

IS OUR
HOUSING
STOCK READY?

HOT & OLD AT HOME

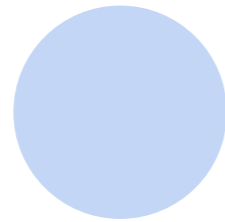


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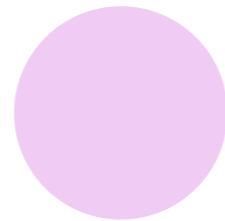


COLLISION OF 3 STORMS



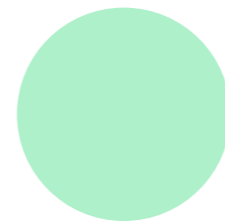
CLIMATE CHANGE

Recent IPCC and US National Climate Assessment reports



DEMOGRAPHIC TRANSFORMATIONS

By 2032, # of Americans 65+ > # younger than 18

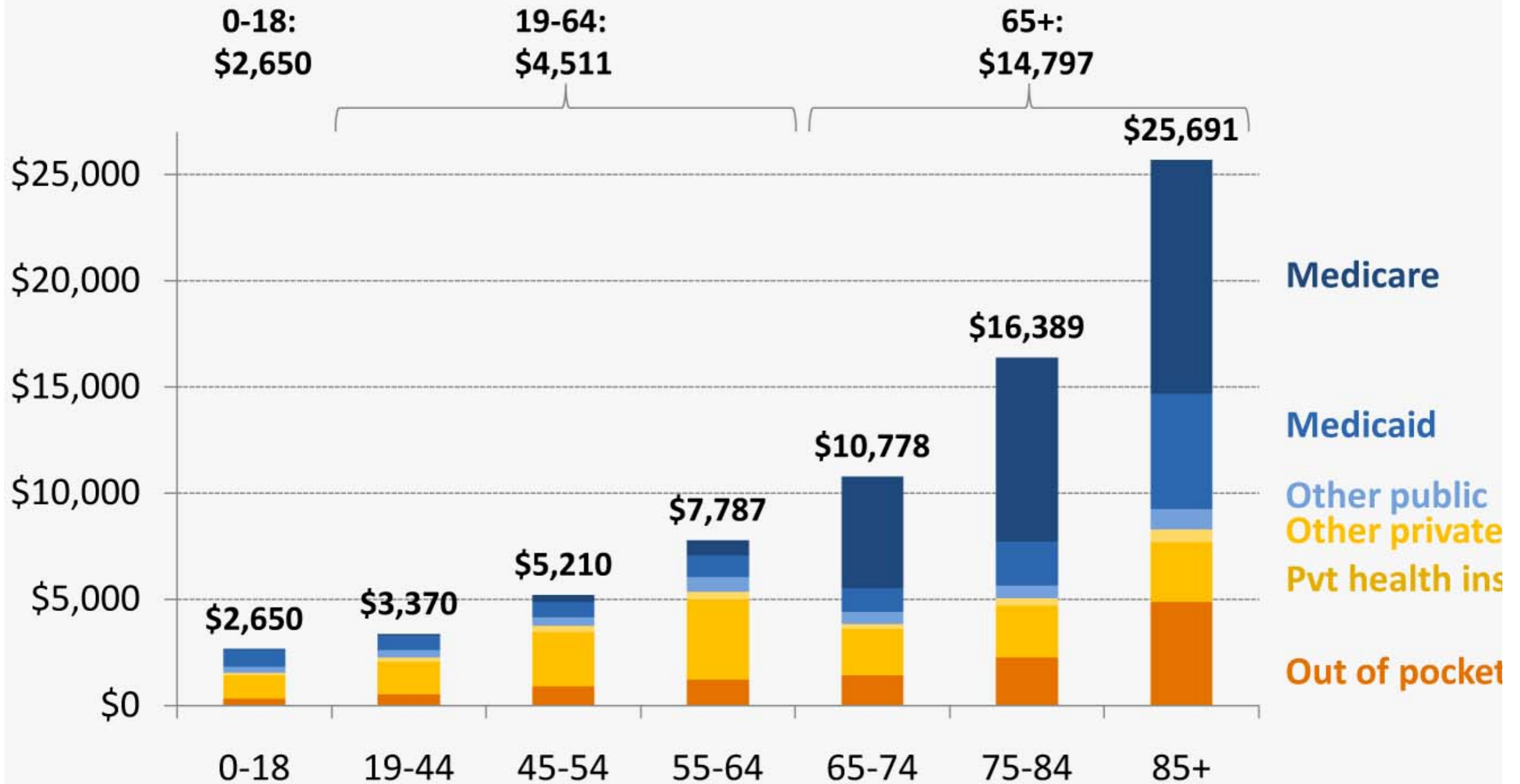


HEALTHCARE NEEDS + COSTS

Hospitals/clinics ↔ homes

Per capita health care spending skyrockets with age.

