



Committee on the Environment

an **AIA Houston** Committee

Resilient Home Guideline

AMERICAN INSTITUTE OF ARCHITECTS
HOUSTON CHAPTER

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What is a Resilient Home?

A **Resilient home** allows you to prepare for emergencies, shelter-in-place for a period, and quickly recover. Typical characteristics include:

DURABILITY – construct (or renovate) for passive survivability and faster recovery

- flood proofing or raised floor construction
- wind resistance and natural storm water mitigation
- landscape and tree protection while reducing structural and exterior damage

ENERGY EFFICIENCY – using less energy for comfort and survivability.

- lower carbon emissions by burning less fossil fuels to mitigate impacts of a warming planet
- on-site renewable energy technologies to cover power outages

MITIGATION OF CHRONIC STRESSORS & ACUTE SHOCKS, including –

- A hotter, more humid Houston
- poor urban air quality
- long commute times
- more severe storms and climate shocks

Our goal is to enhance your understanding of your home's resiliency to help you make choices to improve your situation.

- Some strategies are costly, some are not
- Some need to be original construction
- Some can be retrofitted
- Some are behavioral checklists
- All strategies are additive

This Toolkit will help you withstand disasters:

- Assess your home and family's readiness
- Make a plan
- Be informed before, during and after

HOW TO:

Respond to the eight quick questions on the next page to calculate your score

STEP 1: QUESTIONS

Use your score to diagnose where you are currently on your resilient journey

STEP 2: DIAGNOSIS

Review the actions and consider your options for enhancing your resilient journey

STEP 3: ACTION

The image shows a sample page from 'The Diagnostic Toolkit'. It contains eight questions (Q1-Q8) about home and family readiness for disasters. Each question has a point value and a list of actions to take. The page includes a 'TOTAL' score line and a 'CUMULATIVE POINT TOTAL' line. A note at the bottom says '** Select all that apply to you **'.

Question	Point Value	Score
Q1: Are you prepared for a disaster at home?	4, 3, 2, 1	TOTAL = ____ POINTS
Q2: Is your home prepared for a disaster?	8, 6, 4, 2	TOTAL = ____ POINTS
Q3: Is your yard prepared for a disaster?	4, 3, 2, 1	TOTAL = ____ POINTS
Q4: Does your house reduce summer heat stress?	4, 3, 2, 1	TOTAL = ____ POINTS
Q5: Does your house help with energy bill stress?	8, 6, 4, 2	TOTAL = ____ POINTS
Q6: Does your house help with indoor air quality?	4, 3, 2, 1	TOTAL = ____ POINTS
Q7: Does your house help with work commute and isolation stress?	4, 3, 2, 1	TOTAL = ____ POINTS
Q8: Are there other household strategies?	4, 3, 2, 1	TOTAL = ____ POINTS

** Select all that apply to you **

The Diagnostic Toolkit

** Select all that apply to you **

Q1 Are you prepared for a disaster at home?	
POINT VALUE	4 I have an emergency plan with my family and neighbors.
	3 I have a cell phone that can receive emergency text alerts and maintain a current list of emergency contacts.
	2 I have a disaster checklist and a stockpile of necessities.
	1 My insurance is up to date and applicable for medical, life, and property needs.

TOTAL = _____ POINTS

Q2 Is your home prepared for a disaster?	
POINT VALUE	8 I have an elevation certificate, and my house is above Base Flood Elevation (BFE).
	6 I have a backup generator, along with all other equipment above BFE.
	4 I know for sure my house was built to withstand hurricane winds.
	2 My water pipes are insulated, and NOT in my attic, crawlspace, or garage.

TOTAL = _____ POINTS

Q3 Is your yard prepared for a disaster?	
POINT VALUE	4 I have inventoried, trimmed, and secured all trees, poles, and electrical items.
	3 I have healthy soil which can absorb and hold more rain and promotes healthy landscaping.
	2 I have pervious paving or a rain garden which can detain rainwater temporarily during storms.
	1 I have water-smart planting, trees suitable for Houston, and vegetable garden.

