

# **Geothermal Energy Potential Within the Los Angeles Basin and Its Co-Location With Solar and Wind Renewable Energy Resources\***

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## **Abstract**

Interest in the use of geothermal fluids, in the form of oil field brines, to generate power has become of increasing interest as binary power generation technology has improved. We undertook an evaluation of the suitability of the oil pools in the Los Angeles Basin for power generation using this technology. Using the California Division of Oil, Gas and Geothermal Resources (DOGGR) database of all wells within the District 1 area, we identified those wells for which geopressed conditions existed and temperatures were sufficiently high to allow reasonable power generation potential. We examined the records of 29,156 wells. We considered the temperature and pressure values at known depths in reservoirs for individual pools.

Fifteen pools were identified that have good potential for geothermal power generation. Of these, three are also geopressed. These resources are co-located with identified wind- and solar-resource sites. We describe in this presentation the characteristics of the sites with significant geothermal potential, as well as the magnitude of the co-located wind- and solar-resources. We discuss the potential for developing distributed generation capabilities in this region, and the implications for supporting California's distributed generation mandate and its community choice aggregation program.

## **References Cited**

Blackwell, D.D., M. Richards, and P. Stepp, 2010, Texas geothermal assessment for the I-35 Corridor East, Final Report for the Texas State Energy Conservation, Contract CM709: SMU Geothermal Laboratory, 88 p.

McKenna, J., and D. Blackwell, 2005, Geothermal electric power from Texas hydrocarbon fields: GRC Bulletin, v. 34/3, p. 121-128.

Sanyal, S.K., N. Buening, M. Kramer, and A. Robertson-Tait, 1993, Some aspects of geopressed resources in California: Transactions Annual Geothermal Resources Council Meeting, October 10-13, 1993, v. 17, p. 175-180.

Sanyal, S.K., and S.J. Butler, 2010, Geothermal power capacity from petroleum wells: some case histories and assessment, *in* Proceedings World Geothermal Congress: 25-30 April 2010, Bali, Indonesia, p. 25-29.

# **Geothermal Energy Potential Within the Los Angeles Basin and Its Co-Location With Solar and Wind Renewable Energy Resources**



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With contributions from  
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# Purpose of Study & Outline of Presentation

**The purpose of this study was to determine if significant geothermal resources within the oil & gas fields of the L.A. Basin are co-located with potential wind and solar resources.**

