

Municipal Action on Building Electrification

Go Green Illinois

Jan 2022



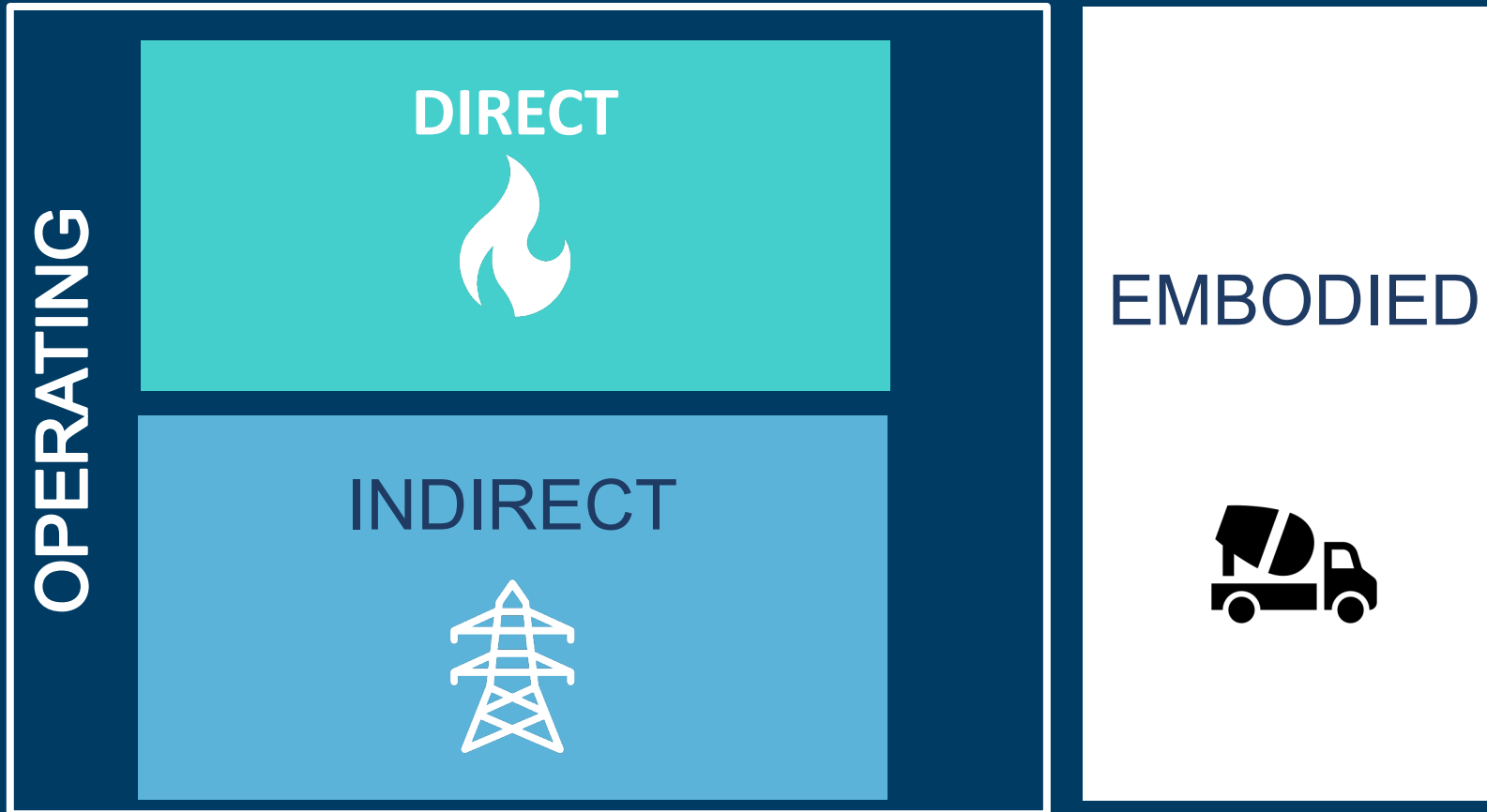
Transforming the global energy system to secure a clean, prosperous, zero-carbon future for all.



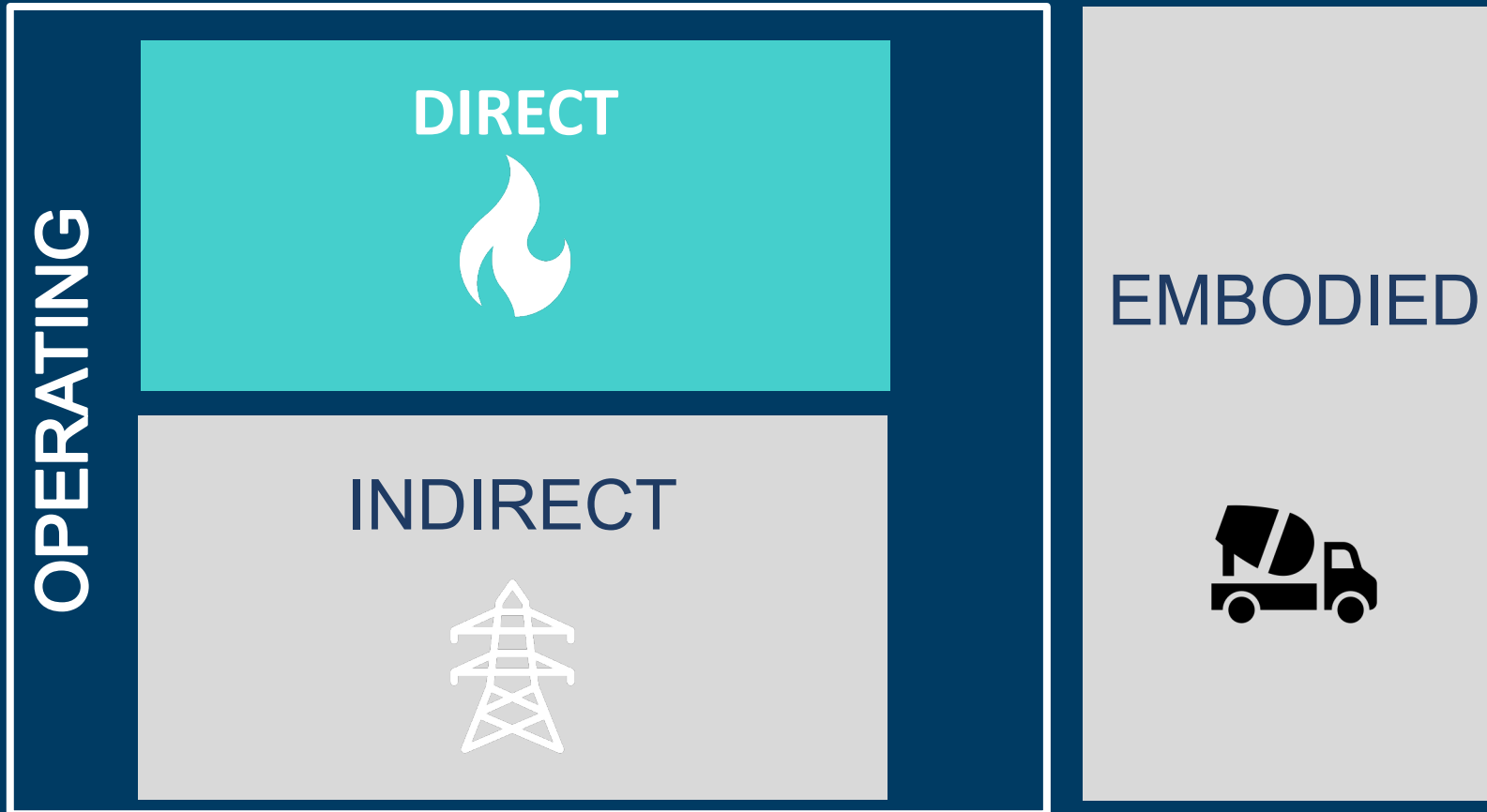
Contents

1. Why building electrification?
2. What can I do in my municipality?
3. What can I do at the state level?

Building sector emissions fall under a few main categories:



