7/06/2012



# Some Dam – Hydro News™ And Other Stuff

CORSO COURT

**Quote of Note:** "Experience is the thing you have left when everything else is gone." - Unknown

# Happy 4<sup>th</sup>

<u>"Good wine is a necessity of life." - -Thomas Jefferson</u> *Ron's wine pick of the week:* Columbia Crest US Red Blend "H3 Les Chevaux" 2009 <u>"No nation was ever drunk when wine was cheap." - - Thomas Jefferson</u>



### <u>Dams</u>:

(This brings up a historical dam failure. The article incorrectly describes the dam – it's a multiple arch-buttress dam. Gigantic may be a stretch for its description. It was long (1700 ft.), but only 20 feet high.)

### Gillespie Dam: The Public Works Project That's Now Home to Wildlife

By Benjamin Leatherman, Jun. 25 2012, blogs.phoenixnewtimes.com

Man versus nature. It's one of the quintessential conflicts in life as well as in the literature world. And it's also one the reasons why the Gillespie Dam on the outskirts of the Valley was transformed from a functional public works project into a curious oddity. Since its partial collapse in 1993 due to overflow from massive rainstorms, the gigantic concrete gravity dam (which is located in the



desert wilderness about 10 miles outside Buckeye) has become a riparian paradise that teems with a variety of fish, birds, and other fauna. As such, Gillespie Dam has become a picturesque destination place for local hikers, fisherman, and urban explorers. A local rancher named Frank Gillespie privately financed the construction of the concrete structure in 1921 along the Gila River southwest of the Valley. The dam not only allowed water to be diverted to feed Gillespie's crops at his nearby Paloma Ranch but also forded the waters enough to permit drivers to pilot maneuver their Tin Lizzies across the river. The path would eventually become Old U.S. Highway 80 and made up one of our nation's first transcontinental highways. Five years later in 1926, Arizona spent \$320,000 to build a gorgeous steel truss bridge a few hundred feet downstream from the dam. Constructed with triangular arrays of strong steel girders, the bridge has withstood the test of time and still functions to this day.

Unfortunately, we can't say the same for Gillespie Dam. In January 1993, torrential thunderstorms and an unusually high amount of winter rainfall around the state filled local rivers and with record amounts of runoff. Over in Tempe, the heavy floodwaters destroyed one bridge under construction along the Salt River. Meanwhile, Mother Nature caused enough water to pour into the Gila River to cause a 120-foot portion of Gillespie Dam to collapse. No attempt was ever made over the past



two decades to either reconstruct the dam or remove the remnants of the structure. Instead, large dirt embankments and a pumping station were created to divert the Gila's waters into the county's canal system. Nature has sort of reclaimed the area surrounding the dam, which is dominated by a large pond ringed with reeds and other plant life that have taken over the premises. It's a rather serene setting, save for the occasional hum of water pumps. Ducks and other waterfowl frequently nest around the dam while fish occasionally leap from the water. Chain link fencing has been erected around area surrounding the dam, but it hasn't kept the public out by any means. Entire families routinely come out to Gillespie Dam and circumvent the fencing to spend a day fishing or relaxing in the great outdoors. They traverse perilous cement walkways or perch on

edge of the dam to find the perfect spot to catch any of the walleye, bass, or rainbow trout that populate the pond. Another popular attraction is the antique Highway 80 Bridge, which looks like it belongs in a postcard from New England. Its numerous steel girders, all of which were rehabbed by the county last year as a part of a \$7.3 million rehabilitation project, have a patina of rust that adds a colorful vintage aura to the structure. Both it and the dam itself are worth taking a quick 40-mile trip to check out, particularly towards the end of the day when thing become especially



picturesque after being lit by the amber rays of sunset.

### Dam failure as described on Wikipedia: http://en.wikipedia.org/wiki/Gillespie Dam

The **Gillespie Dam** is a concrete gravity dam located on the Gila River between the towns of Buckeye and Gila Bend, Arizona. The dam was constructed during the 1920s for primarily irrigation purposes. A portion of the dam failed unexpectedly in 1993 during unusually heavy rains.

### History

The Gillespie Dam was constructed in 1921 by a local rancher to replace an existing structure.<sup>[2]</sup> As the dam was located at an important river crossing that would later become US Route 80, the Arizona Highway Department - the predecessor to the Arizona Department of Transportation - constructed a concrete apron at the foot of the dam to allow for vehicular crossings. As the dam was a simple spillover construction, during times of heavy runoff cars would have to be pulled through the flow by trucks, and during floods could not cross at all.<sup>[1]</sup> In anticipation of the formation of the United States Highway System in 1926, the Highway Department commissioned the construction of a steel truss bridge just downstream from the dam. The bridge was completed and opened to traffic on August 1, 1927 at a cost of US\$320,000 (*US\$3,950,000 in 2007*). The bridge, which was at the time the longest highway bridge in the state of Arizona, was immediately incorporated into the highway system as Route 80.<sup>[1]</sup> The bridge carried US 80 traffic until 1956 when the highway was decommissioned, devolving to a county highway, thus placing the bridge under Maricopa County care. The bridge was added to the National Register of Historic Places on May 5, 1981.<sup>[3]</sup>

### Failure

The winter months of 1993 saw unusually high rainfall amounts that resulted in record flows through central Arizona Rivers and streams, including the Salt River, a major tributary to the Gila upstream from the Gillespie Dam.<sup>[4]</sup> At approximately 10:30 on the morning of January 9, the dam failed when a segment approximately 120 feet (37 m) in length collapsed into the river. While the precise cause of the failure is unknown, the extreme flooding was almost certainly a contributing factor. The precise size of the flood was not recorded due to equipment failure, but an estimate based upon a high water mark recorded on USGS equipment yielded a peak flow of approximately 200,000 cubic feet (5,700 m<sup>3</sup>) per second, corresponding to a predicted 65-year flood, or a flood of a magnitude anticipated only once per 65 years. The previous high, recorded during similarly disastrous floods in 1980, had been 178,000 cubic feet (5,000 m<sup>3</sup>) per second.<sup>[5]</sup> Due to the failure, three underground natural gas lines were exposed and later severed by the floodwaters. The bridge downstream survived, and was deemed safe for travel.<sup>[1]</sup> The remnants of the dam remain in place and the area is largely accessible to the public. A small earthen embankment exists to divert water into nearby canals.



### <u>Hydro</u>

(The following are from a paper presented at the recent OCOLD Conference in Kyoto, Japan by Dr. JIA Jinsheng, ICOLD President. Observation: Hydro has the greater EPR primarily because its efficiency is so much higher than any other energy source. If anyone cares to read a very informative paper, let me know.)

Hydropower has highest Energy Payback Ratio (EPR), extremely low carbon emissions compared with other sources

### EPRs of different modes of energy sources



### CO2 emissions per GWh for different modes of energy sources



(The article is way too long to say what it wants to say – don't build the projects! In case you haven't seen the Mystic Lake Hydro project, included is one of my photos. Lots of NIMBY's here!) **Petitioners rally against East Rosebud hydropower project** By Linda Halstead-Acharya for the Gazette, billingsgazette.com

South of Roscoe — First it was fire. Now it's a hydro project. Residents of the East Rosebud valley had no way to stop the Shepard Mountain fire that roared through the drainage and torched their cabins 16 years ago. But this time, many of the same residents see an opportunity to halt what they consider another threat in their backyards: a small hydropower facility. As of late May, locals had gathered more than 900 signatures on a petition to stop the proposed development.

On June 30, they have invited the public to join them in the East Rosebud for a day of activities and information. Unlike the racing firestorm, progress on the hydropower proposal has been slow.

News of the project first broke in winter 2009, when Hydrodynamics, Inc., of Bozeman, filed for preliminary permits from the Federal Energy Regulatory Commission. The company's applications described two prospective hydropower projects for the Beartooth Front — one along East Rosebud Creek and the second, nearly a mirror project, along West Rosebud Creek. Each would involve a small diversion dam (eight feet high and 100 feet long) and a penstock running roughly two miles downstream to a small power house.



As described in the East Rosebud application, the dam would be approximately 400 feet downstream of East Rosebud Lake and the power plant would be situated in the vicinity of Jimmy Joe Campground. According to the application, the East Rosebud project would generate six megawatts of electricity, roughly half the amount produced by PPL Montana's Mystic Lake Dam. In Hydrodynamics' most recent update to FERC on May 23 of this year, engineer Ben Singer

reports a few changes to original plans including burying the penstock and possibly the power line on the East Rosebud side. And, rather than sending the power to Idaho, Hydrodynamics would most likely sell it in-state. Perhaps most notable to opponents of the project, however, is Singer's statement that the company does not foresee filing a notice of intent or preliminary application within the next six months. When Annette Lavalette and Frank Annighofer first learned of the proposal in the winter of



2009, it caught their attention. The couple lives year-round on a hillside overlooking the East Rosebud valley. "This didn't seem like a good place for it — not here," Annighofer said. Both Lavalette and Annighofer said they favor renewable energy, but emphasize that not every project

makes sense. Annighofer, who spent his career as a consultant for green energy, said opposing such a project is foreign to him. "I was always on the other side," he said. But as the couple pursued more information on the East Rosebud proposal, their findings only confirmed their initial position. "We first looked at the technicalities of the project," Annighofer said. "Can it really generate as much power as they say?" Using stream flow information from 1984, when a different company submitted a similar proposal, they determined the water level of East Rosebud Creek is only high enough to



generate power for four months of the year. Based on that information, they question Hydrodynamics' estimated six megawatt output. "We came up with 1.5," Annighofer said.

Hydrodynamics, Inc. has not responded to messages requesting information on this point and other concerns. Lavalette points out that the 1984 proposal was dropped due to the low stream flow measurements. The couple also questions the expense of mitigations — such as burying the penstock and making provisions to protect the fisheries — that are likely to be required. "We want him (Roger Kirk, owner of Hydrodynamics) to realize what it will cost in the end." Annighofer said. "We don't want him to go bankrupt and have no money to remedy what he started." Kevin Owens, a part-time resident of the Red Lodge area, has spent 35 years working in the utility industry in the Pacific Northwest. In a detailed letter he wrote to FERC, he draws attention to a variety of issues, including stream flow, fisheries and return on investment. He feels the Forest Service should list the project requirements now so Hydrodynamics can determine its financial feasibility. "Only 4 percent of the existing dams in the United States incorporate hydroelectric generation into their structures," he wrote. "Hydrodynamics, Inc. clearly needs to focus on the other 96 percent of the dams in the United States that may provide more realistic and less-damaging opportunities for electric generation." Different concerns resonate from different parties. Longtime resident Sybille Branger foresees a problem with uninvited invaders. "Anytime you disrupt our ground, you get weeds," she said. Dayle Hayes, president of the East Rosebud Association, values the sense of place and the culture of the families that first built cabins there in the late 1800s. "Some of these people's families have been coming here for more than 100 years," she said. Like many of her neighbors, Hayes' family lost its cabin to the Shepard Mountain fire of 1996. Around East Rosebud Lake, she notes, it's taken this many years for the greenery to recover enough to shade the trail. "We've just seen the devastation to an ecosystem," she said. "The thought of having that compromised by unnecessary development is not something we in the association want to see." Scott Bosse, Montana's representative of American Rivers, puts a high priority on designating the upper portion of East Rosebud Creek as a Wild and Scenic River, "We are definitely concerned about impacts to the fisheries and wildlife, to stream habitat, to recreational uses and scenic values," he said. "Less than one percent of rivers are even eligible for federal protection. To compromise on that last one percent, we are not willing to do." Without the designation — there have been no Montana rivers or streams designated as Wild and Scenic since 1976 — residents could be fighting similar battles in the years ahead, he cautioned. The Stillwater Protective Association, the local resource council, also backs the petition effort. SPA President Charles Sangmeister echoes Lavalette's and Annighofer's sentiments that alternative energy is not appropriate in every situation. "Not in an area that is a residential community and not in an area known for fishing and not in an area with Forest Service use and also where water flow is insufficient," he said.

As opponents weigh in, the Forest Service prepares for activity that will trigger its involvement. The agency will step in when Hydrodynamics plans any action that would disturb Forest Service ground, said Mariah Leuschen, acting public affairs specialist for the Custer and Gallatin National Forests. At that point, Hydrodynamics must come to the Forest Service for a special-use permit, which would trigger an environmental review in accordance with the National Environmental Policy Act. It is at that point when the public would typically have a 60-day comment period. To keep followers abreast of activity, a website at www.saveeastrosebud.org posts all related information. Of the 900-plus signatures, most were collected via that site. Roughly half come from residents of the region but the list also includes names from as far away as Japan, Australia and Pakistan. Despite their opposition to the project, at least several petitioners have good things to say about Kirk, owner of Hydrodynamics. At one point, he invited doubters on a tour of a small hydropower project he developed in the 1970s on ranchland east of Red Lodge. The project taps into the end of an irrigation ditch and generates power when the ditch is running. Sangmeister said they were impressed with Kirk's expertise. "We'd probably be supporting him in other areas," he said. "We enjoyed talking with him and learning more about it and I think he understood our concerns. We hope we can work together to resolve this." While Hydrodynamics' proposals include both the East and West Rosebud drainages, the petition effort strictly targets the East Rosebud project. "We had the feeling we should concentrate on one area," Lavalette said. Annighofer adds that the projects are similar but the status of the two valleys is not. Because the West Rosebud is already harnessed by a dam and power generation facility, "the arguments we make here wouldn't apply there," he said.

### (Excerpts)

# Eagle Creek Renewable Energy Acquires Third Mongaup River Valley Hydroelectric Project

marketwatch.com

Morristown, N.J., Jun 25, 2012 (Business Wire) -- Eagle Creek Renewable Energy, LLC ("Eagle Creek") announced today that it completed its purchase of the 7 megawatt Swinging Bridge Hydroelectric Project from AER NY-Gen, LLC on June 11, 2012. The acquisition complements Eagle Creek's purchase of the Mongaup Falls and Rio Hydroelectric Projects that occurred on January 21, 2011, creating a 21 megawatt system of five reservoirs and three generating facilities within New York State's Mongaup Valley. This system produces 55,000 MWh of clean renewable energy per year for downstate New York. The purchase includes the Toronto and Swinging Bridge Reservoirs as well as Cliff Lake. Located 60 miles northwest of New York City, the reservoirs provide valuable recreational resources for the public, as well as a significant source of water flow into the Delaware River system. Eagle Creek and its subsidiary company, North American Hydropower, now own 29 hydroelectric facilities spanning five states with a combined capacity of 61 megawatts and an annual production of approximately 220,000 MWh of clean renewable energy. "Now that we have completed the purchase of Swinging Bridge, we can move forward to optimize the use of river flows and reservoir storage to meet the interests of our various stakeholders and realize the full value of this historic system," said Bud Cherry, Eagle Creek's CEO. "This closing, together with our recent acquisition of North American Hydro, further expands Eagle Creek's platform of small-scale hydroelectric projects and represents an important step in our continued pursuit of high-quality growth opportunities." -----

### (Now here's an article void of the history that actually explains why licensing is a mess) Why is Hydropower Relicensing So Complicated? Unraveling the knot of hydropower development on the Yuba River

June 25, 2012 | blogs.kqed.org | By Molly Samuel

Englebright Dam on the Yuba River is not part of a hydroelectric project, but it's surrounded by them. When most of the <u>dams in California</u> were built, there were few, if any, safety or environmental regulations governing how they operated. Now most hydropower projects, whether they're owned by local agencies or power companies, need licenses from the <u>Federal Energy Regulatory Commission</u>, or FERC. (Federal projects don't require FERC licenses.) Licenses are good for 30 to 50 years, and licensees don't have to keep up with, for instance, environmental laws passed



in the intervening years. So when a hydropower project does come up for relicensing, there's a lot to catch up on. I described some of the relicensing process in a radio story for <u>The California</u> <u>Report</u> for <u>Climate Watch's "Water and Power</u>" series. Dennis Smith, the Hydropower Relicensing Manager for Region 5 for the Forest Service, gave me a taste of how complicated relicensing is when he showed me a <u>flow chart [PDF]</u> of how the process works. It has 39 boxes on it, each a discrete step. A typical application takes at least five years to complete. Some take much longer. "You could have a child and he would be in the first grade by the time you got a license for a dam." Smith said.

One reason why relicensing is so complicated, is that the hydropower projects themselves are incredibly complex. We are not talking water wheels here. Click on this link for better view: Yuba-Bear and Drum Spaulding Projects Schematic (Modeling Version)



This map shows the Yuba-Bear and Drum-Spaulding hydroelectric projects, owned by the Nevada Irrigation District and Pacific Gas and Electric, respectively. These two projects, on the Yuba River in the Sierra Nevada, are so entwined, they're being relicensed together. Combined,

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it's the most complicated hydropower project in the state — possibly in the nation. "You could describe it as a plate of spaghetti tossed on a map, with meatballs. It almost looks that random until you get to know it," Steve Rothert, the California Director for environmental group American Rivers, told me. And it's not the only relicensing happening on the Yuba right now. The Yuba County Water Agency's Yuba River Development Project is also going through the process. "Here on the Yuba there are three different hydro projects going through relicensing, that involve over 30 dams and almost 20 powerhouses," Rothert told me. "And within the next three years <mark>these dams will have new licenses that will govern the next 30 to 50 years."</mark> So the stakes are high when Rothert advocates for better habitat for fish and other animals during relicensing. He's primarily trying to negotiate for higher flows — for more water to be released into the river. And with a project like Yuba-Bear Drum-Spaulding, he and all the other stakeholders aren't just trying to agree on a single flow. There are nearly 50 sections of river to evaluate, at different times of year and during all types of years. (The flows during January in a wet year are not the same as the flows during September in a dry year.) And then there's the irony of where I interviewed Rothert about hydropower relicensing. We stood overlooking Englebright Dam, built by the Army Corps of Engineers to block sediment from gold mining. Fish can't get past the dam, and the National Marine Fisheries Service issued a biological opinion [PDF], saying it jeopardizes springrun Chinook salmon and other species. But it's not a hydropower dam — and it's owned by a federal agency, anyway — so it's not in FERC's jurisdiction; it doesn't have to go through relicensing. And yet, Englebright, too, is linked to the hydropower projects on the Yuba. Two powerhouses are just downstream of it - one owned by PG&E, the other by the Yuba County Water Agency. To misquote John Muir, "When we try to pick out anything by itself, we find it hitched to everything else in the Yuba River."

