URBAN GREEN

U.S. GREEN BUILDING COUNCIL CHAPTER SM

REPORT TO MAYOR MICHAEL R. BLOOMBERG & SPEAKER CHRISTINE C. QUINN

BUILDING RESILIENCY TASK FORCE

JUNE 2013

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INTRODUCTION

In the 20 years leading up to Superstorm Sandy, New York City experienced nine coastal storms and six heat waves. And we are no strangers to blackouts, with widespread power failures in 1965, 1977, 2003, and 2012. These events have caused hundreds of deaths and billions of dollars of damage to buildings, infrastructure, and the city economy. We know that in the near future, heat waves will last longer and bring higher temperatures more often, heavy rains and storm surges will cause flooding more frequently, and there will continue to be power failures affecting large swaths of the city. New York needs resilient buildings that resist damage, protect occupants, and allow residents who must evacuate to quickly return to their homes.

New York City enjoys some natural resiliency advantages. Gravity gives the city water supply enough pressure to rise five stories without electric pumps in many neighborhoods, and the natural gas supply has remained largely uninterrupted. City construction codes already contain emergency egress requirements, and go a long way toward addressing basic resiliency against flooding and high winds. Improving resiliency means filling gaps in what we already have. Yet we don't know exactly what New York City's next weather or power emergency will be, or whether it will happen next year or next decade. Because of this uncertainty, the Building Resiliency Task Force was reluctant to recommend many specific (and potentially expensive) retrofits to existing buildings. Instead, its proposals focus on removing the many barriers to resiliency improvements, sharing information, and giving owners options.

Existing buildings will improve naturally over time when they undergo renovations that trigger higher code standards, allowing upgrades to be made when they are most cost-effective. For this reason, most code changes recommended by the Task Force would affect only new buildings and existing buildings when they are renovated. In a few crucial cases, such as providing for basic water supply and lighting in residential buildings during blackouts, buildings may need to undergo retrofits to supplement their current resiliency features.

Not every building sector will improve its resiliency in the same way. For commercial buildings, market forces and decisions made between tenants and owners will determine the extent to which many of these recommendations are implemented. Hospitals and nursing homes are already extensively regulated. As a result, much of the focus of this

report is on residential buildings (multifamily, adult care facilities, and homes), which must be habitable as soon as possible after natural disasters.

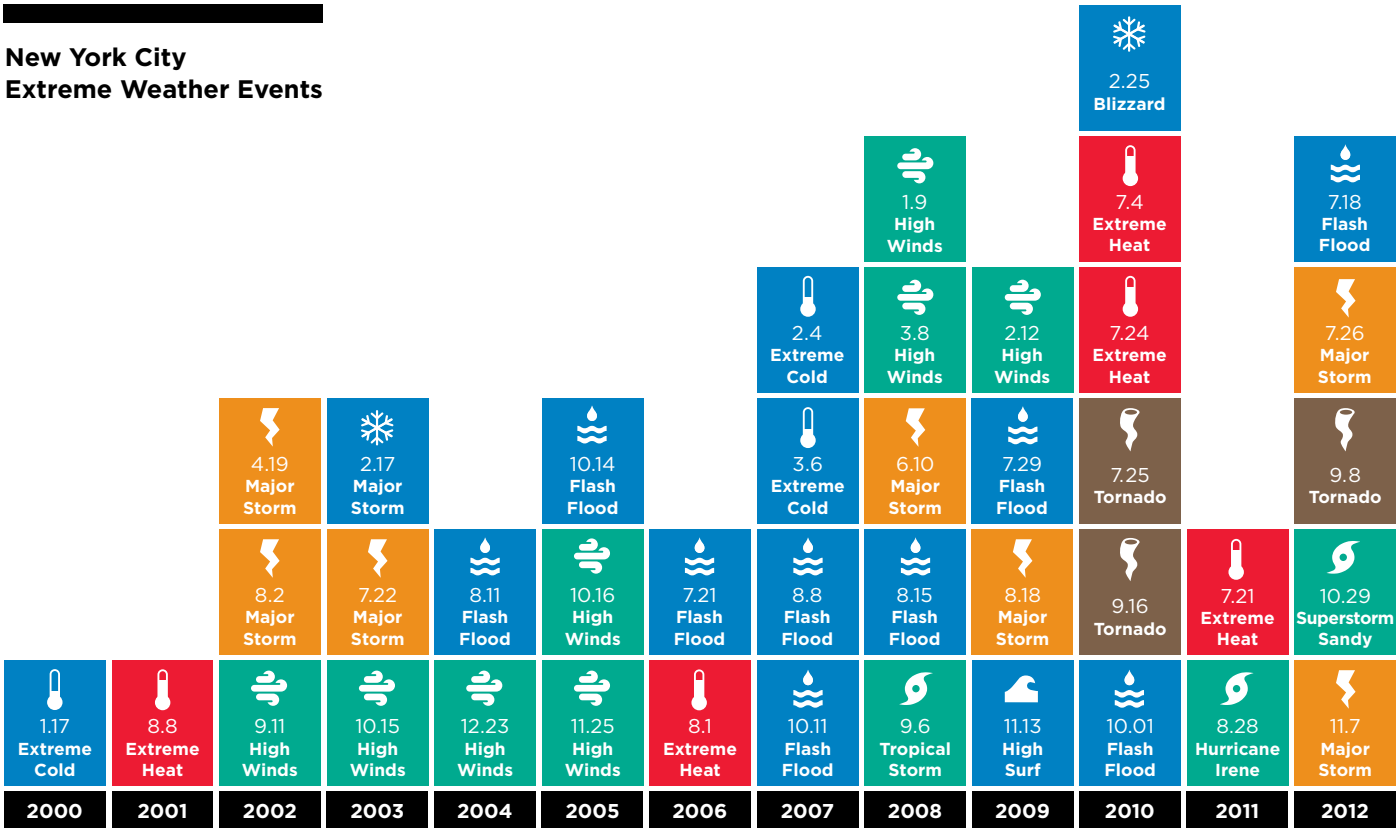
Codes set a legal minimum standard for construction, but for increased resiliency many owners will choose to do more. This report recommends a range of voluntary practices for buildings to adopt beyond basic code requirements, including simple, low-cost measures. Furthermore, constructing buildings for resiliency will be most effective when paired with emergency planning and training of building staff, tenants and homeowners.

Measures that protect individual buildings may have both benefits and costs to society. For instance, elevating buildings can protect against floodwaters, but negatively impact streetscapes. Diesel generators provide buildings with power but cause pollution. On the other hand, a cogeneration system can provide power while also improving energy efficiency. Improving building insulation and air sealing will help ensure habitable temperatures during power outages and mitigate climate change.

Ultimately, any resiliency measures that depend on complex systems or a continuous supply of power are vulnerable to failure. In many large, modern buildings, the common systems we rely on can become hurdles to resiliency when the power fails. For example, dead electric pumps may prevent water from reaching faucets, windows may be sealed shut on the assumption that mechanical ventilation is always available, and automatic toilets may not flush without power. And most New York City homes and residential buildings are not sufficiently insulated to maintain habitable temperatures without power.

The report represents the consensus of more than 200 Task Force members on how to strike the right balance between resiliency, cost, and other issues that are important to New York City. We believe that with the right planning, New Yorkers can be prepared for whatever comes our way.

New York City
Extreme Weather Events



Source: National Oceanic and Atmospheric Administration & NYC Office of Emergency Management

ABOUT THE TASK FORCE

This report is the result of the time and effort of more than 200 dedicated volunteers who are leading experts in their fields. Task Force members include real estate owners, property managers, architects, engineers, contractors, utility representatives, subject matter specialists, city officials, code consultants, cost estimators and attorneys, who devoted nearly 5,000 hours over five months to discuss and develop these proposals.

Urban Green Council convened the NYC Building Resiliency Task Force on December 19, 2012 at the request of Mayor Michael R. Bloomberg and City Council Speaker Christine C. Quinn. The city tapped Urban Green, veterans from managing NYC's 2008–2010 Green Codes Task Force, for its in-house technical expertise and deep connections within the building industry. Urban Green was well-qualified to lead the effort, given the Task Force mandate to include measures that simultaneously advance resiliency and mitigate climate change.

The Task Force coordinated with the NYC Special Initiative for Rebuilding and Resiliency, which studied how to improve citywide infrastructure and building resiliency, as well as how to help communities become more resilient. While focused on New York City and its specific environment and building codes, this report may also be useful to other cities that wish to improve their resiliency.