TOTAL = _____ POINTS

Q4 Does your house reduce summer heat stress?	
POINT VALUE	4 My house is a survivable place that allows me to function without power for 5 days.
	3 I have plenty of attic insulation to keep the heat out of the conditioned space.
	2 My AC is high efficiency and "right-sized" for all the indoor space, saving me money.
	1 I have operable windows, screens, and ceiling fans.

TOTAL = _____ POINTS

Q5 Does your house help with energy bill stress?	
POINT VALUE	8 I have completed a Home Energy Audit to see my energy bill vulnerabilities.
	6 I have Energy Star Appliances, exhaust fans, lighting to conserve energy
	4 I have solar panels for power or solar hot water panels, or both.
	2 My water heater is a heat pump type, tankless, or high-efficiency gas.

TOTAL = _____ POINTS

Q6 Does your house help with indoor air quality?	
POINT VALUE	4 I have a properly sized and configured kitchen exhaust fan taking fumes to the outside.
	3 I have a fresh air intake for my A/C.
	2 I have high performance air filters, change them on schedule, and vacuum regularly.
	1 I have exhaust fans in my bathroom and check for excess moisture frequently.

TOTAL = _____ POINTS

Q7 Does your house help with work commute and isolation stress?	
POINT VALUE	4 I have access to transit and ride sharing programs and use them regularly.
	3 My neighborhood is very walkable and bikable to services, parks, & retail.
	2 Our sidewalks are in reasonable shape and our curb & gutters or open ditches are clear.
	1 I feel relatively safe walking around my neighborhood.

TOTAL = _____ POINTS

Q8 Are there other household strategies?	
POINT VALUE	4 I have a plan to reduce my household carbon footprint with strategies for home and car.
	3 I have a maintenance schedule for my household maintenance items.
	2 I don't use toxic chemicals in my house and yard.
	1 I am actively engaged in my community or religious organization.

TOTAL = _____ POINTS

**** Select all that apply to you ****

Q1 – Q8 CUMULATIVE POINT TOTAL _____

Points Calculation:

STEP 1: Add up your points for each question.

Q1: _____ **Q2:** _____ **Q3:** _____ **Q4:** _____

Q5: _____ **Q6:** _____ **Q7:** _____ **Q8:** _____ **TOTAL:** _____

Scoring Yourself:

0—25: You're getting started. You probably got some ideas on what you can do next.

26—60: You're well on your way to a more resilient home life. Time to learn more and take it up to the next level.

61—100: Have you been working on this for long? You've got something going!

Please take note of this **TOTAL** points number to score yourself and to let us know in your response to any data collection queries.

Diagnosis

Next: The 8 Questions
with Additional Information and
Links to in-depth Resources.



SELECT ALL THAT APPLY	ADDITIONAL INFORMATION	RESOURCES / LINKS
4 POINTS		
I have an emergency plan with my family and neighbors.	<ul style="list-style-type: none"> Plan to contact loved ones before, during, and after a disaster Sign up for crisis response efforts on social media platforms like Facebook, NextDoor, and Red Cross to find each other Make different plans for evacuation and stay-at-home Stay connected with neighbors in case of dropped cell service 	COMMUNITY EMERGENCY RESPONSE TEAM (HOUSTON) FACEBOOK SAFETY CHECK RED CROSS CONTACT LOVED ONES
3 POINTS		
I have a cell phone that can receive emergency text alerts and maintain a current list of emergency contacts.	<ul style="list-style-type: none"> Battery charger for your phone: solar, or auto adapter Include both local and out-of-town relatives & neighbors Join community based social media platforms Check your phone for local & national alerts Check to see whether you are eligible for free phones and service 	NEXTDOOR NATIONAL WIDE EMERGENCY ALERTS HOUSTON WIDE EMERGENCY ALERTS CELL PHONES FOR LOW INCOME CONSUMERS
2 POINTS		
I have a disaster checklist and a stockpile of necessities.	<ul style="list-style-type: none"> Set up a checklist for both evacuation and stay-at-home with <ul style="list-style-type: none"> Medications Toiletries Important documents Water and nourishments First aid kits 	BUILD AN EMERGENCY KIT - FEMA BUILD AN EMERGENCY KIT - READY BUILD AN EMERGENCY KIT - READY_FOOD BUILD AN EMERGENCY KIT - READY_WATER SHOP FIRST AID KITS - REDCROSS
1 POINT		
My insurance is up to date and applicable for medical, life, and property needs.	<ul style="list-style-type: none"> Is your property properly insured? Check to see if flood insurance is recommended for your area Maintain a physical copy of all insurance policies including medical, life, and property Prepare to document the damage for a claim 	HOMEOWNERS INSURANCE CHECKLIST HOME INSURANCE CHECKLIST FLOOD INSURANCE LOCATION INFORMATION FEMA FLOOD INSURANCE INFORMATION

