

December 1, 2017

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

**Re: California Independent System Operator Corporation
Docket No. ER18-_____-000**

**Filing to Temporarily Re-Implement Previously Approved and
Recently Expired Measures to Address Potential Gas
Limitations**

**Request for Expedited Treatment Pursuant to Commission
Guidance Order and Waiver of Notice Requirements**

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) submits a tariff amendment¹ to address the effects of natural gas system limitations on the CAISO's system and market operations, as the Commission invited the CAISO to do in an order issued on November 28, 2017.² These tariff revisions will re-implement on a temporary or interim basis, with no modifications, previously approved tariff provisions to address gas system limitations related to the limited operability of the Aliso Canyon gas storage facility (Aliso Canyon) that automatically expired one day ago, on November 30, 2017.³

The CAISO requests expedited consideration of the proposed amendment under the procedures described in the Commission's *Guidance Order on Expedited Tariff Revisions for Regional Transmission Organizations and*

¹ The CAISO submits this filing pursuant to section 205 of the Federal Power Act (FPA), 16 U.S.C. § 824d.

² *Cal. Indep. Sys. Operator Corp.*, 161 FERC ¶ 61,232, at P 54 (2017) (Aliso Phase 3 Order).

³ See *id.* at P 5. As explained below, there have been four Commission proceedings on CAISO tariff amendments to address Aliso Canyon-related issues: the Aliso Phase 1, Aliso Phase 2, and Aliso Phase 3 proceedings, which are completed, and the Aliso Phase 4 proceeding initiated by this filing. CAISO Governing Board approval was not required for the temporarily re-implementation of the tariff provisions.

*Independent System Operators.*⁴ The CAISO also requests waiver of the 60-day notice requirement under section 35.11 of the Commission's regulations.⁵ As described further below, good cause exists for expedited consideration and waiver of the 60-day notice requirement. Now more than ever, these measures are urgently needed. As reported by the California Public Utilities Commission (CPUC) and California Energy Commission (CEC), the Southern California region "faces new challenges and greater uncertainty than a year ago because of three natural gas transmission pipelines that the Southern California Gas Company (SoCalGas) relies on to serve customers are out of operation."⁶

The CAISO respectfully requests that the Commission issue an order on an expedited basis by December 15, 2017 that accepts the tariff revisions contained in this filing effective December 16, 2017. Commission approval on this expedited basis will ensure that the CAISO has the tools available it needs to address the risks to electric system reliability posed by the limited operability of Aliso Canyon and limitations on the gas system in Southern California for this winter and beyond.

Specifically, the CAISO requests that the Commission allow the CAISO to re-implement the following measures the Commission approved in the Aliso Phase 2 proceeding for an additional 12 months on a temporary basis, *i.e.*, until December 16, 2018:

- 1) Maximum gas constraint: This measure enables the CAISO to enforce a constraint that limits the maximum gas burn in the SoCalGas and San Diego Gas & Electric Company (SDG&E) gas regions in order to (a) better ensure that market dispatches are consistent with observed gas system limitations; (b) reflect these restrictions on market clearing prices; and (c) avoid further stressing the gas system, which could in turn adversely affect electric grid reliability.
- 2) Competitive path assessment: When and where the CAISO employs a maximum gas constraint, this measure allows the CAISO to override manually the dynamic competitive path assessment to determine whether the CAISO should deem

⁴ 111 FERC ¶ 61,009 (2005) (Guidance Order).

⁵ 18 C.F.R. § 35.11.

⁶ See California Public Utility Commission and California Energy Commission, News Release November 28, 2017, *Agencies Release Energy Assessment for Southern California, Express Concern About Existing Pipeline Outages*, available at <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M199/K876/199876868.PDF>; see also Aliso Canyon Update Winter 2017-18, California Energy Commission, November 28, 2017, available at <https://efiling.energy.ca.gov/getdocument.aspx?tn=221863>.

transmission constraints non-competitive. This allows the CAISO to employ its market power mitigation tools in constrained areas to avoid the exercise of market power.

- 3) Virtual bidding: When and where the CAISO employs a maximum gas constraint, this measure allows the CAISO to suspend virtual bidding if the CAISO identifies market inefficiencies related to enforcing the constraint.
- 4) Pre-day-ahead information: This measure provides scheduling coordinators, for informational purposes only, advisory commitment schedules produced in the preliminary residual unit commitment process conducted on a two-day-ahead basis and based on available bids and forecasts of system conditions. Although these advisory schedules are not binding physically or financially, they assist scheduling coordinators with gas procurement decisions and gas nomination processes.

Experience over more than the past year and a half provides valuable information to the CAISO as to what the markets need to reflect better gas system limitations in electric system operations. For example, the maximum gas constraint has proven to be a useful and discrete tool that balancing authority areas can use to reflect the interactions of gas limitations in the electric market optimization. Therefore, the CAISO proposes to re-implement that measure on a temporary basis. Given the limitations of the current market rules and the expectation that Aliso Canyon will continue to have limited operability, combined with other limitations on the gas system in Southern California, the measures proposed herein are just and reasonable to address known gas system limitations.⁷

I. Background and Need for Filing

A. Applicable CAISO Market Provisions and Existing Tariff Authority

The CAISO administers both day-ahead and real-time wholesale electricity markets. A primary objective of these interrelated markets is to ensure there is a sufficient supply of electricity to satisfy demand in the region while maintaining the reliability of the transmission system the CAISO operates (*i.e.*, the CAISO controlled grid). These markets simultaneously optimize the procurement of energy and ancillary services and allocate transmission capacity

⁷ See *ISO New England Inc., et al.*, 144 FERC ¶ 61,204, at PP 21, 42 (2013) (accepting ISO New England's Winter Reliability Program on an interim basis).

on the CAISO controlled grid based on locational marginal prices (LMPs) at both internal nodes (*i.e.*, locations within the CAISO balancing authority area) and the interties (*i.e.*, locations for imports to and exports from the CAISO balancing authority area).⁸ The tariff sets forth rules for the submission of bids and self-schedules for all of the CAISO markets.⁹ The tariff also provides for communications between the CAISO and scheduling coordinators, including communications prior to the day-ahead market.¹⁰

The CAISO operates its markets using a market software system that utilizes various information. This information includes transmission constraints that the CAISO enforces consistent with good utility practice to ensure, to the extent possible, that the market model used in each CAISO market reflects all the factors that contribute to actual real-time flows on the CAISO controlled grid and that the CAISO market results align better with actual physical conditions on that grid.¹¹ Market participants can engage in convergence bidding (also called virtual bidding) to hedge their physical market positions, and manage their exposure to differences between day-ahead and real-time prices.¹² The CAISO has the authority to suspend or limit virtual bidding activities that can detrimentally affect system reliability or grid operations.¹³

The existing tariff includes local market power mitigation procedures to enable the CAISO to mitigate the market effects of any conduct that would substantially distort competitive outcomes in the CAISO markets.¹⁴ The local market power mitigation procedures include calculating default energy bids and running an automated process for determining whether transmission constraints are competitive or non-competitive.¹⁵

⁸ Existing tariff section 27, *et seq.* For the sake of clarity, this transmittal letter distinguishes among existing tariff provisions (*i.e.*, provisions in the current CAISO tariff that apply absent the effectiveness of the temporary measures approved in the Aliso Phase 1, Phase 2, and Phase 3 proceedings), proposed tariff provisions (*i.e.*, new provisions that the CAISO proposes to add to the tariff in this filing, which are all identical to proposed tariff provisions approved in the Aliso Phase 1 and Phase 2 proceedings), and revised tariff provisions (*i.e.*, existing tariff provisions that the CAISO proposes to revise in this filing, which are all identical to revised tariff provisions approved in the Aliso Phase 1 and Phase 2 proceedings).

⁹ Existing tariff section 30, *et seq.*

¹⁰ Existing tariff section 6, *et seq.*

¹¹ Existing tariff section 27.5.6.

¹² Existing tariff section 30.9.

¹³ Existing tariff section 7.9.

¹⁴ Existing tariff section 39, *et seq.*

¹⁵ Existing tariff section 39.7, *et seq.*

B. Natural Gas Leak at Aliso Canyon

The CAISO refers the Commission to attachment C to this filing for background information regarding the natural gas leak at Aliso Canyon and the implications thereof, including the risk posed to the reliability of electric service.

C. Prior Proceedings to Address the Impact on the CAISO Balancing Authority Area of the Limitations on Aliso Canyon

The CAISO filed two successive tariff amendments, in the Aliso Phase 1 proceeding and later the Aliso Phase 2 Aliso proceeding, to incorporate interim measures to address reliability issues that could arise due to the limited operability of Aliso Canyon.¹⁶ The Commission approved the first set interim measures in the Aliso Phase 1 proceeding for a period of approximately five months (*i.e.*, until November 30, 2016)¹⁷ and the second set, which was largely the same as the first, in the Aliso Phase 2 proceeding for an additional 12 months (*i.e.*, until November 30, 2017).¹⁸ In the Aliso Phase 3 proceeding, the CAISO proposed to extend some of those interim measures for another 12 months (*i.e.*, until November 30, 2018) and to make permanent and modify in some respects the balance of the previously accepted interim measures.¹⁹ The Commission authorized the CAISO to extend the interim measures and rejected its proposal to make permanent and modify the balance of the measures, but expressly permitted the CAISO to submit a filing to extend those latter measures for an additional year.²⁰

The discussion below describes the four measures approved in the Aliso Phase 1 and 2 proceedings that the CAISO proposes to temporarily re-

¹⁶ The Aliso Phase 1 proceeding was in Docket No. ER16-1649-000 and the Aliso Phase 2 proceeding in Docket No. ER17-110-000.

¹⁷ See *Cal. Indep. Sys. Operator Corp.*, 155 FERC ¶ 61,224 (2016) (Aliso Phase 1 Order); *Cal. Indep. Sys. Operator Corp.*, 156 FERC ¶ 61,135 (2016) (accepting filing submitted by CAISO to comply with directives in Aliso Phase 1 Order and granting CAISO motion for clarification regarding that Order); *Cal. Indep. Sys. Operator Corp.*, 156 FERC ¶ 61,093 (2016) (granting CAISO petition for limited tariff waiver to modify effective date of certain tariff revisions accepted in Aliso Phase 1 Order); *Cal. Indep. Sys. Operator Corp.*, 157 FERC ¶ 61,029 (2016) (granting subsequent CAISO petition for limited tariff waiver to modify effective date of certain tariff revisions accepted in Aliso Phase 1 Order); Commission Letter Order, *Cal. Indep. Sys. Operator Corp.*, Docket No. ER16-1649-006 (Feb. 24, 2017) (accepting eTariff changes to reflect actual effective date of certain tariff revisions accepted in Aliso Phase 1 Order).

