



OCTOBER 2021



WATER & POWER
ASSOCIATES, INC.

NEWSLETTER

For a Sustainable Los Angeles



IPP's Future Green Energy Hub

By: Kevin Peng, Manager of Generation and Hydrogen, Power External Energy Resource Division

As LADWP marches towards meeting the City of Los Angeles', and California's goals of a 100% renewable energy and zero-carbon resource grid by 2045, the Intermountain Power Project (IPP) has a unique opportunity to help meet the challenges of higher renewable energy penetration in the LADWP grid, by providing long duration energy storage services in the form of green hydrogen.

IPP has been undergoing a transformation over the last decade to change the generation source of the project from one fueled by coal, to one fueled by a mixture of green hydrogen and natural gas. This has been a collaborative effort between the Intermountain Power Agency (the owners of IPP), and its 35 municipal utility participants. LADWP along with 5 other California utilities, 23 Utah Municipals, and 6 Utah Cooperatives, make up the group of IPP's Participants who purchase energy from the plant.



This transformation project, called IPP Renewed, includes the retirement of the existing 1,800 MW coal-fueled units; installation of new natural gas-fueled electricity generating units capable of utilizing hydrogen for 840 megawatts net generation output; modernization of IPP's Southern Transmission System linking IPP to Southern California; and the development of hydrogen production and long-term storage capabilities. The new natural gas generating units will be designed to utilize 30 percent hydrogen fuel by volume at start-up in 2025, transitioning to 100 percent hydrogen fuel by 2045 as technology becomes available. The project is one of the first purpose-built facilities with this capability as a key design criteria for the gas turbines being provided by Mitsubishi Power.

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Editor's Column

On September 2nd, the Los Angeles City Council unanimously approved a motion requiring that 100% of the city's electricity come from clean zero carbon energy by 2035.

With this motion, the Council has directed the Department of Water and Power to plan for and implement modifications to the Los Angeles electrical system ten years ahead of the goal established by the State of California.

Successful implementation of this goal will be LADWP's most monumental accomplishment. The recent LA100 study prepared by LADWP and the National Renewable Energy Laboratory concluded that it is feasible, subject to the implementation of major societal changes such as electrification of transportation and large-scale changes from natural gas to electrical utilization, along with the ability to develop new transmission facilities in a timely manner. It will also require the development of large-scale green generation capability.

The cost of facilities to meet this goal as presented in the LA100 Report would be \$87 Billion. The study suggests that much of these costs to the ratepayers can be offset by a reduction in the purchase of gasoline, with the electrification of transportation. It is also anticipated that substantial federal funding may become available for greening of the nation's electrical supply.

The first step towards implementation will be the developing of a new "Long Term Strategic Resources Plan" which was scheduled for initiation in September. LADWP has established an Advisory committee of representatives from interest groups throughout the City to advise it, as the plan is developed. The W&PA will be represented by William Barlak in this committee and intends to closely follow the progress in the development of the plan with a primary focus on maintaining reliability of the LA electrical supply and a secondary focus on costs and feasibility of the implementation.

At the same time as this major activity is being undertaken by the Power System, the Water System is also continuing planning for implementing a major Mayoral Goal to recycle all of the City's wastewater through a proposal titled "Operation Next". This will also involve the development of extensive facilities and a very large expenditure of funds.

The W&PA intends to be involved in this initiative with the same goals as its involvement in the Green Power Initiative.

Jerry Gewe, Editor



PS: If you enjoy this issue please pass it on to others who might benefit from it and consider joining the W&PA by using the application on Page 22.



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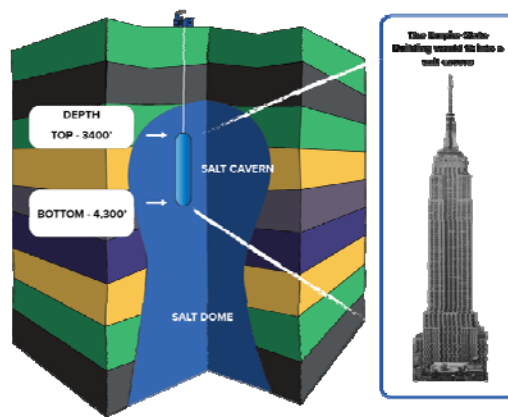
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Hydrogen has been identified as a key component in LADWP’s LA100 study because it provides the ability for true seasonal shifting of renewable energy from surplus months where overproduction of renewable energy would have otherwise been curtailed, to deficit months where dispatchable green energy is needed to support load. IPP will be utilizing green hydrogen, which is hydrogen created using renewable energy-powered electrolysis to split water into oxygen and hydrogen. This green hydrogen will then be stored in underground salt caverns for use as fuel to drive electricity-generating turbines. The project will utilize existing and proven technology to create the green hydrogen, used in industrial applications for decades.

The Project is currently in the preliminary design phase, and procurement has started on key contracts including the selection of EPC partners that will take on the scope of detailed design, procurement, and construction of the generation, transmission, and substation components of IPP Renewed. The gas turbine, steam turbine, and heat recovery steam generator equipment has been awarded to Mitsubishi Power, who are bringing their expertise in hydrogen combustion to help design a facility that can safely operate on the mixture of hydrogen and natural gas. Construction for the generating facility is set to begin in March 2022, where it is projected that over 1,000 construction personnel will be required at peak to build the new units with a commercial operation date of July 1, 2025.

The Intermountain Power Agency, along with LADWP as the Operating Agent and Project Manager for this endeavor, has provided the leadership and vision to create a solution for its participants that meet the core values of the municipalities that it serves, and this industry leading project creates an asset for LADWP to drive towards the goal of a 100% clean grid for LA.



Memorial Tribute to Tom McCarthy

By David Oliphant

We are sad to report that on Tuesday, September 7, 2021, Thomas J. McCarthy, retired Power System Director of Transmission and Distribution, Construction and Maintenance for the Los Angeles Department of Water and Power, passed away, the result of an unexpected heart attack and stroke.

Born in 1946 in Altadena, Tom was always a local resident, with a love for Los Angeles, spending much of his early life in San Gabriel. He attended Mission Grammar School, Don Bosco Technical Institute, and studied electrical engineering at Cal Poly Pomona. An early job at the LADWP was as an inspecting engineer on the construction of the Navajo/McCullough 500 KV transmission line which went from the Navajo Generating Station near Page, Arizona to the McCullough Switching Station south of Las Vegas. It was on that job that Tom's friendly, smiling personality and love for working with the public power system made him many lifelong friends at LADWP. It was also an example of how much he enjoyed working in the field.



Tom had a passion and enthusiasm for studying electric power generation and distribution, the history of power development and particularly those concepts unique to transmission line construction. His enthusiasm saw him constantly reading and studying all aspects of public power from reading professional publications to regular news media, in addition to following technical developments staying on top of political issues and political changes that affected the industry, including environmental and conservation matters. He kept informed on all innovations in provision of public power. As managers in the Power System, Tom and Jack Feldman (W&PA webmaster and editor of the newsletter's Mystery History segment) traveled around the country for a year-and-a-half studying "best practice" electric utilities, discovering ways to keep the LADWP Power System operating optimally – state of the art.

