



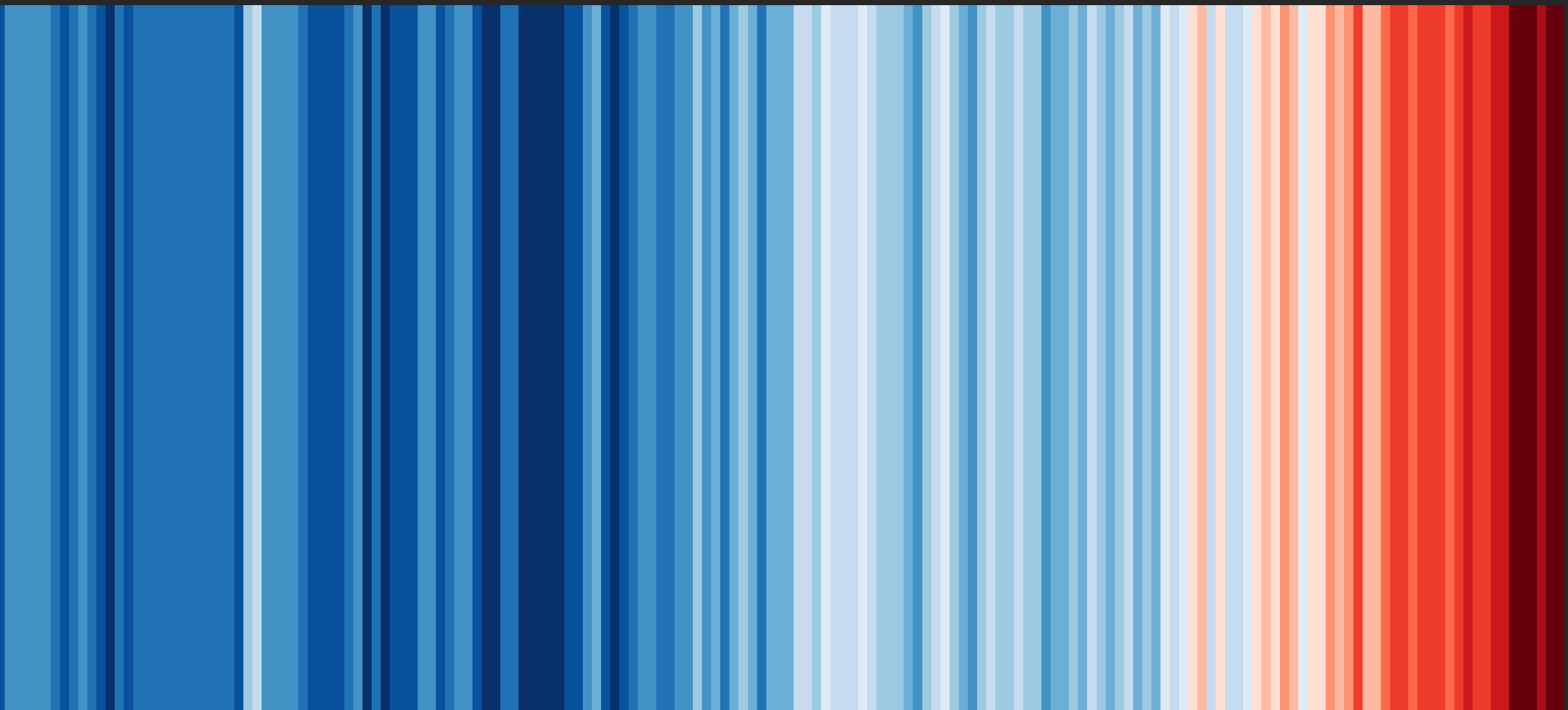
# **HOMEOWNERS & HIGH PERFORMANCE HOMES: THE STATE OF THE STATE IN 2022**

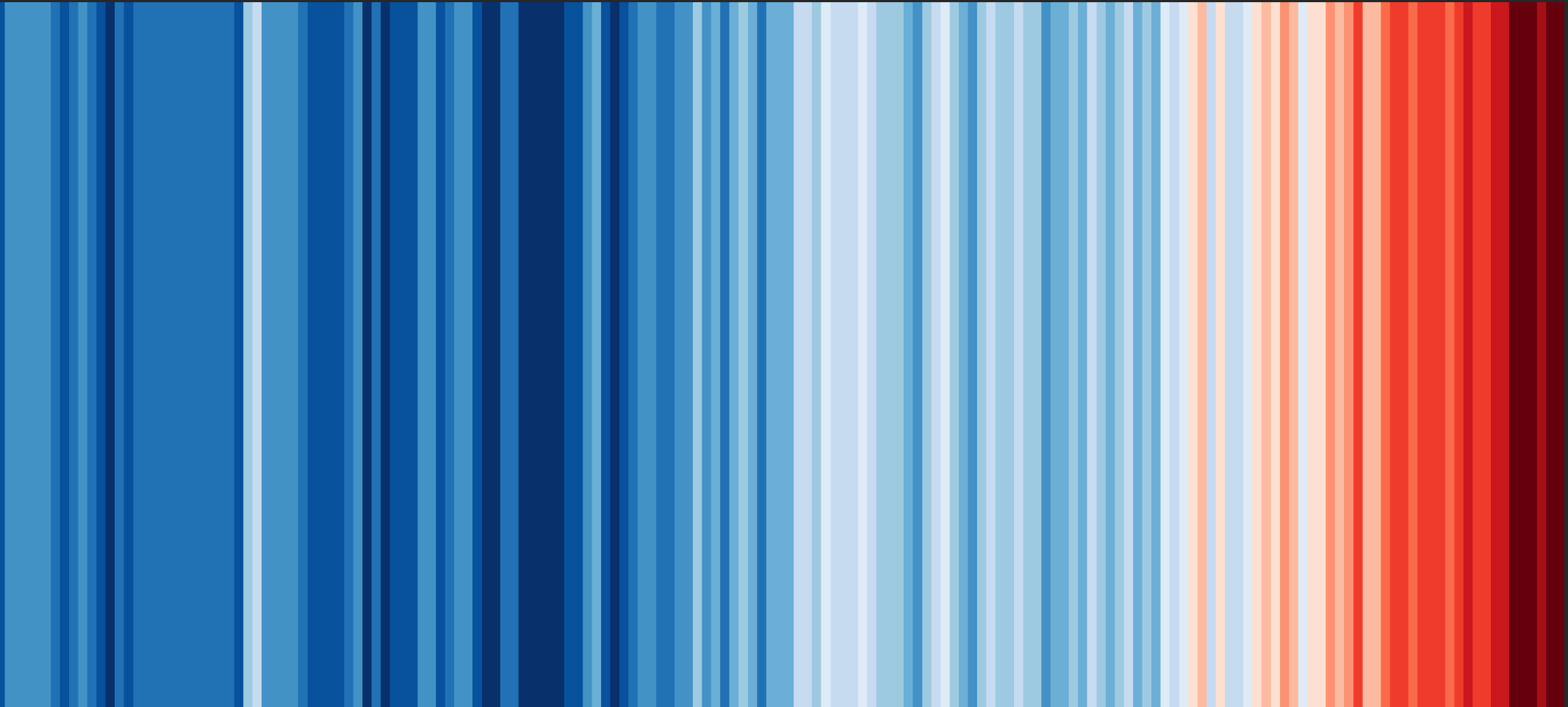
Peter Troast, Founder & CEO

Raterfest

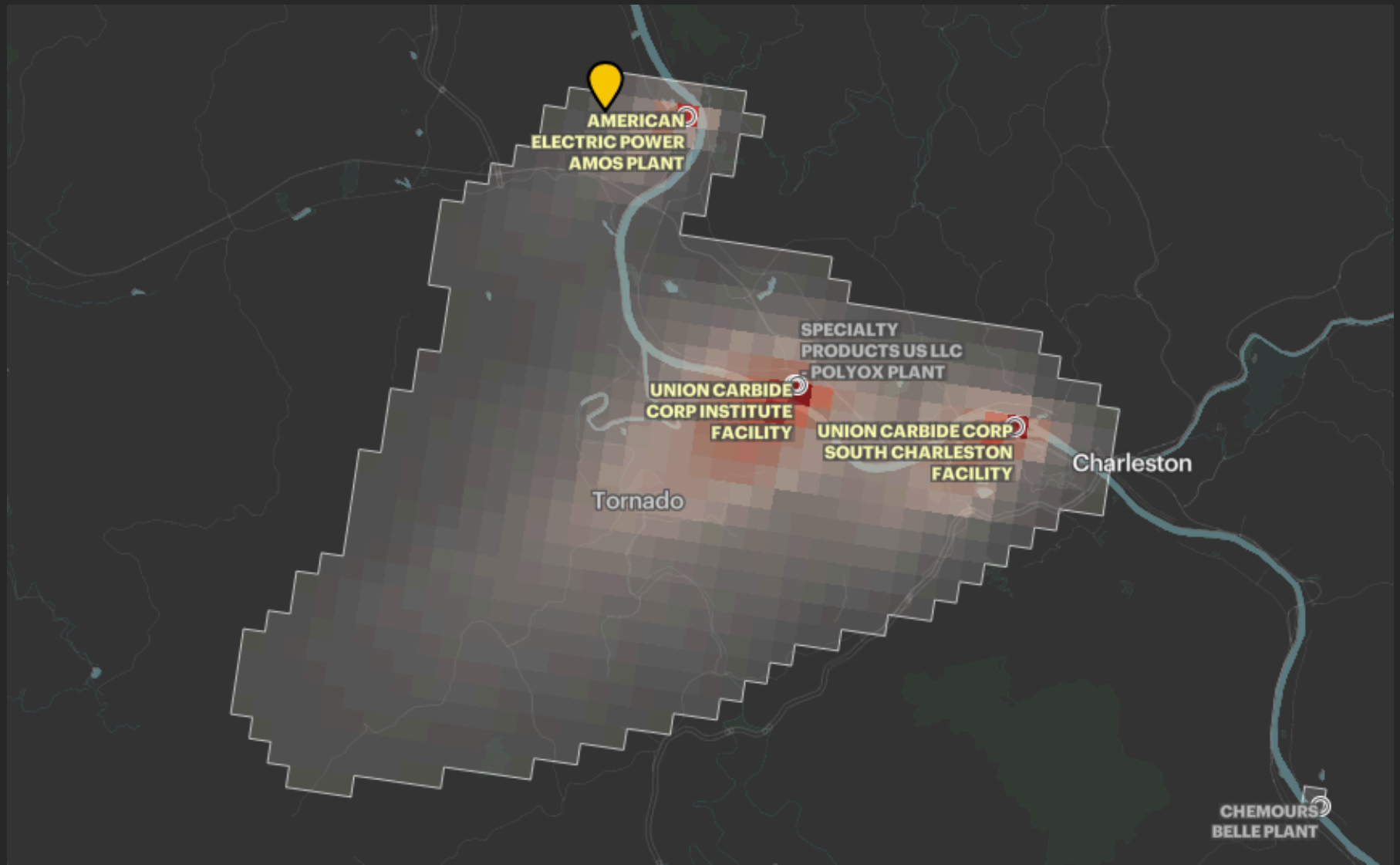
Georgetown, CO

*September 24, 2022*





Annual average global temperatures from 1850-2020  
#showyourstripes



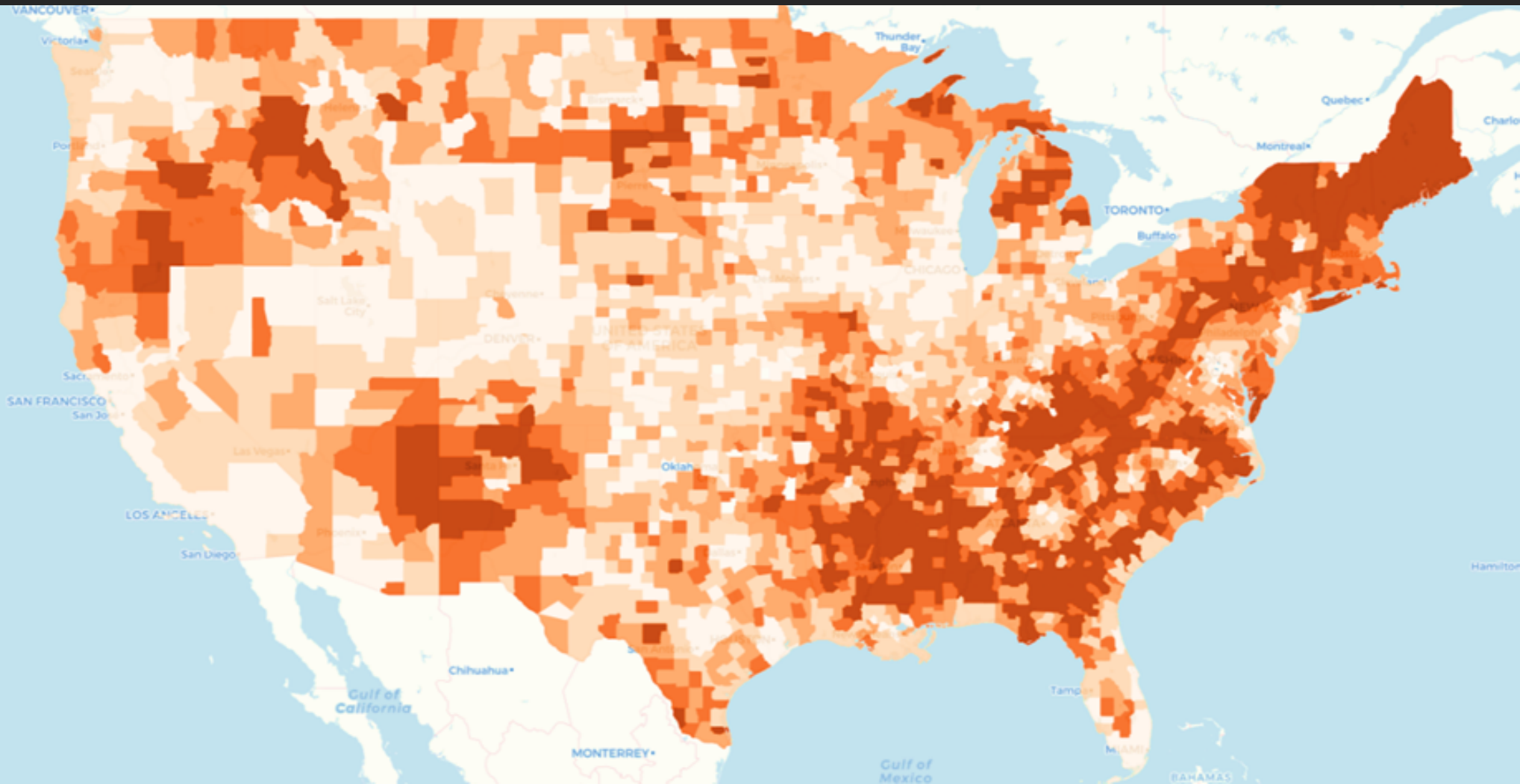
Average Income in Tornado, WV: \$27,578

Propublica





Dixie Fire. Largest in CA History



Energy Poverty for LMI Households. Red: >19% income.





