

Mapping Net Solar Potential of Building Types in LA County



by Hannah Gustafson | Master's in Urban & Regional Planning
Lewis Center Award Winner for Innovative use of Spatial Analysis and GIS in Policy Analysis

As Los Angeles County seeks to meet regional and statewide climate and sustainability goals, solar power and Zero Net Energy (ZNE) capable buildings are gaining policymaker attention. With a growing population, increasing energy demand, and a critical need for reducing greenhouse gas (GHG) emissions, investing in renewable energy and energy efficiency has never been more important. Electricity production alone accounts for **32%** of total carbon emissions in California, the second-largest GHG-emitting state in the country (CPUC, 2008). In response, the state and public utilities have set a goal for ZNE residential construction by **2020** and ZNE commercial construction by **2030**.

This project offers insight into how cities throughout LA County can target high potential ZNE buildings using high-resolution energy consumption data. The maps explore the relationship between annual rooftop solar potential and current energy consumption among building types and sizes for each city in LA County. Because fine-scale energy consumption data is publicly inaccessible, this project is the first exploration of ZNE building potential based upon the LA County Solar Map and address-level energy consumption information. The combination of these powerful datasets allows for an exploration of geographic and building type net solar potential among the **88 cities** in LA County.

RESEARCH QUESTIONS

- 1 What are the spatial patterns of high and low net solar potential across the County?
- 2 What types of buildings are best suited for zero net energy potential at current electricity consumption levels across all cities in Los Angeles County?

METHODOLOGY

STEP ONE : COMPARING TWO DATASETS

- (1) LA County Solar Map & Planning Tool
 - (2) LA County Energy Database from the California Center for Sustainable Communities at UCLA
- (Both datasets contain parcel-level data)

STEP TWO : SPATIAL SUMMING

- Annual electricity (kWh) consumption and solar PV potential for five building types and seven building size categories spatially summed and compared for each city in LA County
- Identified building types and sizes with highest net solar potential
- Ran entire process as python command in a spatially-enabled PostgreSQL database with CSV table output

