Benchmarking Overview

Setting for Benchmarking Analysis

The Power Management Laboratory (Laboratory) has undertaken one of the most aggressive and intensive benchmarking efforts in the hydropower industry. This effort, part of the National Performance Review (NPR), compared Reclamation's powerplants with those of other major hydropower utilities by using publicly available data on more than 900 hydroelectric units. By quantifying the performance of the most effective plants in the industry, we can establish goals and actions to improve Reclamation's power program.

This benchmarking data book displays the quantitative power benchmarking results for Reclamation as a whole and also for individual Reclamation powerplants. These quantitative results are the basis for certain Laboratory recommendations discussed in the companion report entitled, *Future Generations: A New Era of Power, Performance, and Progress*.

Benchmarking Objectives

Benchmarking is a continuous formal process of measuring, understanding, and adapting more effective practices from best-in-class organizations that lead to superior performance. Benchmarking is essential to provide the best service to our customers.

Benchmarking will continue to help us:

- Improve our performance and organization
- Learn about industry leaders and competitors
- Determine what world-class performance is
- Accelerate and manage change
- Achieve breakthrough results
- Improve customer satisfaction
- Become the best in the business

Benchmarks serve as indicators to:

- Understand our process and approach. Comparing overall performance results can indicate whether an approach (e.g., maintenance, training, management decision) was effective. Benchmarks can indicate possible directions for change.

- Pinpoint areas for effective change. Comparison of a powerplant's performance to others in the industry can indicate areas for improvement.

While benchmarks are effective tools, they are not the only factors in evaluating and improving performance. Even though hydroelectric powerplants may have a similar classification, their operating circumstances vary widely. Factors such as location, size, number of units, age, topography, equipment type, and maintenance practices should be considered when examining benchmark performances.

Comparing performance among plants and regions is difficult, as each powerplant works within a unique context of river flows, physical settings, and organizational goals. However, benchmarks provide indicators that allow us to examine individual circumstances and performances within groups of similarly-sized powerplants.

We will use these benchmarks to recommend methods, approaches, and actions for reaching and surpassing identified business standards. To improve performance, we will set specific goals, take appropriate actions, and measure the results against the benchmarks. Implementing and monitoring actions will in turn provide information needed to analyze the benchmark effectiveness and to recalibrate and/or add benchmarks as appropriate.

Seven Prime Benchmarks

Six Laboratory work groups identified potential performance indicators. Out of approximately 500 potential performance indicators, each workgroup developed a list of 10-15 benchmarks. These were condensed into seven prime benchmarks for measuring performance. Benchmarks are valuable to the Reclamation power program because they mirror those used by other hydroelectric utilities and other groups for performance analyses and are recognized as meaningful industry-wide hydropower performance indicators.

The seven prime benchmarks we used were:

- **Benchmark 1 - Wholesale Firm Rate**

  This benchmark shows the wholesale firm power rates that Western Area Power Administration (Western) and Bonneville Power Administration (BPA) charge to the customers.

- **Benchmark 2 - Reclamation's Production Cost as Percentage of Wholesale Firm Rate**

  This benchmark shows the Reclamation production cost as a percentage of the firm wholesale rate.

- **Benchmark 3 - Production Costs**

  This benchmark displays the costs associated with producing one kilowatt-hour of energy.

- **Benchmark 4 - Workforce Deployment**

  This benchmark tracks the full time equivalent (FTE) staffing levels. These staffing levels are further broken down by FTEs per generating unit and FTEs per megawatt.

- **Benchmark 5 - Availability Factor**

  This benchmark illustrates the percentage of time the plant was available to generate power.

- **Benchmark 6 - Forced Outage Factor**

  This benchmark illustrates the percentage of time the units were out of service for unanticipated repairs, etc.

- **Benchmark 7 - Scheduled Outage Factor**

  This benchmark illustrates the percentage of time the unit was scheduled for outage due to maintenance.

We compared the powerplants with internal and external plants of similar capacity and generation type. Powerplants were grouped by the amount of installed capacity and type of operation, i.e., conventional, seasonal, and other (pump storage, station service, etc.) This is explained in further detail in the next section.

