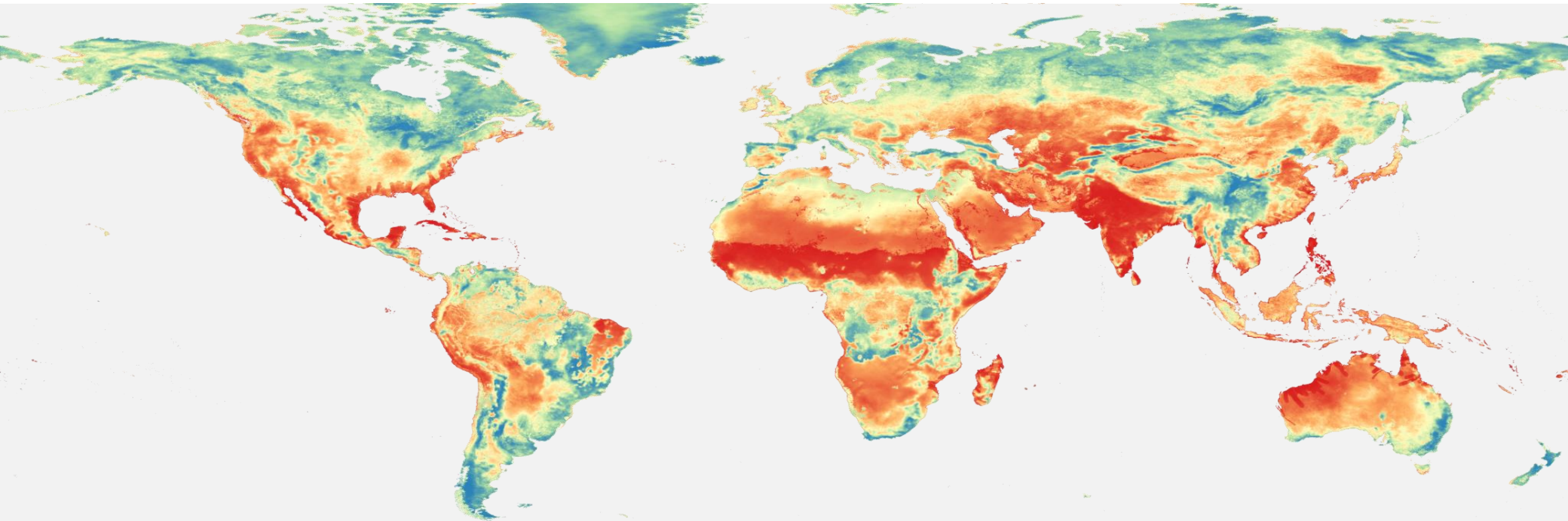# AlphaGeo | Invest in Resilience

Leveraging AlphaGeo's proprietary data science toolkit build a resilient housing portfolio for 2025-2030 and beyond

Dr. Parag Khanna, Founder & CEO, AlphaGeo

www.alphageo.ai

info@alphageo.ai

AI-powered geospatial predictive analytics

Proprietary AI models for data extraction and downscaling

Capturing climate risks and adaptation measures at global scale

Neutral networks trained on wide data forecasting location performance under multiple scenarios

Custom-built cloud SaaS platform featuring analytics, visualizations and API access

AlphaGeo embodies the cutting edge of **"spatial finance"** – the linkage between the environment and the economy – forecasting which geographies and sectors will continue grow and which will depreciate in a complex future. Our systems approach employs **neural network architecture and ML models** to downscale climate data and combine it with socioeconomic, demographic and market factors to build realistic scenarios.

Our leadership, management, research and advisory teams bring together deep expertise in **climate and geospatial data science** with decades of **financial industry experience**. We are **building the category of future-proof investing**, steering asset managers towards geographies and sectors that will outperform amidst systemic volatility.
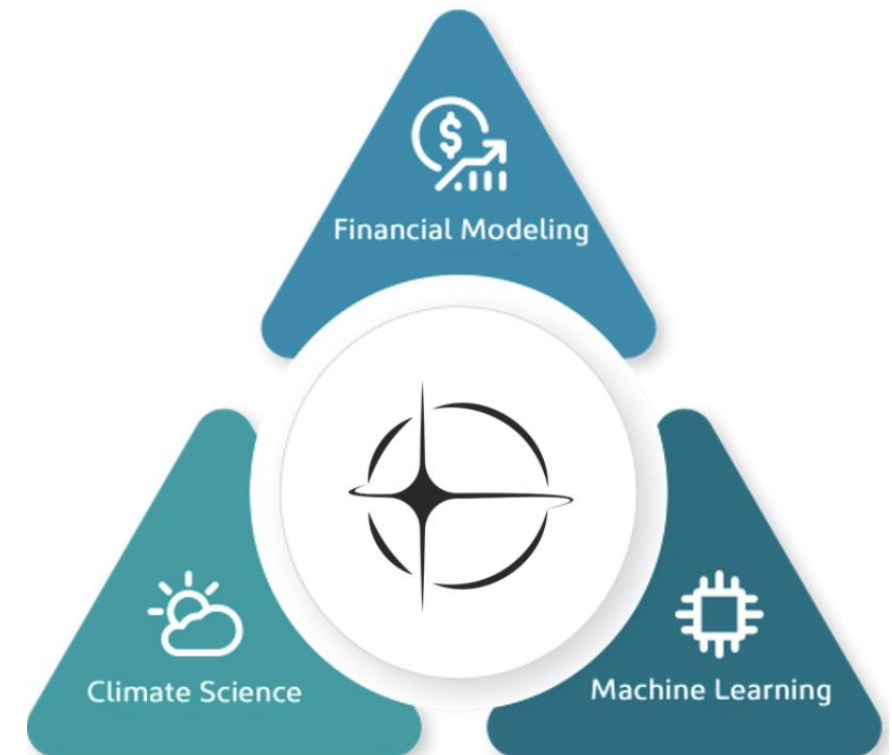
Background: Objective & Methods

AlphaGeo aims to identify the most climate-resilient, high-growth locations for residential real estate investors and developers for the coming decade – starting now.