Tom had an ever-present smile and happy exuberance for life which made him a likeable person who as a manager related equally well with those he directed whether he was dealing with blue collar linemen or white collar engineers. Tom's love of the job was so infectious that, as an LADWP interviewer, people he interviewed signed on and became career workers for the LADWP.

Tom was always an active member of his community. In his Church, St. Rita's Catholic Church in Sierra Madre, Tom was a member of the Financial Council and an enthusiastic supporter of scouting with St. Rita's Troop 110, being a parent escort to a troop climb up Mt. Whitney. He was a member of the Cal Poly Rose Float Association. When people in the community needed help with electrical issues Tom was always ready to help solve problems. He helped solve electrical issues for the Griffith Park Live Steamers. Tom assisted fellow LADWP engineer John P. Harrigan, who was doing electrical work at the Mount Wilson observatory, by helping solve electrical issues on the 60 and 100 inch telescopes.

Tom was interested in social issues. He wanted to see more women coming into careers as engineers and so did his best to make new female engineers feel welcome at LADWP and encouraged them to stay on if they felt problems on the job were causing them to have reservations about being engineers.

On April 1, 2005, Tom retired from LADWP. After his retirement, Tom was not ready to totally retire, so he went to work for Lindsay Systems in Azusa as a consultant in the field, what he referred to as his "little job." Also, In keeping with his love for LADWP and the electric power industry, Tom joined the Water and Power Associates. By October 2005, Tom was a member of the Board of Directors. In keeping with his activist nature, Tom was an active Board member. By October 2008, he was a vice president, and from 2009-2010, Tom was president. As a Board member, Tom contributed regularly to the Associates newsletter, with information on current electrical news, including legislative actions affecting power such as environmental and conservation concerns. On our website (waterandpower.org) you can read many articles written by Tom in past issues of the newsletter. At monthly meetings, Tom would update the Board on the latest developments and practice changes in provision of public power. It was Tom's nature to keep up on such changes both through the general press as well as professional publications. Tom was interested in power not just from the technical sense but also from its service for the welfare of society. He was concerned about how proposed changes of methods of production and distribution of power designed to improve the environment impacted the cost of the power to the public ratepayers, particularly those with limited incomes. Recently, he was interested in methods to improve fire prevention in connection with the serious impact of forest fires on the power industry.

Tom's readiness to help his community solve problems continued with the Associates. When help was needed by the newsletter editor assembling the newsletter, a time-consuming job, folding, labeling, preparing for mail, Tom would assist with the process. When we needed to improve our membership, Tom suggested we look through the retirees' membership directory and do a mailing to those we felt might be interested in membership. He led a small group after the regular monthly Board meeting and helped us identify people to whom we mailed invitations and increased our membership substantially. When the Associates needed help with any project, Tom was always available to assist.

Tom and wife Jerri McCarthy met at LADWP in March 1973 and were married in October 1974. They have three children. The oldest, also Tom, earned his electrical engineering degree from Notre Dame (whose football team was always avidly supported by Tom senior along with his support for the Dodgers). He works for Motiv Space Systems and was involved in design of the robotic arm on the Mars Rover. He and wife Katie have two daughters (Tom and Jerri's grandchildren) Ellie and Olivia. Sister Diane, the middle child, attended USD and earned her master's degree in health care administration from UCI. She works for Centene Corporation. The youngest son, Matt, has a BA degree in Agricultural Business from Cal Poly, SLO. He is an Account Executive for T-Mobile and is married to his wife, Laura.

In preparing this article, I read the comments on the McCarthy Memorial website and discussed with others their thoughts and memories of Tom. The following adjectives were used to describe him: enthusiastic, exuberant, impressive, caring, generous, patient, jovial, thoughtful, considerate, infectious grin, sense of fun, happiest, always smiling, intelligent, helpful, always learning, always mentoring, loving, Godly, devoted to his family, the community, and helping others. From my friendship with and knowledge of Tom, all are appropriate. Tom was loved, is fondly remembered, and will be sorely missed.

The Drought of 2021

By Jerry Gewe

This year Southern California faces very limited impact from the statewide drought. This is because of the investments in storage facilities in the past and the water that was placed in storage during the wet years of the last decade.

However, northern and central California have not fared as well. As of early September, the water levels in California's largest reservoirs were way below where they would normally be at this time of the year. Shasta Lake, the state's biggest reservoir was only 27% full, while Oroville Lake, the primary storage facility for the State Water Project was only 23%, less than a quarter full. San Luis Reservoir was only

13% full. By comparison, Diamond Valley Reservoir the largest reservoir in Southern California was 77% full.



In early August, the State Water Resources Control Board issued an emergency order preventing over one thousand water rights holders from drawing water from the Russian River in northern California. This included holders of pre-1914 water rights, which up until now have been considered untouchable. Under these emergency orders each resident will be entitled to 55 gallons per day.

Dry cracked earth is visible as water levels are low at Nicasio Reservoir on May 28, 2021 in Nicasio, California

With respect to water supplies in central California, the Water Resources Control Board approved an emergency resolution empowering regulators to halt diversions from the state's two largest river systems. This could apply to roughly 86% of the landowners who have legal rights to divert water from the San Joaquin and Sacramento river watersheds. These two river systems drain about 40% of California's land. Most of the water is used for agricultural purposes. In order to partially meet the needs of this area Governor Newsom's administration has relaxed rules on how much water must be available in rivers and streams for environmental purposes. The state has also built a stone wall in the West False River to prevent saltwater from the Pacific Ocean from entering the rivers and contaminating the water supply.

Going Back to the All-Electric House - Does It Make Sense?

By William Glauz

This is the third in a series of articles about efforts to reduce the emission of greenhouse gasses (GHG) by reducing use of natural gas. The combination of the combustion of natural gas, along with the release of methane during the production and delivery of natural gas becomes a significant source of GHG emissions that studies have shown lead to accelerated climate change. Many jurisdictions have approved policies that strive to reduce the use of natural gas. Most of these policies are aimed at requiring new building construction to be all electric, eliminating natural gas as an energy source that would typically be used for space and water heating, cooking and clothes drying. This article will try to address how these policies might be implemented and what will be the impacts to the consumer.

