Dams:
(Show me the money!)

One Year Later, Who Will Pay For Oroville Dam Spillway Emergency?
By Angela Musallam, February 7, 2018, sacramento.cbslocal.com

SACRAMENTO, CA (CBS13) — One year ago on Wednesday, state water officials discovered a failing spillway at the Oroville Dam. Days later, an evacuation would send nearly 200,000 people running for their lives. The estimated cost to repair it today? $870 million. The Department of Water Resources is asking FEMA to help pay for 75 percent of the cost, but FEMA is balking, saying the spillway damage was caused by deferred maintenance; “There is no alternative. The work has to get done, and it has to stay on schedule,” said Assemblyman James Gallagher.

The spillway collapse in 2017 was a wake-up call for Gallagher. He’s now a driving force behind a bill which would require the Department of Water Resources and the Division of Dam Safety to

“Good wine is a necessity of life.” - Thomas Jefferson
Ron’s wine pick of the week: 2013 Vinum Cellars Cabernet Franc "The Scrapper"
“No nation was ever drunk when wine was cheap.” - Thomas Jefferson
update their inspection policies. "That would have been helpful with Oroville, because everybody that's looked at the original design said it was a faulty design," Gallagher added. A group of dam experts last month concluded the Oroville spillway was built incorrectly; they also said the warning signs of failure were ignored by multiple agencies for years. "There were years of lax maintenance and oversight, so they should be the ones paying for it, the state should be responsible for that," said Gallagher.

The Department of Water Resources, which oversees the Oroville Dam is asking FEMA to help cover 75 percent of the repair costs. "DWR did not adequately maintain those facilities," said Rep. John Garamendi, in a phone interview on Wednesday. Garamendi says FEMA should not be helping with repair costs. He says the problem stems from Delta Tunnels project, which he says was funded by agencies with other priorities. That project was downsized on Monday to a single tunnel.

CBS13 asked if the state has enough money to pay for the spillway repairs if FEMA doesn’t step in. Garamendi responded, saying "I can assure you the Metropolitan Water District of Southern California that was willing to spend $15 billion to $20 billion on their tunnels has the capability of paying $870 million to fix what they didn’t bother to maintain." The State Water Contractors would be responsible for footing the repair bill. CBS13 reached out to the agency Wednesday, but they declined to comment. Meanwhile, a spokeswoman for DWR says it will “… continue construction at the Lake Oroville spillways project until repairs are completed in early 2019." DWR says it has already replaced most of the main spillway ahead of another potentially wet season.

(If some of the many lawsuits go against the State, the legal bill for the failure could be enormous.)

Oroville Dam crisis prompts $51 billion lawsuit
BY DALE KASLER, sacbee.com, February 08, 2018

The state got hit with another lawsuit over the Oroville Dam emergency, and this one is enormous. Butte County's district attorney sued the Department of Water Resources on Wednesday for the environmental damage created by last February's crisis. In particular, District Attorney Michael Ramsey said DWR should have to pay between $34 billion and $51 billion for the tons of concrete, rock and other debris that fell into the Feather River below the dam. Ramsey filed the suit on behalf of "the People of the State of California," according to court documents.

Oroville Dam’s main flood-control spillway fractured in two last February, with the resulting debris cascading into the river channel. Tons of additional rock and other material fell into the river when the unpaved hillside beneath the dam’s emergency spillway washed away. The state has already been sued by business owners and area governments over the havoc caused by the spillway crisis, which sparked the evacuation of 188,000 downstream residents. Several farmers are seeking millions for damages to orchards caused by surges in water from the dam. The Butte DA’s lawsuit, however, appears to be the first one focused on the debris that went into the Feather River. The suit says the river was inundated by “concrete, lime, slag and substances and material deleterious to fish, plant life, mammals and bird life." It seeks $10 for every pound of material dumped into the water. DWR spokeswoman Erin Mellon said the agency wouldn’t comment on pending litigation. However, in a lengthy report DWR submitted last month to the Federal Energy Regulatory Commission, agency officials acknowledged that the sediment dumped into the river created “potentially adverse effects” on the river’s fish population, including endangered steelhead and Chinook salmon. Fish also were hurt by the sudden shutoff of water releases from the main spillway, which abruptly dropped water levels in the river. As many as 346,000 juvenile salmon, for instance, may have been stranded, the report says. The report
added that DWR worked quickly to rescue fish at a nearby hatchery, and eventually dredged most of the sediment from the river. About 90 percent of the 2.2 million cubic yards of debris was removed by Nov. 1, the report said. In an interview, Ramsey said the removal of much of the sediment could partially offset the damages but wouldn’t eliminate them completely. “The damage is done,” he said.

(Long article about questions that remain.)

Oroville Dam: One year after crisis, distrust lingers, big questions remain

By Risa Johnston, Chico Enterprise Record | February 11, 2018, mercurynews.com

Oroville, CA – It has been one year since water spilled down the Oroville Dam emergency spillway for the first time in history, spelling near-disaster for nearly 188,000 residents downstream. As erosion on that unlined hillside intensified on Feb. 12, water headed upward toward the concrete weir and there was fear that uncontrollable releases from the reservoir behind it would come crashing down on the cities below. Residents were given just one hour to evacuate that afternoon.

One year later, distrust in the state Department of Water Resources remains prevalent in the community. Some hope the department improves on the transparency front and takes critics more seriously. For others, the damage seems irreversible. There are still big questions to answer, like who will pay for the now $870 million price tag for repairs, and what a new license for DWR to operate the dam would look like. On the first anniversary of the crisis, questions remain open about the state of recreation, how the spillways will be different another year from now, and lawsuits filed by locals against the state.

CAN RESIDENTS’ BROKEN TRUST BE REBUILT?

Brandon Gage, owner of Gage Brothers Ranch in Butte County, says he is not sure. Gage, 41, said his family has lived in the area since the Gold Rush. Before the crisis, he only saw the Oroville Dam as an attribute for the community. Gage grew up in Chico and frequented Lake Oroville in the summer. Following the spillway failure last February, however, his view of the dam changed. "After that, of course, you see it as a real threat in some ways," Gage said. “I don’t trust DWR at all.” Referencing recent lawsuits against the state by the city of Oroville and locals, he said the department has taken many missteps and seems to have internal issues with employees. In his opinion, DWR botched the crisis and handling of its aftermath. “I don’t trust anyone in charge during the event because they minimized the breach,” Gage said. "It was a major problem that could have been catastrophic." While not sure if he will ever place faith in the department again, Gage said it would help to have a completely independent audit of the facilities.