TOTAL = _____

CUMULATIVE TOTAL = _____

[CLICK HERE FOR MORE INFO](#)

Q2 Is your home prepared for a disaster?



SELECT ALL THAT APPLY	ADDITIONAL INFORMATION	RESOURCES / LINKS
8 POINTS I have an elevation certificate and my house is above Base Flood Elevation (BFE.)	<ul style="list-style-type: none"> Elevation Certificates confirm your home's first floor level relative to the level that floodwaters can reach This is used by the insurance industry to price flood insurance Base Flood Elevation (indicated on Flood Insurance Rate Maps) is defined by FEMA as "the elevation of surface water resulting from a flood that has a 1% chance of equaling that level in any given year." 	TEXAS FLOOD INSURANCE - ELEVATION CERTIFICATE
6 POINTS I have a backup generator above BFE, Base Flood Elevation, along with my other mechanical & electrical equipment.	<ul style="list-style-type: none"> When the electrical power goes out, so does your <ul style="list-style-type: none"> Refrigerator AC or heat Lights Ceiling fans Gas generators are common in Houston to provide backup electrical power. 	FLOOD EDUCATION MAPPING TOOL CONSUMER REPORT - GENERATOR SIZING
4 POINTS I know for sure my house was built to withstand hurricane winds.	<ul style="list-style-type: none"> High winds can damage roofs and other parts of the home Research your existing home to discover the active building code during the time it was built Save and safely store your home records and your plot plan If unable to locate home records, contact a home inspector to review your existing home construction 	BUILDING CODE INTERACTIVE WIND ZONE MAP FORTIFIED CONSTRUCTION STANDARDS HURRICANE PROOF HOUSE: WHAT YOUR NEED TO PROTECT
2 POINTS My water lines are insulated and NOT in my attic, crawl space, or garage.	<ul style="list-style-type: none"> The Texas Freeze and power outage of 2021 taught us (again) that water pipes are vulnerable to bursting when frozen and thawed. Ensure that any pipes located in an unheated space (attic, crawl space, garage) are well insulated Cover outdoor hose bibs with insulation Look into a home inspection for recommendations on winterization 	FREEZE PROTECTION WATCH FROZEN PIPES 101

TOTAL = _____

CUMULATIVE TOTAL = _____

[CLICK HERE FOR MORE INFO](#)

Q3 Is your yard prepared for a disaster?



SELECT ALL THAT APPLY	ADDITIONAL INFORMATION	RESOURCES / LINKS
4 POINTS I have inventoried, trimmed, and secured all trees, poles, and electrical items.	<ul style="list-style-type: none"> High winds can knock down branches and trees, as well as poles and other structures, and damage your home Storage buildings, vehicles, and equipment can become projectiles in high winds. Maintain trees on your property when located near utility easements 	TREE PRUNING GUIDE PRUNING IN THREE STEPS TREE TRIMMING 101: WHY, WHEN AND HOW TO DO IT MATURE TREES: MANAGING RISK SECURING A SHED FOR HIGH WINDS
3 POINTS I have healthy soil which can absorb and hold more rain and promotes healthy landscaping.	<ul style="list-style-type: none"> Healthy soils are a little-known asset to most homeowners Plants are healthier and more vigorous in healthy soils Healthy soils hold much more water from heavy rains 	IMPROVING LANDSCAPE SOILS: CRUCIAL TO LONG TERM SUCCESS COMPOST FOR HEALTHY SOILS
2 POINTS I have pervious paving or a rain garden which can detain rainwater temporarily during storms.	<ul style="list-style-type: none"> Impervious surfaces direct rainwater to storm drains and on to the bayous so fast that they flood. Pervious surfaces tend to detain water on the property for longer than impervious surfaces, helping to decrease pressure on the drainage system 	RAIN GARDEN 101 RAIN GARDEN FACTSHEET RAIN GARDEN MAINTENANCE EPA PERMEABLE PAVING
1 POINT I have water-smart planting, trees suitable for Houston, and vegetable garden.	<ul style="list-style-type: none"> Some plants take less maintenance than others Some plants take less watering than others Planting your own fruits and vegetables can provide self-satisfaction in addition to better nutrition and freshness 	TREE FINDER PLANT SELECTOR PLAN YOUR GARDEN THE RIGHT TREE IN THE RIGHT PLACE

