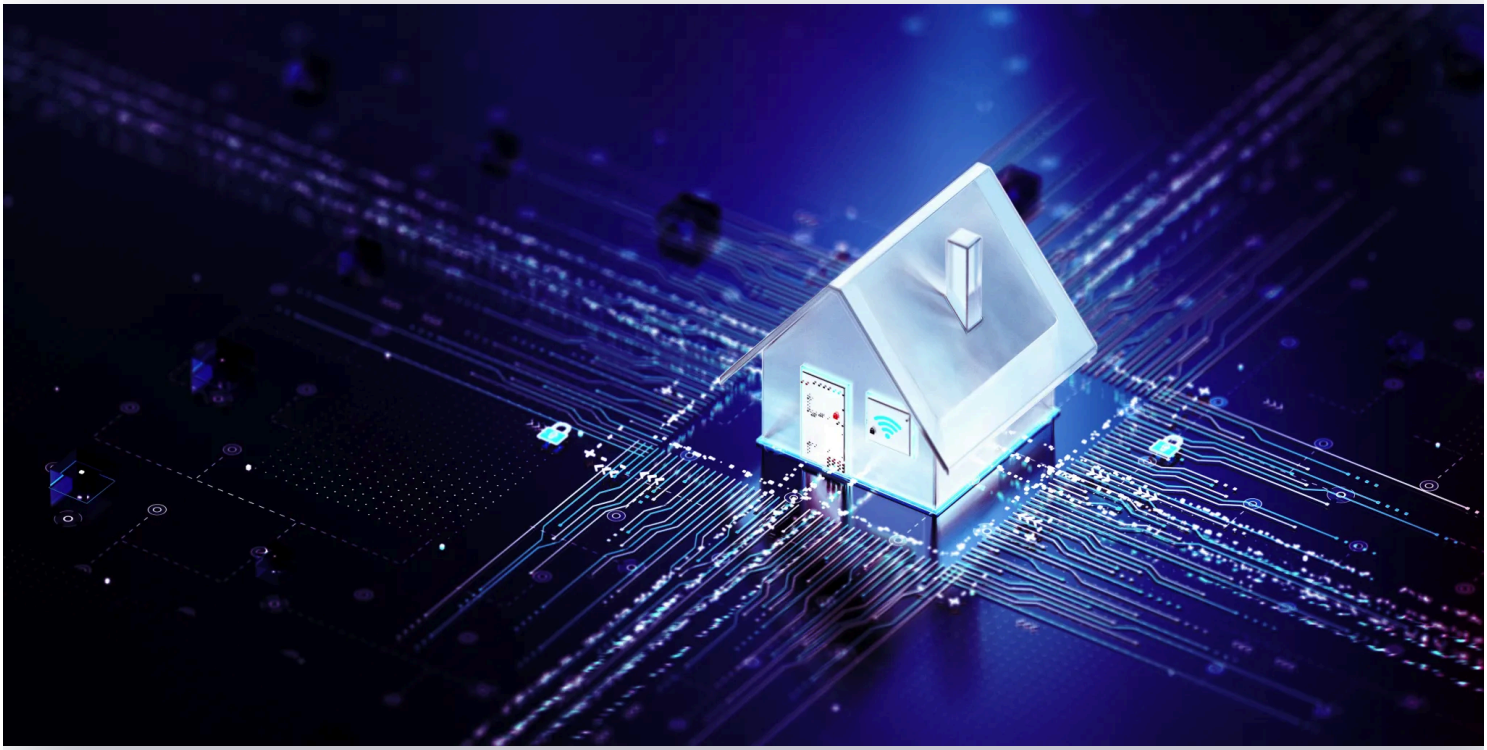
# REM Part 1: A Deep Dive Intro to Mina's Real Estate Model (REM)



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The core of the value creation of Mina Analytics is our Real Estate Model (REM), which allows us to estimate the impact on lease revenue per square foot of each choice an owner makes about an office building – in particular, whether to pursue a green certification, or whether to provide certain amenities to tenants. We have spent two years building a proprietary database to inform that analysis, and then we used those data to develop and validate statistical models that explain how particular green-certification choices or amenity choices affect lease revenue for office buildings. Our database contains thousands of measures of locational and building attributes, and our REM framework allows us to map reliably from those locational and building attributes to the differential revenue consequences of green-certification or amenity choices.