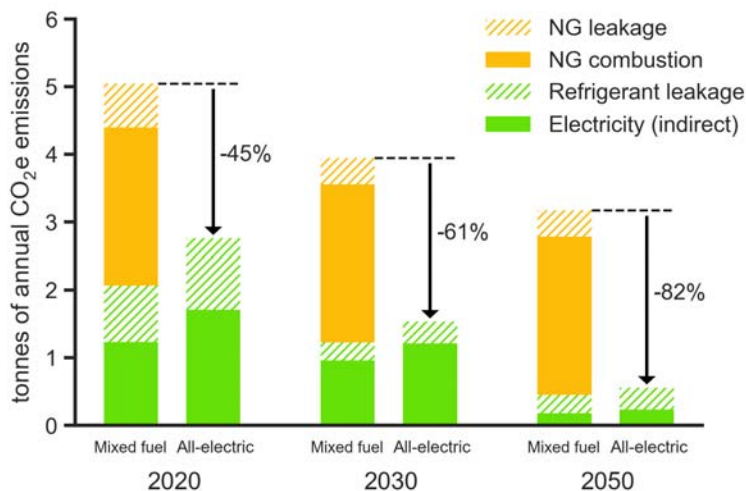
In 2019, LADWP, along with Southern California Edison and Sacramento Municipal Utility District, funded a study by Energy and Environmental Economics, Inc. titled “Residential Building Electrification in California”. This report is available at:

https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf

This study evaluated the greenhouse gas savings, consumer economics and grid impacts of electrification in six representative home types including single family homes and residential low-rise buildings, across six climate zones in California. Consumer economics were evaluated in three ways, by comparing: 1) upfront installed capital costs, 2) energy bills, and 3) lifecycle savings between gas-fired and electric technologies.

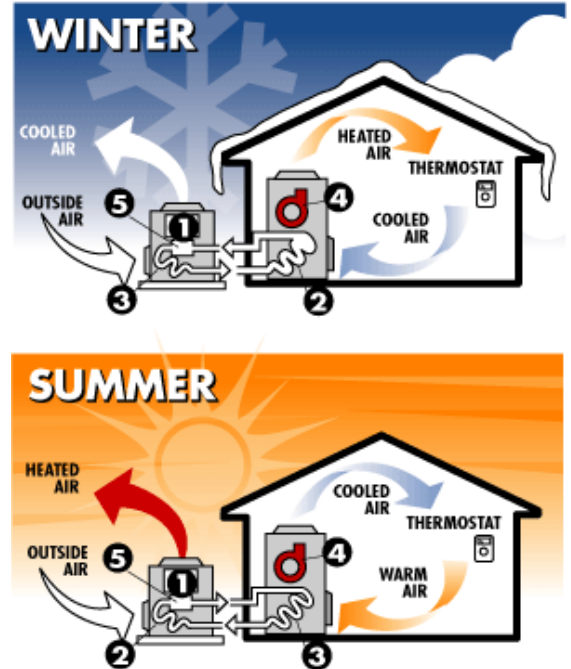
GHG emissions attributable to buildings in California currently represent about a quarter (25%) of the state’s total emissions. Prior research suggested that electrification of buildings is likely to be a lower-cost GHG mitigation strategy over the long-term than a heavy reliance on renewable natural gas.

The study found that an all-electric single family home is estimated to reduce annual GHG emissions by 33 - 56% in 2020 and by 76 – 88% in 2050 compared to a natural gas-fueled home, assuming expanded use of renewable sources for electricity production. The ranges reflect differences based on building vintages and climate zones. Smaller homes with smaller heating and cooling demands, including low-rise multifamily homes, save less GHG emissions per home on an absolute basis, but see a similar percentage reduction in GHG emissions by 2050.

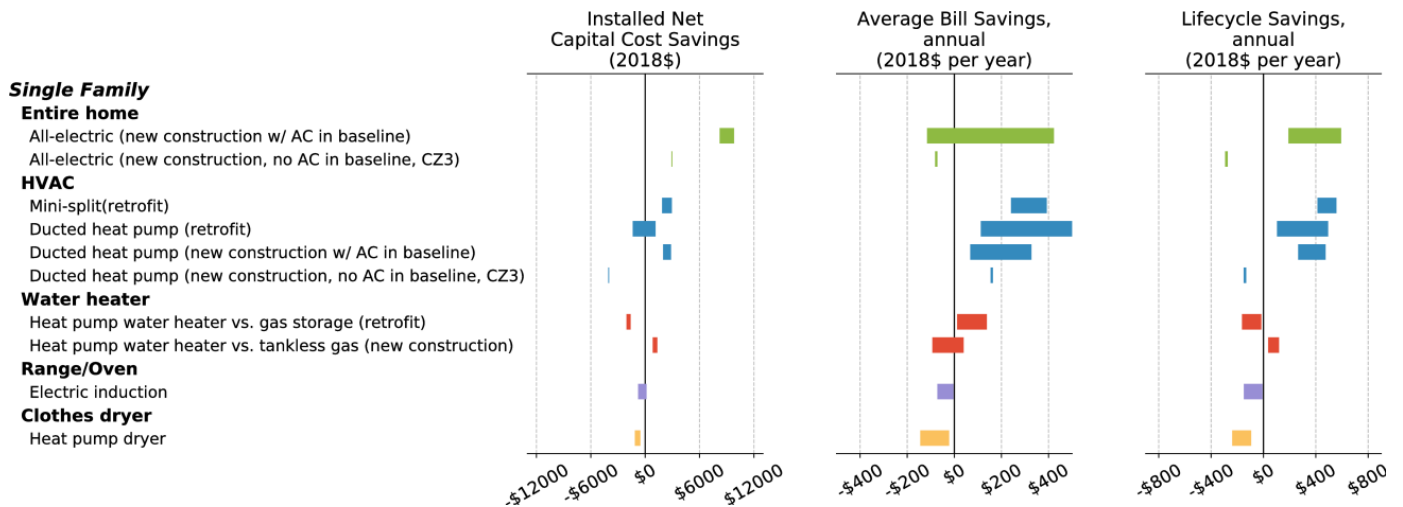


This study evaluated the consumer costs and benefits of several types of electric air source heat pumps for space heating and cooling (HVAC), heat pump water heaters, electric and induction stoves, as well as electric and heat pump clothes dryers. Each of these electric technologies was compared individually to a natural gas alternative. In addition, all-electric new construction is evaluated relative to a mixed-fuel new construction home, as well as a “retrofit package”, where the gas furnace, gas water heater and air conditioner are replaced with electric heat pump options.

All-electric new construction is one of the most promising near-term applications for building electrification efforts. All-electric new construction is expected to be lower cost than gas-fueled new construction homes in homes that have air conditioning, resulting in lifecycle savings of \$130 - \$540/year.



Retrofits to electric air source heat pumps for space heating and cooling represent another near-term savings opportunity in existing homes that have air conditioning. High capital costs of electric heat pump retrofits in existing homes are often perceived as a barrier to electrification, but this assumption was not borne out for homes that are otherwise already upgrading the air conditioning system. While HVAC systems are highly capital-intensive in general, in most cases we found capital cost savings when replacing the combination of an air conditioner and a gas furnace with a standalone heat pump HVAC unit. Further, 87% of the simulated single family retrofit homes (all of which are assumed to have air conditioning) see lifecycle savings from switching from a gas furnace and air conditioner to an electric heat pump HVAC system.



