Sub-regional Vulnerability Assessment: Energy Management

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Background

Estimating Risk to California Energy Infrastructure from Projected Climate Change (2012) estimated that higher temperatures would require up to a 38% increase of generation capacity and 31% increase in transmission capacity by the end of the century

In 2015 Governor Brown signed Executive Order B-30-15 that called for an adaptation implementation plan for each sector of the economy; led to a working group through the Department of Energy's Partnership for Energy Sector Climate Resilience

In May 2018 the CPUC issued an Order Instituting Rulemaking (OIR) to consider strategies to integrate climate adaptation planning I relevant Commission proceedings and other activities

SoCal Gas

2016 Risk Assessment Mitigation Phase (RAMP)

- Chapter dedicated to a vulnerability assessment and adaptation plan to address climate threats to gas infrastructure

Gas Infrastructure Resilience and Vulnerability Report

- Several case-studies examining the impacts of climate hazards on natural gas system
- Natural gas infrastructure and services exhibited “significant resilience to disasters to in part to existing system characteristics” (i.e. underground assets)

Southern California Edison

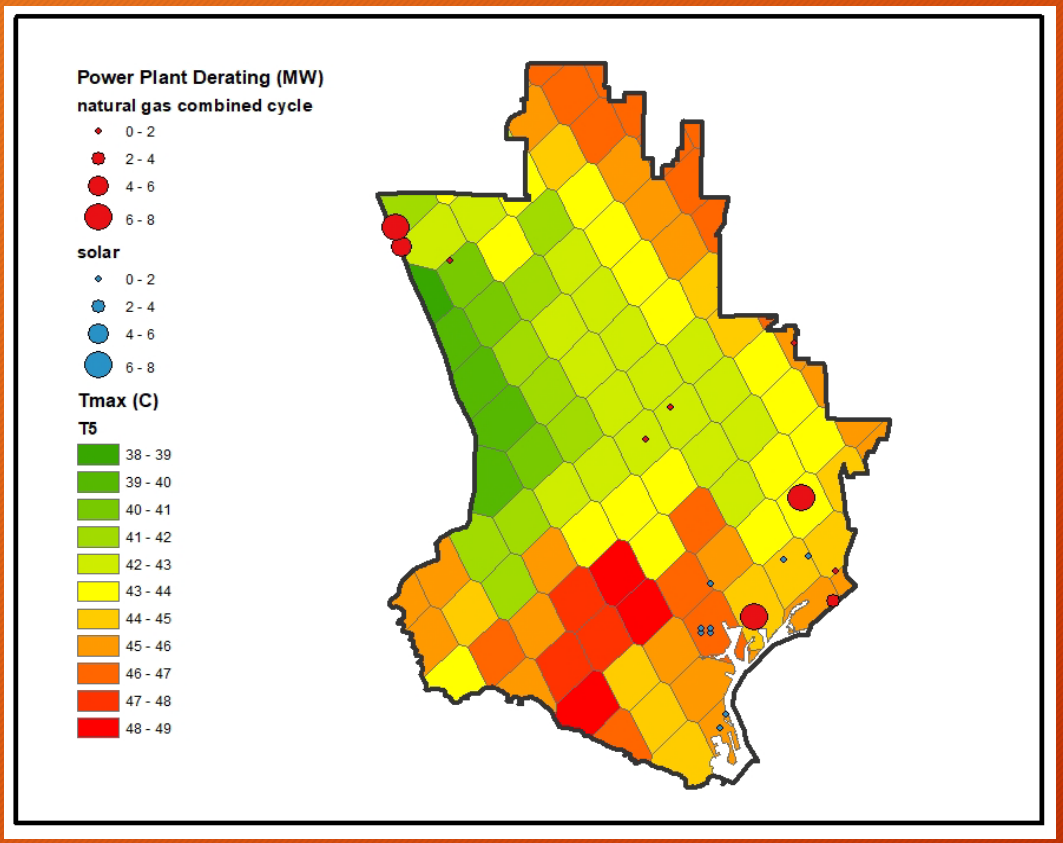
- *Climate Impact Analysis and Resilience Planning* (2016)
  - Vulnerabilities:
    - Risk of facility inundation and flooding, especially at 18 at risk coastal facilities
    - Transmission, distribution and generation systems will operate less efficiently under extreme heat
    - Increased demand due to elevated average temp and extreme heat days
    - Limited generation capacity due to decreased reservoir levels
    - Increased liability and potential disruption of service due to wildfire events
  - Adaptation Measures:
    - Use future projections rather than historical data for planning and design
    - Increase use of distributed energy solutions to limit burden on transmission system
    - Install additional equipment to decrease burden on existing, aging equipment
    - Facilitate relocation of facilities at risk of coastal inundation