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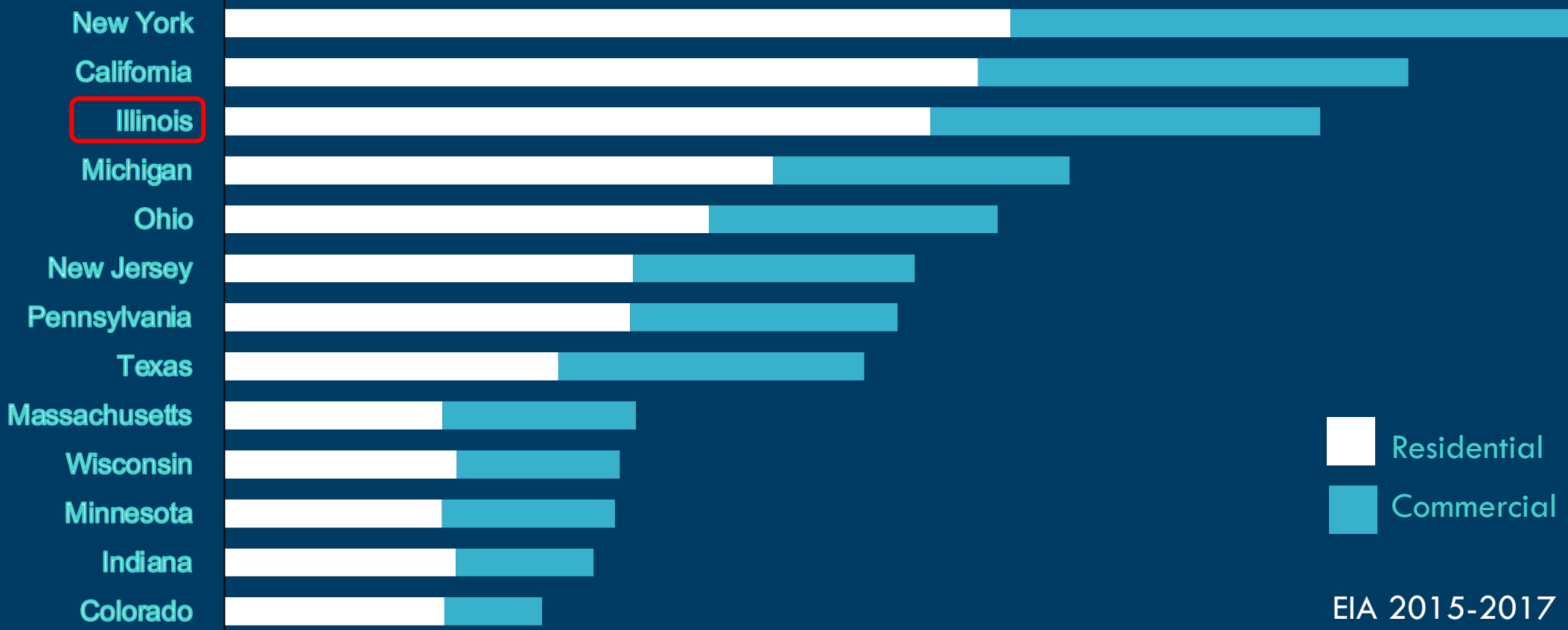


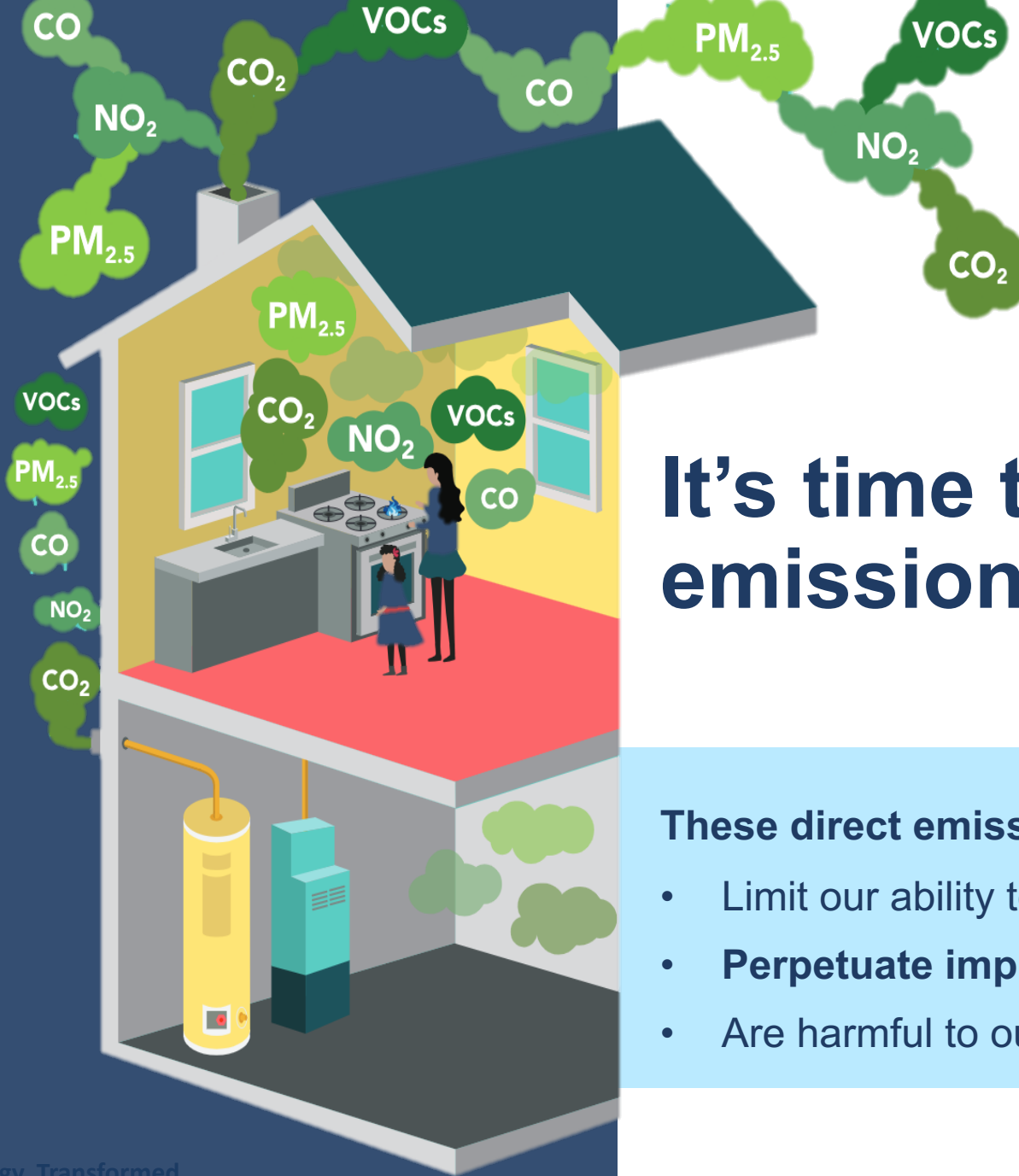
It's time to tackle direct emissions from buildings