Per capita health care spending, by age group and source of payment, 2004

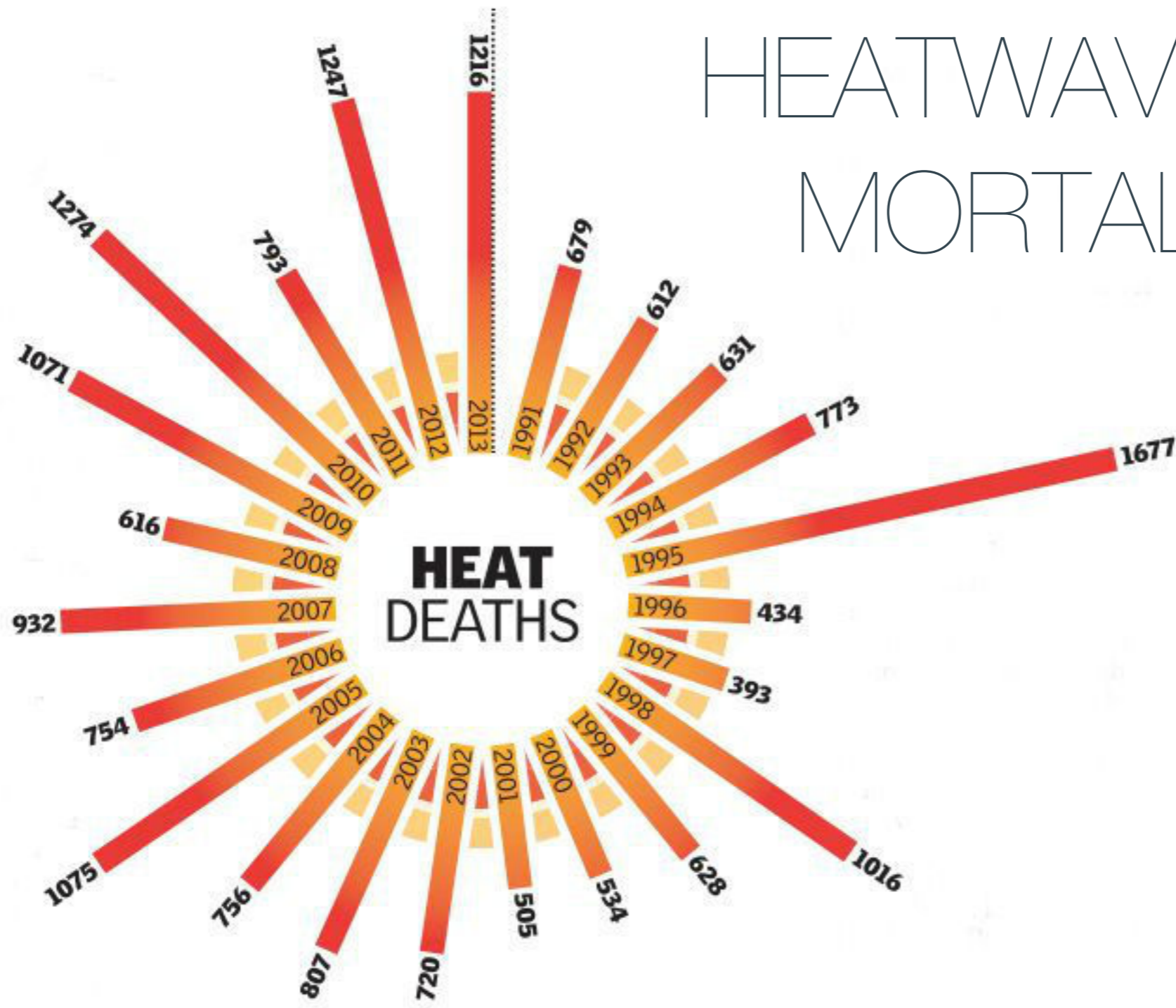


Note: Other public: e.g. workers compensation. Other private: e.g. philanthropy.