(Duh! They just got around to figuring this out. It's worse than the article portrays. The agencies have created bureaucratic empires built around the ability to assess annual charges almost without oversight of any kind. The fix is simple – repeal the 1986 Electric Consumers Protection act, ECPA)

Hydropower stymied by multiple agency reviews Streamline relicensing process, committee told

Bill Opalka | Jun 28, 2012, renewablesbiz.com

A single federal agency should oversee permitting applications for relicensing of existing hydropower plants, a U.S. House committee was told during a June 26 hearing. The U.S. House committee on Natural Resources was told by hydropower advocates that a cumbersome and sometimes conflicting array of federal oversight of relicensing power stations, in which even one objecting agency can effectively kill a project that has been generating electricity for 50 years. The House Natural Resources Oversight Committee held the hearing "Mandatory Conditioning Requirements on Hydropower: How Federal Resource Agencies are Driving Up Electricity Costs and Decreasing the Original Green Energy." The nation has 12 GW of untapped hydropower potential, according to the Energy Information Agency. Chaired by Rep. Doc Hastings (R-Wash.), whose district produces the most hydroelectricity of any Congressional district in the U.S., the hearing concerned only dams not on federal waterways but are nonetheless been under federal purview since President Teddy Roosevelt's time. Such dams account for one-half of the hydropower supply. "The relicensing process should not be a hostage-taking opportunity for federal agencies to demand a ransom to be paid to fund their wish lists, or for federal agencies to push a covert dam removal agenda by imposing conditions so onerous that hydropower licenses are surrendered instead of renewed," Hastings said.

The panel was told that the process took an average of five years and costs millions in compliance that make operators drop relicensing altogether rather than continue a burdensome regulatory review or expend compliance costs that would make the station uneconomic. "Designating one agency as having exclusive siting authority would not usurp the decisional authority of the mandatory conditioning agencies. Rather it recognizes that one agency has been vested with the authority to determine whether the proposal is in the public interest while others

have been vested with authorities that go only to some aspect of the project," said Mark Robinson, principal of JMR Energy Infra, LLC and a former aguatic ecologist at FERC. The witnesses seemed to settle on FERC as the likeliest place for one agency to act as a clearinghouse for all other required reviews. The Energy Policy Act of 2005 tried to quicken the process by creating trial-type hearings for applicants to challenge some regulatory mandates, but that has failed to expedite licensing reviews. "Knowing that the applicant must affirmatively pursue a trial type hearing and that the agencies have an opportunity to provide modified conditions later in the FERC process places the conditioning agencies in a superior position during any negotiations. The playing field is significantly tilted in favor of the conditioning agencies," Robinson added. One such scenario was related by Joln Grubich of the Public Utility District Number 1 in Okanogan County in Washington State. He explained his frustration at reviving 9-MW Enloe hydro project that existed from 1906 to 1958, when it was mothballed. The federal Bureau of Land Management is imposing environmental conditions, on which it must sign off because the project needs a right-of-way over its land. "These recommendations would accomplish BLM programs and objectives that are not directly related to project impacts. Enloe is a very small project, with a total budget of approximately \$30.9 million, of which about \$2.4 million is committed to environmental mitigation," Grubich said. BLM's program would increase total project cost by 20%, he added. "The BLM's many additional recommendations would restore recommendations previously considered and rejected by FERC in its EA (environmental assessment). FERC received these recommendations from BLM at least twice, explicitly considered each of them in its EA, and rejected them," Grubich added.

(Oh my, there are some classic quotes in this one. What the heck are they talking about on the subject of efficiency? This is the same stuff that everyone is doing!)

### Markey, Napolitano Introduce Hydro 2.0

June 26, 2012, wateronline.com

### Legislation Would Improve Efficiency of Hydropower Dams

Recently, Natural Resources Democratic Ranking Member Edward J. Markey (D-Mass.) and Subcommittee on Water and Power Ranking Member Grace F. Napolitano (D-Calif.) introduced legislation to improve the performance of federally-owned and operated hydroelectric dams across America. The "Hydro 2.0 Act" would authorize the Bureau of Reclamation to utilize revenues from new power production at existing sites to upgrade the efficiency of dozens of dams and improve their environmental performance before looking to build new dams. "The wildlife that swim and live in our rivers have evolved over millennia to become highly efficient in the water's currents. It's time that the same dams that create electric power from those waters evolve to become more efficient with the water, too," said Rep. Markey. "The bill we're introducing today will empower the Bureau of Reclamation to ensure our dams work smarter, not harder to produce electricity." "Whether it's our water systems or hydropower projects, efficiency improvements are the most cost effective water and power supply, said Rep. Napolitano. "The ability to make our existing hydropower systems more efficient, mitigate for environmental impacts caused by hydropower, while paying down the debt associated with power, is a win-win-win for everyone."

The Bureau of Reclamation is currently the largest water provider in the nation, and second largest producer of hydropower nationally. The agency estimates that just a one percent efficiency improvement in the 58 dams under their control could produce 16.2 megawatts of additional power at all times, resulting in extra power that is worth approximately \$5.7M annually. Upgrades to 10 of those dams could also deliver another 67 megawatts of electricity to American homes and businesses. Hydro 2.0 would help to fund these efficiency improvements through revenues from new power generation at existing facilities.

### (Excerpts)

### Alcoa to sell Tapoco Hydroelectric Project to Brookfield Renewable Energy Partners

From Staff Reports, thedailytimes.com

Alcoa Inc. announced today that it has reached an agreement to sell its 351-megawatt Tapoco Hydroelectric Project to Brookfield Renewable Energy Partners for \$600 million. Tapoco is a fourstation hydroelectric project located on the Little Tennessee and Cheoah Rivers in East Tennessee and Western North Carolina, and is operated by Alcoa Power Generating Inc., a wholly owned subsidiary of Alcoa Inc. The transaction will include the four generating stations and dams, 86 miles of transmission line, and about 14,500 acres of land associated with and surrounding Tapoco. Alcoa Inc. anticipates receiving proceeds of \$600 million from the sale upon closing, which is subject to customary federal and state regulatory approvals. The transaction, which involves non-core assets, is expected to close by year-end. Tapoco is licensed by the Federal Energy Regulatory Commission (FERC).

Tapoco was originally developed by Alcoa to provide power for its aluminum smelting and rolling mill operations in Alcoa. The four dams - Calderwood, Santeetlah, Chilhowee and Cheoah came into service between 1919 and 1957. Construction began on Cheoah Dam in 1916 and was completed in 1919. At the time of completion, Cheoah was the world's highest overflow dam at 225 feet. The dam was made famous by serving as the backdrop of the jump scene in the 1993 movie, "The Fugitive," starring Harrison Ford. In August 2010, Alcoa kicked off a \$110 million modernization project at Cheoah Dam to increase the dam's efficiency and energy output and increase the life of the dam by at least another 40 to 50 years. The modernization project was given a jump start when the U.S. Department of Energy announced it would award Alcoa a \$12.95 million grant as part of the 2009 American Recovery and Reinvestment Act. The grant was issued by DOE's Wind and Hydropower Technologies Program. The modernization followed the relicensing of the Tapoco project by the Federal Energy Regulatory Commission. The new 40-year license was effective March 1, 2005, and outlines protection, mitigation and enhancement measures for the project that address ecological resources as well as other beneficial uses of the Cheoah and Little Tennessee Rivers, including hydropower generation, watershed protection, endangered species enhancement, fish passage and recreational opportunities.



### <u>Water</u>:

(Another negative report on Dams and Hydropower. The report section on Hydropower starts on page 23 and the report did discount the amount of evaporation by 50 % because reservoirs serve multi-purposes.)

Water Footprint of Electricity Highest for Hydro, Report Says By Randall Hackley - Jun 27, 2012, bloomberg.com

For every gallon of water used in an average U.S. household, five times more water is used to provide that home with electricity via hydropower turbines and fossil-fuel plants, River Network said today in a report. The Portland, Oregon-based environmental group's report said the water footprint of electricity is the highest for hydropower. "Each day, enough water to meet the demands of more than 50 million people evaporates from reservoirs behind hydroelectric dams," it said. The report also said electricity production by coal, nuclear and natural gas power plants is the fastest-growing use of fresh water in the U.S., making up at least half of all fresh, surface water withdrawals from rivers, more than any other sector, including agriculture. "The days of taking water for granted in our decisions about energy production must come to an end," said Cindy Lowry, Executive Director at the Alabama Rivers Alliance. Link to Report: http://www.rivernetwork.org/sites/default/files/BurningOurRivers2\_6-25-12.pdf



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### <u>Environment</u>:

(Well, this is interesting – turns out Dr. Houser claims he does have documentation that supports his statements (see full text on his web site). It's the battle of scientists reality show on the Klamath River (hydrologist vs. hydrologist). Cutting a notch in a fill dam does seem to be too risky. See the 6/22/12 Newsletter for Dennis Lynch article. Now what?)

Paul R. Houser: Dam removal holds risks, uncertainties redding.com, June 24, 2012

After I questioned the accuracy of science reporting and summary documents related to the Klamath Secretarial Decision, I faced systematic reprisal and my job as the Bureau of Reclamation's science advisor was terminated. Subsequently, I filed a scientific integrity allegation, and was invited to speak publicly about it in May. I was confronted with a very wide range of questions, where I carefully offered my opinion or relevant information. Dennis Lynch of the U.S. Geological Survey recently questioned some of this information ("Klamath science process is solid," June 11). Below I summarize the rationale for my comments, and offer some additional perspective. (Full text available at: <a href="http://prhouser.com/houser/?p=830">http://prhouser.com/houser/?p=830</a>).

- Lynch states that "our team summarized these findings in an Overview Report that received a second layer peer review from six independent experts." He fails to mention the peer review comment 3-5: "The Summary and Findings section does not sufficiently express the uncertainties in the responses to restoration options," which is generally consistent with my allegation. These concerns should be addressed by writing a new summary that accurately portrays the dam removal uncertainties and risks, and the additional actions that will be needed to meet the environmental and societal goals.
- 2) Lynch disagrees with my comment that a more in-depth engineering analysis is needed to assure that Iron Gate Dam is removed safely. My comment was based on an EIS/EIR comment submitted by Stephen Koshy, who warned that notching the earth-filled Iron Gate Dam may cause it to fail. This concern can be addressed by providing a public response to Koshy along with the relevant engineering analyses.
- 3) Lynch disagrees with my comment that the sediment coming out of the dams would be the equivalent volume of one to three feet covering 190 miles of a 150-foot-wide channel. The sediment volume studies have discrepancies, but my volume equivalency calculations are correct. Further, the draft EIS/EIR states: "Short-term (2–yr.) aggradation of sediment from the dams could be substantial below Iron Gate Dam downstream to Willow Creek, with up to 5 feet of deposition within 0.5 miles downstream of the dam, to 1.5 feet of deposition near Willow Creek." Downstream impacts of sediment are a significant concern, so alternate options such as dredging may also need to be more seriously considered.
- 4) Lynch disagrees with my concerns that the released sediments may be harmful to fish, and may have a significant impact for 1-2 years. The draft EIS/EIR states, "[T]he short-term (<2 years following dam removal) increases in SSCs [suspended sediment] in the Lower Klamath River and the Klamath Estuary would be a significant impact." Water quality and reservoir sedimentation in the Klamath Basin are very complex issues. While a 2011 Department of Interior report did show that the reservoir sediments have toxic elements below most guidelines, the upper basin is well known to have water and sediment quality issues, and these sediments are being deposited in the reservoirs. A 2006 PacifiCorp study concludes that the absence of the project reservoirs would exacerbate water quality impairment by reducing dissolved oxygen and promoting growth of algae. Water quality issues above the PacifiCorp dams may be among the most significant risks to successful river restoration; these water quality issues should be mitigated prior to dam removal.

5) Finally, Lynch objects to my statement that nonnative Coho salmon were introduced in the Klamath starting in 1895. A 2002 California Department of Fish and Game report confirms my statement and further indicates that "historically, the practice of importing non-native fish was common." The draft EIS/EIR also states that "the vast majority of Coho salmon that spawn in the Klamath Basin are believed to be of hatchery origin, although the percentage varies among years." Based on the century-long history of nonnative salmon transfers and hatchery origin fish, it would be tough to identify a truly native wild Klamath Coho. Nonetheless, it is the law to protect them.

The outcomes of dam removal on this scale and in this unique environment have significant risks and uncertainties. A positive outcome is not guaranteed and a tragic outcome is possible. There are several innovative and economical solutions to meet the Klamath Basin goals that are not being actively considered because they fall outside the politics of the Klamath agreements. It is in the public trust, and a duty of scientific integrity to seriously consider these alternatives. My goal is to make sure that decision makers are aware of these risks and uncertainties, and account for them in their decision-making process. By only reporting the positive aspects of dam removal without the uncertainties and additional needed mitigation, the meaning of the science is perturbed, which may lead to poor decisions. *Dr. Paul R. Houser is a hydrologist and former scientific adviser to the U.S. Bureau of Reclamation.* 

Northwest sees record returns of sockeye salmon to Columbia Basin washingtonpost.com, By Associated Press, Published: June 27AP

(Rick Bowmer/ Associated Press) -A sockeye salmon, left, swims pass a Chinook salmon, center front, and shad, above, at the fish counting window at the Bonneville Dam, Wednesday, June 27, 2012, near Cascade Locks, Ore. Record numbers of sockeye salmon are returning to the Northwest's Columbia Basin, with more than 400,000 expected this year. Record numbers of a once-waning



population of sockeye salmon have been returning to the Northwest's Columbia Basin this summer, with thousands more crossing the river's dams in a single day than the total numbers seen in some previous years.

Since Bonneville Dam outside Portland was built in 1938, there have been plenty of times there weren't 38,000 sockeye salmon swimming over the fish ladders in a whole year. But on Monday that many passed the Columbia River dam, and another 41,000 swam over the



dam on Wednesday — a rate of nearly 30 a minute. That bought the total so far to 290,000. A record run of more than 400,000 of the Columbia Basin's farthest-swimming salmon are expected to return this year, almost all of them wild fish bred in rivers, instead of the hatcheries that produce most Northwest salmon. Sockeye cross nine dams to reach spawning grounds in northern Washington and Canada. Biologists credit habitat improvements in the Okanagan Basin of northern Washington and Canada, improved dam operations, and favorable ocean conditions

for the numbers. Okanagan sockeye swim more than 500 mils to spawn. The bulk of the record returns are going back to the Okanagan River Basin, which drains a series of lakes straddling the Canadian border and flows into the Columbia. "I have been telling people if they get the opportunity, to go up and visit the Okanagan," said Bill Tweit, special assistant to the director of the Washington Department of Fish and Wildlife. "It's going to be an incredible natural spectacle."

Smaller than most salmon at three to five pounds, sockeye are also the brightest in color. They are popularly known as bluebacks for their silvery blue hue as they pass Bonneville Dam, but as they get closer to laying their eggs in the gravels of rivers and lakes in the fall, their bodies turn bright red and their heads green. Though the Okanagan sockeye were never listed as an Endangered Species, as Snake River sockeye in Idaho were, the future was not looking bright for Okanagan sockeye in the late 1980s and early 1990s, said Joe Peone, fish and wildlife director for the Confederated Tribes of the Colville Indian Reservation, which is in the Okanagan Basin. Fewer than 9,000 sockeye returned to the Columbia Basin in 1995. The operation of hydroelectric dams regularly washed out the eggs after the fish laid them in the river, or left them high and dry before they hatched. Sockeye proved difficult to rear in hatcheries, so tribes on both sides of the border teamed up with local utilities that owned the dams to work out rules for maintaining flows that the fish could live with. Natural meanders were restored to rivers that had been straightened to reduce flooding. "Right now those fish are utilizing maybe a quarter of their historic habitat," Peone said. If more habitat is restored, "You could see 1 million fish coming back here." Ritchie Graves, a NOAA Fisheries Service biologist who makes sure federally owned dams are living up to their Endangered Species Act obligations not to kill too many salmon, said the survival rate for young salmon swimming downstream to the ocean has been higher than ever the past three years, hitting about 50 percent for sockeye. Those improved dam operations have also benefited Chinook, Coho, chums, pinks and steelhead, said Graves. The six species combined accounted for 1.8 million salmon over Bonneville in 2010, compared to 471,144 in 1938. Once young salmon get to the ocean, scientists have only a vague idea where they go, and an incomplete understanding of why some years they thrive and some years they starve. Generally, years when climate and weather cause the ocean waters to well up, salting the water column with food, fish do better. But unlike most salmon, which eat other fish, sockeve eat plankton, tiny shrimplike animals. Though poor ocean conditions have been blamed for a nosedive in Chinook salmon in Alaska this year, sockeye have done well, not only in the Columbia, but in Canadian and Alaskan rivers as well. "Whatever is going on in the ocean is basically being good to sockeye," said Tweit.