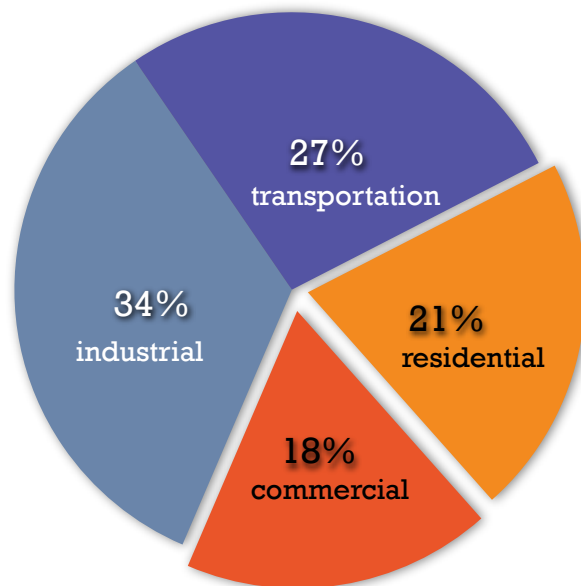


“Our world is too screwed to move slow.”

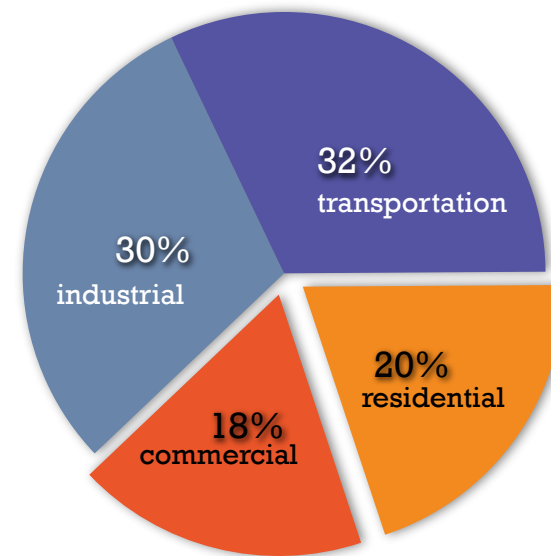
Tucker Troast

# Energy Use in the US

## Use of Energy



## Greenhouse Gas Emissions



Source: US Energy Information Adm.

Buildings are the single largest **user of energy**

Buildings are the largest contributor of **greenhouse gas emissions**



If every home built from now until 2030 was

**Net Zero**

we'd reduce residential building energy by

**~8%**







**124 Million**



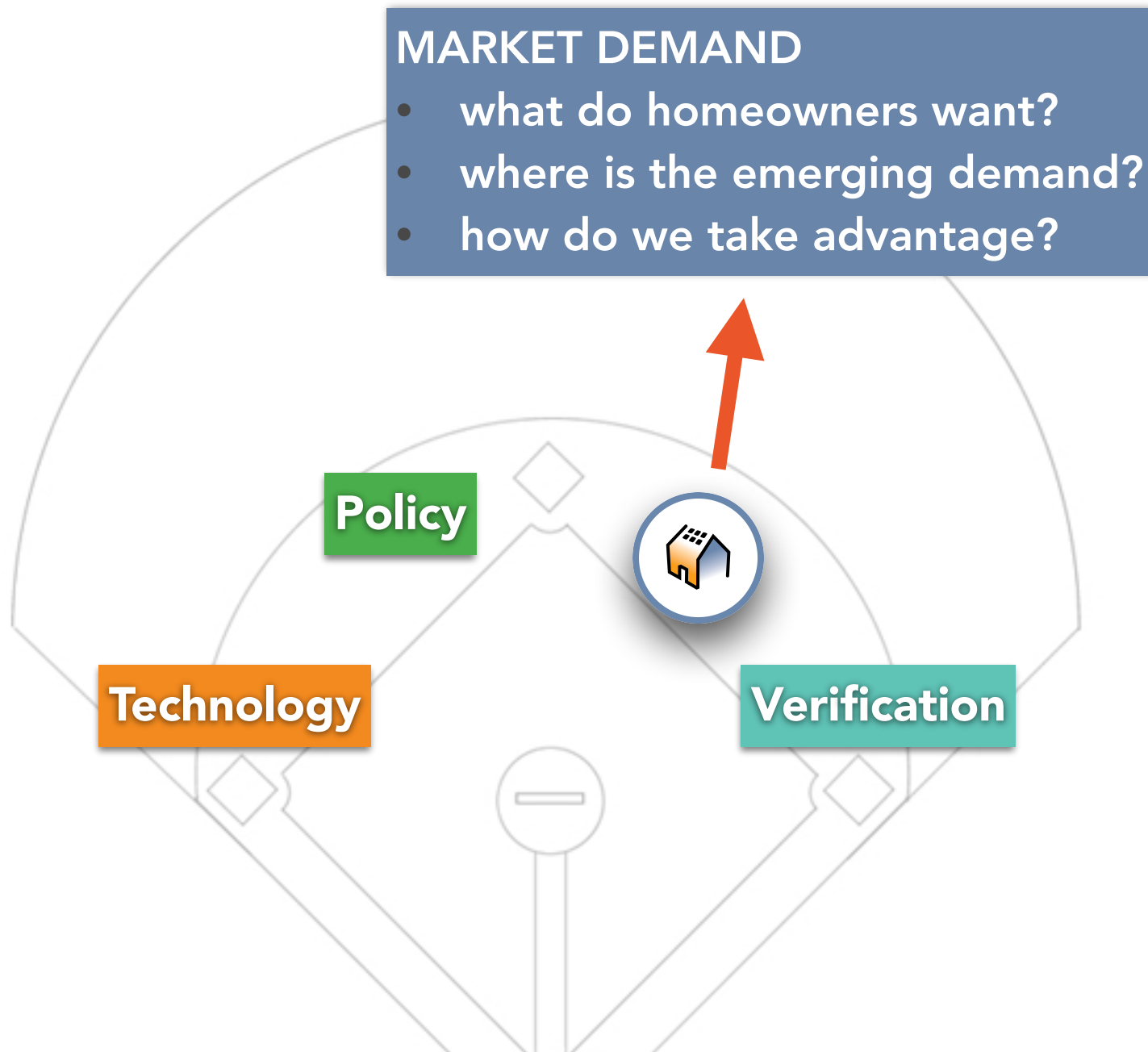
# **ENERGY CIRCLE & OUR ROLE**



# In Service to the Built Environment Transition



# Playing Our Position







**"My house is  
totally green"**

# Understanding/Building Consumer Demand

*“Energy Star House?”*

*“All Electric House?”*

*“Solar Panels?”*

*“Net Zero House?”*







# LET'S TALK BRANDS

**A brand is the way a  
product, company, or  
individual is perceived by  
those who experience it.**

**ExxonMobil**

















2014 ENERGY STAR  
CERTIFIED BUILDING

**DC DOLBY®**





PH

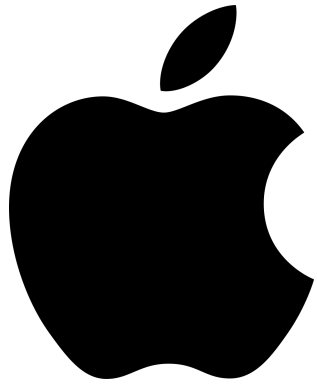
PHIUS+ CERTIFIED







**A brand is the way a  
product, company, or  
individual is perceived by  
those who experience it.**



**ExxonMobil**

**DOLBY**

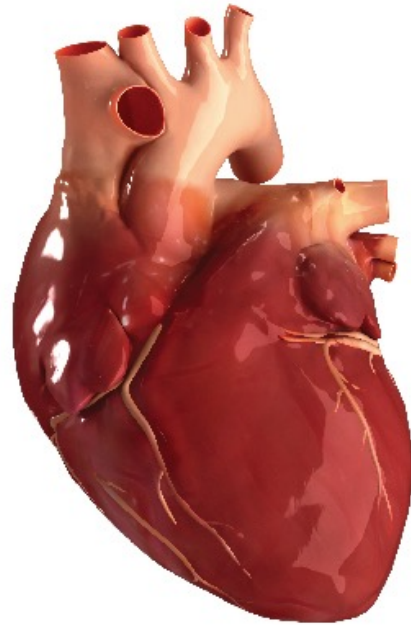






# **WHAT DO CONSUMERS THINK ABOUT HIGH PERFORMANCE BUILDINGS?**

I



**DATA**



# Learning from Google Search

passive



passive **aggressive**

passive **voice**

passive

passive **income**

passive house



passive **house**

passive **house conference**

passive **house plans**

passive **house institute**





**Google Trends shows how often a particular search-term is entered relative to the total search-volume across a region.**



# Green Building

● green building  
Search term

+ Compare

United States ▾

2004 - present ▾

All categories ▾

Web Search ▾

Interest over time ?



Google Trends, 8-9-22



# LEED

● LEED  
Search term

+ Compare

United States ▼

2004 - present ▼

All categories ▼

Web Search ▼

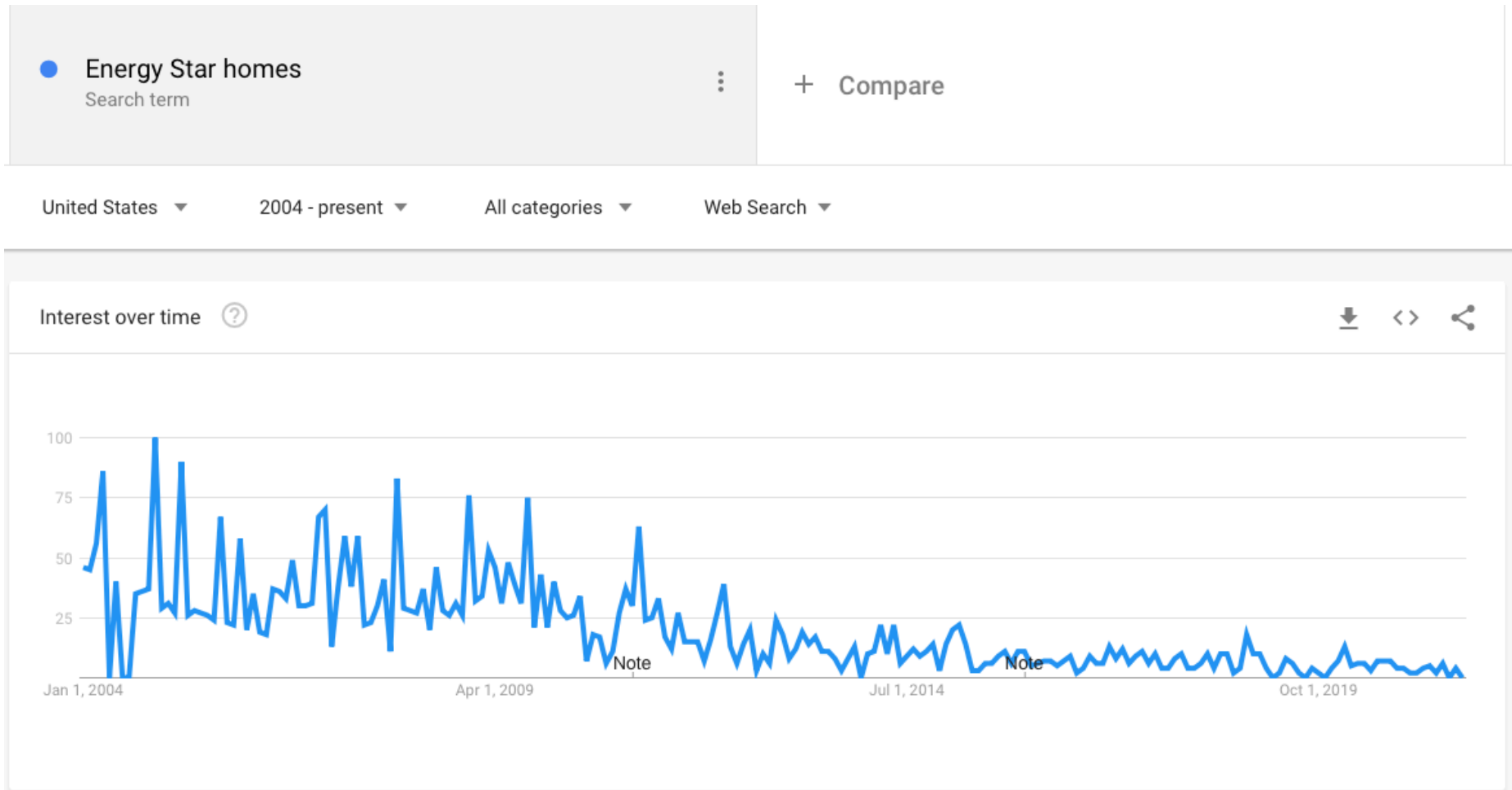
Interest over time ?