These direct emissions:

- Limit our ability to meet climate goals
- Perpetuate imprudent investments
- Are harmful to our health

Illinois is the 3rd highest consumer of gas in buildings in the United States





It's time to tackle direct emissions from buildings

These direct emissions:

- Limit our ability to meet climate goals
- **Perpetuate imprudent investments**
- Are harmful to our health

We are increasing investments in fossil fuels



Nicor pipeline to Pembroke Township

Further reading:

<https://grist.org/agriculture/illinois-gas-pipeline-pembroke-township/>



Chicago pipeline replacement program

Further Reading:

<https://illinoispirg.org/feature/ilp/tragedy-errors>



It's time to tackle direct emissions from buildings

These direct emissions:

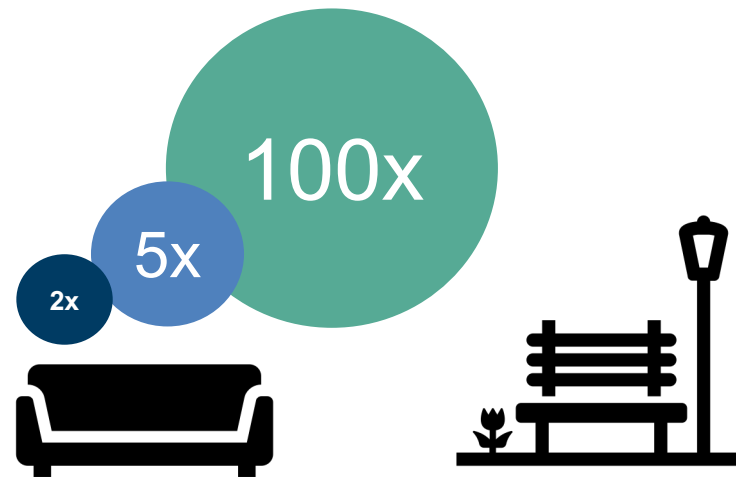
- Limit our ability to meet climate goals
- Perpetuate imprudent investments
- **Are harmful to our health**

Indoor air quality is often worse than outdoor air

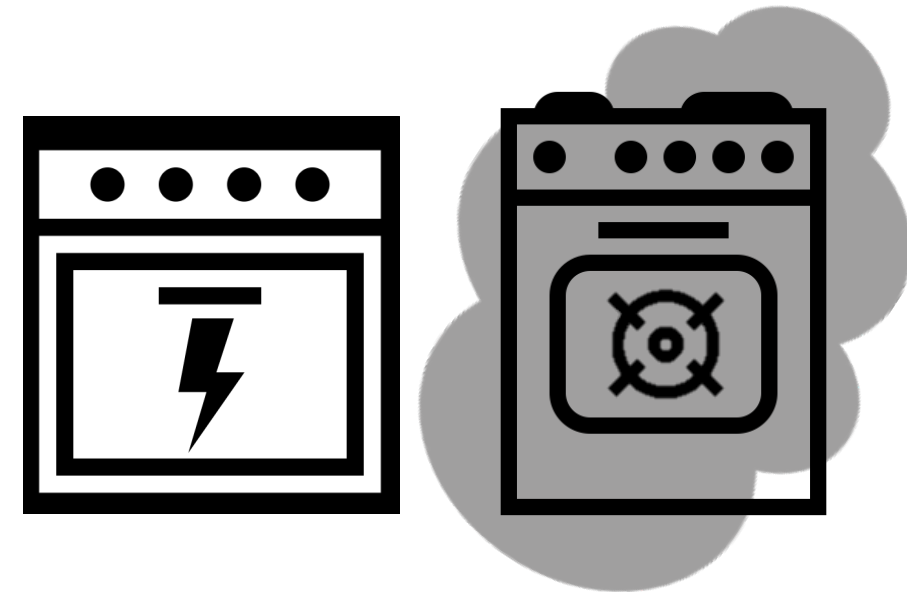
We spend up to **90%** of our time indoors



EPA states indoor pollutant levels may be **2 to 5** and as much as **100 times** higher indoors than outdoors



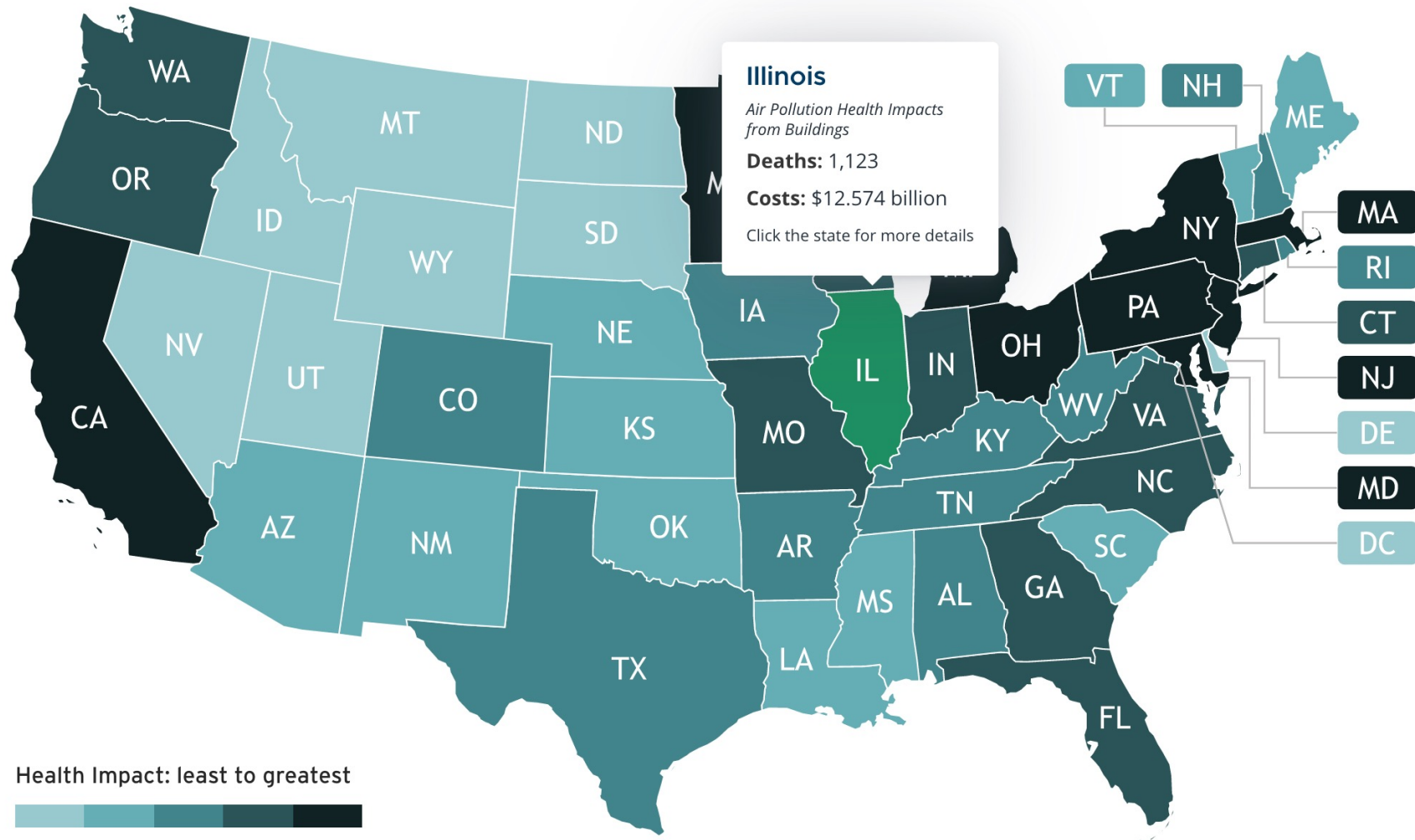
Homes with gas stoves have **50 - 400%** higher NO₂ emissions than homes with electric stoves