7/12/2012



# Some Dam – Hydro News™ And Other Stuff

CORSO COURT

**Quote of Note:** "Don't feel entitled to anything you didn't sweat and struggle for." -- Marian Wright Edelman

<u>"Good wine is a necessity of life." - -Thomas Jefferson</u> *Ron's wine pick of the week:* Trilogy Floral Springs Cab, Merlot, Malbec Blend "No nation was ever drunk when wine was cheap." - Thomas Jefferson



<u>Dams</u>: Press Release

The National Dam Safety Program is One Step Closer to Reauthorization geosynthetica.net

**Lexington, KY -** On June 28, Senators Daniel Akaka (D-HI) and John Boozman (R-AR) introduced the National Dam Safety Act of 2012, which would reauthorize the National Dam Safety Program (NDSP), first authorized through the Water Resources Development Act of 1996. The NDSP focuses on the safety



of the nation's dams by providing vital support for the 50 state dam safety programs. Forty-nine states and the Commonwealth of Puerto Rico have established state dam safety programs; Alabama is the lone exception. Leaders of the <u>Association of State Dam Safety Officials</u> (<u>ASDSO</u>), in partnership with the American Society of Civil Engineers, have been supporting this legislation since its initial authorization in 1996, and in subsequent authorizations in 2002 and 2006. Through its administration of the NDSP, the Federal Emergency Management Agency (FEMA) will continue to lead national efforts to protect the public by preventing dam failures. To this end, FEMA:

- provides vital grant assistance for the improvement of state dam safety programs
- instigates and supports efforts in dam safety research and technology transfer
- supports public awareness efforts

- acts as a hub of communication between state and federal agencies
- provides training for state dam safety staff

According to ASDSO President, Zahir "Bo" Bolourchi, P.E., "Reauthorization of the National Dam Safety Program is tremendously important to public safety. There are more than 84,000 dams in the U.S. and state dam safety programs oversee more than 85 percent of them. The NDSP is invaluable to the state programs involved with the day-to-day safety regulation of these vital, yet potentially dangerous, components of the national infrastructure." Since the American Society of Civil Engineers (ASCE) issued its first national "infrastructure report card" in 1998, ASDSO has worked with ASCE to assess the condition of the nation's dams. The grade assigned to dams since 1998 has remained a consistent 'D', seemingly demonstrating a lack of progress in dam safety in the United States. The grade is both accurate and somewhat deceptive: Improvements since 1996 can be demonstrated:

- Since 1996, funding and staffing of state regulatory programs has increased slightly
- Training for state personnel is more readily available
- There is better coordination between dam safety and emergency officials at all levels of government
- The number of emergency action plans for potentially deadly ("high-hazard-potential") dams is increasing
- The number of dam inspections is increasing
- There is better state enforcement authority

But dam safety is a complicated matter:

- Lack of funding for dam upgrades is a serious national problem, especially within the private sector. Operation, maintenance, and rehabilitation of dams can range in cost from the low thousands to millions, and responsibility for these expenses lies with owners, many of whom cannot afford these costs. Although some states offer loan programs, funding assistance, through government or private sources, is minimal at best. In 2009, ASDSO concluded that it would take approximately \$16 billion to rehabilitate the nation's most critical (high-hazard potential) dams that are in need of rehabilitation. In its 2009 Infrastructure Report Card, ASCE cited the lack of funding available to support the repair and upgrade needs of the nation's dams as one cause of the low grade for dams.
- State regulatory programs are still underfunded and understaffed to keep up with the inspection and enforcement programs necessary to keep all dams safe.
- The great majority of dams in the U.S. are more than 50 years old. While the age of a dam is not necessarily a direct indicator of its condition, it is indirectly an indicator in that old dams were not built to the standards of today. Some older dams are considered in poor condition for this reason alone; others may have been inadequately maintained as well.
- Ownership makes dams a unique part of the national infrastructure. While most infrastructure facilities (roads, bridges, sewer systems, etc.) are owned by public entities, the majority of dams in the US are privately owned. A dam's owner is solely responsible for the safety and liability of the dam and for financing its upkeep, upgrade and repair.

In order to protect the public and to ensure the continued benefits of dams—including flood protection, drinking water, hydroelectric power, irrigation and recreation—dams require ongoing maintenance, monitoring, frequent safety inspections, and rehabilitation. The National Dam Safety Program supports all of these actions. ASDSO lauds Senators Akaka and Boozman for their recognition of this fact, and for championing the cause of public safety. The Association of State Dam Safety Officials (ASDSO) is a national, non-profit organization founded in 1984 and dedicated to improving dam safety through research, education and communication. www.damsafety.org

### (More "important" stuff about dam builders. Read the sarcastic comment.)

Warren County study finds roads could be endangered by beaver dam

### failures

poststar.com, June 28, 2012

There are at least 20 beaver dams in Warren County that threaten roads and/or public property if they burst, a recent county study of beaver dam-related issues has found. The county looked at the issue at the request of Chester Supervisor Fred Monroe, whose town dealt with two road washouts in recent years when beaver dams burst. After one burst three or four years ago on Hidden Lake Road, a woman drove into a washed-out road but thankfully avoided injury, Monroe said. Two others in recent years, in



Riparius and Greenfield, washed out railroad tracks. "It's a big problem," he said. "Some of these dams create big ponds and when they burst there is a lot of water released."

He said many of the worst road washouts during storms are believed to occur when rain-swollen beaver ponds burst the dams that hold them back. Some beaver ponds grow to 20 acres or more, which results in hundreds of thousands of gallons of water building up. The concerns prompted a recent effort by county officials to work with town highway superintendents around the county to catalog where beaver dams are and what roads they threaten. The result was a report outlining what county officials say is an overlooked problem, and a discussion about how state law hinders public works crews' abilities to handle it. The law does not allow public works officials to force private landowners to remove beavers that create dams that threaten roads, unless the dam is within 100 feet of the road, Horicon Supervisor Ralph Bentley said. "A lot of people don't want you to trap them on their property," Bentley said. Landowners can take action themselves to remove nuisance beavers with the State Department of Environmental Conservation's permission. The fact there are fewer trappers than there were decades ago has allowed the beaver population to

grow, Bentley and Monroe said. They have few natural predators. One of the dams catalogued in Horicon actually burst in recent weeks, Bentley said. Water coursed up to the edge of Bean Road but did not cause any damage, he said. "We were lucky because it came right up to the edge of the road. It was close to washing the road out," he said. The town budgeted \$500 to \$600 a year to control them, Bentley said. That can include clearing debris from culverts and trapping beavers if need be. Monroe said the county wanted to identify areas at risk, but it was not clear what can be done to lessen the risks. "This is a significant issue for life and property," he said. "I don't know what the solution is."



### (1) Comments

### quackster - 9 hours ago

I say "Tax the beavers". All of us are taxed to death on everything, so if they want to build illegal dams without permits and APA authorization, tax 'em & charge 'em to death just like us! In fact I'd probably give them the death penalty after making them serve 30 years of hard labor on a chain gang. Gosh darned beavers doing what God programmed them to do. Those beavers just don't learn...ehh?

3

### (A whole lot of to do about a little dam) Removing Bloede Dam has support, despite historical significance

Dam built in 1907 to provide electricity to Catonsville and Ellicott City

By Brian Conlin, July 2, 2012 | baltimoresun.com

A 105-year-old historic dam straddling Howard and Baltimore counties could be gone by winter 2014. The removal of the Bloede Dam was one of four potential plans presented by the Bloede Dam Alternatives Analysis Open House for the 230-foot-long, 30-foot-tall span across the Patapsco River. Based on its analysis of the dam, the



Maryland Department of Natural Resources has recommended removing the dam with "passive sediment management."

Passive sediment management involves minimal excavation and would allow the sediment accumulated by the dam to settle naturally down the river. Concerns about the dam's negative impact on the ecology of the river and issues of public safety prompted the call for some sort of action, according to information provided by the DNR. The DNR recommendation would cost approximately \$1.1 million and restore natural river function, create a resurgence of species more suited to a habitat of moving water, improve fish passage and increase recreational opportunities while reducing safety hazards, the study found. A similar procedure was used to remove the Simkins Dam north of Bloede Dam in 2010.

Potential short-term problems could include the filling of pools downstream, impact on the organisms that live on the river bottom and reduced fishing opportunities, according to the DNR study. Though the procedure "meets all the goals set out for the project," it's not certain that the park service will utilize this option, said Robin Melton, park manager of Patapsco Valley State Park. "There's much more data to come in yet before the park service comes to a decision," Melton said. A design plan for public comment will be available this winter and a contractor could be chosen by 2014, according to information from last week's community input meeting at Catonsville Library.

### Other options

Another dam removal proposal involving active sediment management would provide similar benefits and disadvantages but would take longer and cost about \$1.1 million more. Active sediment management would involve trapping the sediment stuck behind the dam downstream. Two other alternatives presented by the DNR would preserve the structure but prevent the ecological restoration of the habitat without addressing safety concerns. Just repairing the dam would cost \$880,000 and provide some safety improvements, a short-term reprieve from construction costs and reduce the risk of the dam's failure. But the dam's fish ladder would only be 50 percent efficient and the dam would continue to obstruct migratory fishes in the river, who can't go upriver to spawn and lay eggs. The fourth alternative is taking no action, but that would not improve the poor fish passage, degraded stream conditions and safety concerns that currently exist.

### **Removal supported**

Though some contend the dam, which was built by Patapsco Electric Manufacturing Co. developer Victor Bloede to provide electricity to Ellicott City and Catonsville has historical significance, most at the meeting June 28 at the library supported the DNR's recommendation.

Jim Palmer, an electrical engineer from Glenelg, said public safety and ecological concerns outweigh the historic aspects of the dam and justify its removal. "I don't see that it serves any purpose," he said. "It was a step in industrial development, but I think more historic are the shad and herring runs." Bloede Dam, the first to incorporate submerged internal turbines, had its hydroelectric power discontinued in 1932. It was sold to the state Board of Forestry six years later. Towson resident Ken Lewis, a member of Coastal Conservation Association Maryland, called the area around the dam a "fantastic environment." The dam is obstructing 64 miles of spawning habitat," Lewis said. "It's dangerous. It's got 'No trespassing' signs all over it. It's a public hazard."

### Madera County: Crane Valley Dam Retrofit Nearing Completion on Bass

By Tracy Correa, July 3, 2012, pgecurrents.com

Bass Lake – It's no small feat to retrofit a dam at a popular recreational site, but the work at Crane Valley Dam – which includes reinforcing the dam with 300,000 cubic yards of rock – is nearing completion. The seismic retrofit project at Bass Lake in Madera County is more than 70 percent complete with dam construction expected to be finished by year's end. Site restoration also is underway and scheduled to be completed by early next year. "We will have



the project done in time for the recreation season in 2013," said PG&E's Michael Palmer, supervising project manager. And there has been minimal impact to the popular recreational lake about 40 miles northeast of Fresno, he said.

The construction began in October 2010 and will strengthen the dam to meet today's stricter seismic standards. It also will ensure future safe recreation on Bass Lake, which continues to attract visitors even though the water level had to be lowered about 10-feet below (recreation season normal) maximum during construction. The lake is popular with boats and jet-skis as well as those who come to swim or fish. PG&E is responsible for managing Crane Valley Dam and Bass Lake, the reservoir formed by construction of the dam, because its water supplies

hydroelectric power to PG&E customers. It is one of more than 100 reservoirs that PG&E manages as part of its hydroelectric portfolio. In 2002, the state Division of Safety of Dams asked PG&E to review the stability of the dam — built in phases between 1902 and 1911 — to meet today's updated seismic standards, resulting in the current retrofit project. The crest of the dam will be raised about eight feet to provide additional dam safety. To give a sense of what 300,000 cubic yards of rock might look like, one cubic yard is roughly the size of a home washing machine and The Rose Bowl



in Pasadena holds about 400,000 cubic yards, according to the Los Angeles Department of Public Works. The rock being used to reinforce the dam comes from two different locations: about 200,000 cubic yards from an on-site quarry just west of the dam and another 100,000 cubic yards trucked in from a quarry about 30 miles away in Raymond. Five different types of rock were blasted from the quarries, ranging from small, crushed rock and sand to large rocks that are two

and three feet in diameter. At the height of construction, up to 50 workers from a number of contractors were at the job site and the adjacent quarry was dotted with earth-moving equipment. Palmer said the quarry site near the dam eventually will be reinstated: "We will be restoring and replanting so that it redevelops as a natural forest area."

Material removed from the quarry and set aside because it was too fine to be used in the dam sits covered with 750,000 square feet of PVC (polyvinyl chloride) liner to prevent erosion.. As the

construction winds down, the unearthed material will be used to backfill the quarry and the plastic liner will be recycled. Native trees will be replanted at the site. "It's our goal that you won't know it was a quarry site 50 years from now," said Palmer. The project has required careful cooperation with local, state and federal agencies, including the U.S. Department of Fish and Game and the California Department of Water Resources. Among the requirements is a periodic bird survey within a two-mile radius to ensure their safety during construction. PG&E has held community meetings to



keep residents informed of the work around the dam. A special website continues to provide updates and traffic information. About 300 local people signed up to receive e-mail updates from PG&E. Palmer said the public will not notice much of a difference when the project is finished: "From the lake, there will be very little noticed. The dam, from the downstream side, will be brighter because the rock is new."

(At 12 feet wide at the base and less than ½ that at the top, this is basically a wall. You have to wonder what they were thinking when they built this little dam even in the early 1900s. Very expensive!)

### Partial Breach of Fogelsville Dam Possible

Upper Macungie Township might opt for a partial breach of the Fogelsville Dam, which would be less expensive than total removal.

By Margie Peterson, July 5, 2012, uppermacungie.patch.com

Upper Macungie, PA is considering partially breaching the Fogelsville Dam so it would no longer be considered a "high hazard" dam, a township supervisor said. The state Department of Environmental Protection has instructed the township to either repair the deteriorating dam or breach it. Breaching the dam – removing the barrier that holds the water back – could be especially costly because the dam helps hold up Hassadahl Road, so it can't be removed without extensive work to the road, according to township engineer Dean Haas. Upper Macungie Supervisor Kathy Rader said last



week that to breach the dam and replace the road foundation could cost about \$2 million. But a partial breaching of the dam might take it off the "high hazard" list while saving the township from the expense of full removal, Rader said. "We're in the process of preparing a dam breach analysis," Rader said. DEP has also instructed the township to draw up an emergency plan on notifying residents in the area should there be a dam break or other emergency.

The designation "high hazard" refers to the potential for loss of life or property if a dam should break, not the condition of the dam, according to Colleen Connolly, DEP spokeswoman for the Northeast Region. To be considered high hazard, a dam doesn't have to be surrounded by houses. "Water travels pretty far," she said. The label takes into account that a dam break could jeopardize people driving on Haasadahl road and residents far downstream. DEP officials plan to set up a meeting with Upper Macungie officials in the next few weeks to see what progress they've made toward a resolution, Connolly said. Built in the early 1900s by Lehigh Portland Cement Co., the concrete dam is 110 foot across and 13 foot tall and 12 foot wide at its base. When the cement company closed its nearby quarries, it turned the dam over to Lehigh County. The county later gave it to the township along with the Route 100 Park land near the intersection with Tilghman Street. In May, DEP Spokesman Kevin Sunday said his agency has no funds to help pay for dam remediation but it was working with local legislators to see if other money might be available. In 2011, of the 3,325 state-regulated dams in Pennsylvania, 776 were considered high hazard, 287 were rated as having a significant hazard potential and 2,262 were deemed low hazard potential, according to the Association of State Dam Safety Officials.



### <u>Hydro</u>:

(Owners of hydro projects finally speaking up! It's been almost 20 years since Congress totally destroyed the fair licensing process that existed. Look at the ridiculous result! Here's an owner that has spent over 26 % of what the project originally cost to build and what do they have to show for it – mounds of paper and less power production.)

### Placer's water, power concerns voiced in D.C.

By Gus Thomson, Journal Staff Writer, Juky9, 2012, auburnjournal.com

Auburn, CA - The Placer County Water Agency is making its case in Congress for treating hydroelectric power from its Middle Fork Project as greener energy than it is now. A local water official told a congressional committee in Washington, D.C. that agencies like Placer County Water are losing capacity to produce clean, renewable hydroelectric energy because of an unfairly balanced permitting process. At the same time, the nation is trying to find ways to reduce greenhouse gas emissions from energy production by means that include hydropower, water agency Director of Strategic Affairs Einar Maisch told the House of Representatives' Natural Resources Committee. Maisch reported Thursday to the agency Board of Directors after his testimony June 27 at a hearing on "Mandatory Conditioning Requirements on Hydropower: How Federal Resource Agencies are Driving Up Electricity Costs and Decreasing the Original Green Energy." Maisch told the committee that an average of 8 to 10 percent of hydroelectric generation capacity is being lost by local agencies across the nation as they go through the federal relicensing process. The losses are often due to mandatory conditioning authority exercised by select federal and state resource agencies. Maisch said. That authority can require the Federal Energy Regulatory Commission to issue new licenses that redirect water away from generation to enhance environmental conditions for species under those resource agencies' jurisdictions, he said. The agency has spent \$37 million to date in efforts to obtain a new federal license to operate the Middle Fork Project, Maisch said. The agency built the project between 1963 and 1967 with the proceeds from a \$140 million local bond issue passed by the voters of Placer County.

