
- e. **Policy Solution:**
  - i. Partner with the city and local organizations to refund produce vendors for food stamps in order to double the value of produce purchased in order to encourage and enable the purchase of locally produced health foods
  - ii. Subsidize local agriculture to keep down consumer costs

- iii.* Conduct community outreach and education to expand access to food stamps and healthy food distribution programs
- iv.* Expand access to public and privately owned land for local food production
- v.* Change permitting requirements and regulations that pose barriers to community food security strategies such as street food vending and selling home-cooked foods
- vi.* Invest in commercial food kitchens run in partnership with local community organizations to meet community food needs
- vii.* Develop healthy food distribution systems to make available and incentivize the purchase of healthy foods in local stores
- viii.* Support local food systems that do not involve the use of chemical pesticides.

**5. Develop programs to reduce financial hardship of increased food, energy and utility costs on residents**

- a. Description:* Assess impact of climate change on food, energy, and utility costs, including residents most vulnerable to these impacts, and develop programs to address alleviate financial hardship of impacted groups
- b. Advantage:* Greater rate payer equity, ensuring the health and wellbeing of all residents
- c. Disadvantage:* Potentially expensive or difficult to develop programs in collaboration with appropriate corporations or agencies
- d. Equity Concern:* Most impacted groups are likely to be low- and fixed-income, communities of color, immigrants, non-native English speakers, and other historically marginalized communities, thus programs developed may not adequately address these communities' particular needs or dynamics
- e. Policy Solution:*
  - i.* Work with local community organizations or institutions such as schools or religious organizations to develop appropriate and effective programs
  - ii.* Work with local research institutions and ethnographers to gather information on community values and concerns to develop appropriate and effective programs
  - iii.* Prohibit utilities from using water and electricity shut-offs as a means of collecting past-due bills
  - iv.* Develop rate structures and pricing policies that charge high-volume consumers and businesses more for water and electricity
  - v.* Increase outreach for Supplemental Nutrition Assistance Program (SNAP)
  - vi.* Remove the ban for SNAP benefits for drug offenders
  - vii.* Provide incentives for purchasing healthy foods, especially for SNAP benefits recipients



6. **Create green economy/new green work force**
  - a. *Description:* Develop programs to accelerate Brownfield cleanup and redevelopment; train workers to install and maintain green technologies, infrastructure, and construction
  - b. *Advantage:* Creates jobs; increase economic prosperity and resilience
  - c. *Disadvantage:*
  - d. *Equity Concern:* May not provide appropriate training or opportunities for those with low-levels of education, non-English speaking, or low-income; certification programs may not be affordable
  - e. *Policy Solution:*
    - i. Provide environmental job training for vulnerable populations, including the formerly incarcerated chronically unemployed, young adults at risk, on public assistance or among the working poor
    - ii. Prioritize low-income communities for renewable energy demonstration programs and green job training/placement in jobs created by these programs
    - iii. City wage subsidy programs encouraging employers to provide job opportunities to graduates of environmental training programs
  
7. **Assess the sectors and populations that will benefit from new economic development opportunities associated with resilience building**
  - a. *Description:* Conduct a participatory science-based assessment in collaboration with community organizations to determine those sectors and populations that will benefit from new employment, training, and growth opportunities
  - b. *Advantage:* Enable targeted and equitable job creation
  - c. *Disadvantage:* Expense
  - d. *Equity Concern:* Assessments and programs do not capture or address the employment needs of those unemployed, untrained, or uneducated residents
  - e. *Policy Solution:*
    - i. Integrate affordable green training and certification programs into economic plan for those currently unemployed, underemployed, or not employable due to lack of education, skill, or disenfranchisement, etc.
  
8. **Pursue infill, smart growth, and urban renewal projects to build better integrated and more resilient communities**
  - a. *Description:* Work on holistic renewal plans for communities considering green space, transportation infrastructure, local access to essential goods, services, and employment
  - b. *Advantage:* Contributes to more resilient and healthy communities
  - c. *Disadvantage:* Expensive, requires extensive stakeholder engagement of many local and regional agencies for effective implementation
  - d. *Equity Concern:* Infill, smart growth, or urban development may adverse impact low- and fixed-income residents through gentrification and increased rent