We rebased HPI to 2015 and selected the top 25 MSAs according to HPI growth for each of the following buckets:

- Pre-Covid (2015-2019)
- Covid winners (2020-24)
- Zonda Master Planned Communities (MPCs) (53 MSAs)

We then added the top 25 "Climate Havens" MSAs ranked by lowest AlphaGeo Resilience-adjusted Risk (RAJ).

The resulting basket totaled 133 MSAs.

The total pool of locations was further sorted according to:

- AlphaGeo location adaptation capacity score
- AlphaGeo Industrial Renaissance Tracker (IRT) net greenfield corporate investment
- AlphaGeo predictive analytics on future OpEx/CapEx costs: (a) insurance premiums (b) composite of energy/utilities and retrofit/maintenance

Pre-Covid: Top 25 MSAs (2015-2020)

	HPI Growth	Population Change	RAJ Scores (2050, SSP585)	Adaptation Score (max = 30)
Minimum	113	-5	19.6	20.3
Average	144	1.25	47.6	24.3
Maximum	175	5.8	69.4	27.7

- Legacy / baseline high performance markets with broad investor exposure
- Rising climate risk profile towards 2050 despite strong adaptation scores

Covid Winners: Top MSAs (2021-2024)

|	HPI Growth	Population Change	RAJ Scores (2050, SSP585)	Adaptation Score (max = 30)
Minimum	91	-4.9	2.48	17.9
Average	124	0.6	41.1	22.5
Maximum	167	9.71	69.8	25.7

Only one overlapping MSA: Tampa!

- Strong growth and demographic profile from smaller population base
- Rising climate risk profile towards 2050 with relatively lower adaptation scores than traditional markets

Zonda Master Planned Communities (MPCs): Top 53 MSAs (2015-2024)

	HPI Growth (2015 – 2020)	HPI Growth (2021 – 2024)	RAJ Scores (2050, SSP585)	Adaptation Score (max = 30)
Minimum	7.4	23.69	7.94	19.25
Average	47	43.73	41.48	23.86
Maximum	94.15	67.15	68.96	28.88

- Wide spectrum of growth performance with generally flat to decelerating trend
- Relatively climate resilient locations with adequate adaptation scores
- Overlap with Pre-Covid top MSAs: 9 locations
- Overlap with Covid Winner MSAs: 4 locations

Quarterly HPI Change from 2015 to 2024
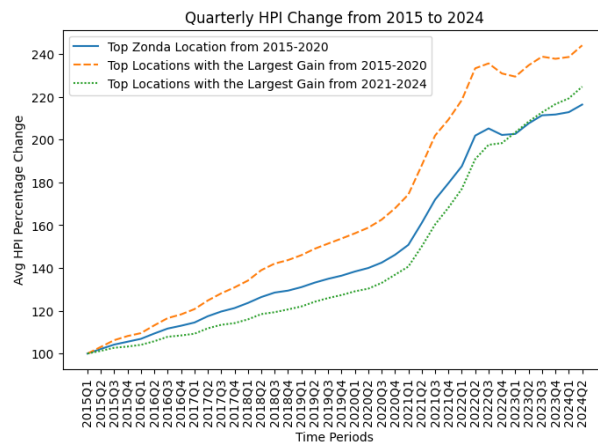
TAKEAWAYS
- Pre-Covid markets: Strong aggregate average HPI growth of ~240 from 2015-24 but significant deceleration during/post-Covid period to <40 by end of Covid
- Covid winners: Rapid ascent from <40 to >60 average aggregate HPI growth with overall continued momentum
- Zonda MPCs: Aggregate deceleration of growth from 2015-24 falling to ~45 by end of Covid

Future-proof MSAs? Ranking by resilience

Pre-Covid Top MSAs (2015 – 2020)	
HPI Rank	RAJ Scores (2050, SSP585)
1	57.18
2	40.91
3	47.88
4	18.65
5	24.42
6	39.05
7	40.2
8	69.47
9	43.06
10	49.67

Covid Winners (2021 – 2024)	
HPI Rank	RAJ Scores (2050, SSP585)
1	61.95
2	66.1
3	3.26
4	6.33
5	5.53
6	34.21
7	2.48
8	67.5
9	61.95
10	68.23

Zonda MPCs	
HPI Rank	RAJ Scores (2050, SSP585)
1	57.18
2	49.67
3	63.20
4	64.44
5	60.35
6	49.14
7	65.84
8	52.43
9	33.66
10	59.70

- Migration away from legacy markets has been towards higher-risk areas
- Significant number of top-performing MSAs have high-risk climate profiles

The Wall Street Journal featured AlphaGeo's analysis of where to invest in Florida ... sparking a gold rush!

## Why This Florida City Is a Safe Haven From Hurricanes

Ocala is at less risk from coastal flooding than other parts of the state, according to a new analysis, making it a popular option for storm-weary home buyers

By [Nancy Keates](#) [Follow] | *Photographs by Zack Whittman for The Wall Street Journal*

Oct. 4, 2023 9:00 pm ET

Not all parts of Florida are equally at risk of natural disasters. The Wall Street Journal asked Climate Alpha—a company that uses AI to build forecasting models based on data from the Federal Emergency Management Agency related to past events, predictions of future weather, an analysis of local government disaster policies, and infrastructure, including hospital beds—to come up with a list of areas in Florida with the least combined risk from hurricanes, flooding and strong winds.