Methodology

Reclamation Powerplant Categories

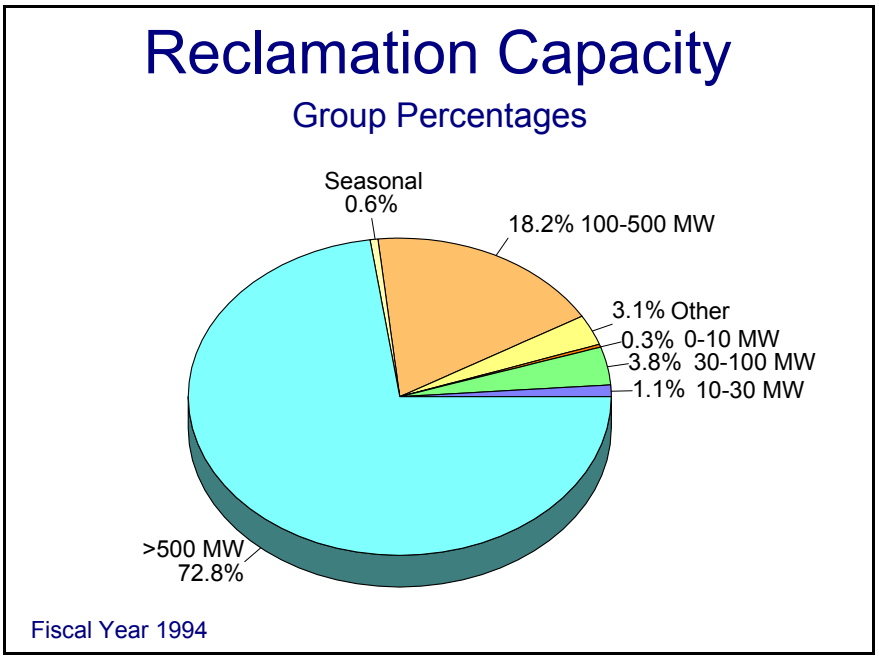
For this report, 56 of Reclamation's 58 hydroelectric powerplants were analyzed. Two hydroelectric powerplants, the San Luis Pump-Generating Powerplant and Spirit Mountain Powerplant were not analyzed. Reclamation owns 49 percent of the San Luis Powerplant, which is operated by the State of California. Western markets the Federal share of power for San Luis; therefore, it is included in the rate setting. Spirit Mountain Powerplant had not begun operations in fiscal year 1994 and had no operating statistics.

The 56 powerplants were divided into two primary categories consisting of:

- Conventional
- Pump-generating

Two powerplants, Grand Coulee and Flatiron, have both conventional generating and pump-generating units. In both cases, these pump-generating units are used primarily in a stand-by mode and represent less than one percent of the total energy production. Therefore, both plants were analyzed as conventional plants.

The primary categories were then subdivided into full-year and seasonal operation. The conventional powerplants operating on an annual basis were subdivided into five groups based on their installed capacity. The amount of total capacity varies greatly by group, as shown on the accompanying chart.



The seasonal plants were kept in one group as their capacity variance was small. The two pump-generating plants, Mt. Elbert and O'Neill, are operated differently. Mt. Elbert is operated as a traditional pumped-storage facility, and O'Neill generates only on a seasonal basis. Therefore, these plants were not grouped together and were not compared with other Reclamation powerplants.

Four of the conventional plants were excluded from the comparative analysis for the following reasons:

