

3/18/2016



# Some Dam – Hydro News™ And Other Stuff



**Quote of Note:** "Courage is being scared to death but saddling up anyway." - - John Wayne

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**"Good wine is a necessity of life." - -Thomas Jefferson**  
**Ron's wine pick of the week: 2013 Kanonkop Pinotage "Estate Wine"**  
**"No nation was ever drunk when wine was cheap." - - Thomas Jefferson**



## **Dams:**

(In case you didn't know. Mainly a PR piece. They forgot the many other benefits of dams.)

### **Dams**

crowdercc.com, 3/5/16

Harnessing the power of water -- one of nature's most precious resources -- is the primary purpose of a dam. Crowder has held a key position in doing just that throughout the southeast region of the United States. From building new projects to reinforcing existing dam structures, we possess the extensive experience, skills, and knowledge necessary to ensure that the project meets its goals from start to finish.

### **Dam Structures Vary**

Utilizing our Heavy Civil Division, Crowder works to devise the right combination of spillways, foundations, intake structures, penstocks, and outfall structures that meet the specific needs of each project. Each turbine, generator, and other machinery type requires a different approach, set of plans, and design method to ensure that it operates efficiently within the parameters -- both natural and manmade -- that are set for it.

### **Temporary Structures**

Temporary structures are often utilized in order to address water control issues as well as to retain the integrity of the earth. Before devising a plan and design, our Heavy Civil Division looks at all the components involved. We do this to determine which structure(s) best meet the goals of the project as well as complement the natural elements involved. Some examples of temporary structures that could be utilized include well point systems, gabion walls, cofferdams, vinyl sheet piles, soldier piles, grouted soil nailing, sheet piling, soldier lagging, and driven soil nailing -- to name just a few.

### Meeting Each Challenge Squarely

Each dam presents its own unique challenges. While no two dam projects are identical, we use each experience to broaden our scope, reach, and diversity. This experience and willingness to always creatively learn with every project we undertake allows Crowder to effectively meet the challenges that each dam presents. As with all dam projects, a variety of regulatory agencies are involved. From the local, state, and federal levels, each agency has its own particular set of goals and specifications that must be met in order for the dam to receive the green light.

### Water Quality Integrity is a Vital Component

While Crowder works closely with each agency involved to ensure that their stipulations are met while also staying within budget, there is another, equally complex issue at stake as well. The integrity of the water is always in the foreground of everything that we do. From the protective measures we utilize to our maintenance design element, water quality is always protected during Crowder's many varied projects.

(Is this wasting water?)

### Folsom Dam could open floodgates during storm

Mar 05, 2016, kcra.com

With heavy rain expected during the next 10 days, water managers at Folsom Dam say it's very likely they'll need to open the floodgates for the first time in more than five years to make room for incoming runoff.



(Others wonder about wasting water.)

### LETTERS TO THE EDITOR

### Don't neglect hydropower



At Folsom Dam, the U.S. Bureau of Reclamation started releasing water from the spillway on Monday, March 7, 2016. A spokesman said water would be released at around 8,000 cubic feet per second, nearly doubling the volume from the weekend. Manny Crisostomo

MARCH 9, 2016, sacbee.com

### Don't neglect hydropower

Re "Water releases rise at Folsom Lake" (Local, March 8): Water releases are necessary flood-control measures. A more serious question is whether scarce water is being traded for hydroelectric (green) power. I propose a baseline hydroelectric supply that excludes pumped reservoirs and flood-control releases routed through turbines. In any drought year, this baseline should be zero for all federal, state or utility dams. Can anyone assure me that it is, and that any revenue from excess generation is not being used as a substitute for taxes?

PAUL SNAWDER, DAVIS

### **Folsom Dam release is absurd**

My water comes from Folsom Lake, and it is being “dumped” from the lake for flood control. The amount is much more than the San Juan Water District’s total usage. It seems like a perfect time for people to accomplish those long-awaited water projects such as fixing the crack in the swimming pool, washing the patio, deep watering lawns and gardens, and filling the ponds for use during restriction times. All of this would use only a small fraction of the water being dumped. A temporary lifting of restrictions would help us prepare for and better weather the restricted times as well as provide San Juan with much needed additional revenue that would perhaps help prevent the discussed rate increases. This could also give us a short reprieve in our restrictions?  
**GARY O’DELL, GRANITE BAY**

(A reminder of why dam safety is important.)

### **ASDSO Marks Tenth Anniversary of Deadly Flood**

**Ongoing Commitment Needed to Ensure All Dams Are Safe**

**With more than 87,000 dams of regulatory size in the U.S., we all have a stake in dam safety.**

(PRWEB) MARCH 06, 2016, prweb.com

Lexington, KY: This month we mark the ten-year anniversary of a man-made disaster that should not have happened. On March 14, 2006, Ka Loko Dam on Hawaii’s island of Kauai broke, sending almost 400 million gallons of water four miles downstream until reaching the ocean. The resulting wave of water reached about 20 feet in height destroying trees, cars, and homes, and killing seven people, including a pregnant woman and a young child. The flood resulted in millions of dollars in property damage, as well as extensive environmental damage. The Ka Loko Dam failed after 40 days of heavy rainfall overtopped the dam, in the



vicinity of where the dam’s original spillway had been filled in by the owner. A lack of resources and sufficient legal authority within State government at that time enabled the owner to ignore his duty to address safety concerns at his dam prior to the disaster.

“The tenth anniversary of the dam’s failure reminds us of the potential dangers posed by dams and the critical importance of both responsible dam ownership and strong dam safety programs,” said Lori Spragens, executive director of the Association of State Dam Safety Officials (ASDSO). “Most dam failures are preventable disasters. Dam owners must keep their dams in the state of repair required by prudence, due regard for life and property, and the application of sound engineering principles. The quality of dam maintenance, emergency planning, and enforcement programs directly affects the safety of communities, as sadly demonstrated on Kauai. With more than 87,000 dams of regulatory size in the U.S., we all have a stake in dam safety.” In the wake of the Ka Loko Dam failure and, as a result of increased funding for its dam safety program, Hawaii’s improved regulation of local dams has helped keep citizens safe and allowed downstream communities to thrive.