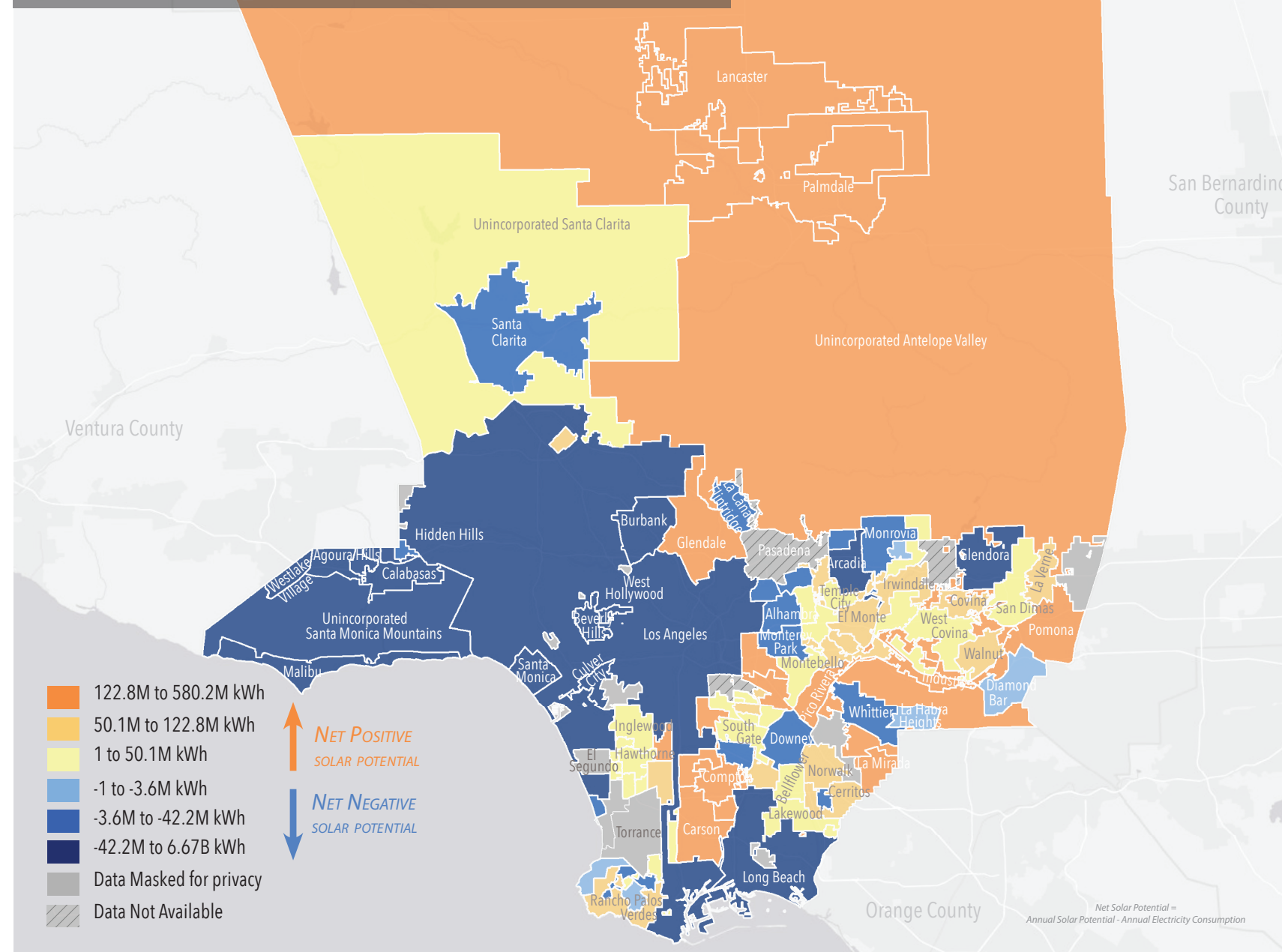
STEP THREE : MAPPING

$$\text{Net solar potential} = \frac{\text{Total annual solar}}{\text{Total annual electricity consumption}}$$

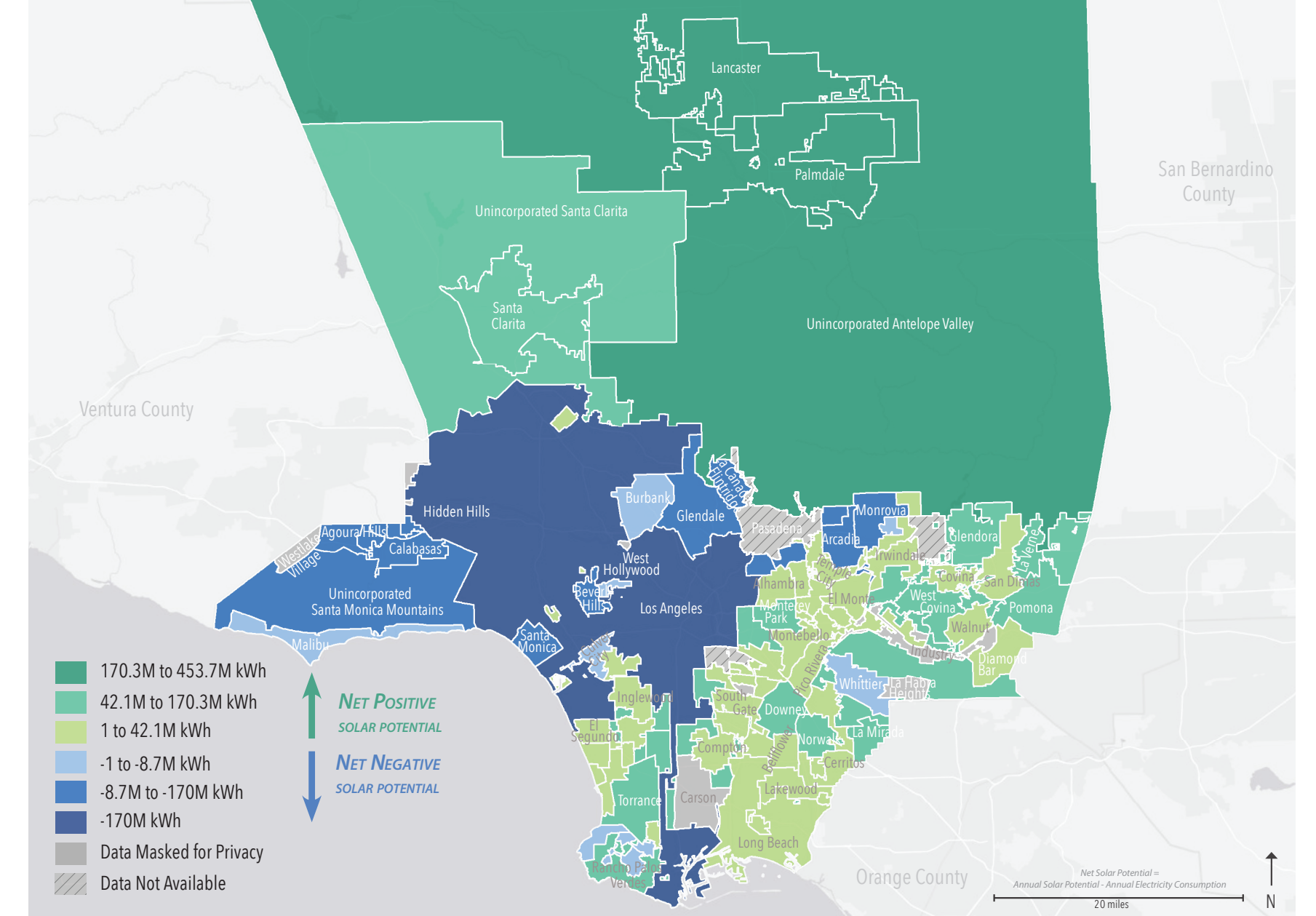
mapped using ArcMap 10.2
(formatted in Adobe Illustrator and InDesign)

