



## Technical FAQs

### **Climate Price™**

#### How is the Climate Price calculated?

The Climate Price™ is calculated as a percentage weight applied to the baseline forecast. This coefficient is derived from the Resilience Index scores (risk, vulnerability, and readiness) of each location, factoring in both exposure to risks as well as adaptation capacity. The risk score carries a 50% weight in the coefficient, while the vulnerability and readiness scores are weighted at 25%, respectively. It is worth noting that both socio-economic variables and climate factors exhibit extreme or tail-heavy distribution by which negatively impacted locations suffer greater erosion of value versus the gains experienced by positively scored locations. Climate change scenarios (RCP 3.4, 4.5, 8.5) modify the risk scores, which in turn impact the weighted coefficient assigned to the machine learning output that predicts market performance versus the baseline forecast.

#### Are features like crime rate or public spending rate static, or are they influenced by the impact of climate factors?

Elements are kept static across all climate scenarios at the moment. In Q2 2023, we will enable socio-economic scenario modification similar to the Shared Socioeconomic Pathways (SSPs) according to IPCC.

#### Can I see attribution by Resilience Index factor?

Yes, there is a Climate Price™ attribution to each of the 17 sub-indicators of the Resilience Index. These attributions will be available to our clients in Q1 2023.

#### Are baseline projections backtested?

The baseline scenario used to generate a relative anchor for the Climate Price™ is backtested with a Mean Absolute Percentage Error (MAPE) of 4%, which is an average of the absolute percentage errors of forecasts. Error is defined as actual or observed value less the forecasted value.



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What research have you reviewed for forward-looking projections, given that past events matter less under climate scenarios?

Please refer to the bibliography in our whitepaper.

What's the difference between Baseline Price Index and Scenario Price Index?

The Baseline Price Index is a forecast of yearly property price index data till 2040. Historical trends, i.e. drivers of property prices from different zip codes or postal codes are used to inform the forecast.

The Scenario Price Index is obtained by applying the Climate Price™ difference onto the Baseline Price Index.

How does your system calculate a baseline (current year) valuation? How have you benchmarked this against more traditional valuation tools?

We have created a composite real estate index that covers all major property markets from data providers like MSCI, RCA, FHFA, and S&P. We then augment the data with other macro economic features for forecasting using our in-house machine learning model. The forecast generates a future trend of a specific market (e.g. a ZIP code in the US, or postal code in Canada).

When a client uploads an asset, we encourage them to indicate the current valuation or the valuation from the latest transaction. The valuation is then mapped to the forecasted trend to give a dollar-value estimation of the future baseline.

Compared to other forecasting methods on the market (e.g. Moody's Analytics), our model uses less heuristics and assumptions, and generates more consistent predictions. Since the method is machine learning driven, we are able to test the accuracy on a sample dataset. Our whitepaper illustrates the experiments and the Mean Absolute Percentage of our model on the test dataset is 4%.

You may submit a request to view our whitepaper [here](#).



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### Is the Climate Price an actual prediction of property values for the future?

The Climate Price is a coefficient that applies to the baseline forecast to generate a risk-adjusted valuation trend for each property or fund. If the customer provides us with an acquisition price and year for a property, the Climate Price is applied to that value and the result is an actual price prediction. However, the prediction can change based on the selected scenario applied to the location, and is modified over time as our datasets are updated. It is best to think of Climate Price as a probabilistic distribution of potential valuations for assets under different scenarios.

### Can you compare best and worst performing assets by property type to the baseline?

The Baseline Price Index value is forecasted using historical data, assuming no change in market fundamentals. The Scenario Price Index is the climate-adjusted valuation (Climate Price), which takes climate change scenarios into consideration.

Users can select from three climate change scenarios as defined by IPCC: worst-case scenario, the business-as-usual scenario, and the best-case scenario. Results are displayed at the combined portfolio level, funds organized by property type, and individual asset level. At the asset level, properties are ranked in performance from best to worst. You can find a more detailed description in the sample report.

### What Is the source of the climate forecasts that underlie the Climate Price forecasting tool? Is it all in-house?

We don't generate climate forecasts in-house. Our current risk dataset is engineered from a mixture of historical and future forecasts obtained from NASA, USGS, FEMA and WRI.

### Are you licensing any third-party modeling systems as inputs to the Climate Price tool?

Not currently, but as we expand globally, we seek to team-up with professional climate and natural hazard risk modelers so that we can focus on translating those risks into price impact.



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Your demo video mentioned Task Force on Climate-related Financial Disclosures (TCFD) reporting. Do you have an example of an output that would qualify? How much of the TCFD analysis / disclosure can Climate Alpha manage?

In Q2 2023, we plan to break down our Climate Price valuation further into physical risk and transition risk. Additionally, when clients submit asset-level information such as the volume, or typology of the building, we can also calculate the Climate Value-at-risk, which is one of the requirements in TCFD.

### **Resilience Index™**

What is the Resilience Index and what does it measure?

The Resilience Index is an intuitive scorecard for qualitative analysis of climate change-induced impact, and a statistical model to account for future shifts in market fundamentals caused by climate change.

How is the index constructed?