ASDSO works with dam owners and state and federal lawmakers to create and maintain strong dam safety programs. According to ASDSO’s data, the nationwide number of high-hazard-potential dams, or dams whose failure would cause the loss of human life, has increased to more than 11,700, about 15 percent of which are considered deficient, or susceptible to failure. ASDSO calculates that it would take about \$18 billion to bring these dams up to current safety standards. Because inadequate funding is often the primary impediment to dam rehabilitation efforts, it is

imperative that funding sources are developed to meet this need. ASDSO supports federal and state legislative efforts to create loan and grant programs for dam rehabilitation funding. *### 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.*

(Leave the dam alone. Never heard of P.P.S. before.)

## Opinion: Lyons dam should be repaired, not destroyed

By Don Jandernoa, Mar. 4, 2016, sentinel-standard.com



This is an open letter to Dr. William Moritz, Director, MI Department of Natural Resources, 525 W. Allegan St, P.O. Box 30028, Lansing MI

48909 and Tom Melius, Regional Director of U.S. Fish & Wildlife Service, 5600 American Blvd., West, Suite 990, Bloomington, MN 55437-1458 from Don Jandernoa, 3761 Portman Lane, SE Grand Rapids, MI 49508. I have requested that the Ionia Sentinel-Standard print a copy of this letter in their newspaper to



inform the Lyons and Central Michigan residents of the actions being taken to save the Lyons Dam, MI and preserve the beauty and the values of the area. The U.S. Fish & Wildlife Service and the Michigan Department of Natural Resources (DNR) are heavily involved with the Lyons Dam issues. Properties affected belong to the Village of Lyons, Green View Point Park owned by Ionia County, dozens of people who own property along the Grand River, citizens who would be denied use of the free Lyons Boat Launch – which enables families and fishermen to launch their boats and cruise the river, thousands of people who enjoy the beauty of the Lyons Dam and "Lyons Lake" which is created by the dam, and citizens who enjoy Green View Point Park.

One hundred fifty years ago as America expanded westward, thousands of dams were built on rivers. Some dams operated factory machinery. Others operated feed mills that ground food for farm animals. **As years passed many of the river dams were converted to hydro power production of electricity. Lyons Dam became one of the hydropower dams.** As other means of producing electricity became more competitive, many of the hydro power dam owners suspended producing electricity. Lyons Dam was one of those. Next, Consumers Power gifted Lyons Dam to the Village of Lyons for \$1. Many river dams have fish ladders to assist fish to go upstream. **Lyons Dam has a fish ladder.**

During the last several decades, the Michigan DNR and the U.S. Fish & Wildlife Service have strongly encouraged many river dam owners to remove their dams. Most common reasons given are: (1) It helps the fish, and (2) it eliminates liability for the dam owners in the event the dam fails. Fishing on the Grand River both above and below the Lyons Dam is very popular, so removing the dam to improve fishing is not an issue. As far as liability for the dam owner (Village of Lyons) in the event the dam collapsed: (A) The water would rush downstream under the bridge and spread on the flat, non-residential farmland area between Lyons and Muir. (B) Dam strength was thoroughly tested by Mother Nature in June 2008.

At that time a rare cloud burst occurred upstream from the dam. Observers at the Lyons Dam reported the water going over the dam was six feet higher than normal. Despite this huge additional pressure, the dam held. That is the best evidence of the dam strength.

- The DNR and the U.S. Fish and Wildlife Service have pressed the Village of Lyons to remove the Lyons Dam. Reportedly they have allocated approximately \$2 million dollars of our federal and state tax money to remove the dam and construct long concrete

walls to minimize erosion of the river banks. Fifteen feet of walkway along the edges of "Lake Lyons" would also be installed. These new features would require maintenance at a cost that could well exceed the costs of maintaining the present dam.

The proposed present plan would remove 8 feet from the top of the Lyons Dam. This would drop water levels and eliminate use of the Lyons Boat Launch, which is free. The popular river cruising by families and fishermen would be terminated, forever. The lower water levels would also decrease the beauty and value of riverside property for a mile or more eastward including Green View Point Park which is owned by Ionia County. Various government entities would experience decreased tax revenue. Can the Village of Lyons, the Michigan DNR and the U.S. Fish & Wildlife Service legally remove the Lyons Dam without considering the interests of the upstream property owners and the thousands of people who enjoy the beauty of the dam? Must we go to federal courts to find out? Or would it be better to simply report that in light of the major concerns of citizens, property owners and visitors of the Lyons area, a decision has been made to repair the dam by using about half of the money that the DNR and U.S. Fish & Wildlife Service have allocated for dam removal? — Don Jandernoa, on behalf of Green View Point Park ([ljandernoa@aol.com](mailto:ljandernoa@aol.com)).

P.S. Copies of this letter are being sent to Dr. William Moritz, Director of the Michigan Department of Natural Resources, Tom Melius, Regional Director of the U.S. Fish & Wildlife Service, Congressman Justin Amash, Michigan. Lt. Governor Brian Calley, Lyons Township State Representative Mike Callton, Lyons Township Supervisor Charles Babcock, The Ionia County Board of Commissioners and the Members of the Lyons Village Council.

P.P.S. To Dr. Moritz and Mr. Melius: This would be an appropriate time to announce that you have instructed your Lyons dam staffs to suspend action until alternatives can be explored. In the meantime I will defer my plans to request a federal court to deny action to destroy the Lyons dam. To improve relationships between your staffs and the public, consider adopting a simple direction for your staffs such as, "Do no harm."

(Natures dam builders, pesky buggers aren't they.)

### **As beavers move in, dams cause destruction in town**

By Chick Jacobs Staff writer, 3/5/16, [fayobserver.com](http://fayobserver.com)

About 50 yards from the rumble of afternoon traffic on Country Club Drive, Jordan Backus pauses. "Listen," he says. "Can you hear it just up ahead?" Before you can see a sprawling, 6-foot-tall monument of wood and waste material, you can hear the steady roar of water where beavers have backed a stream up across a nearby access road. It seems the critters that clog country creeks and turn farmland into swamp have gone big city in Fayetteville, NC. And when nature's engineers encroach on man, trouble rises faster than the water behind one of these impressive dams. Most recently, a beaver dam on Clayton Road in Sampson County ruptured after heavy rain, flooding the road. The road was closed to traffic until water receded. Homeowners across the Cape Fear region have found more dams blocking culverts and backing up water this winter than in years past. Part of that, wildlife experts say, is because North Carolina's wet winter has created new opportunities for beavers. "Heavy rainfall causes water behind existing beaver dams to spread out over a larger area," said Butch Adams, a regional representative with the U.S. Department of Agriculture. "So a minor beaver problem becomes a major beaver problem.