## Presentation Outline:

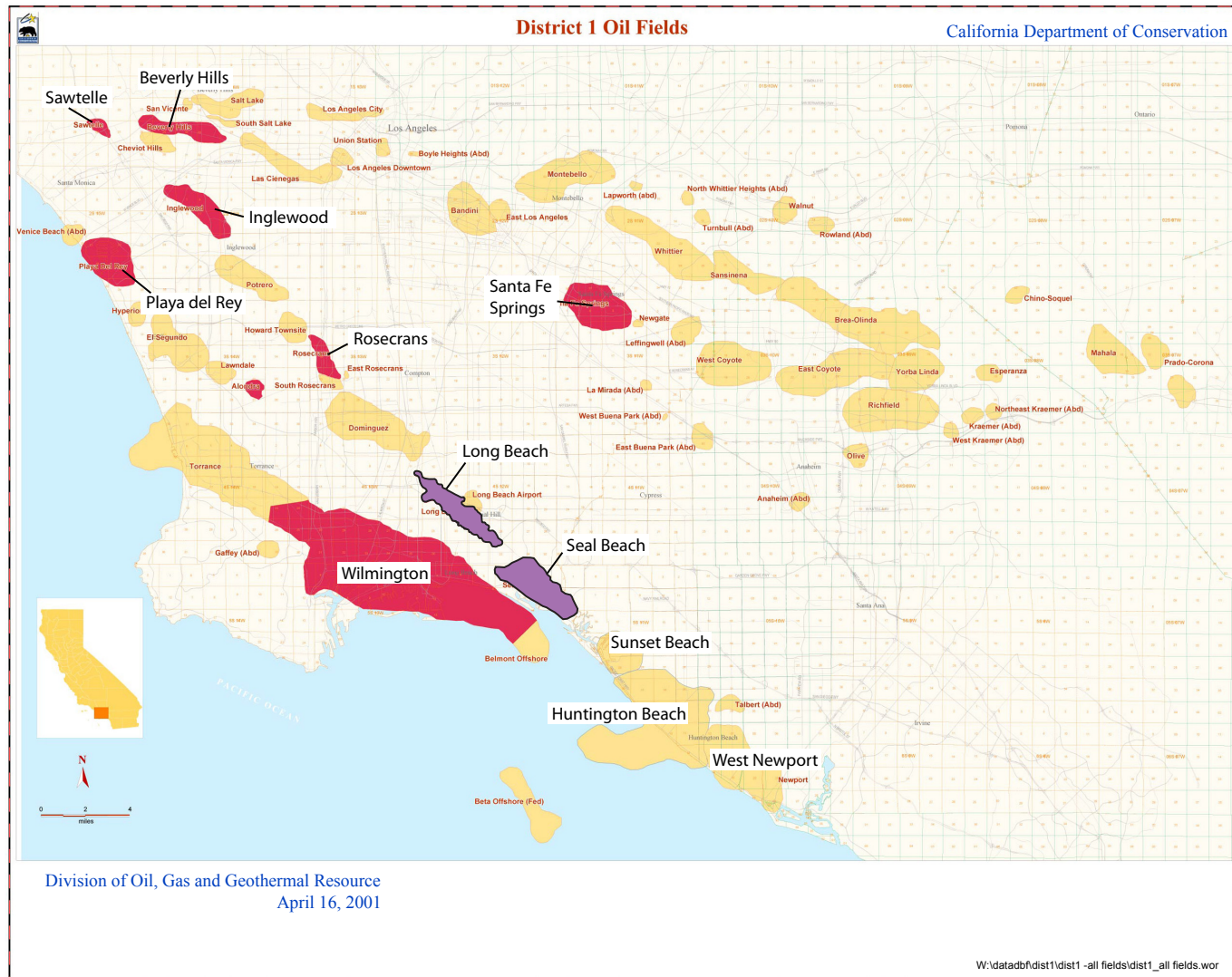
- I. Approach to screening oil & gas fields
- II. Results of screening process
- III. Mapping geothermal and wind resources
- IV. Mapping geothermal and solar resources
- V. Conclusion

*Previous work: Sanyal et al., 1993; McKenna & Blackwell, 2005; Blackwell, Stepp & Richards, 2010; Sanyal & Butler, 2010*



