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January 31, 2019

Mr. Jonathan S. Bishop  
Chief Deputy Director  
State Water Resources Control Board  
1001 I Street, 24<sup>th</sup> Floor  
Sacramento, CA 95814

Dear Mr. Bishop:

Subject: Submittal of the Los Angeles Department of Water and Power's  
2018 Grid Reliability Report

Enclosed is the Los Angeles Department of Water and Power's (LADWP's) 2018 Grid Reliability Report (Report), as required per *Section 3.B (3) – Implementation Provisions*, of the Final Statewide Once-Through-Cooling Policy (Policy), dated May 4, 2010, which became effective on October 1, 2010. Furthermore, in a letter dated April 24, 2014, the State Water Board granted and directed the change for the Report filing deadline from December 31 to January 31 of each year. As required by the Policy, the Report has been presented to and approved by the LADWP's governing board, the City of Los Angeles Board of Water and Power Commissioners.

Please distribute the Report as necessary to the members of the Statewide Advisory Committee on Cooling Water Intake Structures and the State Water Resources Control Board members.

If additional information is required, please contact Mr. Michael Hanson of my staff at (213) 367-0634.

Sincerely,

A handwritten signature in blue ink that reads 'Katherine Rubin'.

Katherine Rubin  
Manager, Wastewater Quality and Compliance Group

EK:

Enclosure

c: Ms. Felicia Marcus, SWRCB  
Ms. Tam Doduc, SWRCB  
Ms. Dorene D'Adamo, SWRCB  
Mr. Joaquin Esquivel, SWRCB  
Mr. Sean Maquire, SWRCB

Mr. Michael Lauffer, SWRCB  
Ms. Marleigh Wood, SWRCB  
Ms. Eileen Sobeck, SWRCB  
Ms. Karen Mogus, SWRCB  
Mr. Phil Crader, SWRCB

LOS ANGELES DEPARTMENT OF WATER AND POWER



# 2018 GRID RELIABILITY REPORT

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PREPARED FOR CALIFORNIA STATE WATER  
RESOURCES CONTROL BOARD

JANUARY 31, 2019 SUBMITTAL

# 2018 Grid Reliability Report

PREPARED FOR CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

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# 2018 Grid Reliability Report

PREPARED FOR CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

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## PREFACE

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Electric utilities are complex entities confronted with an ever-changing array of challenges—operational, financial, and regulatory. These challenges must be met while the utility fulfills its primary purpose of delivering reliable power.

To that end, LADWP routinely forecasts short- and long-term demand for electricity, identifies generating sources, and conducts studies to demonstrate to regulatory agencies the reliability of its system under the different demand and operational scenarios. Nine years out, as cited in the attached 2018 Grid Reliability Report, high- and mid-load power scenarios already project the need in 2021 for more generation in the Los Angeles Basin than the capacity expected to be present. The Local Capacity Requirement (LCR) study referenced herein suggests that Los Angeles can ill-afford to have any of its basin (local) generating units unavailable.

Since 2010, the Los Angeles Department of Water and Power (LADWP) has filed with the California State Water Resources Control Board (State Water Board) an annual Grid Reliability Report. The “Statewide Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling” (OTC Policy) requires such reporting until the last LADWP ocean water-cooled thermal generating unit is removed from service in 2029.

In a letter dated April 24, 2014, the State Water Board granted and directed the change to the deadline for the annual grid reliability report filing from December 31 to January 31 of each year. This change was made at LADWP’s request so the report may include information annually released in December. In consideration of the Statewide Advisory Committee on Cooling Water Intake Structures (SACCWIS) Committee’s March 31 reporting deadline to the State Water Board, LADWP’s 2018 Grid Reliability Report (2018 Grid Report) is intentionally concise and follows the previous year’s format.