The main index is aggregated from three sub-indexes, modeling risk, vulnerability, and readiness separately for ease of qualitative understanding. The index considers future climate projections, exposure to extreme events (e.g. population density and percentage area exposed to flooding), the sensitivity of the county population towards climate risks (e.g. percentage of the elderly population), and the capacity to cope with risk events (e.g. hospital beds per 1,000 population). You can find a more detailed description of the index methodology in the Resilience Index whitepaper.

You may submit a request to view our whitepaper [here](#).

Are Resilience Index scores relative?

Yes, the scores are relative. The index is calculated from all continental U.S. zip codes and counties using a min-max approach, standardizing the performance of each location under each indicator on a scale of 0 to 100.



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### What is the relative weight of each variable in your ranking?

Each indicator score is weighted evenly in the aggregation. Some indicators are made up of more than one data source, evenly weighted to avoid aggregation biases.

### What informs the indicators, i.e. how are they chosen?

We have chosen to include what are most notable in the real estate industry, referring to academic and industrial sources for validation. We also take client feedback into consideration when expanding the breadth of the features. We plan to expand where appropriate the indicators included in the “Risk”, “Vulnerability” and “Readiness” categories.

### The materials for your Resilience Index mention heat, storm, drought, flood and fire as risks - what, if anything, is missing from that list?

The physical risks of real assets *do* extend further than our risk coverage. For example, insurance companies also factor in earthquakes as a primary risk. We, however, seek to bring in natural hazards that are affected by *climate* change only.

That said, we are open to [feedback](#) and can form partnerships with catastrophe modelers to bring more risks into consideration.

### Can I receive this data directly?

Yes, the index is available for purchase. Please contact [info@climatealpha.ai](mailto:info@climatealpha.ai) for pricing information.

## **Alpha Finder™**

### What's the output of Alpha Finder?

The output of the Alpha Finder is a ranking of all eligible locations according to their average score across predefined criteria, the top counties or zip codes being those that most-greatly satisfy the criteria. The performance differences of the top locations can vary.

### What's the relative weight of each variable in your ranking?



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All variables selected by the user contribute to the final ranking equally.

### Are rankings forward looking?

Some features such as climate risks are forward looking. Other features such as population size or job listings are accurate to the latest year available.

### Can we see a time series of historical rankings?

You can inspect the historical trends of the property price index for each of the locations dating back to 1975 and projected till 2040 when you export them to the Climate Price™ analysis view.

### How does increasing feature count affect the rankings?

As the number of features increases, the importance of individual features decreases. The final ranking might therefore be less explainable compared to using a few key features.

### Why did you choose these factors for Alpha Finder and not others?

The available features within Alpha Finder are tested to be either statistically correlated to real estate or are commonly used metrics in the industry. The user has the freedom to choose the features according to their investment criteria.

## **Data & Models**

### What are the critical inputs to your valuation modeling, and how are you managing the data sourcing side of the analysis, despite such fragment availability of data?

The main input is our composite real estate index created from all other major indexers (MSCI, RCA, FHFA, and S&P). Currently, our model covers every critical real estate market at the ZIP code level, from 1975 to 2022.

Obtaining good-quality data is perhaps the most challenging aspect of our methodology. We have a dedicated data engineering team employing



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both manual and automated data mining techniques to integrate 1,500 features from hundreds of sources into our database.

### What are your data sources?

Please refer to our whitepaper for data sources. You may submit a request to view our whitepaper [here](#).

### How regularly is data updated?

Our datasets are generally updated quarterly and yearly.

### Will we be notified when data is updated, i.e. when the software is undergoing updates?

Yes. You will receive email notifications when new features or data are updated.

### Can we add our own models?

Yes. You can use our Scenario Forecaster to add custom weights to specific variables and generate new Climate Price forecasts.

### Can we add our own data points?

Yes. Our platform supports optional data uploads such as property valuations, year of acquisition, cap rates, etc. Please refer to our data upload portal for the full list of fields available. This additional information will be used to provide better forecasts.

For bespoke data uploads that fall out of our predefined parameters, please contact support -- our software is flexible, and we are always looking to improve.

### Do you cover countries outside of the US?

Yes, we also cover Canada, and we will extend our coverage to Europe and Asia in 2023.



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### **Tech Stack**

How is client data stored? Is it kept separate from other clients' data?

Yes. All client data is stored in separate AWS databases.

What happens when we remove our files from the data room? Is the data still kept within Client Alpha's backend?

We track the total number of properties modeled on our platform and the locations, but anonymize all other data. The data is used as training data for future models.

Do we maintain the rights to our data after it is uploaded into your system?

Yes. You have full control over the data. You may add, delete, or modify your database and the analyses will be updated accordingly.

Why REST API? Are other methods like SOAP supported?

REST is a lightweight and popular architecture that is secure, reliable, and efficient for software communications.

API access is supported for Climate Price in which users can query the Climate Price for the desired locations.

We also serve our static data such as the Resilience Index using Snowflake.

About the Provider: Climate Alpha is a location analysis platform for our complex future. It employs advanced machine-learning techniques combining socioeconomic, demographic, and market indicators with multiple climate scenarios to generate property valuations for every year to 2040.

**For any additional questions, please contact [info@climatealpha.ai](mailto:info@climatealpha.ai).**