Further Reading: <https://rmi.org/insight/gas-stoves-pollution-health/>

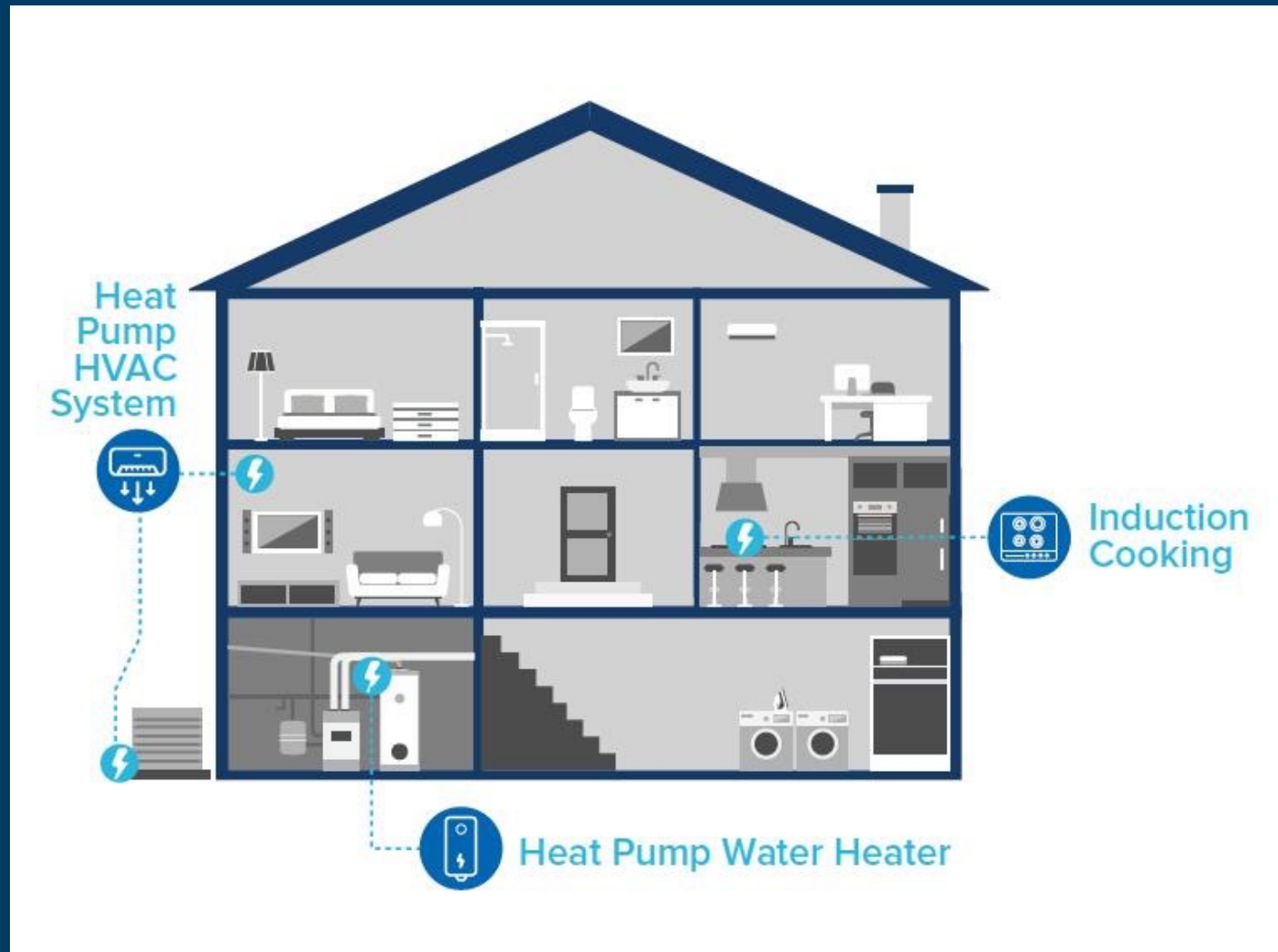
WHAT IS THE HEALTH IMPACT OF BUILDINGS IN YOUR STATE?

Outdoor air pollution from buildings harms public health across the US



Further Reading: <https://rmi.org/health-air-quality-impacts-of-buildings-emissions/>

Solution: Building Electrification

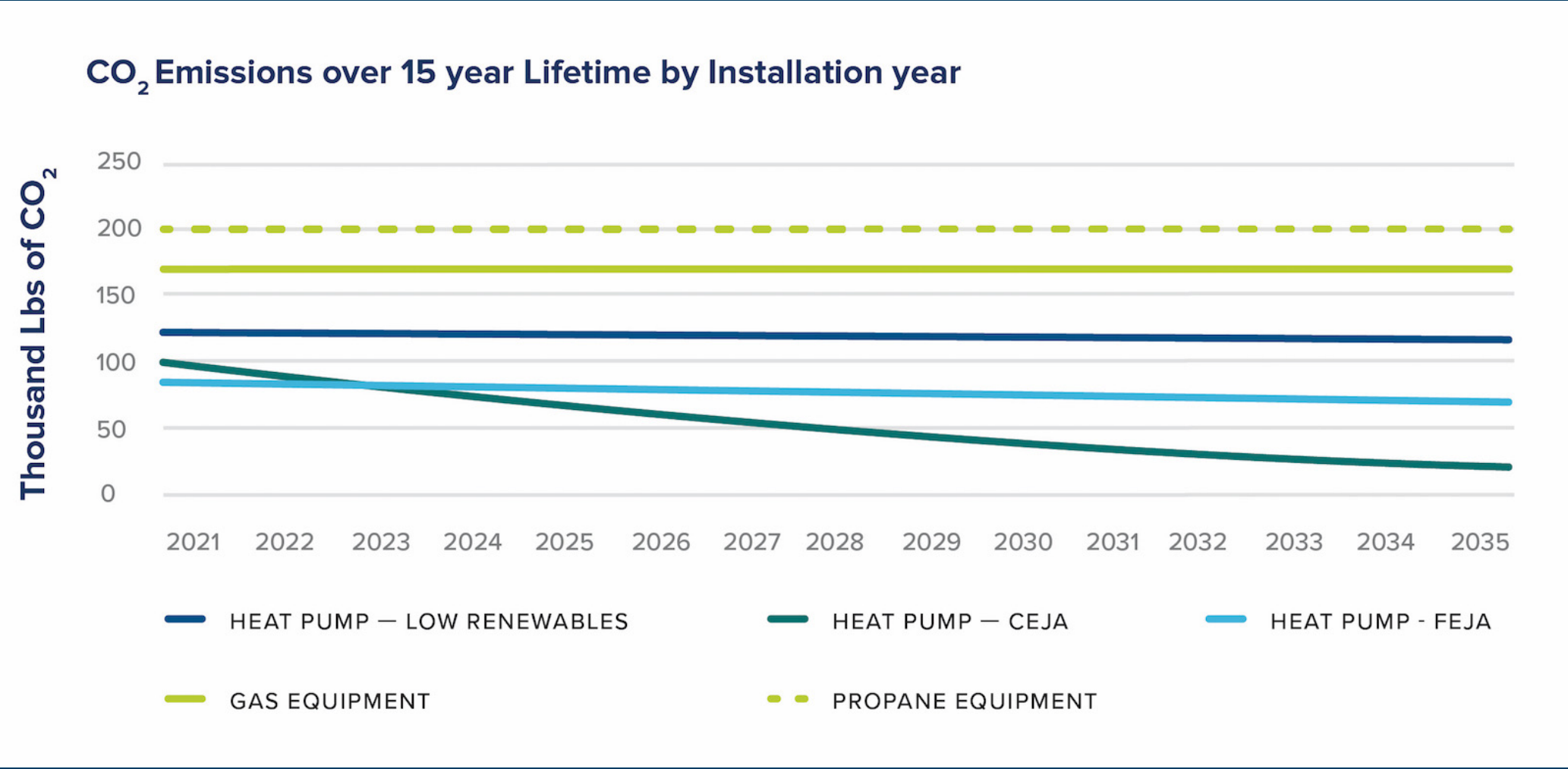


A heat pump uses small amount of electricity to move heat rather than generate heat