This 2018 Grid Reliability Report emphasizes that little has changed in terms of how LADWP’s power system elements contribute toward reliability. Past Grid Reliability Report filings have addressed reliability for the State Water Board by presenting and discussing discoveries from the most recent studies available at the time of the filing. This 2018 filing compares the core findings from those earlier Grid Reports with results from studies conducted in 2018. The comparison suggests that LADWP’s reliability issues have not changed.

The once-through cooling (OTC) compliance projects driving this 2018 Grid Report are important aspects of a transformation that began with California’s Renewable Portfolio Standard (RPS) Program, established in 2002, and continues today with 50% RPS by 2030

mandated by SB350: *Clean Energy and Pollution Reduction Act*, chaptered on October 7, 2015 and the City of Los Angeles' 100% clean energy initiative. LADWP and Los Angeles are so committed to environmental stewardship that aspirational goals of at least 33% RPS by 2020, 50% by 2025, and 55% by 2030 have been set and are embedded in the studies described herein. LADWP and the City of Los Angeles are committed to a clean energy future. To that end, LADWP has embarked on a study to assist in the determination of alternative(s) for the future repowers to replace the remaining OTC units at the Coastal Generating stations, this study is known as the OTC study.

The Western Electricity Coordinating Council's (WECC's) tri-annual reliability audit of LADWP's power system was performed in February 2017. As in each of the previous audits, conducted in 2008, 2011, and 2014, WECC found LADWP's power system reliable. In fact, in this latest audit, LADWP received a perfect score from the auditors for its operations and planning functions.

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## EXECUTIVE SUMMARY

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The body of information collected for this 2018 Grid Report, consistent with previous Grid Reliability Reports, demonstrates the continued importance of maintaining generation capacity in the LA Basin to provide online generation necessary to import external generation and provide cost-effective contingency reserve, voltage support, and balanced network loading. Each of these services provided by the in-Basin generation contributes toward power system reliability. This 2018 Grid Report is drawn from:

- the 2018 Long-Term Transmission Assessment (2018 Assessment), which clearly shows key segments of LADWP's transmission system must be reinforced, to the extent possible, in order to ensure continued reliable operations. Chief among these necessary improvements was the installation and in service of the 230kV Scattergood-Olympic Cable A since September/October 2018 timeframe, which has improved the ability to transmit power throughout the LA Basin from Scattergood Generating Station.
- the Summer 2018 Transmission Reliability Assessment (Summer 2018 TRA), which shows every LA Basin generating unit, including OTC units, is needed for reliability purposes.
- the Resource Adequacy Projection, which shows that even with the current contributions from LA Basin generation, resource shortfalls are expected. LA Basin generation is also critical to LADWP's transition to an energy portfolio dominated by renewable resources, because it compensates for the variability of the desired fossil-free resource so that load continues to be served without disruption and so that North American Electric Reliability (NERC) Reliability Standards can continue to be met.

Table 1 summarizes the status of LADWP’s OTC compliance work:

TABLE 1. LADWP’S COMPLIANCE SCHEDULE

Generating Station	Generating Unit	Status	Compliance Deadline
Harbor	Unit 5		31 Dec 2029
Haynes	Unit 1		31 Dec 2029
	Unit 2		31 Dec 2029
	Unit 5	Project Complete	31 Dec 2013
	Unit 6	Project Complete	31 Dec 2013
	Unit 8		31 Dec 2029
Scattergood	Unit 1	On Schedule	31 Dec 2024
	Unit 2	On Schedule	31 Dec 2024
	Unit 3	Project Complete	31 Dec 2015

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**2018 ANNUAL LONG-TERM TRANSMISSION ASSESSMENT**

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In its execution of NERC Rules of Procedure 403.11, WECC, the Regional Reliability Organization for NERC’s western region, has audited LADWP every three years since 2008. Every such investigation, including the February 2017 audit, has found LADWP’s electric grid reliable. In this latest audit, LADWP received a perfect score for its operations and planning functions.

LADWP’s annual long-term transmission assessments have been critical to these findings as they demonstrate power system compliance with NERC reliability standards during normal operations and under contingencies.