While electrification can be lower cost in many cases, the incremental upfront capital costs can be higher for electrification when retrofitting the HVAC system in older homes that lack air conditioning. This is because air source heat pumps provide both air conditioning and space heating; when compared to just a gas furnace the cost of the heat pump is often higher.

This study also evaluated the consumer economics of heat pump water heaters, electric stoves and electric clothes dryers. Heat pump water heaters are currently more expensive than conventional gas storage water heaters found in many existing homes but are comparable in cost to tankless gas water heaters which have become the norm in new construction and in home renovations. Heat pump water heaters have mixed results for lifecycle costs but can generate lifecycle savings when water heater retrofits are combined with heat pump HVAC retrofits.

Electric stoves and clothes dryers were not found to generate lifecycle savings for customers under today's rates in most cases and represent end-uses that may benefit from different electric rate designs, or from a longer-term market transformation effort. However, my wife Gayle and I did go to a large appliance store to try out an induction cooktop as a possible replacement at our family farm house and were quite impressed with the operating capability as well as the safety of the induction technology. However it was over \$3,000 compared with a gas cooktop at about \$2,000 and an old fashioned electric heating element type of cooktop at about \$1,000. The induction cooktop also requires ferromagnetic cookware to work. Some of our existing cookware may work, but the salesman did say that many of the induction cooktop manufacturers provide rebates for the cookware.



Jerry Gewe
Gayle Glauz (Graphics)
William Glauz
David Oliphant
Robert Yoshimura

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Members and guests are invited to our monthly Board Meetings, via Zoom, at 10:00 am on the Second Wednesday of the month. Please send us a request at comments@waterandpower.org to get the link.

Interested in becoming a member? You can join via our website, waterandpower.org, or by returning the application on page 22.

The Los Angeles Water and Power Associates, Inc. is a nonprofit, independent, private organization, incorporated in 1971 to inform and educate its members, public officials and the general public on critical water and energy issues affecting the citizens of Los Angeles, Southern California and the State of California. Our secondary mission is to preserve the regional history of water and electricity and show its role in the development and growth of the City of Los Angeles. Also, to disseminate knowledge of the rich and diverse multicultural history of the greater Los Angeles area; to serve as a resource of historical information; and to assist in the preservation of the City's historic records.

History of the Development of Water and Electricity for Los Angeles

By Jerry Gewe

An important part of the mission of the Water and Power Associates (W&PA) is to provide information on the role that LADWP has played in the development of the City of Los Angeles and Southern California. Our primary means of doing this is through our “Virtual Museum” located on our website: [www: WATERANDPOWER.ORG](http://www.WATERANDPOWER.ORG). We encourage you to visit that website and get acquainted with the vast amount of information and the many pictures that are located there.

While the virtual museum is a great tool for presenting the history of the DWP, the W&PA have for many years been advocating that a permanent “brick and mortar” exhibit be established where the visitors can be encouraged to delve more deeply into the history of the relationship that Water and Electricity have played in the development of Los Angeles.

In 2015, the W&PA became involved in discussions with the “El Pueblo de Los Angeles Historical Monument (El Pueblo) management and managers from LADWP to investigate the possibility of developing an exhibit to present that story as part of the Monument. The discussions led to a proposal for a permanent LADWP exhibit that would focus primarily on the period through the 1930’s (consistent with the museum’s strategic focus) with a possible additional rotating component to cover other events and/or items of current interest. This would be located in the Hammel building (the second oldest brick building in Los Angeles) which fronts on Olvera Street and includes access to north Main Street. It also provides a view of the “Zanja Madre”, the first water system in Los Angeles, which runs under the building. This understanding was formalized in an MOU between LADWP and El Pueblo in 2015.



The development of the exhibit was passed among several different organizations within LADWP for several years with little real progress made. About 2 years ago, the decision was made to retain staff from the Museum of Natural History (This is the organization that put on the Centennial Exhibit of the Los Angeles Aqueduct) to develop the exhibit. They worked with staff from LADWP, El Pueblo and the W&PA to develop a design for the exhibits. After several design “charettes” it was decided to present the material within the theme of a “Water Store” where the means required for water to get to the customer’s taps could be presented.

After several iterations the conceptual designs were approved, detailed design of construction plans were almost finalized, and they were moving toward issuing contracts for the construction of the exhibits. At the same time, some modifications were made by LADWP personnel to the exhibit space to accommodate the new use of the facility. The goal was to have it open in 2022.

However, things came to a halt when the Department of Building and Safety required a structural analysis of the building to demonstrate that it would be safe for the proposed use as a public exhibit space before proceeding further. While this is reasonable considering the age of the building and its brick construction, it will delay the opening by about a year.

While this is disappointing, given the journey that has been required to get to this point we are looking forward to seeing this project completed and the opportunity for the public to get a hands-on view of what has been and is involved in supplying the City with water and electricity.

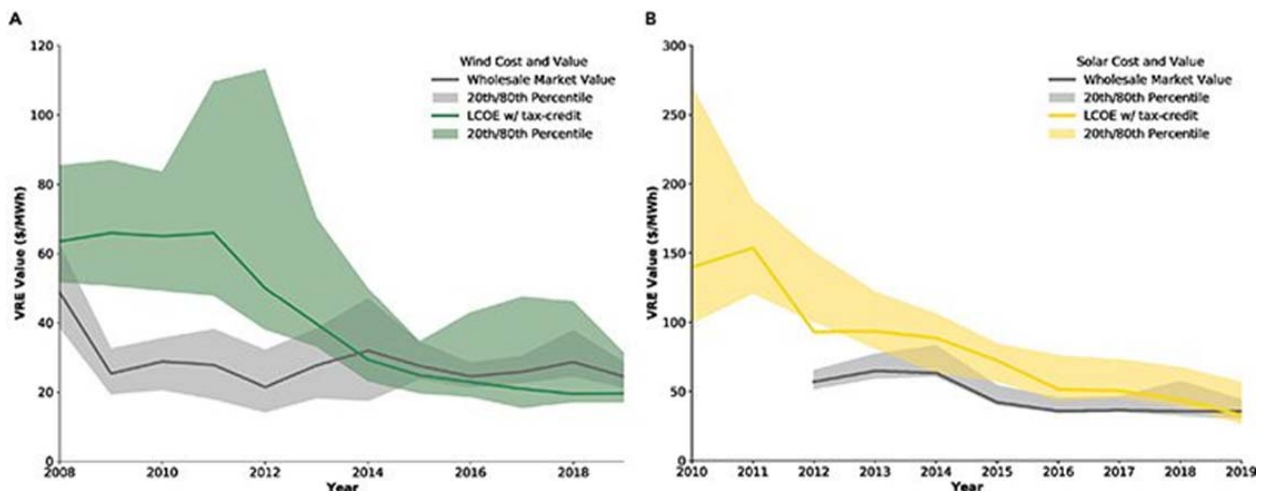
The Solar and Wind Power Cost-Value Conundrum

Excerpted from Power Magazine, August 2021

The costs for wind and solar power generating systems have decreased dramatically over the past decade. According to the International Renewable Energy Agency (IRENA), the global weighted-average levelized cost of electricity for newly commissioned utility-scale solar photovoltaic (PV) projects fell by 85% between 2010 and 2020, from \$0.381/kWh to \$0.057/kWh. Over the same period, costs for onshore wind projects declined by 56%, from \$0.089/kWh to \$0.039/kWh.