- Is different and more efficient than resistance heating
- Provides heating AND cooling
- Heat pumps deliver two to four times more heating energy than the electricity it consumes
- Even burning gas in a power plant to run a heat pump is more efficient than a gas furnace or boiler



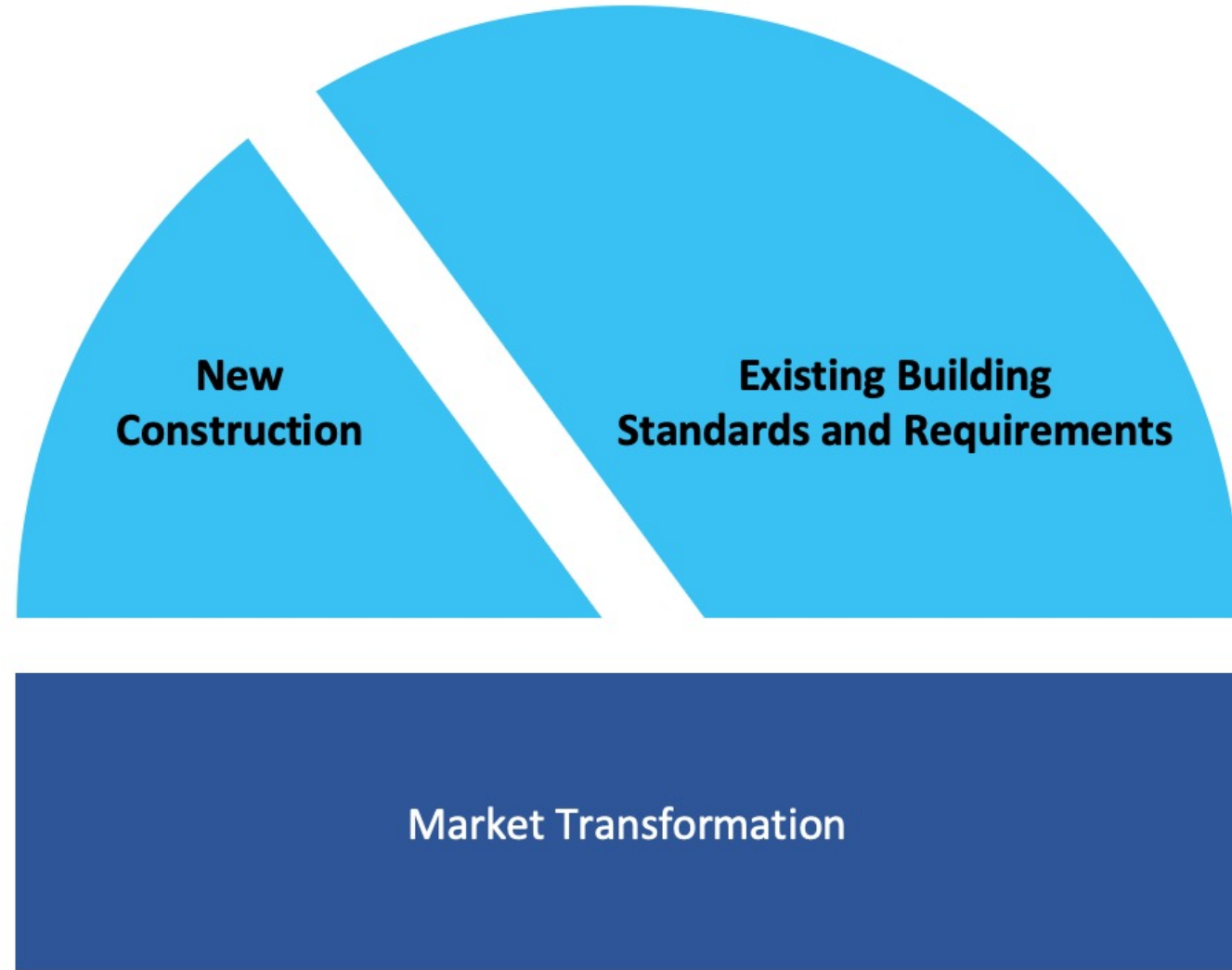
A heat pump today in Illinois will have significant emissions savings over its lifetime.



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BUILDING TRANSFORMATION PATH



Municipal Options

ESSENTIAL



SUPPORT



What Are Some Policy Options?

- Update building codes for new construction and significant renovations
- Establish zoning incentives for all-electric new construction
- New fossil fuel infrastructure prohibitions
- Building and rental performance standards

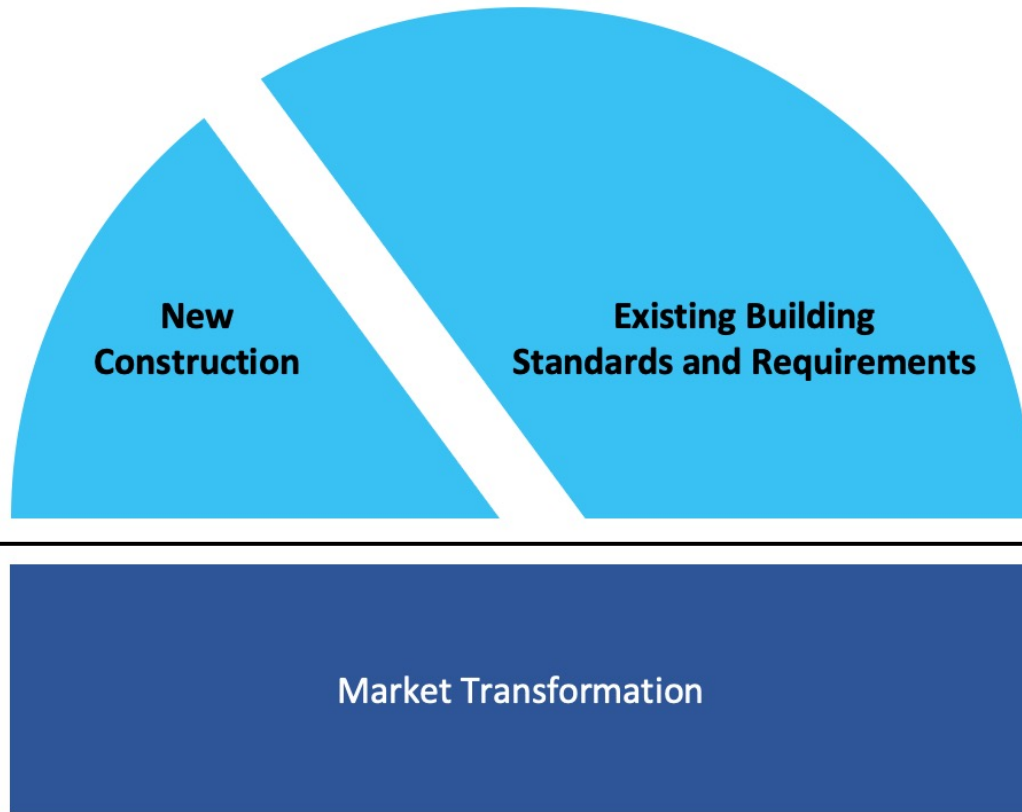
- Pilot projects
- Voluntary heat pump adoption campaigns
- Fundraise for / provide incentives
- Engage in coalitions: Midwest building decarbonization coalition, Health Working Group

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Municipality Options

ESSENTIAL
SUPPORT



What Are Some Policy Options?