¹⁸ See Aliso Phase 2 Order at P 25; Commission Letter Order, Docket No. ER17-110-001 (Mar. 24, 2017) (accepting filing submitted by CAISO to comply with directives in Aliso Phase 2 Order).

¹⁹ The Aliso Phase 3 proceeding was in Docket No. ER17-2568-000.

²⁰ Aliso Phase 3 Order at PP 25-26, 53-63.

implement, with no modifications, in this filing.

1. **Aliso Phase 1 Proceeding**

In the Aliso Phase 1 proceeding, the Commission accepted the tariff revisions submitted by the CAISO to implement measures that included:

- 1) Maximum gas constraint: The Commission conditionally accepted the CAISO's proposal to institute a maximum natural gas constraint in its market solution to reflect gas limitations under certain conditions. The Commission found that this proposal "is a reasonable measure to ensure the reliable operation of the electric grid within the bounds necessarily imposed on it by the operation of the natural gas system, which is outside of CAISO's control."²¹ The Commission "agree[d] with CAISO that these measures are necessary because electric reliability could be compromised if market inputs do not accurately reflect gas system constraints," and found that the CAISO's "proposed method of using generator nomograms with a penalty factor is an appropriate interim means to achieve this goal."²²
- 2) Competitive path assessment: In conjunction with the CAISO's proposal to enforce the gas constraint, the Commission also accepted the CAISO's proposed tariff provisions allowing it to designate a transmission constraint as non-competitive when necessary based on actual system conditions. The Commission found that "CAISO has provided sufficient justification for this measure because, as CAISO explains, actual electric supply conditions may be non-competitive when the natural gas constraint is enforced due to anticipated electric supply conditions in the SoCalGas and SDG&E gas regions."²³ In this regard, the Commission agreed with the analysis of the CAISO Department of Market Monitoring (DMM) finding that "the impact of the natural gas constraint on the assessment of competitive paths can only be assessed based on actual system conditions once the constraint is in place."²⁴

²¹ Aliso Phase 1 Order at P 48. The Commission also accepted the CAISO's proposal to implement a minimum natural gas constraint (*see id.*), but the CAISO eliminated the minimum gas constraint in the Aliso Phase 2 proceeding.

²² *Id.*

²³ *Id.* at P 52.

²⁴ *Id.*

- 3) Virtual bidding: The Commission accepted the CAISO's proposed tariff provisions authorizing the CAISO to suspend virtual bidding when and if it determines that such trading runs counter to market economic efficiency. The Commission found that "during the interim period, with the limited operability of Aliso Canyon and the operational steps that CAISO may undertake to address electric and gas reliability, there may be times when promoting price convergence may run contrary to the efficient economic solution of the market."²⁵ The Commission also stated that there might be "sustained differences in prices between locations and between day-ahead and real-time markets that could be exploited by virtual bidders without yielding any market benefits."²⁶ Further, the Commission explained that "[g]iven the uncertainty surrounding the extent to which CAISO may have to use internal transfer capability or enforce the gas constraint to address threats to reliability, or the impact that these actions will have on market outcomes, we find that CAISO has demonstrated a potential need for limited intervention in market outcomes to ensure these measures achieve their stated objectives."²⁷

- 4) Pre-day-ahead information: The Commission accepted the CAISO's proposal to provide scheduling coordinators with advisory day-ahead commitment schedules produced in the residual unit commitment process on a two-day-ahead basis. The Commission found this advisory information "can help scheduling coordinators make more informed gas procurement decisions and more closely match their gas procurement with their potential gas consumption by nominating an amount of gas to match their expected generation output for each hour."²⁸ The Commission stated that the information can thereby "help reduce gas and electric reliability risks associated with imbalances between the amount of gas that electric generators nominate and the amount of gas that they burn."²⁹ The Commission concluded that the CAISO's proposal was "just and reasonable and not unduly discriminatory in the interim period when there is uncertainty about the operation of Aliso Canyon and the associated impact on gas and electric system

²⁵ *Id.* at P 80.

²⁶ *Id.*

²⁷ *Id.* at P 83.

²⁸ *Id.* at P 16.

²⁹ *Id.*

reliability.”³⁰

2. Aliso Phase 2 Proceeding

In the Aliso Phase 2 proceeding, the CAISO proposed to extend for 12 additional months (*i.e.*, until November 30, 2017), with some modifications, the four previously approved measures listed above (as well as other previously approved measures not addressed in this filing). The CAISO explained that, to the extent the Commission accepted the measures but did not later take action to continue their effectiveness beyond November 30, 2017, the measures would automatically expire on that date and thus the tariff sections reflecting the measures would revert to how they read prior to the Aliso Phase 1 and Phase 2 proceedings.³¹

The Commission accepted the CAISO’s proposal and explained that “continuation of the interim measures for an additional year should improve scheduling coordinators’ ability to manage their gas procurement and enhance their ability to recover gas procurement costs, while also providing CAISO with flexible tools to maintain reliability and avoid adverse market outcomes related to the limited operability of Aliso Canyon.”³²

3. Aliso Phase 3 Proceeding

In the Aliso Phase 3 proceeding, the CAISO proposed to extend for an additional 12 months (*i.e.*, until November 30, 2018), with no modifications, previously approved measures that are not addressed in this filing. The CAISO also proposed to adopt on a permanent basis the four previously approved measures listed above, with some modifications. Specifically, the CAISO proposed to expand the geographic scope of the previously approved tariff provisions regarding the maximum gas constraint and competitive path assessment to apply them on a permanent basis to all areas in which the CAISO operates a market, including the CAISO balancing authority area as well as the balancing authority areas of the Energy Imbalance Market (EIM) entities. The CAISO proposed no modifications to the previously approved tariff provisions regarding virtual bidding and pre-day-ahead information, other than to make those provisions permanent.

³⁰ *Id.* As discussed at pages 9-12 of the transmittal letter for the tariff amendment to implement the Aliso Phase 3 revisions, the Commission also accepted a number of other tariff changes in the Aliso Phase 1 proceeding and subsequent related proceedings.

³¹ Transmittal letter for Aliso Phase 2 tariff amendment at 48-49.

³² Aliso Phase 2 Order at P 26.

In the Aliso Phase 3 Order, the Commission accepted the CAISO's proposal to extend the interim measures but rejected the CAISO's proposal to modify and make the specified measures permanent.³³ The Commission explained that, although it "reject[ed] CAISO's permanent proposals because we find that CAISO's proposed extension of the use of maximum gas constraints to the EIM has not been shown to be just and reasonable and not unduly discriminatory,"³⁴ the Commission's "rejection of [CAISO's] permanent proposals here is without prejudice to CAISO refiling a permanent maximum gas constraint for its own balancing authority area that addresses the Commission's concerns."³⁵ The Commission also found that the other measures the CAISO proposed to make permanent "may be appropriate for an interim tariff provision to address an identified problem, such as Aliso Canyon's limited availability, but CAISO has not provided justification that they are appropriate or adequate in their current form as permanent features of CAISO's market."³⁶

The Commission's rejection of the proposed permanent measures meant that the interim versions of those measures, which the Commission had approved in the Aliso Phase 2 proceeding, automatically expired on November 30, 2017.³⁷ However, the Commission addressed that issue in the Aliso Phase 3 Order:

We recognize that rejecting CAISO's permanent tariff revisions will leave CAISO without the maximum gas constraint and the two-day-ahead advisory schedules to address the ongoing limited operability of Aliso Canyon. Our rejection of these permanent tariff provisions does not foreclose CAISO from proposing an extension of these Aliso Canyon-specific tariff provisions for another year, as CAISO did with the three tariff provisions that we accept on a temporary basis in this order.³⁸

Thus, the Commission recognized the importance of the function the measures serve in addressing the ongoing limited operability of Aliso Canyon, and expressly permitted the CAISO to submit a filing to extend for another year the interim versions of those measures.

³³ Aliso Phase 3 Order at PP 25-26, 53-63.

³⁴ *Id.* at P 55.

³⁵ *Id.* at P 61.

³⁶ *Id.* at P 63.

³⁷ *See id.* at P 5.

³⁸ *Id.* at P 54.

D. Assessment of the Need to Address Continuing Concerns Related to the Limited Operability of Aliso Canyon and Limitations on the Gas System in Southern California

The limited operability of Aliso Canyon, which prompted the measures proposed and accepted in the Aliso Phase 1, Phase 2, and Phase 3 proceedings, still presents challenges today and will continue to do so into the foreseeable future. The Aliso Canyon Technical Assessment Group (ACTAG), whose members include technical experts from the CPUC, CEC, CAISO, and Los Angeles Department of Water and Power (LADWP), with input by SoCalGas, has been periodically assessing Aliso Canyon's role in electric reliability, resulting in the ACTAG's issuance of a number of assessment reports since the limited operability of Aliso Canyon began. The reports, which are summarized in attachment C hereto, describe the risks to electric reliability posed by the continued limited operability of Aliso Canyon.

As discussed in attachment C, the ACTAG issued its most recent report on November 28, 2017 to assess the reliability challenges of delivering energy to Southern California for the winter of 2017-18 and concluded that "the region faces new challenges and greater uncertainty compared to last winter."³⁹ The ACTAG's Winter 2017-2018 Supplement articulates the risks the electric and gas systems face this coming winter and beyond. Although the Supplement recognizes that the availability of Aliso Canyon will likely be greater than it was last year, the Supplement highlights that, because of known (*i.e.*, existing or planned) and unplanned outages on other parts of the Southern California gas system, there is a significant risk of curtailments of non-core customers, which include gas-fired generation facilities.

The Winter 2017-18 Supplement provides a number of crucial findings that bear on the importance of this tariff amendment filing and the need for immediate Commission action to ensure the CAISO has the tools it needs to maintain reliability of the electric system:

- The primary challenge is that three SoCalGas natural gas transmission pipelines are out of operation. SoCalGas relies on these pipelines to serve core customers.

³⁹ Aliso Canyon Winter Risk Assessment Technical Report 2017-18 Supplement (Nov. 28, 2017) at 3 (Winter 2017-18 Supplement, or Supplement). The Winter 2017-18 Supplement is also provided in attachment D to this filing, along with a companion summary of the Supplement entitled Aliso Canyon Update Winter 2017-18 (Nov. 28, 2015) (Winter 2017-18 Update) and a notice of availability of the Supplement issued November 28, 2017. All of these documents are available on the CEC's website at http://www.energy.ca.gov/2017_energy/policy/documents/#05222017.