- e. **Policy Solution:**
    - i. Work with researchers to assess potential economic and social impacts of projects on all current residents before implementation
    - ii. Include elements of mixed-use and mixed income development to combat differential impacts of urban renewal on local populations, particularly taking into account the potential effects of increased rent on low-income residents
    - iii. Incentivize and fund cleanup and redevelopment of underutilized, contaminated properties and abandoned buildings (brownfields) for end uses that strengthen community resilience, such as urban gardens, green job incubators, and renewable energy demonstration projects
- 9. Support existing community organizing efforts around climate change and resilience**
- a. **Description:** Provide funding, resources, and opportunities for collaboration with city to existing community organizations working to increase resilience in their communities
  - b. **Advantage:** Empowering local communities and supporting their capacity to adapt and recover
  - c. **Disadvantage:** Resource constraints
  - d. **Equity Concern:** City may choose to support those groups most politically aligned or allied with the city, excluding those that work with that have been historically under-represented or discriminated against by the city
  - e. **Policy Solution:**
    - i. Assess and monitor recipients of government support to ensure issued the communities groups represent a diversity of demographic communities, neighborhoods, and concerns
    - ii. Contract with and resource community-based organizations to train community resilience specialists in neighborhoods that educate residents on existing programs and resources available to build resiliency

## A.5 Adaptation Strategies for Poor Air Quality

- 1. Modify emissions reduction plan**
- a. **Description:** Modify emissions reduction plan, e.g., regional air quality attainment plans and the State Implementation Plan, to account for the increase in air pollution attribute to climate change
  - b. **Advantage:** Potentially effective way to prevent worsening air quality
  - c. **Disadvantage:** Must be implemented at high levels of governance (state or air quality region), little community/local control
  - d. **Equity Concern:** Emissions reductions efforts may exclude or disproportionately burden low- and fixed-income residents through increased energy costs and financial burden of transitioning to more efficient technologies, etc.

- e. **Policy Solution:**
  - i. Conduct a science-based assessment of target sectors and populations for emissions reductions standards, considering effect of new plan on employment and individual consumer options
  - ii. Work with local community organizations and advocates to develop and determine efficacy of regulations and programs
  - iii. Prioritize communities with the highest health risk from poor air quality for emissions reduction programs and resources
  - iv. Require industrial and transport-related sources of emissions, such as port, rail yard, and warehouse facilities, to provide funding to mitigate negative impacts of their operations on local air quality

## 2. Insulate/ seal homes

- a. **Description:** Use duct tape and plastic sheeting to seal cracks around doors and outside vents in periods of poor air quality, particularly during wildfires
- b. **Advantage:** Reduces exposure and only requires individual action
- c. **Disadvantage:** Inconvenient, more likely to be used during instances of extreme poor air quality than habitually
- d. **Equity Concern:** All residents may not have access to necessary materials; the homeless are excluded from this adaptive measure
- e. **Policy Solution:**
  - i. Establish central distribution points of necessary materials for those on low-or fixed-income
  - ii. Work with local community groups to distribute materials and hold community workshops on health effects of poor air quality and strategies for sealing and protecting the home
  - iii. Establish shelters or public cooling/indoor centers for homeless and low-income residents during extremely poor air quality events
  - iv. Educating residents on measures they can take to protect indoor air quality such as reducing household chemical use
  - v. Evaluate indoor air quality to ensure harmful air isn't being sealed in a home

## 3. Replace furnace filter with a high efficiency filter

- a. **Description:** Install a higher-efficiency filter to reduce air pollution in the home
- b. **Advantage:** Higher efficiency, reduces exposure to air pollution
- c. **Disadvantage:** Expense and inconvenience
- d. **Equity Concern:** May pose financial hardship to low and fixed-income individuals; the homeless are excluded from this adaptive measure
- e. **Policy Solution:**
  - i. Establish a subsidy or rebate system to assist low-income residents in purchasing or installing higher efficiency filters

- ii. Establish shelters or public cooling/indoor centers for homeless and low-income residents during extremely poor air quality events

#### 4. Run air conditioning system

- a. *Description:* Constantly cycle air through air conditioning system with upgraded filters to remove some of the air pollutants
- b. *Advantage:* Adaptive measure to both extreme heat and reduced air quality
- c. *Disadvantage:* Contributes to greenhouse gas emissions, resulting in further reduced air quality and other adverse climate impacts; expensive
- d. *Equity Concern:* May pose financial hardship to low and fixed-income individuals due to increased cooling costs or the cost of purchasing and installing air conditioning; the homeless are excluded from this adaptive measure
- e. *Policy Solution:*
  - i. Establish a subsidy or rebate system to assist low-income residents in purchasing or installing higher efficiency filters
  - ii. Establish shelters or public cooling/indoor centers for homeless and low-income residents during extremely poor air quality events