A.J. Haggard, a partner at California Occupational Medical Professionals in Oroville, also said his amount of trust in the department currently amounts to “zero.” Haggard, 67, grew up in Richvale, while the dam was being built. Construction was completed in 1968. "I thought the dam was a great thing," he said. "Boating, fishing ... that sort of became the identity of the city." His business was closed for about 12 days, posing issues for patients who needed help with things like getting medications, Haggard said. “That was tough, trying to figure out where people were,” he said. "And if people were really hurting, we were trying to get them to an emergency room or something like that to get their medications refilled." Haggard said the business continued to pay employees during that period and lost an estimated $25,000.

“It was an amazingly stupid mistake for (DWR) to make to not maintain (the dam properly),” he said. “It was very unfortunate that they were not forthcoming with the situation. When water got close to the top, they could have asked any 5-year-old that grew up around here, ‘what happens
when you put water over dirt?” To make amends, DWR should be more transparent and truly put public safety first, Haggard said.

Joe Mata, an Oroville resident who works at the Pacific Coast Producers cannery, said he has always been leery of the department. His father worked as an accountant for the county, so Mata grew up hearing about broken promises. “I haven’t trusted them since day one,” he said. On Feb. 12, he noticed an abnormal amount of traffic on Oro Quincy Highway near his home and turned on the radio to find out about the mandatory evacuation. He rushed his two children into the car and headed to Chico, where they would spend the night in their truck in the Walmart parking lot. Already a stressful situation on its own, it was compacted by the fact that Mata had trouble comforting his 12-year-old son who has autism. “He just lost it because he has a certain routine he is used to,” he said. “I had to keep him from bashing his head against the wall.”

The experience afflicted Jane Hume, 74, and her family to the point that she decided to move to Chico afterward, despite continuing to work in Oroville at Sierra Pacific Industries. She got emotional recounting last year’s events. She was at home reading when her daughter called and told her “you need to get out now, don’t take anything, just hop in the car and go.” “Every relative was calling me,” Hume said. “When you’re sitting in traffic, you’re thinking about everything you care about.” Hume, who lived in Oroville for 18 years, said regardless of what changes the department makes, she will not consider moving back.

Louise Feldt, who is 79 and retired, acknowledged that she had a certain level of confidence in DWR, as she continued to live in Oroville. Feldt moved to the city from Red Bluff three years ago and lives in a low-income senior housing apartment complex. Feldt said she hoped for little rain this year as her faith is limited. One way to regain her trust would be for the department to take seriously the UC Berkeley group which has issued several reports critical of DWR’s management and maintenance, she said. “I don’t consider that a good sign, that they don’t believe people from (UC Berkeley),” Feldt said. “It sounds like there was carelessness for years. They ignored what they were supposed to do. It could have flooded the whole area.”

**WHAT’S RECREATIONAL ACCESS LOOK LIKE?**

Kevin Zeitler, chair of the Oroville Recreational Advisory Committee, said the further out, the better. For now, he says, it’s not great. “It’s kind of like getting punched in the eye a second time,” Zeitler said. The committee has been told to expect that the spillway boat launch ramp, the largest ramp on the lake, will likely not reopen until late 2019. In the meantime, the state Department of Water Resources has pushed forward projects the committee has advocated for, as long as 10 or 15 years, Zeitler said. “The good news, in some cases, is the department realized they had to make things better so they’re expanding facilities,” he said. “The department is trying to make things right, if you will. It’s just a long way to go.” Committee members are still wary of the department’s stated intent to reopen the spillway ramp. They want assurance of a plan for a replacement ready to go, in case DWR is told down the road that a security concern makes it impossible to reopen the facility. The committee also wants the department to confirm that Homeland Security has given the all clear. “Our major concern we probably have is the spillway (ramp),” Zeitler said. “It’s such a big project.” While understanding that access has to be limited to some extent during construction, he hopes that there is a change in what seems to be the “default” to extensive closures. “Only things that absolutely have to be closed, close those,” Zeitler said. “Anything else, try to work around and open as much as possible.” If people come to visit Lake Oroville and can’t get in, they won’t come back, he said. With the lake low and use of it limited, tourism suffers. “Time is money. You don’t get any time back when you waste it,” Zeitler said. “It means recreation and the economy is depressed. That’s one of the last things we need in one of the poorest counties in California. Where’s the justice for that? We need everything to be A class.”

**LAKE OROVILLE: WHAT’S OPEN, WHAT’S CLOSED?**

Aaron Wright, California State Parks superintendent, said the following areas are accessible: all trails east and south of the visitors center, the west portion of the Lakeland Boulevard trail, and
trails around the North Thermalito Forebay and South Thermalito Forebay. He added that State Parks does not manage the Thermalito Afterbay, where several miles of trails are open. Boat launch ramps are available at Bidwell Canyon, Lime Saddle and Foreman Creek recreational areas. Campgrounds at Loafer Creek, Bidwell Canyon and Lime Saddle are also open. **In terms of how much is open:**

- For biking: 37.27 miles normally open, 9.79 miles currently open (26 percent)
- For horse riding: 36.62 miles normally open, 11.90 miles currently open (32 percent)
- For hiking: 65.07 miles normally open, 26.69 miles currently open (41 percent)

**WHAT’S NEXT PHASE OF SPILLWAY CONSTRUCTION?**

The department met its Nov. 1 deadline to repair the broken spillway to withstand 100,000 cubic-feet per second flows, and the next phase could be even more challenging, said Jeff Petersen of Kiewit Infrastructure West Co. Kiewit’s contract goes until January 2019. Petersen said on Jan. 26 that 200 employees were working on the site, a considerable downsize since the height of reconstruction. In September, about 600 crew members were out on the spillway, many of whom were working seven days a week or double shifts. The latest cost of repairs jumped in late January from $500 million to $870 million. Officials said that number newly included debris and sediment removal, power line replacements, staff time, technical consultants, inter-agency support and the creation of access roads.

It remains to be seen who will pay for it all. Congressmen Doug LaMalfa (R-Richvale) and John Garamendi (D-Walnut Grove) announced last week that the Federal Emergency Management Agency was voicing uncertainty about whether it would be able to cover the cost of repairs, as FEMA is not meant to cover expenses resulting from a lack of repairs, and will only provide reimbursement for facilities to be brought back to their “pre-disaster design.” The department has been hoping FEMA would pay for 75 percent of the price tag with the State Water Contractors on the hook for the remainder of the bill. The agency has issued the department $86.9 million for emergency response, said Erin Mellon, DWR assistant director of public affairs, on Friday. She said DWR had so far submitted $115.9 million to FEMA, amounting to 75 percent.