It has been exciting to build the database and those models because they produce important, and sometimes surprising, discoveries. In subsequent blog posts, I will talk more about how we constructed our database, why and how we allow thousands of building attributes and locational attributes to interact with one another when identifying the value consequences of certification or amenity choices, how we use artificial intelligence (AI) and natural language processing (NLP) to enhance the reach of those data to provide "soft" data concepts that augment more typical "hard" data measures, and why and how we

Our goal in sharing all this information with prospective clients and investors in these blog posts is to allow them to see a bit inside the black box of statistical modeling, and share our enthusiasm and confidence in the REM framework.

In this initial blog post, I want to summarize some of our basic discoveries about the effects of green certification on office building lease revenue. In this initial discussion, I want to highlight four discoveries from our REM framework:

*Discovery 1*: After fully controlling for other influences on leasing revenue, green certification – that is, either an Energy Star Certification or a LEED Certification – has a large average positive consequence for revenue per square foot in office buildings in Florida and California. That reflects the willingness of tenants, on average, to pay more for space that is green-certified. In Florida, the average certification effect for Energy Star is almost six percent, while the average effect of a LEED rating is roughly seven percent. In California, the average effects for both of the green certifications is about ten percent. These average revenue effects are additional to any cost savings from green energy configuration, which other researchers have found can also be substantial.

*Discovery 2*: Green-certification effects, however, are not the same across all locations within a state. When we consider how demographic and other locational characteristics affect the revenue consequences of green certification, we find that, in both California and Florida, attributes of the local population living in the zip code of the building affect the magnitude of the green-certification effect. Which attributes are reliably important for influencing the size of the green-certification premium varies across states and depending on which of the two green certifications one is considering. The REM framework considers a wide range of potential demographic characteristics when estimating their influence on green certification revenue effects, including characteristics related to income, voting preferences, education, and age.

*Discovery 3*: Market participants choices of green certification indicate that building owners already are aware of the existence of green premia, and they also have opinions about how green certification premia vary across locations. The evidence for those beliefs are the systematic differences in the percentage of buildings that have been green-certified across zip codes with different population characteristics. For example, as Table 1 shows, in both Florida and California, green certification is chosen by owners more in zip codes with people who have more income, are more educated, and tend to vote more for Democrats. This is true both for buildings that are LEED-certified and those that are Energy Star-certified.

*Discovery 4*: Market participants' implied opinions (shown in Table 1) about which local population attributes are associated with greater rewards for green certification are directionally correct, but they are incomplete. Market participants do not always identify the most relevant drivers of different rewards for green certification, or attach the optimal weights to those drivers. Therefore, there is substantial money left on the table from sub-optimal green certification choices. The disciplined statistical analysis of the REM framework is able to guide certification decisions to identify the low-hanging fruit – the buildings that are currently not green-certified, but that would experience large increases in leasing revenues from becoming green-certified.

In our next blog post, I will discuss the role of within-location variation of building characteristics for explaining the magnitude of green-certification effects. In a third blog post, I will explain how we employ

pitfalls.

**Table 1: Percentage of Office Buildings That Are Green Certified, By Population Types**

| Florida | Energy Star-Certified | LEED-Certified |
|---|---|---|
| % in Highest Democrat voting quartile | 6.2% | 4.9% |
| % in Highest education quartile | 7.6% | 7.7% |
| % in Highest income quartile | 7.0% | 7.3% |
| % in Lowest Democrat voting quartile | 0.0% | 0.0% |
| % in Lowest education quartile | 2.0% | 2.2% |
| % in Lowest income quartile | 2.5% | 2.1% |
| Total % of office buildings | 5.0% | 4.1% |

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| California | Energy Star-Certified | LEED-Certified |
|---|---|---|
| % in Highest Democrat voting quartile | 13.8% | 10.7% |
| % in Highest education quartile | 15.7% | 10.3% |
| % in Highest income quartile | 13.6% | 10.2% |
| % in Lowest Democrat voting quartile | 5.7% | 0.9% |
| % in Lowest education quartile | 5.1% | 1.4% |
| % in Lowest income quartile | 6.8% | 3.6% |

| | | |
|---|---|---|
| Total % of office buildings | 11% | 7.2% |

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