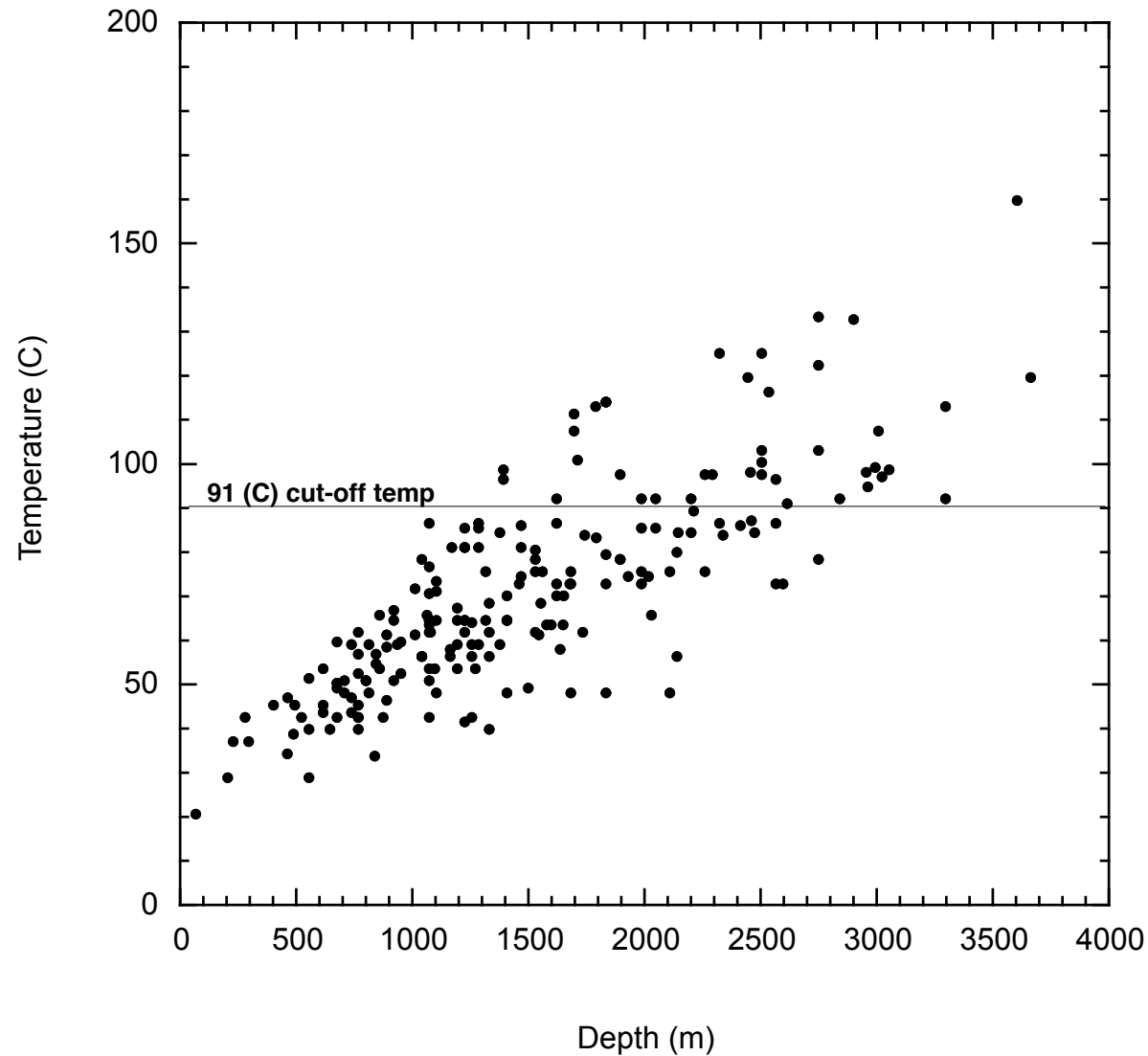


# Oil Fields in the L.A. Basin



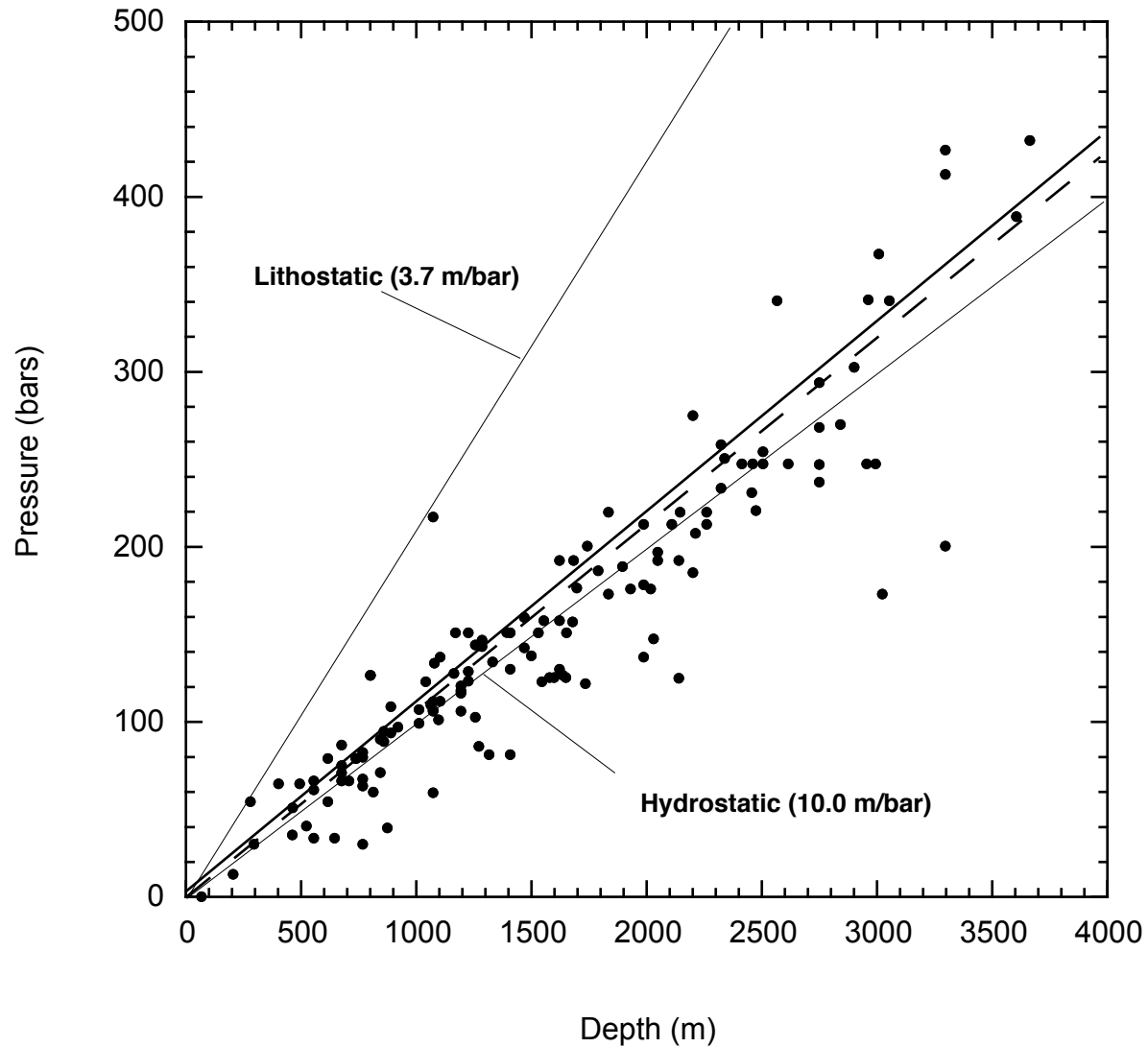