Grid Vulnerability to Extreme Heat: Findings of the 4th Assessment Report

- SBCCOG utilized data and methodology from the 4th Assessment Report to extrapolate the neighborhood-level grid vulnerabilities within the South Bay service territory, and answer the following questions:
  - How much could capacity be reduced at generator plants, transmission lines, and substations by 2060 due to extreme heat?
  - What cities or neighborhoods within the South Bay service territory have the highest risk of shortages in delivery infrastructure capacity, and should therefore be prioritized for capital investments and or demand side management programs?

Results: Power Generation Risk

Map of Worst-Case Losses in Plant Capacity for Composite Temperatures in 2060 RCP 8.5



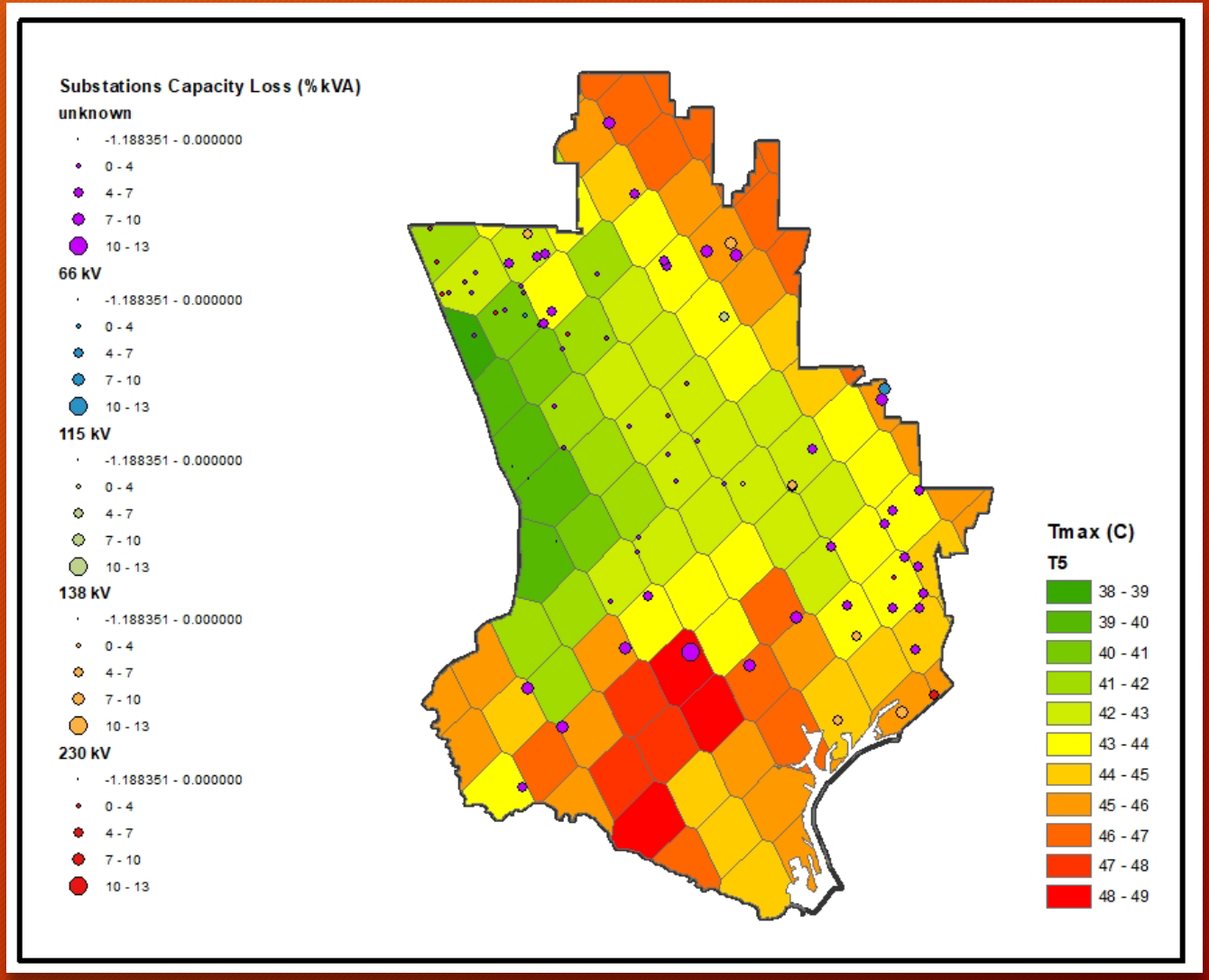
Of the South Bay's 4.1 GW of local power generation, approximately 29.16 MW (0.7%) of energy generation capacity could be lost due to temperature increases over 40 degrees Celsius under the worst-case scenario (2060, RCP 8.5). The South Bay's power generation is therefore at minimal risk to projected temperature increases.