"Flooded streams, rivers and swamps push the beaver to higher elevation drainage canals, where they renew their damming activities."

Backus agreed. "Places that used to be dry aren't dry now," he said, tapping the side of his hip waders as proof. "These guys are opportunistic. They're finding their way into places no one has seen them before." And once they're set up, beavers just don't take a hint and leave. Bust a hole in their dam, and they'll have it fixed overnight. Blow the thing up, and they'll start rebuilding. Trying to chase them off is a Sisyphean task. There's only one option, unpleasant as it seems. Adams noted that in the past, "we have tried both nonlethal and lethal methods. We found that nonlethal methods are ineffective. Live trapping and relocation is against state law, so that leaves lethal removal with the use of specialized traps." "If you want the dam building to stop, the beavers have to go," Backus said. "In the past, they'd try relocating them. But any place you'd put them now already has beaver. There's nowhere to go." A generation ago, the beavers could have been put almost anywhere. By the end of World War II, beavers were all but extinct in the Cape Fear region, hunted out of existence. In fact, several were relocated here to get the native population started again. Cumberland County was an area selected for beaver restocking. They were considered a "renewable resource," since wildlife experts figured farmers and trappers would catch them for pelts and keep the population constant. By the 1970s, roughly 1,500 annual licenses for trapping beavers were issued in the state. It quickly became apparent that beavers do two things very well. They build dams. And they make baby beavers - lots of baby beavers. Statewide, the current beaver population estimate is more than 500,000. At the same time, the population of Cumberland County mushroomed. People began moving into previously unpopulated areas.

And the fashion industry turned anti-pelt. Faster than you could say "fur is murder," prices for beaver pelts plummeted. No one wanted to hunt the critters for the price, so they hunkered down, made more beaver babies and began refilling the creeks and culverts of the region. City life especially agrees with beavers. There are no natural predators to speak of, and there's an all-you-can-eat buffet waiting along the drainage creeks and roadway underpasses. Beavers love soft woods and will make a buffet of ornamental trees and shrubs planted near water. They especially love the tasty outer layer of trees, gnawing off the protective outer layers - a process called "girdling." Backus held up a 3-foot-long chunk of what was probably once a weeping willow, now stripped bare. "Someone had a feast here," he said. "See the teeth marks all along what's left? They just sat down and cleaned it. The rest went into the dam." And the dam isn't just sticks and mud. Beavers have proved themselves to be consummate recyclers. Backus pointed to everything from water bottles to lost toys to a 55-gallon drum that had become part of a dam project. "If they can get it, it's going into the dam," he said. "I've seen everything from sports equipment to car parts in there."

It would be funny, if the dams weren't so destructive. There's no way to put a dollar total on damage statewide, but officials say thousands of acres of farmland and timberland are flooded annually. Septic tanks are rendered useless as water tables rise. In the five years between 2008 and 2013, more than 3,500 Department of Transportation projects were damaged or delayed as USDA Wildlife Services workers destroyed dams. The state pays more than \$1.1 million per year in beaver control efforts, mainly to catch the animals and destroy dams in urban areas and along highway projects. In the city, clogged culverts can threaten roadways in heavy rain. Some sewer systems in the region have been compromised as water backed into manholes. "We have frequent incidents regarding beavers and them backing up water onto our sewer easements," said PWC spokeswoman Carolyn Justice-Hinson. "In some instances when the beavers dam up a natural waterway, the water level rises to a point where it finds another outlet. "This can potentially wash out our lines, depending on the depth of cover, and the flow which is creating the new channel. "In many cases the sewer easement and mains will be adjacent to water features. The beavers will dam up the flow of water and cause flooding." Backus said the biggest risk can come when a large dam, like the one just off Country Club Drive, gives way during a heavy storm. "These guys are great engineers," he said. "But if the dam gives way during a heavy rain ... that's a lot of water heading into populated areas." He pointed toward a mobile home lot downstream.

"Can you imagine what would happen if this dam just gave way? Right now, it's a nuisance. That would be dangerous." He began hacking away at the dam with an imposing-looking hooked hoe, knowing the damage would be fixed by tomorrow. "For now, it's all we can do here," Backus said. "We've got to catch all of the guys living here before it makes sense to take this one down. I figure that's at least a dozen of them here. "When that's done, we'll be able to drain the water slowly. Then we can use dynamite. Remember, all those booms you may hear around here aren't coming from Bragg!"

(Escaping the long arm of the law.)

### **For PacifiCorp, separate dam-removal entity less costly, risky**

**For the power company PacifiCorp, setting up a separate entity to remove dams from the Klamath River is cheaper and less risky in terms of liability than keeping the dams operating or trying to remove them itself, a spokesman says.**

Tim Hearden, Capital Press, March 8, 2016, capitalpress.com

For PacifiCorp, setting up a separate entity to handle the removal of four dams from the Klamath River would be cheaper and less risky for ratepayers than other options, the company's spokesman says. The revised Klamath Hydroelectric Settlement Agreement — under which a “non-federal entity” would apply to the Federal Energy Regulatory Commission to decommission the dams — caps the company's costs at \$200 million, spokesman Bob Gravely said. By contrast, relicensing the dams and keeping them operating would cost more than \$400 million just for improvements such as fish ladders, plus any other costs for measures imposed by the California Water Resources Control Board to obtain Clean Water Act permits, he said. Environmental groups would likely challenge the relicensing application in court, he said. For PacifiCorp to simply handle the decommissioning itself would cost about \$292 million, according to government estimates. The third-party entity would enable PacifiCorp to cap its costs while assuming liability and responsibility for the facilities' removal, Gravely said in an email.

“So we have certainty in terms of cost and risk,” he said, “and have concluded that the KHSA is both less costly and less risky than relicensing under our known terms and conditions or pursuing removal on our own.”