The 2018 Assessment complies with NERC standard TPL-001-4: *Transmission System Planning Performance Requirements* and WECC *Regional Criterion TPL-001-WECC-CRT-3*, in addition to other planning regulations. It is based on the aspirational RPS targets promulgated in the 2018 Strategic Long Term Resource Plan and developed in collaboration with stakeholders and customers: 50% and Coal-free by 2025; 55% by 2030; 65% by 2036 and 100% by 2045. In comparison, SB100 mandates 33% RPS by 2020; 44% by 2024; 52% by 2027, 60% by 2030 and 100% by 2045. Even with these more aggressive targets, the power system is expected to continue to perform reliably under all but extraordinary contingencies over the next ten years. As with every year’s assessment, the 2018 Assessment recommends that a number of system improvements are made to mitigate vulnerabilities that have been identified in the study.

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**RELIABILITY MUST-RUN NEEDS FOR SUMMERS 2011-2018**

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Seasonal TRAs are performed to identify the minimum Reliability Must-Run generators required to meet LADWP's Operating Reliability Criteria and NERC Standards under forecasted seasonal peak demand conditions. A review of the Summer TRAs since 2011 shows the results are essentially unchanged. The obvious differences arise from the retirement of Haynes Units 5 and 6 after Units 11-16 were placed in service in June 2013 and the retirement of Scattergood Unit 3 after Units 4-7 were placed in service in November 2015. Summer 2016 required both Haynes Units 1 and 2 online to compensate for the extended outage of Mead-Victorville 287kV Line 1 until repairs to the Mead 287/230kV Bank M transformer were completed. Summers 2017 and 2018, with all circuits expected to be available, essentially return to the Reliability Must-Run requirements of previous summers.

TABLE 2. RELIABILITY MUST-RUN GENERATING UNITS

	<b>HARBOR</b>	<b>HAYNES</b>	<b>SCATTERGOOD</b>	<b>VALLEY</b>
<b>SUMMER 2011</b>	Units 1,2 and 10-14 @ full load within 2 hrs	Units 1,5,8,9,10	Units 1 or 2 and 3	Units 6-8
<b>SUMMER 2012</b>	Units 1,2 and 10-14 @ full load within 2 hrs	Units 1,5,8,9,10	Units 1 or 2 and 3	Units 6-8
<i>Haynes Units 5-6 replaced in June 2013 with Units 11-16</i>				
<b>SUMMER 2013-15</b>	Units 1,2 and 10-14 @ full load within 2 hrs	Units 1 or 2, and 8,9,10; Units 12 and 14, condense mode; Units 11-16 @ full load within 2hrs	Units 1 or 2 and 3	Units 6-8
<i>Scattergood Unit 3 replaced in August-November 2015 with Units 4-7</i>				
<b>SUMMER 2016</b>	Units 1,2 and 10-14 @ full load within 2 hrs	Units 1 and 2, and 8,9,10; Units 12 and 14, condense mode; Units 11-16 @ full load within 2hrs	Units 1 or 2 and 4-5 Units 6-7, condense mode	Units 6-8
<b>SUMMER 2017-18</b>	Units 1,2 and 10-14 @ full load within 2 hrs	Units 1 or 2, and 8,9,10; Units 12 and 14, condense mode; Units 11-16 @ full load within 2hrs	Units 1 or 2 and 4-5 Units 6-7, condense mode	Units 6-8

**Aliso Canyon.** On July 19, 2017, Aliso Canyon was declared safe and its owner Southern California Gas Company was granted permission to operate at 28% of capacity to support grid reliability in the Los Angeles Basin. The 86 billion cubic feet (Bcf) facility in Northridge, California, the fifth largest such facility in the United States, had been shut down after a natural gas leak was detected on October 23, 2015. The announcement by the State, following the dictates of SB380: *Natural Gas Storage: Moratorium*, was intended to help alleviate electric supply concerns this past summer but its benefits are extending through the winter and beyond.