# Temperature vs. Depth For All Wells





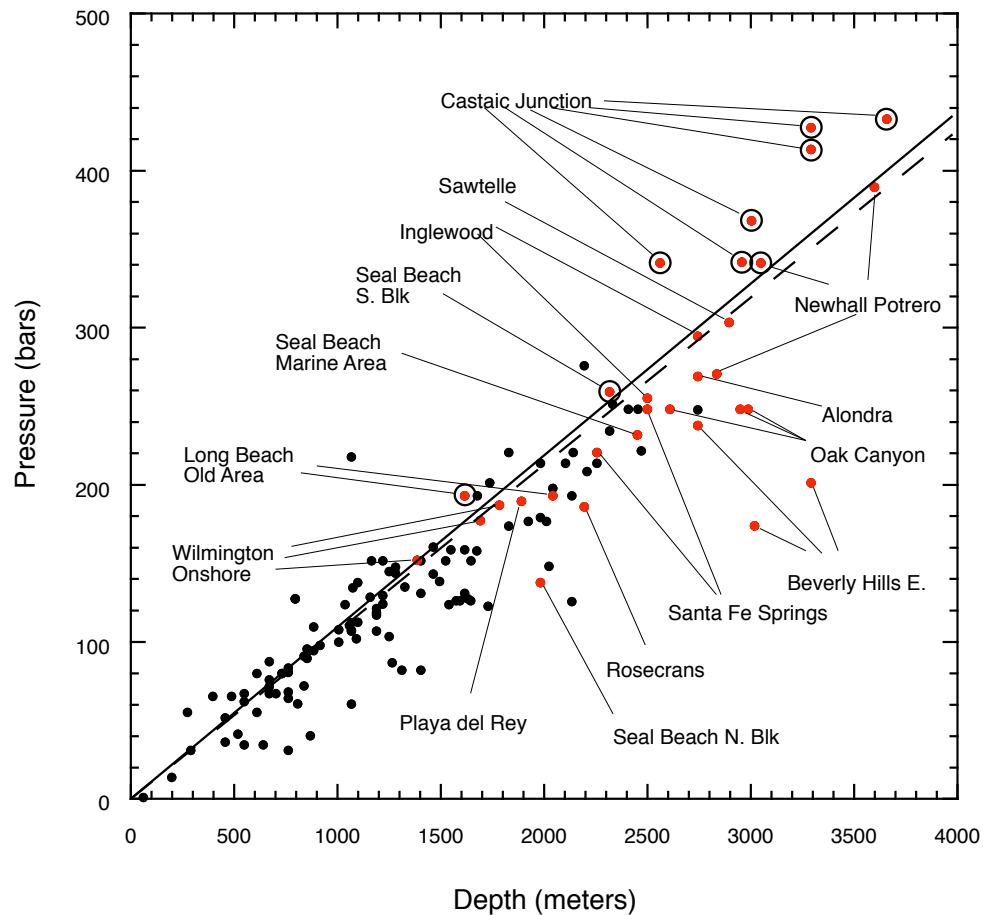
# Pressure vs. Depth For All