Task Force members were selected by Urban Green in consultation with the Speaker's Office and Mayor's Office and divided into three Working Groups and four Committees, each led by two co-chairs. Working Groups determined what *could* be done to improve building resiliency, while Committees considered what *should* be done in each building type.

Technical experts were organized by building system into three Working Groups: *Structure, Façade, & Interiors; Electrical & IT;* and *HVACR, Plumbing, & Fire Protection*. Industry stakeholders represented building sectors on four Committees: *Commercial Buildings,* multifamily *Residential Buildings, Critical Buildings* (including hospitals, nursing homes, and adult care facilities), as well as a special Committee on *1–3 Family Homes.* The Task Force Steering Committee consisted of the chairs of the Working Groups and Committees, as well as representatives of the Mayor, the Speaker, and Urban Green.

Over the course of 45 meetings, close to 100 proposals were examined by Working Groups and Committees. Throughout the process, Urban Green worked closely with Task Force members and chairs to refine proposals to include thorough

explanations of the issues, template code language where appropriate, and practical information about implementation. Although details were often left to subgroups, all Task Force members weighed in on broad concepts.
After much deliberation, 33 proposals were officially confirmed. Urban Green edited the proposals for style and completeness of content, with editing and legal review by Fried, Frank, Harris, Shriver & Jacobson and costing analysis by Turner Construction Company.

We would like to thank the Working Group and Committee members who generously volunteered their time and expertise to the Task Force. We are grateful for the experience, wisdom and dedication of everyone on the Task Force who made this report possible.

Note: This Executive Summary contains brief summaries of the 33 proposals.
The full report is available at **urbangreencouncil.org/BuildingResiliency.**

Reading This Report: Proposal Implementation

The 33 proposals in this report address resiliency in a wide range of buildings, including commercial buildings, multifamily residences, hospitals, and 1–3 family homes. The illustrations on pages 6–11 show Committee recommendations for different building types. There are five ways a proposal may be implemented:

required upgrade

In a few crucial cases, such as providing basic water supply in residential buildings during blackouts, the Task Force has recommended retroactive requirements for existing buildings. "Required Upgrade" proposals would apply to all new construction and renovations, and would also require existing buildings to comply by a specified future deadline. Buildings that are not required to perform these upgrades should still consider these proposals "Recommended."

new code

"New Code" proposals would be applicable at the time of new construction or renovation, but would not retroactively apply to all existing buildings. Building types not affected by the new code should still consider these proposals "Recommended."

remove barrier

Many Task Force proposals focus on improving resiliency by removing obstacles and giving owners more options. "Remove Barrier" proposals are not required for any building sector, but the changes recommended will make it easier for buildings to become more resilient.

recommended

Codes set a legal minimum standard for construction, but for increased resiliency many owners will choose to do more. "Recommended" proposals cover a wide range of voluntary practices, though not every proposal will apply to every building. Taken together, the many best practices in this report represent the advice of the city's experts on resiliency and should be seriously considered.

further action

Continued effort is needed to develop complete code recommendations in some areas. "Further Action" proposals will receive additional consideration, either by the city or by the Task Force under an extended mandate.

COMMERCIAL

The level of preparation for commercial buildings, both large and small, is fundamentally a business decision for their owners. Task Force recommendations are intended to minimize interruptions to building functionality while allowing the market to dictate the need to implement resiliency measures. Still, the city has an overall interest in maintaining a viable economy by reducing large-scale business disruption.

required upgrade

Safeguard Toxic Materials Stored in Flood Zones (#7)
Keep Gas Stations Open During Blackouts (#22)

new code

Relocate & Protect Building Systems (#3)
Add Backup Fire Safety Communication (#6)
Prevent Sewage Backflow (#8)
Plant Wind & Flood Resistant Trees (#9)
Prevent Wind Damage to Existing Buildings (#11)
Keep Gas Stations Open During Blackouts (#22)
Ensure Toilets & Sinks Work Without Power (#24)

remove barrier

Remove Barriers to Elevating Buildings & Building Systems (#4)
Remove Barriers to Sidewalk Flood Protection (#5)
Remove Barriers to Backup & Natural Gas Generators (#17)
Remove Barriers to Cogeneration (#18)
Remove Barriers to Solar Energy (#19)

recommended

Capture Stormwater to Prevent Flooding (#13)
Choose Reliable Backup Power & Prioritize Needs (#15)
Use Cogeneration & Solar During Blackouts (#16)
Add Hookups for Temporary Generators & Boilers (#20)
Enhance Building Water Reserves (#25)
Create Emergency Plans (#28)
Prenegotiate Emergency Recovery Agreements (#33)

further action

Clarify Construction Requirements in Flood Zones (#10)
Maintain Habitable Temperatures Without Power (#26)

Reliable Sanitation
With a manual override or long-lasting batteries, automatic toilets will still flush during blackouts.

Rooftop Pavers
Unlike small gravel, heavy pavers will not become airborne during high winds.

Natural Gas Generators
Provides cleaner power that can be used for lighting, fire safety, elevators, and other building systems.

Elevated Equipment
Raising building equipment to a higher floor ensures it will not be damaged by floodwaters.

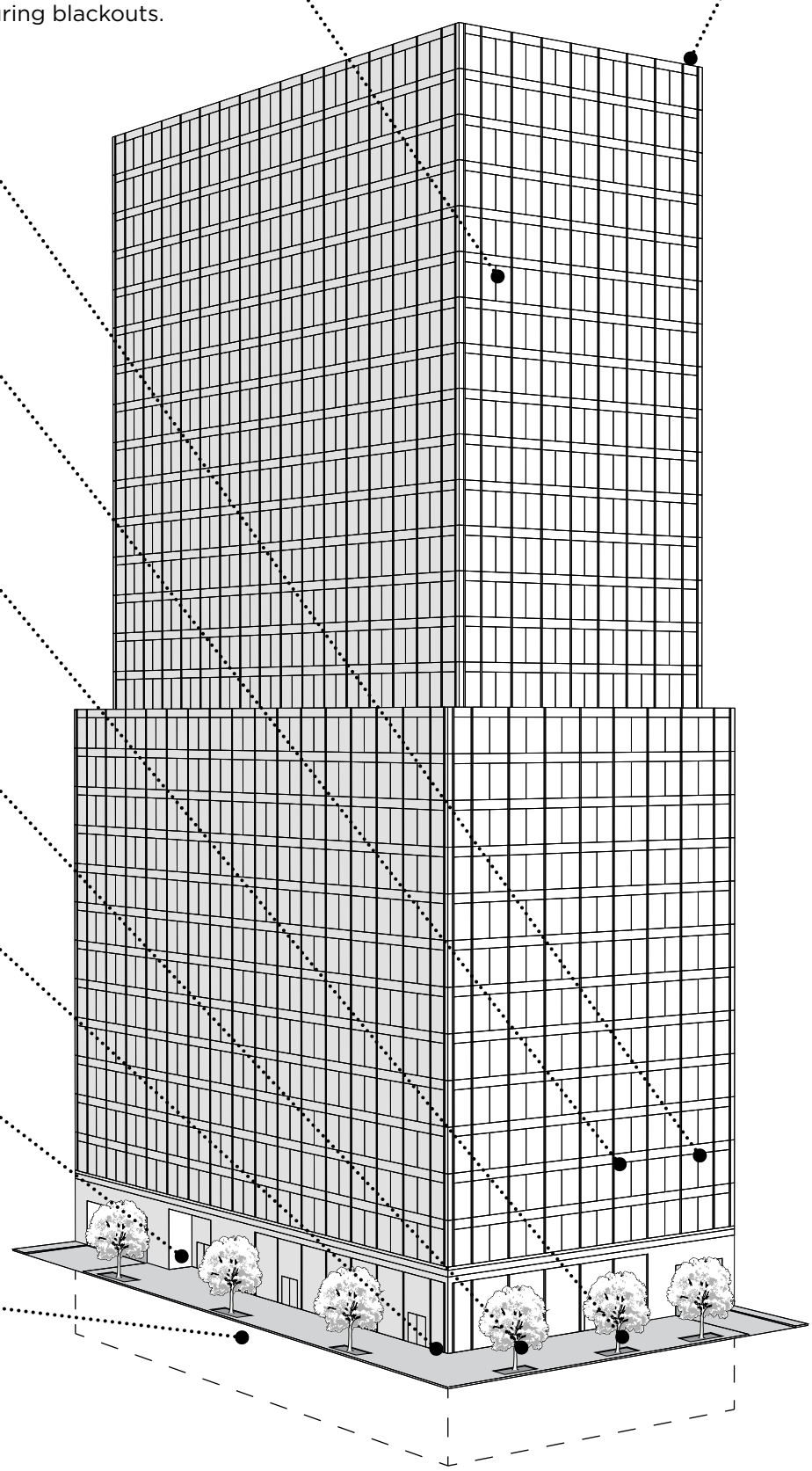
Sloped Sidewalks & Tree Pits
Sidewalks sloped into tree pits absorb rain, reducing flooding from rainstorms.