According to the California Energy Commission's (CEC's) *Aliso Canyon Winter Risk Assessment Technical Report 2017-18 Supplement*, which was released on November 28, 2017, should a single electric contingency arise during a 1-in-10 demand for natural gas that winter, load shedding would have been a very real possibility without support from Aliso Canyon, even with minimum electric generation in the Los Angeles Basin. This shortfall was identified to be as much as 510 million cubic feet per day (MMcfd) while a sustained outage of three Southern California Gas Company natural gas transmission pipelines persists. This year, the California Public Utilities Commission (CPUC) temporarily increased injections into Aliso Canyon and recommended an inventory increase to 40%.

With RPS mandates and targets pushing utilities ever-closer toward a carbon-free future, the State's move to reopen Aliso Canyon may only be short-term. The CEC, with Governor Brown's support, is advocating for the retirement of Aliso Canyon in 10 years in SB380-directed California Public Utilities Commission (CPUC) proceedings. The retirement of Aliso Canyon in ten years would limit LADWP's options for maintaining power system reliability; abbreviate LADWP's OTC compliance completion date of 2029; and essentially limit every LADWP Basin power plant with the exception of Castaic Power Plant, including generating units repowered under regulatory oversight for the express purpose of eliminating their use of ocean waters.

Since the natural gas leak, first detected on October 23, 2015, LADWP has been dealing with the reality of not always being able to depend on Aliso Canyon to accommodate LADWP's hourly natural gas demand fluctuations, a critical element in LADWP's local response to real-time energy demands. LADWP's local Basin Transmission System can be severely stressed without Aliso Canyon's support, because its local transmission system was never intended to reliably operate without local Basin gas-fired generation.

A joint study with the California Independent System Operator in 2016 confirmed LADWP's dependence on its Basin generation. That study showed that to cover a peak load of 6900MW in the LADWP Balancing Authority Area (BAA), which is comprised of LADWP, Glendale, and Burbank, a maximum of 4,666MW may be imported while maintaining reliable operations, utilizing an extensive transmission network which extends into the Owens Valley and Mohave Desert and beyond to Washington, Utah, Nevada, and Arizona.

Minimum Basin generation will always be needed as the transmission reliability, voltage support and stability it provides increases the ability to import power and increases operational flexibility. An important reliability safeguard when the natural gas supply is curtailed is that some of LADWP's generating units at Haynes, Harbor, and Valley can operate with liquid diesel fuel during emergencies, as permitted by the South Coast Air Quality Management District.

**100% Renewables.** In March 2016, Los Angeles City Council Motion No. 16-0243 directed the LADWP to form research partnerships, utilizing relationships with the region's universities, neighboring utilities, SCPPA, and other stakeholders with the objective of determining what investments should be made to achieve a 100% renewable energy portfolio for the LADWP. With this 100% Renewable Energy Study already underway,

SB100: The 100 Percent Clean Energy Act of 2018, enacted on September 10, 2018, which mandates California utilities plan for 100 percent of electricity sales to come from renewable and zero-carbon resources by 2045 is simply being folded into the work. Informing this study will be the outcome of LADWP's investigation into alternatives to repowering the remaining OTC units. Building upon the findings from the OTC Study, with the final report expected to be completed in 2019, will ensure that the most prudent solution is implemented under the constraints of the OTC compliance schedule and that LADWP's renewable energy portfolio is maximized while maintaining the current level of power system reliability and keeping electricity affordable.

At the heart of the issue is the identification of an integrated mix of affordable fossil-free resources capable of mimicking the quick-start and sure-start advantages of LADWP's real and reactive power supplied by the Basin fossil-fueled plants, which provide the minimum Basin generation necessary to maintain power system reliability around-the-clock. In addition to supporting SB100, the work would support SB338, which codified the requirement for LADWP to consider using distributed energy resources, demand-side management, and energy efficiency to serve and reduce peak energy demand and avoid new generation and transmission resources. Every effort is being made to reasonably achieve a Clean Energy Future for Los Angeles.