Wells





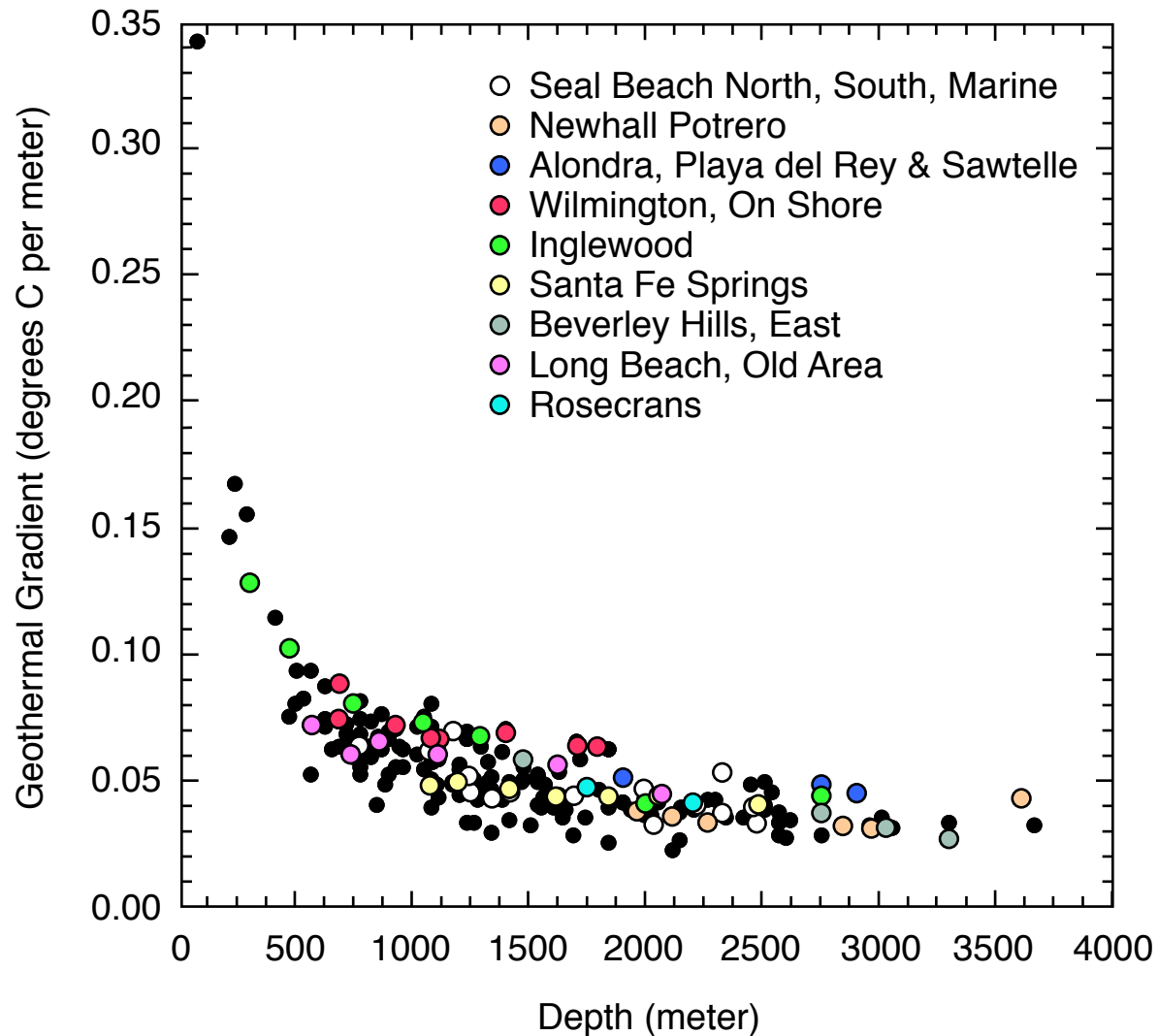
# “Geo-pressured” Fields With Temperature Cut-Off For All Wells