Climate risk score*

161 187 193 195 199 212

140† 170 200 230 268
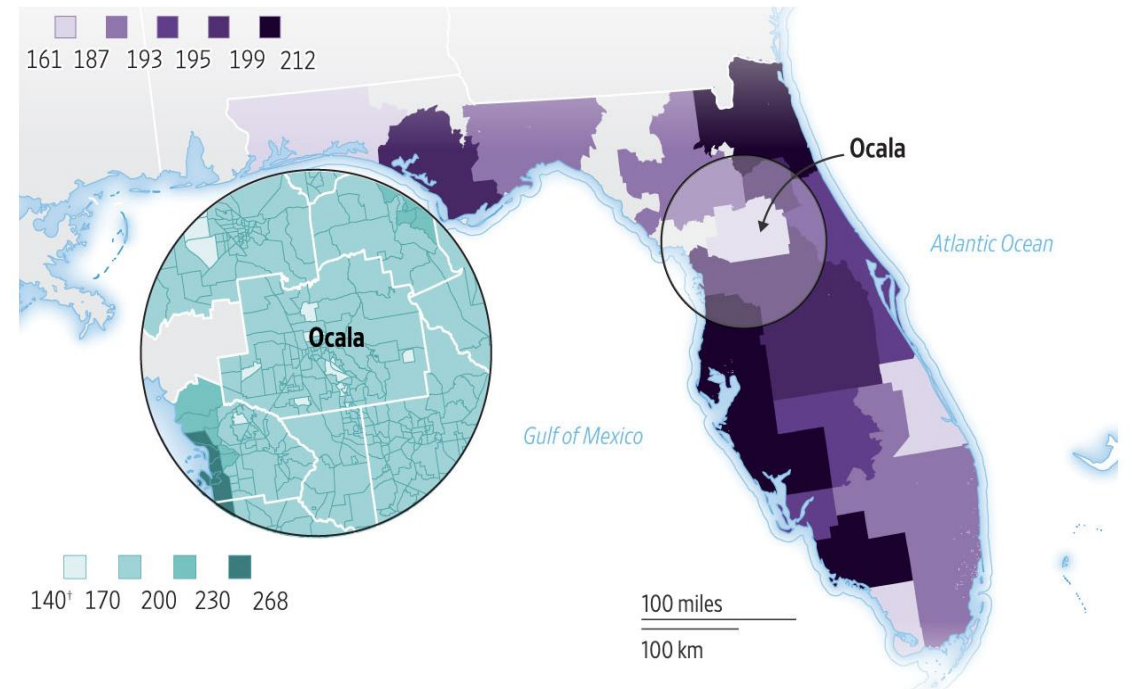
*The climate score averages the risk of hurricane winds, and inland and coastal flooding. It is calculated using Core-Based Statistical Area, defined as containing an urban area with a nucleus population. The lower the score, the less the risk.
†Information at the CBSA level is an average of the Census Tract level, so statistical range varies
Source: Climate Alpha
Camille Bressange/THE WALL STREET JOURNAL

AlphaGeo | The business of geography

The most comprehensive, accurate and actionable data to guide resilience planning

📍 Coral Gables, Florida, United States ✕

Overall Climate Risk Score
0 — Lowest Risk ... 100 — Highest Risk
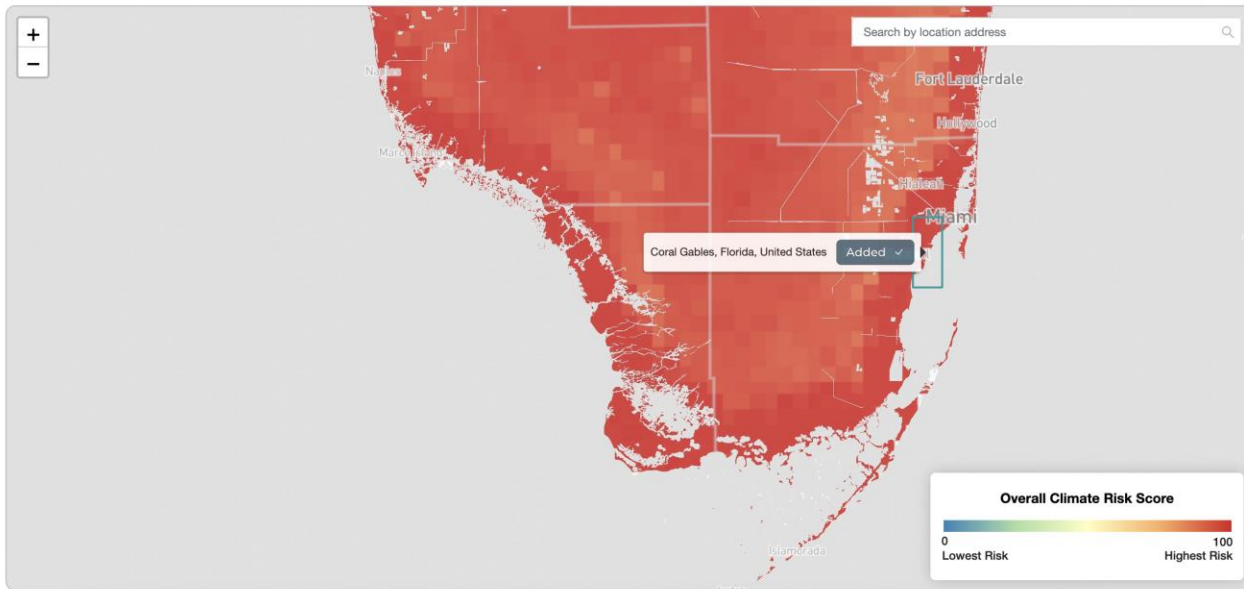
In mid-2024, CPIC requested regulatory approval to raise premiums by 14% -- almost exactly what AlphaGeo recommends!

📍 Coral Gables, Florida, United States

Country Benchmark
SSP5-8.5
This benchmark shows the average performance of locations in the same country of the selected location under the same time period and scenario.