"We began our scientific studies five years early and we've done seven years of collaborative work to demonstrate the health of the Middle Fork American River watershed," Maisch said. "The result is we only anticipate a 5 percent loss in energy production." Additionally, under new terms and conditions, the agency expects to spend \$20 million in capital improvements, \$2.4 million a year in additional operational costs and another \$1 million annually in direct cash payments to resource agencies, he said. "Under the current regulatory framework, this is what success looks

like," Maisch said. The difficulties are in the law, Maisch said. "The problem lies in the structure of the current process, where individual state and federal resource agencies with narrow charters mandate costly conditions which cannot be balanced against other national environmental priorities," he said. Resource agencies aren't being directly blamed, Maisch said. "They are simply carrying out their narrowly focused mission to protect resources under their separate jurisdictions," Maisch said. "The problem is that no one is empowered to balance competing interests." Congress should be encouraged to revise and streamline federal licensing regulations and provide the energy commission with greater authority to balance resource needs and electric generation value, Maisch said. "It's a problem that needs to be solved and we've been offered an opportunity to help develop that legislation," Maisch said.

### (A small step for hydro)

### Wilton office building owner ponders hydro power

By Matt Hongoltz-Hetling, Times Leader Staff Writer, July 2, 2012

Wilton, ME — A tradition of water power may be revived at the Bass-Wilson building downtown, where a grant will help to determine whether a modern hydro turbine would be cost-effective. "I'd like to bring the building back 100 years," Bass-Wilton Properties LLC owner Randy Cousineau said. Back then, the building used a water wheel to draw its power from the waterway that runs beneath it to nearby Wilson Pond. Cousineau said that the wheel is still in the building's cellar. On June 25, Bass-Wilton was awarded a \$2,375 grant from the Rural Energy of America Program, an initiative of the U.S. Department of Agriculture. If all goes well, the 48,000-square-foot office building will once again draw power from the water, this time by restoring an existing hydro turbine and penstock from the 1930s, according to Virginia Manuel, the department's rural development state director. The power could be used to offset or eliminate existing heating and electricity costs.

Cousineau speculated that a generator would probably provide more electricity than the building needed in spring, which would allow him to sell the power back to Central Maine Power. In the drier autumn months, he might need to buy it back. "I hate to feed the oil well," Cousineau said. "I just think it's the right thing to do, to use natural power in the U.S." The grant, which Cousineau said he was required to match with approximately \$7,500 of his own money, will measure the cost effectiveness of the potential power generation. If the project makes sense, Cousineau said he would like to have it in place by the upcoming spring thaw. Hydroelectric power is a growing sector in the state, and had topped 22 percent of all electricity generated in Maine by 2006, according to figures from the U.S. Department of Energy.

### Feds deny stimulus for Taum Sauk reservoir

By Jeffrey Tomich • stltoday.com | July 4, 2012

Energy regulators have rejected Ameren Missouri's bid to get federal stimulus funds for rebuilding the upper reservoir of its Taum Sauk hydroelectric power plant — the giant mountaintop pool that ruptured in 2005. Such grants are more commonly awarded to developers of wind farms and solar projects. But St. Louis-based Ameren asked the Federal Energy Regulatory Commission last month to certify the increased capacity at the Reynolds County pumped storage plant as a green-jobs project, making it eligible for



stimulus funds. The grants are awarded under a provision of the 2009 American Recovery and Reinvestment Act meant to generate jobs and subsidize clean energy projects.

Ameren officials submitted an engineering report to FERC last month stating that the new upper reservoir, completed in 2010, could generate more energy than the one it replaced because it leaked less, and therefore qualified for payments. The utility also said the rebuilt reservoir could be operated at a higher capacity during winter, further adding production capacity. But FERC — the same agency that investigated the reservoir collapse — disagreed. "We have determined that the rebuild of the upper reservoir embankment, which enabled you to reduce leakage from the dam and to restore the upper reservoir elevation to the authorized water limit, are not considered efficiency improvements," Edward A. Abrams, director of the agency's division of hydropower administration and compliance, said in the June 29 letter. Ameren Missouri spokeswoman Rita Holmes-Bobo said utility officials are "studying FERC's order and have made no decisions as to what, if any, further actions we will take."

It is unclear how much Ameren hoped to receive in stimulus funds. Treasury Department program rules say owners of qualifying hydroelectric projects may seek cash grants equal to 30 percent of the "eligible cost basis" In a response to questions before FERC's decision, the utility said it hadn't yet determined that figure. Efforts to secure taxpayer funding for Taum Sauk represent the utility's latest unsuccessful effort to recoup some of the costs of the new reservoir. The utility, which agreed in a 2007 settlement with Attorney General Jay Nixon not to charge electric customers for the cost of rebuilding, did try to sway the Public Service Commission for approval to bill consumers millions of dollars for some "enhancements" at the plant, including safety features. But the PSC disallowed those costs. Ameren also sued two of its insurers for failing to pay claims related to the reservoir disaster. One of the lawsuits was dismissed; another is still pending in U.S. Circuit Court in New York. The upper reservoir disaster occurred on the morning of Dec. 14, 2005, when a 700-foot section of the rockfill dam collapsed. More than 1 billion gallons of water was released in a matter of minutes, scouring the mountainside of trees and boulders. Johnsons Shut-Ins State Park was badly damaged. The rebuilt upper reservoir was completed in early 2010 at a cost of \$490 million. And Johnson's Shut-Ins has been restored.

### The 409-megawatt Taum Sauk plant on the East Fork of the Black River, about 100 miles

southwest of St. Louis, is unlike most other hydroelectric plants. It generates energy using two reservoirs - one atop Proffitt Mountain and another hundreds of feet below. Water is pumped up the mountain at night when electricity is cheap, then released during times of peak electricity demand when electricity prices go up. Ameren makes a profit on the difference in electricity prices even though the plant uses more energy than it generates. Although so-called pumped storage projects are seen as valuable for their ability to store energy, the fact that Taum Sauk also consumes large amounts of energy made it ineligible under the state's renewable energy law. PJ Wilson, director of Renew Missouri, which has battled with Ameren over renewable energy policy in the state, found it ironic that the utility was seeking to take advantage of the green energy provision in the stimulus bill. "While inexplicably doing everything they can to avoid building renewables in Missouri, today it appears they were asking for the federal government to use renewable energy tax incentives to instead incentivize Taum Sauk," he said. As of June 8, the federal government has paid out more than \$200 million in stimulus funds for energy projects in Missouri. The vast majority of that -- about \$193 million -- has gone to two projects - Iberdola Renewables LLC's Farmers City wind project and Wind Capital Group's Lost Creek wind farm. Hydropower projects nationwide had received just \$23.5 million. The stimulus bill signed by President Obama in February 2009 didn't specifically create subsidies for added capacity at hydroelectric projects. But it let developers seek cash grants in lieu of tax credits for expansions, which were originally authorized under the 2005 energy bill. Hydropower projects that add production capacity or boost efficiency between 2005 and 2014 are eligible for payments if owners add generating capacity. The increases must be certified by FERC. In documents filed with the agency, Ameren says the Taum Sauk upper reservoir only leaks at a rate of about 2 cubic feet per second compared to 25 cubic feet per second at the old reservoir. As a result of that and higher operating levels during winter, the plant can generate an additional 12,000 megawatt-hours, an increase of about 1.9 percent a year. But FERC said the increased reservoir capacity doesn't qualify for federal incentives. It attributed the gains to "actions taken to properly maintain and operate the project as licensed."

### Feds may pull plug on hydroelectric proposal

by: Eric Roper. Staff Writer Masako Hirsch contributed to this report, July 5, 2012, startribune.com

The federal government may soon put the kibosh on a controversial and long-delayed plan to build an underground hydroelectric power plant near the Stone Arch Bridge. Crown Hydro, LLC, obtained a license 13 years ago for a 3.4-megawatt plant powered by the Mississippi River. But the project stalled because of continued opposition from local activists and the Minneapolis Park and Recreation Board, which owns a proposed site. Last month, the Federal Energy Regulatory Commission sent notice that they may soon revoke the license because "[Crown Hydro] has failed to complete construction of the project as licensed, and [the commission's] findings fail to show it can do so in the near future." That could spell the end of the project, unless someone makes the case why the license should be extended. Park Board Commissioner Liz Wielinski, who has opposed the project, is not ready to declare victory. "For me, it's a welcome sign that they're finally taking this seriously," Wielinski said. "But until every single door is closed, I'm not assuming that it's completed yet. Because it's come back many many many times."

An attorney for Crown Hydro, Tim Keane, said they plan to file a motion to intervene before the July 19 deadline. He noted that they are now pursuing using a plot of land owned by the Army Corps of Engineers. "The FERC is aware of that — that we are no longer pursuing the location on Park Board property," Keane said. FERC's notice addressed the new site plan, observing that "there is still no expectation that [Crown Hydro] will complete construction of the project in the foreseeable future." Even that site that could prove problematic. The Army Corps has raised its own concerns with the plans, and using the land would require extensive analysis and signoff from the Corps' chief engineer in Washington, D.C. "We support hydropower in general," said Nan Bischoff, the FERC coordinator for U.S. Army Corps of Engineers, St. Paul District. "This particular proposal, I can't say that we're thrilled about. We've stated our concerns, and those concerns are published on the FERC website."

(The economics for this project are questionable. In the old days, the FERC denied issuing licenses if it determined a project was uneconomical. Now, they say it's your decision to take the risk.)

### Power from Dorena

A hydroelectric project at the dam begins after years of planning By Christian Wihtol, The Register-Guard, registerguard.com, Jul 5, 2012

Cottage Grove, OR — After nearly a decade of planning, an energy company has begun building a powerhouse to generate electricity from water flowing at Dorena Dam southeast of Cottage Grove. The work began in late June and is expected to take a year. The power project's owner is Idaho-based Symbiotics, a branch of Riverbank Power, a privately held Toronto company that's pursuing hydroelectric projects in the United States, Peru and Chile. Riverbank Power in mid-May announced that it had secured \$38 million in loans to finance the 7.5-megawatt Dorena project and the 4.7-megawatt Clark Canyon hydroelectric project in Montana. The company has not said how much the Dorena project is costing, but officials at the Emerald People's Utility District, which until last year was involved in the undertaking, estimated its cost at \$20 million. "Closing this financing marks a significant milestone for Riverbank as we transition from developer to independent power producer," John Douglas, president and CEO of Riverbank Power, said in a May news release. "I am particularly proud of our team's ability to successfully work with the U.S. Army Corps of Engineers and (the Federal Energy Regulatory Commission) in the case of the Dorena Lake project to finalize our design and approval to commence construction."

### Symbiotics has been working since 2004 doing studies and getting approvals from a range of

agencies, including the corps, which owns Dorena Dam; the federal energy board, which oversees power production; and state agencies including the Department of Environmental Quality, which regulates water quality and fish habitat. In fact, the state DEQ and Symbiotics still are wrangling over where the company plans to put the intake that will syphon water from Dorena

Lake into the powerhouse the company will build below the dam. To meet the Dorena Dam project's construction schedule, Mowat Construction Co., the general contractor for the project, expects to be working 10-hour shifts, six days per week, with possible periods of two shifts per day, finishing the project is June 2013, Symbiotics said in an announcement. Mowat is based in Woodinville, Wash. It's unclear how many people the project will employ. Mowat and Symbiotics did not return calls seeking comment. The plan involves running a large water intake pipe from Dorena Lake through the north side of the dam, and into a powerhouse with two turbine generators that will be built at the downstream base of the dam on the north side of Row River, said Scott Clemans, a spokesman for the Corps of Engineers. Row River flows into and out of Dorena Lake. The corps releases water through valves at the base of the dam. The Symbiotics project would not alter the volume of water flowing out of the dam, Clemans said. Rather, it would take some or all of the volume of water now being released, channel it through the turbines and discharge it into the Row River, he said. After Symbiotics began the project in 2004, EPUD joined with the firm to work on it. In 2008, the federal energy agency issued its license, spelling out the requirements Symbiotics had to meet. Then, Symbiotics and EPUD began looking for construction and equipment funding.

As part of granting the license, the federal agency calculated the project's costs and whether it made financial sense. The agency's conclusion: In its first year, taking into account capital and other expenses, the project would cost nearly \$400,000 more than the likely cost of buying an equal amount of power from an alternative source. "Although the staff's analysis shows that the project as licensed herein will cost more to operate than the estimated cost of alternative power, it is the applicant who must decide whether to accept this license and any financial risk that entails, FERC wrote in the license. FERC pointed out that an advantage of hydropower projects is that once they are built, they are relatively immune to inflation, compared with plants that must buy fossil fuels. EPUD eventually dropped out of the Dorena project after the Internal Revenue Service ruled that the utility couldn't get a major federal grant, cost estimates soared and the recession put a dent in demand for power. Initial estimates for the Dorena project were \$8 million, but grew to \$20 million, EPUD said. EPUD sold back its stake in the projects to Symbiotics. Symbiotics, in addition to finding funding for the project, has found a market for the power. PacifiCorp has signed a 20-year contract to buy the Dorena plant's output. Meanwhile, the DEQ asked Symbiotics to evaluate whether changing the location of the water intake pipe would raise water temperatures in downstream Row River.

The river is home to Upper Willamette River Chinook salmon, listed by the federal government as a threatened species, and Oregon chub, an endangered species. Salmon are particularly sensitive to raised water temperatures. In its 2008 design, Symbiotics showed the water intake at the same elevation in the reservoir as the existing outlet that releases water through the base of the dam. The DEQ figured that meant the project wouldn't increase water temperatures downstream. But in its final design, Symbiotics shifted the powerhouse intake 15 feet higher in order to avoid complications including dredging, DEQ project engineer Christopher Stine said. That means that in the fall, as the fall temperature inversion mixes water in the lake, the new intake might take in warmer water than what now flows from the existing release valves, Stine said. If the evaluation shows that's the case, the DEQ might, for example, bar Symbiotics from operating the hydropower project in the middle and late fall, Stine said. "We will not allow them to operate the project in a manner that violates water quality standards," Stine said. Erik Steimle, Symbiotics' director of environmental compliance, said the company will do the modeling requested by the DEQ.



### (This one of those – "I don't know where to put it" articles. It's about water – it's about hydro!) Water 2012: The Gunnison River Basin

By Frank Kugel, Jul 3rd, 2012, alamosanews.com

The Gunnison River is formed by the confluence of the East and Taylor Rivers at Almont and flows west to Grand Junction, where it discharges into the Colorado River and contributes some 40 percent of the flow in the Colorado at the state line. Significant tributaries to the Gunnison include the North Fork of the Gunnison River and the Uncompangre River. The Gunnison Basin is home to the largest body of water entirely within the state of Colorado, Blue Mesa Reservoir, which has a capacity of 940,000 acre-feet (830,000 acre-feet active capacity). It is the primary storage component of the three reservoirs comprising the Aspinall Unit. Morrow Point Dam is the middle structure and its primary purpose is the production of hydropower. Crystal Dam creates a stabilizing reservoir for the variable flows produced by Morrow Point Dam releases. Below Crystal lies the Black Canyon of the Gunnison River National Park. The Black Canyon of the Gunnison was designated a national monument in 1933 and became a national park in 1999. A federal reserved water right was issued for the canyon in 1933, but efforts to quantify that right did not commence until the National Park Service filed an application with Division 4 water court in 2001. A decree was issued after nearly eight years of negotiations, with the intent of mimicking the natural hydrograph and providing peak flushing flows through the canyon. The annual peak flow is determined through a series of complex formulas using the May 1 inflow forecast to Blue Mesa Reservoir. Another factor affecting Gunnison River flows through the canyon is the Aspinall EIS, which was adopted in January, 2012. The objective of this EIS is to provide sufficient releases of water at times, quantities, and duration necessary to avoid jeopardy to endangered fish species and adverse modification of their designated critical habitat while maintaining and continuing to meet authorized purposes of the Aspinall Unit.

The Bureau of Reclamation has a number of other storage projects in the basin, in addition to the Aspinall Unit reservoirs, including Taylor Park on the Taylor River, Ridgway on the Uncompandere River, Silver Jack on the Cimarron River, Crawford on the Smith Fork of the Gunnison, fruit growers on Current Creek and Paonia on Muddy Creek, a tributary to the North Fork of the Gunnison River. One of the first projects developed by the Bureau of Reclamation was the Uncompany Project, which provides irrigation water for a variety of crops in the Uncompanyre Valley between Colona and Delta. A key component of the project is the Gunnison Tunnel, a 5.7 mile long tunnel that diverts water from the Black Canyon of the Gunnison and discharges it into a series of canals in the Uncompangre Valley. The tunnel has a 1913 water right for 1300 cfs and supplies some 60% of the irrigation water for the 76,000 acres under the project. Taylor Park Dam was constructed in 1937 to provide supplemental irrigation for the Uncompany Valley. Taylor Park Reservoir has a capacity of 106,230 acre feet. The 1975 Taylor Park Exchange Agreement allows for transfer of storage downstream to Blue Mesa Reservoir to provide the Gunnison Tunnel with a more readily available source of irrigation water. An additional benefit of this exchange was the flexibility to make releases in time and amount that would benefit recreational and agricultural users in the Upper Gunnison basin. The Gunnison Whitewater Park is a recreational in-channel diversion water right owned by the Upper Gunnison River Water Conservancy District. The key event at the Whitewater Park is the Gunnison River Festival, which on June 23, 2012 celebrates its 10th anniversary. Events at the festival include a community raft race, raft rodeo and professional kayaking.