Quick Connects
Exterior hookups allow easy connection to portable generators.

Flood Barriers
Temporary sidewalk barriers can protect against floods.

Sandbags
Part of a building's emergency preparedness plan, sandbags are an inexpensive way to protect against flooding.

Sewage Valves
Valves prevent sewage backflow into basements during rainstorms and floods.



MULTIFAMILY RESIDENTIAL

Multifamily residences, dorms, hotels, and adult care facilities must provide for essential needs such as safety, drinking water, habitable temperatures, and functioning stairs and elevators. The Task Force intent was to add few financial burdens, and only in the most critical areas, given the limited financial resources available for upgrades.*

required upgrade

Safeguard Toxic Materials Stored in Flood Zones (#7)
Supply Drinking Water Without Power (#23)
Create Emergency Plans (#28)

new code

Relocate & Protect Building Systems (#3)
Add Backup Fire Safety Communication (#6)
Prevent Sewage Backflow (#8)
Plant Wind & Flood Resistant Trees (#9)
Prevent Wind Damage to Existing Buildings (#11)
Use Cool Surfaces to Reduce Summer Heat (#14)
Keep Residential Stairwells & Hallways Lit During Blackouts (#21)
Ensure Toilets & Sinks Work Without Power (#24)

remove barrier

Remove Barriers to Elevating Buildings & Building Systems (#4)
Remove Barriers to Sidewalk Flood Protection (#5)
Remove Barriers to Backup & Natural Gas Generators (#17)
Remove Barriers to Cogeneration (#18)
Remove Barriers to Solar Energy (#19)

recommended

Capture Stormwater to Prevent Flooding (#13)
Choose Reliable Backup Power & Prioritize Needs (#15)
Use Cogeneration & Solar During Blackouts (#16)
Add Hookups for Temporary Generators & Boilers (#20)
Prenegotiate Emergency Recovery Agreements (#33)

further action

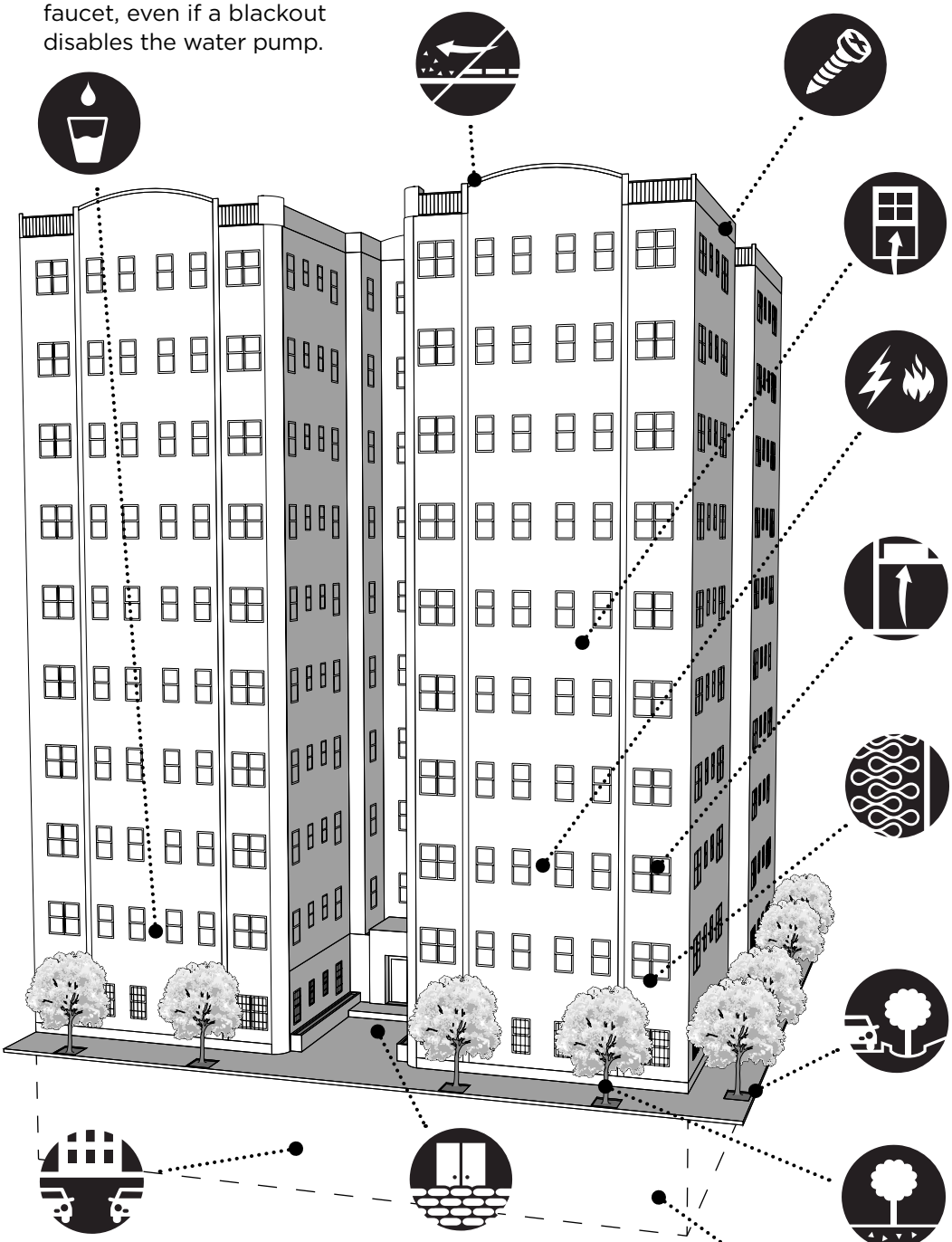
Clarify Construction Requirements in Flood Zones (#10)
Maintain Habitable Temperatures Without Power (#26)
Ensure Operable Windows in Residential Buildings (#27)

*The list of proposals above also applies to Critical Buildings (hospitals and nursing homes), excluding #'s 15, 16, 21, 23 and 28.

Common Area Faucets
Natural pressure in the city's water mains provides water to a common area faucet, even if a blackout disables the water pump.

Rooftop Pavers
Unlike small gravel, heavy pavers will not become airborne during high winds.

Secure Loose Outdoor Items
Tie down furniture and plants or move them indoors to prevent windblown damage.



Operable Windows
Open windows help buildings remain habitable during summer power outages.

Cogeneration System
Provides cost-effective hot water and electricity, and backup power for fire alarms, lighting, and water pumps.

Elevated Equipment
Raising building equipment to a higher floor ensures it will not be damaged by floodwaters.

Insulated Walls
Walls, windows, and roofs that are sealed and insulated keep heat in during winter and out during summer — especially important during blackouts.

Sloped Sidewalks & Tree Pits
Sidewalks sloped into tree pits absorb rain, reducing flooding from rainstorms.

Salt-Tolerant Trees
Trees planted in flood zones should be salt tolerant and pruned regularly.

Sewage Valves
Valves prevent sewage back-flow into basements during rainstorms and floods.

Move Cars From Flood Zones
Park vehicles elsewhere to prevent damage and costly cleanup from leaked gas and oil.

Sandbags
Part of a building's emergency preparedness plan, sandbags are an inexpensive way to protect against flooding.