Source: Centers for Medicare and Medicaid Services, 2009.

Stanford Center on Longevity

PUBLIC FOCUS TO DATE: HEATWAVES + MORTALITY



WIDENING OUR VISION OF THE PROBLEM



Chronic indoor
thermohygrometric
conditions (may or may not
be “heatwave” related)

Other health impacts:
respiratory, pulmonary,
heart attacks, sleep,
agitation, and other

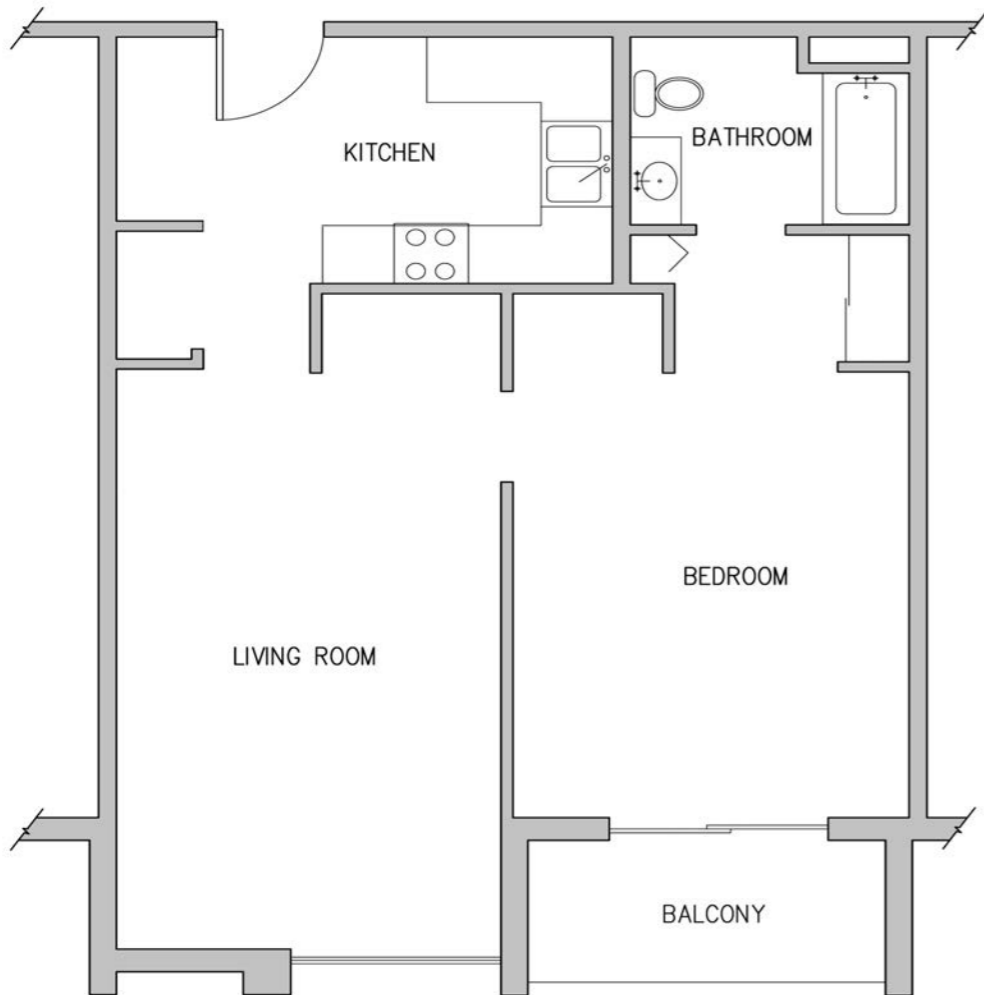




IS GREEN HOUSING HEALTHY HOUSING FOR OLDER ADULTS?