- REFERENCES:
1. The LA County Solar Map and Green Planning Tool (which itself is based on high-resolution imagery and elevation information acquired in 2006 by the LAR-IAC (Los Angeles Region Imagery Acquisition Consortium).
 2. 2010 energy consumption data from the California Center of Sustainable Communities at UCLA
 3. City boundaries shapefile from the LA County Enterprise GIS Data Portal

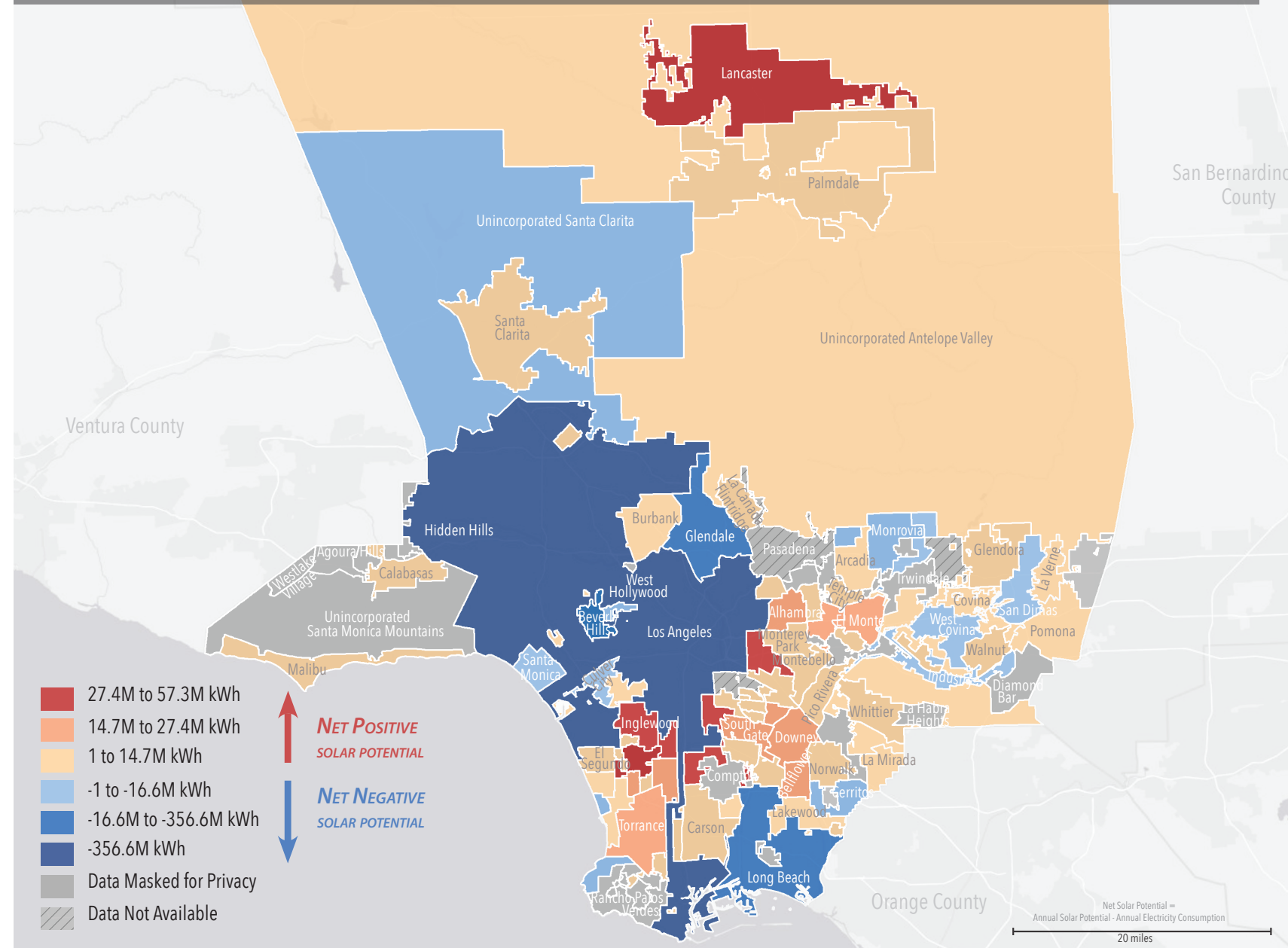
MAP 1. TOTAL CITYWIDE NET SOLAR POTENTIAL