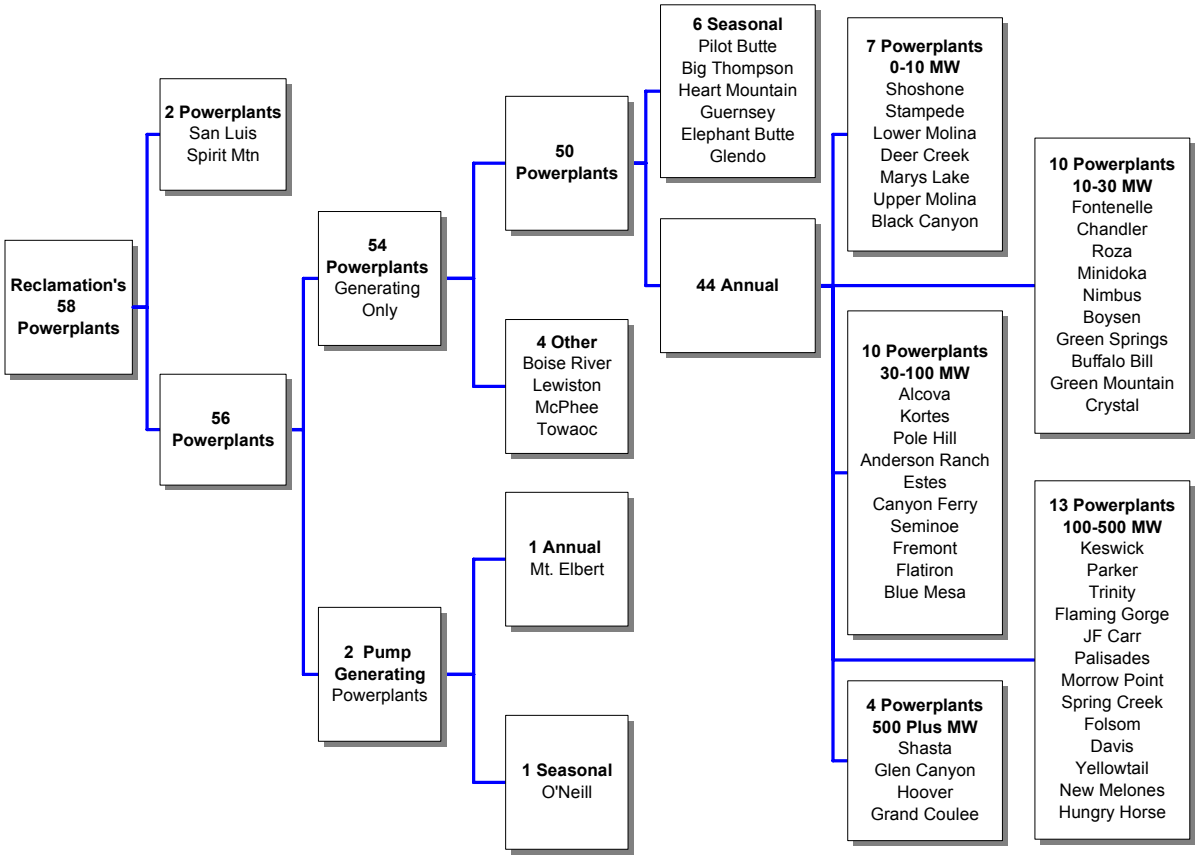
- Boise River Diversion Powerplant was excluded from the comparative analysis as it is operated in the standby mode and has not generated power for several years.

- Lewiston Powerplant was excluded from the comparative analysis as its capacity is small (350 kilowatts) and it is operated primarily for supplying station service to Trinity Powerplant.

- McPhee and Towaoc Powerplants were excluded because the plants had not reached operational status through fiscal year 1994.

This left 50 powerplants in the conventional category with 44 operating year-round and 6 operating on a seasonal basis.

The following chart shows how each plant was grouped for internal comparisons.



Production Cost Calculations

Reclamation has historically analyzed financial data at the aggregate level, e.g., total revenues and costs, for all Reclamation power facilities. As part of the Laboratory, a Financial Work Group identified and recommended financial reporting improvements for Reclamation's powerplants. To allow for project- and plant-specific financial analysis, the group compiled fiscal year 1994 revenue data at a project level and cost data at the powerplant level. This initial compilation will establish a baseline from which future financial performance can be measured.

Power related costs were divided into costs for producing power and for transmission. The costs for producing power were further divided into direct and indirect costs. Direct costs included operation, maintenance, and replacement costs, which were further subdivided into payroll; benefits; travel and transportation; utilities; other services; contracts; and materials, supplies, and equipment. Indirect costs included overhead and administrative and general expenses (A&GE).

Transmission costs discussed above are mainly associated with transmitting project use power from powerplants to project users and do not include the Power Marketing Administration's (PMA) costs for marketing and delivering power. In addition, the PN Region allocates all costs associated with powerplant switchyards and the majority of transmission costs to commercial power sales.

Due to the unique nature of each Reclamation project, only 22 of the 56 powerplants have associated transmission costs. These costs vary widely, depending on the amount and size of transmission requirements and represent only about 5 percent of total costs for producing and transmitting power. For this reason, no attempt was made to analyze transmission costs.

The cost of producing power at Reclamation facilities is fully reimbursable. The costs for producing power are repaid through power revenues associated with power rates paid by customers. Power users pay a power rate that not only includes Reclamation's power production costs but also includes "other" costs. Included within "other" costs are:

- Repayment of capitalized costs of power related facilities
- Interest on the unpaid capital investment
- The portion of project irrigation costs, above the irrigator's ability to pay, which have been allocated to power for repayment
- The PMAs costs of marketing and transmitting the power
- Other costs the Congress requires
- PMAs cost of purchasing firm power

The costs and net generation were used to calculate performance parameters which are measured in mills (one thousandth of a dollar) per kilowatt-hour. Net generation is defined as the generation remaining after subtracting out generation used at the site to operate the facility. The net generation is the power supplied to project use power customers and to the PMAs.