

Turbine Cost History

In 1999, the cost to upgrade the four turbines at Box Canyon was estimated at \$17.5 million. But this was a very simple project, just new blades for the turbines and rewinding of the existing generators and transformers. Nothing else. And that was 10 years ago.

During the next 10 years, global prices for copper and stainless steel, that are used for these machines, tripled. Energy prices and labor costs skyrocketed. Global markets for this type of equipment have become overloaded from demand in places like India and China. All of these forces have caused turbine and generator prices to also triple.

By September 2004, FERC estimated the cost to do the turbine upgrades at \$43.4 million but this included a significant change. They ordered two of the four turbines to be upgraded to “fish friendly” technology. This dramatically increased the costs from the earlier estimates. The change, however, provided a significant environmental benefit in improvement of safe passage of smaller fish through the turbines.

By the time the contract was awarded in 2007 for \$68 million, costs of commodities had escalated even farther. Those increases were estimated to be from \$43 million to \$52 million. Further increases were because the PUD decided to make all 4 turbines “fish friendly” for the benefit of operating and maintenance efficiencies. The PUD also added new governors, exciters and all controls for these machines. This was an additional \$8 million for the two additional turbines and \$8 million for the other equipment. The existing equipment is all over 50 years old and needs to be replaced, with or without turbine upgrades.

The work began and the generators were taken apart. Upon inspection and discovery of some significant stator damage, it was decided that all units should have stator core replacements rather than a simple rewind. This will cost \$2 million per machine or \$8 million total. Sales tax of 8% will add \$6 million to the total project cost, and a 10% contingency that is prudent with all contracts of this magnitude will add another \$8 million.

Another 10% to allow for District staff and engineering support over the seven year project will add \$10 million. This would bring the total turbine upgrade to approximately \$100 million, and \$18 million of that is for costs that may not occur.

This whole project and cost estimate is much different from the one first talked about in 1999. Other work that is underway and being done to modernize the plant includes a) rebuilding and upgrading two large cranes to 2008 standards, b) installing a new trash rake to remove floating debris at the turbines, c) purchasing new gate sections to allow old sections to be removed for maintenance, d) buying new transformers (4) instead of rewinding the 53 year old ones, e) replacing water pumps and piping at the end of its life, f) replacing 55 year old wiring and switchgear at the end of its life, and many other small upgrades or refurbishments.

These additions add approximately another \$26 million to the above mentioned \$100 million for a total of about \$126 million.

It should be made clear that this total is not entirely for the turbine upgrade and is much different from the originally discussed project. This work will all be spread over seven years.

Five-year warranties on the new machines ensure low operating costs for the first five years of operation. The costs will be spread over a long period of time, likely 30 years, with long-term bond financing, so annual costs will gradually rise for the purchasers of Box Canyon power.