KEY RENOVATIONS



Insulation and improvement in **building roof**

PTAC system upgrades

Energy Star exhaust fans, appliances

New bedroom **ceiling fan** with pull-cords

Double-pane, low-E sliding balcony door and window

Low-flow **plumbing fixtures**

Complete **kitchen** and **bathroom remodel** with low-VOC materials

Low-VOC **flooring, paint, adhesives**



\$1.7M renovation from ARRA Green Retrofit Program

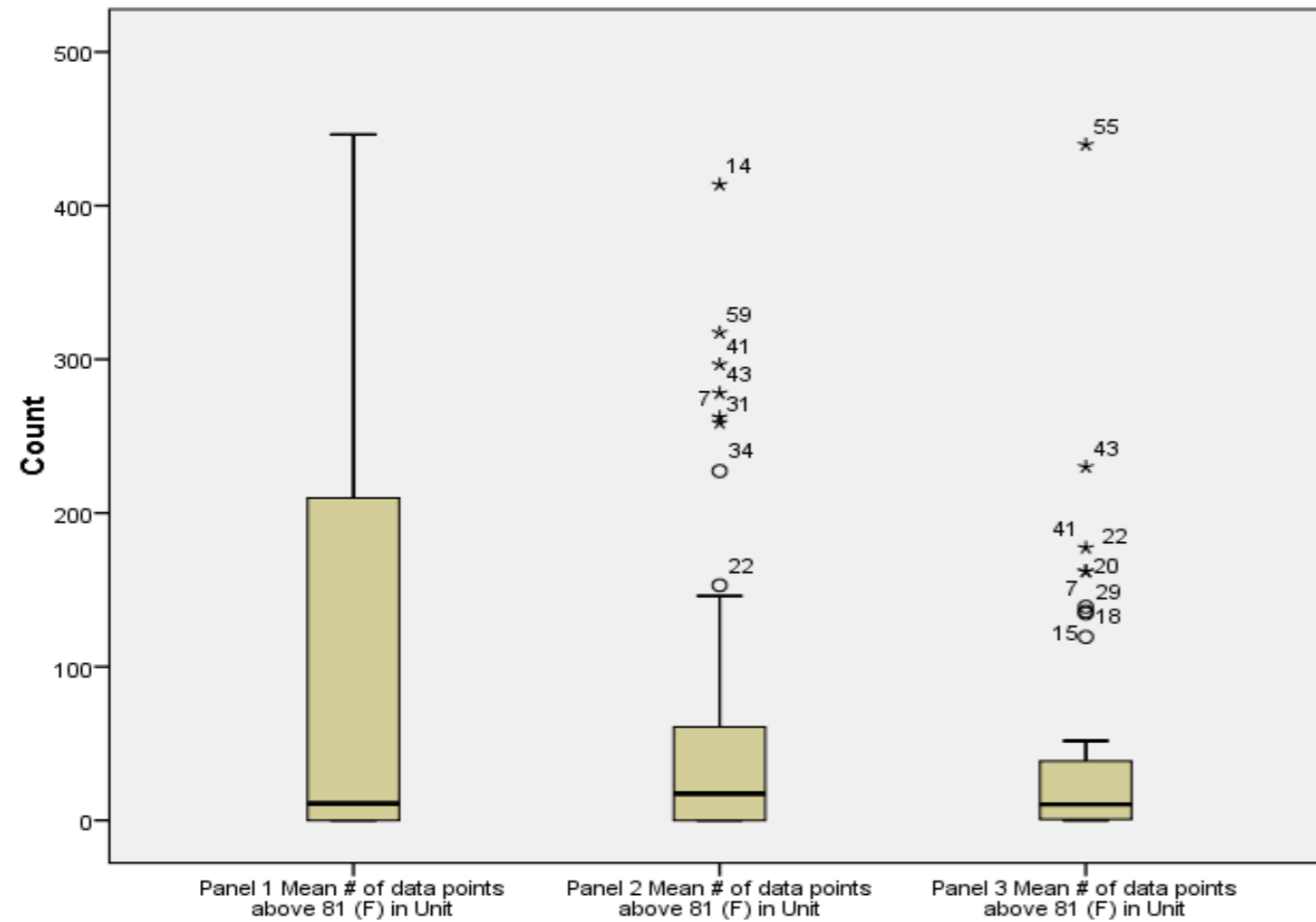