As costs decreased, the installed capacity of solar and wind power has increased significantly. IRENA reports the global cumulative installed capacity of all solar PV (utility-scale and rooftop) increased from 42 GW in 2010 to 714 GW in 2020. The cumulative installed capacity of onshore wind grew from 178 GW to 699 GW during the period.

This dramatic increase in solar and wind capacity has brought about the need for curtailment during times of high production and lower demand for electricity as discussed in the curtailment article in this newsletter. This situation of supply surpassing demand has driven hourly costs of energy down during times of the day that have traditionally been higher than night time costs.



A comparison of value and cost trajectories for wind and solar plants in the U.S. Source: LBNL

To date, energy costs have declined more quickly than grid-system value, allowing for strong wind and solar growth. Despite this positive result, value decline is important to consider into the future. A

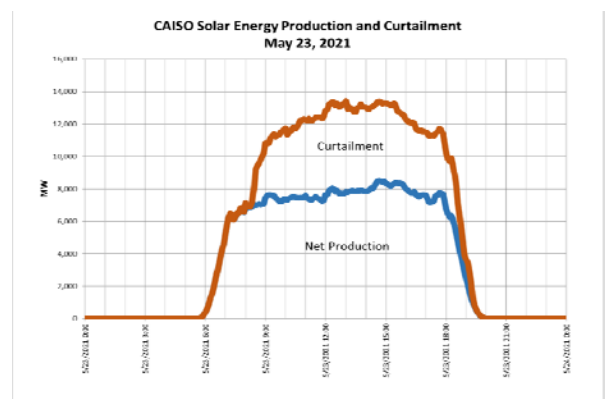
significant portion of new solar projects are now coming paired with battery storage. Recent studies show that these hybrid plants have significantly more value than stand-alone solar plants. So, storage is also a key aspect of efforts to address value decline. However, while this decline in value may be a concern to solar and wind developers, it brings financial benefits to the consumer and environmental benefits to society.

Cal ISO Increases Solar Energy Curtailments

Excerpted from the US Energy Information Agency, August 24, 2021

Curtailments of solar-powered electricity generation have increased in the California Independent System Operator (CAISO) region that covers most of the state. In 2020, CAISO curtailed 1.5 million megawatt hours of utility-scale solar, or 5% of its utility-scale solar production.

Grid operators curtail electricity production from solar and wind generators when supply exceeds demand. In 2020, solar curtailments accounted for 94% of the total energy curtailed in CAISO. Solar curtailments tend to be greater in the spring months when electricity demand is relatively low (because of moderate temperatures decreasing heating and cooling demand) and solar output is relatively high. In the early afternoon hours of many spring days in 2021, CAISO curtailed an average of 15% of its utility-scale solar output.



CAISO has been exploring and implementing various solutions, to minimize future curtailment including:

- Utilizing the Energy Imbalance Market
- Adding battery storage capacity
- Expanding hydrogen production and storage
- Increasing demand response programs to adjust consumer demand when warranted
- Encouraging time-of-use rates to better match consumer prices with real-time energy prices
- Reducing minimum generation levels for existing generators to allow for greater use of renewable energy production

Hydroelectric Energy Production in the West Severely Impacted By Drought

Excerpted from Power Magazine, August 2021

Intensifying drought conditions in California and historically low water levels at the Oroville Dam on August 5 forced the state's Department of Water Resources (CDWR) to shut down the 644-MW Edward Hyatt Power Plant—the fourth-largest energy producer of all California's hydroelectric facilities.

While the current drought is affecting 95% of the West, it is most severe in California and in the Colorado River Basin. Multiple reservoirs monitored by the U.S. Bureau of Reclamation (USBR) are “substantially” affected. The federal agency reported on August 8 that at least six of its 44 major reclamation reservoirs, including Lake Mead and Lake Powell have now fallen to their lowest storage levels in the last 30 years.



The California Independent System Operator (CAISO) is “closely monitoring” reservoir levels statewide as it grapples with shoring up supplies this summer. However, it said the grid is currently stable, mainly because it anticipated the significant drought and the risk it posed for reduced hydro supplies.

On July 30, Governor Gavin Newsom issued an emergency proclamation that suggests that California still faces a 3,500 MW shortfall during peak periods this summer and fall. In summer 2022, the shortfall could grow to 5,000 MW.

On August 7, storage at Shasta Lake in California, where the 663-MW Shasta power plant is located, was about 46% of its typical storage level. The Shasta plant serves as a peaking unit. At another California reservoir, Folsom Lake, storage levels have fallen to about 40% of its typical storage level. Generation from the 162-MW Folsom power plant has been dwindling since 2019.

Water Futures Market for California?

In 2020, a program to establish a water futures market for California was initiated by a financial exchange operator, CME Group. Their aim was to help farmers and utilities reduce their risk during a drought by establishing futures contracts to hedge drought risks.

The contracts establish an index that tracks prices for water rights leases in California. These contracts hedge against financial loss, but do not provide water if there is no water to buy in the spot market.

This program has not taken off and only a limited number of contracts have been consummated. Potential customers, mostly agricultural operations, are reluctant to enter this type of financial hedge, when there is no assurance of actual water being available to be purchased. An anticipated robust water market in California has yet to be developed and there is no assurance that the customer would be able to obtain the water they need for their operations, even if they were provided funds through the contracts.



This concept of a futures water market may become viable in the future, if a robust spot water market develops, but currently customers are more interested in the ability to obtain water, than to cover their increased expenses if they are able to purchase water when their apportionments run out.

Water Shortage Declared on Colorado River

By Robert Yoshimura

For the first time in its history, the US Bureau of Reclamation on August 16, 2021, declared an emergency water shortage on the Colorado River that will affect the lower basin (California, Arizona, Nevada, and Mexico). The shortage declaration was triggered when the elevation of Lake Mead dropped to 1075 feet and will in turn trigger reductions in water allocations in 2022.