Higher Emission
SSP5-8.5
Climate change scenarios are based on the Shared Socioeconomic Pathways (SSPs) of the Coupled Model Intercomparison Project 6 (CMIP6). They project greenhouse gas emissions under different climate policies until the year 2100.

Insurance Costs	Utility Demand	Retrofit Costs
LOW MED **HIGH**	LOW **MED** HIGH	LOW MED **HIGH**
+15.90 % per year	**+1.30** % per year	**7.5** % of income
With a **significant increase** in the intensity and frequency of acute climate hazards, this location is projected to see a **substantial** annual increase in insurance premiums of **+15.90%** per year.	This location is expected to witness a **moderate increase** in utility demand due to extended heatwaves and a noticeable urban heat island effect.	Due to **substantial changes** in the local climate patterns, a comprehensive retrofit is **highly recommended**. It is advisable to allocate an additional **7.50%** of income towards climate risk retrofitting measures to mitigate stranding risks and significant damage costs.
Specifically, flood premium is likely to change by **+15.90%** per year, fire premium by **+0.00%** per year.	The anticipated annualized net change in cooling demand is **+1.30%** and the corresponding change in heating demand is **-0.00%**.	Specifically, an additional **3.04%** of income can be allocated for thermal comfort retrofit, **4.46%** for hurricane and flood defense retrofit, and **0.00%** for fire defense retrofit.

Physical		Resilience-adjusted	
〰 **Heat Stress** Physical	**71** /100	〰 **Heat Stress** Resilience-adjusted	**66** /100
⊘ **Drought** Physical	**42** /100	⊘ **Drought** Resilience-adjusted	**13** /100
≡ **Hurricane Wind** Physical	**98** /100	≡ **Hurricane Wind** Resilience-adjusted	**70** /100
≈ **Inland Flooding** Physical	**26** /100	≈ **Inland Flooding** Resilience-adjusted	**10** /100
⊡ **Coastal Flooding** Physical	**62** /100	⊡ **Coastal Flooding** Resilience-adjusted	**34** /100
🔥 **Wildfire** Physical	**0** /100	🔥 **Wildfire** Resilience-adjusted	**0** /100

Overview Heat Stress ● Drought ● Hurricane Wind ● Inland Flooding ● Coastal Flooding ● Wildfire ●   % # ◄ **Early Century** (2030-2035) ►
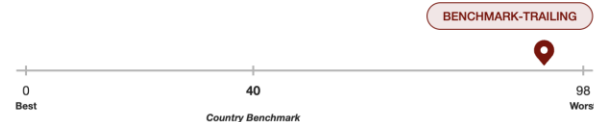
Overall Physical Risk Score **91** /100

Overall Physical Risk Score is the ranking of the risk profile based on the cumulative total exposure to all risks of this location. It is expressed as a percentile rank compared to all locations globally.

Individual Risk Scores measure the risk profile of a location on a scale of 0-100. The higher the individual risk score, the greater the exposure to the specific risk relative to all locations globally.

Individual risk profiles change depending on the shifting intensity of the risk to that location under the selected scenario over the selected time horizon. The minimum/maximum performance range for all scenarios is anchored to 2050.

BENCHMARK-TRAILING 📍

0 Best	40	98 Worst

Country Benchmark

Overall Resilience-adjusted Risk Score **68** /100

Overall Resilience-adjusted Risk Score is the ranking of the resilience-adjusted risk profile based on the total exposure to all resilience-adjusted risk of this location. It is expressed as a percentile rank compared to all locations globally.

Individual Resilience-adjusted Risk Scores measure the risk profile of a location after accounting for all local adaptation measures. If the score is lower that the physical risk score, the adaptation measures are effective in reducing exposure. If the score is higher then adaptation measures are insufficient to cope with the location's changing risk profile.

As with the Physical Risk Scores, the minimum/maximum performance range for all scenarios is anchored to 2050.

BENCHMARK-TRAILING 📍

0 Best	19	89 Worst

Country Benchmark

Pricing the future: Insurance, utilities and retrofits

Pre-Covid Markets		
Rank	Insurance	OpEx
1	15.16	0.42
2	3.42	1.67
3	8.42	1.34
4	0.56	0.85
5	4.45	1.85
6	2.49	1.51
7	0.58	1.46
8	11.43	1.26
9	3.93	2.71
10	1.04	0.9

Covid Winners		
Rank	Insurance	OpEx
1	7.17	1.32
2	8.14	1.36
3	0.52	1.83
4	1.13	0.90
5	1.96	0.93
6	1.60	0.26
7	0.11	2.22
8	6.35	1.13
9	7.17	1.32
10	5.98	1.13

Zonda MPCs		
Rank	Insurance	OpEx
1	15.16	0.42
2	1.04	0.90
3	10.11	1.29
4	9.99	1.30
5	7.56	1.29
6	9.68	1.37
7	11.93	1.30
8	0.18	-0.62
9	5.60	0.74
10	10.21	1.24