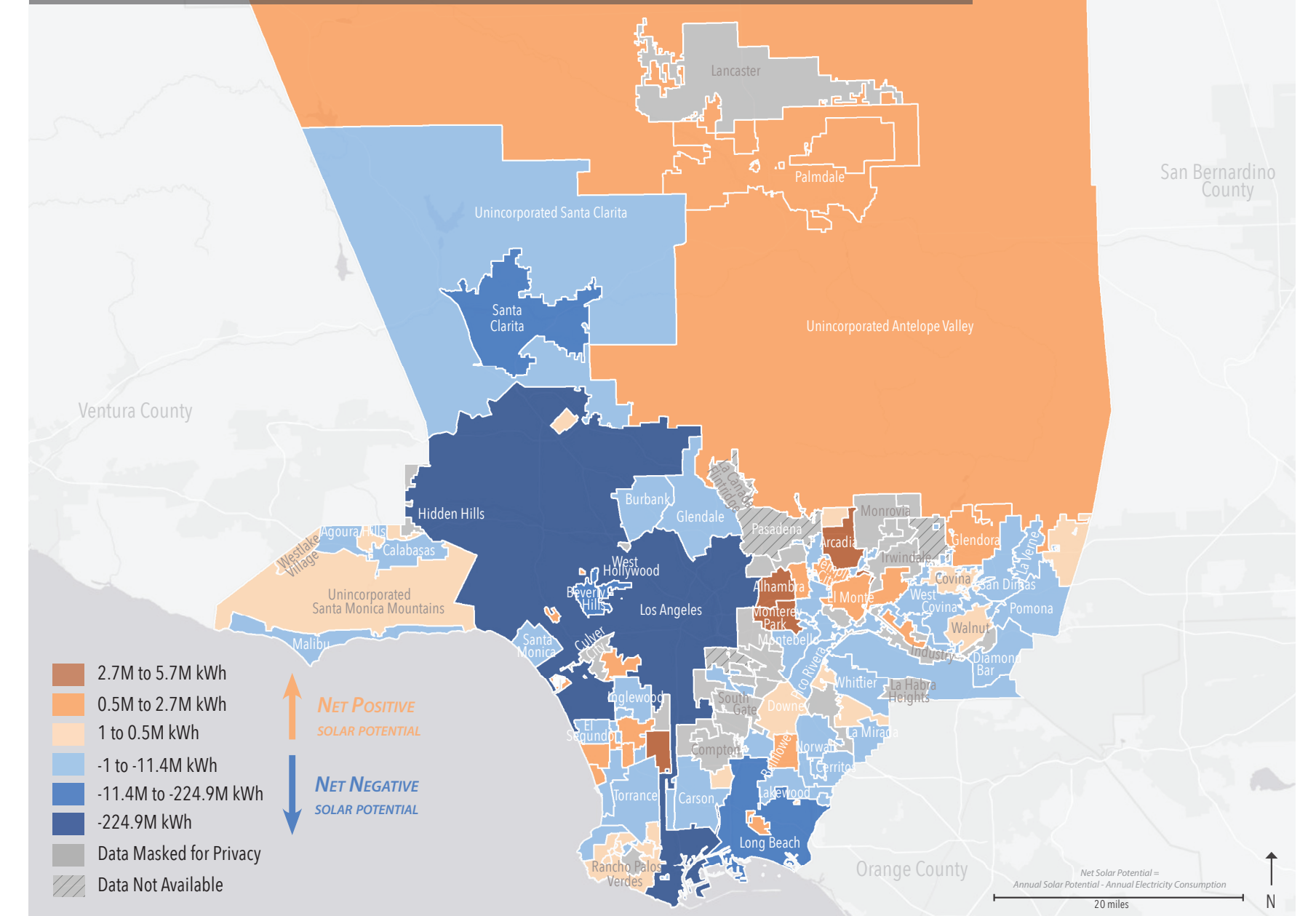
MAP 2. TOTAL CITYWIDE NET SOLAR POTENTIAL: Single Residential Buildings