3-story, 116-unit, each unit 619 SF



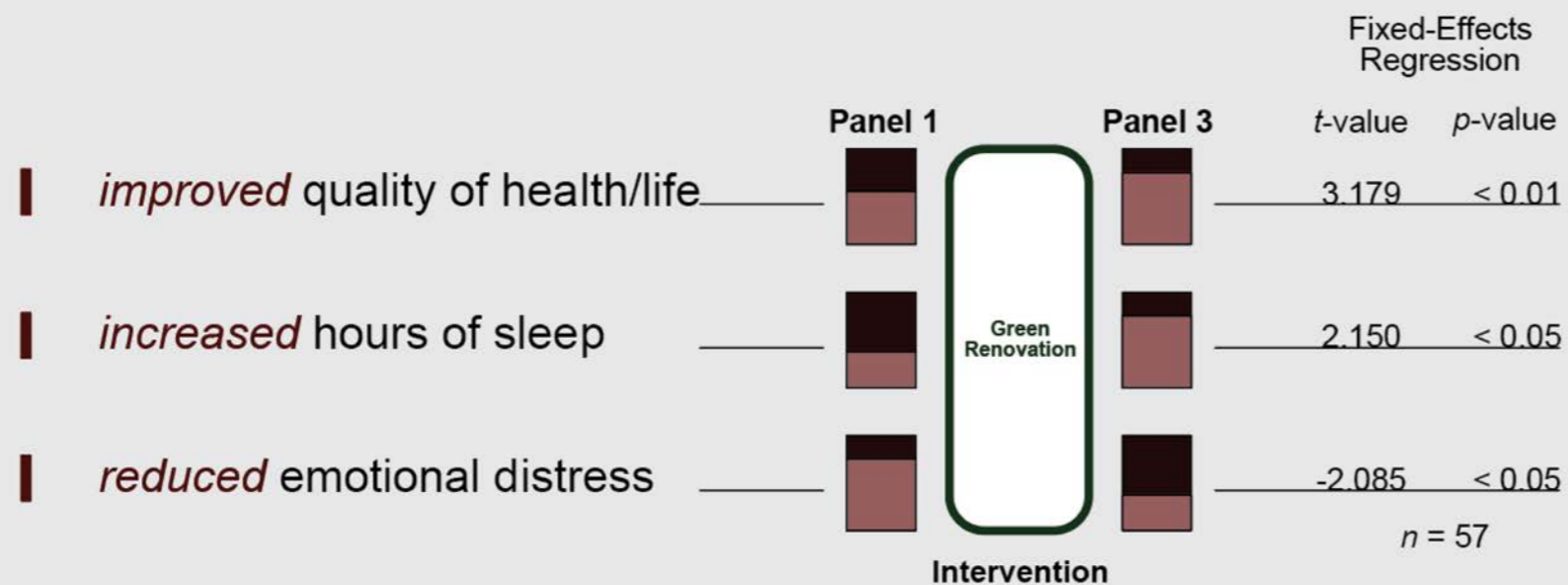
FINDING:

REDUCTION # OF HOMES WITH MANY COUNTS OF EXTREME INDOOR TEMPERATURE

Count = # of times of 448 data points that indoor temperature exceeded 81°



Reductions in indoor temperatures over 81°F resulted in:



FINDING:
REDUCTION IN
TEMPERATURE “PEAKS”
RELATED TO SELF-
REPORT HEALTH
OUTCOMES OF...

QUALITY OF LIFE/HEALTH

SLEEP

EMOTIONAL DISTRESS



WHY AGING?