Agriculture is the largest user of water in the Gunnison Basin. High elevation grass pasture is the predominant crop in the Upper Gunnison basin. The North Fork Valley of the Gunnison River is renowned for their fruit orchards, featuring apples, pears and peaches. Small grains and alfalfa are the prominent crops in the Uncompandere Valley. The cattle industry has maintained a strong economic presence in the Gunnison Basin since the 1870's. The Redlands Power Canal is a key diversion structure in the Gunnison Basin. It is located two miles upstream of the confluence of the Gunnison and Colorado Rivers near Grand Junction. The Redlands Power Canal has a 1912 water right for 670 cfs for irrigation and hydropower. The State Engineer declared virtually the entire Gunnison Basin to be over-appropriated as a result of a 2003 Redlands call. The City of

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Grand Junction is the largest municipal water supplier in the Gunnison Basin and obtains its raw water supplies from the west side of the Grand Mesa. Project 7 Water Authority is the next largest municipal provider, serving the cities of Montrose and Delta as well as other domestic users in the Uncompany valley.

Hydropower is a significant water use of Gunnison River water, as evidenced in the aforementioned Aspinall and Redlands projects. New hydropower projects are currently under construction at Ridgway Dam and on the South Canal. Studies are underway to evaluate the feasibility of a hydropower installation at Taylor Park Dam.



<sup>i</sup>This compilation of articles and other information is provided at no cost for those interested in hydropower, dams, and water resources issues and development, and should not be used for any commercial or other purpose. Any copyrighted material herein is distributed without profit or payment from those who have an interest in receiving this information for non-profit and educational purposes only.

7/20/2012



# Some Dam – Hydro News™ And Other Stuff

CORSO COURT

**Quote of Note:** "Instead of giving a politician the keys to the city, it might be better to change the locks." - Doug Larson

"Good wine is a necessity of life." - -Thomas Jefferson Ron's wine pick of the week: Castoro Cellars Venti Sette Anni XXVII "No nation was ever drunk when wine was cheap." - - Thomas Jefferson

### Other Stuff:

The Direct Costs of Energy - Hydro & Nuclear Best, Solar Still Lagging forbes.com, 7/08/2012

Wrapping up our discussion on the actual costs to produce electricity, we can determine a total actual life-cvcle cost for coal, nuclear, solar and hydro needed to build and operate the number of each plants or arrays required to produce a trillion kWhrs over their lifespan. Key assumptions and references are given in the three previous posts. In 2011, a 750 MW coal fired power plant cost \$2.5 billion, expected to operate at



2011(\$) Actual Costs per kWhr Produced

a capacity factor of 71% for the 8,766 hours each year over its 40-year life, producing 187 billion kWhrs, more or less. 750 MW x 1000 kW/MW x 0.71 x 8,766 hrs. /Yr. x 40 yrs. = 187 billion kWhrs

To produce one trillion kWhrs over their life span will require building about 5 (5.3) of them at a cost of about \$13.4 billion. Fuel costs are about 2¢/kWhr @\$40/ton of coal, O&M costs are about <math>0.6¢/kWhr and decommissioning costs are 0.21¢/kWhr. So to produce a trillion kWhrs from coal will cost: \$13.3 billion + \$20 billion + \$6 billion + \$2.1 billion = \$41.4 billion or 4.1¢/kWhr. This year, the Westinghouse AP1000, a 1,000 MW nuclear power plant, costs \$7 billion, operating at a capacity factor of 90% for the 8,766 hours each year over its 60-year life, and will produce 473 billion kWhrs, more or less. 1000 MW x 1000 kW/MW x 0.90 x 8,766 hrs./Yr. x 60 yrs. = 473 billion kWhrs To produce one trillion kWhrs over their life span will require building about 2 (2.1) of them at a cost of about \$14.8 billion. Fuel costs are about 0.6¢/kWhr for nuclear @\$100/lbU308, O&M costs are about 1.3¢/kWhr and decommissioning costs are 0.11¢/kWhr (if put in the right geology, i.e., massive salt). So to produce a trillion kWhrs from nuclear will cost: \$14.8 billion + \$6 billion + \$13 billion + \$1.1 billion = \$34.9 billion or 3.5¢/kWhr.

NRG Energy is installing a 92 MW solar array costing \$300 million, operating at a capacity factor of 20% for the 8,766 hours each year over its 25-year life, and will produce 4 billion kWhrs, more or less. 92 MW x 1000 kW/MW x 0.20 x 8,766 hrs./Yr. x 25 yrs. = 4.0 billion kWhrs To produce one trillion kWhrs over their life span will require building 250 of them at a cost of about \$75 billion, the most expensive build of any source. But all other costs are the lowest of any source – fuel costs are zero, O&M costs are only about 0.1¢/kWhr and decommissioning costs are only 0.08¢/kWhr. So to produce a trillion kWhrs from solar will cost: \$75 billion + \$0 billion + \$1 billion + \$0.8 billion = \$76.8 billion or 7.7¢/kWhr. Most anticipate that this cost will come down as newer technologies are implemented, such as HPG cells and concentrated solar (see David Ferris's post on the left), and the capacity factor increases substantially.

Finally, The Alaska Energy Authority has been authorized by the State to build a 600 MW hydroelectric plant on the Susitna River which will cost about \$3 billion and operate at a capacity factor of 44% for the 8,766 hours each year over its 80-year expected life, producing 185 billion kWhrs, more or less. 600 MW x 1000 kW/MW x 0.44 x 8,766 hrs./Yr. x 80 yrs. = 185 billion kWhrs To produce one trillion kWhrs over their life span will require building five and a half of them (5.4) at a cost of about \$16.2 billion. Fuel costs are zero, O&M costs are 0.8¢/kWhr and decommissioning costs are 0.86¢/kWhr (the highest decom cost of any source). So to produce a trillion kWhrs from hydro will cost: \$16.2 billion + \$0 billion + \$8 billion + \$8.6 billion = \$32.8 billion or 3.3¢/kWhr, the cheapest of all sources.

As discussed previously, the longer fossil fuel plants operate, the less cost effective they become, but the longer nuclear, hydro and renewables operate, the more cost effective they become, because it is all about the fuel. So the final ranking of energy sources on actual costs to produce a trillion kWhrs over their lifespan is 3.3¢/kWhr for hydro, 3.5 ¢/kWhr for nuclear, 3.7 ¢/kWhr for natural gas @ \$2.60/mcf, 4.1 ¢/kWhr for coal, 4.3 ¢/kWhr for wind, 5.1 ¢/kWhr for natural gas @ 4/mcf, and 7.7 ¢/kWhr for solar. Again, these costs do not include connecting to the grid or buffering of the intermittency of renewables to prevent grid crisis. When ranked like this, the differences between hydro, nuclear, wind, coal and gas @ \$2.<sup>60</sup>/mcf are pretty minor in the long-term and other issues like capital investment, emission goals, distribution and energy security should be deciding the mix we aim for by mid-century. But anticipated rising fossil fuel costs, even for natural gas, over the coming decades will change this ranking. So which ones, what mix, do we invest in?



Dams:

### (Guess this could fall under the heading of stealth dam planning. The comments of the USBR would make anyone pause who has been around dam construction.)

### City keeps alive prospect of building new dams on Castle and Maroon creeks

Guest - Non ADN Writer: Brent Gardner Smith, Byline: Special to the Aspen Daily News, July 9, 2012, aspendailynews.com

The upper ends of both the Castle and Maroon Creek valleys would be the sites of two new city of Aspen water storage reservoirs and dams, under 47-year-old conditional water rights that the city has continued to keep alive. With the threat looming that global warming could eventually render Aspen's municipal water supply system inadequate, a state water court in 2010 extended the conditional water rights necessary for the reservoirs and their dams. The extension is good through 2016. "It is the city's policy to maintain and protect its water rights," said Aspen City Attorney Jim True, pointing to a 1993 City Council resolution on water policy. Though the plans are little known to local residents, the city has done enough procedurally with the water court to keep the projects on the table. They are seen by officials as a long-term contingency plan. The feasibility of the dams and reservoirs is questionable, however. One Bureau of Reclamation study found that soil conditions in the wetlands area where the Castle Creek dam would be built would make construction difficult. The U.S. Forest Service has also raised objections to placing a dam and reservoir on public land near the Maroon Bells.

If built as currently described by the city's conditional water rights, the Maroon Creek Reservoir would store 4.567 acre-feet of water behind a 155-foot dam just below the confluence of East Maroon and West Maroon creeks. By comparison, Ruedi Reservoir stores about 90.000 acre feet and Grizzly Reservoir about 600 acre feet. The Maroon Creek Reservoir would cover 85 acres of U.S. Forest Service land about a mile and a half below Maroon Lake, which is one of the most highly visited sites in the national forest system. The reservoir would inundate portions of both the East and West Maroon Creek trails in the Maroon Bells-Snowmass Wilderness. It would require extensive federal review. As currently conceived, the Castle Creek Reservoir would hold 9,062 acre feet of water behind a 170-foot-tall dam located about two miles below the historic townsite of Ashcroft. The reservoir, inundating 120 acres, would affect mostly private land between Fall Creek and Sandy Creek, but would also flood a small piece of Forest Service land within the Maroon Bells-Snowmass Wilderness. "Aspen will build the Castle Creek and Maroon Creek. reservoirs if necessary and in the best interest of the citizens of the community," a committee of city officials wrote to Aspen Journalism last week in response to questions. The answers were prepared by True, the city's Denver-based water attorney Cindy Covell, and Phil Overevnder, a utilities engineer with the city and former head of the department. "Aspen views these reservoirs as a contingency plan," the city officials stated. "Maintaining options is prudent municipal planning."

#### Who knew?

Few in the Aspen community are aware that the city has been keeping the prospect of the two dams alive since 1965. "I didn't know that the city had conditional water rights for these two reservoirs," said John Ely, Pitkin County's attorney and in-house expert on local and regional water issues. Sloan Shoemaker, executive director of environmental watchdog group Wilderness Workshop in Carbondale, also said he was unaware of the conditional water rights. "I wasn't aware of those potential reservoirs," Shoemaker said. "I had to pick my jaw off the desk top." But the city's draft "1990 Comprehensive Water Management Plan," which informed the 1993 City Council resolution affirming the long-term planning strategy, states that "the reservoirs are the final step to be implemented in the upgrading of the entire Aspen water supply system, to ensure reliability of water quality and quantity during successive drought years." If the city were to move forward with the reservoirs, officials said a number of factors would be considered, including whether such measures as water conservation had been put in place and how much water was available in the face of a prolonged drought. "Any construction at these sites would require extensive permitting as well as consideration of environmental values and community priorities at

the time," the city officials wrote in their responses to questions from Aspen Journalism. They also noted that the conceptual design of the reservoirs would likely change during a review process. City officials have barely mentioned the reservoirs in the context of a proposed hydropower facility on lower Castle Creek. A 2010 environmental report by biologist Bill Miller on Castle and Maroon creeks includes a one-sentence mention of the dams, acknowledging that the city owns the conditional water rights. Both reservoirs would be upstream from the city's diversion dams on lower Castle Creek and Maroon Creek, so water from the reservoirs could easily be delivered to the proposed Castle Creek hydro plant. In 1989 the city told the water court that water from the Maroon Creek Reservoir could be used to power the Maroon Creek hydropower plant it had recently built. But city officials said last week that "these reservoirs are not part of the Castle Creek hydroelectric project."

### 1965 water rights

The conditional water rights date back to September 1965 when Dale Rae, a consulting engineer for the city, laid out plans for the reservoirs. In November 1966, Rae testified in water court that given low seasonal flows and occasional dry years, Aspen would need at least one reservoir by 1975. He predicted that both reservoirs would likely be in place by 2000 to meet the water demands from a projected population of 30,000. Today there are 6,600 residents in Aspen but the peak holiday population reaches about 30,000. The conditional water rights were first recognized by the water court in a 1971 decree which stated that the dams "shall be completed" within "a reasonable length of time." The city has since obtained extensions of the original decree at least eight times, and filed evidence of its diligence in 1972, 1977, 1981, 1985, 1989, 1995, 2002 and 2009. In its September 2009 diligence filing the city told the water court "it has steadily applied efforts to complete" the reservoirs "in a reasonably expedient and efficient manner." A court official, known as a water referee, agreed.

"To date, the city of Aspen has not needed to construct the storage structures as it has devoted considerable resources to reducing per capita water consumption," the unnamed referee reported. "However, during the last diligence period, the city has analyzed studies on global warming and climate change, and implications for the city of Aspen's future water demand and supply and water management strategies. "Such studies have indicated a widespread and large increase in the proportion of rainfall versus snowfall and the need for the city of Aspen to develop these reservoir storage rights to preserve and retain its water supply for future needs," the referee found. In October 2010 Garfield County District Court Judge James Boyd agreed with the water referee and issued a new decree good until 2016. The city's decision to hold on to its conditional water rights differs from a recent decision by the Colorado River District and the West Divide Water Conservancy District in Rifle. Those districts voted in 2011 to abandon conditional water rights for the 129,000-acre-foot Osgood Reservoir, which would have flooded Redstone, and to reduce a potential Placita Reservoir, located below Marble, from 62,000 acre feet to 4,000 acre feet. "It was not economical, it wasn't politically feasible, and there certainly was not institutional or local support for such a project," Chris Treese, the external affairs director for the Colorado River District, said at the time about the Osgood Reservoir.

### Federal agencies skeptical

In 1970 the Bureau of Reclamation drilled three test bores at the Castle Creek dam site and found 142 feet of "pervious sand gravel" piled up below the valley floor, which meant it would be hard to keep water in the reservoir from seeping out. It also said "the bedrock was also quite broken and believed to represent a possibly dangerous fault zone." The bureau concluded it was a relatively poor location for a dam and told city officials it would not study the Castle Creek Reservoir any further. The city recently acknowledged the 32-year-old drill tests and said that "costly mitigation of soil conditions, such as grouting and lining," would likely be necessary for the Castle Creek Reservoir. More recently, the U.S. Forest Service weighed in on both reservoirs. A November 2009 letter from Scott Fitzwilliams, forest supervisor for the White River National Forest, told the city the reservoirs would require federal review and "would not comply with the goals and objectives" of the current forest plan. "For example, the Maroon Creek Reservoir, as currently sited, would not be compatible with the specific management of this highly visited area

for the protection of its high scenic value," Fitzwilliams wrote. "Both proposed structures would conflict with our management objective to maintain or improve long-term riparian ecosystem conditions in the forest."

Both reservoirs would flood what are today complex wetland areas. The city also got recent pushback from a private property owner in the Castle Creek Valley. Mark and Karen Hedstrom, who own a home and 21 acres of land on what would be the upper shore of the Castle Creek Reservoir, formally opposed the city's 2009 diligence filing in water court. But in May 2010 the Hedstroms agreed that if the reservoir did not flood any of their land, they would withdraw their opposition. Another property owner whose land would be flooded by the Castle Creek Reservoir, Simon Pinniger, said the notice he was sent by the city's water attorney in Denver in 1990 obscured many of the details of the city's reservoir plan. "Wouldn't it have been nice if the city had explained to the three landowners affected, in non-legal jargon and with a decipherable map, exactly how each property would be affected if the Castle Creek Reservoir is built; what would

make the reservoir necessary, why it has to be located on our land and when this might happen," Pinniger said in an email. In 1965, the Castle Creek Reservoir was estimated to cost \$790,000, while the Maroon Creek Reservoir was estimated at \$770,000. According to a 2007 report prepared for the city and Pitkin County by Grand River Consulting, reservoirs on the Western Slope now cost between \$5,000 and \$10,000 an acre-foot to build. At \$7,500 an acre-foot, the 9,062-acre-foot Castle Creek Reservoir would cost \$68 million and the 4.567-acre-foot Maroon Creek Reservoir would cost \$34 million.



Editor's note: Aspen Journalism is a nonprofit news organization working in the local public interest. More information and additional images are available at www.AspenJournalism.org.

(FERC has ordered dams removed for dam safety reasons. Will Congress will act on the money needed is the question?)

### Siskiyou County Calls for FERC Action on Klamath Dams Stalling Brings About Call to Action

By Allie Hostler, Two Rivers Tribune, tworiverstribune.com, July 9th, 2012

Dam removal on the Klamath River is stalled and opponents of the Klamath Settlements are pushing to speed up water quality improvements on the ailing river. Although Klamath Settlements are on the Congressional table in the form of the Klamath Basin Economic Restoration Act, stakeholders such as the Hoopa Tribe believe there is a less expensive route to dam removal. The Tribe filed a petition with the Federal Energy Regulatory Commission (FERC) in late May to restart the process for evaluating the future of the dams. The final step in the FERC relicensing process is Clean Water Act certification from California and Oregon. Siskiyou County does not support dam removal, but last week filed a response to Hoopa's petition that says the states are failing to uphold their obligations under the Clean Water Act. "...The states of California and Oregon have ignored their lawful options in processing the water quality certification for the Project (Klamath Hydroelectric Project) and have instead entered into a contract—with the signatures of their respective governor's—that provides for the 401 process to be held in abeyance until at least the year 2020," Siskiyou County wrote in their response to the Hoopa Tribe's Petition to FERC.