Phase two should start in May, weather permitting. Major work to be completed this year includes:

- A concrete splash pad made of roller-compact concrete, or RCC, will be installed below the emergency spillway weir.
- An underground secant pile wall, also referred to as a cutoff wall, should be complete in March. Concrete is being drilled 35-65 feet underground into bedrock. The underground wall combined with the splash pad are measures to prevent massive erosion and headcutting like what occurred last February, leading to fear that water would overtop the weir.
- The uppermost 730 feet of the spillway will be entirely reconstructed.
- Reinforced structural concrete will be laid on the middle chute and its walls, which were filled with RCC in 2017.
- At the bottom of the spillway, energy dissipaters, also known as dentates, will be hydro-blasted and resurfaced.

**WILL POWER PLANTS BE AT FULL OPERATION?**

DWR aims to have two of four units at the Ronald B. Robie Thermalito Powerplant up and running by the end of 2018, Mellon said. That power plant at the outfall of the Thermalito Forebay has not been functional since a fire broke out there on Thanksgiving Day in 2012. The department announced in November plans to have all turbines in the Hyatt Powerplant operational in 2018 for the first time in years. Mellon said on Friday that the department aimed to have the plant’s sixth turbine operational by mid-2018 but a recent test of the refurbished turbine’s shutoff valve showed a need for further repairs, which the department intends to have done by the end of the year. DWR also has an outage planned for one of its two penstocks, which involves three turbines, but that will be timed to ensure the department can safely manage lake levels during the outage, she said. A fire broke out at the Hyatt Powerplant on Wednesday, the
one-year anniversary of the day the spillway started to break. The fire was described as small and was already put out by the time Cal Fire-Butte County arrived on scene. Mellon said it was discovered during a routine inspection, and that a formal investigation would be conducted. Despite the fire, she said on Wednesday that the plant could operate, if needed.

WILL SUITS, NEGOTIATION BRING ANY CHANGES?
Over the past month, four lawsuits have been filed against the state over the Oroville Dam crisis. The city of Oroville filed first, followed by over 40 downstream farmers, business owners and other property owners. The Butte County District Attorney filed a $51 billion complaint for environmental damages on Wednesday, and a class action lawsuit was brought forth on Thursday. Other than the District Attorney’s suit, all are represented by law firms Cotchett, Pitre & McCarthy, LLP out of Burlingame and Woodland-based Gardner, Janes, Nakken, Hugo & Nolan. While damages in the three complaints are different, they contain the same allegations of corruption within the department. The city seeks reparations for road repairs but the suit also contains accounts that are not directly related to the crisis. County Counsel Bruce Alpert said that was sending a message. “That complaint was a sea change,” Alpert said. “People are seeing what’s in our backyard for what it is.”

For a long time, the county and city have not seen eye-to-eye on what their relationship to DWR should be, a main point of contention being that the county did not sign onto the $61 million settlement agreement, while the city did. With negotiations finalized over 10 years ago, a new license for the department to operate the dam has yet to be issued. Meanwhile, DWR has continued to operate under the conditions of the old license. The Oroville City Council approved another one-year extension in June by a 5-2 vote, with councilors Jack Berry and Marlene Del Rosario against.

The Federal Energy Regulatory Commission, or FERC, could grant the license for a term of up to 50 years. Many license agreement signatories, including local environmental groups and cities downstream, have formally requested that FERC delay issuing the license at least until all parties have time to review and process the findings in the independent forensic report, which was released on Jan. 5. The report blamed “long-term systematic failure” for the crisis. Bill Connelly, chair of the Butte County Board of Supervisors, said he thinks the signatories should not just delay, but ask for a reopener because of how much has changed in the last 10 years. It is unclear if there is a legal way to get out of the agreement. Is his view, the city has taken a “180” with its recent lawsuit, but he still feels the community does not fully appreciate what benefits the city could have because of the dam’s location, like lower cost electricity, for example. “You would think the world would wake up and listen to us a little bit,” Connelly said. Butte County has four pending lawsuits against DWR unrelated to the Oroville Dam crisis. Since its claim was recently rejected, supervisors may soon vote in closed session to pursue a lawsuit of their own.

California lawmakers unanimously passed new legislation Monday to inspect most dams and reservoirs annually, one year after state officials ordered emergency evacuations for hundreds of thousands of residents living below the Oroville Dam. “More needs to be done to ensure the safety and integrity of our water infrastructure,” said Assemblyman James Gallagher (R-Yuba City), the bill’s author. Under current law, state inspectors are required to examine the condition of dams, but don’t have specified timelines. Last year, after strong rainfall across Northern California, the Oroville Dam reached capacity and its main spillway was severely damaged. The threat of the spillway’s failure led to a sudden evacuation order due to fear of flooding and levee failures for miles around the dam. To have something that catastrophic occur
should certainly be a wake-up call for all of us," said Assemblywoman Susan Talamantes Eggman (D-Stockton) during debate on the bill. "The legislation, Assembly Bill 1270, is an urgency measure, meaning it will take effect immediately if Gov. Jerry Brown signs it.

(The infrastructure is falling apart.)

S.O.S: Locks and Dams on U.S. Rivers Falling Apart
2/5/2018 | By Mary Kennedy, DTN Basis Analyst, dtnpf.com

According to a recent press release from the Soy Transportation Coalition (STC), they noted there is "widespread agreement that it is not a matter of if there will be a failure at one or more of our key lock and dam sites, it is a matter of when." "A failure of significant duration -- particularly during and subsequent to harvest -- would severely impact the competitiveness of the soybean and grain industries and diminish the profitability of the individual farmer. This increasingly likely scenario must be avoided. As a result, an enhanced focus on operations and maintenance to increase the reliability of resiliency of the nation's locks and dams should be adopted."

"Maintenance and rehabilitation of locks and dams to significantly reduce the potential for unexpected, widespread and prolonged failure," was recommended by the STC. "Priority should be devoted to ensuring the reliability of locks and dams along the nation's inland waterways. Available funding for new construction of locks and dams should be directed first to locks and dams 20 to 25 on the Mississippi River," said the STC. There are currently 28 locks and dams on the Upper Mississippi River system. This series of locks and dams is operated by the U.S. Army Corps of Engineers and maintains a 9-foot channel on the Mississippi from St. Paul, Minnesota, to St. Louis, Missouri. As the aging locks and dams continue to deteriorate, especially when damaged by floods, the Corps has to make costly repairs, and in some cases, can only make a temporary fix. The U.S. Army Corps of Engineers (USACE) has said in the past that it is "unable to adequately fund maintenance activities to ensure the navigation system operates at an acceptable level of performance." The most notable disruption last fall was the multiple closures between September and October at locks and dams 52 and 53 on the Ohio River. These disruptions occurred at the worst time for farmers who were hauling their fall harvest to the river for shipment to the Gulf. Even though the river finally reopened there on Oct. 19, the backlog of tows remained an issue well into November, slowing traffic anxious to get to the Gulf for export. Problems continued into January 2018, stalling barges at times from getting up and down river.