- Line 235-2 ruptured on October 1, 2017, also damaging the nearby Line 4000. This outage reduces maximum system capacity by 800 million cubic feet per day (MMcfd).
- Maintenance scheduled at the Playa del Ray gas storage field from November 7, 2017, through December 18, 2017 reduces maximum system capacity by 260 MMcfd.
- The risk of additional unplanned outages could further reduce maximum capacity on the SoCalGas system.
- SoCalGas has adopted mitigation measures to address these outages, which in part depend on deliveries on alternative pipelines.
- This winter's minimum generation requirement (*i.e.*, the gas needed by the electricity system operators to maintain electric system reliability) estimated by LADWP and the CAISO is higher than it was for 2016-17.
 - The increase is due to higher demand forecasts.
 - LADWP is postponing a planned transmission line outage until February 1, 2018 because of gas constraints. Once the LADWP line goes out of service, LADWP will require additional gas-fired resources in the Los Angeles Basin to meet electric reliability needs.
 - Between now and February 1, 2018, 38 MMcfd is needed to meet the total minimum generation requirement for the CAISO and LADWP balancing authority areas. If the balancing authority areas experience a contingency event, 112 MMcfd is needed to meet electricity demand. After February 1, 2018, those numbers will increase to 219 MMcfd and 293 MMcfd.⁴⁰
 - Absent the gas to meet the minimum generation requirement, electric reliability is threatened.
- Increased pressure to conserve gas use because of low storage inventory means that SoCalGas will not have the field pressures needed to withdraw enough gas to serve core customers.
 - Curtailments of non-core customers may occur in December to preserve inventory needed for core customers on cold days.

⁴⁰ Last year, those numbers were at 22 MMcfd and 96 MMcfd.

- Although the ACTAG considers mitigation measures in its assessment, it is not clear that these measures will suffice to avoid gas curtailments to non-core customers this winter.

In sum, the gas system capacity and maximum supported demand will vary this winter depending on when the pipelines can return to operation during the winter and on system mitigation actions that may be taken.⁴¹ But in any event, absent the availability of gas from Aliso Canyon, a shortfall occurring this winter on a 1-in-10-year demand day will require curtailments of non-core customers, including electric generators, even if the generators reduce their output to a minimum.⁴² The ACTAG warned:

While the ACTAG offers several mitigation measures in this assessment, including using gas at Aliso Canyon, it is not clear that they and the prior measures already in place will be sufficient to avoid gas service curtailments to noncore customers in Southern California this winter. Assuming no additional gas system or electric transmission system outages and that full supplies arrive at the pipeline receipt points, the need for curtailments depends entirely on the weather and by how much customers can decrease gas demand.⁴³

The Winter 2017-18 Supplement makes plain the increased risks to reliability this winter due to the continued limited operability of Aliso Canyon and outages on the gas pipelines in Southern California.

⁴¹ Winter 2017-18 Supplement at 3-5; Winter 2017-18 Update at 5.

⁴² Winter 2017-18 Supplement at 17-19; Winter 2017-18 Update at 6.

⁴³ Winter 2017-18 Supplement at 27. See also Winter 2017-18 Update at 9.

II. Proposed Tariff Revisions

The CAISO proposes to temporarily re-implement, until December 16, 2018, the exact same four measures approved in the Aliso Phase 2 proceeding as discussed above, which automatically expired on November 30, 2017.⁴⁴ Re-implementing the measures will ensure the CAISO can continue to manage its system reliably when faced with gas constraints such as those posed by the limited operability of Aliso Canyon and known outages on the Southern California gas pipeline system.

A. Temporarily Re-Implement the Previously Approved Tariff Provisions Allowing the CAISO to Use a Maximum Natural Gas Constraint in the SoCalGas and SDG&E Gas Regions

1. Overview of and Rationale for the CAISO Proposal

The CAISO proposes to re-implement temporarily the tariff provisions previously approved in the Aliso Phase 2 proceeding to implement a gas constraint that limits the maximum amount of natural gas that can be burned by natural gas-fired resources in the SoCalGas and SDG&E gas regions.⁴⁵ Although the other bidding rules and measures approved in the Aliso Phase 1, Phase 2, and Phase 3 proceedings provide an opportunity for better visibility of the impacts of the constrained gas system on the electric system, additional tools are necessary to ensure that CAISO operators can maintain the system reliably to address known gas constraints and challenges posed by the continued limited operability of Aliso Canyon.⁴⁶ Re-implementing the maximum natural gas constraint will permit CAISO operators to enforce in the day-ahead and real-time markets constraints to limit the dispatch of generators in the affected areas to a maximum gas usage if there is a limitation on the maximum amount of gas used.⁴⁷ The constraints will also limit CAISO market dispatch of the affected generators in the real-time market to a maximum gas usage if there is a limitation that relates to differences between gas scheduled with the gas company and gas consumed during the operating day due to gas system imbalance limitations. The tariff provisions are a reasonable and necessary measure to ensure the reliable operation of the electric grid within the bounds imposed on the CAISO by

⁴⁴ This filing initiates the Aliso Phase 4 proceeding.

⁴⁵ Proposed tariff section 27.11 and revised tariff section 6.2.1.3, both of which are identical to the versions of those sections approved in the Aliso Phase 2 proceeding.

⁴⁶ See the discussion of these issues above in section I.D of this transmittal letter and in attachment C to this filing.

⁴⁷ The CAISO will inform the affected generators that they are subject to the constraint or constraints.

the operation of the natural gas system.⁴⁸

2. Enforcement of the Maximum Gas Constraint

As was the case before the tariff provisions regarding the maximum gas constraint automatically expired on November 30, 2017, in the event that the CAISO observes constraints on the gas system, which could come in the form of curtailments or requests for conservation to non-core customers, the CAISO will apply a constraint for the day-ahead market, the real-time market, or both, to limit the gas burn in specific areas. The CAISO will enforce the constraint based on its assessment of gas and electric conditions, but will coordinate with the affected gas companies in Southern California to the maximum extent possible to ensure that the limitations imposed by the constraint in the market are consistent with the limitations observed on the gas system.

For example, the CAISO would apply a maximum gas constraint as follows. The CAISO has already developed and defined a constraint for the SoCalGas or SDG&E gas region. The CAISO may enforce the constraint in both the day-ahead and the real-time markets to ensure the CAISO market does not dispatch or commit resources that exceed the maximum gas burn in the specified region. If gas system constraint occurs after the day-ahead market or a gas curtailment is issued during the real-time market, the CAISO may enforce the constraint in the real-time market run only. Similarly, the CAISO may enforce the constraint if it anticipates that large imbalances between gas schedules and gas consumed could compromise gas reliability or electric system reliability. As it did before the previously approved tariff provisions expired on November 30, 2017, the CAISO will retain the flexibility to modify the level of the constraint, or to remove the constraint, if the CAISO determines that the constraint is leading to adverse market impacts.

If there are known and identifiable constraints on the natural gas system, over-dispatching resources in gas-constrained regions could negatively affect pipeline conditions, exacerbating existing gas system limitations. This, in turn, potentially could lead to significant outages or curtailments of gas-fired generating resources, thereby threatening the reliability of the electric system. For example, if the gas system experiences limitations affecting a specific region of the CAISO grid, but the CAISO market system is unable to capture those limitations through market constraints, the market could clear generation based on submitted bids and system conditions that do not account for gas system limitations. This could potentially occur in the real-time market even if the bids of generators on the affected systems reflect tightened gas balancing requirements. Such dispatches could aggravate already constrained gas system conditions, thereby compromising gas reliability and resulting in gas curtailments because

⁴⁸ See Aliso Phase 1 Order at P 48.

gas generators cannot access gas needed to serve the electric grid reliably. If this occurs and electric generators cannot access gas to serve electric load and power cannot be delivered into the local area, electric curtailments are also likely.

Re-implementing the tariff provisions will allow the CAISO to respond to gas system conditions proactively as they develop, better ensuring that market dispatches reflect actual gas system conditions. It is critical for purposes of both gas and electric system reliability that the CAISO have the authority to be proactive and act in advance of such occurrences to ensure the dispatch reflects the conditions on the natural gas system to the maximum extent possible.

3. The Effect of Enforcing the Maximum Gas Constraint

When binding, the maximum gas constraint ensures that generation in the day-ahead or real-time market is dispatched taking into consideration gas system limitations. Because the CAISO cannot predict at this time exactly how and when the gas system will be constrained, it seeks the re-implementation of its previously approved authority to reflect any such limitations through market constraints based on its observations of gas system limitations and how those limitations could affect electric reliability if not appropriately reflected in the CAISO markets.⁴⁹

As it did before, the CAISO will re-implement the maximum gas constraint using generation nomograms that include the generators within the affected areas.⁵⁰ The nomogram will affect the congestion component of the relevant generators' locational marginal prices and have a relaxation parameter value (*i.e.*, a "penalty price") associated with relaxing the gas constraint. The CAISO will apply this parameter to function appropriately relative to the parameters for other constraints enforced in the market and has specified the parameter in the business practice manual for market operations.⁵¹ Use of the constraint

⁴⁹ The CAISO provides a detailed mathematical description of the constraint on pages 22-26 of the Draft Final Proposal provided in attachment D to the Aliso Phase 2 tariff amendment (Draft Final Proposal). <http://www.caiso.com/Documents/DraftFinalProposal-AlisoCanyonGasElectricCoordinationPhase2.pdf>.

⁵⁰ A nomogram is a set of operating or scheduling rules that are used to ensure that simultaneous operating limits are respected. Tariff appendix A, existing definitions of "Nomogram" and "Contingency". Detailed mathematical information regarding nomograms is provided on pages 29-34 of the Draft Final Proposal.