Under the FERC process, PacifiCorp would have to decide whether to invest in expensive fish passage and water quality upgrades to the hydroelectric project, or remove the dams. The Hoopa Tribe believes that dam removal is far more likely to occur under the aforementioned scenario than deadlocked legislation. Others disagree, like the Northwest Regional Director of the Pacific Coast Federation of Fishermen's Associations (PCFFA), Glen Spain. Spain defends the Klamath Settlements and remains optimistic that legislation is the cure for decades of perpetual disaster in the Klamath Basin. "The KBRA is very much like the San Joaquin Settlement Agreement, seeking to restore salmon to the completely dewatered San Joaquin River for the first time in 60 years. That also took some years longer to get funded through Congress than originally anticipated," Spain wrote in an email. "But once the San Joaquin Settlement Act began to move, it took only three weeks to become law." Siskiyou County opposed the Settlements early in their inception, but for different reasons than the Hoopa Tribe. Hoopa wants the dams to come down, but doesn't believe the Settlements are realistic. The Tribe also believes the settlements fail to provide enough water for salmon and fail to protect senior water rights in the Basin. "Despite the aspirations of the Klamath Hydroelectric Settlement Agreement, that planning process is not cleaning up our water. Instead, it blocks fish unless Congress passes dangerous and expensive legislation, which is going nowhere," Hoopa Valley Tribal Chairman, Leonard Masten said in a prepared statement. Spain holds that the FERC process will not bring down the dams. FERC has never ordered a dam down in its history except pursuant to a Settlement like the KHSA," Spain said. "There is no special reason they would do so in this one case. This is an agency of which it is said that is has never seen a dam it did not like!" Representing the Hoopa Tribe on the matter, Thomas Schlosser also wrote in an email that Settlement proponents have ignored the many dam removals that are occurring as a result of the FERC process. He cited the removal of PacifiCorp's Condit Dam last October. "Why did PacifiCorp remove Condit?" he said. "It was because FERC's license included the agencies' prescriptions-requirements of volitional upstream and downstream fish passage...typically in these cases, the licensee concludes that future operation of a project on the new terms that are consistent with existing law will be uneconomic, so the licensee seeks and obtains FERC's permission to decommission the project. PacifiCorp's testimony to the PUCs in connection with the dam removal surcharge makes clear their opinion that the most cost effective route for them is removal of all four dams." On Monday, the Hoopa Tribe issued a call to action asking the public to participate in an upcoming California State Water Resources Control Board meeting where they are expected to continue stalling the Clean Water Act Certification process. The meeting will be held on July 17, 2012 in Sacramento.

### (Another dam story coming to an end.)

### Condit Dam removal nearing completion, possibly safe for boaters in September

oregonlive.com, July 12, 2012, By Ian C. Campbell, The Oregonian

White Salmon, Wash. -- On the shores of the White Salmon River, tree stumps pock the hillside. They haven't touched air for nearly 100 years. Last October, 700 pounds of dynamite changed that. When the Condit Dam was built in 1913, the river backed up to form Northwestern Lake and flooded Douglas firs cut down to make way for boats. In 2011, it was time for the dam to go. Federal regulators needed owner PacifiCorp to install technology for fish to pass the dam, but they chose what they found more cost-effective -- remove the dam rather than upgrade it PacifiCorp for



<mark>the dam rather than upgrade it.</mark> PacifiCorp engineers breached Condit Dam, and the lake drained in a turbid rush in just 40 minutes.

At the moment, the steep riverbank is barren. Few plants have rooted in the active deconstruction

site. The appearance should change this fall, said Todd Olson, PacifiCorp's project manager for decommissioning the dam. The company is working with the counties and local agencies to replant the riverbank with native grasses, shrubs and trees. Rehabilitation of the area is nearing completion. Excavators work 12-hour days to demolish what's left of the concrete structure. Olson says that amounts to almost 500 cubic yards per day. At this pace, the dam should be gone by the end of August, he said, although more than half the dam remains. By November, the riverbanks are scheduled to be replanted. "Should be pretty quiet by December," he said Wednesday at a tour of the dam site. The stumps aren't just reminders of Condit Dam's past. They are markers for the future. Because the river-fed lake deposited silt across the landscape, engineers weren't entirely sure where the original riverbank was. The stumps were their guides. Upstream, a new boat launch site is in the works, and a temporary one is already complete. Whitewater rafting companies are using the temporary site to pull boats out before they reach the half-removed dam. On Wednesday afternoon, a group of wet but grinning rafters returning from a trip down the White Salmon paddled over to the site. Tyler Houck, with Wet Planet, a rafting company in the town of White Salmon, guided the group down the restored river. He says

customers seem to enjoy the new rapids formerly tamed by the lake.

PacifiCorp is working to address complaints of the dam removal. Several cabins with lakefront property now have a steep, rocky cliff between the door and the river. In some cases, the bank is collapsing. Since June, Olson said, PacifiCorp is negotiating to remove some of the high-risk cabins. Additionally, wells for about 15 cabins were ruined. PacifiCorp worked to get water service to those, he said. And what of the salmon? Last fall, the Fish and Wildlife Service and other agencies trucked Tule fall Chinook upstream. With the dam removed,



the fish should be able to head for the ocean this winter. The effort seems to be working. Rafting guide Houck noted that they've already seen fish jumping the falls upstream.

(This is something interesting about dam history. Imagine, this individual has collected 4,000 postcards of dams. Go to the web site and see some of them: http://www.theatlanticcities.com/design/2012/07/greetings-dam/2531/#slide14)

#### Greetings From a Dam

Nate Berg, JUL 10, 2012, THEATLANTICCITIES.COM

riptheskull/Flickr

You may, at some point, find yourself in an antique store or junk shop flipping your way through a seemingly endless stack of postcards. It happened to me recently, and though it may not have been the highlight of my weekend, it did open my eyes to a clear trend in early 20th Century postcardery: dams. The postcards (and postcard senders) of yore really had a thing for dams. "It's amazing how much variety there is compared to what we think of today as postcards," says D.C.



Jackson, a dam historian, civil engineer and professor of history at Lafayette College in Easton,

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Pennsylvania. "A hundred years ago, for every little town, you can find local views of every little store and the fire engine house and the civil war memorial and scenes along the river. And dams are a part of that record."

Jackson is also fascinated with dam postcards. Over more than 30 years, he's collected upward of 4,000 postcards that feature dams. That's a lot of dam postcards. [Couldn't resist.] He's even working on a book specifically about postcard of dams, due out sometime next year. He argues that these postcards are valid celebrations of what were at the time very important parts of cities and towns. Dams provided power, irrigation and the ability to run city-fueling industries like paper mills and lumber yards. They were a sight to see, and apparently to brag about via the U.S. Postal Service. Despite a huge influx of postcards featuring dams from the 1900s to the 1940s. the heyday of dam postcards is decidedly over. And that's mainly because the heyday of the small dams that were featured in these early 20th century postcards is also over. "Over the course of the 20th century, a lot of the smaller dams lose their purpose, especially as electric power systems get larger. Small local dams that are powering the local mills become, in a sense, irrelevant," Jackson says. "In a world of 1,000 megawatt nuclear power plants, who cares about a plant that produces 1 megawatt?" Jackson says the dam postcard craze eventually shifted to focusing on the bigger, more monumental dams – Hoover Dam near Las Vegas, for example, or the Grand Coulee Dam in Washington. These were projects born in the New Deal era, projects that enabled massive growth and development in the West. "It became a part of this celebration of sort of American resilience in a time of economic hardship," Jackson says. "And those postcards, they still keep cranking them out." The guy at that store I was at wanted five bucks apiece for the stack of old dam postcards I picked out (come on!), but thankfully the internet abounds with freely available scans of these monuments of American water engineering. Here are some fine examples of dam-bedazzled stationery from yesteryear.



### Hydro:

Hydropower proposal at Coon Rapids Dam

By Peter Bodley on July 12, 2012, abcnewspapers.com

An effort to generate hydropower again at the Coon Rapids Dam is under way. BOST 1 Hydroelectric LLC wants Coon Rapids Dam to produce hydropower again. When the dam was built in the 1913, its purpose was to produce electricity and that continued until the 1960s when it became economically unfeasible and the dam and surrounding property on both sides of the Mississippi River became a regional park with the dam as a focal point. Now BOST 1 Hydroelectric LLC, a wholly-own subsidiary of Golden Valley-based Nelson Energy LLC, is preparing to file a license application with



the Federal Energy Regulatory Commission (FERC) to develop a project that would produce 12 MW (megawatts) of hydropower capacity at the dam. But it is a long drawn-out process. According to Robert P. Larson, Nelson Energy manager, BOST 1 Hydroelectric received preliminary permit approval from the FERC in October 2010 to study the feasibility of a proposed Coon Rapids Dam hydroelectric project. That put in motion a three-year process to develop preliminary engineering, transmission, environmental and other required information for the project, Larson said. However, the project was put on hold while the future of the Coon Rapids

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Dam was being debated because of the repairs that were needed to fix structural deficiencies, he said. In 2011, the Minnesota Legislature approved \$16 million in state bonding to repair and renovate the dam, a project that is now in the design and engineering stage and is scheduled to start construction in 2013. As part of the dam reconstruction project, the six-mile pool above the dam would remain at its higher summer level permanently. That is important in making hydropower viable at the dam, according to Larson. Once the application for the hydropower license is submitted, FERC has two years to make a decision on whether to approve it or not. But Larson said that before any license application is sent to FERC, either the Anoka County Board or the Three Rivers Park District or both would have to sign off on the project. Anoka County operates the Coon Rapids Dam Regional Park on the Anoka County side of the dam, while Three Rivers Park District not only owns and maintains the dam, it also operates the Coon Rapids Dam Regional Park on the river.

The company hosted a public meeting on its proposal July 12, primarily for agencies affected by the process, at the Earle Brown Heritage Center in Brooklyn Center. This initial consultation meeting was an opportunity to present the plan, listen to any concerns that were raised and discuss any additional information that would be required for the license application, Larson said. This meeting was the next step in the preparation of a license application to obtain a license to construct and operate the project, he said. Under FERC regulations, written comments are due from agencies or the public within 60 days of the July 12 meeting - on or before Sept. 10. Earlier this year, the company met with Anoka County Board members at a board work session to explain the project and a meeting with the Three Rivers Park District took place this month, he said. "If FERC issues us a license, then we have four years to get it constructed," Larson said. "It is a very lengthy process. Any hydropower project at the dam is a long way out." As part of any hydropower project at the dam, a power plant would have to be built with two turbines and a sluice/waterway, he said. No decision has yet been made on which side of the river the power plant would be constructed, he said. According to Larson, there are plenty of potential customers nearby for hydropower at the dam. Utility companies would be interested because hydropower is very reliable and predictable, Larson said.

A project generating 10 MW would produce enough electricity for 20,000 residences; what BOST 1 is proposing in capacity, 12 MW, would produce more electricity than that, he said. A copy of the pre-application document for the proposed project can be obtained by written request to Nelson Energy LLC, 8441 Wayzata Blvd., Suite 101, Golden Valley, MN 55426. According to its website, Nelson Energy is a privately-held company specializing in the development of hydroelectric potential at existing dams. Larson and Douglas A. Spaulding manage the company. In 2001, the company developed the 9 MW Lower St. Anthony Falls project in downtown Minneapolis and since 2001, Nelson Energy has developed and licensed over \$250 million worth of hydroelectric projects in the Midwest and has an additional 92 MW of hydro potential under development at existing dams in Louisiana, the website states. The Coon Rapids Dam was built in 1913 by Northern States Power (NSP) Co. to generate hydroelectric power. When power generation stopped in the 1960s, NSP donated the dam and surrounding land on both sides of the river to what is now the Three River Park District to develop as a regional park. Anoka County now owns all the regional park property on this side of the river.

## (Read the full article here: <u>http://theenergycollective.com/jemillerep/92641/us-renewable-electric-power-25-years-progress</u>)

#### Excerpts

**Hydroelectric Power** – Hydropower was the original U.S. renewable power source beginning the late 19<sup>th</sup> century and continues to be the largest renewable power source today. Total hydroelectric net power generation has varied over the years due to the annual rainfall, maintenance and operation restrictions imposed by regulatory agencies to possibly improve downstream ecosystems. The hydroelectric power generation average trend has been fairly constant over the past 25 years. Maintaining existing hydroelectric power capacity continues to face environmental concerns, as does possible expansion of future power generation capacity.

### **Current Renewables, Fossil Fuels and Nuclear Power Generation**

With renewable wind and solar power rapidly increasing in recent years, coal and petroleum power in decline, and natural gas increasing, what is the current energy supply mix for U.S. electric power generation? Refer to the following bar chart.





(Mmmm! I don't think a shortage of staff and overworked mean the same thing! Also, what about all the other agencies that get involved?)

### Overworked feds slow relicensing of Wells Dam

By Christine Pratt, World staff writer, July 13, 2012, wenatcheeworld.com

East Wenatchee, WA — The special, abbreviated process that the Douglas County PUD followed to apply for a new license to operate its Columbia River dam is taking longer than expected. A shortage of staff at the Federal Energy Regulatory Commission (FERC) has delayed the process to issue a new license for Wells Dam, PUD



spokeswoman Meaghan Vibbert said Wednesday. "At the end here, it just comes down to a workload issue for FERC," she said.

The dam's original 50-year license expired in May. In June, the feds issued a one-year license extension. The utility has requested a new 50-year license. The PUD submitted a draft of its license application and supporting documents — 50 pounds worth — to the feds in December 2009, and a final application package in May 2010. The final follow-up mailings to address FERC's questions and concerns were mailed by late February 2012, Vibbert said. Federal regulators created the abbreviated process to avoid the series of one-year extensions that other PUDs had received during the relicensing processes for their own dams. For example, when the Chelan County PUD's license expired for Rocky Reach Dam in 2006, it received three consecutive one-year extensions before its new license was approved in 2009. Its Lake Chelan Dam license received two, one-year extensions before its new license came in 2006. FERC's abbreviated process, the new license is supposed to be issued before the old one expired. Vibbert said the feds have not said when the new license could come, but they hope it

will be before their one-year extension ends<mark>. "We're not sure when FERC will issue the license,</mark> but when we get it we're going to have a big party," she said.

(If it's a hydro project, someone in some state will find a way to tax them. I wonder if NY taxes wind energy with these extras? It's kind of strange that the people getting the flood protection don't pay and why doesn't the court case apply to all FERC licensed hydro projects!)

### Fees to increase in Black River hydro producers

By Brian Amaral, Times Staff Writer, July 14, 2012, watertowndailytimes.com

Owners of hydroelectric dams along the Black River, including the city of Watertown, will see a 36 percent increase in the fees that they pay to a state regulating agency that came under financial duress in other parts of New York. Officials at the Hudson River-Black River Regulating District say the move to raise \$313,000 in one year was inevitable, but a state legislator said it was just another example of robbing from Black River communities to pay for problems elsewhere. "The Black River side is now paying for the mismanagement of the Hudson River side," said Assemblyman Kenneth D. Blankenbush, R-Black River, who proposed splitting the agency. The agency controls the flow and level of water on its rivers to prevent the risk of flooding. It receives its operating revenue by charging a fee to hydroelectric dams on the Black River. <mark>It used to raise</mark> most of its money by charging federally licensed hydroelectric dams on the Hudson River, but in 2008 it lost a court battle to be able to do so. In 2011, the agency used \$3 million in a reserve fund belonging to the Black River portion of the district to make up for the Hudson River portion's cash flow problems. Each side of the agency has its own administrator and its own board members, and the two sides have separate bank accounts, but a court decision forced the agency to use the Black River side's money to pay off property taxes owed to Hudson River communities. The added revenue from the 36 percent fee hike won't go toward paying any Hudson River expenses, said Michael Clark, the system wide administrator. Instead, it will go toward refilling the Black River side's bank accounts, which nearly were depleted after the court decision.

"Unfortunately, it meant for this year an increase in assessments that's clearly unpalatable," Mr. Clark said. "I understand. I understand the cost of doing business in this economy. And yet to not have the necessary income would jeopardize the fulfilling of the regulating district's mission." Mr. Clark said that Mr. Blankenbush's proposal to split the two agencies was not a good idea. The agencies used to be separate, but were combined in the 1950s to reduce overhead costs. The Black River side of the district pays about 20 percent of administrative expenses, which would increase if it were to split into its own agency, he said. The Hudson River side of the district is now looking to charge the state and five Capital Region counties — Warren, Washington, Saratoga, Albany and Rensselaer — a fee to protect them from flood damage. A court has given the go-ahead for that fee, Mr. Clark said. The agency believes it's only a matter of time before the Hudson River side of the district is back on its feet again and, by next year, the fees for the city of Watertown and other Black River hydro producers will be reduced. The hydro producers usually see a small, single-digit increase in assessments, Mr. Clark said, calling the 36 percent hike "unprecedented." He said the fee hike was passed at the district's June meeting.



### <u>Environment</u>:

(Didn't know something like this would come under the Clean Water Act? How's that happen? It seems that there is no end to how far EPA can reach. Does anyone know if an alewife will make a good meal, or is it just fish food?)

### EPA overrules Maine on alewives issue

By Colin Woodard / Portland Press Herald, Maine, July 11, 2012, bostonherald.com

The U.S. Environmental Protection Agency has directed the State of Maine to allow alewives into the St. Croix River. The ruling was issued in a July 9 letter to Attorney General William Schneider. In the letter, the federal agency effectively quashed Maine laws passed in 1995 and 2008 that ordered the fishways at Grand Falls Dam on the Maine-New Brunswick border to be closed to alewives, also known as river herring. The EPA said the law -- passed largely at the behest of sport camp guides in interior Washington County -- violated the federal Clean Water Act and EPA regulations. "Maine should take appropriate action to authorize passage of river herring to portions of the St. Croix River above Grand Falls Dam," Stephen Perkins, director of the EPA Office of Ecosystem Protection wrote Schneider. The heated battle over the alewives access to the St. Croix was the subject of a story in the Maine Sunday Telegram this past Sunday.