Google Trends, 8-9-22



# Energy Star Homes



Google Trends, 8-9-22



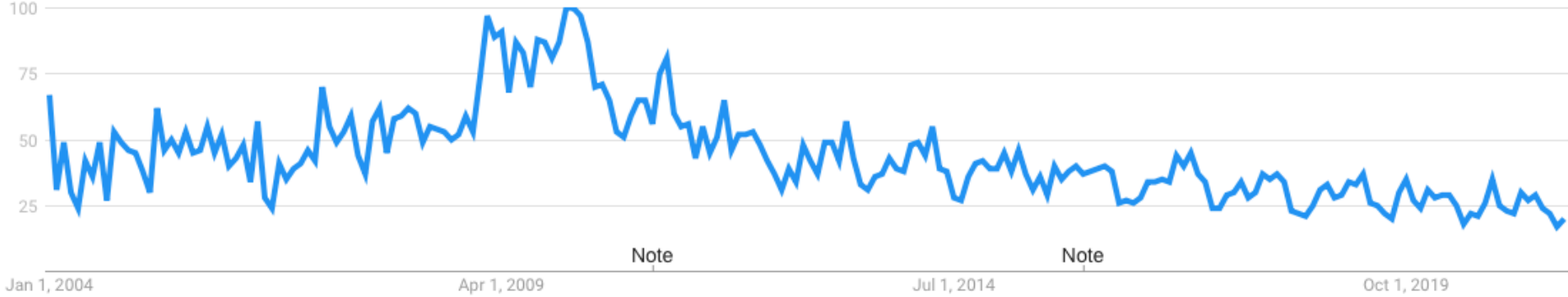
# Energy Efficiency

● energy efficiency  
Search term

+ Compare

United States ▾ 2004 - present ▾ All categories ▾ Web Search ▾

Interest over time ?



Google Trends, 8-9-22





# Home Performance

● home performance  
Search term



+ Compare

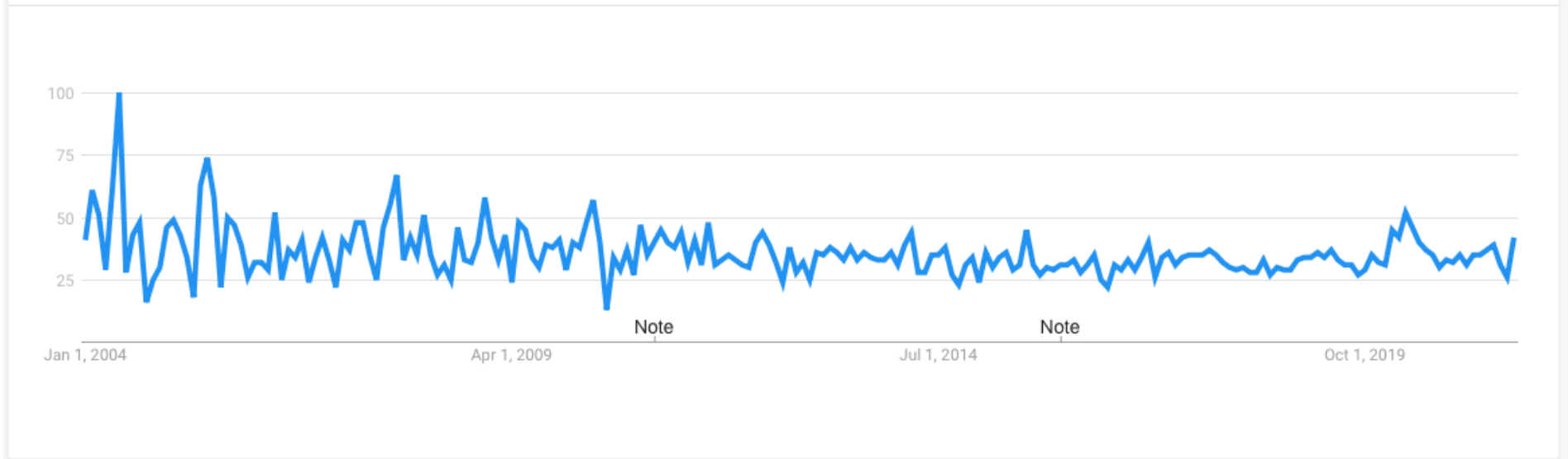
United States ▾

2004 - present ▾

All categories ▾

Web Search ▾

Interest over time ?



Google Trends, 8-9-22



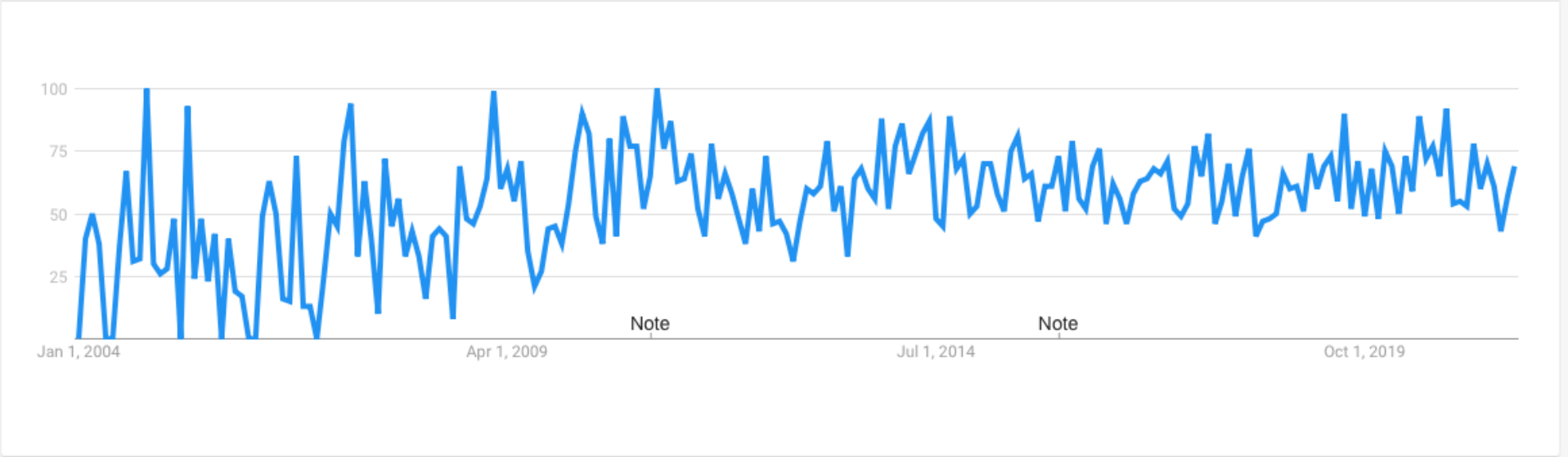
# Passive House

● passive house  
Search term

+ Compare

United States ▼ 2004 - present ▼ All categories ▼ Web Search ▼

Interest over time ⓘ



Google Trends, 8-9-22



# Net Zero Building

● net zero building  
Search term

+ Compare

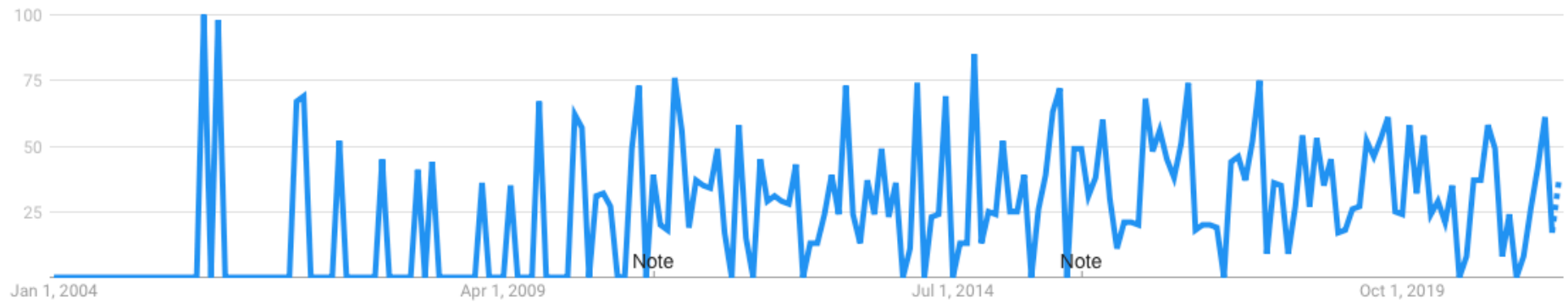
United States ▼

2004 - present ▼

All categories ▼

Web Search ▼

Interest over time ?



Google Trends, 8-9-22



# Various ZE Terms

● net zero building  
Search term

● zero energy building  
Search term

● zero energy ready  
Search term

+ Add comparison

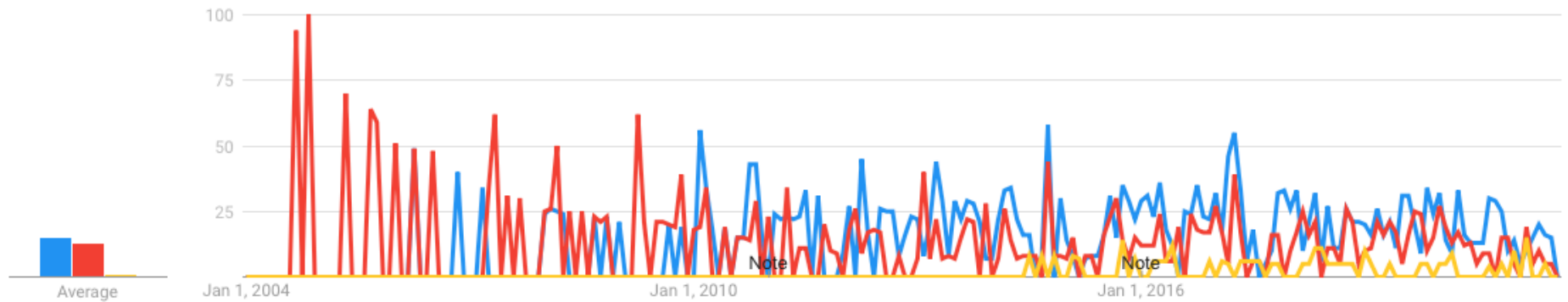
United States ▼

2004 - present ▼

All categories ▼

Web Search ▼

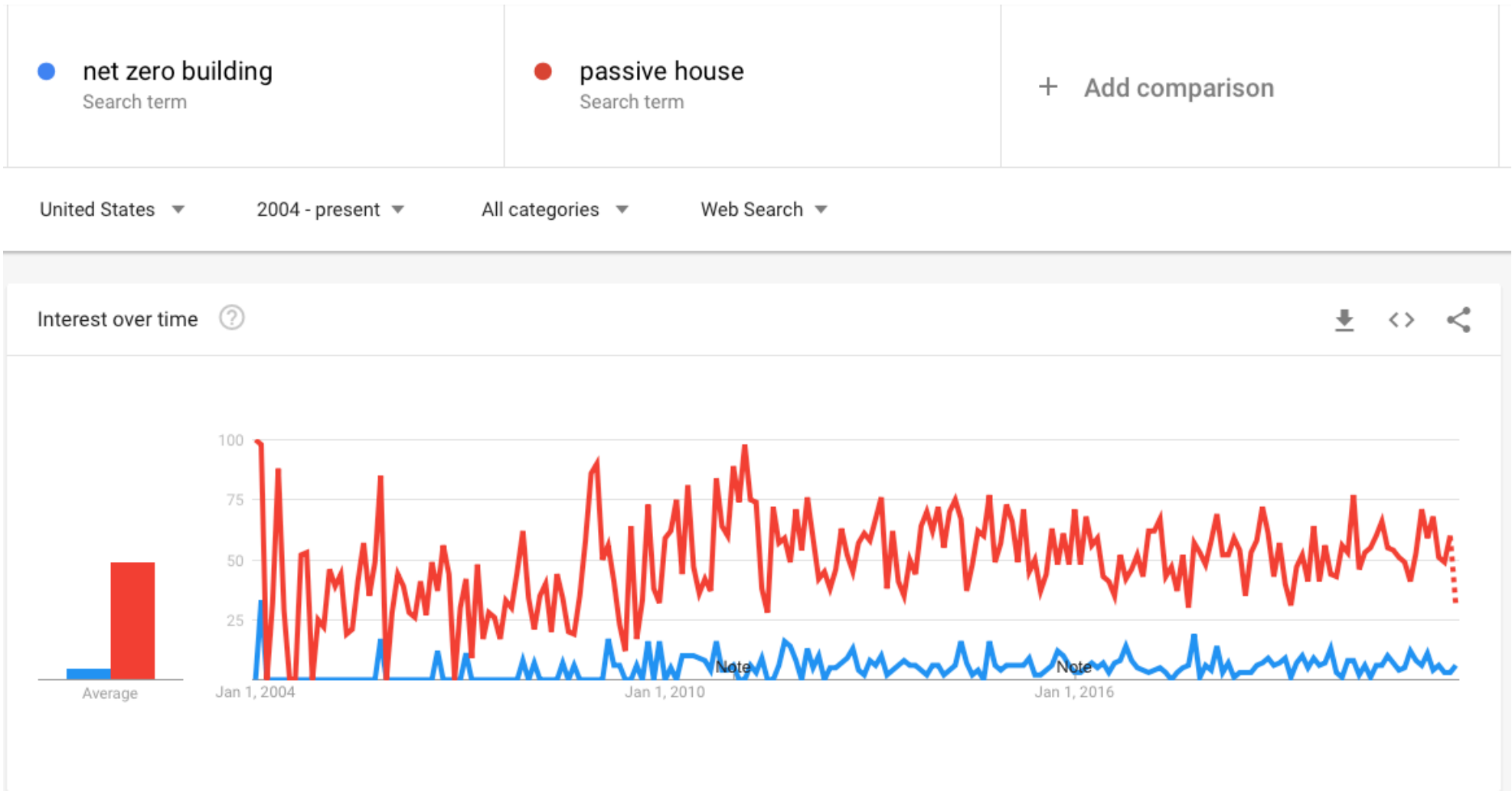
Interest over time ?