(Hoping for success.)

Success Lake Dam project sent to Congress
Reservoir Enlargement
February 9, 2018, portervillerecorder.com

Army Corps of Engineers estimate costs at $59 million

The Success Reservoir Enlargement Project was authorized by Congress in the 1999 Water Resources Development Act at a funding level of $17.9 million. Construction on the SREP started in 2004, but was put on hold because of potential safety issues. Following nearly a 15 year delay, the U.S. Army Corps of Engineers (USACE) has re-started the SREP, including providing $200,000 for this project in its Fiscal Year 2017 Work Plan. However due to the delay, SREP costs have increased, potentially requiring Congress to re-authorize this project at a higher level. In 2017, the Tule River Improvements Joint Powers Agreement Agencies, a consortium of Tulare County entities, submitted an application, to the USACE to increase the authorization level for the
SREP based on potential increased costs. McCarthy has in years past advocated for the project and is still doing so.

"Last year, I invited Army Corps leadership to Success Dam to meet with local officials and discuss the enlargement project," he stated. "There a commitment was made to get this important project off the bureaucratic sidelines and into high gear. Today’s report further advances this goal. Our community has been ready for updates to our water infrastructure for years and this enlargement project will ensure that we can capture more water in wet years to use during the inevitable dry years, as well as increase flood protection for communities below the dam. "I will continue to work with our community, the Army Corps, and my colleagues in Congress to get this project underway and completed as quickly as possible." In June of 2017, officials estimated the project would cost more than $35 million. If funded no timetable as to when work will begin was given. Estimates are the project would take 18 months to construct.

(Dam removal is always in the news.)

One final step to Columbia Dam removal

By Bruce A. Scruton, New Jersey Herald, Feb. 11, 2018, njherald.com

KNOWLTON, NJ -- A permit to remove the Columbia Dam on the Paulinskill has been issued and work can begin, with a break for the spring fish spawn, as soon as one final permit, permission to "de-water" the current lake behind the dam, is obtained. The project, while in the state-owned Columbia Wildlife Management Area, is being undertaken by The Nature Conservancy as part of the group's overall plans for the entire Paulinskill watershed, which begins in Sussex County and ends in the Delaware River, just a half-mile downstream from the dam. Approval of the removal was granted by then-DEP Commissioner Bob Martin on Jan. 5 and the formal permit to tear down the dam was issued on Jan. 22. The commissioner's approval came after he reviewed the results of a public hearing held in November, which was prompted by a Knowlton Township Committee resolution opposing removal of the dam. That resolution was a consequence of a township-wide vote held in November 2016 where two-thirds of the voters opposed removal of the dam. The result of the public vote triggered the state law that required the public hearing and the DEP commissioner decision on whether to allow the project to go forward.

In his six-page decision, Martin said that none of the people who spoke at the hearing in opposition to the dam's removal did so based on "the design or the belief that it would not be successful." Instead the opposition was based on a variety of reasons, ranging from taking away a 43-acre recreational lake to infiltration of the Paulinskill by the invasive Northern Snakehead, an eel-like fish. Concerns that a fire department standpipe, used to fill up water tankers during a fire, was fed by the lake were met, the letter noted, with The Nature Conservancy committing to build a new dry hydrant in a place "identified as being preferable to the current location at Columbia Lake." Martin wrote that the Northern Snakehead was already in most tributaries to the Delaware River and the fish's presence had not affected the variety of local fish. He noted that the losses of some warm-water fish because of the dam's removal, would be replaced by other species of fish that prefer colder, moving waters. He also noted that water quality would be improved by a free-flowing stream, and the dam's removal would restore natural river processes such as sediment transport. The de-watering permit will regulate how fast the lake is emptied as the dam structure is taken down.

Because of fish spawning, no work within the river can be done between March 15 and June 30.
Work must begin within a year of the permit's issue and be completed within two years, or by Jan. 22, 2020. The dam was built in 1907 to provide hydroelectric power to the local grid. The Nature Conservancy negotiated with the owner, Great Bear Hydropower, to buy its permit to operate. That permit was due to expire within the next eight years, and Great Bear was facing a major financial commitment to upgrade equipment to renew the permit. The dam is 18 feet high and 330 feet across. It produced only 400 kilowatts of power and operated only part-time. As part of its plan, The Nature Conservancy is working with the Pequest Fish Hatchery to build a solar power array at its facility which will produce more than the 400 kilowatts lost with the dam's removal.

Oroville crisis drives harder look at aging US dams
By ELLEN KNICKMEYER, February 11, 2018, foxbusiness.com

SAN FRANCISCO, CA – One year after the worst structural failures at a major U.S. dam in a generation, federal regulators who oversee California's half-century-old, towering Oroville Dam say they are looking hard at how they overlooked its built-in weaknesses for decades. The Federal Energy Regulatory Commission is telling owners of the 1,700 other hydroelectric dams it regulates nationally that it expects them to look equally hard at their own organizations and aging dams, in the wake of the sudden collapse of much of first one, then both spillways last February at the 770-foot (235-meter-tall) Oroville Dam, the nation's tallest. Given that the average dam in the United States is in its 50s, like Oroville, it's critical that owners and monitors of America's 90,580 dams act on a main lesson of the near-disaster, dam officials nationally say: Is the way a dam was built in the Cold War-era or earlier good enough to protect lives in 2018 and beyond? The crisis in California, a state that had been recognized nationally for its dam-safety program, "makes very clear that just because a project has operated successfully for a long period of time, does not guarantee that it will continue to do so," the federal dam regulators wrote late last month in an unusual, blunt open letter to U.S. dam operators.

"We are focusing on how to improve our program to identify and prevent incidents, regardless of magnitude, that could result from similar dam safety and organizational factors that contributed to the Oroville incident," regulators wrote. "We expect our regulated dam owners to have similar internal discussions." Last Feb. 12, residents across parts of three counties in the Sierra Nevada foothills fled their homes. Authorities warned the chain reaction of structural failures at the Oroville Dam complex could send a wall of water gushing through their nearby Gold Rush-era towns within the hour. Despite evacuation orders for nearly 200,000 people, however, the feared uncontrolled release of massive amounts of Oroville's reservoir did not happen. California's repair bills for the near-disaster have neared $1 billion. Residents downstream have filed more than $1 billion more in claims.