EPA wrote the letter in response to legal action by two separate groups earlier this year. On May 31, the Conservation Law Foundation filed a lawsuit against the agency in an effort to compel it to review and overrule the Maine laws. Another environmental group, the Richmond-based Friends of Merrymeeting Bay, had notified EPA they intended to sue as well. "It's a good day for the St. Croix and for alewives and people and other critters that depend on them, but this is not done until the state takes the final step, which is repealing the law and allowing the perfectly functioning fish passage to operate," said CLF's Sean Mahoney. The offices of Attorney General Schneider and Gov. Paul Lepage did not immediately respond to requests for comment. The chiefs of the state's Passamaguoddy, Penobscot, Maliseet and Micmac Indian tribes sent a joint letter to Gov. Paul LePage June 21 urging him to support a forthcoming effort to get the legislature to overturn the law and allow the forage fish access to the watershed. Alewives were effectively shut out of the river from 1825 to 1981, first because of impassable dams, and later because of pollution from lumber and paper mills. But between 1981 and 1987, their annual run grew thirteen-fold to more than 2.6 million. But in 1995, Augusta lawmakers passed a law that ordered the fishways at Woodland and Grand Falls to be closed to the fish because of fears over their effect on smallmouth bass populations in the region's lakes and ponds. The St. Croix alewife runs collapsed to just 900 fish in 2002, a fall of 99.7 percent. In 2008 the legislature revisited the issue, but ultimately decided only to open the Woodland Dam to the fish, depriving them of an estimated 94 percent of their habitat. Environmentalists and marine-fisheries advocates say a restored alewife population will benefit both the freshwater and marine ecosystems, as they are a source of food for smallmouth bass, cod and other species.



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7/27/2012



# Some Dam – Hydro News™ And Other Stuff

CORSO COURT

**Quote of Note:** "Any supervisor worth his salt would rather deal with people who attempt too much than with those who try too little." -- Lee Iacocca

<u>"Good wine is a necessity of life." - -Thomas Jefferson</u> *Ron's wine pick of the week:* Cline "Cool Climate" Pinot Noir, Sonoma Coast, California 2010

"No nation was ever drunk when wine was cheap." - - Thomas Jefferson



### <u>Dams</u>:

(You would have thunk that after the enormous number of studies done on the original Susitna Project, the number this time around would be reasonable. But, you have to support all those agency employees I guess!)

### Study plan for Susitna dam project submitted

by Associated Press, July 19, 2012, ktoonews.org

The Alaska Energy Authority has submitted to federal regulators a study plan for a proposed large-scale dam between Anchorage and Fairbanks. The plan includes 58 separate studies that an AEA public outreach liaison says are intended to help AEA better understand the ecosystem and potential impacts from the proposed Susitna-Watana dam. Emily Ford says AEA will hold meetings with other agencies and stakeholders to discuss the study plan. She says the authority will have an opportunity to file a revised plan, taking into account comments from the meetings, in November. The Federal Energy Regulatory Commission will then weigh in on the plan. Ford says information from the studies will be used in making a license application. Separately, AEA is soliciting proposals for an independent cost estimate for construction.

(A good coat estimate is a good thing especially when you will be doing a bazillion studies) Alaska Energy Authority seeking third-party Susitna-Watana Hydroelectric Project estimate

by Staff Report / Jul 19, 2012 | newsminer.com

Fairbanks, Alaska — The Alaska Energy Authority has posted a request seeking a third-party estimate of the costs to build the Susitna-Watana Hydroelectric Project. The request for proposal, or RFP, is soliciting proposals from an independent third-party that has experience with large-scale, remote construction projects in arctic conditions and can review existing engineering documents to provide an estimated price to build the project. The current cost estimate for the project comes in around \$4.5 billion and is based on updated analyses of cost estimates produced for the Watana Dam Project in the 1980s. "The contractor will prepare a cost estimate for the project based on the assumptions and information provided and their experience with similar projects," the RFP reads. "They will also be expected to identify potential cost issues or assumptions that may require additional research or analysis." The estimated amount for the review is between \$75,000 and \$150,000 and bids are due by Aug. 7. The proposed dam site is 184 miles up the Susitna River, above Devil's Canyon. The AEA is in the process of beginning to license the project, a process expected to be complete in late 2016 to early 2017. Construction would take about five years. The project would be estimated to come online by 2022 or 2023 and is expected to provide about 50 percent of the Railbelt's electricity needs.

(Mmmm! Sounds serious. A sink hole can often lead to failure and that's serious!)

### Sinkhole discovered in Yelm canal

yelmonline.com, July 19, 2012, From our sister newspaper in Centralia, The Chronicle

Centralia City Light has shut down its hydroelectric plant on the Nisqually River, which produces nearly a quarter of the city's electricity. The move came earlier this month after inspectors found a small sinkhole inside the canal that delivers water to the plant's generators. With no power coming from the Yelm hydro plant since July 6, City Light Manager Ed Williams said the city has to pay the Bonneville Power Administration, the primary energy provider for the city, an additional \$10,000 a day to cover the lost hydropower. Williams said City Light has money set aside for issues like a leak in the canal, but if the problem is not fixed in the next couple months, energy rates will increase. However, Williams expects the sinkhole to be repaired within two weeks.

City Light inspectors found the sinkhole on July 6 when they noticed water being sucked out of the canal. The inspectors believe the leak may have been caused by an old decayed tree root or animal in the area. Williams said he will meet with the Federal Energy Regulatory Commission in Portland on Friday to propose his repair plan. Williams needs the FERC's permission to repair the leak. To repair the sinkhole, Williams is looking for a contractor to provide the right consistency of soil to fill the leak. The total repair project could cost nearly \$250,000, Williams said. "(The leak) is not unusual," Williams told The Chronicle from Yelm on Wednesday. "It's just irritating and expensive." The leak is not related to the recent day-long power outage for much of the Hub City on July 1 as Centralia City Light worked on a new substation. "It's just bad luck," Williams said.

(It took 12 years to get around to fixing the dam. It probably took Congress that long to come up with the money.)

### Echo Dam retrofitted for major earthquake

\$50 million project reduces risk of liquefaction

Sarah Moffitt, The Park Record, parkrecord.com, 07/20/2012

When Utahns practiced for a massive earthquake during "The Big Shakeup" two months ago, they didn't prepare for the liquefaction of Echo Dam and the deadly consequences that could follow. But due to a large project by the Federal Bureau of Reclamation, the dam's destruction in an earthquake may no longer be a threat. According to Bureau of Reclamation Area Manager Curt Pledger, Echo Dam, located about seven miles north of Coalville, was built in the 1930s to provide residents with more water from the Weber River. Pledger said that during one of the comprehensive inspections of the dam in 1999, it was discovered that if a high magnitude earthquake struck along the Wasatch Front fault, the materials underneath the dam could liquefy.

"Liquefaction is a new phenomenon that we really just began to understand in the 1990s," Pledger said. "What it means is that loosely deposited soil under the dam becomes saturated with water and then when it is shaken by an earthquake it turns from a solid to a liquid and loses all of its strength, causing the dam to slump." A major fault line runs along the Wasatch Front and Pledger said another one runs along East Canyon near Henefer, making it likely that the dam may have to withstand an earthquake someday.



Bureau of Reclamation Program Coordinator Jonne Hower said that a contract was awarded to local contractors PnK Construction in 2011 to remove the water from the dam's foundation, excavate the material from under the dam and replace it with stronger, denser material. "They began removing water and doing some excavation this year," Hower said. "The first phase of the project is expected to be completed next summer and then they will make some improvements to the spill way. Overall the project will be done in December 2014." Hower added that there were no immediate problems with the dam and officials wanted to bring it up to current standards. Jimmie Keyes, president of PnK Construction in Coalville, said that while his company has worked on dam-retrofitting projects before, the Echo Dam project is unique. "Primary concerns or risks working on dams are vast, including what types of materials are encountered and how much ground water will be present when removing the dam embankment," Keyes said, adding that the materials that are used in the project must also fit the Bureau of Reclamation's strict requirements. According to Pledger, the project is ahead of schedule by six weeks due to the low water level in the reservoir this year. "We thought we would need to wait until mid-June for the water to reach a low enough level so we could begin construction," he said. "But due to the low runoff this year and farmers needing extra water for irrigation, the water was at a low enough level by June 1. Right now, the reservoir is only at one-third capacity." Pledger added that once the improvements are complete, the dam will be able to withstand a 7.5 magnitude quake on the Wasatch Fault and a 6.5. magnitude quake on the fault near East Canyon. "The fault line in Summit County is not as large as the one in Salt Lake, but if an earthquake happened on it, it would place a larger load on the Echo Dam," Pledger said. "We want this dam to be able to withstand an earthquake anywhere." The Echo Dam project is estimated to cost \$50 million. Hower said the Bureau of Reclamation will pay for 85 percent of the project and the Weber River Water Users Association will pay the other 15 percent.

### (Anyone want a free dam?)

**Granite Falls, Minn., opts against pursuing ownership of 107-year-old dam** By: Tom Cherveny, West Central Tribune, wctrib.com, 7/21/12

Granite Falls, MN — Xcel Energy will be awarding a bid for the demolition of the 1905-built Minnesota Falls dam in August, unless a party unexpectedly steps forward with an interest to purchase it. Jim Bodensteiner, director of environmental affairs for Xcel, said the company is moving down the path toward demolition in the wake of a recent decision by Granite Falls Energy



not to seek ownership of the dam. <mark>The ethanol company had recently notified the City of Granite</mark> Falls and Chippewa and Yellow Medicine counties that it is ending its pursuit of ownership. The

City of Granite Falls was the last party to express any interest in ownership of the dam. It is not likely to pursue it, according to Mayor David Smiglewski. The ethanol company determined that it would be too costly to restore the dam, according to Kevin Stroup of Marshall, attorney for GFE.

The ethanol company also determined that the economics of retro-fitting the dam to hold hydroelectric generation were not favorable. GFE's board of directors was especially concerned about the unknowns associated with future maintenance costs and regulatory matters, and the risk represented to shareholders, said Paul Enstad, chairman of the board, The ethanol company has its water intake located above the dam, but will be able to modify it and continue to obtain the water it needs when the dam is removed. It will be less expensive to modify the intake than earlier estimates indicated. Stroup said. Xcel Energy is on track to award a contract for the dam's removal, quite likely in mid-August, according to Bodensteiner. It began a drawdown of the Minnesota River on July 18 to prepare for the work. A contractor would begin work by developing access to the site and constructing a water control structure. Actual demolition could occur as early as October, if all goes as planned, said Bodensteiner. The project will require removing an estimated 10,000 cubic yards of sediment and the concrete dam and channels that had been part of a hydro-electric system. A previous study of the 107-year-old structure found several potential structural deficiencies. The Minnesota DNR ordered the company to either repair the dam or remove it. An initial study indicated that it would cost \$2 million plus to remove it, as compared to over \$5 million to repair it. Xcel no longer has any use for the dam. It represents a liability and ongoing maintenance cost that does not benefit the company's rate payers or shareholders, said Bodensteiner. Its hydro-electric system was removed in 1961. The reservoir created by the dam provided cooling water for the Minnesota Valley generation plant located upstream, but the 1930's-vintage coal plant was retired in 2009. It is slated to be demolished in the years ahead. The dam is 600-feet wide and 14.5 feet high. It is calculated that its removal will restore a natural, 10-foot fall at the site, quite possibly as a cascading series of rapids.

(Dams have been around for a long time doing what they do best because it never rains where or when you want it!)

### Ancient Mayan dam unearthed in Guatemala

July 17, 2012, upi.com

Cincinnati, July 17 (UPI) -- Researchers excavating the pre-Columbian city of Tikal in Guatemala say they've found the largest ancient dam built by the Maya of Central America. A multi-university archaeology team led by the University of Cincinnati said the dam, constructed from cut stone, rubble and earth, was more than 260 feet long, stood about 33 feet high and held about 20 million gallons of water in a man-made reservoir. It was one of several new landscaping and engineering feats uncovered at Tikal, a



paramount urban center of the ancient Maya, a university release reported Monday. The discoveries shed new light on how the Maya conserved and used their natural resources to support a populous, highly complex society for more than 1,500 years despite environmental challenges including periodic drought, the researchers said. Water collection and storage were critical in the environment, where rainfall is seasonal and extended droughts not uncommon, the said. "Their resource needs were great, but they used only stone-age tools and technology to develop a sophisticated, long-lasting management system in order to thrive," UC anthropologist Vernon Scarborough said. "So, they managed to sustain a populous, highly complex society for well over 1,500 years in a tropical ecology."

(In this day and age, everyone has an opinion and the expert's opinion doesn't seem to count! Who did that dumb graphic of a dam? You can imagine what the dam owner thinks of this article. Is this a scare tactic?)

If the Addicks and Barker Dams Fail They've already been labeled "high risk." Experts say the resulting damage could be bigger than Katrina in New Orleans.

By Steve Jansen, Jul 19 2012, houstonpress.com

The psychic's office at South Highway 6's Briarhills Parkways strip mall would be one of the first ones to go. Later, jungle gyms and mailboxes painted in Texas state flag colors might join the bobbing televisions and tombstones from Memorial Oaks Cemetery in the crude river that's been formed by a breached Barker Dam. North of Interstate 10, Barker's younger sibling, Addicks Dam, has also been wiped out by an unstoppable current that starts to overwhelm Buffalo Bayou. Behind the swell, suitcases — left behind by evacuated guests of the Omni Hotel — thud against upper-floor windows of an Energy Corridor office tower. Further east on Katy Freeway, Bibles from area



churches, unsliced foot-long bread rolls from a Subway and family pets float toward downtown like New Braunfels tubers. Years afterward, as Houston continues to clear debris from the multibillion-dollar disaster, survivors might demand to know how this happened. Outdoor freaks who never could get over the loss of the soccer fields, bike trails, dog park and shooting range at George Bush Park, which had been built around Barker Dam, might relocate to the Hill Country to get their parks and rec fixes. Others, while combing through the mangled ruins of the Texas Medical Center and River Oaks, could wonder if the psychic had seen it coming.

For more than 60 years, the Addicks and Barker dams have prevented an estimated \$4.6 billion in flooding damages by limiting large amounts of water from reaching flood-prone Buffalo Bayou. But the dams, once located in the rural nothingness of Harris and Fort Bend counties, have been pushed to their limits, largely due to all of the people and buildings that currently coexist upstream and downstream of the dams. In April 2009, during an unnamed weather event that leveled the west side with more than nine inches of rain in 24 hours, the dams exhibited signs of irreversible failure. Five months after the 2009 storms, the United States Army Corps of Engineers, which owns the dams, which are located near the intersection of Interstate 10 and Beltway 8, slapped Addicks and Barker with an "extremely high risk of catastrophic failure" label.



The dams are currently two of the country's six most dangerous, according to the Corps. Despite the Corps' "urgent and compelling" Dam Safety Action Classification I ranking, the local chapter of the Sierra Club, concerned residents and a professional engineer say the Corps has downplayed the risk — a member of the Houston Sierra Club says that she accidentally discovered the Level I distinction while researching other matters. Additionally, in Sierra Club v. U.S. Army Corps of Engineers — filed on August 22, 2011, in the United States District Court for the Southern District of Texas, Houston Division — the environmental group alleges that the

Corps tested fate when, in June 2011, they gave a thumbs-up to the construction of Segment E of the Grand Parkway (Highway 99). While some say the toll road is needed to keep up with fast-growing Houston, environmentalists say that the 15.2-mile segment between I-10 and Highway 290 will coax more concrete from housing and retail projects, which could send more water to the aging dams.

Local environmental attorney James Blackburn, who is representing the plaintiffs in the civil suit - currently in the appeals process after a district court sided with the Corps - says that if the dams broke, folks would have to deal with a lot more than soiled couches and temporary power outages. "It could dwarf New Orleans and Katrina," says Blackburn, who adds that the Memorial Drive area, the Energy Corridor, River Oaks, the Texas Medical Center and maybe even downtown could be wading in nasty, disgusting floodwaters. Not that everyone agrees. According to Michael Sterling of the Corps' Galveston District, Addicks and Barker dams aren't about to crumble. The Corps, which has put in a couple of quick fixes that may or may not work, says the soonest that Addicks and Barker can be fully repaired is by September 2017. "All dams present risk potential; however, it is important to know that Addicks and Barker dams are not in imminent danger of failing," says Sterling, who adds, "The fact that the Houston metropolitan area is the nation's fourth largest population center is a primary concern. Any dam safety issues at Addicks and Barker could have a far greater impact due to the magnitude of people and property downstream as opposed to other dams around the country located in rural or low-population density areas." Meanwhile, in order to prevent the reservoirs from getting too full, the Corps doubled the amount of water that can be released downstream. Properties and homes from Wilcrest Drive down to Chimney Rock Road could be flooded during a big storm, an issue that homeowners in the immediate flood plain aren't even aware of. "I would say if you talk to 99 out of 100 people in West Houston and ask them about this problem, they wouldn't know anything about it," says Steve Rosencranz, a Sierra Club member and West Houston dweller. "It's something that nobody is talking about." Though a Texas-based licensed professional engineer acknowledges that the dams were dry about 90 percent of the time during last summer's drought — a far cry from last week's heavy rain and flash-flood warnings that saturated Austin County down to Galveston — he says that it might not take an apocalyptic weather event to turn our town into the lost underwater city of Houston, Texas.



### <u>Hydro</u>:

(More anti-hydro rhetoric. Leaving large hydropower out of the renewable energy mix is nonsense. But, nonsense seems to prevail. Leaving out large hydro only encourages expensive renewables that are not economical on their own. The article does the usual and repeats the incorrect GHG data.)