The shortage declaration is considered a Level 1 shortage and will require reductions in water deliveries from Lake Mead as follows:

- Arizona – 512,000 Acre Feet (AF) or approximately 18% of its annual allotment
- Nevada – 21,000 AF or approximately 7% of its allotment
- Mexico – 80,000 AF or approximately 5% of the country's allotment

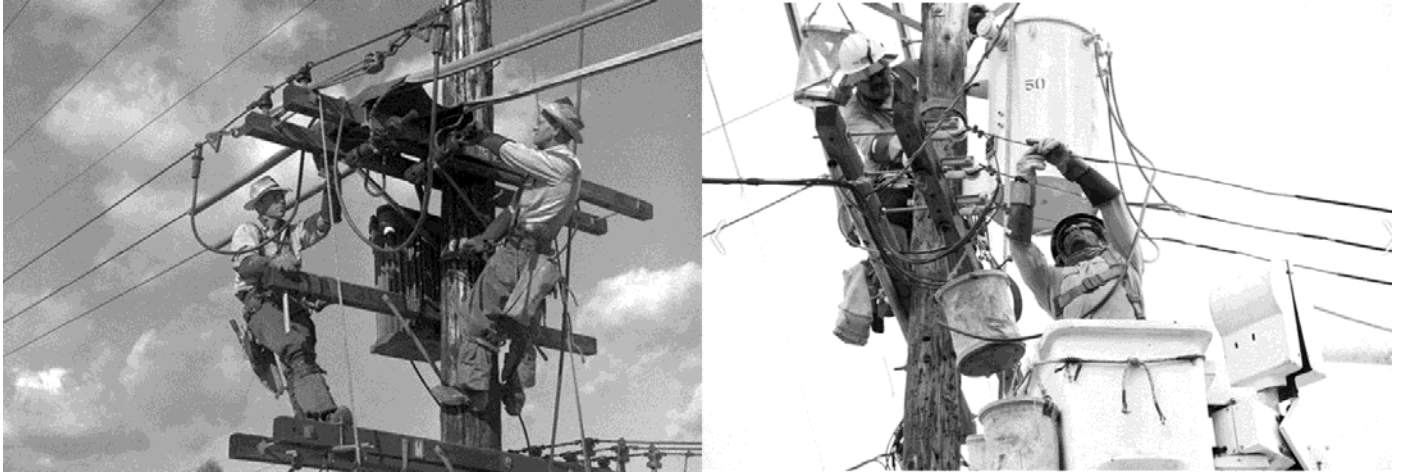


California is not affected by a Level 1 shortage because of its priority water rights to the river. However, should another dry year result in a further decline of Lake Mead's water elevation, California may be required to take reductions as well. A Level 2 shortage is declared when Lake Mead's elevation drops to 1050 feet, and Level 3 occurs at elevation 1025 feet. At that elevation, the lower basin entities are required to meet and agree on further actions to prevent the elevation from dropping below 1020 feet. The current Drought Contingency Plan adopted in 2019 does not provide for contingencies beyond Level 3. The lowest elevation outlet at Lake Mead is at 895 feet. Below that level, the lake becomes a "dead pool" since no water can flow out of the lake.

The emergency declaration is the result of several factors that have plagued the Colorado River watershed since 1999. The elevation of Lake Mead at that time stood at 1215 feet and has dropped precipitously and continuously since then. The devastating situation of Lake Mead is blamed partially on overallocation of water in the original Colorado River Pact, partially on climate change that caused the long running drought, and partially on population growth that has exceeded expectations in the lower basin states.

Is there a fix to the problem? The answer is yes, but not without serious economic and social consequences. One solution is to cover Lake Mead and other reservoirs in the lower basin to eliminate the 10% annual evaporation rate from those reservoirs. The cost of such an undertaking would be huge, and a number of beneficial uses of those reservoirs would be lost forever. Approximately 80% of the water from the Colorado River is used for agriculture and about 70% of agricultural use is for non-essential crops such as alfalfa which is used to feed cattle for meat production. Any reduction in that use will likely result in shortages of beef nation-wide. However, the potential for conservation from such uses is tremendous but comes with significant societal consequences. Neither solution is likely to be implemented anytime soon.

Mystery History Questions



Then and Now: DWP Power Distribution Overhead Construction crews working on energized cable.

The picture on the right shows DWP linemen working on energized lines in 2020. On the left can also be seen DWP linemen working on energized lines.

What decade was the picture on the left taken?

- a) 1930s
- b) 1940s
- c) 1950s
- d) 1960s
- e) 1970s
- f) 1980s

What are some of the things that have changed between then and now?

Answers on Page 22

GUEST SPEAKERS

Summaries by Robert Yoshimura

GUEST OF THE MONTH
JULY 2021

Kelly Nguyen
Pasadena Water & Power

Pasadena's Approach to Green Power Issues

The July 2021 guest speaker was Kelly Nguyen, Assistant General Manager of the Power Supply Division of Pasadena Water & Power. Kelly brings 23 years of experience in the power industry including stops at the State Power Exchange, the City of Anaheim, Southern California Public Power Authority, and the City of Vernon. Kelly provided a brief update of Pasadena's approach to green power issues.

Pasadena Water & Power (PWP) was established in 1906 as a full-service water and power utility that currently serves 172,000 customers in and around the City of Pasadena. PWP is one of 46 publicly owned utilities in California.



Green power compliance requirements are established in state regulations and enforced by the California Energy Commission, California Independent System Operators (CAISO), and the California Air Resources Board. Pasadena's specific goals for green power issues generally exceed the minimum requirements of those regulations and are articulated in the city's 2018 Integrated Resource Plan (IRP). That IRP sets a goal of a 60% renewable energy portfolio and a 75% decrease in greenhouse gas emissions by 2030. Furthermore, the IRP mandates that all future long-term commitments for power be from renewable sources, that planning efforts

consider the implications of transportation electrification, that reliability be maintained, and that cost, reliability, and environmental considerations be balanced.

Based on progress made to date, Pasadena's implementation efforts are expected to result in a 60% renewable energy portfolio by 2030 (meeting SB 100 goals), a 90% reduction in greenhouse gas emissions (exceeding the IRP and CARB goals of 75%), and termination of its long-term contract with the Intermountain Power Project for coal-fueled energy after 2027. Additionally, PWP's reliability goals will be achieved by repairing and upgrading local generation units to maintain the needed on-demand capacity during the transition. Greenhouse gas emissions have already been reduced by 56% from 1990 levels as of 2020.

PWP staff is currently working on a voluntary update to the 2018 IRP that will maintain the goals of that document and add updated market and resource costs, regulatory requirements and conditions, and develop cost and rate impacts of an optimized renewable energy portfolio. Several new considerations will be added including energy efficiency, demand side management, the social cost of carbon, and other pertinent issues. Information derived from this assessment will feed into the 2024 IRP for which development will begin early next year.

The 2024 IRP will promote carbon-free electricity consumption and incorporate a detailed stakeholder process to take input from all affected parties. The new IRP will aim to meet or exceed all local and state mandates including infrastructure additions such as energy storage. It will also address the resiliency of PWP's power supplies and infrastructure in extreme conditions such as heat storms and accommodate the electrification of buildings and vehicles.