⁵¹ The constraint parameter establishing the penalty price for the gas constraint is a "penalty factor" that governs the conditions under which constraints may be relaxed and if relaxed will impact the prices at applicable locations. The parameters that impact prices are specified in existing tariff section 27.4.3 with further detail provided in the business practice manual for market operations. A detailed description of how the CAISO establishes the penalty price relative to other penalty prices used in the market is provided on pages 26-29 of the Draft Final Proposal.

parameter in this manner is consistent with the finding in the Aliso Phase 1 Order that using generator nomograms with a penalty factor is an appropriate means of employing the gas constraint to ensure electric reliability.⁵²

The CAISO is also working on software improvements that will allow it to modify the relaxation parameter assigned to the gas constraint so that it will be more effective relative to other constraints.⁵³ At this time, the CAISO is working have software enhancement in place that will enable it to change the parameter setting by the third week of December 2017. In the interim, employing the constraint is still effective and preferable to relying on exceptional dispatches alone. The parameter change would only make it more effective. Therefore, there is no basis for depriving the CAISO of this tool until the CAISO adopts the software enhancements. Once the software enhancement is completed, the CAISO will modify the business practice manual for market operations to reflect the new parameter setting. The DMM and other stakeholders will have full visibility into its setting relative to other constraints. If the parameter requires further tuning, the CAISO can modify the business practice manual to obtain the desired results.

Pursuant to the re-implemented tariff, provisions proposed in this filing, as was previously the case, when the maximum gas constraint is binding, the shadow price of the constraint will be reflected in the marginal cost of congestion component of the resource-specific locational marginal prices of the affected gas-fired resources. The shadow price of the constraint will not be reflected in the marginal cost of congestion component of point-of-receipt locational marginal prices, including trading hub and other aggregated locations, and will not be reflected in locational marginal prices used for settling supply other than the affected generators, load, virtual bids, or congestion revenue rights.⁵⁴ The CAISO will re-implement its approach of applying the constraint only to the resource-specific price at the network connectivity node (CNode)⁵⁵ used to dispatch affected generators but not to the bus location reflecting the point of delivery or receipt on the CAISO controlled grid.⁵⁶ It is just and reasonable to

⁵² See Aliso Phase 1 Order at P 48.

⁵³ See CAISO Answer to DMM Comments, Docket No. ER17-2568-000, at 17 (Nov. 8, 2017).

⁵⁴ The tariff provisions also specify how the CAISO will allocate any non-zero amounts attributable to the price differential between the marginal cost of congestion used for settling a generating unit's scheduled or dispatched amounts at their location and the marginal cost of congestion used for settling demand, virtual bids, or congestion revenue rights.

⁵⁵ Although this transmittal letter uses the capitalized term "CNode" as a convenient shorthand signifying a network connectivity node, that term is not defined in the tariff but is used in the business practice manuals.

⁵⁶ The full network model is composed of CNodes interconnected with network branches. A CNode represents a connection point used to define the physical topological connectivity of the

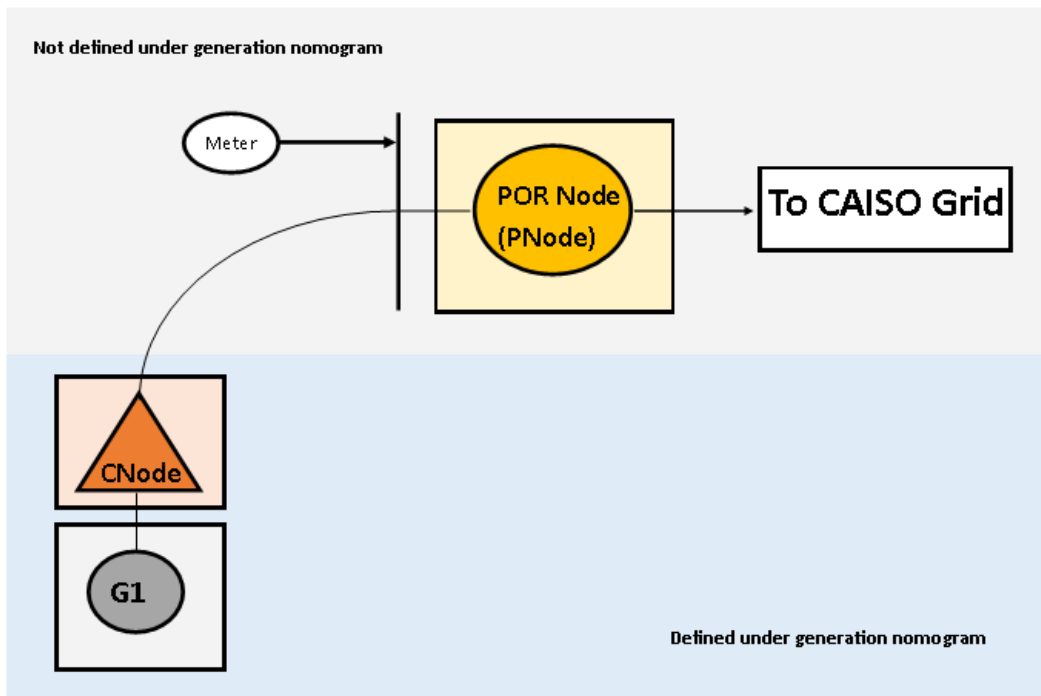
apply the shadow price of the constraint only to the resource-specific locational marginal price for generators connected to the affected gas systems because they are the only market participants subject to the gas limitations.

When the constraint is binding, the market will ensure generation subject to the constraint will not be dispatched higher or lower than the constraint's limits. When a maximum gas constraint is binding, the CNode locational marginal price (*i.e.*, the affected generator's locational marginal price) will decrease, which will tend to reduce the amount of energy the CAISO market dispatches from an affected generator.

Figures 1 and 2 below illustrate the locations at which the CAISO will set prices when it enforces a gas constraint. The grey circle represents a generator's (G1) physical topological connection to a network node, the CNode. In this example, there is only one piece of equipment connected to a CNode. Therefore, the CNode and bus pricing node (PNode) are unique. Figure 1 also shows the connection between the CNode and the PNode, which represents the point at which the injection is received into the CAISO controlled grid for supply, or withdrawal is delivered out of the CAISO controlled grid for demand. Generally, the PNode of a generating unit will coincide with the CNode and is where the relevant revenue quality meter is connected or compensated, and reflects the point at which the generating unit is connected to the CAISO balancing authority area. This location is referred to as the "point of receipt" (POR) and is considered to be a PNode. However, the PNode and CNode can differ in the CAISO's network model.

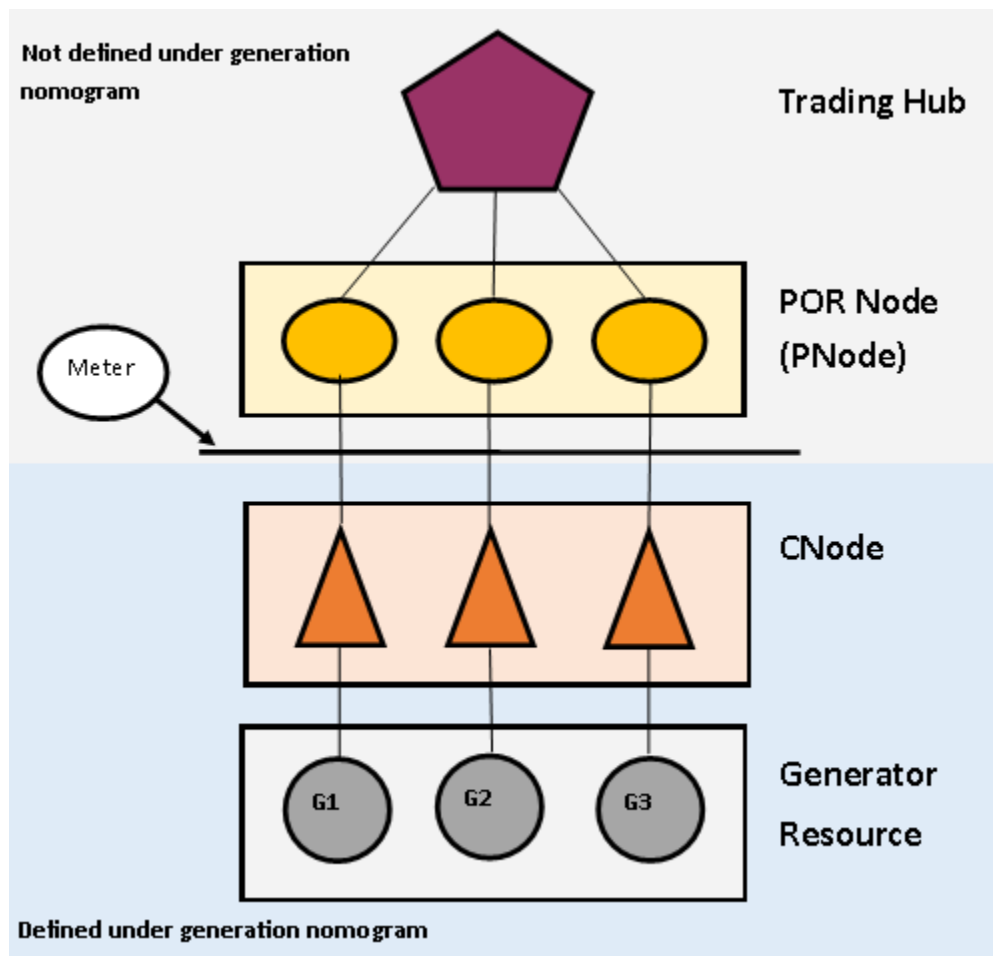
network and only one load or generation device can be connected to a CNode. Each piece of equipment has a CNode associated with it and rolls up into a bus which represents all the topological nodes associated with a generating resource.

Figure 1



With respect to aggregated locations such as trading hubs, the settlement of transactions using these locations would be based on price information from the PNodes that are aggregated into the aggregated pricing node (APNode), and do not use price information from the CNode(s). Figure 2 below shows the relationship between the generators (represented by grey circles), CNodes (represented by orange triangles), and PNodes that are aggregated into the Trading Hub's APNode. Figure 2 illustrates that the PNode contributes to the pricing of the trading hub price represented by the purple pentagon and not the CNode.

Figure 2



The CAISO proposes to re-implement the tariff language authorizing it to settle injections into the CAISO controlled grid in the SoCalGas and SDG&E gas regions at prices influenced by the maximum gas constraint. The CAISO will accomplish this by pricing such resources based on the resource-specific locational marginal prices at the CNode rather than the PNode prices shown in Figures 1 and 2. For all other transactions, the CAISO will continue using the PNode-related prices. Consequently, only prices for generators on the affected gas systems at the specific resource location will reflect the cost of honoring the constraint.

The re-implemented maximum gas constraint will establish just and reasonable prices at affected generator locations, because under a maximum gas constraint the price should decrease according to the constrained availability of gas available to fuel generating power at that location. This is similar to how a supply source behind a transmission constraint is priced higher to reflect the congestion cost associated with dispatching that supply.