### Revisiting the Issue of Emissions from Hydropower

2012-07-20, blogs.worldwatch.org

Recent legislative proposals in a number of states across the country have reignited the debate over how 'sustainable' hydropower actually is, **and if it is truly emissions free.** California's Assembly Bill 1771, which was rejected in the state legislature this past April, would have allowed large hydropower facilities to contribute toward state <u>Renewable Portfolio Standards</u> (RPS). As a growing number of states establish increasingly ambitious targets for shares of



energy production from renewable sources, there has been ongoing discussion about what types of hydropower should be included in these RPS schemes. In the United States, state regulators divide hydro into two categories - small and large - depending on the facility's installed generating capacity. For example, California considers any facility with at least 30 megawatts (MW) of capacity to be 'large hydro'. Currently, utilities in most states can count only 'small hydro' toward RPS targets. California's Assembly Bill 1771 is neither the first nor the only proposal of its kind. As states that have implemented RPS programs scramble to reach their renewable energy targets, the movement to count large hydro towards these goals has gained momentum. Similar bills have been proposed in California in the past, as well as in Minnesota. North Dakota currently counts all hydropower in its RPS, including power imported from Manitoba, but stipulates that large hydro facilities must have been placed in service on or after Dec. 31, 2010. Wisconsin will allow utilities to count hydropower from large facilities starting in 2015. Despite the ultimate defeat of Assembly Bill 1771, the proposal highlights the importance of understanding the distinct economic and ecological characteristics of large hydropower that distinguish it from sustainable renewable energy sources. These include the relative maturity of hydropower technology, as well as its impacts on sensitive ecosystems, land use considerations, and negative effects on cultural and community resources.

A major reason that policymakers do not traditionally include large hydro in renewable energy targets is that RPS policies aim to encourage development of new renewable sources, including those – such as offshore wind and concentrated solar power (CSP) – which are still in developmental stages and need investment for economies of scale to kick in. Since many states already derive a large share of their energy from large hydro facilities that have existed for years, including this technology in an RPS would divert much-needed investment away from less mature technologies and diminish the intended impact of any RPS scheme. Compared to most renewable energy sources, large hydropower is a mature and financially viable technology; it has been used in various forms since antiquity, and modern usage for electricity generation dates back to the 19<sup>th</sup> century. Hydro accounts for approximately 18 percent of electricity generation globally, and at least 50 percent of the total electricity supply in more than 60 countries. In the United States, about 9 percent of total electricity is generated by hydro, although this varies widely by region. Hydropower provides around two-thirds of electricity generation in the Pacific Northwest and 17 percent of electricity generated in California. In addition to incubating emerging renewable energy markets, RPS policies also aim to achieve environmental and climate mitigation benefits by promoting cleaner and low-carbon energy sources. Although hydro is generally considered a carbon-neutral method of generating energy, research has shown that there is considerable uncertainty in assessing the carbon dioxide (CO<sub>2</sub>) emissions from hydropower facilities. Aside from the emissions attributed to the construction of the facilities, considerable greenhouse gases (GHGs) are emitted as a result of biomass decomposition from

reservoir flooding to create hydro dams. The rate of decomposition is highly variable depending on the climate zone (i.e. tropical, boreal) as well as the specific characteristics of the flooded area (i.e. river area, wetlands, forest area), making it extremely difficult to determine the real rate of emissions. For example, the rate of decomposition is higher in tropical regions, where emissions from reservoir flooding are up to 20 times higher than in boreal areas. Post-flooding biomes and water columns also typically capture and store less carbon from the atmosphere, further contributing to net carbon emissions.



Soils, wetlands, forests, and other ecosystems play an integral role in the global carbon cycle, acting as sinks by absorbing vast amounts of carbon dioxide from the atmosphere. A study conducted by the United States Forest Service in 2011 estimated that the world's forests absorb

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2.4 billion tons of carbon dioxide every year, which accounts for roughly one third of the carbon annually emitted through the burning of fossil fuels. Because many hydroelectric reservoirs are located in areas close to forests and other green landscapes, flooding is extremely common, preventing trees, plants, and soils from absorbing carbon. The creation of hydropower dams also contributes to bacterial accumulation on plant matter at the bottom of reservoirs, leading to accelerated decomposition of this organic matter which emits CO<sub>2</sub> and methane, both greenhouse gases. Recent studies have estimated that net hydropower GHG emissions can be up to two-thirds of those from a natural gas power plant - most of which occur during the first ten years following reservoir creation. GHG emissions from hydropower are comparable to those from nuclear and higher than those of most renewable options, with figures varying depending on site location and other considerations. In addition to climate impacts from GHG emissions, large hydropower has a long and controversial history of ecological disruption and human displacement. Reservoir flooding destroys ecosystems and local biodiversity. Hydropower facilities also have direct impacts on migratory routes for fish, natural river flow and intensity, and water temperature and composition. Many large hydro dams, such as the Three Gorges Dam in China, require forced relocation of local communities. Regulators and policymakers should carefully weigh this range of issues when assessing hydropower facilities, determining what emissions or emissions reductions would have naturally occurred in the region in question, as well as the impact of such facilities on specific regions, landscapes, biomes, and human communities.

(Interesting title! How come we haven't seen much of these small projects using the Archimedes screw in the U.S.? Don't have a clue as to whether they're cost effective, but they are interesting. See videos at this web site:

http://www.smartplanet.com/blog/intelligent-energy/hydropower-now-london-gets-screwed/17665)

Hydropower: Now London gets screwed By Mark Halper | July 19, 2012, smartplanet.com

All screwed up: An Archimedes screw in action along the River Dart in Devon, England. First the Queen did it, on the River Thames near Windsor Castle. Now the operators of a public stately home and park in London are doing it and, like Her Majesty, have headed to a river bank to pull off the deed. The owners of Morden Hall Park have installed an ancient piece of machinery, called an Archimedes screw, to power their visitor center. Following the Queen's example, they've essentially turned the idea of the screw upside down. Greek philosopher and



mathematician Archimedes of Syracuse invented the contraption over 2,000 years ago as a way to lift water from a river to irrigate crops. In his application, turn a hand crank and water rises up the threads. But as "green" engineers have discovered, if you let water run over one in a tumbling river weir, the screw spins enough to drive an electricity generator. As an environmental bonus, proponents say the screw is gentle on wildlife - i.e., it does not mangle fish the way larger hydro machines can.

Morden Hall's website estimates that the screw will generate "59,000 kWh a year - about 12 times as much electricity as an average household uses." The Guardian newspaper, which observed engineers maneuver the screw into place this week, reports its capacity at a modest 8.5 kilowatts, "enough power for 18 average-sized houses in the UK." Either way, the screw is part of a movement toward local electricity generation through small scale, renewable energy projects. The two Archimedes screws that the Queen installed on the Thames are to power the Windsor Castle, her little suburban retreat outside of London. Both Morden Hall Park and the Queen bought their screws from Holland. Morden Hall is a former snuff mill where water wheels once turned millstones that crushed tobacco into powder, so when the screws start operating in September,

they'll mark a full circle back to river power. It's owned by The National Trust, a non-profit conservation group that buys and protects heritage and beauty sites.

(Another 100 years and counting. It seems often that we see articles commemorating a 100 year anniversary of a hydro project. You won't see any other renewable that has a long-lived record like this and the environmental community says it's not a renewable!)

### A power house of power

Keokuk celebrates 100 years connected to Hamilton, III. By Collin Calderwood, 7/22/2012, thehawkeye.com

Keokuk - A claim like "the largest power house in the world" wouldn't be associated with lowa today, but 100 vears ago. Keokuk made the claim. In an effort to produce hydroelectric power and, at the same time, make the Des Moines Rapids more navigable, Hugh L. Cooper undertook the challenge of building the Keokuk hydroelectric dam, the first and still only such dam on the Mississippi River. Cooper fought with investors, many of whom believed inexpensive coal in the Mississippi Valley made the project a waste of money. According to John Hallwas, author of "Keokuk and the Great Dam," Cooper was turned down 58 times and spent most of his money in the process of trying to be named the engineer on the project. Cooper finally found funding for the project, allowing construction to begin immediately. The dam ended up costing investors just over \$25 million, about \$578 million in today's dollars. A



hefty portion went to Cooper's engineering fee, a staggering \$12,000 a month, the equivalent of about \$280,000 a month today. The average civil engineer in 2010, according to government statistics, earned about \$78,000 a year - and Cooper wasn't a licensed engineer. Excavation

work began on the Illinois side Jan. 10, 1920, followed by construction on the Iowa side in December. Throughout the construction of the dam, many important people came to see its progress, from engineers and stockholders to government leaders. To accommodate the visitors, the Hugh L. Cooper Co. rented a large home on the bluff, operating it as a hotel and calling it the "Riverview Club." Accommodations were free for anyone important enough to get invited. People reacted with awe in seeing the engineering marvel. "The visitors were



amazed and delighted with what they saw," The Hawk Eye reported July 13, 1912. "They absorbed information and filled up on wonders," a reaction that isn't re-created by astronauts traveling to and from the international space station today.

As construction on the dam moved along, it grew tougher with each completed section. Eventually, on July 22, 1912, both sides of the dam were connected by a single timber. Imagine sliding a thumb over the end of a running garden hose. As more of the thumb covers the opening, the water has to squeeze through a smaller opening, making it nearly impossible to fully plug the stream with just your thumb. That's the same basic principle the dam workers contended with as the dam grew closer to completion. "They never closed off the entire river at once," said Ed Kiedaisch, an engineer and member of the Lee County Iowa Historical Society board. "All they were doing was building the archways, not the spillways (the doors in the arches), so they weren't really blocking the flow of the river." Eventually, once the arches were built, the spillways needed

to be poured. "After the arches were built, they fit beams across both faces of an arch, pumped out the water, and then poured only five feet of concrete before moving on down the line, at the end they would go back to the beginning and pour five more feet," Kiedaisch said. The dam wasn't completed until almost a year later on May 31, 2013, when the last bucket of concrete was placed in the dam at a ceremony celebrating the structure's completion. On June 3, 1913, electric current traveled from the powerhouse to Keokuk, signifying the project was days from completion. A week later the first steamers used the lock, as many people spectated from the lock's walls and nearby bluffs. Now, 100 years later, there have been some slight changes. "They started facing the concrete 15 years ago, adding 12 inches to 18 inches of concrete on the downriver side of the dam," Kiedaisch said. Currently, the original turbines are being replaced with stainless steel ones. "They are going to stainless steel, which is much more resistant to cavitation," Kiedaisch said. Kiedaisch explained cavitation happens with all water turbines, even boat props. The spinning creates low pressure and bubbles form in the vacuum, which pulls off pieces of metal. To fix these small holes left by the bubbles, the wheels have to be pulled out and the pockets welded shut. Kiedaisch estimated once the new turbines are in place, they will reduce the already low maintenance another 80 to 90 percent and increase efficiency by 3 percent. "Three percent doesn't sound like much, but over the course of the next hundred years, it will be quite a lot," Kiedaisch said. He also explained over the last century, the dam always has made roughly the same amount of power. "It is pretty much the same now as it was then, the process of replacing the turbines will help, but it can only produce as much power as water is flowing," Kiedaisch said, "nature really determines how much power it produces." Most people think of power lines running from a power plant to their home when thinking about how a power plant works, but that is just not the case, and in this instance, the Keokuk dam never produced power for homes. "It was originally built to provide power to St. Louis for street lights and street cars," Kiedaisch said, "Now Ameren doesn't even have power distribution in Iowa, it all goes south. I'm not sure what they are doing now, but electricity goes into the grid and goes a million places." Kiedaisch compares the electrical grid to a lake. "Unless it's a private power plant, no power plant powers just one thing," he said, "It's like a lake with anyone from around the lake who needs water coming to fill up."

Even though the Mississippi is one of the world's largest rivers, this is the only commercial hydroelectric plant on the river. "Technically, someone may have a small operation producing a couple kilowatts, like a backyard wind turbine, but as far as commercial operations, this is the only one," He said the reason is the Mississippi is a pretty flat river, and dams need some drop. The largest drop on the Mississippi River is at Keokuk, making it the only suitable location for a hydroelectric plant, though new technology has permitted other communities, including Burlington, to investigate hydro options. While the Keokuk dam was built 100 years ago, it has by no means out lived its usefulness. "Back in the 1980s, Union Electric's Vice President of Production said there was no other asset they were keeping in their production plans for more



than 50 years, but they were keeping the dam in their plans for the next 200 years, and there was no reason that it wouldn't be around in 300 to 400 years," Kiedaisch said.

### Water:

(It can happen again because we don't even know what the real 100 flood happens to be and it could be a much greater rainfall?)

### Could 1912 flood happen again in Wausau?

Jul. 22, 2012, Written by Jeff Starck, Wausau Daily Herald, centralwisconsinhub.wausaudailyherald.com

A storm that dumped a foot of rain on Wausau 100 years ago Monday caused the Wisconsin River to flood its banks and left portions of downtown Wausau's riverfront under water.

Businesses and homes were destroyed; one person drowned. Wausau was in ruins.

That can't happen again, right? Improved technology, land-use management, communication and a change in how the river is used for industry all have greatly reduced the chances of a devastating Wisconsin River flood ripping through the city. But they haven't eliminated the possibility. Sam Morgan, operations manager for Wisconsin Valley Improvement Co., the organization that oversees the 21



reservoirs and 25 hydroelectric dams on the Wisconsin River, said Wausau still would end up submerged if Mother Nature decided to unleash her fury.

"If we got 11-plus inches in 24 hours, we'd still get a heck of a flood in Wausau," Morgan said, referring to the rainfall amount in Merrill that caused the 1912 flood. It's Morgan's job to try to turn back Mother Nature if he can.

#### A massive downpour

On July 23, 1912, Wausau got about 5 inches of rain in 24 hours -- barely a misting compared with unofficial accounts of 15 inches of rain in Merrill. A torrent of water rushed downstream, carrying debris and thousands of logs stored on the river by paper mills. The dam at the Wausau Paper mill in Brokaw was destroyed. The logs moved swiftly downstream and battered bridges in Wausau and Rothschild. Water overflowed the riverbanks, wiping out businesses and homes in Wausau. The damage was

epic -- at least \$2 million, or about \$46.4 million in today's world.



The odds of a flood with that magnitude of damage happening again here are slight, Morgan said. Wausau was at the end of the logging boom in 1912 and the Northwoods of Wisconsin was largely clear-cut of virgin timber. Rain ran off the cleared ground and straight into the river with no

vegetation to slow it. The regrown forest that covers much of the area today interrupts rain's path to the river and tree roots absorb water that seeps into the ground. The Wisconsin River also is no longer used to float logs downstream like in the early logging days. Weather forecasting and communication improvements the past century also have improved immensely. When the 1912 flood hit, the lone telephone wire from Merrill to Wausau was knocked out. Merrill residents tried to drive to Wausau to warn people about the rising flood water, but their efforts were stymied because bridges across the river had



been leveled. In 1912, the best weather forecast was staring at the sky and observing what was happening. Today, Morgan reviews five-day precipitation forecasts generated by the National Weather Service every morning to know how rain might affect the flow of the river.

Those precipitation forecasts were important in September 2010 and April 2011 when several inches of rain were predicted for the Wausau area. Flooding occurred in both cases in low-lying areas, such as along the Big Rib River in Marathon and Business Highway 51 in Rothschild, but the area was spared from a catastrophe. Dam operators along the Wisconsin River used teleconferences in the days before the 2010 and 2011 storms about how they should prepare. Bill Bloczynski is the regional generation manager for Wisconsin Public Service Corp., which operates several dams in the Merrill and Wausau areas, and he participated in those discussions. The 6-megawatt dam WPSC operates in downtown Wausau is licensed to generate electricity -- not for flood control -- but it can be used to help regulate the river if needed. "If we know the water is coming, we can draw down the reservoirs to store the water coming downstream from the rain," Bloczynski said.

### No guarantees

What happens if the perfect storm does hit central Wisconsin again? Would Wausau be wiped off the map and forced to rebuild? Probably not, If meteorologists predict a 10-plus-inch rainfall north of Wausau, dam operators will open their gates and drain water from the reservoirs behind the dam. That will allow flood water to collect behind the dams and then slowly be released after the rain subsides. The logs that blew out the dams are gone, and bridges no longer are built of timber and stone, so neither would be factors in a modern flood. Today, dams are built of concrete and steel and can withstand the battering if large debris does come down the river. "When bridges are built, a hydraulic study is done to determine the (water) elevations for a 100-year flood," said Allen Wesolowski, project manager for the city of Wausau. "The free board -- the bridge deck -- is kept above those levels and an analysis is made to make sure the structure doesn't cause any flooding." The WPSC dam in Wausau was built in 1922 and 95 percent of the original structure remains today, Bloczynski said. It even withstood the September 1941 flood that was as bad, if not worse, than 1912's. Though preventative efforts and the strength of dams will protect the Wausau area from massive flooding, some areas still would be under water if a 100-year flood hit, Morgan said. D.C. Everest Park on South Third Avenue in Wausau is barely above water level and would be flooded for six to eight blocks, despite 4-foot-high levees that were created along the banks of Lake Wausau to hold back flood waters. Gilbert Park on Sixth Street, Oak Island on River Drive, Sherman Road, all in Wausau, and Business Highway 51 in Rothschild would be under water. Rural areas such as places along the Big Rib River in Marathon would flood again, and some culverts and small bridges on town and county roads would be overrun or washed out, Morgan said. Though today's structures are built to withstand events such as the 1912 flood and limit destruction, there are no guarantees. "No matter how big man can make a structure, Mother Nature can come up with a flood that can overcome it," Morgan said.



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