Green power rates for large commercial customers are currently being addressed to accommodate those customers' requests for a reduced carbon footprint while stabilizing their costs by contracting for known-cost green power options (such as those offered by LADWP). For PWP, such requests must be accommodated without shifting costs or taking on risks of uncompensated cost escalation.

PWP staff has begun the process of obtaining Green-e certification which will yield numerous benefits with few added administrative costs. Green-e certification is expected to result in a higher quality more marketable product that will increase participation in green power programs and provide additional revenue. It will also increase the legitimacy of PWP's efforts from an environmental perspective and satisfy the demands of green power advocates.

Over the past 12 years, PWP has experienced a 22% reduction in electricity sales due primarily to energy efficiency programs and customer generation (both solar and fossil-fueled). PWP is concerned that this trend will result in funding gaps for future infrastructure investments and/or create an upward pressure on rates to compensate for the reduced sales. In those 12 years, average power rates have increased 3.6% annually. PWP's current power rates for various sizes and types of customers are lower than Southern California Edison's, but generally comparable to other local utilities.

During that same 12 years, PWP's energy portfolio has become significantly cleaner as renewable sources have come online. Greenhouse gas emissions have been cut in half and are projected to easily reach the city's 90% reduction goal by 2030.

PWP's current and future plans anticipate increased load and sales growth as electrification proceeds. They will target off-peak energy sales, all-electric homes and buildings, and incentives for electric vehicles and charging stations. They plan an extensive educational and marketing campaign and building code changes to accomplish these goals. They have partnered with Tesla to provide public electric vehicle charging stations at various locations around the city.

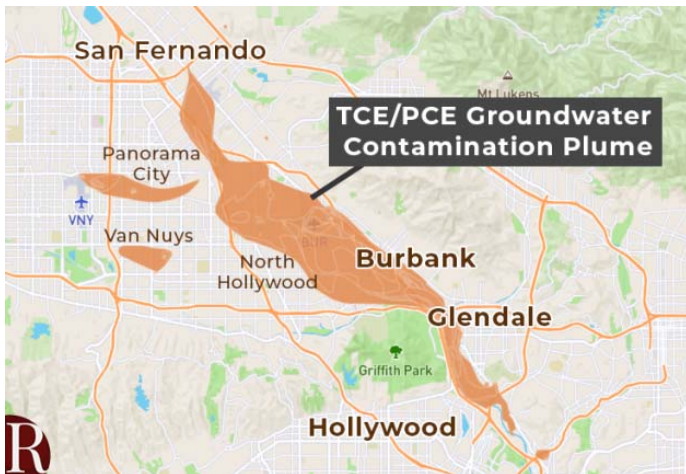
Lastly, PWP has partnered with Cal Tech on an energy storage pilot project to study the potential for energy storage for deferred distribution of intermittent solar and wind energy sources. PWP is installing the energy storage devices and Cal Tech will test out modeling tools and analyze the impact of the project for future use on a broader scale.

Andrew Linard and Dave Christensen
Los Angeles Department of Water & Power

Groundwater Cleanup in the San Fernando Basin

This month's guest speakers were Andrew Linard and Dave Christensen of LADWP. Andrew is the Director of Engineering and Technical Services Division (WETS) and Dave is the manager of Project and Construction Management in WETS. Together they provided an update of the DWP's groundwater cleanup actions in the San Fernando Basin.

The San Fernando Basin Groundwater Remediation Program is a focused initiative driven primarily by three factors: 1) Mayor's Directive #5, which calls for an integrated strategy for groundwater remediation and a reduction in the city's reliance on imported water; 2) the Sustainable City Plan, which directs DWP to clean up the groundwater basin and ensure that the city gets its fair share of Proposition 1 funding; and 3) Proposition 1, the 2014 water bond issue passed by the state's citizens to increase the availability and reliability of our water supplies.



The goal of the Groundwater Remediation Program is to “restore and protect the full use of the San Fernando Groundwater Basin (SFB) as a source of water consistent with LADWP’s long-term water rights and historical groundwater use”. Currently, 85 of the LADWP’s 115 wells in the SFB have become impaired due to contamination. The nature of such contamination was found to be a variety of volatile organic compounds (VOC), primarily trichloroethylene and perchloroethylene, and 1,4 dioxane. On that basis, LADWP created three response actions targeting three regions of the basin which are called the Tujunga Centralized Treatment (TJ Central), North

Hollywood Centralized Treatment (NH Central), and North Hollywood West Wellhead Treatment (NHW). The selected treatment process for all three locations is Advanced Oxidation using a combination of hydrogen peroxide oxidation followed by ultra-violet irradiation and granular activated carbon adsorption.

The NHW project was jointly designed by the team of Hazen & Sawyer/Arcadis and WETS Project Design and is being constructed in house by Power Construction and Maintenance Division. In contrast, both the TJ Central and NH Central projects are being delivered via a design-build contract with Kiewit Infrastructure West and Stantec. The project delivery method of progressive design-build was chosen to reduce risk to LADWP, simplify the administrative process of contracting, and create a single point of accountability. The design-build contractor was chosen using a qualifications-based selection method. The success of this process is demonstrated by the fact that to date there have been no change orders.

Prior to initiating the selection process for a design-build contractor, LADWP hired the Simplar Institute to help in becoming the “owner of choice” to attract higher quality proposers. Simplar emphasized the importance of openness, fairness, integrity, and ethics in developing a selection process that would yield

the best value contractor. The process began with the issuance of a Request for Proposals which required proposers to submit an anonymous description of scope, approach, cost, and other details without identifying the proposer, accompanied by a second document describing the proposer. The anonymous proposals were then scored to determine their qualification for the job and subsequently, all proposers were interviewed to determine the eventual winner Kiewit/Stantec.

During the design phase, Kiewit/Stantec and the LADWP agreed to a rigorous design review process involving weekly task force meetings by discipline between Kiewit/Stantec's design team and LADWP engineers. The design review process also incorporated monthly reviews exclusively for users including construction and operations staff. This process assured good communication and early resolution of conflicts that kept the process on schedule. The project management team received much positive feedback about the benefits of this methodology. Using this process, eleven task orders have been issued to date totaling \$458 million.

A separate but related project is being developed concurrently by Honeywell Corporation at their cost under a legal settlement with LADWP. This project replaces the North Hollywood Operable Unit (NHOU) constructed by LADWP many years ago. The replacement for the NHOU will ultimately produce 8,500 AF/year of treated groundwater. Once completed, LADWP will operate the plant, but Honeywell will remain responsible for the provided equipment.

The NHW treatment plant is under construction and is 87% complete. Its construction schedule has been negatively affected by the electrical subcontractor's limited resources and by Covid-19 which required a rotating work schedule under which crews worked every other week to minimize exposure. The project is expected to be substantially complete by December 2021 and be in service in August 2022.