TOTAL = _____

CUMULATIVE TOTAL = _____

[CLICK HERE FOR MORE INFO](#)

Q4 Does your house reduce summer heat stress?



SELECT ALL THAT APPLY	ADDITIONAL INFORMATION	RESOURCES / LINKS
4 POINTS My house is a survivable place that allows me to function without power for 5 days.	<ul style="list-style-type: none"> Imagine your home without power in the summer with no AC (February 2021 showed us what no power in a freeze is like) Are your windows operable? Do you have emergency fans to stay cooler? Do you have a backup generator? 	HOW TO BUILD A KIT FOR EMERGENCIES MITIGATION FOR HOMEOWNERS FACT SHEET RECHARGEABLE FANS
3 POINTS I have plenty of attic insulation to keep the heat out of the conditioned space.	<ul style="list-style-type: none"> In a typical ventilated attic, the insulation should cover the rafters Current codes call for 12" of blown or batt insulation Insulation should be uniformly distributed throughout the attic The attic access door should be insulated and weatherstripped 	ADDING ATTIC INSULATION PROS AND CONS OF ATTIC INSULATION TYPES
2 POINTS My AC is high efficiency and "right-sized" for all the indoor space, saving me money.	<ul style="list-style-type: none"> Properly sized AC for the house is essential If you replace your AC have it sized per ACCA Manual J – your AC contractor will know what that is Ductwork should be sealed and not leaking Replace AC filters regularly – not only does this improve air quality, but it will also help keep your system running efficiently 	A GUIDE TO ENERGY-EFFICIENT HEATING AND COOLING RIGHT-SIZED AIR CONDITIONERS GUIDE TO HOME HEATING AND COOLING
1 POINT I have operable windows, screens, and ceiling fans.	<ul style="list-style-type: none"> Operable windows allow for natural ventilation, and during pleasant weather can save AC usage with screens to keep the bugs out Ceiling fans are much cheaper to run than AC to keep you comfortable 	NATURAL VENTILATION FANS FOR COOLING ENERGY EFFICIENT WINDOW ATTACHMENTS

TOTAL = _____

CUMULATIVE TOTAL = _____

[CLICK HERE FOR MORE INFO](#)

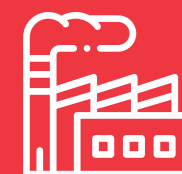


SELECT ALL THAT APPLY	ADDITIONAL INFORMATION	RESOURCES / LINKS
8 POINTS		
I have completed a Home Energy Audit to see my energy bill vulnerabilities.	<ul style="list-style-type: none"> Home energy audits are extremely helpful isolate energy wasting components of your home infrastructure and usage habits There are do-it-yourself audits and you can hire a professional 	HOME ENERGY YARDSTICK ENERGY SAVINGS AT HOME DIY HOME ENERGY AUDIT
6 POINTS		
I have Energy Star Appliances, exhaust fans, and lighting to conserve energy	<ul style="list-style-type: none"> Energy Star is a Department of Energy program that appliance producers join to show how much energy you would consume using their device You can use the predicted energy usage as a purchase criteria prior to acquiring an appliance 	ENERGYSTAR WATER CONSERVATION STRATEGIES
4 POINTS		
I have solar panels for power or solar hot water panels, or both.	<ul style="list-style-type: none"> Most solar panels are installed without batteries and will lower your electricity bills significantly Solar hot water panels usually circulate water between them and the hot water tank, and heat the water with the sun's free energy instead of electricity you purchase 	SOLAR PANEL PROS AND CONS SOLAR INDUSTRY RESEARCH SOLAR WATER HEATER SYSTEMS
2 POINTS		
My water heater is a heat pump type or tankless or high-efficiency gas.	<ul style="list-style-type: none"> The Department of Energy recommends heat pump water heaters as the most cost effective type of heater Tankless water heaters use energy to heat water only when hot water is used, not to keep heating water in the tank in between uses 	HEAT PUMP WATER HEATERS BEST TANKLESS TANKLESS PROS AND CONS ENERGY STAR WATER HEATERS