Last month, two national dam-safety organizations focused the blame on the dam's overseers. California's Department of Water Resources, which owns Oroville; regulators; and consultants had focused on satisfying routine regulatory requirements for the dam — which anchors a water system that supplies more than half of California's people — but never took stock of whether the dam complex was built well enough in the 1960s to stand up over time, their independent probe concluded. Oroville shows "we got a little complacent with what we were doing" as an industry, "and now need to re-examine and identify some of the more subtle and latent problems," John France, a Colorado-based dams expert who led the probe, says now. California's Department of Water Resources declined to make an official available to comment for this article, but said in an email it is implementing changes called for by France's team. The 19,000 residents of Oroville, the town that would have been first in the path of water from the reservoir, watch the year-round
repairs at the dam in the hills behind them, uneasy still. "I'm not sure how much we trust DWR, but that's out of our hands," said Julie Jackson, owner of a downtown Oroville flower store. "It was pretty devastating," Jackson said of the fear that overrode tens of thousands of people stuck on evacuation-clogged roads as they tried to save families from what authorities said could be imminent disaster. "All our family members and friends we knew were in the path."

For Lori Spragens, executive director of the national Association of State Dam Safety Officials, the Oroville spillway collapses were the biggest structural failures at a major U.S. dam of her career. The last comparable one was the U.S. Bureau of Reclamation's Teton Dam in Idaho, which broke apart in 1976, killing 11 people. Teton was less than half the height of Oroville, at 305 feet (93 meters). Other U.S. dam failures since the 1970s involved dams that were just fractions of Oroville's size, but killed multiple people. Oroville Dam, by contrast, is the height of a 70-story skyscraper. Its size, and the deep, snaking canyon that opened below it took France's breath away when he drove to the foot of the dam after the spillways' collapse. "I can't report exactly what I said without expletives," the dam-safety expert said of his reaction. "It's an enormous structure. The erosion was massive."

Dam safety officials, regulators and watchdog groups call Oroville a wake-up call. Most say it's being heard. "Absolutely it's changed things," said Kevin Colburn, a national director of American Whitewater, which works on policy issues affecting rivers nationally. "If I lived downstream of a dam, I'd be glad Oroville happened," Colburn said. The Federal Energy Regulatory Commission, which oversees Oroville and the nation's other hydroelectric dams, said it's too early to detail whether the post-Oroville reviews it ordered nationally have led to changes at other dams, and declined to make a dam regulator available for interview. For some dam owners, however, Oroville's immense size might make them think lessons there don't apply to ordinary dams, said Jonathan Garton, president of the Association of State Dam Safety Officials and a dam regulator for Iowa. So might the fact that no one died, Garton said. "Definitely from a dam-safety community perspective, it was a wake-up call," he said. But "in terms of owners saying, 'Gosh, that scares me,' I haven't seen that."

(Removing dams is one thing, removing hydro is another.)

**Dam removal planned in Fort Dodge**

FEB 13, 2018, by BILL SHEA, City Editor, messengernews.net

The two dams that span the Des Moines River, Iowa in Fort Dodge would be removed during the winter of 2018-2019, according to a plan presented to the City Council Monday. Once the dams are gone, some type of structures will be built in the river to direct the water and reduce stream bed erosion. One of those types of structures, a rock crest weir, was used in Charles City to create some whitewater kayaking and canoeing on the Cedar River. Removing the Hydroelectric Dam and the one south of the Kenyon Road Bridge commonly called the Little Dam would cost an estimated $4.3 million, according to Wade Greiman, a project manager with Snyder & Associates, of Ankeny. Most of that money, an estimated $3.55 million, would be spent on removing the Hydroelectric Dam. He said removing the Little Dam would cost an estimated $750,000.

Money for getting rid of both dams would be included in a proposed $9 million general obligation bond issue the council will consider on March 12. Greiman said staffs from his firm have been out in boats taking measurements of the dams. The dams would be removed in phases, he said. He added that a concrete wall on the western riverbank near the Hydroelectric Dam would also be removed. Local leaders will have a choice of structures to be created after the Hydroelectric Dam is gone. One option is what Nicole Church, an environmental specialist with Snyder & Associates, called a "J-hook." It would be a structure north of the Hydroelectric Dam site that
would look like the letter J. Church said it would direct the flow of water while creating areas that would be good for fishing. The other possibility is rock crest weirs. Church said a number of those were used to create the whitewater attraction in Charles City. Removal of the dams was recommended in a riverfront masterplan adopted by the council last year. "I think this is going to be a great improvement in the condition of the river," Councilman Terry Moehnke said. The council took no action on the plan Monday. Greiman said there will be multiple steps to complete over several months before demolition of the dams can begin.

(Caution on dam removal.)

River Falls commissions recommend keeping Kinnickinnic River dams for now

BY GREG SEITZ | FEBRUARY 12, 2018, stcroix360.com

Two River Falls city committees have recommended retaining two hydroelectric dams on the Kinnickinnic River, WI for the time being. The dams on one of the St. Croix River’s most famous tributaries have been the subject of more than four years of discussion in the community. The recommendations next go to the city council for a final vote on Feb. 27. On Jan. 15, the Municipal Utilities Board recommended renewing the federal license for one of the dams and surrendering the license for the other dam, with removal possible “sometime in the future.” On Jan. 25, the Kinni Corridor Project Committee, a special committee leading the dam decision-making process, issued a final report (PDF): https://www.stcroix360.com/wp-content/uploads/2018/02/Final-Feasibility-Report-for-Dam-Management-2.7.18-FINAL_.pdf on its work and passed a revised version of the recommendation. The committee recommended the city council vote to remove the Powell Falls (lower) dam by 2026 and retaining the Junction Falls (upper) dam for another 22-30 years.

Some river advocates have been advocating for the removal of both dams as a means of restoring the treasured trout stream, revealing long-hidden falls, and improving a valuable asset for the city’s downtown area. Local organizations Friends of the Kinni and the Kinnickinic River Land Trust, as well as the St. Croix River Association, the Kiap-TU-Wish Trout Unlimited chapter, the River Alliance of Wisconsin, and other groups all expressed support for removing the dams.

Friends of the Kinni is urging the city council to overrule the recommendations and remove the dams now. The group is seeking signatures on a petition calling for the immediate cancellation of the federal license, and a plan to remove the dams as soon as possible.

The Kinni Corridor Project Committee examined the dam removal options in the context of a larger planning and engagement process. They developed concepts of how River Falls could bring back its eponymous falls and open up the...
One key aspect of the corridor committee’s recommendation is that removal of the lower dam be carefully studied to understand the costs and benefits, to inform the future removal of the upper dam. The committee also called for a faster removal of the upper dam if ecological conditions degrade unexpectedly. Learn more about the Kinni Corridor Project Committee on its website, and download its final report.