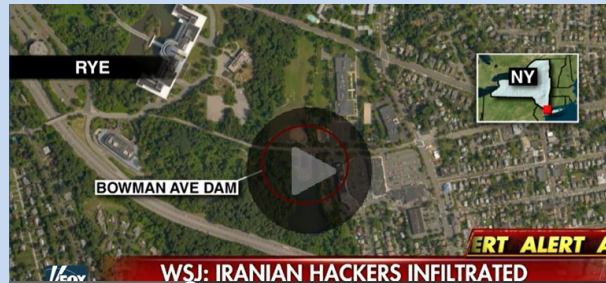
The non-federal entity — a key component of a new agreement that Pacificorp and state and federal agencies unveiled last month — has come under criticism from dam-removal opponents such as Rep. Doug LaMalfa, R-Calif., who accused the agencies of setting up a “shell corporation ... designed to avoid public scrutiny” of the decommissioning process. Oregon state Sen. Doug Whitsett, R-Klamath Falls, opined that the agreement between PacifiCorp, the states of Oregon and California and the U.S. departments of the Interior and Commerce to set up the dam-removal entity amounts to an interstate compact that must legally be approved by Congress. However, Gravely has asserted that dam removals are normally handled by FERC and that congressional approval was sought in the Klamath dams' case so that the Department of the Interior could handle — and provide funding for — their removal. Bills to authorize the Klamath agreement have languished in Congress since 2011, so having a non-federal entity handle the decommissionings was an alternative, he said. Such an arrangement is not unprecedented, he said. In Maine, a trust operated jointly by a tribe, conservation groups, hydropower companies and state and federal agencies purchased three dams on the Penobscot River in 2010. The trust has removed two of the dams and is decommissioning and building a bypass around the third. PacifiCorp had planned to relicense its Klamath River dams but agreed to decommission them under certain conditions, including the cost cap, liability protection and not being the entity to carry out the dams' removal, Gravely said. Those terms were in the original agreements in 2010 and carried over to the pacts unveiled in February. “The parties that want dam removal get dam removal, but under terms and conditions that also protect PacifiCorp and its customers and make it a better outcome for customers than relicensing,” Gravely said. “That's the essence of the KHSA.”

(Caught the SOBs, but they'll never put them in jail.)

### **DOJ expected to charge 5 Iranians in 2013 hacking of New York dam**

March 10, 2016, FoxNews.com

The Department of Justice is expected to announce charges against up to five Iranians believed to be tied to the 2013 hacking of a New York dam, a law enforcement source told Fox News. The DOJ is expected to make the announcement sometime in the coming days, according to the source. The individuals are believed to have connections within the Iranian government.



The hackers allegedly infiltrated the control system of the Bowman Ave Dam in Rye Brook, N.Y., which is about 20 miles outside New York City, The Wall Street Journal reported at the time. The breach raised fears of the vulnerabilities of the United States' infrastructure to foreign hackers. It also came at a time that the Iranians were on the offensive in attacking U.S. banks. It was believed at the time that the hackers never took control of the dam, but were able to probe the system, the report said. The expected DOJ announcement was first reported by The Wall Street Journal. In this case, the hackers were believed to have gained access to the dam through a cellular modem, the paper reported in 2015, citing an unclassified Homeland Security summary of the case that did not specifically name the dam. Two unnamed sources told the paper that the summary was referring to the relatively small, 20-foot-tall, concrete dam about 5 miles from Long Island sound. The dam is used for flood control in the area. Initially, intelligence analysts feared the hackers were targeting another dam: The Arthur R. Bowman Dam in Oregon, a 245-foot-tall earthen structure that irrigates local agriculture and prevents flooding near the town of Prineville, approximately 150 miles southeast of Portland. That belief prompted investigators to notify the White House that Iran had escalated its cyberwar with the United States. The source told Fox News that the upcoming charges are expected to come out of the U.S. Attorney's Office in the Southern District of New York.



## Hydro:

(Seems like yesterday.)

### Our view: 50 years ago today, Smith Mountain Lake filled up

March 7, 2016, roanoke.com

Today marks a curiously precise anniversary. Fifty years ago, on March 7, 1966, at 5:03 a.m., Smith Mountain Lake filled up. It's unclear now how the lake-builders arrived at that specific time, but they did. The creation of the lake was an engineering marvel, so perhaps we shouldn't be surprised at that level of detail. The origins of the lake date back to the 1920s, when power companies were scouting for hydroelectric sites wherever they could find them – and the narrow gap where the Roanoke River cut through Smith Mountain looked like it would make an ideal site for a dam. Starting in 1924, the Roanoke-Staunton River Power Company bought up land around the site, but then abandoned the project, not convinced there'd be enough water flow to





**make it economically feasible.** When Appalachian Electric Power bought out the company in 1954, the news merited just five paragraphs in The Roanoke Times. Perhaps that's because Appalachian said it had no immediate plans for the property – or perhaps because three decades had gone by with nothing happening. Three years later, in 1957, Appalachian had such plans. Three years after that, in 1960, the bulldozers started moving earth. The site was considered so dangerous that workers were advised to carry snakebite kits with them. One resident was particularly unhappy about the project – “a cantankerous, long-horned goat” who roamed wild on the mountainside. Workers had to move dirt, fell trees, relocate cemeteries, and also divert the Roanoke River – which was routed around the dam's construction site in a tube. On September 20, 1963, the dam was nearly finished and workers lowered a gate over that tube. On that date, the lake began to form, rising at a rate of 1 1/2 feet every 24 hours. It took a few years, as the waters steadily backed up over what had been mostly farmland, but by March 7, 1966, the lake was full. It took several decades after that for the lake to transform the region's culture and economy, as well. **Today, “the lake” is not simply a lake, but a community – home to about 12,000 people year-round – and an economy unto itself. About 60 percent of Franklin County's revenue comes from around the lake.** If you peer into the lake, you may not see the bottom, but you may get a glimpse of just how much the world has changed over the past half-century or more. Here are two big ways:

**Energy.** **Smith Mountain works in conjunction with Leesville Lake downstream.** Together, they average 494,000 megawatt-hours per year – enough power to handle all of Appalachian's Virginia customers for a month. Now, here's some perspective: Appalachian has 10 hydroelectric projects in all. Yet they account for just 1 percent of the company's total fuel mix – which gives you some sense of our enormous demand for electricity. **How to generate energy is one of the most controversial subjects around – that whole fossil fuels-vs.-renewable energy thing.** While the sources of power get a lot of attention, there's not much given to the sheer volume of power that has to be produced.

