

# New Approaches to Hydro

BOOSTING POWER OUTPUT

BY STEVE WENKE

**AVISTA WAS FOUNDED WITH THE DEVELOPMENT** of a hydroelectric project on the Spokane River in 1889. The company has since relied primarily on hydroelectric energy to supply its customers. Our hydro projects were developed over a 50-year period, primarily from the 1900s through the 1950s. Today about 52 percent of the company's power comes from hydro.

For a variety of reasons it is no longer realistic to build new hydroelectric projects in the United States, but electric demand continues to grow. To help address this, Avista began a program in the 1990s to upgrade its existing plants. The focus of this program was to take advantage of the advancements in hydro turbine design and manufacturing technology that could provide cost-effective incremental improvements in energy generation. The increased efficiency provided by modern design turbine runners allows more energy

generation without increasing water use or changing the basic operation of the plant.

Avista also joined with nine other utilities to initiate a research and development program with the U.S. Department of Energy's Environmentally Friendly Hydro Turbine Program. Recent projects have incorporated elements from this program into new turbine runner designs.

With the incremental improvements in turbine output, it also required the existing generator to match the improved turbine output. This has resulted in a number of generator refurbishment projects that are conducted in parallel with the turbine replacements.

In 2007, Avista completed upgrades on the



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## NewsFlash

### NRG CARBON CAPTURE

NRG Energy and Powerspan Corp. plan to develop a commercial scale carbon capture generating project.

The post-combustion process uses an ammonia-based solution to capture CO<sub>2</sub> from the flue gas of a power plant and release it in a form that is ready for transportation and permanent storage, the companies said.

The Texas project, expected to be operational in 2012, will capture up to 1 million tons of carbon dioxide annually, making it one of the largest such efforts in the world. The gas will be used for enhanced oil recovery near Houston.

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Avista crews perform final inspection of the new, high-efficiency turbine runner and shaft assembly just prior to setting it in place at the Cabinet Gorge Project powerhouse.

PHOTOS COURTESY OF AVISTA

final unit at Cabinet Gorge on the Clark Fork River in north Idaho. Upgrades on three other units were completed in 1994, 2001 and 2004. The company replaced the original 1952 equipment with modern designs. Capacity increases range from an existing 55 megawatts up to 72 megawatts maximum for each unit

respectively. This project increases the energy production from the site by an estimated 25,300 megawatt-hours annually for unit 2 and 22,300 megawatt-hours annually for unit 4.

Similar improvements are currently under way at the Noxon Rapids project in Montana. All four units at that powerhouse will be upgraded over the next several years. An extensive evaluation is under way for potential enhancements for other hydro plants in our system.

The conventional hydro industry has been moving in a similar direction. A number of companies have taken on incremental hydro improvement projects for a variety of reasons. To date, the cost effectiveness of these opportunities has been somewhat limited to larger companies that have greater financial means and own larger units.

An important consideration that makes these hydro upgrades feasible is the 2005 energy act. This legislation included provisions for development of clean and renewable energy sources. This included language that provides for tax credits as a financial incentive to owners to make incremental improvements on existing and other qualifying hydro facilities.

While Avista has several projects under way that will be able to take advantage of this program, these types of improvements involve two to three years of lead time to acquire the specialized equipment required. Unfortunately, the production tax credit in the 2005 bill is set to expire at the end of 2008. For the industry to take full advantage of the energy opportunities present with these types of improvements, an extension of the tax credit is critical.

*Steve Wenke is Avista Utilities chief generation engineer.*



With the dam spillway in the background, the old runner is removed from the powerhouse erection bay where it will be loaded onto a truck and shipped off to make room to install the new turbine runner.

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## FEBRUARY

<b>4-6</b>	<b>POWER-GEN Middle East</b> Manama, Bahrain	<b>QL:</b> E16964
<b>7-10</b>	<b>Bioenergy World Europe</b> Verona, Italy	<b>QL:</b> E17603
<b>19-21</b>	<b>POWER-GEN Renewable Energy &amp; Fuels</b> Las Vegas	<b>QL:</b> E17363
<b>25-26</b>	<b>Smart Metering Scandinavia</b> Stockholm, Sweden	<b>QL:</b> E17702

## MARCH

<b>4-6</b>	<b>WIREC</b> Washington	<b>QL:</b> E17688
<b>4-5</b>	<b>Underground Cables</b> Vancouver, British Columbia	<b>QL:</b> E15798
<b>5-6</b>	<b>Smart Grid Initiatives</b> Atlanta	<b>QL:</b> E17605
<b>19-20</b>	<b>Globalcon</b> Austin, Texas	<b>QL:</b> E17389
<b>26-28</b>	<b>POWER-GEN India &amp; Central Asia</b> New Delhi, India	<b>QL:</b> E16965
<b>31-3</b>	<b>European Wind Energy Conference &amp; Exhibition</b> Brussels, Belgium	<b>QL:</b> E17421

## NewsFlash

### TUCSON TOWER

Towers could help solve the problem of greenhouse gas emissions. That is the plan that a Tucson firm is pursuing to combat global warming, according to the *Arizona Daily Star*.

Global Research Technologies is working on a device the size of a 40-foot shipping container that would capture a ton of carbon dioxide a day for storage underground or underwater.

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