Google Trends, 8-9-22



# Net Zero vs Passive House



Google Trends, 8-9-21





# Energy Star Homes vs Passive House

● energy star homes  
Search term

● passive house  
Search term

+ Add comparison

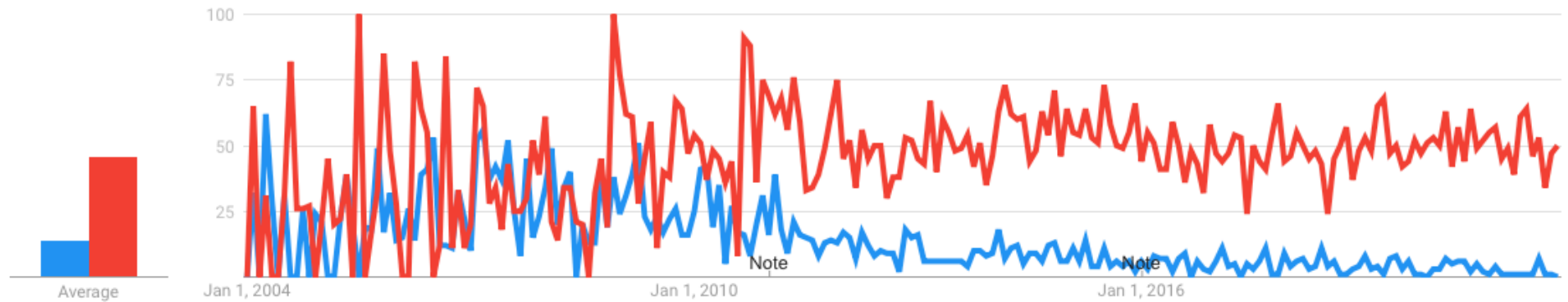
United States ▾

2004 - present ▾

All categories ▾

Web Search ▾

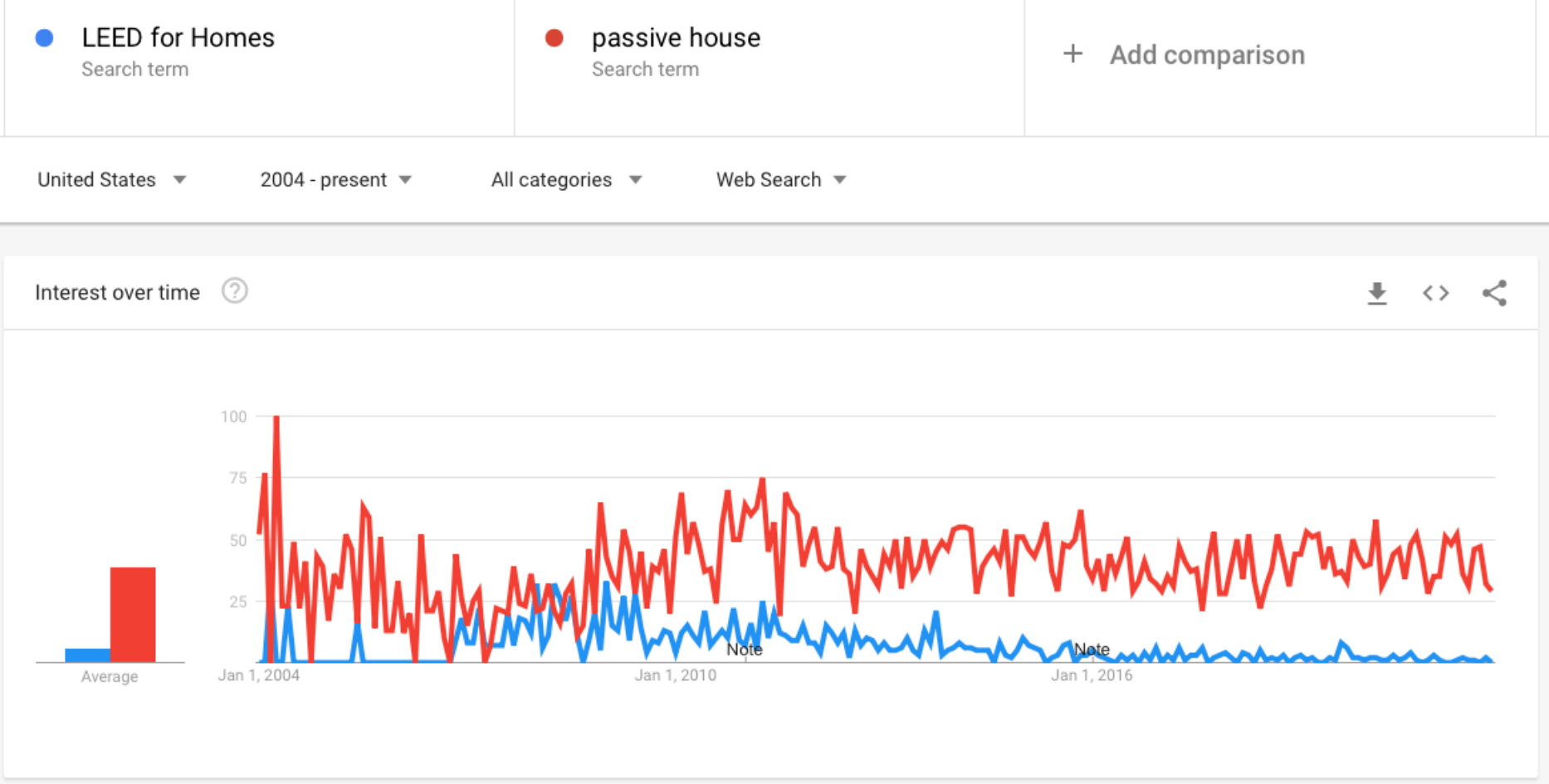
Interest over time ?