As was the case before the previously approved tariff authority expired, the price for load, virtual bids, and congestion revenue rights will not reflect the shadow price of the maximum gas constraint. An incremental injection at the point of receipt locational marginal price is not assumed to come from the generators under this constraint that may reside at the point of receipt locations. Because the constraint depends only on the generation group under it and not on a general injection at that location, the nodogram does not change. In particular, if the incremental change in injection at the point of receipt location was actually an increment in load at the location, the generation group under the constraint would not change and, therefore, the impact of the constraint is not captured at the point of receipt locations. The locational marginal prices for the point of receipt should send accurate marginal price signals associated with the incremental change in injection or demand at that specific location.

It is just and reasonable not to reflect the shadow price of the maximum gas constraint in the price of CRRs and virtual bids. If CRRs and virtual schedules settle on locational marginal prices that reflect the shadow price of the constraint, financial entities might be able to take large positions at little or no cost and inappropriately profit at the expense of revenue inadequacy balancing accounts allocated largely to load serving entities.

When the maximum gas constraint is binding in the day-ahead market, CRRs that source at a node impacted by the constraint and sink at a node not impacted by the constraint will continue to be paid based on the shadow price of the constraint. There likely will be such source and sink node pairs with few to no other constraints creating price separation between the source and sink nodes. Therefore, market participants could obtain large quantities of such CRRs at little to no cost and with very little downside risk. When the gas usage constraint binds in the day-ahead market, these positions could be lucrative for the financial entities and costly for the load serving entities that would pay the revenue inadequacy uplift charges.

Also, when the maximum gas constraint is enforced in the real-time market but not in the day-ahead market, virtual supply at a node whose settlement price is affected by the constraint, offset by virtual demand at a node whose settlement price is not affected by the constraint, will continue to be paid based on the real-time shadow price of the constraint. As described in the paragraph above, there are likely to be node pairs with few or no other constraints creating price separation between the virtual supply and virtual demand nodes. Therefore, using the shadow price of the constraint to settle virtual bids could result in market participants obtaining large quantities of offsetting virtual supply and demand schedules at little to no cost and with very little downside risk. When the constraint is binding in the real-time market, these offsetting virtual positions could be lucrative for the financial entities and costly for the load serving entities that would pay the imbalance energy uplift charges.

Further, the Commission and market participants will have transparency regarding the effects of the tariff revisions on the CAISO markets pursuant to the quarterly Reports on Market Issues and Performance that DMM issues.⁵⁷

B. Temporarily Re-Implement the Previously Approved Tariff Provisions to Address Market Issues Related to the Enforcement of the Maximum Gas Constraint

To address potential market issues, the CAISO also proposes to re-implement temporarily the tariff provisions previously approved in the Aliso Phase 2 proceeding regarding two measures related to use of the maximum gas constraint. First, the CAISO proposes to re-implement the criteria for designating a transmission constraint as competitive or non-competitive, separate from applying the dynamic competitive path assessment in the CAISO's local market power mitigation process.⁵⁸ The separate criteria provide that, notwithstanding application of the dynamic competitive path assessment, when the CAISO enforces the maximum natural gas constraint the CAISO may deem selected internal constraints to be non-competitive for specific days or hours based on its determination that actual electric supply conditions may be non-competitive due to anticipated electric supply conditions in the SoCalGas and SDG&E gas regions. Re-implementing this authority is consistent with the Commission's finding in the Aliso Phase 1 Order that such provisions are a reasonable measure to address actual electric supply conditions that are found to be non-competitive when the constraint is enforced due to anticipated electric supply conditions in gas regions.⁵⁹

Second, consistent with the Aliso Phase 1 Order,⁶⁰ to ensure that virtual bidding cannot detrimentally affect the CAISO markets, the CAISO proposes to temporarily re-implement the tariff provisions previously approved in the Aliso Phase 2 proceeding that allow the CAISO to suspend or limit virtual bidding activities in circumstances where submitted virtual bids detrimentally affect CAISO market efficiency related to enforcement of a natural gas constraint.⁶¹ Re-implementing these tariff provisions is just and reasonable because virtual bidding behavior that adversely affects market efficiency can cause problems for

⁵⁷ These quarterly reports are available on the CAISO website at <http://caiso.com/market/Pages/MarketMonitoring/MarketIssuesPerformanceReports/Default.aspx>.

⁵⁸ Revised tariff section 39.7.2.2, which is identical to the same revised tariff section approved in the Aliso Phase 2 proceeding.

⁵⁹ See Aliso Phase 1 Order at P 52.

⁶⁰ See *id.* at PP 80, 83.

⁶¹ Proposed tariff section 7.9.2(d), which is identical to the same proposed tariff section approved in the Aliso Phase 2 proceeding.

system reliability, which the tariff language is expressly intended to protect.⁶² Further, as the Commission recognized in the Aliso Phase 1 Order, with the limited operability of a gas region and the measures that CAISO may have to undertake to address electric and gas reliability, there may be times when promoting price convergence may run contrary to the efficient economic solution of the market. There may also be sustained differences in prices between locations and between day-ahead and real-time markets that could be exploited by virtual bidders without yielding any market benefits.⁶³ Re-implementing the tariff provisions will allow the CAISO to resume addressing these issues as they may arise.

As was the case before the previously approved tariff provisions automatically expired on November 30, 2017, if the CAISO suspends or limits virtual bidding pursuant to the tariff provisions, the CAISO will file an informational report with the Commission explaining why it took such action. The CAISO has included detail regarding this tariff authority in the business practice manual.

C. Temporarily Re-Implement the Previously Approved Tariff Provisions Allowing the CAISO to Give Generators Advisory Information Regarding Their Potential Day-Ahead Commitments Prior to the Day-Ahead Market Run

The CAISO proposes to temporarily re-implement the tariff provisions previously approved in the Aliso Phase 2 proceeding, under which the CAISO helps scheduling coordinators make more informed gas procurement decisions by providing them with advisory information regarding their resources' potential commitment in the day-ahead market that the CAISO produces through its existing two-day-ahead process.⁶⁴ This involves the CAISO running the commitment process based on available bids and estimates of system conditions at that time. As was the case before the previously approved tariff provisions expired on November 30, 2017, the CAISO will provide this information to scheduling coordinators only to advise them of their potential commitments; the information will not be binding. The CAISO will continue to conduct its actual day-ahead market runs the day prior to the operating day to produce financially and physically binding commitments and dispatches.

As was the case before November 30, 2017, the advisory information provided to scheduling coordinators will come in the form of the MWh advisory

⁶² See existing tariff section 7.9.2.

⁶³ Aliso Phase 1 Order at P 80.

⁶⁴ Proposed tariff section 6.5.2.2.3, which is identical to the same proposed tariff section approved in the Aliso Phase 2 proceeding.

schedule produced by the residual unit commitment process conducted as part of the typical day-ahead market. The CAISO communicates the advisory resource-specific RUC schedule to each scheduling coordinator for its resources through the CAISO's secure communication system and does not include pricing information.⁶⁵ Although the precise constraints that operations personnel use may change between market runs until the final set of constraints for the real-time market is determined, the CAISO and stakeholders believed that providing scheduling coordinators with the two-day-ahead residual unit commitment process results will improve their ability to plan for gas procurement. The Commission reached the same conclusion in approving this mechanism in the Aliso Phase 1 Order, finding that this information will help reduce gas and electric reliability risks.⁶⁶ Those same reasons support retaining this tool on a temporary basis.

Without this information, scheduling coordinators would be required to wait until publication of the day-ahead market results, which is typically at 1:00 p.m. on the day prior to the operating day, for any forecast of their potential commitment. The CAISO understands that most gas trading for delivery on the CAISO's trading day occurs earlier in the morning before the day-ahead market publication time. Although market participants can consider demand forecasts and bilateral gas and electric market activity and can plan based on their expectations of where economics will place their bids in the CAISO day-ahead market supply curve relative to the demand bid curve, scheduling coordinators are limited in their ability to predict day-ahead market schedules because such schedules are also affected by the numerous constraints modeled by the CAISO market. The advisory schedules will enable scheduling coordinators to make more informed decisions regarding gas procurement.

As was previously the case, the CAISO will provide advisory information only to the responsible scheduling coordinator for resources bidding into the day-ahead market and not to all market participants. The information reflects confidential schedules, which the CAISO tariff restricts the CAISO from sharing with other market participants. This restriction is reasonable because the scheduling coordinators for these resources are the entities that must ensure they have procured and nominated sufficient gas to perform consistent with expected CAISO dispatches. The Commission found in the Aliso Phase 1 Order that it is just and reasonable to provide the information only to the responsible scheduling coordinator.⁶⁷ The same reasoning continues to apply.

⁶⁵ The CAISO notes that the results of the two-day-ahead run will be meaningful only to the extent there are bids available in the CAISO's systems to represent clearing of the two-day-ahead market based on bid-in supply and bid-in demand.

⁶⁶ See Aliso Phase 1 Order at P 16. See *also* Aliso Phase 2 Order at PP 6, 25-26 (authorizing extension of tariff provisions for an additional 12 months).

⁶⁷ Aliso Phase 1 Order at P 17.

III. Effective Date and Requests for Expedited Treatment and Waiver of Notice Requirements

In order to permit the proposed amendment to become effective on December 16, 2017, or as soon thereafter as possible, the CAISO respectfully requests expedited tariff revision procedures pursuant to the Guidance Order, including a shortened comment period. In the Guidance Order, the Commission stated that a request by a Regional Transmission Organization or Independent System Operator for expedited treatment of a tariff revision should clearly demonstrate that a rule change is required due to a flaw, why action is necessary in the market, and that the proposed tariff revision will correct the flaw.

A proposed tariff amendment qualifies for expedited treatment if the flaw meets the following criteria:

- (1) it materially adversely impacts the market (due to the unanticipated workings of the tariff or unanticipated actions by market participants);
- (2) it requires prompt action to prospectively revise the tariff to remove the ability to cause such material adverse impacts; and
- (3) it is susceptible to a clear-cut revision or interim tariff revision or market rule.⁶⁸

The proposed tariff amendment qualifies for expedited treatment as it would grant the CAISO authority to use tools that are more efficient than simply relying on exceptional dispatches to deal with the known and increasing constraints and curtailments on the natural gas pipeline system in Southern California. Lacking the tools proposed in this filing, the current CAISO tariff provisions do not provide the CAISO with optimal tools to ensure the limitations on the gas system do not adversely affect CAISO electric reliability. The use of the constraint provides more accurate dispatch of resources in the CAISO system than exceptional dispatches because the gas constraint reflects the gas system limitations, which are in turn optimized through the market systems. Therefore, the market systems can better ensure an optimal market solution and consider the gas limitations together with other system constraints in any given market run. Moreover, the gas constraint ensures that the market clearing prices reflect the cost of the gas limitations on the electric system. The two-day-ahead advisory data provides scheduling coordinators with notice two days prior to the actual day of the expected gas burn. This allows scheduling coordinators to line up their gas procurements and schedule services accordingly. Re-implementing

⁶⁸ Guidance Order at P 2.

these tariff revisions as soon as practicable is necessary to ensure that the CAISO continues to have improved procedures and flexibility in place to address timely the risks presented by the limited operability of Aliso Canyon and the gas pipeline outages in Southern California during this winter and beyond.

