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# Sacramento Municipal Utility District: Strategy for 37% Renewable Energy by 2020

Elaine Sison-Lebrilla

Sacramento Municipal Utility District

## Keywords

*Renewable energy, renewables portfolio standard, biomass, geothermal, solar, small hydro*

## ABSTRACT

In 2008, the Governor of California announced a state Renewable Portfolio Standard (RPS) goal of 33% by 2020. Legislation to this effect is anticipated to be passed in 2009. In December 2008, the Sacramento Municipal Utility District's (SMUD) Board of Directors accelerated a 23 percent renewable energy goal to 2010 and established a renewable energy supply goal of 37% by 2020 (33% RPS and 4% Greenergy). Based on current projections, SMUD will meet its 2010 goal of supplying 23 percent of SMUD's retail sales with renewable energy. Currently, SMUD needs to fill a projected gap of approximately 2400 GWh. There are many pathways to achieving the 2020 target of 37 percent renewable supply. This paper presents the potential, issues and challenges to fill the gap by using local renewable energy resources and more distant renewable energy resources, but connectable to the SMUD balancing authority.

## Introduction and Background

SMUD is a publicly owned utility serving about 1.4 million people in Sacramento County and parts of Placer County and has a record peak demand of 3,299 megawatts (MW) on July 24, 2006. SMUD has long been a leader in energy efficiency and renewable energy and is one of the most progressive utilities in the nation. SMUD's core mission is to deliver vital energy reliably and affordably and is committed to utilizing renewable energy to meet its customer's electrical load. SMUD had a 12% target for renewable energy supply by 2006 and 23% by 2011. SMUD met its target with 13.1% in 2006. By December 2008, SMUD entered into several power purchase agreements (PPAs) that will enable us to reach our 23%

renewable energy supply goal by 2010. Soon after, the SMUD Board of Directors accelerated the 23% renewable energy goal to 2010 from 2011 and established an RPS Goal of 33% by 2020.

In order to grow renewable energy supplies for its customers, SMUD voluntarily created two separate programs: 1) Green Pricing Program called Greenergy, and; 2) RPS Program. Both programs were initiated by SMUD before the State created its RPS program. Accounting for SMUD's renewable energy supply is done separately for these two programs and aggregated as SMUD's total, non-large hydro renewable energy supply. Greenergy currently accounts for 3% of our renewable supply and is expected to grow to 4% by 2020. With the established RPS goal of 33% by 2020, SMUD's renewable energy goal becomes 37% by 2020.

In 2008, SMUD's gross procurement of renewable supply was 19.6% with 16.6% in RPS and 3% in Greenergy, see Table 1. In addition, SMUD has a diverse portfolio of renewable resources. It consisted of 62% baseload resources (biomass and geothermal) and 38% variable resources (wind, small hydro and solar PV), see Figure 1. It is interesting to note that in mid 2009 SMUD's geothermal power purchase agreement will end, leaving no geothermal resource in its portfolio.

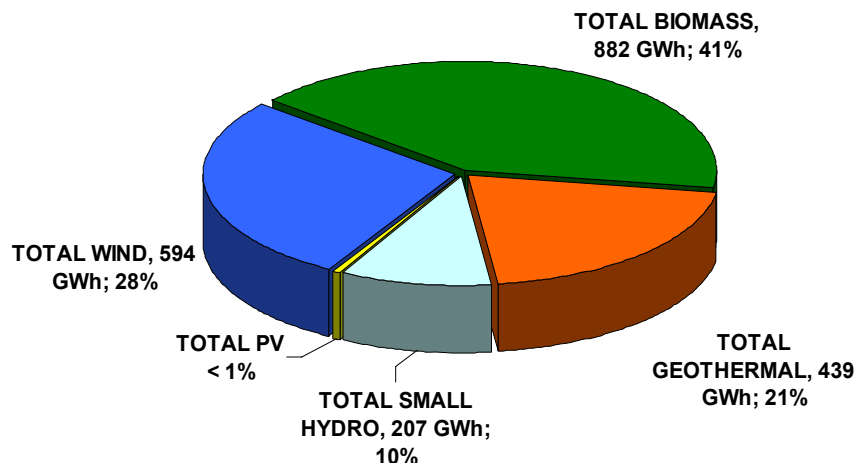


Figure 1. SMUD's 2008 Renewable Energy Mix (RPS and Greenergy).