TOTAL = _____

CUMULATIVE TOTAL = _____

[CLICK HERE FOR MORE INFO](#)



SELECT ALL THAT APPLY	ADDITIONAL INFORMATION	RESOURCES / LINKS
4 POINTS I have a properly sized and configured kitchen exhaust fan taking fumes to the outside.	<ul style="list-style-type: none"> Cooking fumes and gas stove combustion gases are major sources of indoor air pollution that are unhealthy to inhale A properly exhausted kitchen is important 	CALCULATE HOOD SIZE
3 POINTS I have a fresh air intake for my A/C.	<ul style="list-style-type: none"> An efficient home that doesn't waste energy has an air barrier around the perimeter that stops air leakage With air leakage stopped, fresh air is needed to feed the AC especially when exhaust fans are drawing air out of the house 	CHOOSING BETWEEN A HRC AND AN ERV WHY FRESH AIR INTAKE? FRESH AIR INTAKE FOR AC
2 POINTS I have high performance air filters, change them on schedule, and vacuum weekly.	<ul style="list-style-type: none"> Standard air filters prevent larger particles from clogging up your AC unit, but high performance filters prevent smaller particles from going into your lungs Change your filters regularly 	IMPROVING INDOOR AIR QUALITY WHOLE HOUSE VENTILATION GIVE THE AIR IN YOUR HOME A SPRING CLEANING BEST VACUUM CLEANERS AIR FILTER INFO
1 POINT I have exhaust fans in my bathroom and check for excess moisture frequently.	<ul style="list-style-type: none"> Moisture build up in your bathrooms can create untold air quality problems Exhaust fans need controls that are either timers or have moisture sensors so they will do their job and turn themselves off when their job is over to save electricity 	INDOOR AIR QUALITY BEST PRACTICES IN POST-CONSTRUCTION ENVIRONMENTS BEST EXHAUST FANS EXHAUST FAN SWITCHES

TOTAL = _____

CUMULATIVE TOTAL = _____

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Q7 Does your house help with work commute and isolation stress?



SELECT ALL THAT APPLY	ADDITIONAL INFORMATION	RESOURCES / LINKS
4 POINTS I have access to transit and ride sharing programs and use them regularly.	<ul style="list-style-type: none"> look up your local transit routes on Houston METRO website use the Houston METRO Trip app on your phone to plan your route according to your location Zipcar car sharing – can be used to rent cars on an hourly basis 	HOUSTON METRO SYSTEM MAP RIDESHARE ZIPCAR
3 POINTS My neighborhood is very walkable and bikable to services, parks, & retail.	<ul style="list-style-type: none"> use the Houston Bike Plan Network Map to find nearby bike routes use Walkscore to find out walkability of your neighborhood 	HOUSTON BIKE PLAN NETWORK MAP WALKSCORE
2 POINTS Our sidewalks are in reasonable shape and our curb & gutters or open ditches are clear.	<ul style="list-style-type: none"> if sidewalks on property are in need of repair, property owner is responsible for repairs in City of Houston if cannot afford repairs, or sidewalks are not on personal property, see whether sidewalk route qualifies for the following City of Houston Programs: Pedestrian Accessibility Review Program, or the Houston Public Works Safe Sidewalks Program (schools and major thoroughfares only) it is property owner's responsibility to keep open ditches and gutters clear of trash and debris; it is responsibility of the City Storm Water Branch to grade ditches and flush culverts call 311 to report any stormwater issues with storm drains or storm sewers 	HOUSTON PEDESTRIAN ACCESSIBILITY REVIEW PROGRAM / SAFE SIDEWALKS PROGRAM DRAINAGE DITCHES
1 POINT I feel relatively safe walking around my neighborhood.	<ul style="list-style-type: none"> Look into establishing a neighborhood safety network with your neighbors Get to know your neighbors better – this can help encourage 	NEIGHBORHOOD SCOUT

TOTAL = _____

CUMULATIVE TOTAL = _____

[CLICK HERE FOR MORE INFO](#)

Q8 Are there other household strategies?