The CAISO did not anticipate lacking the authority to implement these two provisions this winter. The Commission's rejection of the proposed permanent tariff revisions in the Aliso Phase 3 proceeding was unexpected. The proposed tariff provisions are clear-cut and the Commission previously approved the exact same provisions on an interim basis in the Aliso Phase 2 proceeding. The CAISO requests in the instant filing that the Commission permit these measures again to be in place temporarily and has proposed tariff sheets that would automatically expire after the proposed 12-month period as discussed below.

For the foregoing reasons, the CAISO requests that the Commission establish an expedited comment date no later than December 7, 2017, and issue an order accepting this filing by December 15, 2017.

The CAISO also requests that the Commission grant waiver of its notice requirements to accept the tariff revisions contained in this filing effective December 16, 2017.⁶⁹ Good cause exists to grant this waiver in order to permit the tariff revisions to go into effect as soon as practicable to address the issues discussed above. As discussed in the ACTAG's Winter 2017-2018 Supplement, the gas pipeline system is already significantly constrained, and as the winter days progress the likelihood of colder temperatures increases, putting greater pressure on the already constrained system. The sooner the CAISO regains the authority to employ the measures proposed in this filing, the better equipped the CAISO will be to deal with such issues. Given that the CAISO is requesting these measures be made effective on a temporary basis only, which the Commission has already found to be just and reasonable, there is no basis for waiting to approve these measures. Therefore, the Commission should grant the requested waiver.

IV. Temporary Effectiveness of the Tariff Revisions Until December 16, 2018 to the Extent the Commission Does Not Permit Them to Remain in Effect Beyond that Date Pursuant to a Subsequent CAISO Filing

For these reasons discussed in this filing, the CAISO requests that the Commission permit the proposed tariff revisions to remain in place for an additional 12 months, *i.e.*, until December 16, 2018.

⁶⁹ Pursuant to Section 35.11 of the Commission's regulations, 18 C.F.R. § 35.11, the CAISO requests waiver of Section 35.3(a)(1) of the Commission's regulations, 18 C.F.R. § 35.3(a)(1), to permit the requested effective date.

To implement this temporary approach, the CAISO is submitting two sets of tariff records – one set that contains the proposed tariff revisions and shows the December 16, 2017 effective date discussed above, and a second set that contains the tariff sections revised by this filing as they read in the existing tariff (*i.e.*, omitting the tariff revisions) and shows an effective date of December 16, 2018.⁷⁰ Pursuant to this approach, to the extent the Commission accepts the tariff revisions and does not later take action to continue their effectiveness beyond December 16, 2018, on that date the first set of tariff records described above will automatically be superseded by the second set of tariff records, and thus the tariff sections revised by this filing will revert to how they read before the CAISO submitted this filing.

V. Communications

In accordance with the Commission's regulations,⁷¹ correspondence and other communications regarding this filing should be addressed to the following individuals, whose names should be placed on the official service list established by the Commission with respect to this filing:

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VI. Service

The CAISO has served copies of this filing on the CPUC, the CEC, and all parties with scheduling coordinator agreements under the CAISO tariff. In addition, the CAISO has posted a copy of the filing on the CAISO website.

⁷⁰ The clean tariff sheets and red-lined document provided in attachments A and B to this filing reflect only the first set of tariff records described above.

⁷¹ 18 C.F.R. § 385.203(b).

VII. Contents of Filing

In addition to this transmittal letter, this filing includes the following attachments:

Attachment A	Clean CAISO tariff sheets for this tariff amendment;
Attachment B	Red-lined document showing the revisions contained in this tariff amendment;
Attachment C	Additional background information regarding Aliso Canyon; and
Attachment D	Winter 2017-18 Supplement, Winter 2017-18 Update, and notice of availability of the Supplement.

VIII. Conclusion

For the reasons set forth in this filing, the CAISO respectfully requests that the Commission issue an order by December 15, 2017 that accepts the tariff revisions contained in this filing effective December 16, 2017.

Respectfully submitted,

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Attachment A – Clean Tariff Records

**Filing to Temporarily Re-Implement Previously Approved and
Recently Expired Measure to Address Potential Gas Limitations
Related to the Limited Operability of the Also Canyon Gas Storage
Facility**

California Independent System Operator Corporation

6.2.1 Scheduling Coordinators

* * * *

6.2.1.3 Individually Assigned Login Accounts

The CAISO will provide an interface for data exchange between the CAISO and Scheduling Coordinators who shall each have individually assigned login accounts via digital certificates. Through the use of the security provisions of CAISO's secure communication system, data will be provided by the CAISO to Scheduling Coordinators on a confidential basis (such as Day-Ahead Schedules and resource-specific pricing data resulting from the enforcement of a natural gas constraint as specified in Section 27.11 for individual Scheduling Coordinators). Other CAISO data that is not confidential (such as CAISO Demand Forecasts) will be published on the public access reporting system of the CAISO Website and be available to anyone.

* * * *

6.5.2 Communications Prior to the Day-Ahead Market

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6.5.2.2.3 Advisory Day-Ahead Market Results

The CAISO may provide to the responsible Scheduling Coordinator its MWh amounts scheduled in the preliminary RUC process the CAISO conducts two (2) days prior to the Trading Day, that is based on Bids and forecasts of system conditions as available in the CAISO Market systems at the time the CAISO conducts the preliminary RUC process. This information is for advisory purposes only and is not financially binding.

* * * *

7.9.2 Reasons for Suspension or Limitation

The CAISO may suspend or limit the ability of one or more Scheduling Coordinators to submit Virtual Bids if the CAISO determines that virtual bidding activities of one or more Scheduling Coordinators on behalf

of one or more Convergence Bidding Entities detrimentally affect System Reliability or grid operations. Virtual bidding activities can detrimentally affect System Reliability or grid operations if such activities contribute to threatened or imminent reliability conditions, including but not limited to the following circumstances:

- (a) Submitted Virtual Bids create a substantial risk that the CAISO will be unable to obtain sufficient Energy and Ancillary Services to meet Real-Time Demand and Ancillary Service requirements in the CAISO Balancing Authority Area.
- (b) Submitted Virtual Bids render the CAISO Day-Ahead Market software unable to process Bids submitted into the Day-Ahead Market.
- (c) Submitted Virtual Bids render the CAISO unable to achieve an alternating current (AC) solution in the Day-Ahead Market for an extended period of time.
- (d) Submitted Virtual Bids detrimentally affect CAISO Market efficiency related to enforcement of natural gas constraint pursuant to Section 27.11.

* * * *

27.11 Natural Gas Constraint

The CAISO may enforce constraints that limit the maximum amount of natural gas that can be burned by natural gas-fired resources in the Southern California Gas Company and San Diego Gas & Electric Company gas regions, based on limitations in applicable gas regions anticipated by the CAISO during specific hours. In the event that such a constraint is binding, the Shadow Price of the constraint will be reflected in the Marginal Cost of Congestion component of the Locational Marginal Prices of only the affected natural gas-fired resources. The Shadow Price of the constraint will not be reflected in the Marginal Cost of Congestion component of the Locational Marginal Prices for purposes of settling cleared Demand, Virtual Bids, or Congestion Revenue Rights. The same Marginal Cost of Congestion used for settling Demand, Virtual Bids, or Congestion Revenue Rights is used for the calculation of the Real-Time Congestion Offset pursuant Section 11.5.4.1.1. The CAISO will allocate any non-zero amounts that are attributable to the price differential between the Marginal Cost of Congestion used for settling a

Generating Unit's scheduled or Dispatched amounts at their location and the Marginal Cost of Congestion used for settling Demand, Virtual Bids, or Congestion Revenue Rights pursuant to Section 11.5.4, except that for Day-Ahead settlements the CAISO will allocate the difference through the CRR Balancing Account pursuant to Section 11.2.4.5. The CAISO will provide, through the procedures set forth in Section 6.5.10.1.1, information on whether the CAISO plans to enforce a natural gas constraint in the Day-Ahead Market, and after the Day-Ahead Market is executed, whether it enforced a natural gas constraint in the Day-Ahead Market. In addition, to the extent feasible in advance of the deadline for submitting Bids for the Day-Ahead or Real-Time Market, as applicable, the CAISO will issue a notice through its market notification system indicating its intent to enforce a natural gas constraint along with the affected areas and the magnitude and expected duration of the natural gas constraint.