Table 1.

Renewable Energy Program	2008 Goal	2008 Actual	2010 Goal	2020 Goal
RPS	14.0%	16.6%	20%	33%
Greenergy	3.0%	3.0%	3%	4%
<b>Total</b>	<b>17.0%</b>	<b>19.6%</b>	<b>23%</b>	<b>37%</b>

## Objective

The main objective of this study is to investigate the issues, challenges and strategic actions to help meet the SMUD's Greenergy and RPS goals by 2020.

## Challenges

Renewable energy resources at SMUD today are viewed as increasingly vital to the economic growth and sustainable development at both the regional and state levels. The contribution of renewable energy resources and technologies to the SMUD's energy supply mix will substantially increase due to policy mandates, improving cost competitiveness, reliability, and other factors. Major obstacles continue to stand in the way of widespread deployment, effective integration within the electricity grid and the larger energy system, and sustainable long-term performance. SMUD believes that meeting the goals for 2020 will require daunting tasks to achieve. Challenges include transmission and grid interconnection constraints, high costs of producing renewable energy, arduous permitting process, lack of financing, decline of available renewable energy projects (such as geothermal) and resulting increasing prices for renewable energy projects. Expanding SMUD's reliance on renewable requires substantial and sustained investment in the research, development, demonstration, and deployment (RDD&D) of renewable and integration technologies.

## Strategic Actions

Assessing the role of renewable for SMUD's sustainable energy future demand an appreciation of each option's current status and future potentials with ample considerations on reliability and affordability. To expand the renewable portfolio, SMUD purchased the entire output of the 55 MW biomass cogeneration plant in Tacoma, Washington. On April 20, 2009 SMUD announced that it had signed a 15-year contract with Shell Energy North America for 6 billion British thermal units of gas per day from a landfill near Dallas that will be used to fuel the SMUD Consumnes Power Plant. SMUD expects the landfill gas to provide about 8 percent of its renewable target in 2010, or 200 to 300 GWh of renewable power per year. One month earlier, on March 19, 2009, SMUD announced it had signed a 15-year contract with Gas Recovery Systems LLC, a subsidiary of Fortistar Methane Group, for the purchase of approximately 1.5 megawatts of renewable energy from a plant near Santa Cruz, generating electricity from landfill gas. The expected output is 12 GWh per year. SMUD contracted with local builders in Sacramento County to construct more than 4,000 new solar homes.

There are ongoing efforts to identify areas with significant renewable resources and possible transmission pathways (i.e.

California's Renewable Energy Transmission Initiative and the Western Governor's Association's Western Renewable Energy Zones project) and the ability of these efforts to provide cost competitive renewable energy still remains to be seen. In light of this, SMUD is prioritizing to access local renewable resources and renewable resources that can be connected to SMUD's balancing authority to provide a majority of the projects to contribute to its renewable supply portfolio.

For local renewable generation, SMUD can utilize several approaches to obtain renewable energy: power purchase agreements (PPA), Ownership, and Feed-In Tariff (FIT). SMUD releases request for offers (RFO), usually on an annual basis, to solicit renewable energy for PPAs. SMUD is also accepting unsolicited proposals for renewable energy outside of the RFO process. SMUD will also consider ownership of renewable energy facilities within and near the service territory. A new option that SMUD is currently developing is the FIT for renewable distributed generation. SMUD's FIT is expected to be available by September 2009 for renewable generation with capacities of 5 MW or less.

For renewable resources that can be connected to SMUD's balancing authority, the approaches are typically through PPA's. However, SMUD may be open to innovative ownership options based on benefits and cost to SMUD's customer/owners.

## Local Renewable Resources

Because of transmission constraints and the uncertain economic impact of proposed transmission pricing structures, SMUD is looking closely at possible local renewable projects. The SMUD territory has limited renewable resources mainly solar and biomass. A small amount of geothermal potential from co-produced fluids was identified but further investigation is needed to determine viability for electricity generation. A resource assessment identified a technical potential of over 147 GW predominantly from solar, including 81 MW (603 GWh) from biomass. The estimated biomass potential is primarily from municipal solid waste and agricultural and forestry residues. However, not all this potential can be economically realized, particularly the solar resources. Further analysis identified four potentially cost-effective projects utilizing both solar and biomass, totaling over 130 MW or 360GWhr. See Table 2.