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#### RESOURCE ADEQUACY PROJECTION

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The Strategic Long Term Resource Plan (SLTRP), which in the past was referred to as the Integrated Resource Plan (IRP), is annually produced to ensure LADWP, its customers, and other stakeholders that its transmission system and supply options are well-positioned to meet the electricity demands of its customers at every step of its renovation plan. Every SLTRP gathers, considers and incorporates new information, including public feedback. The result is that every piece of equipment replaced or added to the power system is installed with confidence that both power system reliability and public interest are being respected.

One consequence of LADWP aggressively acquiring solar resources is that the maximum system demand, when offset by solar and other variable energy resources, has been occurring later in the evening. By 2030, when LADWP's RPS will be 55%, the maximum demand is expected to occur after 8 pm. By contrast, the August 31, 2017 all-time peak demand of 6502MW occurred at 4:15 pm. Historically, LADWP had a reliable 4 pm peak load. The 2017 SLTRP's resource adequacy looks at the capacity contribution of each resource on an hourly basis within the study's 20-year horizon. The capacity contribution is evaluated under a threshold of 95 confidence probability. Typically during peak hours which occurs after 8 pm, the capacity available from variable resources, such as wind and solar, contribute little to no capacity towards resource adequacy under a 95% confidence probability.

Table 3, extracted from the SLTRP, summarizes the scenarios resource planners expect to be the most challenging over the next decade. LADWP’s planned reserve margin is the sum of:

1. 738MW of contingency reserves to satisfy NERC Standard BAL-002-WECC-2a for the balancing area comprised of Los Angeles, Burbank, and Glendale.
2. 738MW of replacement reserves to replace the contingency reserve that has been deployed; and

As Table 3 shows, a capacity shortfall is expected for most of the ten-year period investigated. This shortfall suggests that energy purchases may be necessary to cover forced outages at the generating stations during a 1-in-10 heat storm.

TABLE 3. TEN-YEAR RESOURCE ADEQUACY PROJECTION (MW)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Large Hydro	1584	1584	1584	1584	1584	1584	1584	1584	1584	1584
Nuclear	388	388	388	388	388	388	388	388	388	388
LA Basin Thermal	3329	3329	3329	3329	3329	3329	3329	3329	3305	3300
Out-of-Basin Thermal	500	500	500	500	500	500	500	500	500	500
Renewables	670	722	760	799	903	661	912	1011	995	1021
IPP Coal	1188	1188	1188	1188	1188	1140	1042	942	0	0
IPP Replacement	0	0	0	0	0	0	0	0	553	553
Demand Response	68	88	125	175	225	275	325	375	425	475
Energy Efficiency	44	87	131	172	229	254	344	406	474	547
Storage	3	10	34	76	81	228	248	275	292	298
<i>Total Resources</i>	<i>7774</i>	<i>7896</i>	<i>8039</i>	<i>8212</i>	<i>8428</i>	<i>8361</i>	<i>8673</i>	<i>8810</i>	<i>8517</i>	<i>8666</i>
2017 Gross Load 1-in-10	6983	6526	6668	6818	6905	6707	7060	7353	7461	7645
Reserve Margin	1476	1476	1476	1476	1476	1476	1476	1476	1476	1476
<i>Resource Requirement</i>	<i>8459</i>	<i>8002</i>	<i>8144</i>	<i>8294</i>	<i>8381</i>	<i>8183</i>	<i>8536</i>	<i>8829</i>	<i>8937</i>	<i>9121</i>
<i>Resource Margin</i>	<i>-685</i>	<i>-105</i>	<i>-105</i>	<i>-82</i>	<i>47</i>	<i>178</i>	<i>137</i>	<i>-19</i>	<i>-420</i>	<i>-455</i>