* * *

39.7.2 Competitive Path Designation

* * * * *

39.7.2.2 Criteria

- (A) Notwithstanding the provisions in Section 39.7.2.2(B), when the CAISO enforces the natural gas constraint pursuant to Section 27.11, the CAISO may deem selected internal constraints to be non-competitive for specific days or hours based on its determination that actual electric supply conditions may be non-competitive due to anticipated electric supply conditions in the Southern California Gas Company and San Diego Gas & Electric Company gas regions.
- (B) Subject to Section 39.7.3, for the DAM and RTM, a Transmission Constraint will be non-competitive only if the Transmission Constraint fails the dynamic competitive path assessment pursuant to this Section 39.7.2.2.
 - (a) **Transmission Constraints for the DAM** - As part of the MPM process associated with the DAM, the CAISO will designate a Transmission Constraint for the DAM as non-competitive when the fringe supply of counter-flow to the Transmission Constraint from all portfolios of suppliers that are not identified as potentially pivotal is less than the demand

for counter-flow to the Transmission Constraint. For purposes of determining whether to designate a Transmission Constraint as non-competitive pursuant to this Section

39.7.2.2(a):

- (i) Counter-flow to the Transmission Constraint means the delivery of Power from a resource to the system load distributed reference bus. If counter-flow to the Transmission Constraint is in the direction opposite to the market flow of Power to the Transmission Constraint, the counter-flow to the Transmission Constraint is calculated as the shift factor multiplied by the resource's scheduled Power. Otherwise, counter-flow to the Transmission Constraint is zero.
- (ii) Fringe supply of counter-flow to the Transmission Constraint means all available capacity from internal resources not controlled by the identified potentially pivotal suppliers and all internal Virtual Supply Awards not controlled by the identified potentially pivotal suppliers that provide counter-flow to the Transmission Constraint. Available capacity reflects the highest capacity of a resource's Energy Bid adjusted for Self-Provided Ancillary Services and derates.
- (iii) Demand for counter-flow to the Transmission Constraint means all internal dispatched Supply and Virtual Supply Awards that provide counter-flow to the Transmission Constraint.
- (iv) Potentially pivotal suppliers mean the three (3) portfolios of net sellers that control the largest quantity of counter-flow supply to the Transmission Constraint.
- (v) Portfolio means the effective available internal generation capacity under the control of the Scheduling Coordinator and/or Affiliate determined pursuant to Section 4.5.1.1.12 and all effective internal Virtual Supply Awards of the Scheduling Coordinator and/or Affiliate. Effectiveness in supplying counter-flow is determined by scaling generation capacity and/or Virtual Supply Awards by the shift factor from that location to the Transmission Constraint being tested.
- (vi) A portfolio of a net seller means any portfolio that is not a portfolio of a net buyer. A portfolio of a net buyer means a portfolio for which the average daily net value

of Measured Demand minus Supply over a twelve (12) month period is positive. The average daily net value is determined for each portfolio by subtracting, for each Trading Day, Supply from Measured Demand and then averaging the daily value for all Trading Days over the twelve (12) month period. The CAISO will calculate whether portfolios are portfolios of net buyers in the third month of each calendar quarter and the calculations will go into effect at the start of the next calendar quarter. The twelve (12) month period used in this calculation will be the most recent twelve (12) month period for which data is available. The specific mathematical formula used to perform this calculation will be set forth in a Business Practice Manual. Market Participants without physical resources will be deemed to be net sellers for purposes of this Section 39.7.2.2(a)(vi).

(vii) In determining which Scheduling Coordinators and/or Affiliates control the resources in the three (3) identified portfolios, the CAISO will include resources and Virtual Supply Awards directly associated with all Scheduling Coordinator ID Codes associated with the Scheduling Coordinators and/or Affiliates, as well as all resources that the Scheduling Coordinators and/or Affiliates control pursuant to Resource Control Agreements registered with the CAISO as set forth Section 4.5.1.1.13. Resources identified pursuant to Resource Control Agreements will only be assigned to the portfolio of the Scheduling Coordinator that has control of the resource or whose Affiliate has control of the resource pursuant to the Resource Control Agreements.

(b) **Transmission Constraints for the RTM** - As part of the MPM processes associated with the RTM, the CAISO will designate a Transmission Constraint for the RTM as non-competitive when the sum of the supply of counter-flow from all portfolios of potentially pivotal suppliers to the Transmission Constraint and the fringe supply of counter-flow to the Transmission Constraint from all portfolios of suppliers that are not identified as potentially pivotal is less than the demand for counter-flow to the Transmission Constraint. For purposes of determining whether to designate a Transmission Constraint

as non-competitive pursuant to this Section 39.7.2.2(b):

- (i) Counter-flow to the Transmission Constraint has the meaning set forth in Section 39.7.2.2(a)(i).
- (ii) Supply of counter-flow from all portfolios of potentially pivotal suppliers to the Transmission Constraint means the minimum available capacity from internal resources controlled by the identified potentially pivotal suppliers that provide counter-flow to the Transmission Constraint. The minimum available capacity for the current market interval will reflect the greatest amount of capacity that can be physically withheld. The minimum available capacity is the lowest output level the resource could achieve in the current market interval given its dispatch in the last market interval and limiting factors including Minimum Load, Ramp Rate, Self-Provided Ancillary Services, Ancillary Service Awards (in the Real-Time Market only), and derates.
- (iii) Potentially pivotal suppliers mean the three (3) portfolios of net sellers that control the largest quantity of counter-flow supply to the Transmission Constraint that can be withheld. Counter-flow supply to the Transmission Constraint that can be withheld reflects the difference between the highest capacity and the lowest capacity of a resource's Energy Bid (not taking into account the Ramp Rate of the resource), measured from the Dispatch Operating Point for the resource in the immediately preceding fifteen (15) minute FMM interval or the preceding five (5) minute RTD interval, as applicable (taking into account the Ramp Rate of the resource), adjusted for Self-Provided Ancillary Services and derates in determining whether to designate a Transmission Constraint as non-competitive for the RTM, or adjusted for Ancillary Service Awards and derates in determining whether to designate a Transmission Constraint as non-competitive for the RTM. In determining whether to designate a Transmission Constraint as non-competitive for the RTM, counter-flow supply to the Transmission Constraint that can be withheld also reflects the PMin of each Short Start Unit with a Start-

Up Time of sixty (60) minutes or less that was off-line in the immediately preceding fifteen (15) minute interval of the FMM. In determining whether to designate a Transmission Constraint as non-competitive for the FMM, counter-flow supply to the Transmission Constraint that can be withheld also reflects the PMin of each Short Start Unit with a Start-Up Time of fifteen (15) minutes or less that was off-line in the immediately preceding fifteen (15) minute interval.

- (iv) Portfolio means the effective available internal generation capacity under the control of the Scheduling Coordinator and/or Affiliate determined pursuant to Sections 4.5.1.1.12 and 39.7.2.2(a)(vii). Effectiveness in supplying counter-flow is determined by scaling generation capacity by the shift factor from that location to the Transmission Constraint being tested.
- (v) A portfolio of a net seller has the meaning set forth in Section 39.7.2.2(a)(vi).
- (vi) Fringe supply of counter-flow to the Transmission Constraint means all available capacity from internal resources not controlled by the identified potentially pivotal suppliers that provide counter-flow to the Transmission Constraint. Available capacity reflects the highest capacity of a resource's Energy Bid (not taking into account the Ramp Rate of the resource), measured from the Dispatch Operating Point for the resource in the immediately preceding fifteen (15) minute interval of the FMM or five (5) minute interval of the RTD, as applicable (taking into account the Ramp Rate of the resource), adjusted for Self-Provided Ancillary Services and derates in determining whether to designate a Transmission Constraint as non-competitive for the RTM, or adjusted for Ancillary Service Awards and derates in determining whether to designate a Transmission Constraint as non-competitive for the RTM.
- (vii) Demand for counter-flow to the Transmission Constraint means all internal dispatched Supply that provides counter-flow to the Transmission Constraint.

Attachment B – Marked Tariff Records

**Filing to Temporarily Re-Implement Previously Approved and
Recently Expired Measure to Address Potential Gas Limitations
Related to the Limited Operability of the Also Canyon Gas Storage
Facility**

California Independent System Operator Corporation

6.2.1 Scheduling Coordinators

* * * *

6.2.1.3 Individually Assigned Login Accounts

The CAISO will provide an interface for data exchange between the CAISO and Scheduling Coordinators who shall each have individually assigned login accounts via digital certificates. Through the use of the security provisions of CAISO's secure communication system, data will be provided by the CAISO to Scheduling Coordinators on a confidential basis (such as Day-Ahead Schedules and resource-specific pricing data resulting from the enforcement of a natural gas constraint as specified in Section 27.11 for individual Scheduling Coordinators). Other CAISO data that is not confidential (such as CAISO Demand Forecasts) will be published on the public access reporting system of the CAISO Website and be available to anyone.

* * * *

6.5.2 Communications Prior to the Day-Ahead Market

* * * *

6.5.2.2.3 Advisory Day-Ahead Market Results

The CAISO may provide to the responsible Scheduling Coordinator its MWh amounts scheduled in the preliminary RUC process the CAISO conducts two (2) days prior to the Trading Day, that is based on Bids and forecasts of system conditions as available in the CAISO Market systems at the time the CAISO conducts the preliminary RUC process. This information is for advisory purposes only and is not financially binding.

* * * *

7.9.2 Reasons for Suspension or Limitation

The CAISO may suspend or limit the ability of one or more Scheduling Coordinators to submit Virtual Bids if the CAISO determines that virtual bidding activities of one or more Scheduling Coordinators on behalf

of one or more Convergence Bidding Entities detrimentally affect System Reliability or grid operations. Virtual bidding activities can detrimentally affect System Reliability or grid operations if such activities contribute to threatened or imminent reliability conditions, including but not limited to the following circumstances:

- (a) Submitted Virtual Bids create a substantial risk that the CAISO will be unable to obtain sufficient Energy and Ancillary Services to meet Real-Time Demand and Ancillary Service requirements in the CAISO Balancing Authority Area.
- (b) Submitted Virtual Bids render the CAISO Day-Ahead Market software unable to process Bids submitted into the Day-Ahead Market.
- (c) Submitted Virtual Bids render the CAISO unable to achieve an alternating current (AC) solution in the Day-Ahead Market for an extended period of time.
- (d) Submitted Virtual Bids detrimentally affect CAISO Market efficiency related to enforcement of natural gas constraint pursuant to Section 27.11.

* * * *

27.11 Natural Gas Constraint ~~[Not Used]~~

The CAISO may enforce constraints that limit the maximum amount of natural gas that can be burned by natural gas-fired resources in the Southern California Gas Company and San Diego Gas & Electric Company gas regions, based on limitations in applicable gas regions anticipated by the CAISO during specific hours. In the event that such a constraint is binding, the Shadow Price of the constraint will be reflected in the Marginal Cost of Congestion component of the Locational Marginal Prices of only the affected natural gas-fired resources. The Shadow Price of the constraint will not be reflected in the Marginal Cost of Congestion component of the Locational Marginal Prices for purposes of settling cleared Demand, Virtual Bids, or Congestion Revenue Rights. The same Marginal Cost of Congestion used for settling Demand, Virtual Bids, or Congestion Revenue Rights is used for the calculation of the Real-Time Congestion Offset pursuant Section 11.5.4.1.1. The CAISO will allocate any non-zero amounts that are attributable to the price differential between the Marginal Cost of Congestion used for settling a

Generating Unit's scheduled or Dispatched amounts at their location and the Marginal Cost of Congestion used for settling Demand, Virtual Bids, or Congestion Revenue Rights pursuant to Section 11.5.4, except that for Day-Ahead settlements the CAISO will allocate the difference through the CRR Balancing Account pursuant to Section 11.2.4.5. The CAISO will provide, through the procedures set forth in Section 6.5.10.1.1, information on whether the CAISO plans to enforce a natural gas constraint in the Day-Ahead Market, and after the Day-Ahead Market is executed, whether it enforced a natural gas constraint in the Day-Ahead Market. In addition, to the extent feasible in advance of the deadline for submitting Bids for the Day-Ahead or Real-Time Market, as applicable, the CAISO will issue a notice through its market notification system indicating its intent to enforce a natural gas constraint along with the affected areas and the magnitude and expected duration of the natural gas constraint.