SOME PHYSIOLOGICAL FACTORS AFFECTING THERMAL

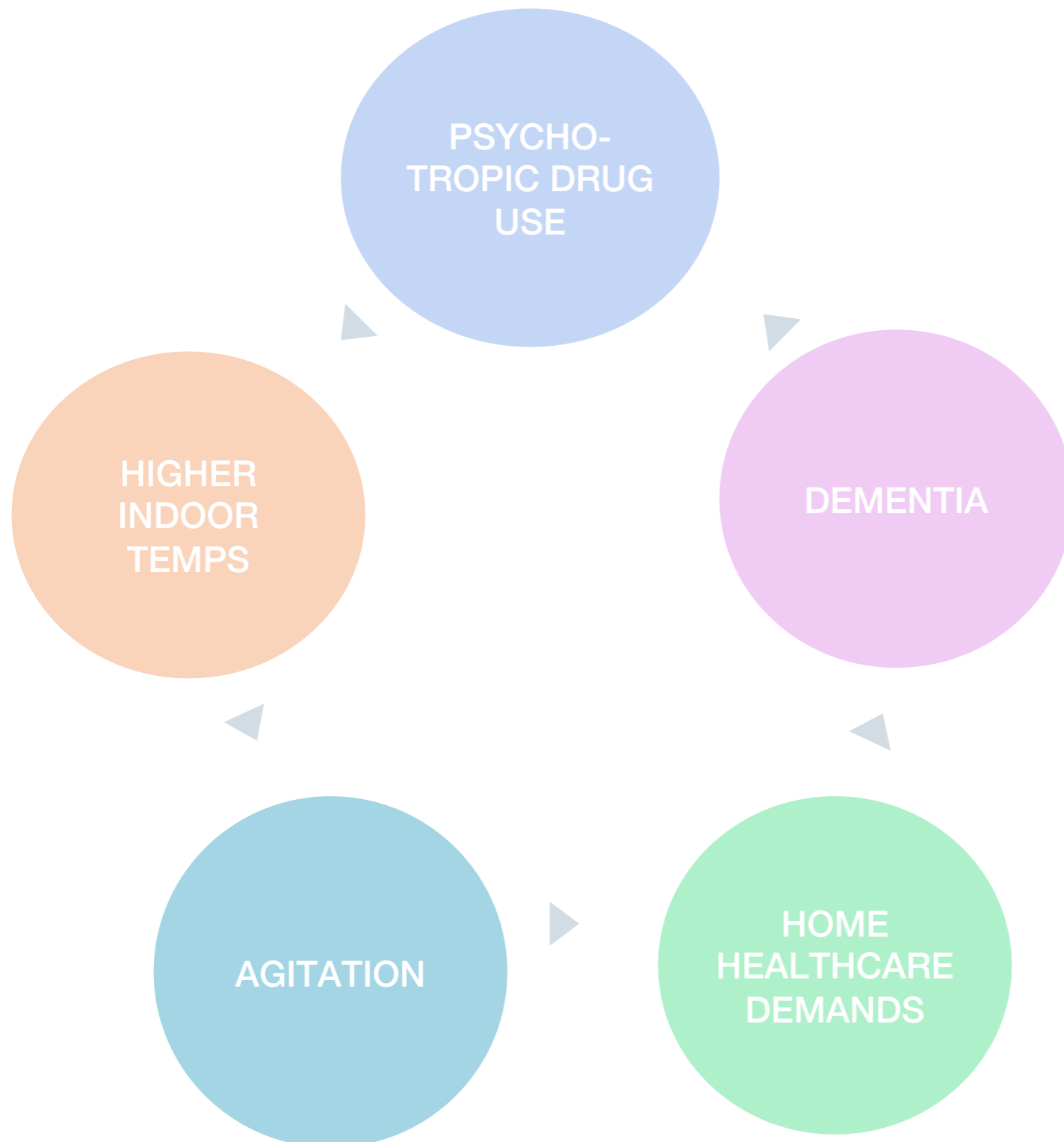
- Reduced efficiency of cold and warm defense mechanisms
- Decreased thermoregulatory response
- Lower metabolic rate
- Reduced vascular reactivity
- Lower cardiovascular flexibility and output

LIVING PATTERNS

- Sedentary. 90-100% time spent indoors, at home
- Higher usage of pharmaceuticals
- Live alone, social isolation, depression
- Tend to live in older homes than do younger adults
- Desire to “age in place” or “age in community”



ONE EXAMPLE:



CYCLE OF DEMENTIA AND THERMAL CONDITIONS

- Altered sensitivity to environmental conditions
- Increasingly reactive to their environment
- Behavioral problems (e.g. agitation) affect care staff and other residents

IS OUR HOUSING
STOCK READY
FOR AGING
POPULATION IN
THE ERA OF
CLIMATE
CHANGE?