(This ought to about kill it.)

**Tribes have stated opposition to PUD’s hydropower project**

*heraldnet.com, February 13, 2018*

My December letter to the editor compared the needs of starving southern resident orca whales with the desires of Snohomish County PUD to develop hydropower on the south fork Skykomish River at Sunset Falls, which produces 20 percent of Snohomish basin chinook salmon that southern orcas need to survive. In response, a senior PUD engineer replied that the project is “not anticipated to harm fish and wildlife based on review of scientific data by fishery/wildlife experts,” and that it would “greatly enhance conditions for salmon migrating upstream at the existing trap and haul operation.”

The Tulalip Tribes, respected fishery/wildlife experts, have concluded otherwise. In April 2016 the Tulalip and Snoqualmie tribes formally requested that the Federal Energy Regulatory Commission deny PUD’s application based on anticipated harm to juvenile salmon and steelhead. Specifically: “The project will impair downstream fish passage as well as degrade and reduce fish habitat necessary for spawning salmon and other native fishes in the South Fork Skykomish River system, by reducing median monthly flows 63 percent to 90 percent.” “The productivity of the ESA-listed natural origin Skykomish chinook salmon population has substantially declined over the past 15 years to well below the replacement level, meaning the population is currently in steep decline.” “Chinook and coho salmon populations are at or near historic lows, and adding a new source of mortality is not appropriate. The project threatens to do irreversible damage to chinook salmon.” PUD must avoid even the appearance of complicity in the extinction of chinook salmon and orca whales. *David Wick, Marysville, WA*

**Hydro:**

(Developer says No Go.)

**Developer Pulls Plug On Dam Plan**

*By Tim Camerato, Valley News Staff Writer, February 06, 2018, vnews.com*

Lebanon, NH — A Boston-based hydropower developer has abandoned plans to generate power using two dams along the Mascoma River in Lebanon, saying the project would be too costly. Tom Tarpey, owner of Grafton Hydro LLC, filed a petition last week with the Federal Energy Regulatory Commission, or FERC, to surrender a permit that allows him to study the proposed energy project. The move comes after more than two years of research, which revealed that the two-dam project wouldn’t produce sizable enough profits, Tarpey said during an interview on Monday. “Energy prices are extra low and it looks like they’re going to stay low for a good long time,” he said. Grafton Hydro proposed generating energy from the existing Mascoma Lake Dam and a new dam.
Archimedes screw in Meriden’s Hanover Pond dam out of commission

By Leigh Tauss, Record-Journal, February 07, 2018, myrecordjournal.com

MERIDEN, CT — Firefighters responded to Hanover Pond Monday after a malfunction with the Archimedes screw caused a loud noise and smoke, damaging the hydroelectric dam’s generator. The screw, which is the first of its kind installed in the United States, is no longer producing power and the extent of the damage is being assessed. New England Hydropower Company installed the 20-ton screw in Hanover Pond dam in December 2016. The technology is attributed to ancient Greek scientist Archimedes and generates power by harnessing the gravity of water flowing downward through the dam, turning the screw. The hydroelectric dam is expected to generate 920,000 kilowatt-hours of electricity annually and save the city $20,000 a year in power costs and property taxes over 20 years. Firefighters responded to the dam Monday afternoon after a loud noise and smoke was reported coming from the generator on site, according to acting City Manager Michael Lupkas. A malfunction with the screw had caused the generator to overheat, causing damage, Lupkas said. No injuries were reported and fire crews were on site for several hours, Lupkas said.

Company officials on site told city employees, “out of 300 installations worldwide this is the first time this (malfunction) has ever happened,” Lupkas said. Spokesman for New England Hydropower Company Christian Conover said the dam is not currently producing energy and the company is still in the process of assessing the cause of the malfunction and damage to the system. “There was a shutdown of the system and we’re evaluating the root cause and some of the subsequent effects, but there’s been some damage.” Conover said.

Environment:

How’s it going to work?

Dam project could have severe impact on farmers

A major proposal to boost fish passage and stabilize the water temperature at Detroit Dam could leave irrigators high and dry for up to two years in the Mid-Willamette Valley.

By GEORGE PLAVEN, Capital Press, January 25, 2018, capitalpress.com

The North Santiam River flows past fields of green grass at Butler Farms west of Stayton, Ore., where Gary Butler and his two brothers grow more than 2,000 acres of irrigated crops. In addition to grass seed, the family farm raises green beans and sweet corn for NORPAC Foods, along with hazelnuts and peppermint. Irrigation is essential to the operation, Butler said. That is why a major proposal 30 miles upstream at Detroit Dam has him so concerned. The U.S. Army Corps of Engineers, which maintains 13 multipurpose dams in the Willamette River Basin, wants to build a 300-foot-tall water temperature
control tower and floating screen at Detroit Dam to benefit native fish, including endangered chinook salmon and steelhead.

However, construction of the project may require draining Detroit Lake — the reservoir that feeds into the North Santiam — for up to two full years, leaving farms parched during the dry summer months and vulnerable to flooding during high river flows. Butler, who serves on the board of directors for the Santiam Water Control District, said the impacts could be devastating for agriculture in the Mid-Willamette Valley. "If we can’t irrigate, we can’t plant vegetable crops. If we can’t plant them, then NORPAC is looking for vegetable crops elsewhere," Butler said. "It’s going to be an issue." Farmers are not the only ones who would be impacted. The cities of Salem and Stayton both get their drinking water from the North Santiam, and Detroit Lake is a popular destination for fishing, boating and outdoor recreation that drives tourism in the area.

The Army Corps is currently considering five construction alternatives with varying levels of drawdown at Detroit Lake. Tom Conning, spokesman for the agency’s Portland District, said it is still early in the process and will take years to complete an environmental impact study before work can begin in 2021, at the earliest. Butler said local farmers are not pushing the panic button yet, but they realize how much is at stake. "The jury’s still out," he said. "We have to take a wait-and-see attitude on how they’re going to make it happen."

The proposal
Completed in 1953, Detroit Dam is a 450-foot-tall concrete structure on the North Santiam. It provides 321,000 acre-feet of water storage and has a peak electricity generation capacity of 100 megawatts. It is also a barrier for salmon and steelhead that migrate to the Pacific Ocean before returning up the river as adults to spawn. Over the last 10 years, fewer fish have returned on average into the Upper Willamette Basin compared to the previous 50-year average, according to the Oregon Department of Fish & Wildlife which tracks passage at Willamette Falls Dam. Combined spring and fall chinook returns averaged 11,757 fewer fish per year, or roughly a 24 percent reduction, while winter steelhead returns averaged 3,852 fewer fish, a 41 percent reduction. To protect the species, the National Marine Fisheries Service issued a biological opinion — called a BiOp — in 2008 outlining what the Army Corps needs to do to improve fish survival. Part of the BiOp includes the project proposed at Detroit Dam, said Conning, the Corps spokesman. "Basically, (the BiOp) gave us some recommendations for reasonable, prudent actions to take so we did not violate the Endangered Species Act," Conning said.