HOMES

One- to three-family homes must have protection against storm damage and adequate emergency planning, as water can be supplied without pumps and vertical transportation is not an issue. Since many homeowners have limited financial resources for upgrades, the Task Force avoided adding significant financial burdens.

new code

Prevent Storm Damage to Homes (#1)
Relocate & Protect Building Systems (#3)
Prevent Sewage Backflow (#8)
Plant Wind & Flood Resistant Trees (#9)
Prevent Wind Damage to Existing Buildings (#11)
Use Cool Surfaces to Reduce Summer Heat (#14)
Ensure Toilets & Sinks Work Without Power (#24)

remove barrier

Remove Barriers to Elevating Buildings & Building Systems (#4)

recommended

Launch Design Competition for Raised Homes (#2)
Capture Stormwater to Prevent Flooding (#13)
Use Cogeneration & Solar During Blackouts (#16)
Create Emergency Plans (#28)

further action

Clarify Construction Requirements in Flood Zones (#10)
Maintain Habitable Temperatures Without Power (#26)

Rooftop Pavers
Unlike small gravel, heavy pavers will not become airborne during high winds.

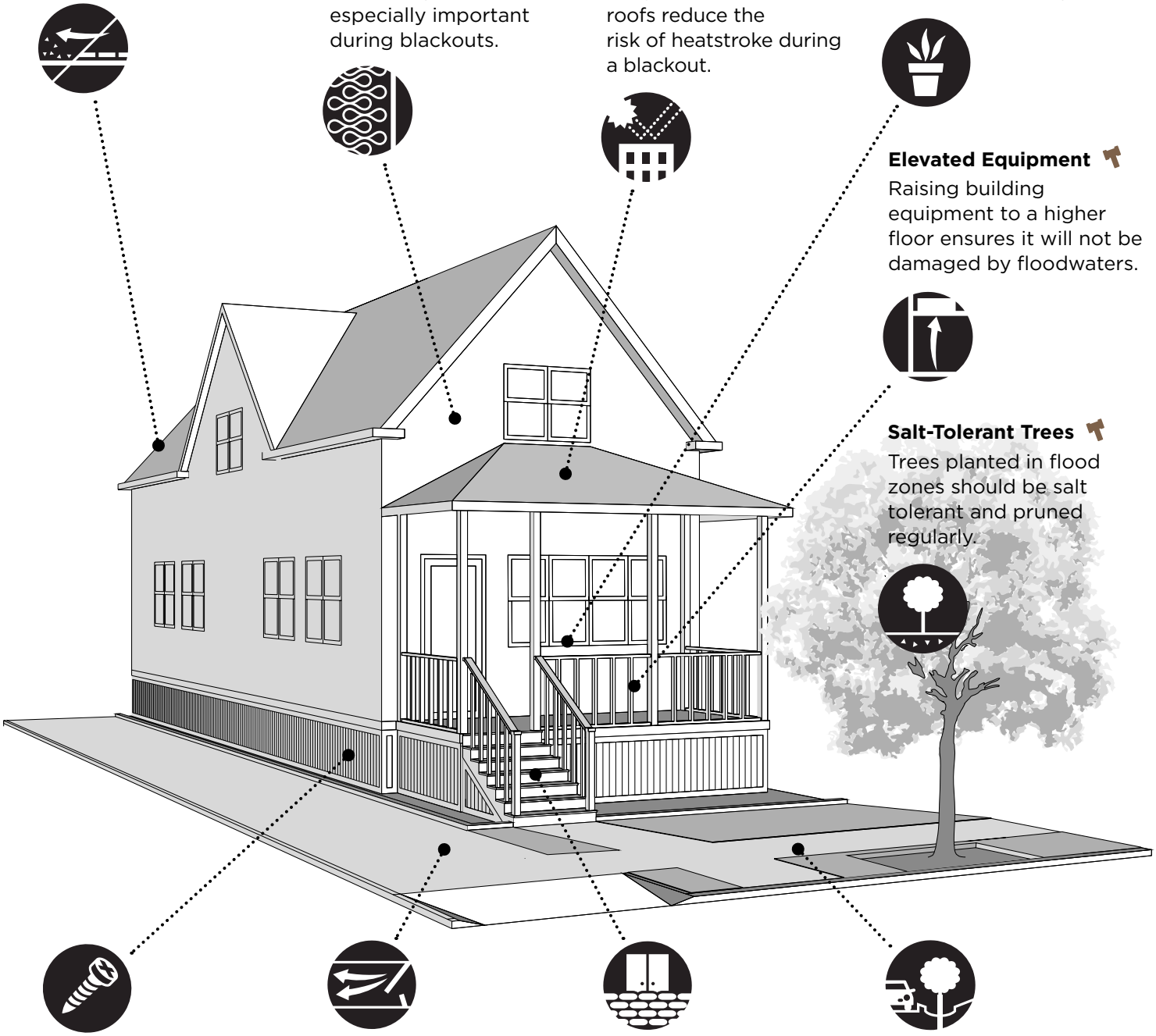
Insulated Walls
Walls, windows, and roofs that are sealed and insulated keep heat in during winter and out during summers — especially important during blackouts.

Cool Roofs
Reflective shingles that come in a full range of colors help reduce indoor and outdoor temperatures. Cooler roofs reduce the risk of heatstroke during a blackout.

Secure Loose Outdoor Items
Tie down furniture and plants or move them indoors to prevent windblown damage.

Elevated Equipment
Raising building equipment to a higher floor ensures it will not be damaged by floodwaters.

Salt-Tolerant Trees
Trees planted in flood zones should be salt tolerant and pruned regularly.



Framing Anchors
Anchoring a home's framing to its foundation stops it from floating or blowing away during storms.

Sewage Valves
Valves prevent sewage backflow into basements during rainstorms and floods.

Sandbags
Part of a building's emergency preparedness plan, sandbags are an inexpensive way to protect against flooding.

Sloped Sidewalks & Tree Pits
Sidewalks sloped into tree pits absorb rain, reducing flooding from rainstorms.

STRONGER BUILDINGS

STRONGER BUILDINGS

During Superstorm Sandy, nearly 20,000 buildings were damaged by flooding and high winds. We need to be prepared for both the next storm and other natural hazards, including heat waves and flooding from heavy rains. While there is much to learn from other, storm-prone parts of the country, our high-density city — which contains 11 percent of the nation's multifamily building residents[1] — will need to find its own way.

Our buildings must become stronger. New York City's current building code ensures that new buildings will be hardy enough to stand up to the weather of the past. But the code needs to prepare for the weather of the future, which will be more extreme due to climate change. We must also carefully consider how to improve the resiliency of our existing buildings. This chapter is the largest in the Task Force report, with proposals that fall into three groups: managing flooding, resisting wind, and preventing emergencies.

Flooding can kill people, destroy property, and cause mass evacuations, leaving thousands of refugees in need of shelter. To prevent the worst damage, houses need to be securely attached to their foundations, and physically protected or raised. Doing so, however, may change the streetscape and neighborhood character. The city should launch a design competition to create attractive, flood-resistant designs for 1–3 family homes. In larger buildings, mechanical equipment at risk from floods must either be relocated to a higher floor, or waterproofed, and the building code must be revised to remove barriers to doing so. To prevent floodwaters from becoming a toxic soup, hazardous materials need to be protected and sewage prevented from flowing back up into buildings. Outside the building, allowances must be made for flood barriers, and coastal trees should be chosen for salt-resistance and pruned regularly.

Winds can occur anywhere in the city and may cause local or widespread damage. Rooftops should have heavy pavers instead of loose pea gravel that can become airborne missiles, and hospitals in high wind zones should install impact-resistant windows. The city should study how high winds will affect existing buildings, partially completed buildings, and temporary structures, and assess how climate change may influence future wind events.

While we cannot stop extreme weather, we can reduce the likelihood that extreme weather will escalate into emergency conditions. We should capture stormwater to reduce surface flooding during heavy rains, and build cool roofs to reduce indoor temperatures during heat waves.

An award-winning design of an elevated home in New Orleans.

1 Prevent Storm Damage to Homes

Issue: Flooding, precipitation, high winds, storm surge, wave action and wind-/water-borne debris can damage homes. Much of this damage can be prevented with targeted design and construction measures.

Recommendation: Require new and replacement windows and doors to be wind resistant. Recommend anchoring framing to foundations and strengthening foundations and basements in existing homes. Develop custom requirements for attached homes that present unique challenges.

new code

recommended

2 Launch a Design Competition for Raised Homes

Issue: New York City has 71,000 buildings located in the new 100-year flood zone. New buildings in these areas will have to build above the flood line, and other homeowners may decide to voluntarily raise their homes. This will impact the city's architecture, streetscapes, and accessibility.

Recommendation: Launch a competition to design a streetscape of attractive raised homes that fit the character and aesthetic of existing neighborhoods and remain accessible to people with disabilities. The competition should address both detached and attached homes.

recommended

3 Relocate & Protect Building Systems

Issue: The first and lower floors of many existing buildings are at risk because they are below flood level, and essential building equipment is often located on these lower floors.