Google Trends, 8-9-22



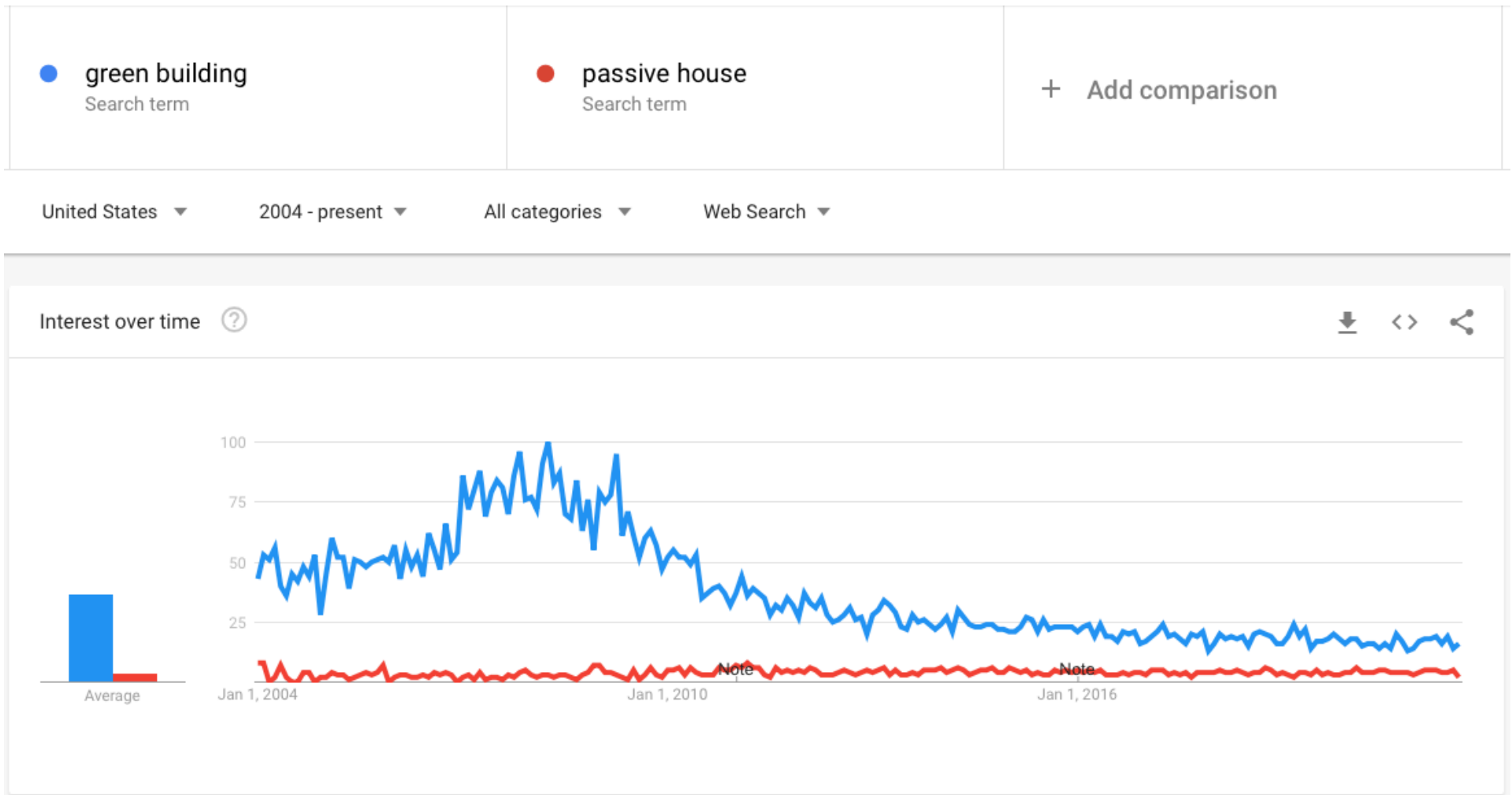
# LEED for Homes vs Passive House



Google Trends, 8-9-22



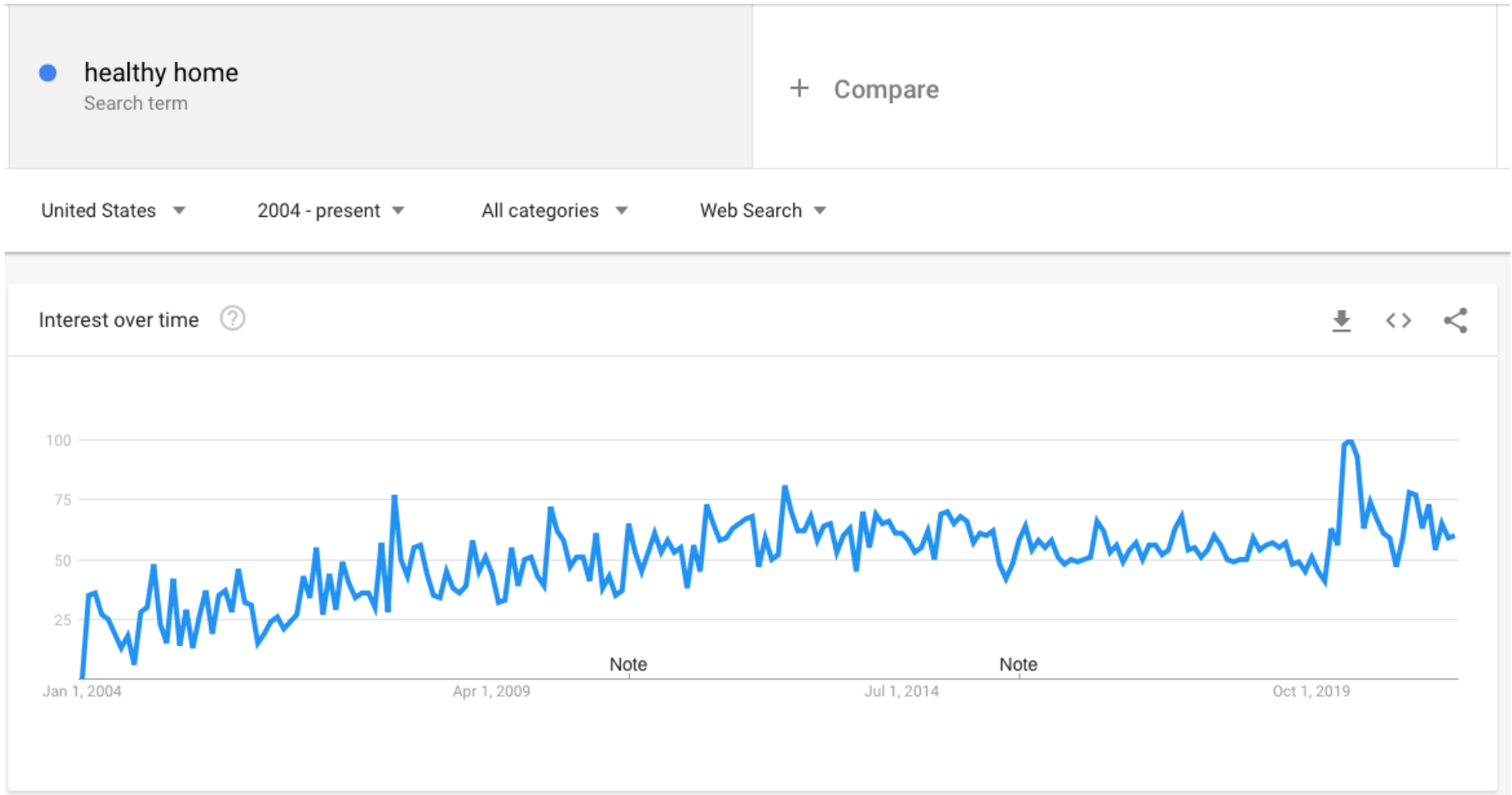
# But...It's All Relative



Google Trends, 8-9-22



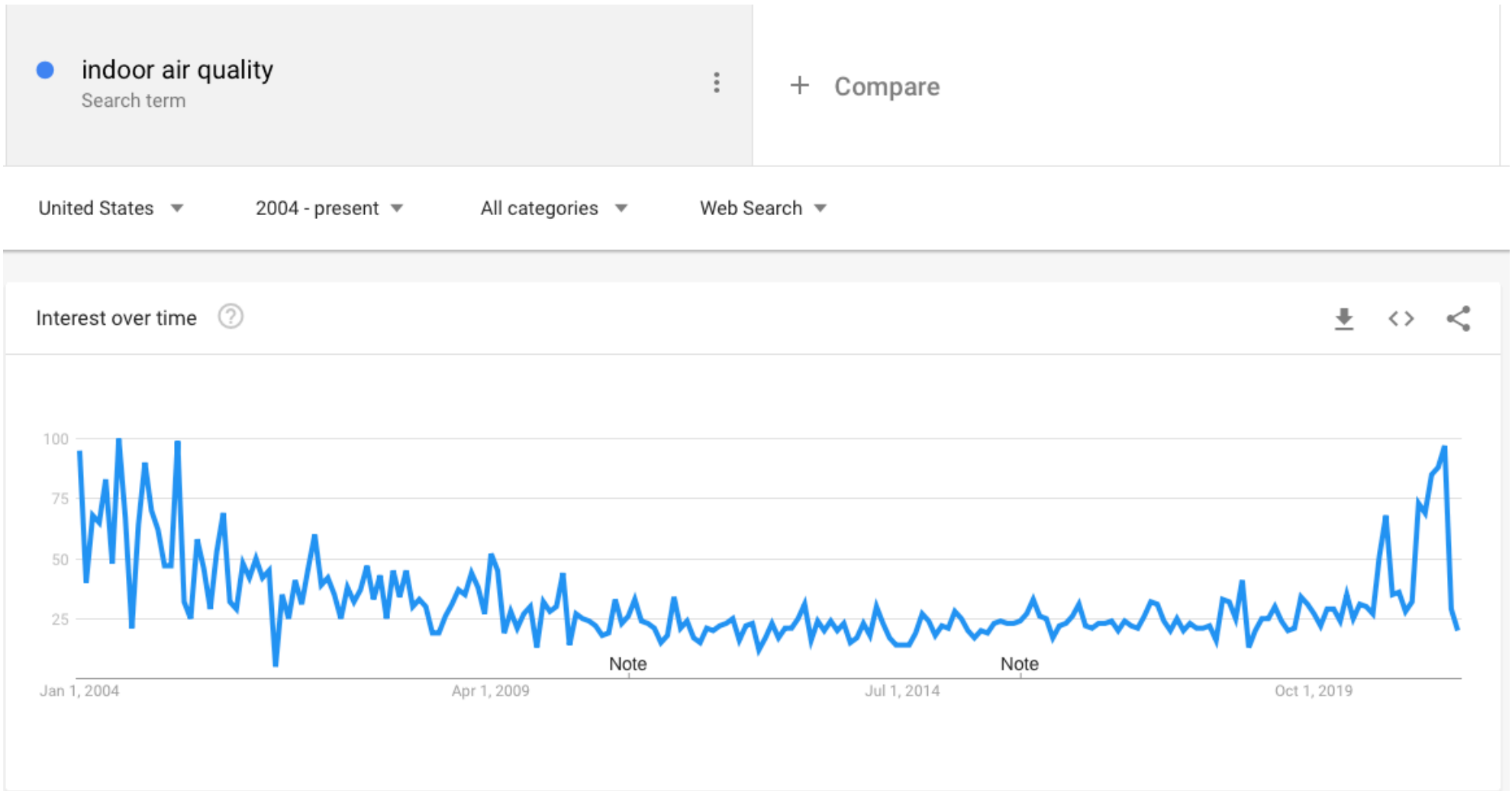
# "skate to where the puck is going to be"



Google Trends, 8-9-22



# Recent Rise of Indoor Air Quality



Google Trends, 8-9-22





# The key to tackling climate change: electrify everything

By David Roberts | @drvox | david@vox.com | Updated Oct 27, 2017, 8:48am EDT

f | Twitter | SHARE



(Shutterstock)

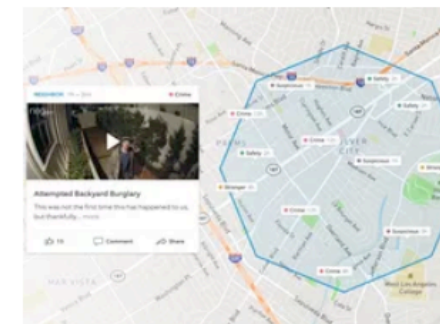
Tackling climate change is a complicated undertaking, to say the least. But here's a good rule of thumb for how to get started:

Electrify everything.

Powered by TripleLift

**SPONSORED VIDEO**  
Watch to learn more  
**Ad** Tdameritrade.Com

## MOST READ



The rise of fear-based social media like Nextdoor, Citizen, and now Amazon's Neighbors



Action Plan to Accelerate Strategic  
Electrification in the Northeast

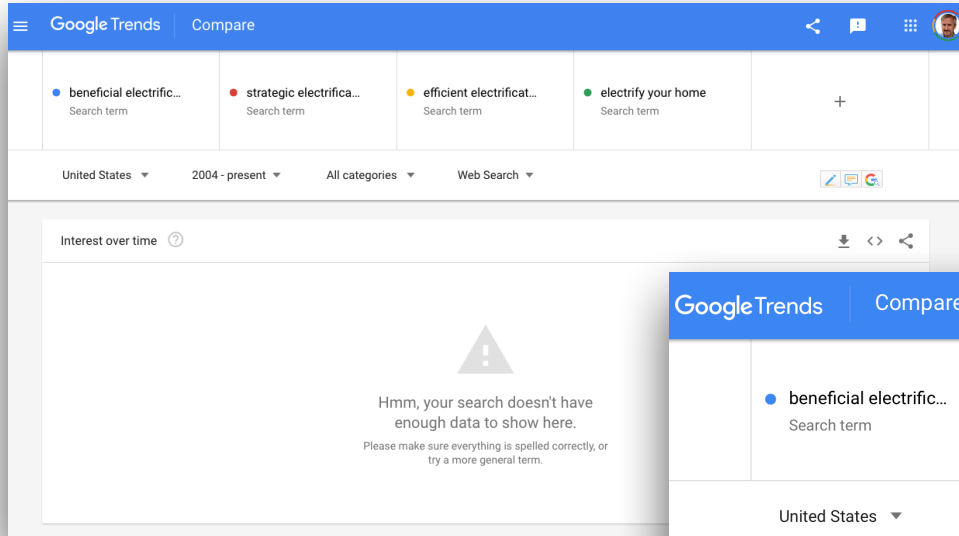
# Wonk Talk

- **Beneficial Electrification**
- **Strategic Electrification**
- **Efficient Electrification**
- **De-Carbonization**
- **Home Electrification**
- **Electrify Everything**

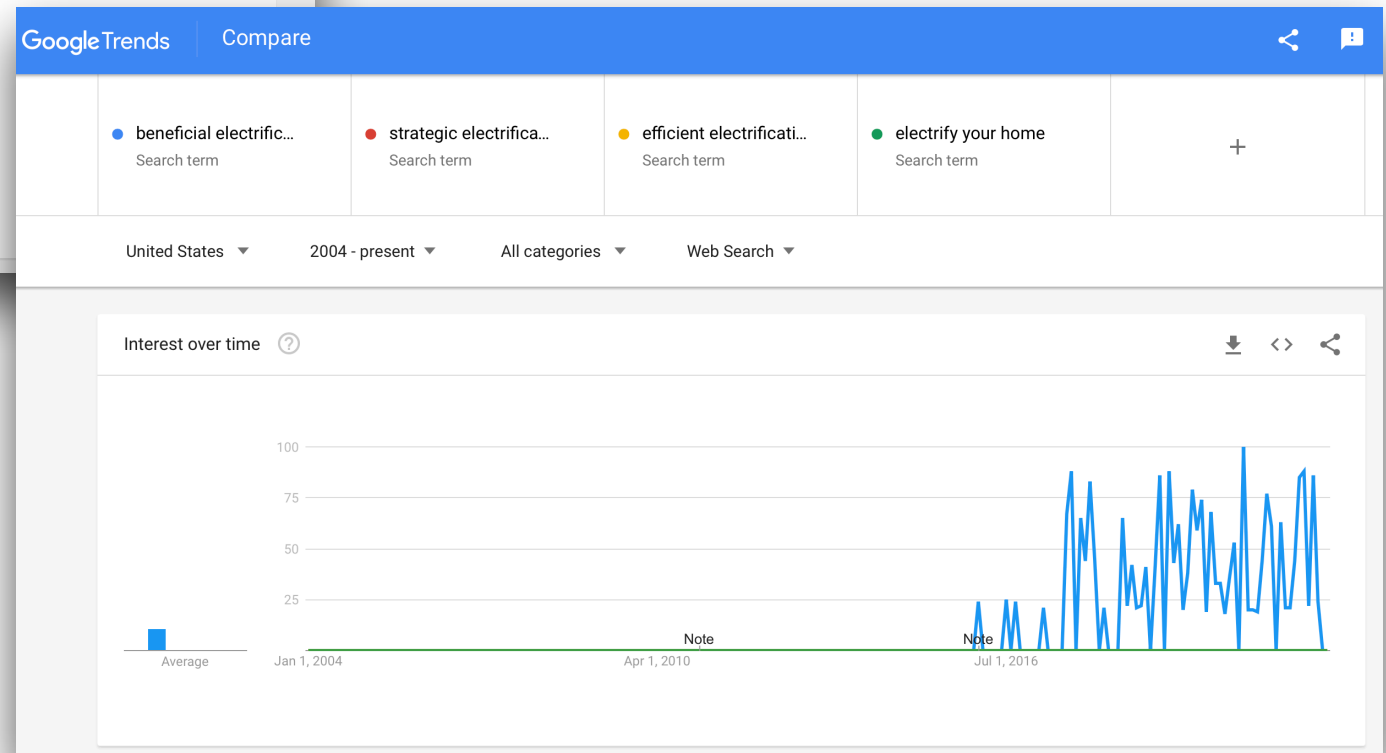


# Even Google Says...Hmm

## 2019



## 2022



# Electrification as Market Driver

● all electric home  
Search term

+ Compare

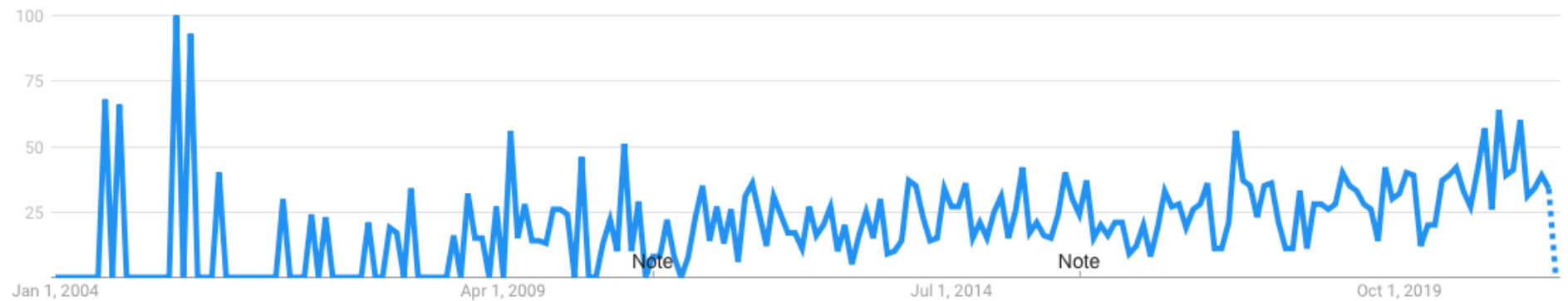
United States ▾

2004 - present ▾

All categories ▾

Web Search ▾

Interest over time ⓘ



Google Trends, 8-9-22







**electrification**  
Search term

**gas to electric**  
Search term

**decarbonization**  
Search term

+ Add comparison

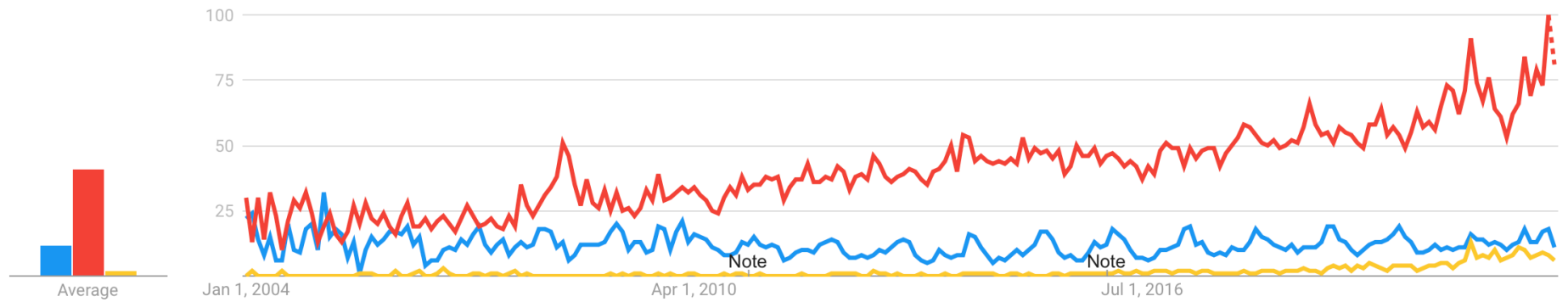
United States ▾

2004 - present ▾

All categories ▾

Web Search ▾

Interest over time ?