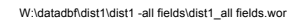
- All data ( $T < 91^\circ\text{C}$ )
- Temperature  $> 91^\circ\text{C}$
- Geopressured





# Geothermal Gradient vs. Depth For Selected Fields

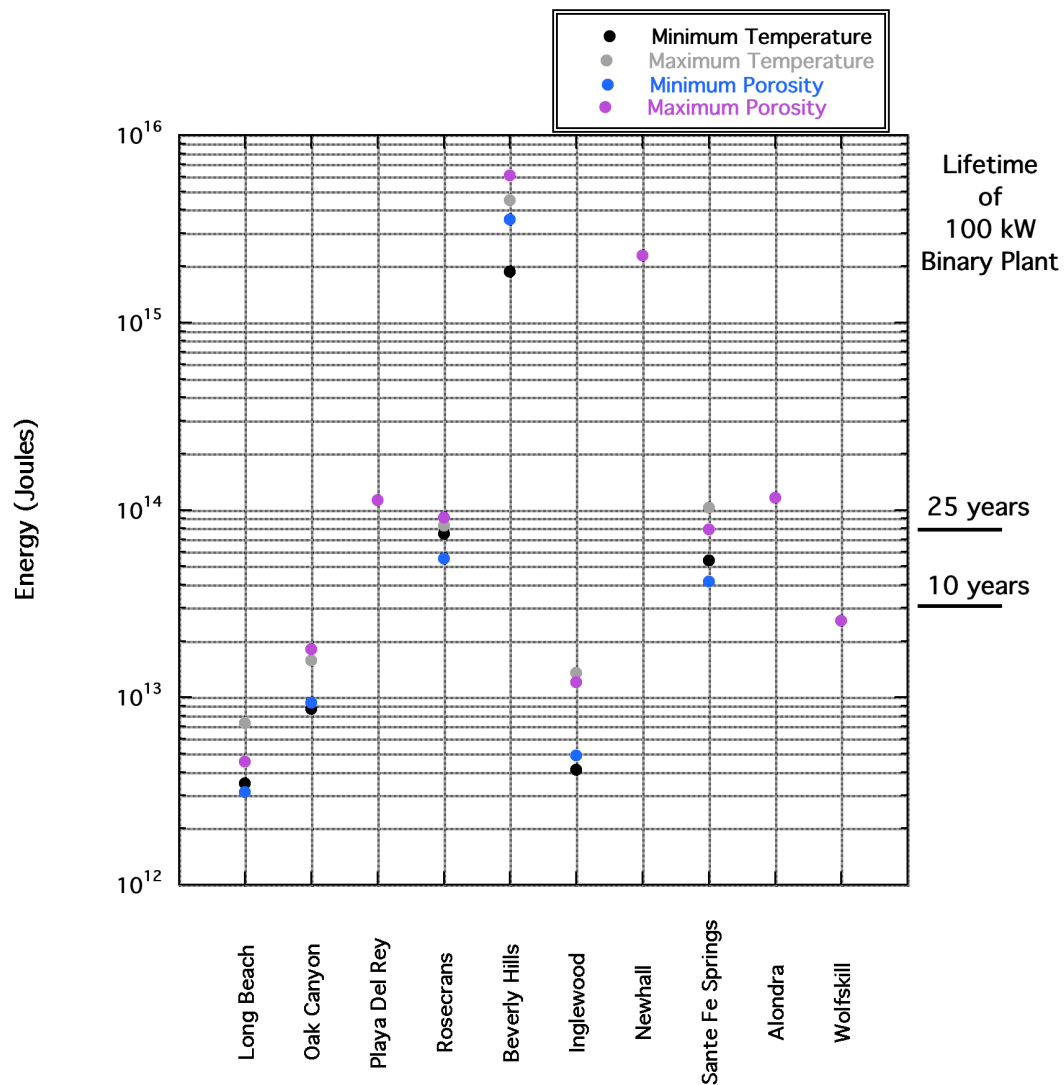






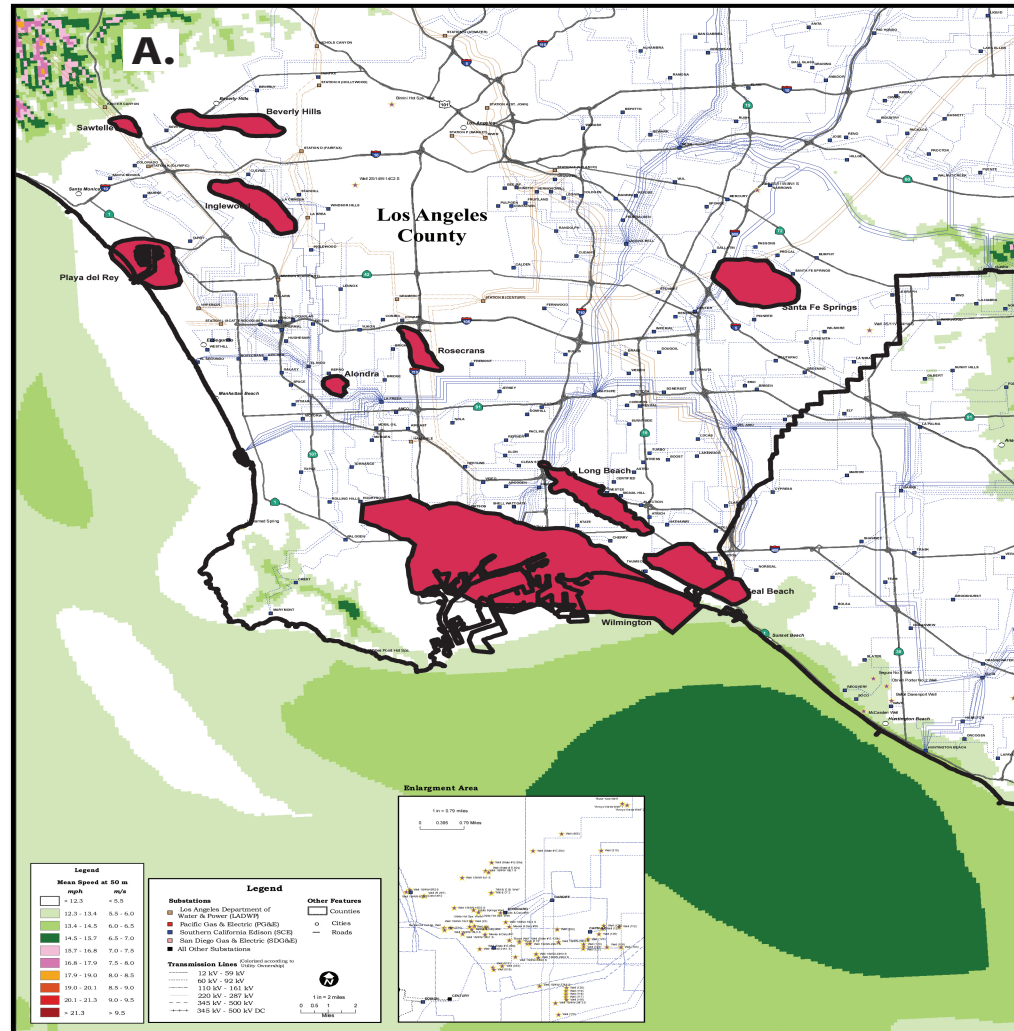


# Power Generation Potential





# Geothermal Field Locations Relative to Mapped Wind Resources

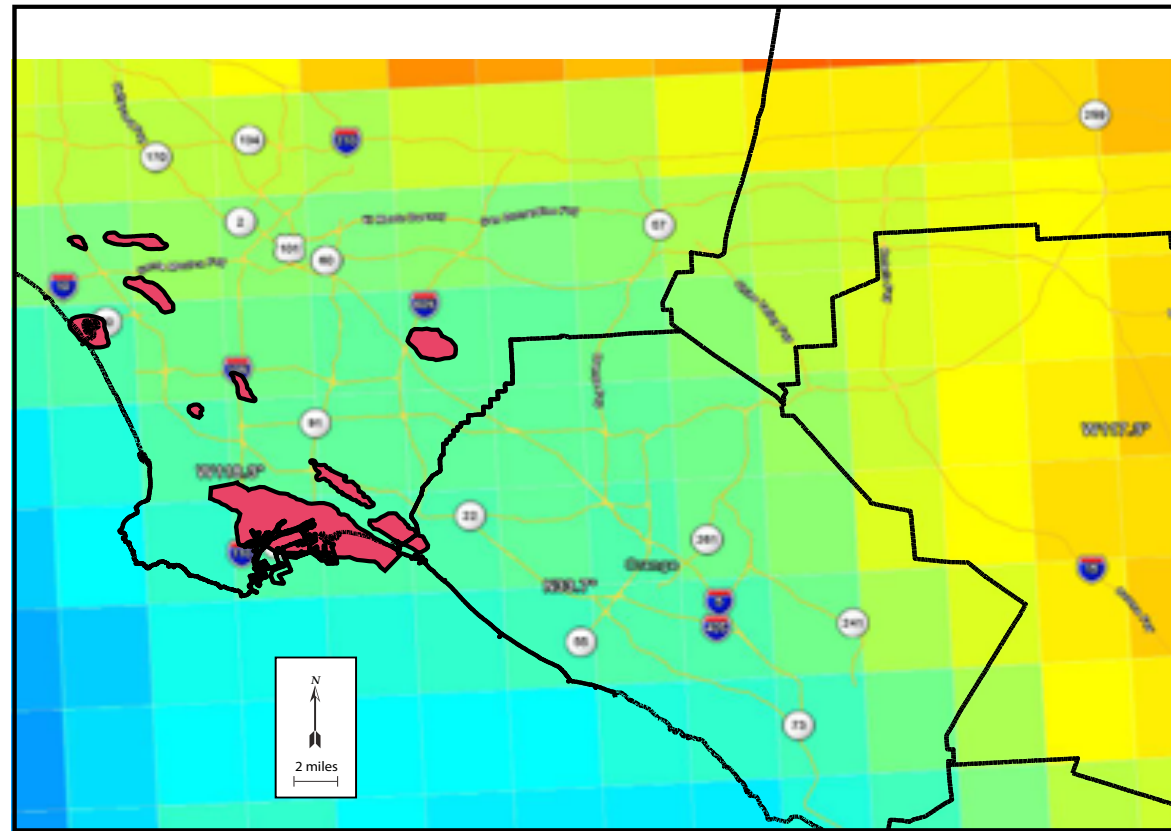
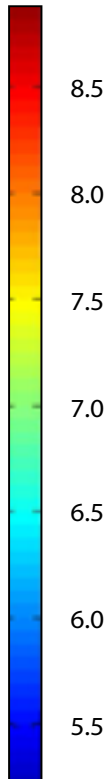






# Geothermal Field Locations Relative to Mapped Solar Resources

kW-h/ m<sup>2</sup> /day  
(June)





# Conclusions

1. Of the 10 oil fields, 8 have significant geothermal potential.
2. Four of the fields are proximate to significant wind resources.
3. All of the fields are within regions that have modest (6.5 to 7.3 kWh/m<sup>2</sup>/day) solar PV potential.
4. Coupling of flexible geothermal generation potential with solar and wind resources in the L.A. Basin could provide significant distributed generation capacity.

***We are currently quantifying the total generation capacity that could be achieved using these resources.***

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