**Smith Mountain Lake covers more than 20,600 acres and yet all that water is still just a drop in a very big bucket of energy demand.** The controversy over energy is mostly over carbon emissions, but scale and reliability are quite real issues of their own. Coal plants – and power dams – can run whenever they need to. Skeptics still fret whether wind and solar can provide enough reliability at the volume we need (though some European countries are making renewables work – just at a higher cost than Americans are accustomed to paying). Hydroelectric dams were the renewable energy of their day. Some small utilities grew up based completely on local dams. Amazingly, some of those dams from the early 1900s remain in operation today. “Our Buck and Byllesby plants on New River near Galax were constructed in the very early part of the last century and continue to be workhorses for us,” says Appalachian spokesman John Shepelwich. Just outside Vinton, the Niagara Dam is still good for 2.4 megawatts – about fourth-tenths of one percent of Smith Mountain Lake's maximum output. **But when you flick the switch, some of you have your lights come on because of it. In the 1930s came the big dam projects – Claytor Lake was built in 1939, about the same time as the Hoover Dam and the Tennessee Valley Authority dams. Smith Mountain Lake was the post-war continuation of that push for more hydroelectric power.** Nobody's really building hydroelectric dams in the United States anymore, but China – whose communist regime doesn't have to worry as much about public opinion or private property – sure is. China generates about 17 percent of its power from hydroelectric dams and has at least eight more under construction – all of which would dwarf Smith Mountain Lake many times over.

**Environmental laws.** **When the lake was first proposed, some were skeptical that it would be much use for recreation.** That's because Roanoke, Salem, and Vinton were all still dumping raw sewage into the Roanoke River – and manufacturing plants in the valley dumped who-knows-what. The Roanoke World-News in 1962 contained this not-so-assuring news: “A Salem manufacturing plant sometimes throws ‘plating waste’ directly in the river, notes one official. He says it is harmless.” **Today, we have an alphabet soup of state and federal environmental agencies to prevent such things.** The lake's water is also considered clean enough the Bedford Regional Water Authority now pumps up to 3 million gallons of it to Bedford and Forest as

drinking water (though it does first go through a treatment plant in Moneta). Then again, there are some things that haven't changed. Government often moves slowly: The possibility of a state park at the lake was first mentioned in 1960, perhaps even earlier. It didn't open until 1983. Perhaps most importantly, our ability to tell the future is often as murky as the lake waters. On October 4, 1963, as the rising waters were starting to submerge some of the trees along the riverbank, the Roanoke World-News took note of the lake forming to the east, with these words: "It is impractically impossible now to foresee the impact the lake will have on this area of the state."

(One of the oldest hydro sites.)

## Holyoke dam to be honored on 'Infrastructure Day' May 14

By Mike Plaisance | masslive.com, March 07, 2016

HOLYOKE, MA -- An engineering group will celebrate the foresight that led to the construction of the hydroelectric dam, the system of canals and their ongoing benefits here on "Infrastructure Day" May 14.

"These resources are often overlooked and sometimes seen as outdated, whereas they are extraordinary and unique to this city and still play a major role in Holyoke's infrastructure," said an event listing on the city website. Engineeryourfuture.org, which is dedicated to marking engineering's benefits, is leading the Infrastructure Day honoring of the Connecticut River dam here.



Last year the website honored the stone arch Choate Bridge over the Ipswich River in Ipswich. Details about Infrastructure Day events here are still being planned but will involve multiple locations and public school students, teachers and parents, according to Holyoke Historical Commission Chairwoman Olivia Mausel and the website listing.

Former Gov. Deval L. Patrick visited Holyoke in 2009 to announce a unique computer facility would be built here. On Nov. 16, 2012, the \$165 million Massachusetts Green High Performance Computing Center opened overlooking the first-level canal on Bigelow Street between Appleton and Cabot streets. The computing center is an academic research hub that offers scientists, professors and researchers an acre-sized room of computers to explore areas like Lou Gehrig's Disease, banana blight in Costa Rica and ways to predict earthquakes. The computer center partners are Harvard University, the Massachusetts Institute of Technology, the University of Massachusetts, Boston University, Northeastern University, EMC Corp., of Hopkinton, an information storage, back-up and recovery firm, and Cisco Systems Inc., a California-based internet network equipment maker.

The dam is why Holyoke was able to land such a facility. The answer lies in the 1800s, when city founders realized the potential of the Connecticut River and took advantage of the city's grade and the flow of the river to build the hydroelectric dam. The dam powered the late 19th and early 20th century mills in Holyoke. The computing center needed a steady and relatively affordable supply of power such as what it gets from the dam, owned by the Holyoke Gas and Electric Department (HGE). The computing center uses 15 megawatts of electricity, enough to power 15,000 homes. The renewable energy that is the flow of the river is partly where the "green," or environmentally friendly, part of the computing center's name comes from. Mausel said Infrastructure Day events will include tours of the dam and visits to the computing center, Holyoke Heritage State Park, Holyoke Children's Museum, CanalWalk and other sites. Organizations involved in planning Infrastructure Day include HGE, Holyoke public schools, Holyoke Public Library History Room, Holyoke Historical Commission, Holyoke Children's Museum, Boston

Society of Civil Engineers, O'Connell Construction, Girl Scouts of Central and Western Mass, Holyoke Heritage State Park and Connecticut River Watershed Association, the city website said.

(The article used a photo of the Canadian power plant so I used my photo. The U.S. plant is in the foreground.)

## **Robert Moses Niagara Hydroelectric Power Station**

niagarafallsmarriott.com, 3/9/16

Located near Niagara Falls in Lewiston, New York, the Robert Moses Niagara Hydroelectric Power Station is an important structure. The plant gets its name from the New York City planner Robert Moses and is owned and operated by the New York Power Authority (NYPA).



### **Once the Largest HydroPower Facility**

Construction on this power station began in 1957 to replace the Schoellkopf Power Station. The plant opened in 1961 and at that time it was the largest hydropower facility in the western world. It uses 13 generators at a capacity of 2,525 megawatts to produce electricity. The Robert Moses Niagara Power Plant and the Lewiston Pump Generating Plant together produce a total of 2.4 million kilowatts of electricity. On the opposite side of the Niagara River you can see the Sir Adam Beck Hydroelectric Power Stations in Ontario, Canada.

### **Niagara Power Project Visitors Center**

If you want to visit the plant and see and understand the way things work there, you can do so. Due to security reasons, tours of the inside operations of the power plant are not conducted. You can head to the Niagara Power Project Visitors Center – Power Vista that is located above the power plant. While people of any age can enjoy this tour, it's a great learning experience especially for children. During their visit, they can understand all about hydroelectricity and the important role the plant played in the expansion of Niagara.