● home electrification  
Search term

● heat pumps  
Search term

+ Add comparison

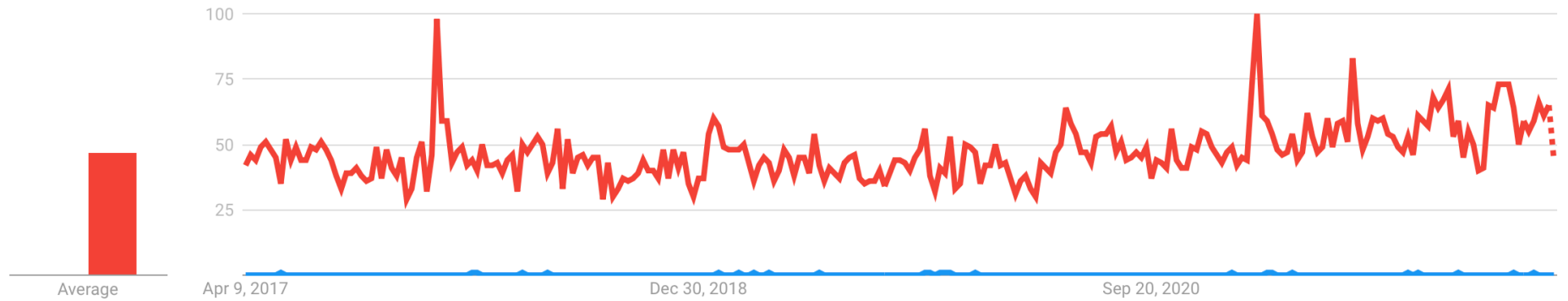
United States ▾

Past 5 years ▾

All categories ▾

Web Search ▾

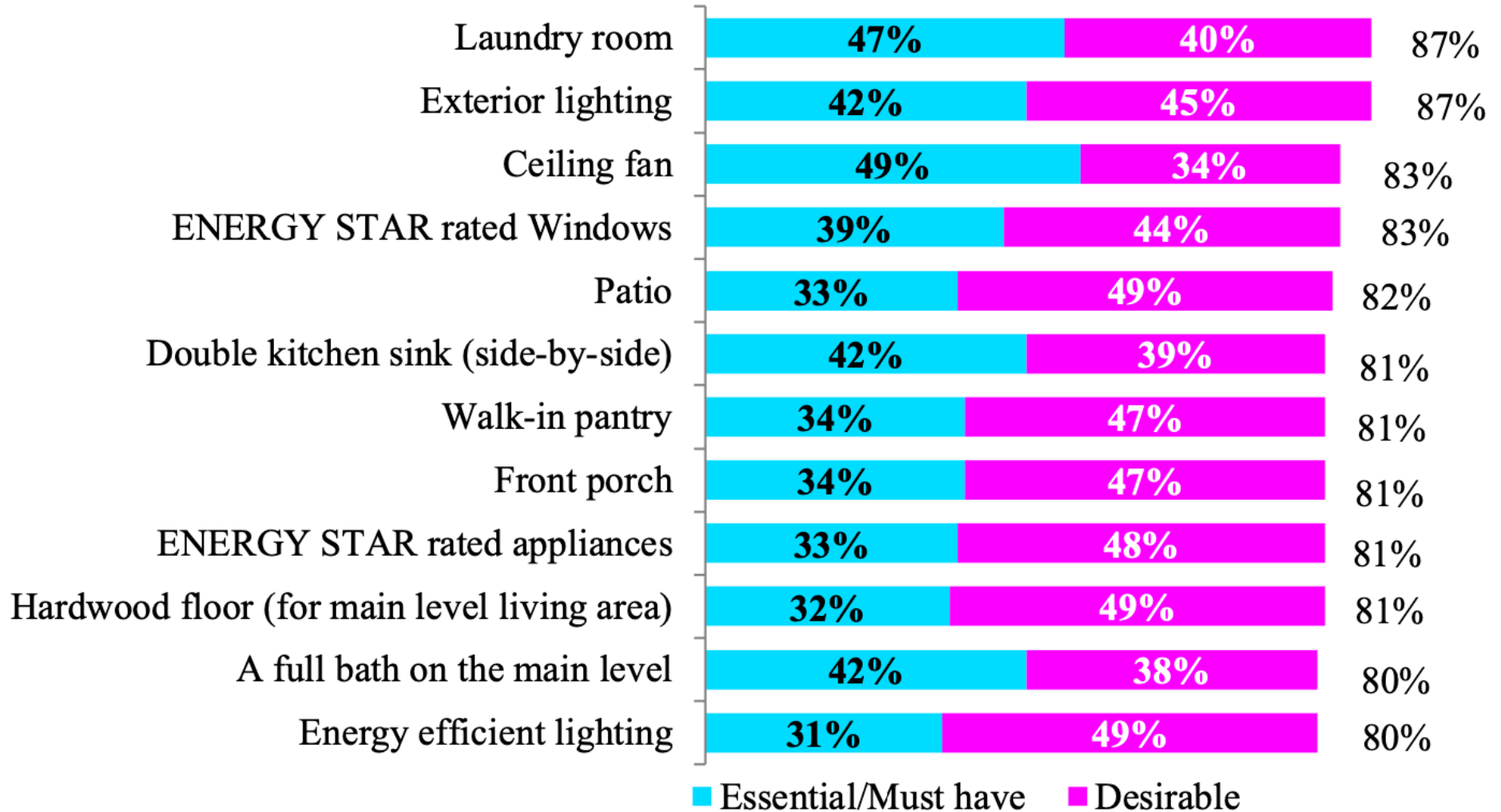
Interest over time ?





# **CHANGING DYNAMICS: WHAT DO HOMEBUYERS WANT?**

### Top Most Wanted List (Out of 200+ Features)



**NAHB: What Homebuyers Really Want, 2021. n = 3247**

We've seen for a while now that **health** and **control** are really the key drivers related to sustainability in the home.

**We predict these drivers will become exponentially more important.**

# 72%

believe their **house** has a moderate to strong **impact on their health**



# 60%

Have been at least moderately concerned  
about indoor air quality

Which has often led to considering upgrades to ventilation systems

51%

of consumers say it is important to upgrade the air ventilation system in their homes

How much each statement describe your feelings about creating and living in a healthy home?

Source: *Energy Pulse*™, Shelton Group, 2019  
n=2,028

# 25%

of the population are strong believers in the connection between a home's health and one's personal health.

Let's call them the *Healthy Home Believers*.

And

  
**58%**

of consumers looking to purchase a newly-built home are VERY INTERESTED in adding smart home features to maximize how heating/cooling systems work or using less energy overall, etc.

2019: How interested are you in adding smart home features for energy efficiency reasons – maximizing how heating/cooling systems work or using less energy overall, etc.?

Source: Energy Pulse™, Shelton Group, 2019  
n=393

Only  
**4%**

Of Americans name their homes, buildings or  
electricity production as a leading cause of  
climate change





# Understanding Home Occupant Perspectives on Decarbonization: Results from a U.S. DOE Study

**Chrissi Antonopoulos & Saurabh Biswas**  
Pacific Northwest National Laboratory

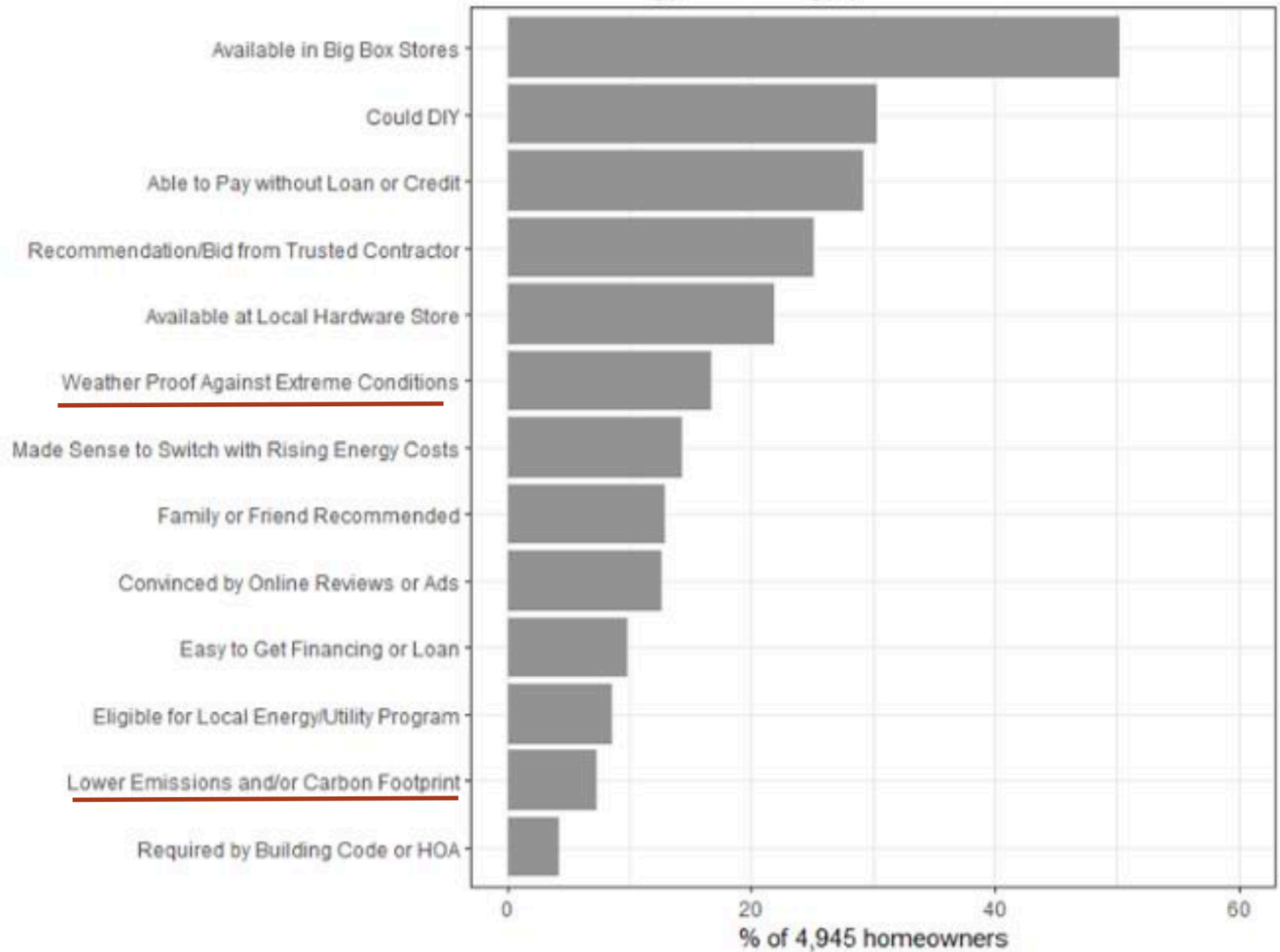


PNNL is operated by Battelle for the U.S. Department of Energy





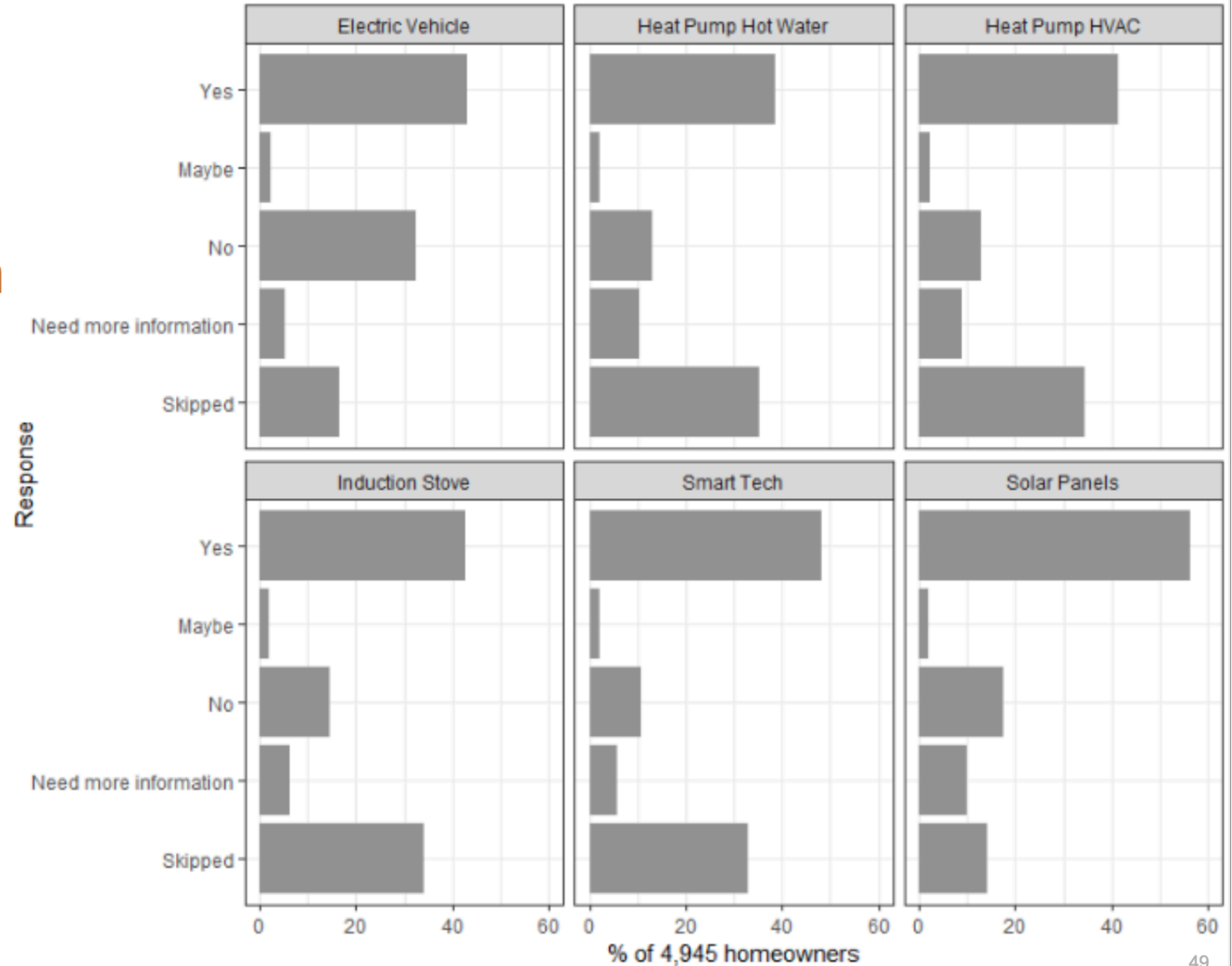
### Which factors influenced your last appliance or home energy technology purchase?



Visibility

## Willingness to buy Low Carbon Tech.

- We asked: “If affordable, would you invest in the following technologies.”
- Respondents that answered overwhelmingly said “yes” to all technologies, with EV’s being the standout with the most “No” answers (~30%).