Table 2.

Project	Project Size (MW)	Estimated Annual Generation (MWh)	Estimated Generation Cost (\$/MWh)
Thin-Film PV	20	30,000	\$150
Solar Thermal	100	246,000	\$166
Biomass	10	74,000	\$122
Biogas	2	13,000	\$133

## Renewable Resources near Balancing Authority

SMUD also has unique opportunities because it is its own balancing authority, meaning that SMUD is responsible for operating a control area, including SMUD's own service territory and an area going north encompassing the Western Area Power Administration transmission lines. See Figure 2. SMUD matches generation with

BPAT & SMUD adjacent Control Areas at Captain Jack

MID joins SMUD Control Area – WASN sub-Control Area Adjacent Control Area Interconnections with TIDC and CISO

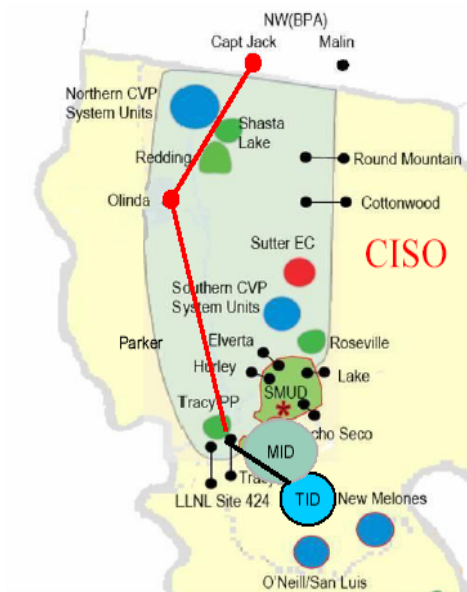


Figure 2. SMUD Control Area Foot Print with COTP Added & Mid Moves to SMUD Control Area.

Table 3.

Resource	Estimated Capacity (MW)	Estimated Annual Generation (MWh)
Biomass*	1,845	13,742,000
Geothermal**	320	2,663,000
Solar (PV)*	2,881,823	5,738,829,300
Solar (CSP)*	9,923	22,023,172
Wind***	4,406	14,279,000
<b>Total</b>	<b>2,898,317</b>	<b>5,791,536,472</b>

\* From IEC report to SMUD, February 13, 2009

\*\* From GeothermEx report to SMUD, April 2009

\*\*\* From Yen-Nakafuji, Dora, *California Wind Resources*, Publication #CEC-500-2005-017-D

loads and maintains frequency within limits. Renewable resources, which are near and can be connected to our balancing authority, are attractive to SMUD because it has the capability to schedule delivery of that energy to SMUD’s territory at a known cost. Renewable resources near and accessible to SMUD’s balancing authority are more diverse, including biomass, geothermal, solar and wind. An analysis of renewable resource near our balancing authority resulted in a vast potential, totaling nearly 2,900,000 MW or 5,800,000 GWh. See Table 3.

Since realistically not all of this potential can result in viable projects, further analysis is needed to identify renewable generation projects that could be economically developed from these resources. As indicated earlier, for renewable resources that can be connected to SMUD’s balancing authority, the approaches are typically through Power Purchase agreements but with possibilities open to innovative ownership options based on benefits and cost to SMUD’s customer/owners. The results in Table 3 indicate that SMUD could meet our renewable energy gap with the potential located within California. SMUD will need to proactively solicit proposals that can cost effectively meet our renewable energy targets for 2020.

### Conclusion

The task of filling a gap of about 2400 GWh with a diverse portfolio of renewable resources is challenging. There appears to be sufficient renewable resources within SMUD’s service territory and California to supply that gap. Overcoming the challenges to development will be an important element in realizing SMUD’s goals for renewable energy and sustainable development. Collaboration with SMUD’s customers, community, diverse stakeholders, federal and state governments for accelerated RDD&D and market penetration of renewables is required to help meet the gap by 2020 and beyond. However further analysis is needed to determine the cost effectiveness of these resources. SMUD is committed to utilizing renewable energy to meet its load and help reduce its impact to the environment while providing service to our customer/owners with cost effective energy.