



State of Utah

Department of  
Natural Resources

ROBERT L. MORGAN  
*Executive Director*

MICHAEL O. LEAVITT  
*Governor*

OLENE S. WALKER  
*Lieutenant Governor*

September 25, 2003

Jan Miller  
Utah Division of Air Quality  
150 North 1950 West  
Salt Lake City, UT 84114-4820

Subject: Utah Renewable Energy Assumptions and Methodology

**Utah Renewable Energy**  
**Estimation Assumptions and Methodology**

**Renewable Electricity Generation (Table 15) and Capacity (Table 13) in Utah**

The Utah Energy Office (UEO) developed and sent two survey instruments to wholesalers, retailers, and installers of renewable energy (RE) equipment in the state, as well as government agencies, such as the Bureau of Land Management, and utilities who participate in renewable energy projects. The first survey was for small-scale systems less than 25kW in size. The second survey covered medium-scale renewable energy projects between 25kW and 10MW in size. No large-scale survey instrument was developed because it was assumed generation and capacity data from large-scale RE projects were available from the Department of Energy (DOE) Energy Information Administration (EIA).

The surveys were sent and follow-up calls were placed to increase the response rate. No formal effort was undertaken to quantify response rates. Also, the survey effort likely missed several RE projects for which equipment was purchased out of state and/or installed by non-professionals. For these reasons, it is possible that the approach taken may serve to underestimate the amount of small- to medium-scale RE generation and capacity in Utah.

Upon receipt of completed small- and medium-scale surveys, UEO compiled the results along with relevant EIA data in spreadsheets. Because of data and survey instrument design limitations, it was difficult if not impossible to ensure that no double-counting occurred when comparing wholesaler, retailer, and installer RE responses for solar photovoltaic (PV) projects. As a result, a decision was made to only include solar PV generation and capacity from government projects and wholesalers. This may have resulted in under-accounting for small-scale solar PV RE, but safe-guarded against double-counting. The resulting small-scale solar PV generation and capacity estimates may therefore be considered conservative.

Because some medium-scale RE projects were also identified in EIA's generation and capacity data tables, medium-scale survey results were screened against EIA's utility and non-utility power plant inventories to avoid double-counting. In the case of medium-scale hydroelectric power plants, a decision was made to use EIA utility and non-utility data, which were more complete. Also, the Utah Municipal Power Agency (UMPA) Cove-Fort power station generation and capacity data were obtained directly from the plant manager, since the UMPA medium-scale survey information for the plant was incomplete and EIA generation data for the plant were non-existent. Annual generation and capacity values were then totaled by survey-scale (i.e. small or medium) and by RE type (i.e. hydroelectric, solar, geothermal, etc.). In some cases, annual generation values were estimated using reported capacity and the observed capacity factor for similar RE projects. The results of this effort were summarized in two spreadsheets showing estimated RE generation and capacity in Utah for 1999 through 2002.

#### **RE vs. Total Electricity Generation (Table 16) and Capacity (Table 14) in Utah**

RE generation and capacity estimates were then compared to EIA estimates of non-RE generation and capacity. Generation and capacity from all sources (i.e. fossil fuel and RE) were summed to show total electricity generation and capacity for the state and the percentages of RE and non-hydroelectric renewable electricity (NHRE) were calculated. It should be noted that no effort was made to identify small- to medium-scale electric generation from fossil fuel sources, such as portable and fixed location gasoline- and diesel-powered generators, other than those included in the EIA non-utility power plant inventory. As a result, the estimate of total electricity generation and capacity is likely to be skewed slightly lower, which – in turn – will skew the ratio of NHRE over total electricity generation slightly higher.

#### **Consumption of Non-Hydro Renewable Electricity in Utah (Table 17)**

Consumption of NHRE in Utah was assumed to equal the sum of Utah NHRE generation for Utahns (i.e. distributed Utah NHRE generation and Utah municipal utility NHRE generation) plus the "portion" of PacifiCorp's sales to Utah from NHRE sources.

To estimate Utah NHRE consumption, the RE generation totals discussed earlier were screened to remove hydroelectric generation (none of which is certified in Utah as "low-impact" by the Low Impact Hydro Institute and considered eligible for inclusion in the 309 SIP filing) and all PacifiCorp generation, some of which could theoretically be sold outside of Utah. Total sales from PacifiCorp's system were then estimated from EIA and PacifiCorp (from Barry Bell, PacifiCorp) data. The ratio of PacifiCorp's NHRE electric generation (not attributable to the Blue Sky program) to PacifiCorp's total electric generation was applied to PacifiCorp's total sales values as a proxy to estimate PacifiCorp's Utah NHRE sales. PacifiCorp's Utah NHRE sales were then added to the company's Blue Sky program sales, and the remaining NHRE generation in Utah to estimate total NHRE consumption for the state. This value was then compared to total electricity sales in Utah to estimate the percentage of Utah electricity consumption from NHRE sources.

### **Utah NHRE Potential – Generation and Capacity (Part I. 3. a)**

UEO relied upon estimates of NHRE energy generation potential from the *Renewable Energy Atlas of the West: A Guide to the Region's Resource Potential*, written by the Land and Water Fund of the Rockies, the Northwest Sustainable Energy for Economic Development, and the GreenInfo Network. These NHRE generation estimates were used along with industry-wide capacity factors reported by the National Renewable Energy Laboratory (NREL) and others to develop estimates of potential Utah NHRE capacity. These estimates represent a theoretical maximum for NHRE generation and capacity if all known resources were exploited and should be used with caution. Most of these resources could not be exploited economically given current technology, infrastructure, regulatory environment, and – most importantly – market conditions.

### **Growth in NHRE Capacity vs. Total Capacity for Utah, 2004-2020 (Part I.4.a)**

UEO relied upon integrated resource planning forecasts from utilities to help estimate the growth in NHRE capacity between 2004 and 2020. Although integrated resource plan (IRP) periods considered the mix of new resources as far out as 2018, however, estimates of incremental, annual resource additions were only available through 2013 for PacifiCorp and through 2011 for Utah Associated Municipal Power Systems (UAMPS). UMPA reported that no additional resources would be added during the time horizon considered. Incremental additions to Utah's NHRE and total electricity capacity were then summed by year and over the period from 2004 through 2013, and ratios of NHRE to total new capacity were calculated. Due to data limitations, no attempt was made to forecast additions of non-utility and other distributed or small scale NHRE resources. As a result, estimates of new NHRE capacity over the period in question are likely to be conservative (i.e. to understate likely new NHRE capacity).

### **Current Utah Capacity vs. Western Electricity Coordinating Council (WECC) Capacity (Part I.4.a)**

The ratio of Utah NHRE new capacity (550 MW) to the desired WECC NHRE new capacity (20,000 MW) for the forecast period (2.8 percent) was then compared with the current ratio of Utah to WECC capacity (3.5 percent). This was done to gauge Utah's anticipated progress towards meeting the goal of having 20,000 MW of new capacity in the West by 2020. Because Utah currently only represents 3.5 percent of WECC capacity and because the estimate of Utah NHRE new capacity of 550 MW is probably low (as it only accumulates from 2004 through 2013), it is likely that Utah is on track towards contributing to the regional 2020 goal.

Sincerely,



Glade Sowards  
Energy Analyst  
Utah Energy Office