#1

Demand for Air-Conditioning

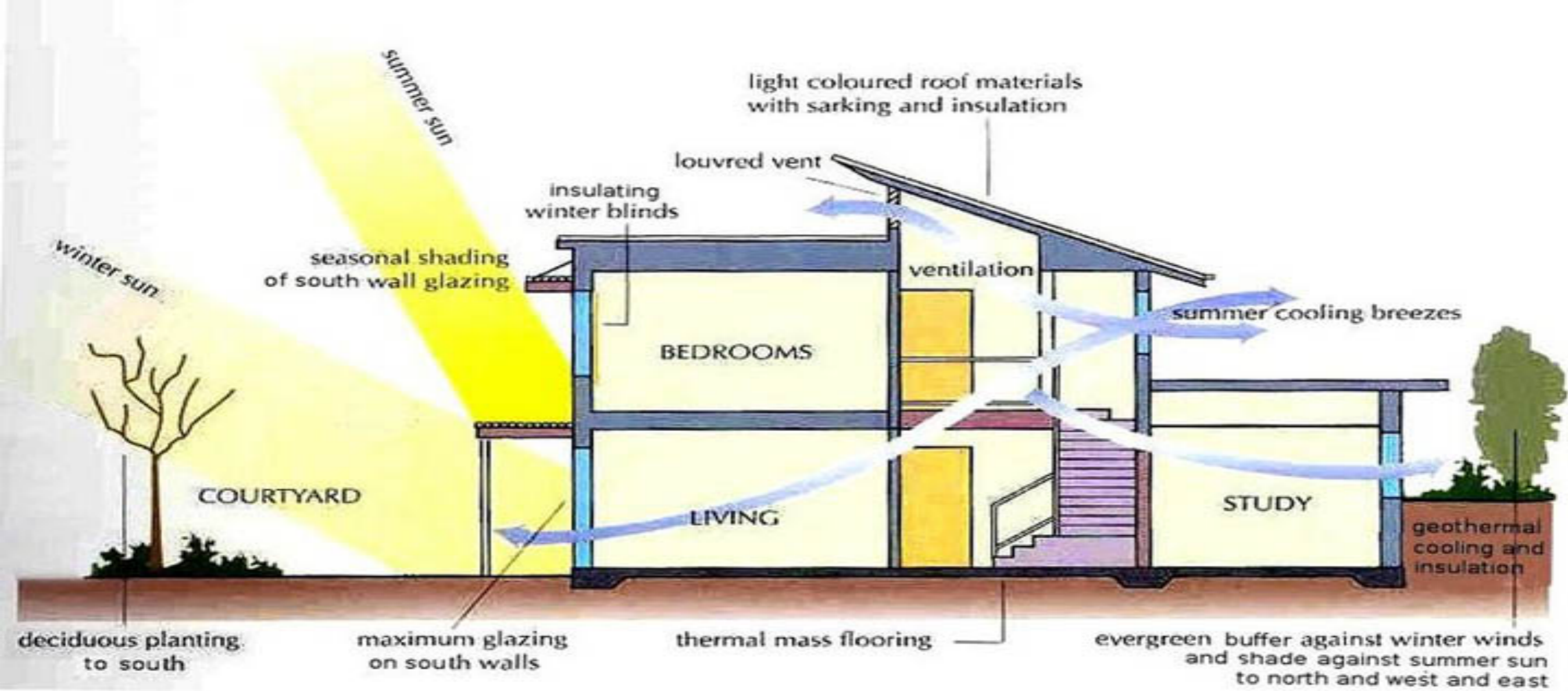
- # of a/c units worldwide rise from 1.6B to 5.6B by 2050
- Instrumental in cutting premature deaths on hot days by 75% since 1960
- Emissions and venting hot air outside home
- Routine maintenance