- Est. 2025 onwards annual insurance premiums, energy/utility costs and retrofit/maintenance expenditures
- Strong correlation of high insurance premium outlook with rising flood, hurricane and fire risk
- Heat stress drives rising energy/utilities costs for cooling
- Rising retrofit costs linked to thermal comfort and flood-related asset remediation
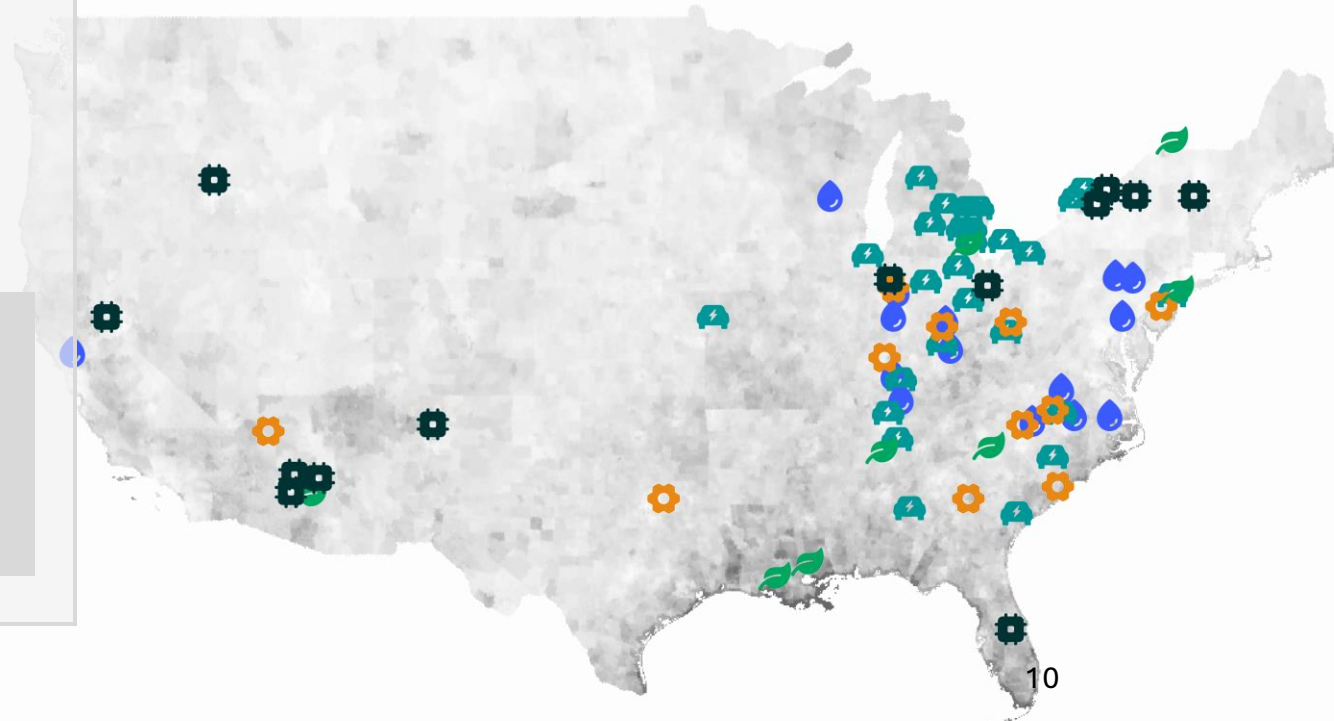
Economic resilience: Mapping multiplier effects

AlphaGeo's Industrial Renaissance Tracker (IRT) is a comprehensive and frequently updated dataset of greenfield corporate investment that correlates sectors, companies and capital commitments to each location's climate profiles.

This sample map illustrates key US locations that have received the largest allocations of capital investment by sector in 2022-23. We map the findings of the IRT onto our proprietary location risk and resilience datasets to forecast which geographies will achieve the most sustainable multiplier effects from the Inflation Reduction Act (IRA), CHIPS Act, Infrastructure Bill and other funding earmarked to stimulate the US economy.

AlphaGeo's IRT identifies the most sustainable locations for investment in:
• Renewable energy and environmental solutions
• Tech/IT hardware, software and digital services
• Infrastructure and real estate (residential, commercial, industrial, etc.)

Legend
- Semiconductors & Electronics
- Clean Energy
- EVs & Batteries
- Biomanufacturing
- Heavy Industry

Industrial Renaissance Tracker (IRT) winners

Significant expansion of greenfield corporate investment in moderate to low (<50) AlphaGeo RAJ scores, underscoring their solid potential for stable growth

Overlap with main residential baskets:

- Pre-Covid Markets: 3 locations

- Covid Winners: 3 locations

- Zonda MPCs: 17 locations

Identify best overlap of:

- Industrial momentum

- Residential opportunity

- Climate resilience

Location Rank	Total Investment (USD Millions) (2022-24)	HPI Change (%) (2015-24)	RAJ Scores for 2050 (SSP585)	Insurance	OpEx
1	113488	138.31	53.35	0.11	0.76
2	50361	94.85	0.44	0.03	4.15
3	27662	118.36	38.96	3.22	0.26
4	25841	174.59	57.18	15.16	0.42
5	19072	99.93	21.72	3.29	0.36
6	13900	112.11	27.43	3.35	0.31
7	11268	127.63	41.35	11.96	-0.04
8	11000	129.19	35.5	9.8	0.57
9	10695	72.74	60.42	3.46	1.08
10	9385	130.01	29.99	2.27	0.3
11	8819	127.57	67.51	6.35	1.13
12	8619	114.66	62.8	3.36	0.15
13	7904	130.72	49.14	9.68	1.37
14	7311	67.81	40.55	3.3	0.8
15	6204	88.69	13.34	1.84	1.66
16	6186	74.15	43.71	0.66	2.24
17	5387	132.55	39.99	2.96	0.21
18	4913	107.29	38.04	6.23	2.41
19	4555	139.11	69.76	6.78	1.14
20	4374	120.87	51.98	0.34	0.91

Climate Havens

MSAs with the lowest RAJ profiles to 2050 that also exhibit strong HPI performance since 2021