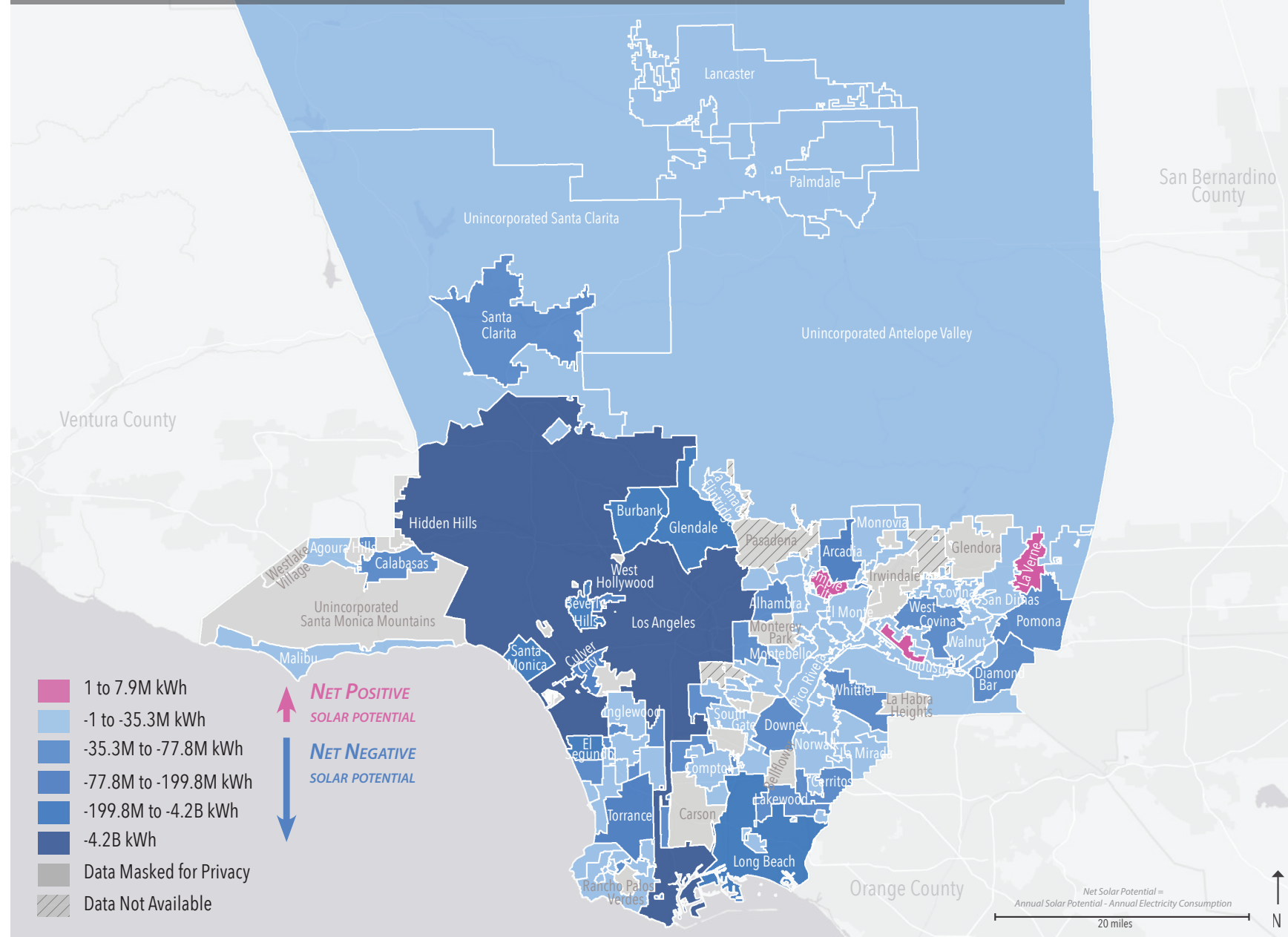
MAP 3. TOTAL CITYWIDE NET SOLAR POTENTIAL: Multi-family Residential Buildings