- Advocacy around stretch code
 - Affordable housing QAP advocacy
-
- Energy efficiency programs: ensure utility funding can be directed at electrification
 - Advocate for a “future of gas” regulatory proceeding

Thank you!

amifsud@rmi.org

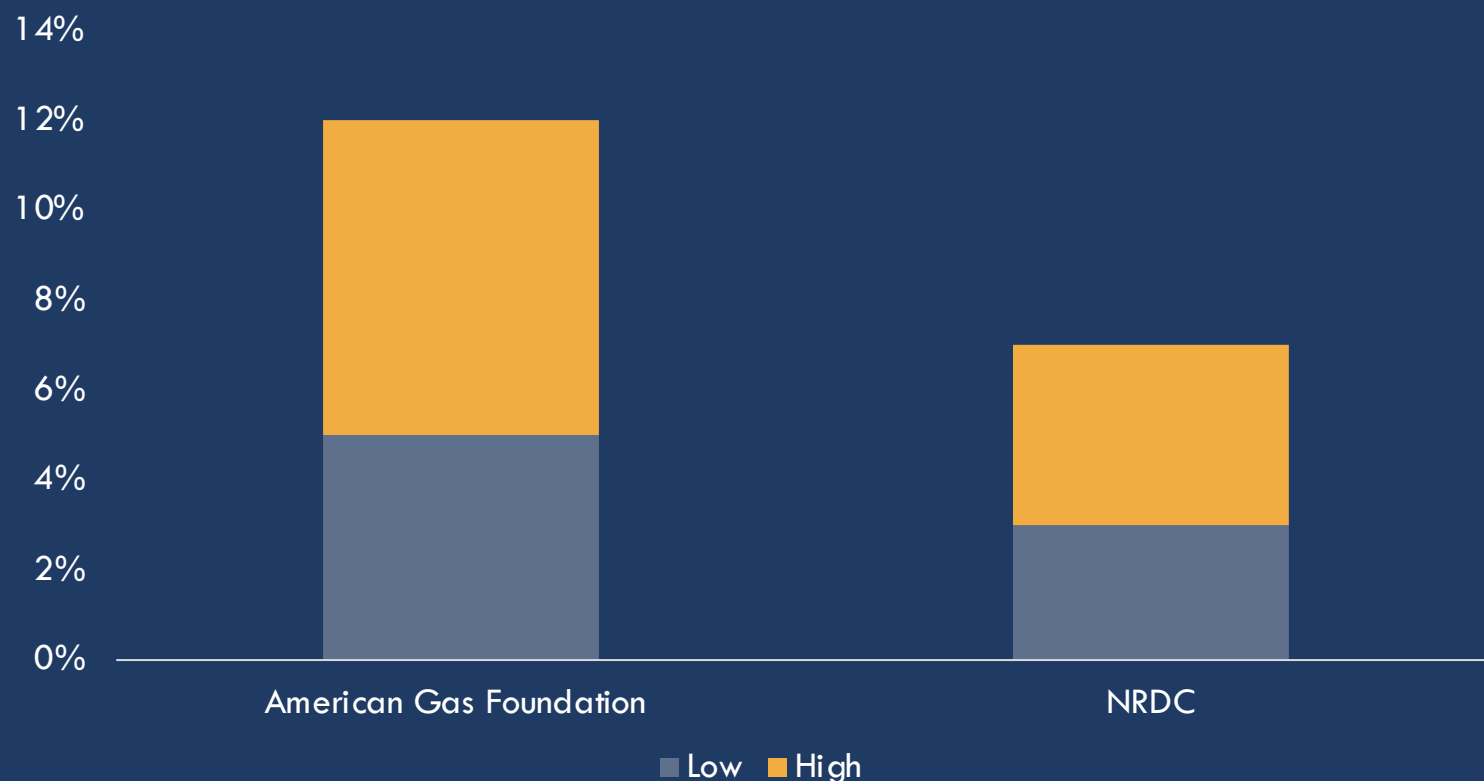
Heat Pumps Work in Cold Climates

Key issues are around back up heating and grid impacts

- There is concern over winter peaking – in a highly electrified future, the electric grid could be strained during the coldest days of the year. Although not an immediate concern, key mitigating strategies include **weatherization and demand response programs.**
- **Ground and water source heat pumps function well without much reduction in efficiency in extreme temperatures**
- **Today modern air-source heat pumps work without back up to -15°F**
- **Electric resistance or existing fossil fuel infrastructure can be used for backup heating – some heat pump programs leave existing fossil fuel infrastructure as back up source of heating, but electric resistance heating is also effective.**

“Renewable Natural Gas” is not a viable alternative to decarbonize gas use widely

“Renewable Natural Gas” supply by 2040 compared to 2019 U.S. Demand



“Renewable natural gas” refers to **biogas** and **synthetic gas**

Even most optimistic analysis show that “renewable natural gas” would meet **at most meet 12% of U.S. demand** by 2040

Biogas gets more expensive over time and synthetic gas is expected to be **8-17 x more expensive** than fossil fuel gas

Heat pumps can be cost-effective for new construction and, in some cases, for retrofits

Heat pump programs can drive cost down and stimulate a supporting ecosystem

- **New construction - heat pumps are usually lower cost**
- **Electric resistance - efficiency leads to significant cost savings**
- **Delivered fuels - high cost of propane and heating oil make investments in heat pumps a good payback for these customers**
- **Avoid gas infrastructure - cost of extending gas delivery or gas expansion projects can be avoided**
- **Health and emission costs – incorporating externalized costs to justify investments**

Further reading: <https://rmi.org/insight/the-new-economics-of-electrifying-buildings>



In the US, 1 out of 3 homes cook with gas.

In Illinois, 2 out of 3 homes cook with gas.



SIERRA
CLUB

HEALTH EFFECTS FROM GAS STOVE POLLUTION

PUBLISHED MAY 5, 2020



Indoor NO₂ Emissions from Gas Stoves Often Exceed Outdoor Standards

Outdoor Standards for NO ₂	1-hr average (ppb)
US National Standard (EPA)	100
Canadian National Standard	60
California State Standard	180
Indoor Guidelines for NO ₂	1-hr average (ppb)
Canada	90
World Health Organization	106

Measured NO ₂ Emissions from Gas Stoves	Peak (ppb)
Baking cake in oven	230
Roasting meat in oven	296
Frying bacon	104
Boiling water	184
Gas cooktop - no food	82–300
Gas oven - no food	130–546