#2

Power Outages

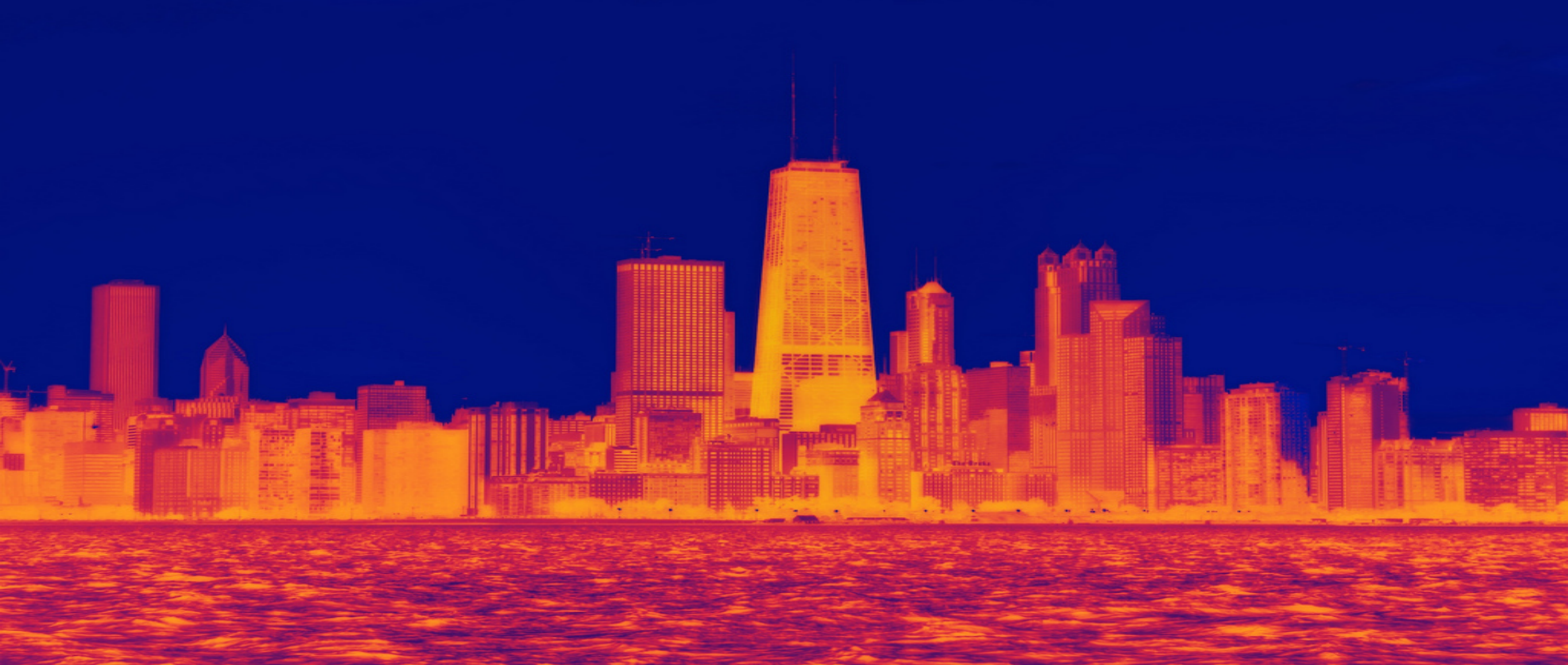
- Post-hurricane media coverage of nursing homes
- Response: Generators
- Approximately 5% of 65+ live in nursing homes, assisted living, board/care, etc.



Passive & Non-Mechanical Features

- Air flow
- Materials and insulation
- Solar orientation
- Shading
- Cool paving, low albedo
- Etc.

#3



#4

Urban Heat Island

- High albedo
- Trees and vegetation
- Green roofs, cool roofs
- etc

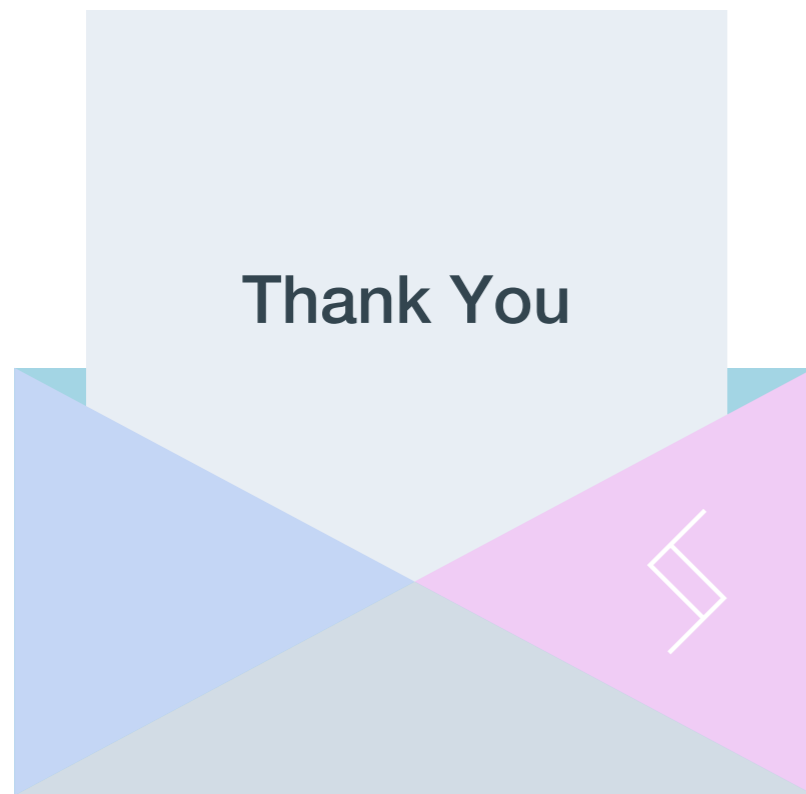


#5

Social Connectivity

- Living alone strong risk factor during heatwaves for older adults
- Smart technologies: benefits and shortcoming
- Co-living models

THANK YOU & CONTACTS



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