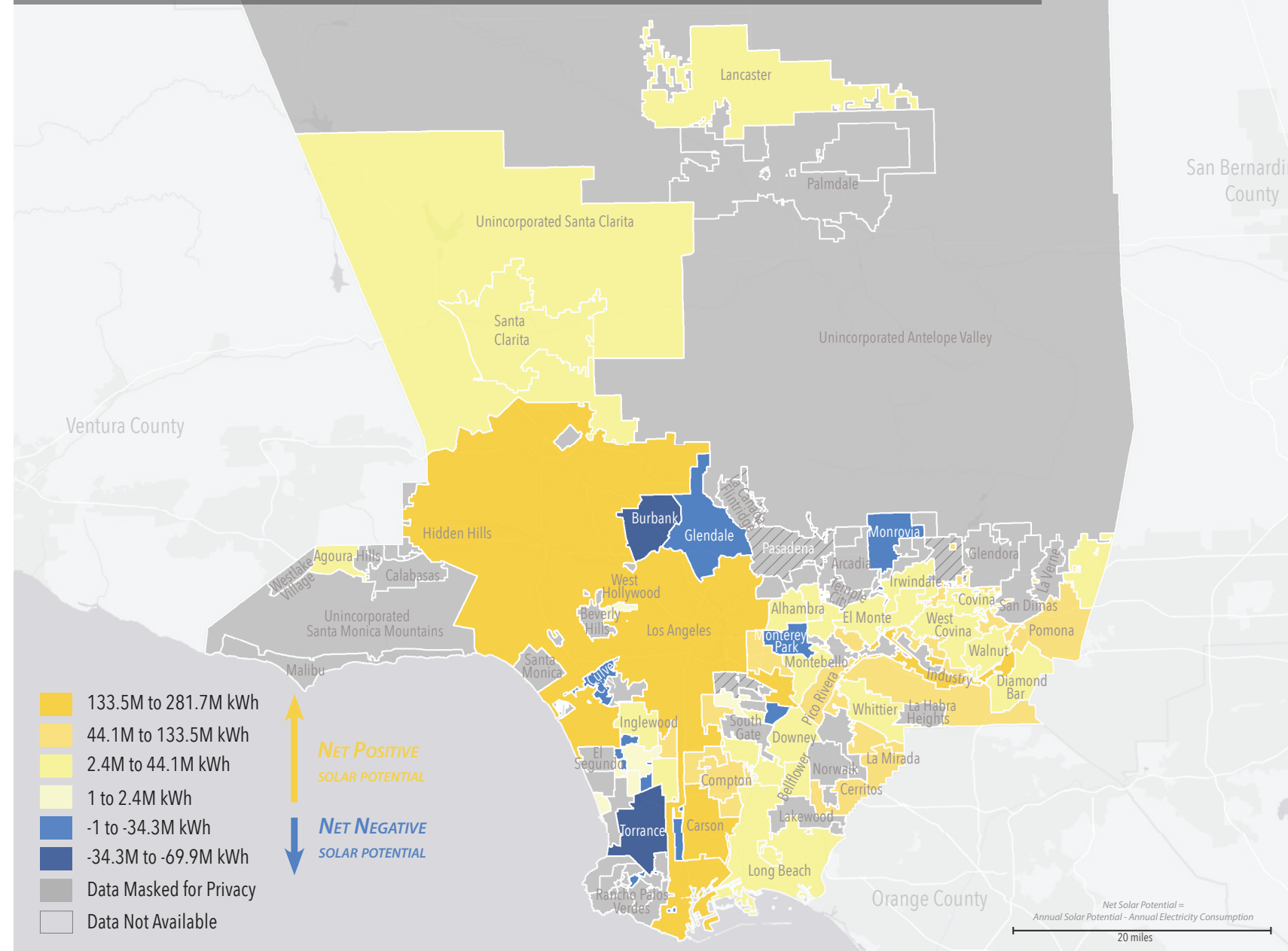
MAP 4. TOTAL CITYWIDE NET SOLAR POTENTIAL: Condo Buildings



MAP 5. TOTAL CITYWIDE NET SOLAR POTENTIAL: Commercial Buildings



MAP 6. TOTAL CITYWIDE NET SOLAR POTENTIAL: Industrial Buildings



MAP 7. TOTAL CITYWIDE NET SOLAR POTENTIAL: Institutional Buildings