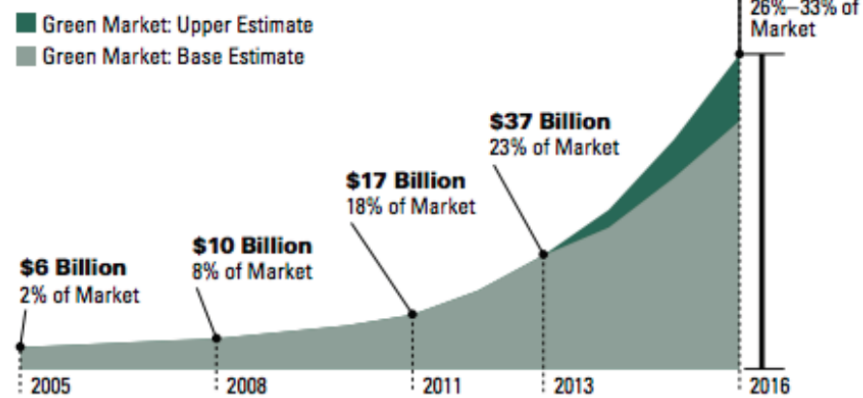
**WHAT SHARE OF THE MARKET  
SHOULD WE BE AIMING FOR?**



# Big Market?

## U.S. Single Family Housing Green Residential\* Market (Billions of Dollars)

Source: McGraw Hill Construction, 2014. Value of residential construction starts from McGraw Hill Construction Dodge Construction Market Forecasting Service, as of April 2014.



\*MHC defines a green home as one that is either built to a recognized green building standard or an energy- and water-efficient home that also addresses indoor air quality and/or resource efficiency.

## Global

\$116 billion 2020

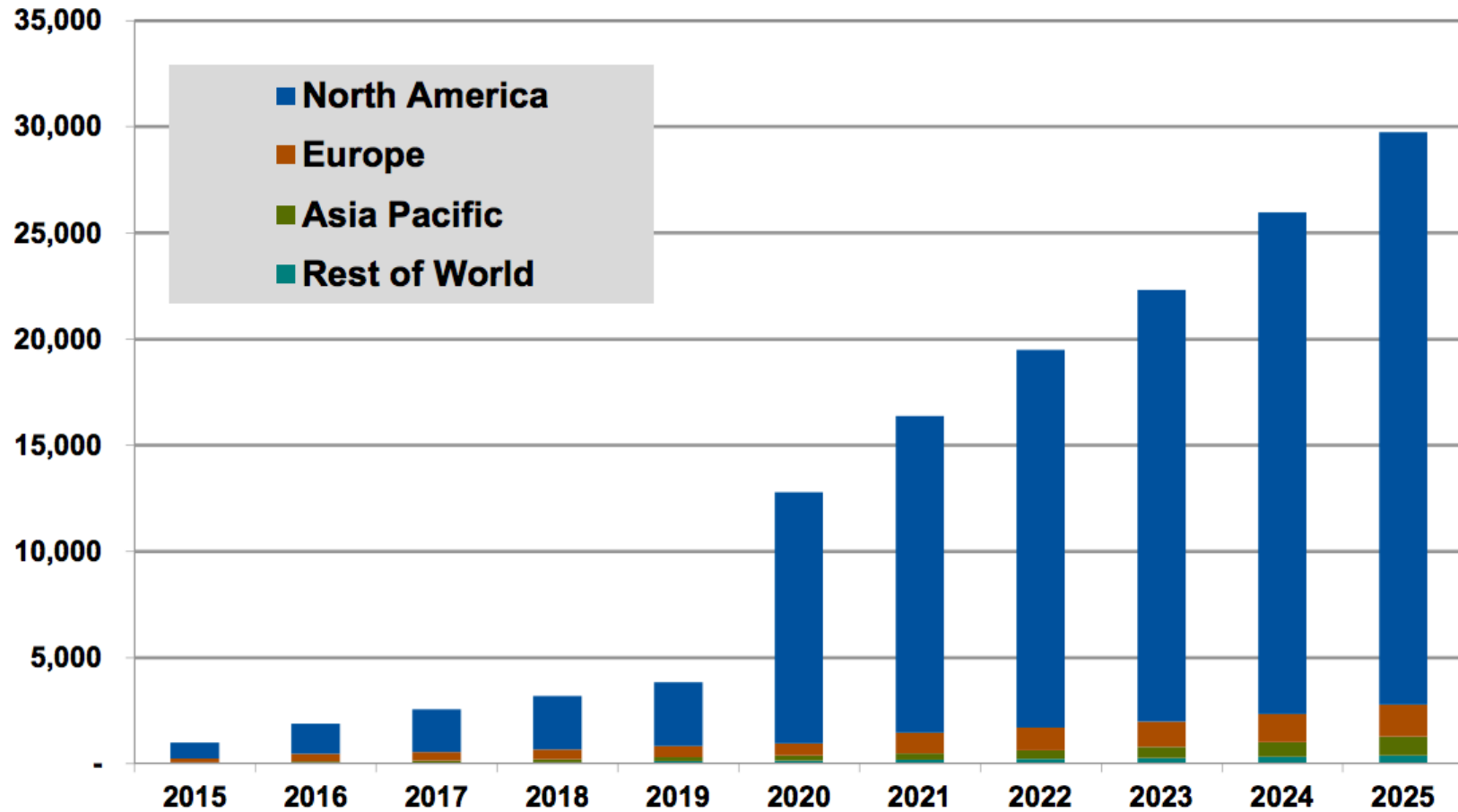
\$151 billion 2023

Research & Markets, 8/20



# Zero Net Energy Homes

**Chart 1.1** Total ZNEH Units by Region, All Categories, World Markets: 2015-2025



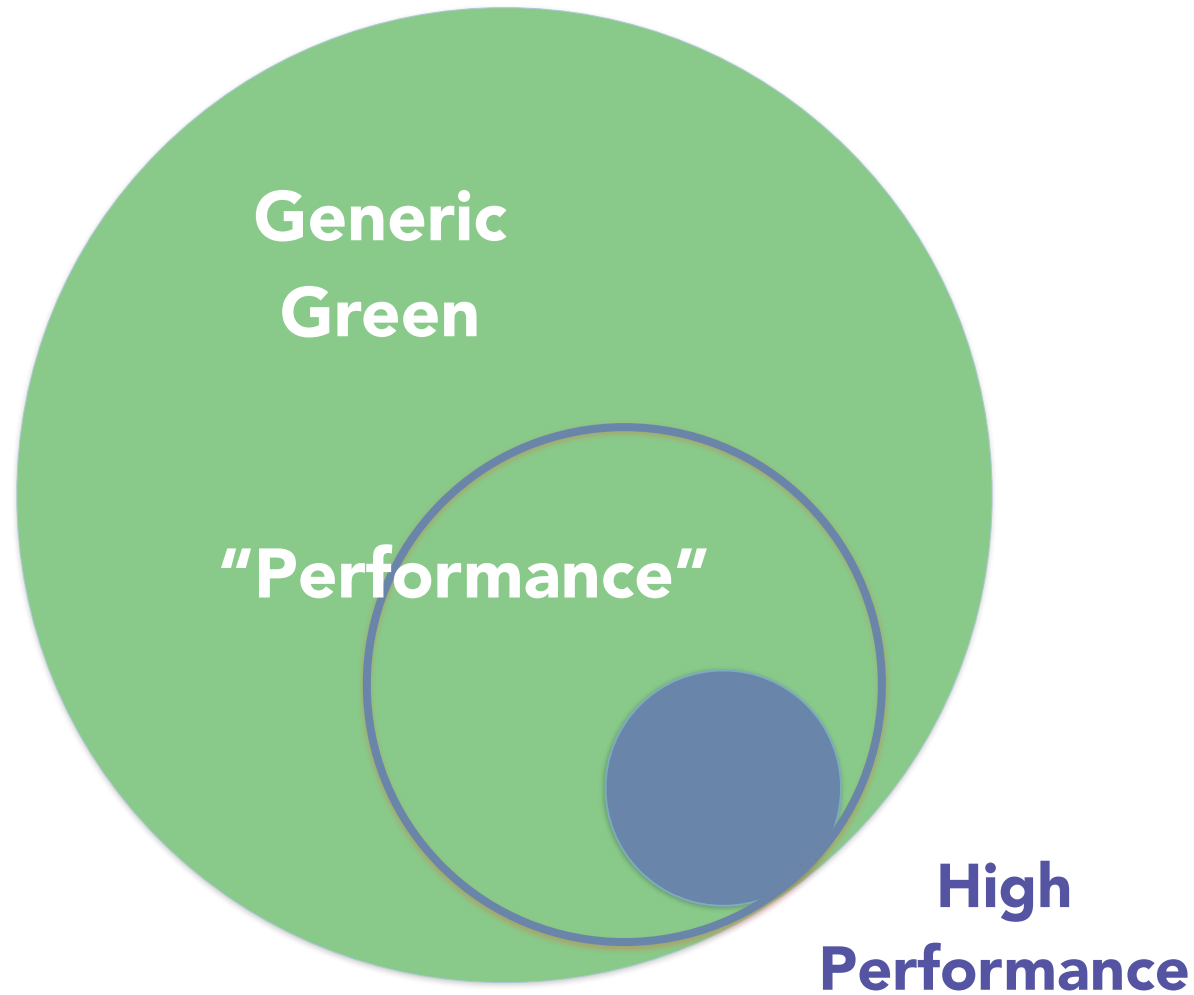
(Source: Navigant Research)

US CAGR 43.1%

December 2015



# "Performance" Building in Context



# "Performance" Building in Context

HERS Ratings: **313,153 (2021)**

HPwES Retrofits: **70,000 (2020)**

EnergyStar Homes: **120,000 (2021)**

Zero Energy Ready Homes: **~2000 (2021)**

Local/Regional Green Certifications: **?**

Certified PHIUS Submissions: **474 (current)**



# "Performance" Building in Context

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Certified PHIUS Submissions: **474 (current)**

Single Family Starts in 2021: **1,120,000**



# McKinsey Segmentation

## **Green Advocates**

"care about energy-saving behavior as a goal in its own right." Motivated by environmental factors. About 20% of the total population.

## **Disengaged Energy Wasters**

"don't care about saving energy or saving money." Not interested in the environment, and not interested in saving money. 20%.

## **Traditionalist Cost-focused Energy Savers**

motivated entirely by cost savings.

## **Home-Focused Selective Energy Savers**

motivated primarily by home improvement, which may involve a cost-savings or technological element.

## **Non-Green Selective Energy Savers**

happy to improve their homes' energy efficiency, as long as they don't have to think about it. "Set it and forget it."

\*last 3 = 60%, not broken down

Unlocking Energy Efficiency in the US Economy, 2009





# **THOUGHTS ON MOVING THE MARKET**

# Labels are Important





# PRETTYGOODHOUSE

A GUIDE TO CREATING BETTER HOMES



DAN KOLBERT

EMILY MOTTRAM

MICHAEL MAINES

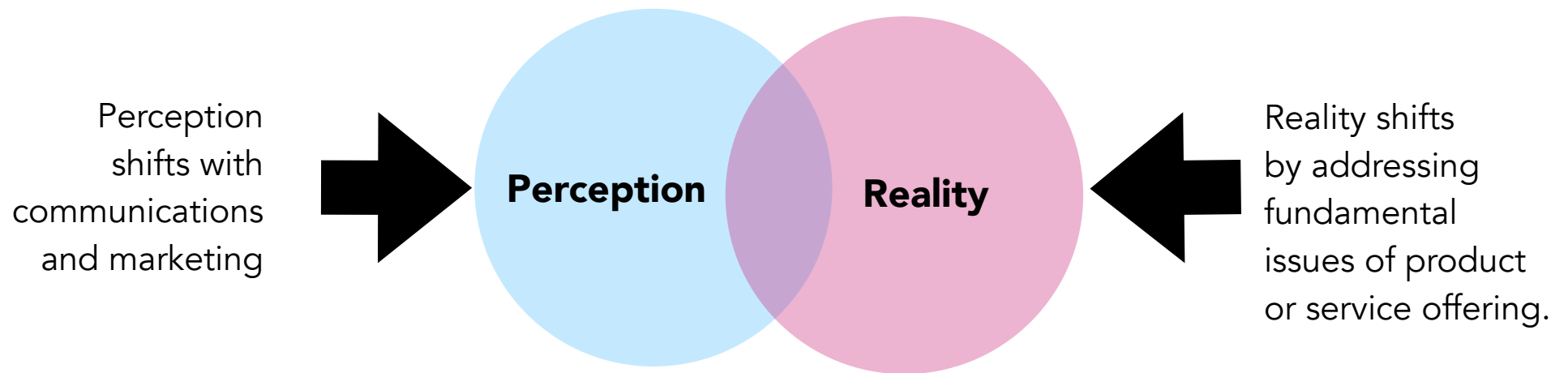
CHRISTOPHER BRILEY

**THE EDGE DEFINES THE MIDDLE**



PHIUS+ CERTIFIED

# Levers for Change





# Framework for Achieving Scale



# The Brand (and Label) Challenge

NAMES	CERTIFICATIONS	"BRANDS"
Green	Energy Star	Passive House
Sustainable	LEED	Net Zero
Low Energy	Green Globes	Deep Energy Retrofit
Healthy	Living Building Challenge	Pretty Good House
High Performance	Nat'l Green Bldg Std	Thrive Home
	WELL Bldg Std	
	NZEB	
	Sites	
	Energy Fit	
	Earthcraft	
	Pearl Certified	
	Etc, Etc, Etc	





# We're Not Making it Easy

**Zero Net Energy (ZNE)**

**Net Zero Energy (NZE)**

**Zero Energy Ready (ZER)**

**Zero Energy Building (ZEB)**

**Zero Energy (ZE)**

**Zero Carbon (ZC)**

**Ultra Low Energy Building (ULEB)**

**Deep Energy Retrofit (DER)**



# Where We're Seeing Traction Today

## **Locations with Aggressive Electrification Incentives**

—Sacramento Municipal (SMUD)