The NH Central project schedule has also been affected by Covid-19, because property purchased by LADWP adjacent to the jobsite more than a year ago cannot be accessed due to the Covid moratorium on evictions. Some redesign of the project was necessary to mitigate schedule delays which resulted in a more crowded facility. The crowded site presented additional challenges which Kiewit has impressively resolved on its own. The project is now 22% complete with substantial completion expected in June 2023, and in-service by January 2024.

The Tujunga Central project is progressing with fewer challenges than the other two projects. It is now 31% complete with substantial completion expected in May 2023 and an in-service date of November 2023.

Contamination of the San Fernando Basin has increasingly limited the use of this groundwater resource over the last 25 years. Completion of these four projects will finally enable LADWP to utilize this important water source at levels close to its adjudicated rights and substantially increase the reliability of the water system. Current pumping is limited to about 25,000 AF/year, but groundwater cleanup is expected to enable pre-contamination pumping rates of up to 90,000 AF/year. Future groundwater recharge of recycled water from Operation NEXT will further increase the pumping of groundwater from San Fernando Basin.

Following the meeting, Walter Zeisl reported via email that he updated the LADWP's Times in Education Teacher's Guide by adding information about the three new plants described above and the years they are expected to be completed. In last year's edition, LADWP just mentioned that it had plans to help clean the water supply.

**Mike Webster, Executive Director
Southern California Public Power Authority**

Renewable Power Procurement by SCPPA

This month's guest speaker was Mike Webster, Executive Director of SCPPA who described the efforts of SCPPA and member agencies to procure renewable power. SCPPA is a joint powers authority created primarily to develop funding for power projects on behalf of its member agencies.

Because of the intense focus on renewable power, SCPPA staff has been incredibly busy exploring renewable power availability and negotiating contracts to purchase such power on behalf of its members. SCPPA has established aggregate targets for renewable power delivery by all its members for 2024, 2027, and 2030 of 44%, 52%, and 60%. However, because of great success of its member agencies in this regard, the actual aggregate power portfolio is expected to reach 50%, 52%, and 63% by the targeted years. The targets are SCPPA's estimates of interim progress needed to achieve the SB 100 goal of 100% renewable power by 2045.

The development of renewable power originally focused on biofuels (basically the capture of landfill gasses) and solar and wind power. Subsequently, the Publicly Owned Utilities (POU) developed geothermal resources which, although costlier than other sources, enabled a steady, on-demand flow of energy to balance the intermittent nature of wind and solar. Mike noted that Investor Owned Utilities (IOU) were obligated to pursue least-cost alternatives and thus did not focus on geothermal sources. As of 2021, SCPPA's current mix of renewable power sources (procured by SCPPA) consist of:

- Hydroelectric power – 1%
- Biofuels – 7%
- Wind – 27%
- Geothermal – 31%
- Solar – 34%

Wind power has been a particularly valuable source because, although intermittent, it also helps to balance the lack of solar power at night.

For 2030, the SCPPA-procured portfolio of renewable power is projected to be as follows:

- Geothermal – 9%
- Storage – 20%
- Wind – 32%
- Solar – 39%



As the amount of renewable generation in the portfolio increases, SCPPA will add energy storage to further bridge the disparity between power demand and supply. To achieve the 2030 goals, SCPPA is currently in negotiations to procure 783 MW of additional storage, 250 MW of geothermal power, 606 MW of wind power, and 1065 MW of solar power.

SCPPA is exploring several options for energy storage on behalf of its members that include long-term battery storage, compressed air, liquid air, mechanical energy storage (flywheel), and hydrogen energy storage. Liquid air is the newest technology and involves the supercooling of air to liquify it and enable storage locally in tanks. When the liquid air is evaporated, it produces a high-pressure gas that can be used to power turbines to generate electricity. SCPPA is pursuing a California Energy Commission grant to help develop liquid air technology. Of the above options, the most promising are long-term batteries, liquid air, and hydrogen, if their development can bring their costs down.

SCPPA is exploring financing options for POUs. Unlike the IOUs, POUs cannot take advantage of Investment Tax Credits to defray some of the cost of renewable power. Also, the innovative project delivery methods common among IOUs are not available to POUs. However, three potentially game-changing bills are now being considered in Congress that would enable direct payments of investment tax credits to POUs for renewable energy and storage projects. They are the Green Act, the Renewable Energy Investment Act, and the Clean Energy for America Act. If any one of the above bills is passed, POUs will be able to enter into direct EPC (engineer-procure-construct) contracts for “turnkey” projects, lease-to-own deal structures, Design-Build-Operate-Transfer contracts, and power purchase agreements with fixed asset purchase amounts. SCPPA is currently actively lobbying Congress in favor of the three bills as well as for funding that may become available through the pending Infrastructure bill.







Mystery History Answers

b) 1940s

- Hard Hats vs. Felt Hats
- Work done from a bucket truck
- Type of climbing boots (difficult to compare)
- Type of clothing and protective gear

SAVE THE DATE

2021 CALENDAR	<h3>GUEST OF THE MONTH</h3> <p>MEETINGS VIA ZOOM EXCEPT AS NOTED</p> 	JASON RONDOU DIRECTOR, CLEAN GRID LA LADWP	OCTOBER 13, 2021 Status and Schedule for the LADWP Long Term Strategic Resources Plan
	RANDY HOWARD GENERAL MANAGER NORTHERN CALIFORNIA POWER AUTHORITY	NOVEMBER 10, 2021 Northern California's Strategy for Responding to Green Power Initiatives	
	HOLIDAY LUNCHEON 	DECEMBER 8, 2021 ANTICIPATED IN-PERSON MEETING LOCATION TO BE DETERMINED	

<h3 style="text-align: center;">BECOMING A MEMBER</h3> <ul style="list-style-type: none"> • HELP PRESERVE LOS ANGELES REGIONAL HISTORY OF WATER AND ELECTRICITY • DISSEMINATE KNOWLEDGE OF THE RICH MULTI-CULTURAL HISTORY OF LOS ANGELES • BECOME INFORMED AND GAIN INSIGHT AND EXPERTISE ON WATER AND ELECTRICITY ISSUES <p style="text-align: center;">ANNUAL MEMBERSHIP \$30</p> <p style="text-align: center;">ONLINE AT WATERANDPOWER.ORG BY MAIL FILL OUT THE CARD AND WRITE CHECK TO: W&P ASSOCIATES, INC. SEND BOTH TO: 1467 CREST DRIVE ALTADENA, CA 91001</p>	<p>NAME _____</p> <p>ADDRESS _____ _____</p> <p>PHONE _____</p> <p>EMAIL _____</p> <p>TITLE/POSITION/COMPANY _____</p> <p style="text-align: right;">RETIRED/COMPANY _____</p> <p><input type="checkbox"/> Check if you would like to receive a digital copy of the newsletter only, to save mailing costs.</p> <p>• The W&P Associates, Inc. is an IRC 501(c) (4) organization. Donations are not tax deductible.</p>
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