Recommendation: Building owners should consider relocating equipment above the flood level and follow best practices when floodproofing. Require fire protection equipment to be raised in new construction, and enhance standards for hospitals.

new code
recommended

4 Remove Barriers to Elevating Buildings & Building Systems

Issue: Building owners may wish to elevate buildings or building systems, but are restricted by regulations and zoning height limitations.

Recommendation: Allow building owners to raise telecommunications rooms and to store more fuel above the flood line. Consider allowing zoning relief for buildings elevating to the 500-year flood line.

remove barrier

5 Remove Barriers to Sidewalk Flood Protection

Issue: Building owners may wish to install flood barriers on sidewalks, but are deterred by codes that limit sidewalk use and that assume buildings are fully occupied during floods.

Recommendation: Allow underground sidewalk attachments for temporary flood barriers. After evacuation, allow nonresidential buildings to maintain a single entrance/exit for emergency personnel so that flood barriers can be installed.

remove barrier

6 Add Backup Fire Safety Communication

Issue: Loss of power to telecommunications systems and flooding that damages underground phone and data lines can cut off communication between buildings and the Fire Department.

Recommendation: All large buildings in flood zones should consider having a backup wireless fire communication system, and new large critical buildings must have backup phone and data connections. Mandate the use of storage batteries with a life of at least eight hours to serve buildings' fire and life safety communication systems.

new code
recommended

7 Safeguard Toxic Materials Stored in Flood Zones

Issue: The NYC Department of Environmental Protection requires facilities that store hazardous chemicals to file a risk management plan, but it does not require special protection for chemicals stored in flood zones.

Recommendation: Require toxic materials in flood zones to be stored in a floodproof area.

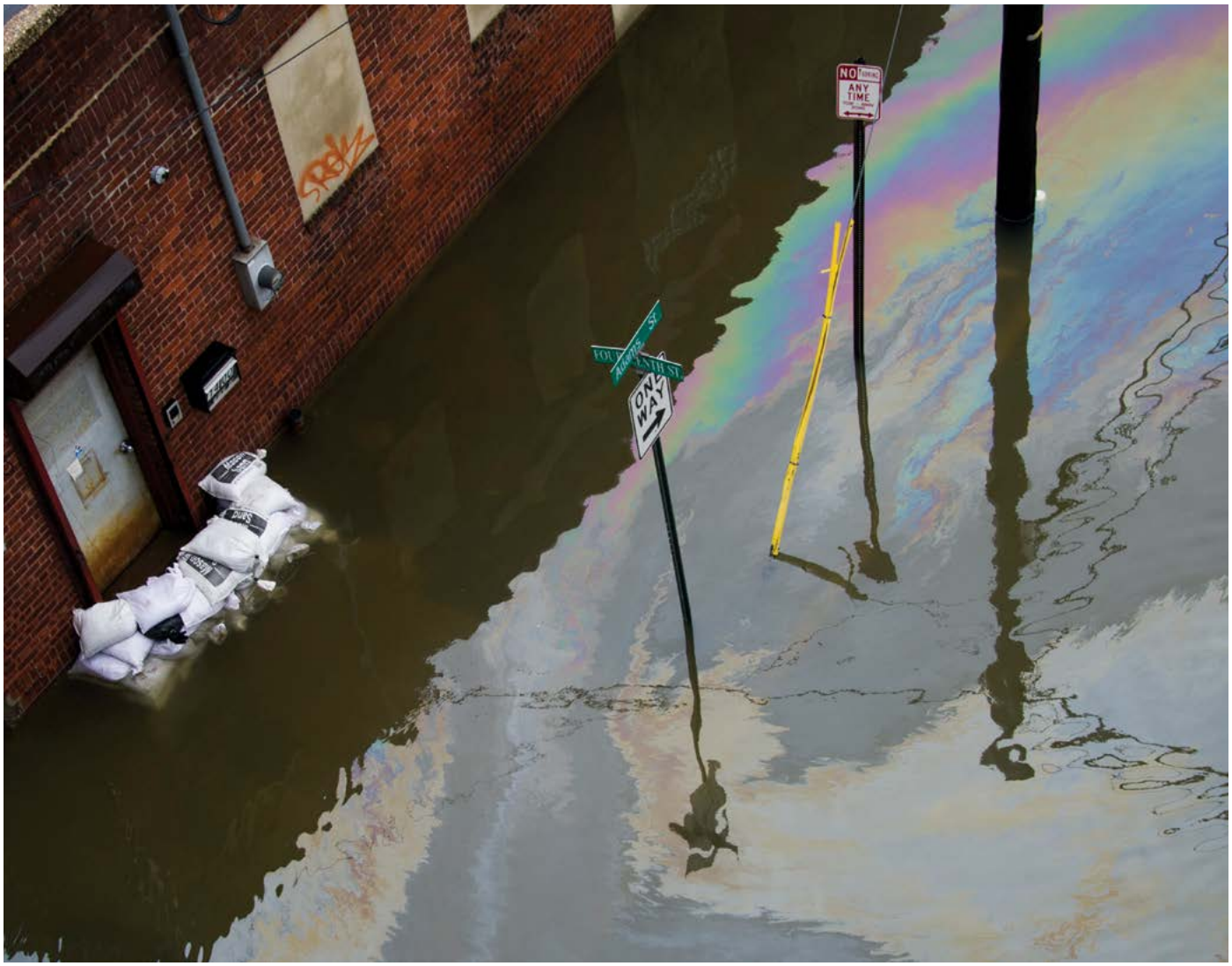
required upgrade

8 Prevent Sewage Backflow

Issue: During floods, sewage can flow back into buildings.

Recommendation: Require valves on building sewage lines to prevent sewage from entering the building.

new code



Unprotected hazardous chemicals can turn floodwaters into a toxic soup.

9 Plant Wind & Flood Resistant Trees

Issue: People, property, buildings, and utility lines can be at risk from trees damaged by high winds and flooding.

Recommendation: In waterfront areas accessible to the public, require wind- and salt-tolerant trees and regular tree pruning. Encourage private owners to follow the same practices.

new code

10 Clarify Construction Requirements in Flood Zones

Issue: City regulations for new construction and substantial renovations provide for resiliency in flood zones. However, the requirements are not always clear to design professionals and contractors.

Recommendation: Clarify flood zone construction requirements in code and through a Department of Buildings Bulletin. Allow more flexibility in requirements for enclosures below the flood line.

further action

A tree damaged this Staten Island home during Superstorm Sandy.

11 Prevent Wind Damage to Existing Buildings

Issue: High winds can cause walls, windows, doors, and building equipment to come loose. Loose stones on rooftops can become small missiles. While new buildings must meet strong wind standards, renovations to existing buildings do not.

Recommendation: Require that equipment and structures added to existing buildings meet the same wind standards in effect for installations on new buildings. Require heavy pavers on rooftops, and impact-resistant windows in high wind zones.

new code

12 Analyze Wind Risks

Issue: Standards for protection against high winds have been in place since 1968. However, older buildings and buildings under construction are not as well protected.

Recommendation: Study wind effects on existing buildings and those with particular wind vulnerability. Propose new standards and practices to protect against identified wind risks, considering the influence of climate change on future wind speeds.

