Comparison of Proposed Hostetter Road Turnout Projects

San Jose Water Company

AL418 versus GRC

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10/14/10_ Rev2

Purpose: This white paper compares two distinctly different projects, as proposed by San Jose Water Company (SJWC) at the Hostetter Road Turnout. The first was a 100-kW hydro-turbine-generator (HTG), as proposed in the 2009 GRC. The second was a 150-kW HTG, as proposed in Advice Letter AL418.

Background: On a continuous daily basis, SJWC purchases treated water from the Santa Clara Valley Water District (the SVCWD is a county wholesale water agency) and distributes it to residential consumers through a series of seventeen turnouts. Each turnout is comprised of one or more pressure regulating valves (PRVs), located inside an underground vault, connected upstream to the SCVWD's high-pressure transmission line and connected downstream to SJWC transmission mains. The pressure energy is deliberately wasted across a PRV to protect SJWC's distribution main from over-pressurization. The SCVWD maintains a high pressure to deliver water to other retail customers, located several miles downstream of SJWC.

In its 2009 GRC application, SJWC proposed to recover some of the embedded energy in the imported water supply at Hostetter Turnout PRV #1. In AL418, SJWC proposed to recover most of the embedded energy in the imported water supply at both PRV #1 and PRV #2 (located in a common vault) at the Hostetter Turnout.

Discussion: The comparison of the two projects is presented below.

- The GRC application proposed a conventional HTG project, using centrifugal-pump-as-turbine technology (manufactured by Cornell Pump Co), which was the only product available in 2008, when the GRC application was prepared.

  The AL418 project proposed a premiere technology, called positive-displacement-pump-as-turbine (manufactured by Zeropex Co; also know as an electrical-regenerative-flow-control-valve) specifically designed for one-on-one replacement of PRVs. This technology was introduced to the market earlier this year and was not available at the time of the GRC application submission.

- The GRC application proposed a project that would have generated 664,700-kWh/yr.

  AL418 proposed a project that would generate 1,322,000-kWh/yr (almost double the output).

- The GRC application project was proposed as a typical capital improvement project, with a firm cost of $696,200 to bypass PRV #1.

  AL418 proposed as a research, development and demonstration (RD&D) project at a lower but non-firm price of $365,838 to replace PRV #1 plus $413,298 to replace PRV #2. Thus the cost savings is $330,362 over the proposed GRC project for PRV #1 (i.e., $696,000 - $365,838).

- The GRC application proposed equipment, which is considered industry standard, and can be counted on to deliver reliable repeatable results, within the limits of the design parameters.

  The AL418 project will demonstrate a new technology, which has the potential to revolutionize California water agencies' efforts at reducing their energy consumption by recovering energy embedded in flowing water pipelines.

- The GRC application proposed a single 100-kW HTG.

  AL418 proposed two hydro-turbine-generators, rated at 133-kW at the first turnout, and 37-kW at the second turnout.

- The GRC application proposed a project that only qualified for a 10% energy investment tax credit.

  The AL418 project would produce 150 kW, making this project eligible for an ARRA Section 1603 grant equal to 30% of the project cost.

- The GRC application proposed a project that involved bypassing the existing PRV and installing the hydro-turbine in the bypass line. This design uses considerably more piping and available space in the vault.

  The AL418 project involves removing the two existing PRVs and directly replacing them with drop-in-line hydro-turbine-generators, which eliminates costly piping bypass piping. This product was designed specifically for the water industry.

- The GRC application implied that there would be a net metering agreement with PG&E.

  AL418 states that SJWC would sell energy to PG&E without net metering by using PG&E's Tariff E-SRG (the small renewable generator power purchase agreement).

- The GRC application proposed a project that would only have distributed water to the Cambrian Zone.

  The AL418 project would distribute water to both the Columbine and Cambrian Zones.

- The GRC application project could generate energy but the AL418 project can also pump in either direction during low-pressure supply conditions.

- The GRC application project would discharge water (and energy) to the sanitary sewer during an emergency loss of load condition (i.e., open circuit connection to the grid) to prevent a water hammer transient. The AL418 project equipment includes a full-load heater bank to dissipate the energy during an emergency loss of load condition; therefore, there is no concern about a transient.

- The positive displacement pump in the AL418 project also serves as a flow meter. The GRC application project includes a costly separate flow meter.

- The GRC application HTG was designed for a specific flow rate and pressure, which engineers would describe as a tight range. It can achieve 75% energy recovery when operating at the design parameters; however, the HTG loses efficiency (up to 35%) rapidly whenever the flow rate and available pressure deviate from the design parameters.

  The AL418 HTG was designed for a broad range of flow rates and pressures. It can achieve 75% energy recovery uniformly across the entire parameter range.

- SJWC would have provided the funding for the GRC application project and the project cost would have been entered in rate base.

  Because the proposed project in AL418 is a promising new technology, but unproven, the project needs to be classified as RD&D. Funding responsibility shall be at the discretion of the Commission.

Proposed Project Management

SJWC suggests that the proposed AL418 project be managed in the following three phases:

1. The four water companies should hire a single engineering consultant to design all six HTGs; doing so will assure uniformity and thoroughness of design, permitting and interconnection with the three energy utilities. The consultant can also manage construction. We have held preliminary discussions with Black & Veatch, who is competent, qualified and interested in these projects. The engineering consultant will report directly to the Commission's Division of Water & Audits.

2. The four water companies should hire a single consultant to perform the necessary evaluation, measurement and verification (EM&V) for the projects. This should assure a consistent and uniformity review of operational performance data. They can submit a report to the Commission in a timely manner. The EM&V consultant will report directly to the Commission's Division of Water & Audits.

3. In order to get the proposed projects operational in 2011, the water companies should fund the proposed HTG pilot projects and enter them into rate base, when built. The

Commission, the water companies and the energy utilities can meet in 2012, after the six pilot HTG projects are operational, to jointly develop a policy for subsidizing and interconnecting future HTG.

Conclusion:

Given each of these significant differences, it is evident that the project that SJWC proposed in the GRC application is entirely distinct from the HTG Project that SJWC currently proposes in AL418.

In 2011, the water companies should fund the pilot projects. In 2012, the Commission, water companies and energy utilities shall jointly develop a policy for subsidizing the cost and interconnecting future PRV-to-HTG conversions.