### **Interactive Exhibits**

You can visit and go around on your own or try a customized guided tour tailored according to age groups. An interactive kiosk in the exhibit area provides information to the visitors. You can take in the views at 350 feet above the Niagara River from the glass enclosed walkway or go to the outdoor observation deck to enjoy the sights. The Basics of Electricity Show is tailored to educate children according to different age groups and is a great experience. These are hands on fun as well as the Electric Lab with 50 interactive exhibits that children would love to press, push, pull along with several practical activities. The Terrain Map which is an original scale model exhibit uses an audio presentation to show how the Niagara River is used to produce electricity. There are several video presentations on different topics that are interesting as well as educative. Visiting hours are between 9 and 5 all days a week. Admission is free. There might be slight changes in the timings due to renovations or other such factors.

(Renewables, this is what it will cost you. Ain't cheap.)

## **Hydropower Costs | Renewable Energy Hydroelectricity Costs vs Other Renewable & Fossil Costs**

planetsave.com, 3/10/16

Hydropower costs reportedly equal the lowest levelized price of electricity compared to all major renewable energy and fossil fuel sources.

This clean electricity source is regarded as the most mature, reliable, and cost-effective renewable power generation technology available in the world. Hydropower operations usually have flexibility in their design as well and can be structured to meet baseload and peak demands.



### World Hydropower Electricity Production

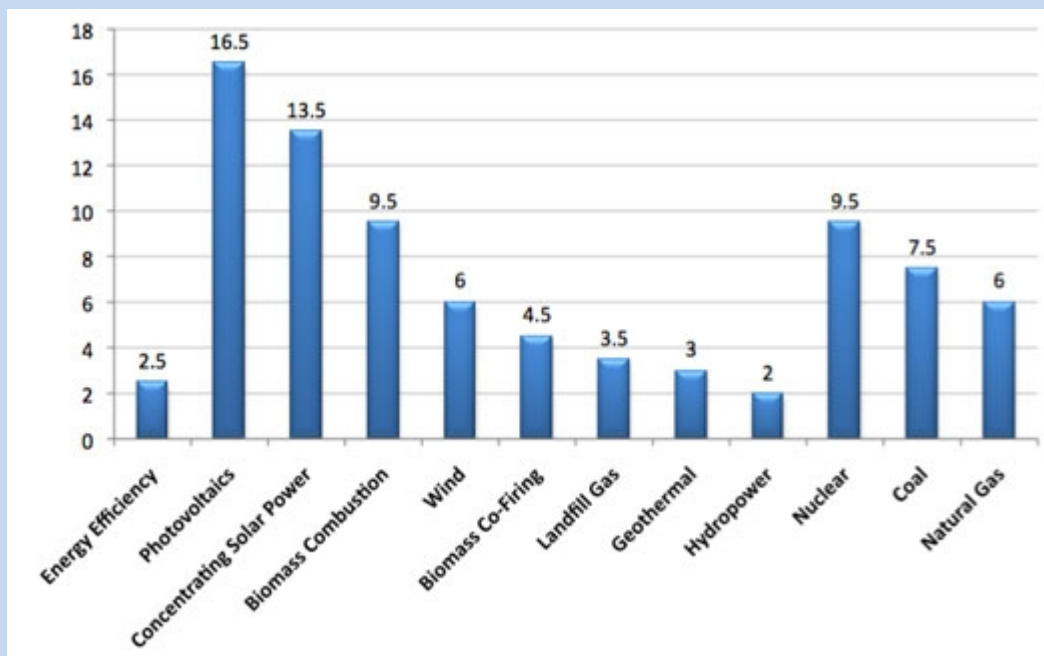
Hydropower produces around 16 % of the world's electricity and over 80% of the world's renewable electricity.

Currently, more than 25 countries in the world depend on hydropower for 90 % of their electricity supply (99.3 % in Norway), and 12 countries are 100% reliant on hydro. Hydropower also produces a large share of electricity in 65 countries and is used at some level by more than 150 countries. Canada, China, and the United States have the largest hydropower generation capacity.

According to the International Renewable Energy Agency (IRENA), hydropower is the most flexible source of power generation available. It is also capable of responding to demand fluctuations in a short time sequence.

“Although other plants, notably conventional thermal power plants, can respond to load fluctuations, their response times are not as fast and often are not as flexible over their full output band. In addition to grid flexibility and security services (spinning reserve), hydropower dams with large reservoir storage be used to store energy over time to meet system peaks or demand decoupled from inflows. Storage can be over days, weeks, months, seasons or even years depending on the size of the reservoir.”

The National Hydropower Association (NHA) highlights that hydropower generation benefits consumers through lower electricity costs. States in this country getting the majority of their electricity from hydropower include Idaho, Washington, and Oregon. On average, residents there have energy bills which are lower than the rest of the country. Relying only on the power of



moving water, hydro prices don't depend on unpredictable changes in fuel costs.

When evaluating cost factors, hydropower shows the lowest levelized cost of electricity across all major fossil fuel and renewable energy sources. In addition, it actually costs less than energy efficiency options, according to a recent study from Navigant Consulting and the American Council on Renewable Energy (ACORE).

### **LEVELIZED COST OF ELECTRICITY FOR VARIOUS POWER AND ENERGY EFFICIENCY OPTIONS, ¢/KWH — National Hydropower Association**

The above chart shows the relatively low cost of hydro in terms of maintenance, operations, and fuel costs when compared with other electricity sources and across a full project lifetime. For hydro projects, a longer lifespan (the Navigant study assumed 50 years) means not only are costs spread across a longer timeframe but also takes into account that the power generating equipment used at these facilities can often operate for long periods of time without needing major replacements or repairs.

#### **Annual Operations & Maintenance Costs**

The IRENA study concludes, “Hydropower is the only large-scale and cost-efficient storage technology available today. Despite promising developments in other energy storage technologies, hydropower is still the only technology offering economically viable large-scale storage. It is also a relatively efficient energy storage option.”

IRENA reports average investment costs for large hydropower plants with storage typically range from as low as \$1,050/kW to as high as \$7,650/kW, while the range for small hydropower projects is between \$1,300/kW and \$8,000/kW. Adding additional capacity at existing hydropower operations or existing dams that don't have a hydropower plant can be significantly cheaper, and can cost as little as \$500/kW.