further action

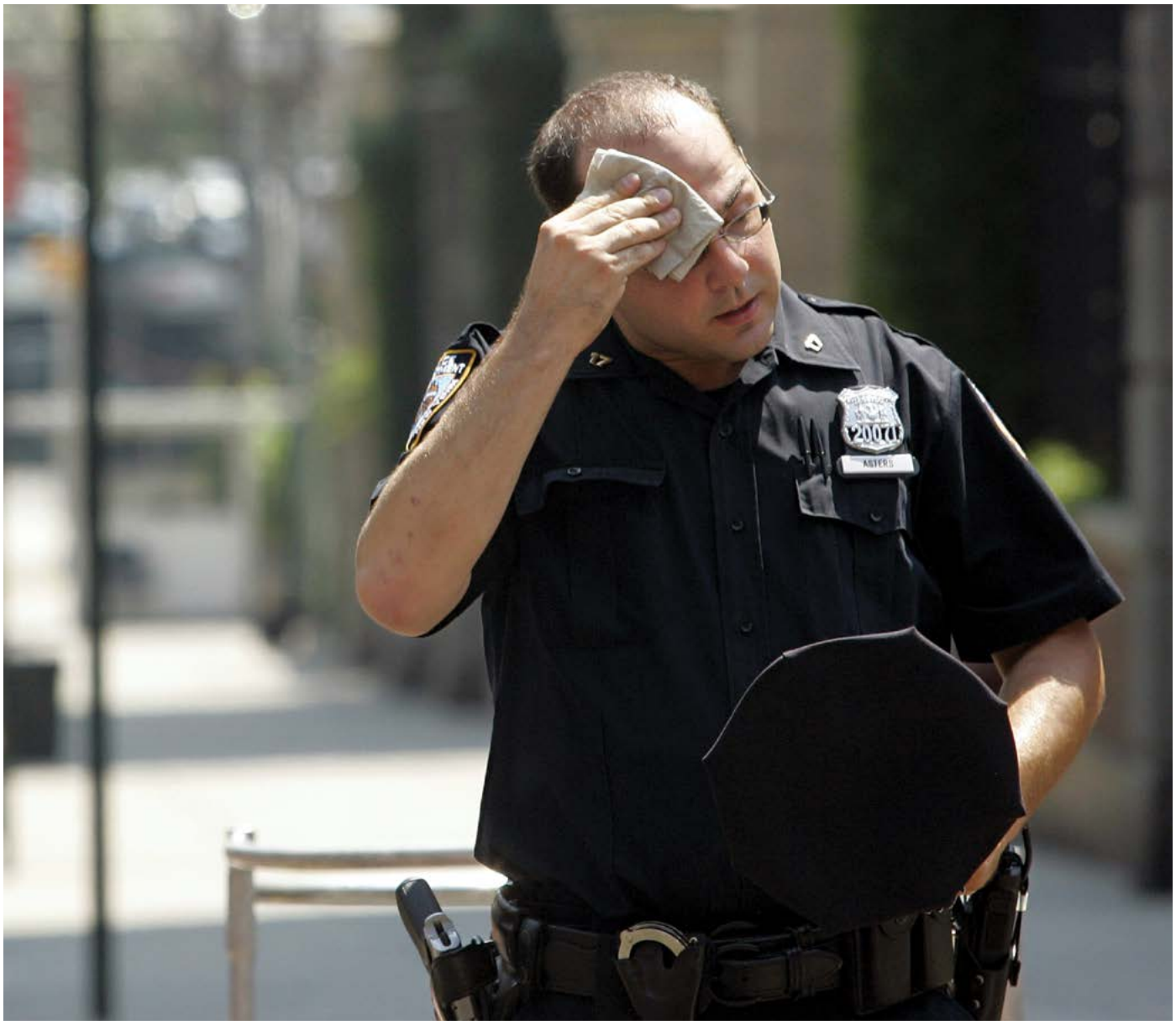
13 Capture Stormwater to Prevent Flooding

Issue: Storms can cause localized flash flooding of buildings and streets. The city applies rigorous stormwater standards to buildings that add new sewer connections, but stormwater from existing buildings must still be addressed.

Recommendation: Design sidewalks to capture stormwater and continue supporting the NYC Green Infrastructure Plan.

recommended

High winds can damage unsecured equipment.



A police officer bakes in the summer heat.

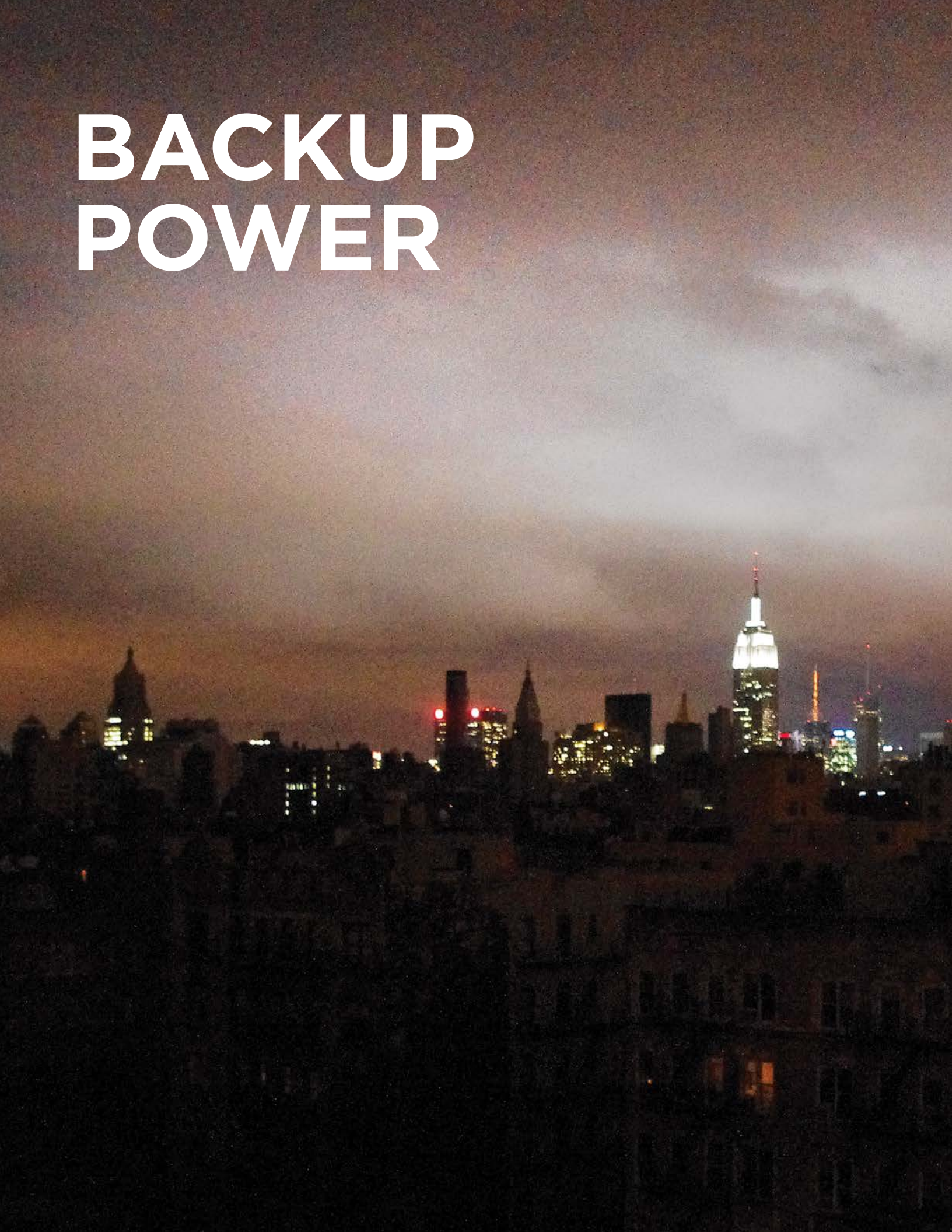
14 Use Cool Surfaces to Reduce Summer Heat

Issue: Light-colored roofs and surfaces reflect light and heat back into the atmosphere, cooling buildings and cities. City regulations mandate light-colored roof coatings, but only for flat roofs. These coatings also tend to darken over time, losing their effectiveness. Dark, noncompliant coatings are still sold in NYC, increasing unintentional violation of code.

Recommendation: Expand existing cool roof requirements to include pitched roofs. Prohibit the sale of dark roofing materials and dark "crumb" rubber in synthetic playing fields. Encourage owners to use self-cleaning cool roof coatings and study the longevity of various cool roof options.

new code

BACKUP POWER



BACKUP POWER

Modern buildings need power to operate, but power sometimes fails: New York City has had two widespread blackouts in the past 10 years. Lack of electricity after Superstorm Sandy was a bigger problem for many people than the storm itself, affecting 20 percent of New Yorkers.[1]

Backup power should be a part of any resiliency plan. The proposals in this chapter fall into three groups. The first group consists of installation recommendations for building owners who voluntarily add backup power. The second group consists of proposed changes to laws and incentives to allow owners to choose the right backup power source for their building. The third group addresses power for two essential needs during blackouts: egress lighting in buildings and pumps at gas stations.

Providing enough backup power for full operation during a blackout can be expensive, so owners will need to prioritize their backup power uses so that basic safety and sanitation needs are addressed first. When installed, onsite power should be designed to be available during blackouts.