The plan has two components. First, the Corps would build a temperature control tower — called a selective withdrawal structure — roughly the height of a downtown Portland building next to Detroit Dam. It would mix water from different levels of the reservoir to ensure the water released downstream is neither too warm nor too cold for the fish. "Salmon need a specific temperature to navigate all the way back to where they originally spawn from," Conning said. The second component would be a floating screen structure about the size of a football field to capture juvenile fish swimming downstream in the reservoir so they can be moved past the dam either by truck or bypass pipe. Together, Conning estimated the work will cost between $100 million and $250 million. But first, the Corps must complete its environmental impact study evaluating the impacts on everything from aesthetics to the water supply. "We’re getting feedback from the public about their concerns," Conning said.

Five alternatives
For farmers, the chief concern remains how the Corps plans to build the project, and how that will affect the irrigation supplies. The alternatives for building the tower at Detroit Dam range from
draining the reservoir for two full years — what the agency calls “building in the dry” — to no
drawdown whatsoever, or what it calls “building in the wet.” Building in the dry poses the lowest
safety risk of the alternatives, but potentially has the greatest impact on water users. Building in
the wet, on the other hand, has the lowest impact on water users, but is the most expensive and
dangerous of the five options. Another option involves building a temporary coffer dam around the
construction site, allowing the reservoir level to remain higher. The Santiam Water Control District
was formed in 1954 and is responsible for delivering irrigation water to more than 17,000 acres of
farmland, along with water to three hydroelectric plants and other uses. The district also provides
the majority of municipal water to the city of Stayton, population 8,080. District Manager Brent
Stevenson said the project details are still fuzzy, but each of the Corps’ five alternatives describes
at least one season with reduced or no stored water.

“Early on, it’s just really hard to clearly identify what the range of impacts could be,” Stevenson
said. “The worst case is we don’t have water available for the drawdown years.” The value of the
crops grown in the area adds up quickly. Marion County is the top agricultural producer in
Oregon, according to the 2012 USDA Census of Agriculture, with 286,194 acres of farms
generating $592.8 million in farm gate value. The district provides water to about 6 percent of the
county’s farms. Mary Anne Cooper, public policy counsel for the Oregon Farm Bureau, said the
organization will submit comments to the Corps, and has big concerns from both an irrigation and
flood control perspective. “There’s not a ton of information out there, but one of the plans does
look at dewatering the reservoir,” Cooper said. “It seems like there’s got to be another way to
achieve any fisheries objectives that need to be achieved.”

Public feedback
The Corps won’t release its draft impact study until next year. Until then, Conning said the agency
is urging stakeholders to provide feedback that will help it analyze each alternative. “We need
input from the public,” he said. “They might know something we don’t about how much water they
need, or those types of issues.” Steve Keudell, a board member of the Santiam Water Control
District and co-owner of Keudell Farms in Aumsville, Ore., said draining Detroit Lake for any
period of time could potentially alter the face of farming in this part of the Willamette Valley.
“You’d have to try to raise crops that aren’t so dependent on irrigation,” Keudell said. “You
basically either turn into a dryland farmer, or maybe you’d have to look at drilling irrigation wells.
... There’s obviously going to be an expense.” In 39 years of farming, Keudell said he has never
gone without irrigation water for his fields.

“In our case, all lower ground has water rights on it,” he said. “The peppermint and the vegetables
get watered every year. There’s never been a year, and there won’t be a year that I foresee,
when you wouldn’t need irrigation for that.” On Tuesday, Stevenson submitted four pages of
written comments to the Corps on behalf of the district. He asked the Army Corps to complete a
detailed “water budget” identifying all legal water rights, which would then be reviewed by the
Oregon Water Resources Department to determine exactly which rights would be vulnerable
during the project construction. The district also wants the Corps to analyze which flows may
be released from the nearby Big Cliff Dam during construction. Big Cliff Dam is 2.7 river miles
below Detroit Dam, though it does not store nearly as much water and is instead relied upon as a
“re-regulation” dam, smoothing out flows from power generation at Detroit Dam. “It is critical to
understand if Bureau of Reclamation stored irrigation water will be available during the
construction period,” Stevenson wrote in his comments. He added the federal Bureau of
Reclamation should be included as a cooperating agency on the project. For now, Keudell said
he is trying not to get too alarmed and carry on business as usual.
“I just don’t know how it’s going to work,” he said.

(Such passion. You gotta use the rivers for our benefit too. Dams provide benefits to us.)

Paul Lindholdt: Free-flowing rivers are essential to our region’s health
By Paul Lindholdt, Feb. 10, 2018, spokesman.com

Copy obtained from the National Performance of Dams Program: http://npdp.stanford.edu
Imagine hovering high above the drainage of the Columbia, that great river in the West. Its sprawling watershed includes all of Idaho, most of Washington, large parts of British Columbia, Montana and Oregon. Tributary rivers, streams and creeks pulse like arteries and capillaries. Much like arteries, the tributaries help shuttle lifeblood from the heartland out to the continent’s coast. Much like veins, clouds from the Pacific Ocean trundle wetness back to our inland core. The Columbia River is a drudge because 14 major dams congest it. In its watershed ranging north and east, dozens of upcountry dams emboss its tributary streams like bad bling on a cashmere jacket. Kris Johnson recently published a partisan op-ed in The Spokesman-Review ("Dams balance energy, wildlife needs," Jan. 27). As president of the Association of Washington Business, Ms. Johnson is solicitous of business interests. She neglects sustainability to assist her constituents. That’s her job. She falsely argues that the four lower Snake River dams help salmon recover. Her frail argument uses “alternative facts” and demonstrates how out of step she is with other citizens in the region.

Federal judges and regional governors – not to mention every conservation group in the nation – regard those dams as the worst of the worst. They block 500 miles of prime spawning habitat in wild Idaho. Those dams remain in place so a few farmers can ship their grain. At the same time, billions of dollars are being spent by the Bonneville Power Administration and state agencies to recover threatened salmon downstream. The news from Idaho ought to alarm even Ms. Johnson and those farmers. Runs of anadromous fish in the Snake, Clearwater and Salmon rivers were so small in early 2017 that Idaho Fish and Game restricted fishing to catch-and-release. Any so-called “harvest” of steelhead or salmon, whether wild or hatchery-raised, would put their populations too much at risk. Midseason, though, yielding to business interests, IDFG reversed its hive-mind. It allowed dead fish to be toted home.