#### 5. Create a “safe room” at home using a HEPA filter

- a. *Description:* Install a HEPA filter in a common space or a room where particularly sensitive members of the household can retreat
- b. *Advantage:* Reduces exposure, particularly for sensitive members of the household
- c. *Disadvantage:* Contributes to greenhouse gas emissions; expensive
- d. *Equity Concern:* May pose a financial hardship to low- and fixed-income individuals due to increased electricity costs and the costs of the HEPA filter; the homeless are excluded from this adaptive measure
- e. *Policy Solution:*
  - i. Establish a subsidy or rebate system to assist low-income residents in purchasing an energy-efficient HEPA filter
  - ii. Provide funding for HEPA filter replacement for low-income households, those with chemical sensitivities and respiratory disabilities
  - iii. Establish shelters or public cooling/indoor centers for homeless and low-income residents during extremely poor air quality events

#### 6. Develop a warning system for air quality

- a. *Description:* Publish and promote Air Quality Index in a variety of media for daily information about air quality and potential health effects
- b. *Advantage:* Provides residents with more information necessary to take precaution and reduce exposure
- c. *Disadvantage:* Information may not increase ability of residents to either mitigate or adapt if their resources and alternatives are still limited

- d. **Equity Concern:** Air quality index may not be published in multiple languages or presented in a manner intelligible to those unfamiliar with the measure; may not be distributed in economically, culturally, linguistically accessible forms, i.e., only online or in an English-language newspaper
- e. **Policy Solution:**
  - i. Provide warnings and education in multiple languages and multiple culturally or economically appropriate/ accessible information streams (radio, word-of-mouth, at pre-existing local gathering places, etc.)
  - ii. Partner with local community-based organizations to determine most effective methods of information distribution and education about health effects of air pollution

**7. Public outreach/ education programs**

- a. **Description:** Develop public education and outreach programs to reduce emission-causing activities and limit exposure on high air pollution days
- b. **Advantage:** Increase community awareness of potential adaptive measures that can be taken to reduce vulnerability to poor air quality
- c. **Disadvantage:** Expense, required city resources and staff time
- d. **Equity Concern:** May not be designed to communicate effectively to all groups, especially the most vulnerable; education about preventative measures (i.e., sealing home, staying indoors, taking transport rather than walking to reduce time outdoors, etc.) are ineffective if residents have no alternatives or limited resources to carry out adaptive measures
- e. **Policy Solution:**
  - i. Provide warnings and education in multiple languages and multiple culturally or economically appropriate/ accessible information streams;
  - ii. Provide resources to partner with community-based groups to develop and implement community education and outreach programs
  - iii. Establish systems of neighborhood leaders/outreach workers who are trained and charged with disseminating information to local residents that capitalize on existing information streams, social networks and neighborhood institutions;
  - iv. Establish regulation to protect outdoor workers in periods of high air pollution; ensure information about adaptive measures is paired with information about assistance programs and less expensive alternatives for adaptive action
  - v. Conduct community education on that focuses on preventative care and solutions that address causes of poor outdoor and indoor air quality, such as environmentally-safe alternatives to household chemicals

**8. Revise building design guidelines to address air quality**

- a. **Description:** Revise building codes and design guidelines to consider and mitigate air quality impacts

- b. *Advantage:* Addresses air quality concerns in design of developments
- c. *Disadvantage:* Could be politically unpopular because it may increase costs of development; increased costs to developers could be passed on to residents in the form of higher housing costs, which could contribute to gentrification
- d. *Equity Concern:* Could benefit more affluent residents with a greater ability to pay for more expensive housing that conforms to revised building design guidelines
- e. *Policy Solution:*
  - i. Require proposed developments in areas with poor air quality to adhere to building design guidelines that mitigate health risk

Prioritize developments for vulnerable populations, e.g., low-income residents, those with pre-existing respiratory conditions, and those with sensitivities to poor air quality, for indoor air quality programs and resources that support green design