Choosing the right backup power source for reliability and cost-effectiveness means considering power sources that run continuously, such as cogeneration* units or solar, increasing the chances power will work when the grid fails. To avoid reliance on potentially unreliable fuel deliveries during an emergency — and to reduce cost and air pollution — natural gas may be a better choice than diesel fuel. Emergency generators are currently required to power heavy loads and to start up with almost no delay; smaller, less-expensive models and more options will be available if this is relaxed. For some buildings, it may be easier to install accessible connections for portable electric generators, as well as for backup heating and cooling.

To ensure that people can get in and out of buildings that are otherwise habitable, residential buildings should provide long-lasting lighting in stairwells and corridors. If the state does not act to ensure that gas stations stay operational during blackouts by requiring generators or emergency hookups, the city should do so.

***Cogeneration:** When buildings use cogeneration (sometimes called "cogen," "combined heat and power," or just "CHP"), they make both their own heat and electricity on-site. It's more efficient than having a separate boiler and electrical connection, since the waste heat from making electricity is used for warmth and hot water in the building rather than going up the flue. Cogeneration can also increase resiliency, since natural gas-fueled cogeneration can operate as long as gas pipelines are working, even during electricity blackouts.

NYU's cogeneration plant kept the lights on during Superstorm Sandy.

15 Choose Reliable Backup Power & Prioritize Needs

Issue: Few backup power systems are large enough to serve a whole building, forcing most buildings to make difficult choices about what equipment to back up.

Recommendation: Prioritize which electrical equipment will run on backup power so buildings can remain habitable during extended blackouts. Because cogeneration and solar power systems are always in use, they are more reliable than generators that are only turned on during emergencies.

recommended

16 Use Cogeneration & Solar During Blackouts

Issue: Many cogeneration and solar power systems are not set up to run during a blackout. Because of this, they cannot provide heat and power to buildings during these emergencies.

Recommendation: Cogeneration and solar power systems should be designed to run during blackouts.

recommended

17 Remove Barriers to Backup & Natural Gas Generators

Issue: For buildings that voluntarily provide backup power, existing regulations require that the standby generator powers at least one elevator in addition to the other loads the building has chosen to support. This increases generator size and cost, making backup generators too expensive for some buildings. Other regulations discourage natural gas generators, which are clean burning and can power buildings for extended periods without fuel deliveries.

Recommendation: Require only buildings higher than 75 feet to power an elevator with the standby generator, and reduce the minimum requirements for generator size. For emergency generators, increase the allowed start-up delay from 10 to 60 seconds, making more options available for generators operated by natural gas.

remove barrier

18 Remove Barriers to Cogeneration

Issue: On-site cogeneration can be an efficient and cost effective source of heat and power to large buildings, but technical and regulatory barriers inhibit its use.

Recommendation: Con Edison should help facilitate the installation of larger systems by preparing guidelines similar to those for smaller systems, and implement a plan for significant expansion of cogeneration. Cogeneration should be properly sized to maximize economic benefit and energy efficiency.

remove barrier

19 Remove Barriers to Solar Energy

Issue: On-site solar power can keep buildings habitable during blackouts, but technical, regulatory, and economic barriers inhibit its use.

Recommendation: Con Edison, NYSERDA, and other government agencies should continue working together to streamline permitting processes, reduce barriers in project schedules, and increase the allowable roof area for solar power.

remove barrier

20 Add Hookups for Temporary Generators & Boilers

Issue: Buildings with extended service disruptions can use electricity and heat from temporary emergency generators and boilers. It is much easier to connect this equipment if convenient hookup points are installed in advance.

Recommendation: Require some existing health care facilities to install external electrical hookups. Recommend these installations as best practice for other buildings, and recommend external hookups for heating and cooling as well.

required upgrade
recommended

21 Keep Residential Stairwells & Hallways Lit During Blackouts

Issue: All buildings are required to have 90 minutes of emergency lighting so they can be safely evacuated. However, during a prolonged blackout, residents in multifamily buildings need lighting in hallways and stairwells throughout the duration of the event.

Recommendation: Require most new multifamily buildings to provide lighting in hallways and stairwells during extended blackouts; require the same of existing multifamily buildings within two years.

new code
further action

Stairwell lighting is essential during extended blackouts.

22 Keep Gas Stations Open During Blackouts

Issue: During blackouts, most service stations are unable to sell gas because the pumps rely on electricity. In the days following Superstorm Sandy, about half of NYC's service stations were not operational, delaying recovery efforts and disrupting work and life for hundreds of thousands of residents and businesses.

Recommendation: Unless New York State passes an equivalent law, NYC should require all fuel stations to either have a backup generator or be "generator ready."

required upgrade

Drivers waited for hours to fill up after Superstorm Sandy.

ESSENTIAL SAFETY

ESSENTIAL SAFETY

Buildings must be capable of safely harboring residents under a wide range of circumstances, because evacuating or sheltering large portions of the city simply isn't possible. Unfortunately, modern buildings can quickly become uninhabitable without power. Since backup power is neither a universal nor a completely reliable safeguard against power failures, buildings must be able to provide essential safety without any power at all.

Proposals in this chapter focus on protecting lives by ensuring drinking water, sanitation, and habitable interior temperatures. These recommendations are generally directed toward residential buildings since most other buildings can be left vacant after extreme weather events.

Homes and other low buildings usually have a power-free water supply from the city's water system. In taller buildings, lack of access to water for drinking and sanitation during power outages will eventually force people out of their apartments. All apartment buildings should provide common area water taps that don't require water pumps so that residents have access to drinking water during power failures. Addressing this crucial need is one of the few Task Force proposals that would require upgrades to existing buildings. In addition, owners should consider installing or retaining rooftop water tanks to enhance building water reserves, and toilets and sinks should be able to flush without electricity.

Heat waves killed 152 New Yorkers between 1997 and 2010, more than any other natural disaster.[1] A power outage during a cold snap could be similarly deadly. The Task Force recommends extending its mandate to create a five-year plan to address this issue for residential buildings by improving insulation and air sealing. City regulations should be clarified to allow windows to safely open enough to help cool buildings during blackouts.

This Manhattan family carried water upstairs after Superstorm Sandy left their building without power.

23 Supply Drinking Water Without Power

Issue: During a power failure, residential buildings using electric pumps lose their supply of potable water. Water may be present below the sixth floor, but in some cases remains unavailable if a non-operating pump blocks the water supply.

Recommendation: Require residential buildings to provide drinking water to a common area, supplied directly through pressure in the public water main.

required upgrade

24 Ensure Toilets & Sinks Work Without Power

Issue: Some toilets and faucets need electricity to function. This presents a sanitation risk during an extended power outage.

Recommendation: Require that toilets and faucets be capable of operating without grid power.

new code

25 Enhance Building Water Reserves

Issue: Water towers can provide potable water during power losses. City regulations no longer require water towers for new construction, and they allow towers to be removed from existing buildings.

Recommendation: Encourage building owners to maintain existing water towers and consider using water towers in new construction.

recommended

26 Ensure Operable Windows In Residential Buildings

Issue: Operable windows permit cooling without power, which allows buildings to remain habitable during power outages and saves energy. New windows are often installed with stops that prevent them from opening more than 4.5 inches, reducing their cooling potential.

Recommendation: Extend the mandate of the Task Force through Fall 2013 to recommend options for regulating windows that address both child safety and overheating during blackouts.

further action

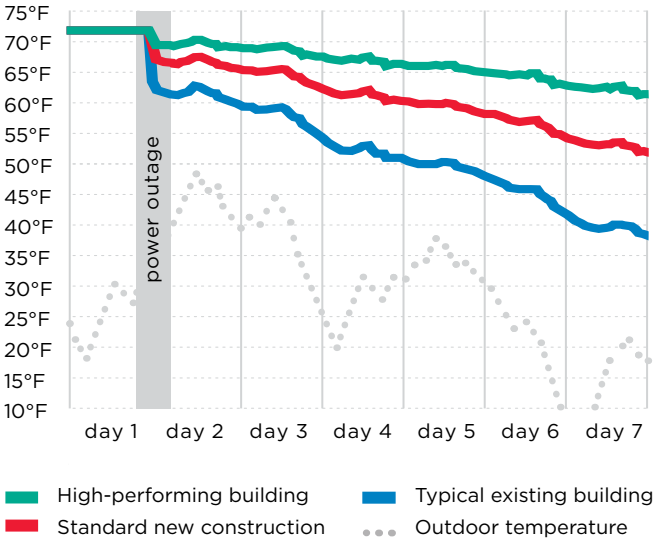
27 Maintain Habitable Temperatures Without Power

Issue: Utility failures often disable heating and cooling systems, leaving interior building temperatures dependent on whatever protection is provided by the insulation and air sealing of a building's walls, windows, and roof.