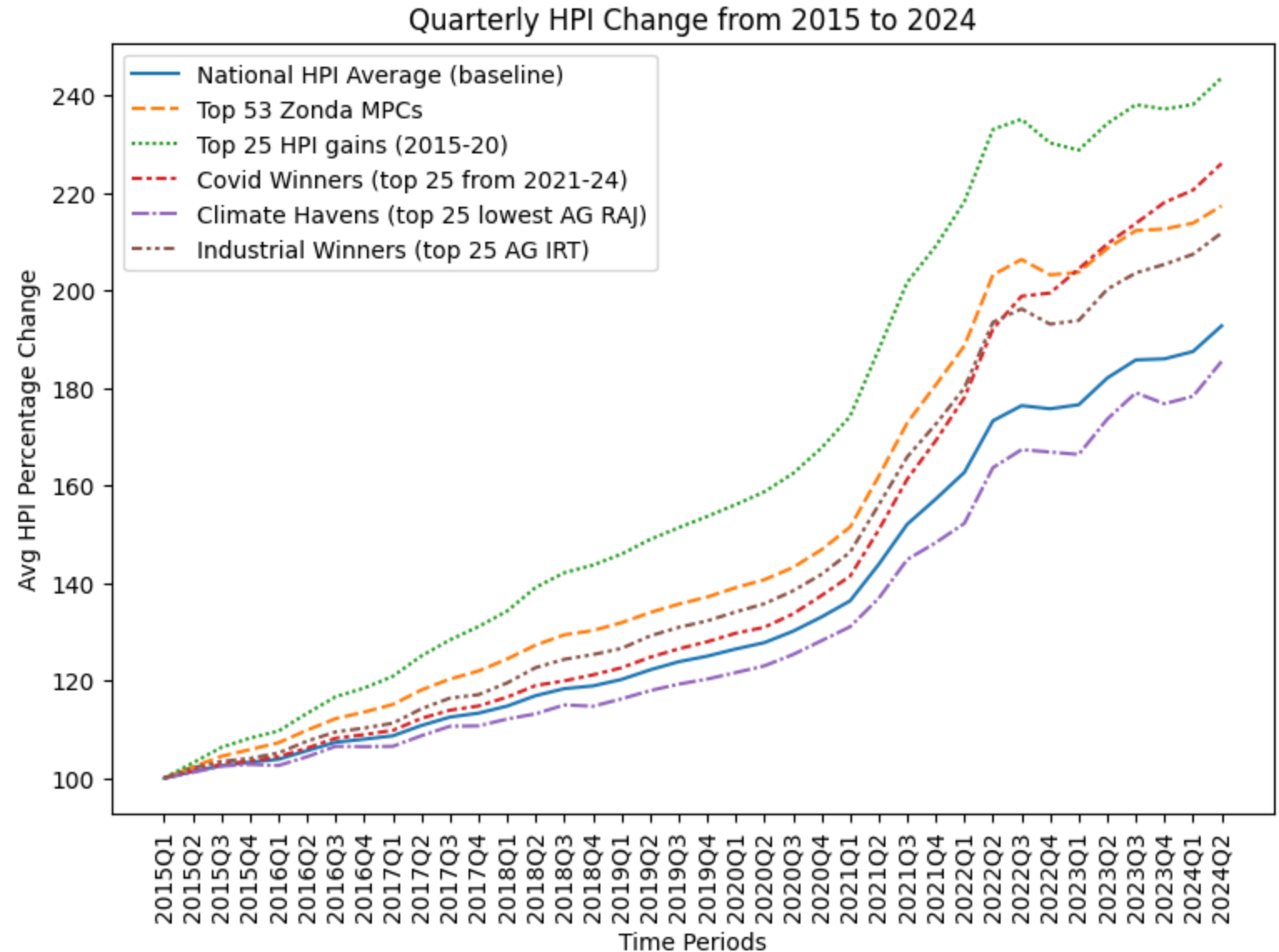High potential for population growth amidst accelerating relocations due to:
- remote work
- affordability concerns
- climate risk

"Climate havens" also feature underpriced land and real estate, serving as both a hedge and capital appreciation opportunity

Location Rank	RAJ Scores in 2050, SSP585	Population Change (%)	HPI Change (%)	Insurance	OpEx
1	0	0.09	66.59	0.02	4.74
2	0.08	-0.07	102.34	0.01	4.59
3	0.13	0.03	99.25	0.06	4.48
4	0.14	0.59	47.34	0.18	4.29
5	0.25	-0.77	67.67	0.10	4.19
6	0.25	-0.01	57.79	0.13	4.44
7	0.26	0.26	72.34	0.29	4.95
8	0.34	-0.53	38.69	0.01	3.60
9	0.38	-2.17	55.77	0.17	3.47
10	0.44	0.05	94.85	0.03	4.15
11	0.65	-0.95	92.64	0.03	3.00
12	0.67	2.48	69.74	0.11	4.35
13	0.92	-0.62	101.93	3.25	1.06
14	1.85	1	101.57	1.95	2.63
15	2.03	0.12	104.78	0.70	4.03
16	2.13	0.19	87.94	0.58	3.41
17	2.23	-1.3	114.92	3.41	1.03
18	2.35	0.39	83.07	3.10	4.67
19	2.49	1.9	108.85	0.11	2.22
20	2.63	-0.55	127.62	0.22	2.28

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Aggregate comparative analysis of location baskets

- Pre-Covid / Covid / post-Covid divergence within and across key location baskets

- IRT winners overlap with but will surpass Zonda MPCs and likely also Covid Winners due to stronger labor markets

- Climate Havens have the highest potential to achieve what Covid Winners did given current underpricing and potential to attract new industry and talent

Quarterly HPI Change from 2015 to 2024

Legend:
- National HPI Average (baseline)
- Top 53 Zonda MPCs
- Top 25 HPI gains (2015-20)
- Covid Winners (top 25 from 2021-24)
- Climate Havens (top 25 lowest AG RAJ)
- Industrial Winners (top 25 AG IRT)

Future-proof housing portfolio construction

- Aggregate selection from all key baskets generates a hypothetical portfolio with robust future potential

- Top 5 taken from each of the five baskets based on:
  - strong recent HPI growth
  - high climate resilience
  - robust corporate investment
  - low future insurance and CapEx costs