## **Aggressive Heat Pump & HPWH Locations/ Programs**

—New England states

—Northwest

—Oil & Propane locations

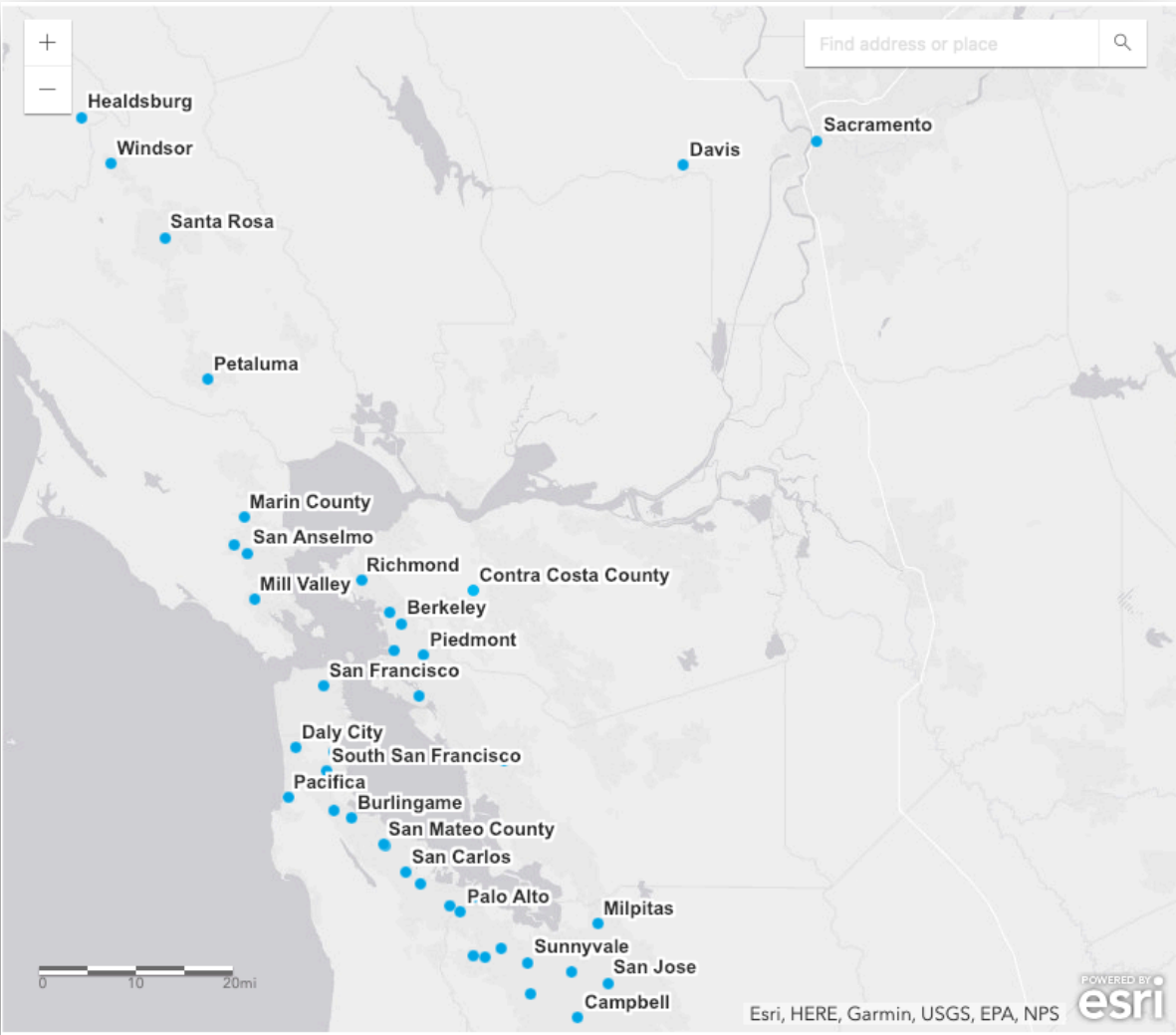
## **Gas Disasters**

—Lawrence/Andover, MA

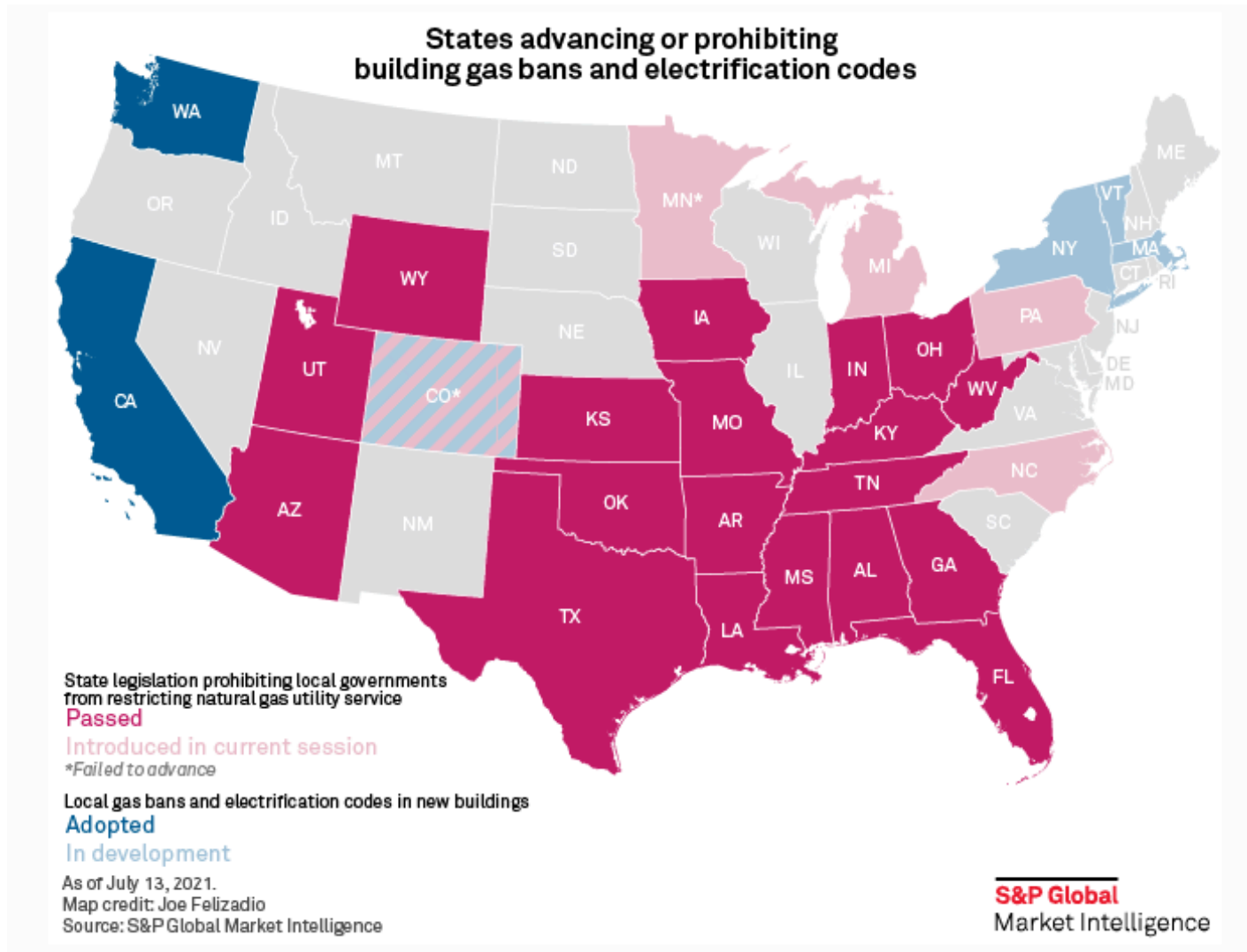
## **Very Select Climate Change-oriented Locations**



# Some Cities are Banning New Gas Hookups

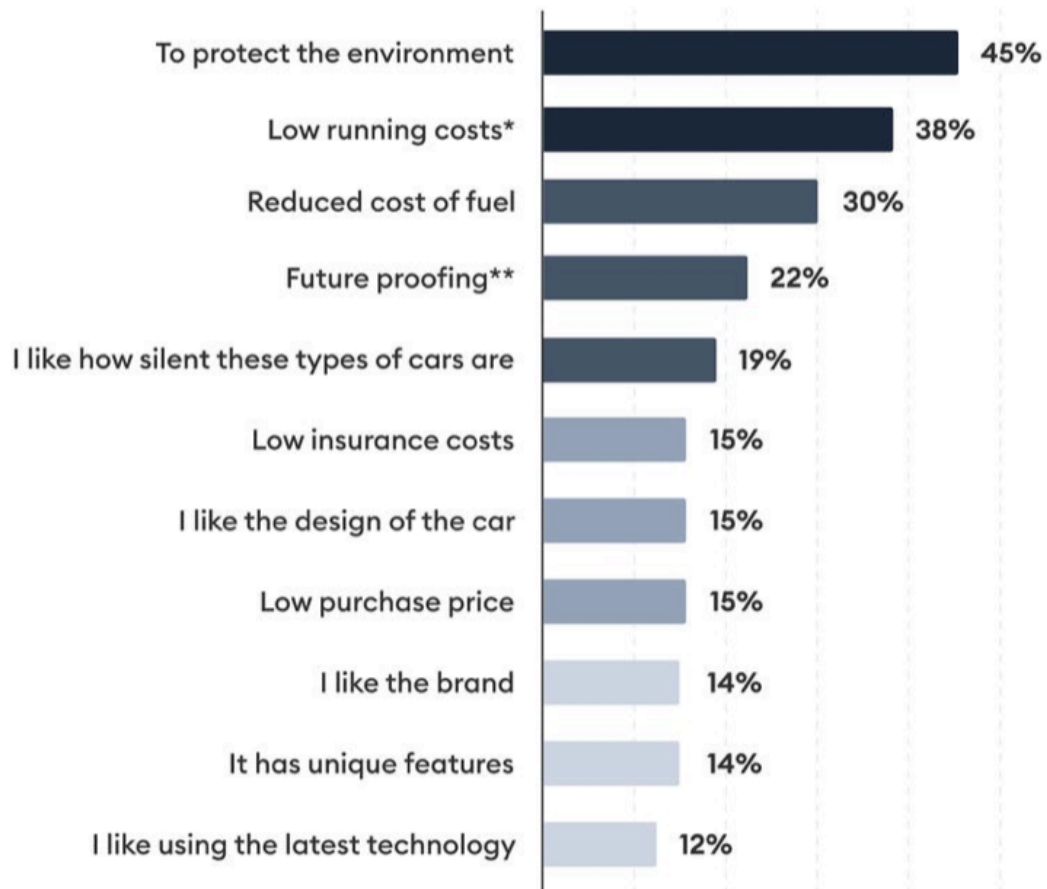


# Gas Bans, Bans on Gas Bans, Electrification



# Electric Car/Environment Connection Strong

**“Which, if any, of the following reasons describe why you would consider purchasing a new or used electric vehicle?”**



**YouGov for Forbes**  
**33,113 licensed drivers**  
**September 2021**



# More Than Energy Efficient



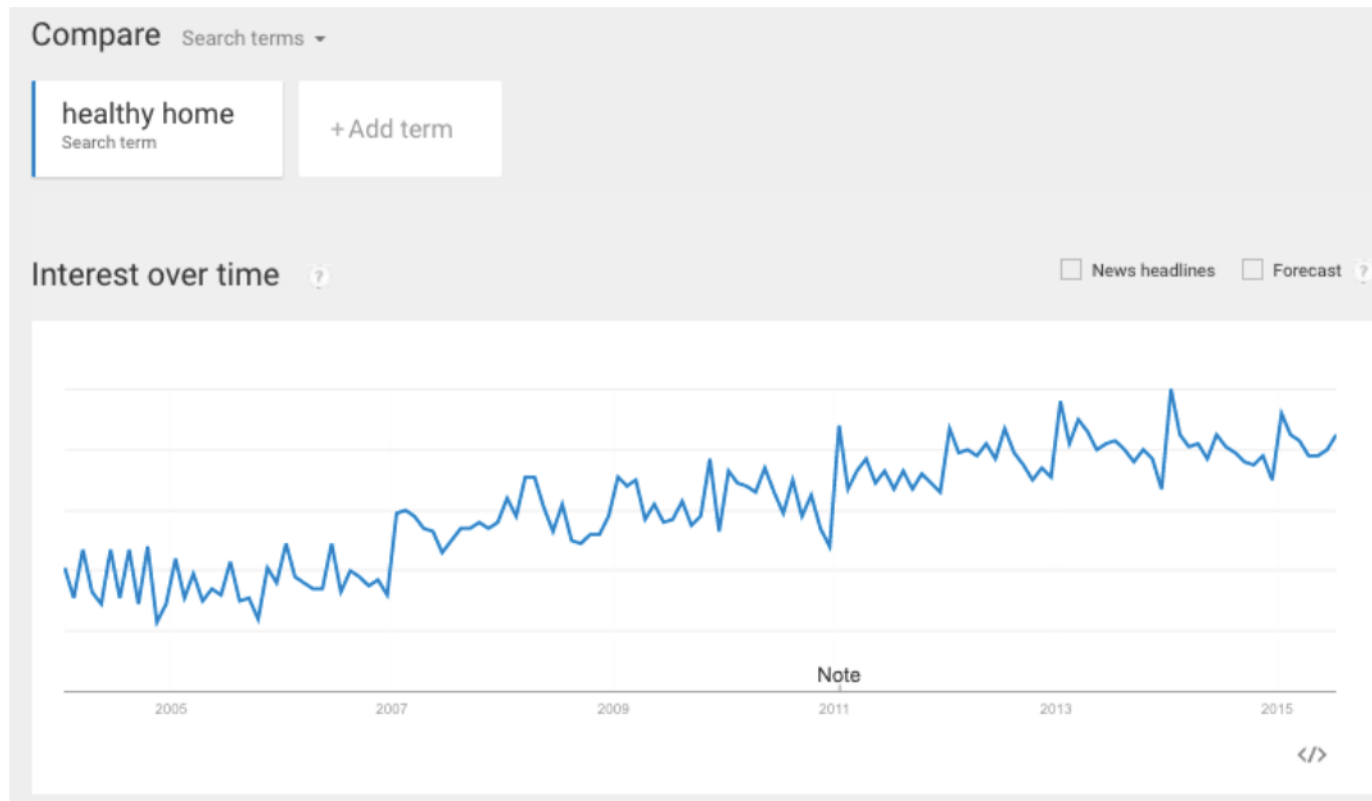
*"I'm right there in the room, and no one even acknowledges me."*





# Dissonance?

## Building Tightness vs Healthy Home



# Simplicity vs High Tech

## Do We Have Dueling Messages? Baby Boomers vs Millennials



**Last-home William**



**Techie Tom**





# DISCUSS!

Peter Troast

[peter@energycircle.com](mailto:peter@energycircle.com)