Then an unexpected event occurred. Fly-fishing groups organized to oppose all Idaho harvests. Fishermen and -women who wade in wild waters know something the business promoters and officeholders seem unable to acknowledge: Dams impede the lifeblood of the land. That oceangoing fish are the counterparts of healthy red blood cells thronging in the planet’s body. The crowds of opponents to the four lower Snake River dams are growing every year. Fly-fishermen, Indians, judges, journalists, merchants and voters on the coast recognize threats those dams pose. In the Salish Sea, orca populations are at a 30-year low point. So-called killer whales depend on healthy salmon stocks to thrive. The entire food chain depends on them. Nor are fish alone at risk.

Dams also add to climate change. An article in Smithsonian ("The Costs and Benefits of Hydropower," Jan. 5) noted, "Aging reservoirs have become inefficient … and research suggests that hydropower reservoirs may be a much larger contributor of methane – a greenhouse gas roughly 30 times more potent than carbon dioxide – than previously realized." Organic material gathers in dam reservoirs, consumes oxygen and discharges methane. Alternative facts from Snake River dam apologists notwithstanding, there is cause for hope. That hope rests with the Columbia Inter-Tribal Fish Commission, a project of the Nez Perce, Umatilla, Upper Columbia, Warm Springs and Yakama tribes. Those tribes are leading the way on salmon recovery. The tribes observe that “it will take everyone who lives in the basin to restore the salmon.” Locals need to seize control of their destinies. In a hopeful sign also this year, 21 tribes got the U.S. Supreme Court to agree to hear a case on culverts blocking fish migration in Washington state.
Some people’s hearts get clogged from bad food. From lack of exercise or genes that make them weak. Medical providers then need to carve side channels to help those clogged hearts plug away.

Consider dam breaching the landscape-scale equivalent of heart-bypass surgeries. Procedures that allow blood to flow free again, and the rivers to enjoy refurbished circulation. Ignore alternative facts. Vote out resistant politicians. Let’s keep the good stuff flowing, the liquids lifting off and drifting back down – the systole and diastole by any other name performing the complex circulatory work. Paul Lindholdt is professor of English at Eastern Washington University and the editor of “The Spokane River,” a book the University of Washington Press will publish in April.

Other Stuff:
(Renewables on the rise.)

US continued growth for renewables with wind, solar, and hydropower in the lead
13 Feb 2018, steelguru.com

Overall US energy consumption decreased slightly to 97.4 quadrillion British thermal units (Btu) in 2016—a 0.3% decline from 2015. Compared to 2015, energy consumption increased in 2016 for renewables (+7.3%), natural gas (+3.8%), nuclear (+1.0%), and petroleum (+1.2%). Consumption from coal continued to decline, dropping by 8.5%.

1. US electric power sector energy consumption decreased to 37.8 quadrillion Btu in 2016, a 0.8% decline from 2015.
2. In 2016, US renewable electricity grew to 18.3% of total installed capacity and 15.6% of total electricity generation. Installed renewable electricity capacity exceeded 214 gigawatts (GW) in 2016, generating 640 terawatt-hours (TWh).
3. The combined share of wind and solar generation (294 TWh) continued to grow in the United States in 2016, exceeding generation from hydropower (266 TWh) for the first time. U.S. hydropower produced nearly 42% of total renewable electricity generation, wind produced more than 35%, solar (photovoltaic [PV] and concentrating solar power [CSP]) produced nearly 11%, biomass produced 10%, and geothermal produced nearly 3%.
4. In 2016, renewable electricity accounted for 67% of U.S. electricity capacity additions, compared to 64% in 2015. Coal-fired generation comprised nearly 80% (7.6 GW) of retirements in 2016.
5. In 2016, installed wind capacity increased by more than 11% (8.2 GW), accounting for more than 40% of U.S. renewable electricity capacity installed in 2016. U.S. wind generation increased by nearly 19% compared to 2015, and it reached a total of 226 TWh by the end of 2016.
6. U.S. solar electricity installed capacity increased by 52% (11.4 GWac or 14.8 GWdc), accounting for nearly 57% of newly installed U.S. renewable electricity capacity in 2016. Solar generation reached a total of 64 TWh in 2016.
8. Installed global renewable electricity capacity continued to increase, and it represented 31% of total electricity capacity worldwide in 2016.
9. Worldwide, solar PV continued to be one of the fastest-growing renewable electricity technologies in 2016, as global PV capacity increased by 33%.

10. Globally, new investments in clean energy in 2016 fell by nearly 18% from 2015 to USD 288 billion.

From the wind summary

In the United States, wind installed capacity grew 11% in 2016, compared to 12.3% in 2015. Nearly 8.2 GW of additional wind capacity was installed in 2016, leading to a total cumulative capacity of more than 82 GW.

1. States with some of the highest cumulative wind installed capacity also experienced the most growth in capacity in 2016, including Texas (2.6 GW), Oklahoma (1.4 GW), Iowa (0.7 GW), and Kansas (0.7 GW).
3. In 2016, China continued to lead the world in cumulative installed wind capacity, with capacity additions of over 23 GW.
4. The first US commercial offshore wind farm off Block Island (Rhode Island) commenced commercial operation in December 2016. Globally, offshore wind installed capacity grew to 14.4 GW.

(Traffic nightmares.)

10 Worst Cities for Traffic

Sorry, drivers of Los Angeles

By Newser Editors, Newser Staff, Feb 6, 2018, newser.com

(NEWSER) – It's not a title that Los Angeles drivers want, but it's one that probably won't surprise them much. INRIX, a company that specializes in transportation data, calls LA the most congested city in the world for traffic in its annual report card. The results show that Los Angeles drivers spent 102 hours in traffic jams in 2017, though San Francisco, Seattle, Boston, and Portland actually fared worse in terms of peak-period tie-ups, reports USA Today.

The 10 worst cities in the ranking:  
1. Los Angeles
2. New York City (tie)
3. Moscow (tie)
4. Sao Paulo, Brazil
5. San Francisco
6. Bogotá
7. London
8. Atlanta
9. Paris
10. Miami

The worst cities in the US for traffic congestion:
1. Los Angeles
2. New York City
3. San Francisco
4. Atlanta
5. Miami
6. Washington, DC
7. Boston
8. Chicago
9. Seattle
10. Dallas

Click for the full rankings: http://inrix.com/scorecard/