HPI Change (%) (2021-24)	RAJ Scores in 2050 (SSP585)	Total Investment (Million USD)	Insurance premium (% annual)	CapEx (% annual)	Basket
143.54	17.33	1,350	0.56	0.85	Pre-Covid
125.11	17.33	1,350	0.56	0.85	Pre-Covid
136.42	19.61	237	14.43	0.85	Pre-Covid
139.97	24.43		4.45	1.85	Pre-Covid
137.05	27.1		0.82	0.45	Pre-Covid
108.85	2.49	7	0.11	2.22	Covid Winners
105.64	3.26	13	0.52	1.83	Covid Winners
124.99	5.53	3	1.96	0.93	Covid Winners
132.44	6.34	1,617	1.13	0.9	Covid Winners
126.59	12.86		2.49	0.25	Covid Winners
114.92	2.23	200	3.41	1.03	Zonda
114.32	9.26	1,149	1.86	0.81	Zonda
116.98	10.6	2,605	1.76	1.69	Zonda
44.74	12.77	-	1.11	1.53	Zonda
88.69	13.34	6,204	1.84	1.66	Zonda
66.59	0	365	0.02	4.74	Climate Haven
102.34	0.08	1,056	0.01	4.59	Climate Haven
99.25	0.13	880	0.06	4.48	Climate Haven
47.34	0.14	13	0.18	4.29	Climate Haven
57.79	0.25	142	0.13	4.44	Climate Haven
94.85	0.44	50,361	0.03	4.15	IRT
99.93	21.72	19,072	3.29	0.36	IRT
112.11	27.43	13,900	3.35	0.31	IRT
130.01	29.99	9,385	2.27	0.3	IRT
129.19	35.5	11,000	9.8	0.57	IRT

# Alpha Finder: AlphaGeo's proprietary filtering tool for market discovery

Filter dozens of datasets and proprietary indexes spanning the categories of real estate markets, demographics, socio-economic and hedonic features, infrastructure and climate

Iterate on user-generated criteria to rank and prioritize transaction opportunities for acquisitions

Leverage AlphaGeo's georeferenced alt data:
- Energy grid resilience
- Best performing economies
- Amazon warehouses
- Vacation rentals
- Air quality
- In-migration (domestic and international)
- Innovation hubs

... and many more!

Blend data into AlphaGeo data lake for refined results
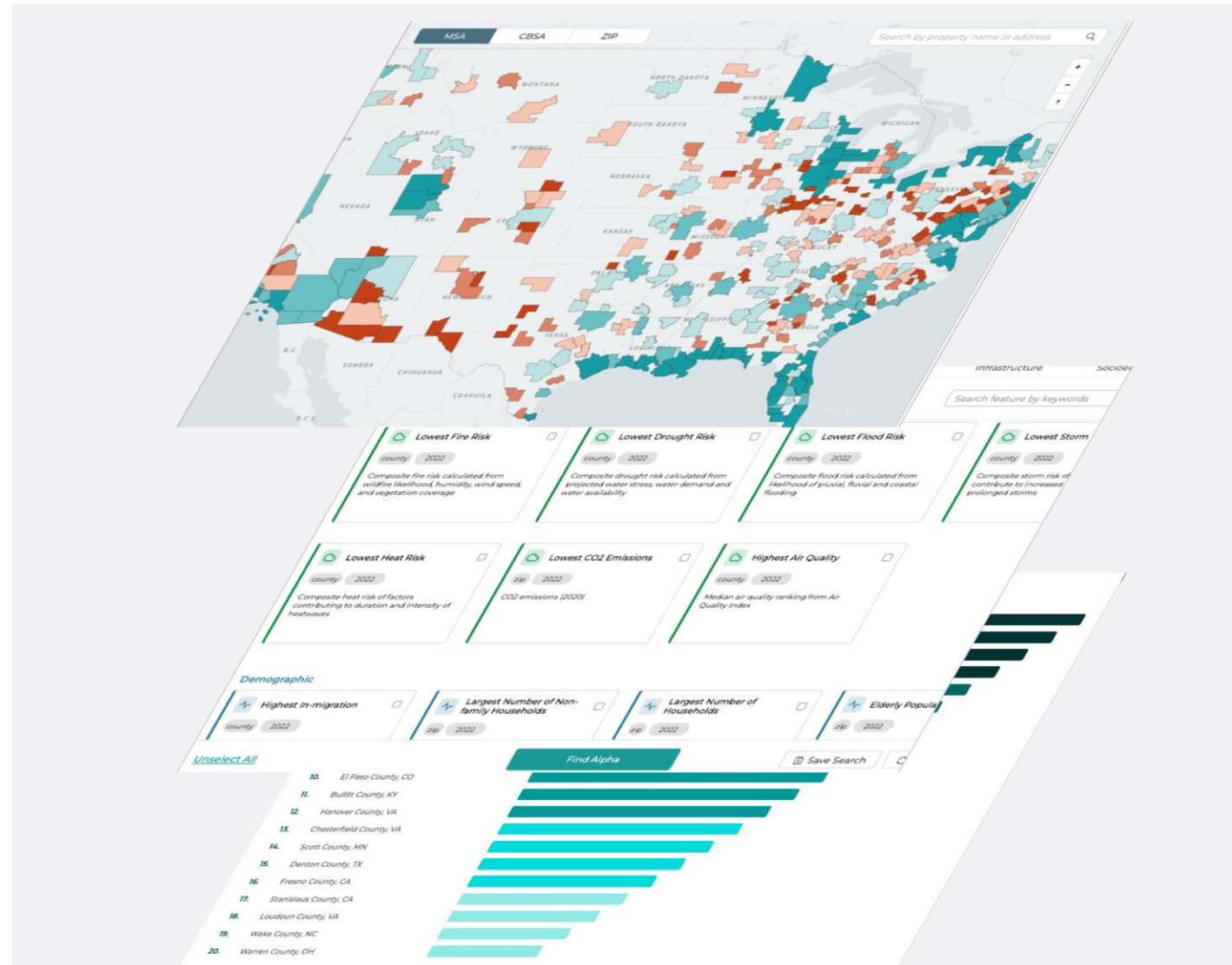
Resilience Certification: Place-making and up-selling with AlphaGeo