New technologies are also viewed as holding tremendous promise for further hydropower development, including marine and hydrokinetics.

Installed project costs – as opposed to levelized electricity costs – also need to be considered regarding hydropower. There is no standard, based on the various types and sizes of hydro projects and number of technologies deployed.

#### **Hydropower Facts**

Via the Wisconsin Valley Improvement Company:

- Worldwide, about 20% of all electricity is generated by hydropower.
- Hydropower provides about 10% of the electricity in the United States.
- Norway produces more than 99% of its electricity with hydropower.
- New Zealand uses hydropower for 75% of its electricity.
- In the US, hydropower produces enough electricity to serve the needs of 28 million residential customers. This is equal to all the homes in Wisconsin, Michigan, Minnesota, Indiana, Iowa, Ohio, Missouri, Nebraska, Kansas, North and South Dakota, Kentucky, and Tennessee.
- Hydropower can come “on line” quickly to meet rapid increases in electric demand and respond to emergency energy needs.
- In the U.S., hydropower is produced for an average of 0.85 cents per kilowatt-hour (kWh). This is about 50% the cost of nuclear, 40% the cost of fossil fuel, and 25% the cost of using natural gas.

#### **Hydropower Development in the Future**

James Conca, writing for Forbes, states: “...developing countries are planning to dramatically expand hydroelectric power generation in their desperate need for electricity and irrigation.” Not only do such countries use their own resources without breaking the bank, hydropower is proven to provide low-carbon, long-term, reliable baseload electricity generation. Over 620 hydroelectric dams are presently under construction and some 3,000 are planned for the near-future. Most of this hydropower development is taking place in Latin America and Asia. Concerning future development in this country, the NHA contends hydropower is this nation's most available, reliable, affordable, and sustainable energy source. The basic requirement calls only for the power of moving water, whether it happens to be rivers, streams, or ocean tides. “Free from a

dependence on volatile fuel prices, much of the money invested in hydropower stays in America and expanding hydro capacity would create hundreds of thousands of US jobs." Linda Church Ciocchi wrote in the StarTribune, "At the national level, hydropower is combating climate change more than any other renewable resource. Thanks to hydropower, the US avoids approximately 200 million metric tons of CO2 annually — the equivalent of taking 42 million cars off the road." Conca's Forbes calculations show the current level of worldwide hydropower development will require about \$3 trillion in investment to produce about 60 trillion kWh of electricity by mid-century. On the plus side, "It would provide irrigation water and sufficient power to raise almost a billion people up out of abject poverty. And this much hydropower would avoid 50 billion tons of carbon emissions from entering the atmosphere," Conca said.

### Environmental Impacts

Hydropower may stand tall as we search for inexpensive renewable power sources. However, it can come with a significant price, including damming most of Earth's important rivers. Writing for Vox, Brad Plumer's crystal ball shows this potential consequence: "If built, these dams could provide electricity for millions of poor people who don't have it. But dams can also be extremely controversial. Some projects can end up displacing thousands of people and destroying river habitats — something the United States learned the hard way last century. What's more, recent research has questioned whether hydropower is as climate-friendly as once thought." The clean side of this energy source may be great; but the disruptive side needs to be considered with the utmost care. Those are costs too, and they don't show up in the levelized cost of electricity calculations.



### Water:

(More is what they need.)

### **Rain swells lakes, dams in Northern California**

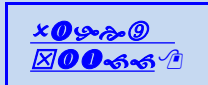
By Associated Press, March 10th 2016, [bakersfieldnow.com](http://bakersfieldnow.com)

SAN FRANCISCO (AP) — The ongoing deluge of storms in Northern California has swelled lakes and dams, boosting the prospects for outdoor recreation but likely falling short of ending the drought. Heavy rain hit the region north of San Francisco on Thursday with four inches expected by Friday, the National Weather Service said. In Santa Rosa, the storm caused a partial roof collapse at a K-Mart store. No injuries were reported. The water level at Loch Lomond Reservoir in Santa Cruz County, which had been closed for the past three years, rose so fast that the lake was reopened for the weekend, the San Francisco Chronicle reported (<http://bit.ly/1YBO0BJ>). The lake was about 85 percent full and climbing. In Marin County, Lagunitas, Bon Tempe, Alpine, Kent, Phoenix, Soulajule and Nicasio lakes are 100 percent full.

Of the big reservoirs, Shasta rose three feet last weekend and is 63 percent full. The water in Lake Oroville has climbed 20 feet in the past week after hitting a near-record low in December. "We were down in the mud, Oroville Marina general manager John Prieto told abc10 (<http://bit.ly/21X7yGa>). "We became the face of the drought. So people on the one hand got to hear about Lake Oroville, hear about where it was and why it was so important. Hopefully they'll come back now that the water's here and see it in a whole new light." Water was released from Sugar Pine Reservoir after the latest storm. A body was recovered Wednesday from a car that plunged into a rain-swollen creek south of the reservoir. Workers have opened Folsom Dam's three floodgates for the first time since 2012.

Still, nearly all the state's major reservoirs hold far less water than average for this time of year, the Department of Water Resources said. In Southern California, the sun was shining Thursday,

but rain was expected by Friday. In addition, a Pacific storm system was headed for Central California. The snow level was expected to drop to around 5,000 feet in the mountains. Water experts have said that one wet year won't be enough to end the drought, given the water deficit from the driest four-year period on record. The Sierra snowpack, which normally stores about 30 percent of California's water supply, was only 83 percent of the March 1 average.



### **Other Stuff:**

(More renewables than we thought.)