SELECT ALL THAT APPLY	ADDITIONAL INFORMATION	RESOURCES / LINKS
4 POINTS I have a plan to reduce my household carbon footprint with strategies for home and car.	<ul style="list-style-type: none"> Find out your current footprint by using the "Creating a Baseline" tool (see link) Utilize Basic Carbon Footprint Reduction Strategies (see link) Reduce your transportation footprint (see link) 	KNOWING WHERE WE STAND (CREATING A BASELINE) BASIC CARBON FOOTPRINT REDUCTION STRATEGIES FOR HOME CHECKLIST FOR ACTIONS THAT CONSERVE ENERGY IN YOUR HOME REDUCING YOUR TRANSPORTATION FOOTPRINT
3 POINTS I have a maintenance schedule for my household maintenance items.	<ul style="list-style-type: none"> Assemble a heating and cooling maintenance checklist (see link) Assemble a common Houston homeowner maintenance checklists (see link) 	HEATING AND COOLING MAINTENANCE CHECKLIST COMMON HOUSTON HOMEOWNER MAINTENANCE CHECKLISTS HOME MAINTENANCE SCHEDULE MAINTENANCE TIPS FOR THE ENERGY-EFFICIENT HOME
2 POINTS I don't use toxic chemicals in my house and yard.	<ul style="list-style-type: none"> Household chemicals are generally toxic to humans and pets Cleaning products can be hazardous to your health Household furnishings can be hazardous to your health Yard care chemicals can be hazardous to your health 	SAFER HOUSEHOLD CHEMICALS TOXIC CLEANING PRODUCTS AND HUMAN HEALTH HEALTHY HOMES- INDOOR AIR QUALITY (1) HEALTHY HOMES- INDOOR AIR QUALITY (2) HEALTHY YARDS AND SAFE OUTDOOR CHEMICALS (1) HEALTHY YARDS AND SAFE OUTDOOR CHEMICALS (2)
1 POINT I am actively engaged in my community or religious organization.	<ul style="list-style-type: none"> Find a community group to join - <ul style="list-style-type: none"> Super Neighborhood Council Flood Resilience Task Force Interfaith Environmental Network of Houston 	SUPER NEIGHBORHOOD COUNCIL FLOOD RESILIENCE TASKFORCE BUILDING RESILIENT HOUSTON COMMUNITY INTERFAITH ENVIRONMENTAL NETWORK OF HOUSTON (IENOH) GO-NEIGHBORHOODS.ORG

TOTAL = _____

CUMULATIVE TOTAL = _____

[CLICK HERE FOR MORE INFO](#)

Top Ten Elements of a Resilient Home

Now that you have reviewed the 8 questions and 32 answers, you probably can see there are no “10 Easy Elements for a Resilient Home” – this is a list, but they are not Easy.

Resilience is complex and dependent on many features and a response to multiple stressors, some of which are unique to Houston’s hot, humid climate and experience with extreme weather events and flooding.

Feel free to compare this list with your scoring on the toolkit, and develop your action plan to make yourself more resilient at your house!

1. Design for use and occupancy post disaster/shelter in place, a survivable home
2. Improve the energy efficiency of the home – especially the building envelope (walls, windows, attic.)
3. Improve home systems, check electrical for resiliency and HVAC for improved operation and Indoor Air Quality
4. Design, replace and select materials for durability and health, especially in indoor environments
5. Modify outdoor space (Home Grounds/yards) for resiliency
6. Make your yard a sponge – Improve site landscaping for stormwater management and plant trees
7. Alternate energy supply – consider solar panels, solar hot water, fireplace, gas range, etc
8. Implement Home Maintenance strategies for resiliency
9. Implement community building strategies for your neighborhood
10. Lower household Carbon Footprint to reduce impacts from climate change and build up city and regional resiliency