Initial selection criteria: Locations with AlphaGeo RAJ score below 25

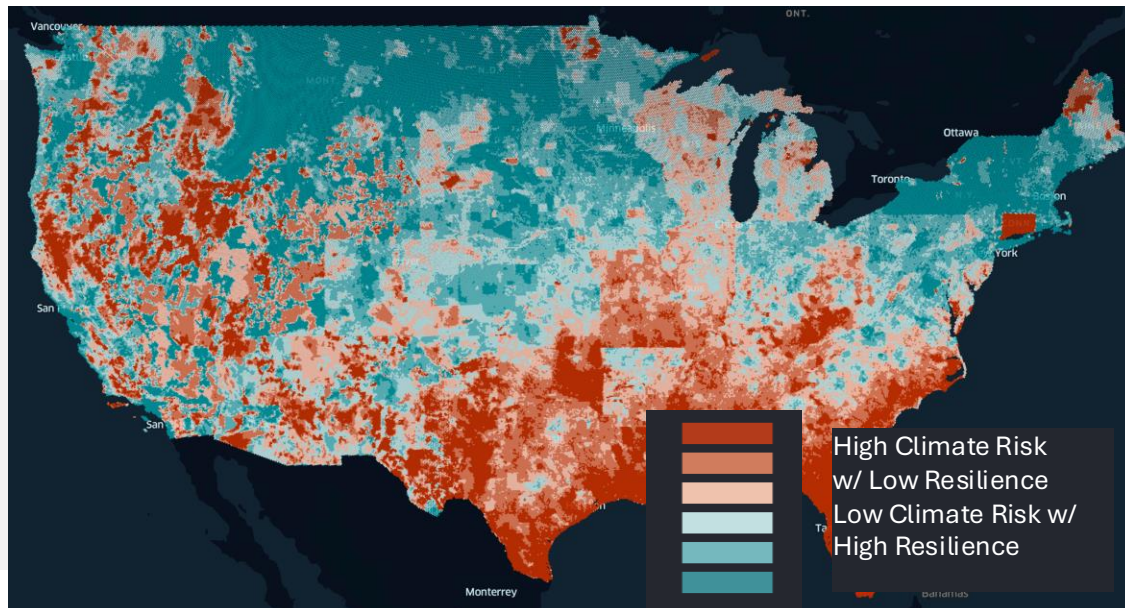Potential for open-source or exclusive branding via AlphaGeo resilience certification

White-label or commercial advisory opportunity to upgrade communities to earn resilience certification

AlphaGeo designated resilient zones represent:		
12,571 zip codes (of ~40,000)	547 CBSAs (of 935)	48 states (of 50)

Blue areas face lower physical climate risk but also boast higher resilience as measured by indicators such as energy grid reliability and renewable power, economic momentum and social robustness, and other variables.

Multi-family markets: Navigating

- NCREIF multi-family sector capital returns for top 20 MSAs (2021-24)

- Some locations with high RAJ scores also have projected higher insurance premiums

Location Rank	Avg Growth (%) (2021-24)	2021 (%)	2022 (%)	2023 (%)	2024 (%)	Insurance	OpEx	Adaptation (max = 30)	RAJ Scores for 2050 (SSP585)
1	3.4	7.3	4.1	0.4	1.7	4.06	0.37	27.83	48.81
2	2.7	8.1	3.1	-1.2	0.6	6.78	1.14	24.82	69.76
3	2.5	6.9	4.2	-1.3	0.2	7.17	1.33	25.25	61.54
4	2.4	7.7	3.9	-1.6	-0.2	11.93	1.3	25.62	65.84
5	2.3		4.3	1.5	1.2	8.14	1.36	25.44	66.1
6	2.2	9.6	2.7	-3.1	-0.5	0.11	0.76	22.88	53.35
7	2.2	7.9	2.5	-1.8	0	3.22	0.26	26.13	38.96
8	2.1	9.9	2.2	-3.2	-0.4	0.18	-0.62	21.52	52.44
9	2.1	6.2	0.9	0.1	1.2	3.14	2.71	25.87	45.7
10	2	7.8	3.2	-1.9	-1.1	8.89	1.29	27.07	57.92
11	1.9	6.3	2	-1.8	1	1.96	2.57	23.93	41.66
12	1.9	7.1	2.7	-2.4	0	2.96	0.21	23.52	39.99
13	1.9	7.6	2.4	-2.2	-0.3	0.23	0.48	22.38	52.04
14	1.9	8.4	2.4	-2.5	-0.9	3.36	0.15	22.77	62.8
15	1.8	6.8	2.9	-3.4	0.9	5.47	1.82	25.3	45.27
16	1.8	5.5	2.9	-0.8	-0.5	1.16	0.82	23.86	30.74
17	1.7	7.3	2.4	-2.3	-0.8	1.73	0.48	21.37	29.76
18	1.6	6.2	2.6	-1.8	-0.5	2.27	0.3	22.16	29.99
19	1.5	3.2	2.3	0.2	0.2	4.42	1.83	23.48	19.02
20	1.5	6.4	2.2	-2.4	-0.3	3.96	1.15	25.1	43.12

Forthcoming enhancements to drive alpha-generating investments

- Stress test all locations with AlphaGeo's proprietary "SSP X" accelerated climate volatility scenario

- Simulate population shifts through agent-based modeling driven by climate, infrastructure, housing and other drivers

- Layer in land valuation trends based on (a) transaction prices (b) correlation to HPI

- Auto-ingestion of client data for blended analytics

To access the underlying data and market selection recommendations contained in this presentation, please contact us to discuss becoming an AlphaGeo client!

Partner with AlphaGeo to build a more resilient future!

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