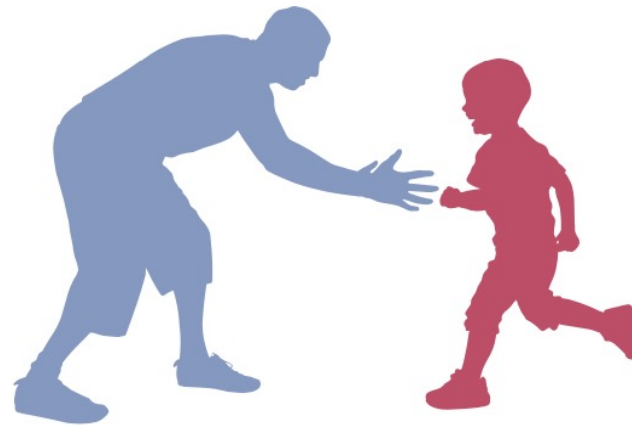
Living in a home with a gas stove increases the risk of asthma in children

42% increased risk of experiencing asthma symptoms

24% increased risk of being diagnosed with asthma by a doctor

32% increased risk of experiencing symptoms & being diagnosed by a doctor

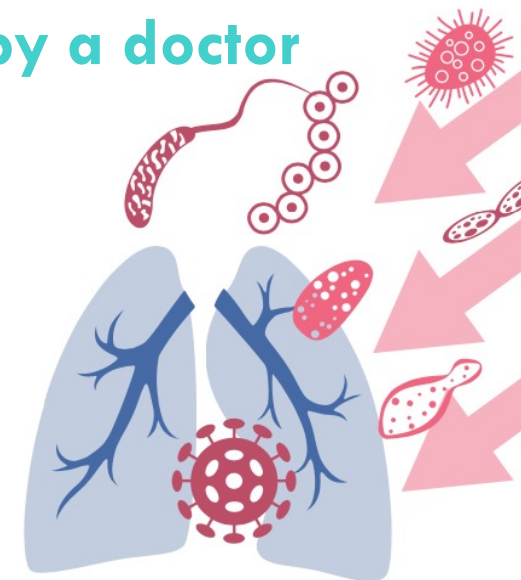
Children are more susceptible to air pollution than adults.
3 main reasons:



Higher **breathing rates**
and more **physical activity**

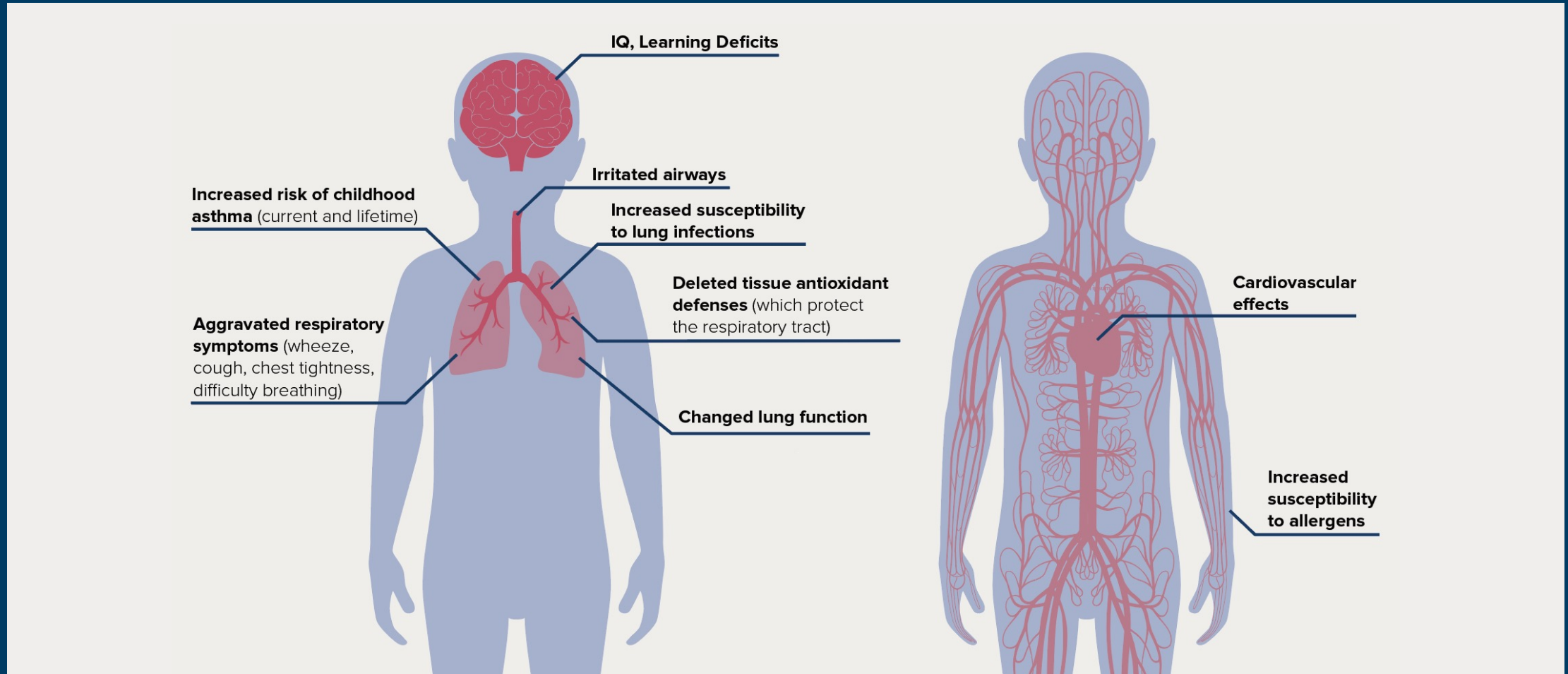


Higher lung surface to body ratios
and smaller bodies



Immature lungs and
immune systems

Health Effects of NO₂ in Children May Include:



Lower-income Households May be at a Higher Risk of Exposure to Gas Stove Pollution

FACTORS CONTRIBUTING TO HIGHER LEVELS OF NO₂ IN HOMES:



