Preface

Background

Energy is a key element in every aspect of modern life. It heats and cools our homes, powers our businesses, and provides services that enhance our quality of life. The San Diego region relies heavily on imported natural gas and imported electricity to meet its non-transportation energy needs. Recognizing that a strong economy requires a diversity of energy resources and a balanced mix of imported and locally generated electricity, a local group recently developed a San Diego Regional Energy Strategy (RES) to address the energy needs of the Region.[1] The RES was adopted as the energy component of the Regional Comprehensive Plan (the long-term development plan for the San Diego region) by the San Diego Association of Governments (SANDAG) in 2003.[2]

An important element of the Regional Energy Strategy (RES) is the role of renewable energy resources in the overall energy mix for the Region. The RES calls for 40 percent of the electricity supply to be met by renewable resources by 2030, and of these renewable resources, 50 percent should come from within San Diego County.

The State of California has also set an aggressive goal to increase the amount of renewable energy used in California. The California Renewable Portfolio Standard (RPS) requires an investor owned utility to buy electricity from renewable sources equivalent to 20 percent or more of its energy needs. While the legislation sets a target date of 2017, San Diego Gas & Electric (SDG&E), the local utility, plans to meet that goal by 2010.[3]

To meet these renewable energy goals local planners and the utility must address the question: How much developable renewable resource is available in the Region.[4] Although anecdotal evidence suggests significant renewable energy resources are available in San Diego County and nearby areas, to date no in-depth, technical studies have been completed to determine the extent of the renewable resource base and, more importantly, how much can be developed to produce electricity.

This study was undertaken to determine how much renewable energy could be developed in the Region. Once this figure is known, important decisions about how much renewable energy should be, and ultimately will be developed can proceed with greater confidence and acceptance.

Providing a clear, fact-based and widely accepted understanding of each renewable technology's potential for development is vital to the efficient development of renewable power. For example, knowing the amount of solar energy that falls on the Region is not the same as translating this into the amount that falls onto rooftops suitable for solar systems. Similarly, knowing the maximum wind velocity across the Region does not equate to the wind potential at locations that are geographically accessible. The result of such refinements

[1] www.sdenergy.org, San Diego Regional Energy Strategy.
[2] www.sandag.org, San Diego Regional Comprehensive Plan.
[3] See Appendix B for more details about the RPS and SDG&E's plan.
[4] This report takes a wide geographic perspective. It defines the Region as San Diego County, Imperial County, and northern Baja California.

represents a resource's technical potential.[5] Technical potential has been a critical, but missing, foundational element in regional renewable energy policy and implementation.

Purpose and Scope

Recognizing the need to provide a fact-based answer to the fundamental question—what is the technical potential for the each renewable resource in the Region—a group of local energy experts have worked together on a voluntary, collaborative study over the past 18 months. The results of this collaboration to date, incorporating input from a widespread peer review, are presented in this report. The Study Group emphasizes that this is a work in progress and that, although the study addresses San Diego and Imperial Counties as well as Northern Baja California, Mexico, the technical potential for some resources has not yet been fully studied for all three areas, as shown in the table below. Further, in the interest of time, the Study Group limited its study to those renewable energy technologies judged to have the highest potential to contribute significant power to the Region: solar, wind, geothermal, and biomass.

Resource Locations Studied, by Technology

Resource	San Diego County	Imperial County	Northern Baja CA, Mexico
Solar Photovoltaic	Yes	No	No
Concentrating Solar	Yes	Yes	No
Wind	Yes	Partial	Partial
Geothermal	Yes	Yes	Yes
Biomass	Yes	Yes	No
Small Hydro	Yes	No	Partial

Acknowledgments and Participants

The Study Group was a voluntary collaboration of individuals from the following organizations: Center for Energy Studies at San Diego State University, San Diego Regional Energy Office, San Diego Gas & Electric, and the Autonomous University of Baja California. Other Study Group members included David Rohy and Robert Resley. Substantial input to the report was provided by the National Energy Renewable Laboratory and the California Energy Commission. The Study Group wishes to thank the Southwest Consortium for Environmental Research and Policy (SCERP) for funding parts of this study, especially those aspects related to Baja California; U.S. Department of Energy for funding the Geographic Information Systems (GIS) evaluation of commercial roof area; and the City

[5] Technical potential is the amount of renewable energy available to be developed with present technologies, after the impact of constraints such as geography, land use, and available rooftop area. It is not limited by cost/economic considerations, which are clearly among the drivers of the actual penetration of each technology, likely a smaller number than the full technical potential.

of San Diego Information, Technology, and Communication Department for performing the GIS work in conjunction with the San Diego Regional Energy Office. Special thanks to Dr. Michal Moore for his participation throughout this project.

The Study Group thanks the peer reviewers for providing significant input to this effort. Peer reviewers and other key contributors are listed in Acknowledgments.

Methodology

The first step was to conduct a comprehensive survey of available literature, forecasts and studies, and databases for renewable energy technical potential in the San Diego region. References are located in footnotes in each chapter. These were scanned for currency, relevance, and methodological rigor. These findings formed a starting point for subsequent work.

The next step involved applying a series of "screens" or filters to the available data for gross potential to derive the technical potential for renewable energy in the Region. For example, a state-of-the art analytical methodology was developed and applied to the CEC's data for theoretical maximum wind potential to yield a more precise potential for the Region. Similarly, estimates of solar insolation were screened through data and forecasts of available rooftop area to determine technical potential for this resource. Upon completion, the report was peer reviewed by numerous experts. Names of people who provided this valuable service are listed in Acknowledgments.

Community Utilization of this Report

The results of this analysis constitute the Study Group's findings on renewable energy's technical potential for the Region. This result is not constrained by, nor intended to be, an assessment of how much of that potential will actually be deployed. Making that translation…from potential to reality…is driven by the community through public policy, statute, regulation, cost, energy market design, and business practices. Public and private decisions will hopefully be grounded in the reality of each renewable resource's technical potential, as identified by this study and subsequent refinements to it.

The Study Group looks forward to a thorough discussion of the current report, possible refinements and expansion of the report as new perspectives and information emerge, and completion of work for the remaining study/resource areas identified in the list on page 2. Some Key Drivers of Future Development of the technical potential of Renewable Energy in the Region are described in Appendix B.