Results: Substation Risk

- The maximum projected substation capacity loss is 12.6%. Approximately 37 square miles within the South Bay (26%) are within a substation area projected to have substations operating at a weather-de-rated factor of 1-1.2. This de-rated load factor corresponds to a “warning” risk level.

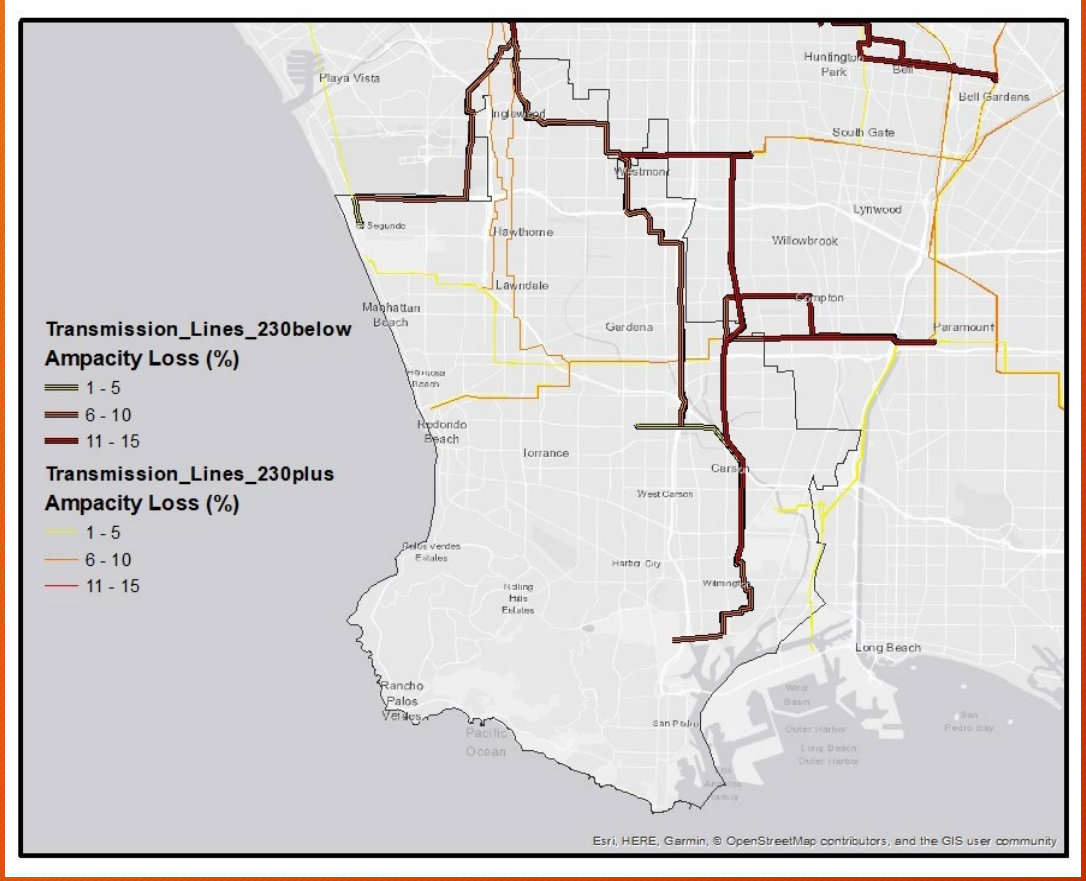
- Approximately 16.8% of the sub-region live within a “warning” designated risk level substation area

Worst-case losses of substation capacity for composite temperatures (2060, RCP 8.5)



Results: Transmission Line Risk

Worst-Case Transmission Line Ampacity Loss



High voltage transmission lines are projected to experience on average 3.46%; low transmission lines are projected an average ampacity loss of 8.4%.

Transmission lines are most vulnerable between North and South Carson