Recommendation: Extend the mandate of the Task Force through Fall 2013 to develop a multiyear strategy for ensuring that new and substantially altered buildings maintain habitable temperatures during utility failures. Clarify requirements for tightly sealing new windows and doors and upgrading roof insulation during roof replacement.

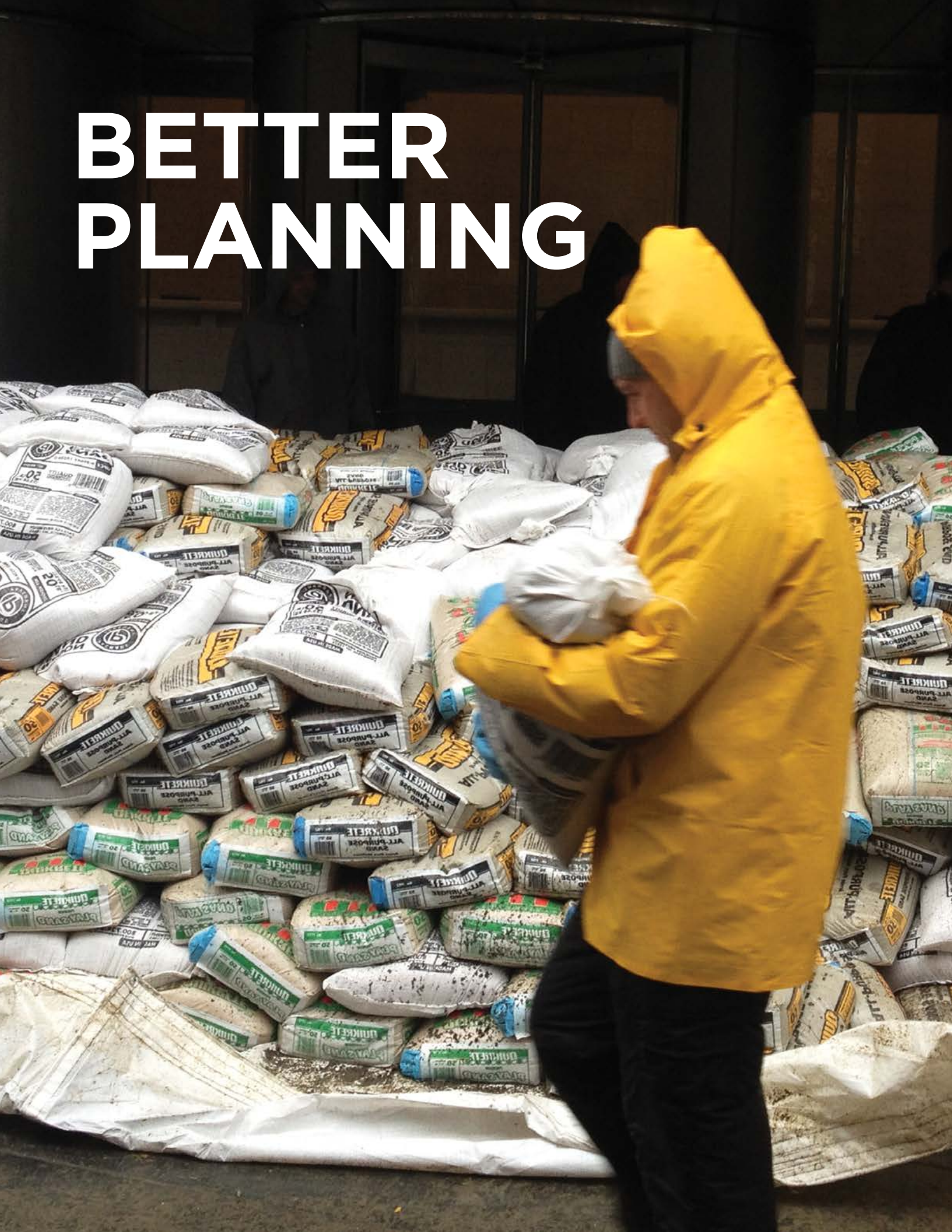
further action

Indoor Temperatures in a Masonry Building After a Winter Blackout



Which of these buildings is not like the other? The dark blue super-insulated Brooklyn rowhouse in this thermal image shows just how drafty its neighbors are.

BETTER PLANNING



BETTER PLANNING

Many low-cost steps can help save lives and property during emergencies, but only if building owners, their staff, and tenants prepare ahead of time and are adequately trained. Emergency planning can begin at any time without incurring large costs. City government should take a central role in educating building owners and residents, and owners will also need to share information with their tenants.

The proposals in this chapter fall into three groups: emergency planning, removing barriers to assisting those in need of help after disasters, and speeding up recovery.

Good planning is essential to reducing the impact of emergencies. The city should work with industry experts to develop emergency preparedness information and instructions for apartment residents and homeowners, as well as a building contact directory and emergency operation plans. Operation plans may include inexpensive measures that can prevent significant damage, such as using sandbags. And to facilitate disaster recovery, the Department of Buildings should continue its current effort to adopt an Existing Building Code, including special provisions for recovery and reconstruction.

We should also make sure that people can help each other during an emergency. Events such as Superstorm Sandy can bring out the best in people, but fear of liability or unintentional law-breaking can be barriers to helping out. This includes building owners and staff who might put makeshift lights in stairwells and carry water and food to those in need, as well as professionals such as architects and engineers who inspect buildings during recovery. Both of these groups should be protected from liability while providing assistance after emergencies. Also, the city should inform building owners and tenants of official suspensions or relaxations of laws that may be temporarily in effect.

Recovery will go faster if officials and contractors are in a position to spring into action. The city should pre-approve more emergency inspectors. And, building owners should consider pre-negotiating agreements with their suppliers so that contract issues do not hold them up during desperate times.

Building facades may be at risk of failure from heavy rain and high winds.

28 Create Emergency Plans

Issue: The multiday loss of power and flooding from Superstorm Sandy exceeded most planning scenarios. As a result, few buildings or residents had plans to manage such emergencies.

Recommendation: The city should work with industry experts to develop emergency preparedness information and instructions for apartment residents and homeowners, including model emergency operating procedures and a building contact directory.

required upgrade

recommended

29 Adopt Existing Building Code

Issue: Existing building renovations are governed by a complex mix of new and old codes. This complexity discourages upgrades that would improve resiliency, particularly during time-sensitive recovery periods.

Recommendation: The Task Force supports the Department of Buildings plans to adopt an Existing Building Code, which will simplify regulation of building upgrades and streamline permitting for resiliency improvements. The new code or other regulations should include specific provisions for post-disaster reconstruction.

further action

Planning ahead is essential for resiliency.

30 Don't Discourage Buildings from Operating During Emergencies

Issue: Buildings need to remain open during many emergencies, but makeshift services that don't meet code standards during normal operations can be a liability risk. Buildings also need clarity about enforcement of various regulations during an emergency, such as those governing heat and stairwell lighting.

Recommendation: New York State should adopt legislation that limits the liability of building owners and their staff during emergency conditions. The city should inform owners and tenants how enforcement of regulations may be relaxed during emergencies.

further action

31 Support Good Samaritan Legislation

Issue: Architects and engineers often hesitate to volunteer with emergency recovery efforts due to liability concerns.

Recommendation: Enact New York State "Good Samaritan" legislation protecting architects and engineers from liability for emergency volunteer work.

further action

32 Preapprove Emergency Inspectors

Issue: The Department of Buildings has procedures to mobilize large numbers of public and private sector inspectors trained for post-disaster building assessments. There are opportunities to speed implementation and enhance capabilities by formalizing this program.

Recommendation: The Department of Buildings should formalize its practices by creating a Preapproved Emergency Inspector Program through its "special inspector" program to assist the city during emergencies.

further action

33 Prenegotiate Emergency Recovery Agreements

Issue: Finding service providers and negotiating agreements can delay recovery for damaged buildings.

Recommendation: As part of emergency planning, building owners and managers should identify service providers and prenegotiate emergency recovery agreements, reducing the economic and human impact of an emergency.

recommended

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Certain Task Force members were recognized by their peers for going above and beyond their duties. **Special designation** is given on the page following the cover of this report.

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Endnotes:

Chapter 1: Stronger Buildings

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