### **Defying projections, renewable provide 13.5% of U.S. electricity In 2015**

By admin, March 7, 2016, greentechlead.com

SUN DAY Campaign, a non-profit research and educational organization dedicated to sustainable energy future, says the renewable energy (biomass, geothermal, hydropower, solar, wind) growth in the U.S. has been promising, but the Federal Energy Regulatory Commission (FERC) has failed in their forecasts on the industry. In the first 2016 issue of its monthly



“Energy Infrastructure Update” report, the Federal Energy Regulatory Commission (FERC) notes that five new “units” of wind (468 megawatts (MW)) and 6 new units of solar (145 MW) accounted for 100 percent of new electrical generation brought into service in January. No new capacity for nuclear, coal, gas, or oil was reported

Renewables now account for 17.93 percent of total installed operating generating capacity in the U.S.: hydropower (8.56 percent), wind (6.37 percent), biomass (1.43 percent), solar (1.24 percent), and geothermal (0.33 percent). In fact, installed capacity for non-hydro renewables (i.e., biomass, geothermal, solar, wind) alone (9.37 percent) now exceeds that for either nuclear (9.15 percent) or oil (3.84 percent). The new renewable energy capacity added in January is continuing a trend. Just a month earlier, FERC's December 2015 “Energy Infrastructure Update” revealed that renewables had accounted for 64 percent of all new electrical generating capacity installed last year. Separately, the U.S. Energy Information Administration (EIA) has issued its latest “Electric Power Monthly” (covering all twelve months of 2015) indicating that electricity generated by renewable energy sources grew by over 2 percent compared to 2014 and accounted for almost 13.5 percent of “utility-scale” electrical output in the U.S. last year. Moreover, EIA's end-of-the-year data reveals significantly higher growth in the renewable energy sector than the agency had forecast less than three months ago for calendar year 2015 in its “Short-Term Energy Outlook.” At that time, EIA said it expected “total renewables used in the electric power sector to decrease by 1.8 percent in 2015. Hydropower generation is forecast to decrease by 8.2 percent, and non-hydropower renewable power generation is forecast to increase by 4.2 percent.” In reality, compared to calendar year 2014, non-hydro renewables increased by 6.9 percent, hydro output declined by just 3.2 percent, and the total of hydropower plus non-hydro renewables grew by 2.03 percent. For calendar year 2015, grid-scale renewables accounted for 13.44 percent of net U.S. electrical generation — up from 13.16 percent in 2014, SUN DAY campaign reported. Of that, non-hydro renewables accounted for 7.30 percent while conventional hydropower was 6.14 percent. Generation by all non-hydro renewable sources grew in 2015. Biomass was up by 0.3 percent, wind by 5.1 percent, geothermal by 5.6 percent, and solar by 49.6 percent.

Renewable energy growth is significantly outpacing earlier EIA projections. Less than four years ago, in its "Annual Energy Outlook 2012," EIA forecast that non-hydro renewables would grow at an annual rate of 3.9 percent and provide about 250,000 thousand megawatt-hours in 2015 while non-hydro renewable electrical generating capacity would reach approximately 85 gigawatts (GW). It also forecast that non-hydro renewables would not surpass hydropower until 2020. In fact, EIA now reports actual generation from non-hydro renewables in 2015 to have hit 298,358 thousand megawatt-hours from utility-scale facilities alone; in addition, at least 12,141 thousand megawatt-hours was provided by distributed solar photovoltaic and an unknown amount from other distributed, small-scale renewables that are not grid-connected (e.g., small wind). Further, electrical generation from non-hydro renewables surpassed that from hydropower more than a year ago.

And, according to FERC, the total installed generating capacity of wind, biomass, solar, and geothermal units had reached 109.6 GW by January 2016 — and this reflects just the combined capacity of larger renewable energy facilities. FERC's data only includes plants with nameplate capacity of 1 MW or greater and therefore does not reflect the additional capacity provided by rooftop solar or other smaller, distributed renewable energy systems. "Just a few years ago EIA had forecast that renewables might provide 15 percent of the nation's electricity by 2035," noted Ken Bossong, executive director of the SUN DAY Campaign. "It now appears that goal could be reached within the next two years and quite possibly sooner!"

(That's the way it's always been. The consumer pays the freight. Who else will pay?)

### Legalized Theft In the Beaver State

William O'Keefe | 03/10/2016 | economics21.org



Only government can make stealing a virtue. Oregon is on a course to do just that. The House and Senate have passed legislation that would eliminate coal as an electric power source within two decades. The bill, now awaiting Governor Kate Brown's signature, would require that renewables provide 50 percent of the state's power by 2040. This is a scheme that must have the state's two major utilities--Portland General Electric and Pacific Power--salivating, because they will reap higher profits. Oregon's in-state power generation is primarily hydroelectric, providing at least half of the Beaver State's electric power, according to

the Energy Information Administration. Coal and natural gas provide most of the rest of the state's electrical power. Oregon also imports electricity from Idaho Power, which generates electricity from hydropower and natural gas. Since the legislation forces in-state coal-generated power to be eliminated before the end of its useful life, customers will bear the brunt of shut down and decommissioning costs. This could represent a financial windfall for the two major utilities. The potential for expanding hydropower is limited because the same environmental activists who have led the charge to eliminate coal-fired power also oppose expansion of hydroelectric power. As a result, coal-fired power will be replaced by higher-cost alternatives or greater imports from out of state power generators. The state's two major utilities complain and wring their hands about the heavy hand of government overriding good business decisions and market forces. In reality, they will smile all the way to the bank. But since utilities operate at a "cost of service" basis, they get reimbursed by customers for the costs they incur and also have a guaranteed rate of return. The higher the costs, the more revenue they receive. In the end, Oregon's utilities will market themselves as leaders in the green energy climate change movement even though nothing they do will affect the climate.

It is unlikely that Oregon's legislation will lead to a single coal plant closing. Pacific Power, one of the utilities subject to the legislation, has equity interests in coal plants that provide electric power



to customers in six states. As National Association of Regulatory Utility Commissioners president Travis Kavulla wrote in the Wall Street Journal, Pacific Power "could simply reallocate coal-generated power to customers outside Oregon." Portland General Electric is a co-owner of a coal plant with Montana utilities. It could follow a similar strategy. **How can the Oregon legislature monitor and enforce its anti-coal mandate?** Unless coal-fired power from those power generators declines, emissions will not be affected. In the end, Oregon electric utility customers will pay more for power while emissions are not reduced. Furthermore, since emissions are global, state emission reduction schemes only have value if they are part of a global program. EIA projects that coal consumption will increase over the next two decades. This is a classic example of how different interest groups--in this case, the environmentalists and the utilities--conspire to pick the pockets of consumers while making it appear that the public good is being served. This election year is making it obvious that a large segment of the voting public is tired of being bamboozled. **When Oregon citizens find out that they have been fleeced by their legislators and climate activists who wrongly assert that greenhouse gases are declining, they may show the same level of anger.** *William O'Keefe is the President of Solutions Consulting.*

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