Smaller unit size



More people
per home



Older homes, inadequate
ventilation



Using the stove/ oven
for supplemental heat

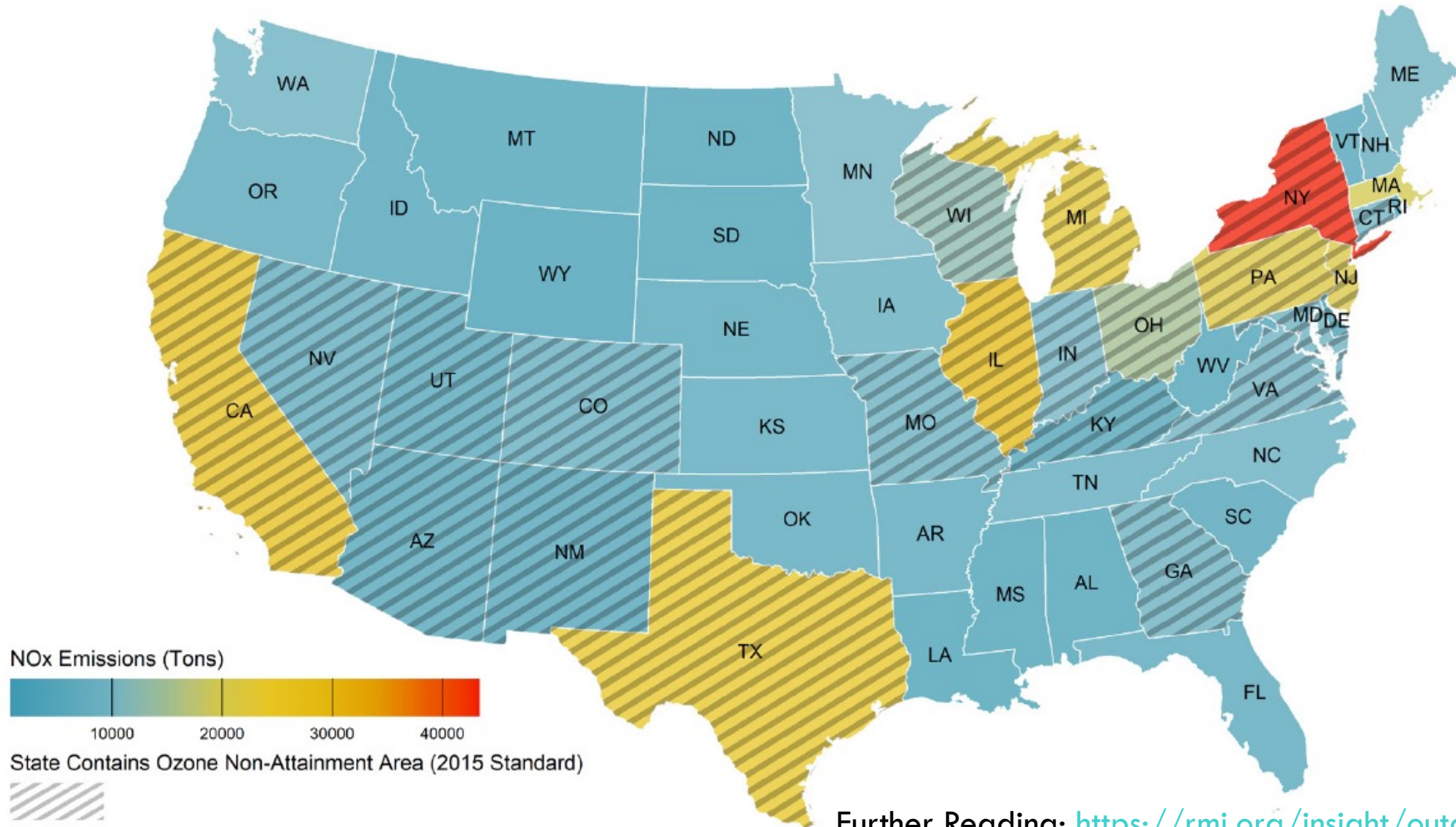


Higher exposure to
outdoor pollution



Greater asthma
burden

NO_x emissions and ozone non-attainment areas



Further Reading: <https://rmi.org/insight/outdoor-air-quality-brief/>

Note: Map depicts NO_x emissions associated with natural gas, oil, and propane combustion in residential and commercial buildings

Electric Heat Pump Technology is Efficient and Available



Hot Water



Space Heating and Cooling



Gas Stoves

To reduce or eliminate exposure to gas stove pollution

Install & maintain a CO detector

If available, run your exhaust hood while cooking

Open a window while cooking

Cook on the back burners



Use other electric appliances like toaster oven or kettle.

Try a plug-in induction stove (\$50)

Switch to an electric/induction stove



Health Co-Benefits of Building Electrification

Less exposure to harmful appliance pollution both indoors & outdoors = improved health outcomes including COVID-19



Fewer safety concerns because no gas-related leaks, explosions, fires



Better indoor air quality during wildfires & other poor air quality days since heat pumps don't draw in outdoor air



Improved thermal comfort indoors thanks to more efficient and affordable space heating & cooling with heat pumps

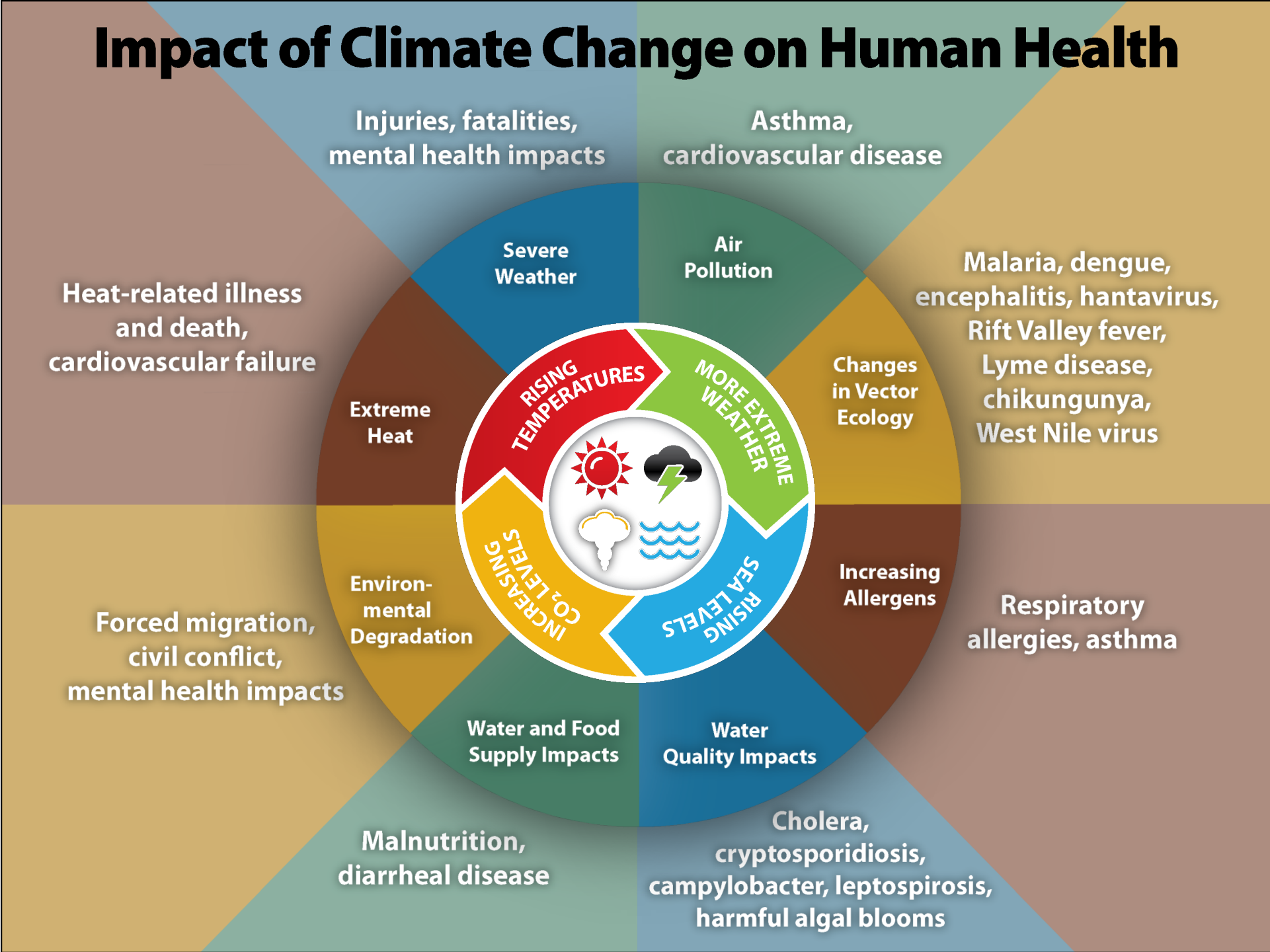


Imagine 70 million fewer US homes and businesses burning fossil fuels

Direct buildings GHG emissions by end use and sector



Impact of Climate Change on Human Health



Other states have started pursuing building decarbonization policies

- Heat pump customer & market programs – Maine, New York, Colorado (proposed, with labor standards)
- Building performance standards – St. Louis, Washington State, Washington DC
- Affordable housing funding allocation – Pennsylvania
- Building codes, including high-ambition stretch codes – Massachusetts, California
- “Clean heat” emissions standards for utilities – Colorado
- Gas planning Proceeding– New York, California, Minnesota