**Drought.** After four years of aggressive water management to combat drought, Los Angeles found itself being challenged in 2017 by potential flooding and property damage from an overabundance of snowmelt in the Eastern Sierra Mountains. Only twice in recorded history has the Mammoth Pass snowpack exceeded this year’s 82.3 inch April 1<sup>st</sup> reading, most recently in 1983. On March 20, 2017, Mayor Eric Garcetti issued an Emergency Declaration to support LADWP’s efforts to mitigate the threat of damage to its

infrastructure. With the natural terminus for the Owens River at Owens Lake, measures were taken to protect from inundation the 500kW Owens Dry Lake Solar Demonstration Project at the north end. Overall, the near-record snowmelt provided much welcome water and hydroelectric power from Los Angeles' first power plants.

The water level at Lake Mead, which feeds Hoover Dam, a valuable resource since it was placed in service in late 1936, will require many years to recover to its historical average of 1160 feet.

The forecast provided in Table 3 reflects the forecasted contributions from these available sources.

**Energy Imbalance Market.** LADWP's participation in the California Independent System Operator's real-time wholesale Energy Imbalance Market (CaISO's EIM) is slated to commence on April 1, 2020. In so doing, it will be pooling its real-time surplus renewable energy with those of PacifiCorp; NV Energy; Arizona Public Service; Puget Sound Energy; Portland General Electric; Idaho Power; Seattle City Light; Salt River Project; Balancing Authority of Northern California/Sacramento Municipal Utility District; Canada's Powerex; and other CaISO participants. This is a voluntary market that requires LADWP to maintain its BAA responsibilities for meeting its load reliably.

Although LADWP is a self-sufficient and vertically integrated electric utility, it is looking to the EIM as an attractive option for addressing the inherent challenges associated with over-generation from intermittent resources so that it can continue to increase its renewable energy supply and achieve its RPS targets. With CaISO's EIM participants covering WECC's important electricity markets, LADWP sees CaISO's EIM as a means to reliably meet customer load, avoid curtailments of precious renewable energy, reduce its carbon footprint, minimize its ramping requirements, and increase potential revenues.

In these months leading to LADWP's entry into CaISO's EIM, LADWP is focusing on gaining EIM intelligence, connecting with the CaISO EIM information technology systems; developing and implementing EIM policies and procedures; and adding other resources and tools necessary to seamlessly participate in the EIM.

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#### EVENTS AND OUTAGES

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During the first four months of 2018, Valley-Rinaldi 230kV Lines 1 and 2 were simultaneously switched out to replace circuit conductors in order to increase the circuits' ratings. This capacity in-basin upgrade is one of the first steps LADWP has taken to reliably increase the penetration of renewable energy resources into daily operations, and to begin the process for becoming a 100% carbon free electric utility by 2045.

Because the Valley-Rinaldi lines are among the most critical circuits in the LA Basin Transmission System, the double-line outage required Reliability Must-Run (RMR) generation far in excess of that normally run during the Winter load period.

The following table lists the RMR generation commitment required during the 2017-18 Winter peak load, and the RMR generation required to reliably accommodate the Valley-Rinaldi double-line outage during that same Winter peak.

TABLE 4. INCREASED RMR GENERATION DUE TO CIRCUIT UPGRADES

<b>VALLEY-RINALDI LINES 1 &amp; 2</b>	<b>HARBOR</b>	<b>HAYNES</b>	<b>SCATTERGOOD</b>	<b>VALLEY</b>
<b>LINES IN</b>	None	Units 12 and 14, condense mode; three Units 11-16 @ full load within 2hrs	Unit 6 or 7	None
<b>LINES OUT</b>	10-14 @ full load within 2 hrs	Units 8,9,10; Units 12 and 14, condense mode; Two Units 11-16 @ full load within 2hrs	Unit 6 and 7	Units 6 or 7, and-8; Unit 5 available within 2 hrs

This double line outage is the first of several planned outages required to upgrade the LA Basin Transmission System. These outages will occur over the next several Winter load periods, and all such outages will require RMR generation commitment far above normal RMR Winter requirements.