* * *

39.7.2 Competitive Path Designation

* * * *

39.7.2.2 Criteria

(A) Notwithstanding the provisions in Section 39.7.2.2(B), when the CAISO enforces the natural gas constraint pursuant to Section 27.11, the CAISO may deem selected internal constraints to be non-competitive for specific days or hours based on its determination that actual electric supply conditions may be non-competitive due to anticipated electric supply conditions in the Southern California Gas Company and San Diego Gas & Electric Company gas regions.

(B) Subject to Section 39.7.3, for the DAM and RTM, a Transmission Constraint will be non-competitive only if the Transmission Constraint fails the dynamic competitive path assessment pursuant to this Section 39.7.2.2.

(a) **Transmission Constraints for the DAM** - As part of the MPM process associated with the DAM, the CAISO will designate a Transmission Constraint for the DAM as non-competitive when the fringe supply of counter-flow to the Transmission Constraint from all portfolios of suppliers that are not identified as potentially pivotal is less than the demand

for counter-flow to the Transmission Constraint. For purposes of determining whether to designate a Transmission Constraint as non-competitive pursuant to this Section

39.7.2.2(a):

- (i) Counter-flow to the Transmission Constraint means the delivery of Power from a resource to the system load distributed reference bus. If counter-flow to the Transmission Constraint is in the direction opposite to the market flow of Power to the Transmission Constraint, the counter-flow to the Transmission Constraint is calculated as the shift factor multiplied by the resource's scheduled Power. Otherwise, counter-flow to the Transmission Constraint is zero.
- (ii) Fringe supply of counter-flow to the Transmission Constraint means all available capacity from internal resources not controlled by the identified potentially pivotal suppliers and all internal Virtual Supply Awards not controlled by the identified potentially pivotal suppliers that provide counter-flow to the Transmission Constraint. Available capacity reflects the highest capacity of a resource's Energy Bid adjusted for Self-Provided Ancillary Services and derates.
- (iii) Demand for counter-flow to the Transmission Constraint means all internal dispatched Supply and Virtual Supply Awards that provide counter-flow to the Transmission Constraint.
- (iv) Potentially pivotal suppliers mean the three (3) portfolios of net sellers that control the largest quantity of counter-flow supply to the Transmission Constraint.
- (v) Portfolio means the effective available internal generation capacity under the control of the Scheduling Coordinator and/or Affiliate determined pursuant to Section 4.5.1.1.12 and all effective internal Virtual Supply Awards of the Scheduling Coordinator and/or Affiliate. Effectiveness in supplying counter-flow is determined by scaling generation capacity and/or Virtual Supply Awards by the shift factor from that location to the Transmission Constraint being tested.
- (vi) A portfolio of a net seller means any portfolio that is not a portfolio of a net buyer. A portfolio of a net buyer means a portfolio for which the average daily net value

of Measured Demand minus Supply over a twelve (12) month period is positive. The average daily net value is determined for each portfolio by subtracting, for each Trading Day, Supply from Measured Demand and then averaging the daily value for all Trading Days over the twelve (12) month period. The CAISO will calculate whether portfolios are portfolios of net buyers in the third month of each calendar quarter and the calculations will go into effect at the start of the next calendar quarter. The twelve (12) month period used in this calculation will be the most recent twelve (12) month period for which data is available. The specific mathematical formula used to perform this calculation will be set forth in a Business Practice Manual. Market Participants without physical resources will be deemed to be net sellers for purposes of this Section 39.7.2.2(a)(vi).

(vii) In determining which Scheduling Coordinators and/or Affiliates control the resources in the three (3) identified portfolios, the CAISO will include resources and Virtual Supply Awards directly associated with all Scheduling Coordinator ID Codes associated with the Scheduling Coordinators and/or Affiliates, as well as all resources that the Scheduling Coordinators and/or Affiliates control pursuant to Resource Control Agreements registered with the CAISO as set forth Section 4.5.1.1.13. Resources identified pursuant to Resource Control Agreements will only be assigned to the portfolio of the Scheduling Coordinator that has control of the resource or whose Affiliate has control of the resource pursuant to the Resource Control Agreements.

(b) **Transmission Constraints for the RTM** - As part of the MPM processes associated with the RTM, the CAISO will designate a Transmission Constraint for the RTM as non-competitive when the sum of the supply of counter-flow from all portfolios of potentially pivotal suppliers to the Transmission Constraint and the fringe supply of counter-flow to the Transmission Constraint from all portfolios of suppliers that are not identified as potentially pivotal is less than the demand for counter-flow to the Transmission Constraint. For purposes of determining whether to designate a Transmission Constraint

as non-competitive pursuant to this Section 39.7.2.2(b):

- (i) Counter-flow to the Transmission Constraint has the meaning set forth in Section 39.7.2.2(a)(i).
- (ii) Supply of counter-flow from all portfolios of potentially pivotal suppliers to the Transmission Constraint means the minimum available capacity from internal resources controlled by the identified potentially pivotal suppliers that provide counter-flow to the Transmission Constraint. The minimum available capacity for the current market interval will reflect the greatest amount of capacity that can be physically withheld. The minimum available capacity is the lowest output level the resource could achieve in the current market interval given its dispatch in the last market interval and limiting factors including Minimum Load, Ramp Rate, Self-Provided Ancillary Services, Ancillary Service Awards (in the Real-Time Market only), and derates.
- (iii) Potentially pivotal suppliers mean the three (3) portfolios of net sellers that control the largest quantity of counter-flow supply to the Transmission Constraint that can be withheld. Counter-flow supply to the Transmission Constraint that can be withheld reflects the difference between the highest capacity and the lowest capacity of a resource's Energy Bid (not taking into account the Ramp Rate of the resource), measured from the Dispatch Operating Point for the resource in the immediately preceding fifteen (15) minute FMM interval or the preceding five (5) minute RTD interval, as applicable (taking into account the Ramp Rate of the resource), adjusted for Self-Provided Ancillary Services and derates in determining whether to designate a Transmission Constraint as non-competitive for the RTM, or adjusted for Ancillary Service Awards and derates in determining whether to designate a Transmission Constraint as non-competitive for the RTM. In determining whether to designate a Transmission Constraint as non-competitive for the RTM, counter-flow supply to the Transmission Constraint that can be withheld also reflects the PMin of each Short Start Unit with a Start-

Up Time of sixty (60) minutes or less that was off-line in the immediately preceding fifteen (15) minute interval of the FMM. In determining whether to designate a Transmission Constraint as non-competitive for the FMM, counter-flow supply to the Transmission Constraint that can be withheld also reflects the PMin of each Short Start Unit with a Start-Up Time of fifteen (15) minutes or less that was off-line in the immediately preceding fifteen (15) minute interval.

- (iv) Portfolio means the effective available internal generation capacity under the control of the Scheduling Coordinator and/or Affiliate determined pursuant to Sections 4.5.1.1.12 and 39.7.2.2(a)(vii). Effectiveness in supplying counter-flow is determined by scaling generation capacity by the shift factor from that location to the Transmission Constraint being tested.
- (v) A portfolio of a net seller has the meaning set forth in Section 39.7.2.2(a)(vi).
- (vi) Fringe supply of counter-flow to the Transmission Constraint means all available capacity from internal resources not controlled by the identified potentially pivotal suppliers that provide counter-flow to the Transmission Constraint. Available capacity reflects the highest capacity of a resource's Energy Bid (not taking into account the Ramp Rate of the resource), measured from the Dispatch Operating Point for the resource in the immediately preceding fifteen (15) minute interval of the FMM or five (5) minute interval of the RTD, as applicable (taking into account the Ramp Rate of the resource), adjusted for Self-Provided Ancillary Services and derates in determining whether to designate a Transmission Constraint as non-competitive for the RTM, or adjusted for Ancillary Service Awards and derates in determining whether to designate a Transmission Constraint as non-competitive for the RTM.
- (vii) Demand for counter-flow to the Transmission Constraint means all internal dispatched Supply that provides counter-flow to the Transmission Constraint.

Attachment C – Additional Background Information
Regarding Aliso Canyon
Filing to Temporarily Re-Implement Previously Approved and
Recently Expired Measure to Address Potential Gas Limitations
Related to the Limited Operability of the Aliso Canyon Gas Storage
Facility
California Independent System Operator Corporation

ATTACHMENT C

ADDITIONAL BACKGROUND INFORMATION REGARDING ALISO CANYON

I. Implications Regarding the Natural Gas Leak at the Aliso Canyon Gas Storage Facility

A. The Aliso Canyon Facility

Southern California Gas Company (SoCalGas) and San Diego Gas & Electric Company (SDG&E) own and operate an integrated gas transmission system located in southern California, for which SoCalGas is responsible. Using a network of transmission pipelines and four interconnected storage fields, SoCalGas and SDG&E deliver natural gas to more than five million business and residential customer accounts, which equals approximately 21 million residents.¹

The largest of the gas storage fields is the Aliso Canyon facility (Aliso Canyon) located near Los Angeles.² Aliso Canyon is an integral part of the gas and electric system and is used normally year round. For summer operations, the SoCalGas Control department strives to fill completely Aliso Canyon to provide firm injection services to customers and prepare for the upcoming winter. For winter operations, Aliso Canyon provides needed winter supply and withdrawal services and allows preparation for the following summer.³

Aliso Canyon is integral to the reliable operation of the electric grid and infrastructure that the CAISO operates in California. Its gas storage acts as a shock absorber for the real-time dynamic variations in electric demand. Aliso Canyon also provides additional gas delivery capacity when gas demand exceeds the amount of flowing supply and provides a place to inject unutilized gas when electric demand is less than expected.⁴

B. The Gas Leak at Aliso Canyon and Subsequent Events

¹ Aliso Canyon Risk Assessment Technical Report Prepared by the Staff of the California Public Utilities Commission, California Energy Commission, the California Independent System Operator, the Los Angeles Department of Water and Power, and Southern California Gas Company, at 5-7 (Apr. 5, 2016) (2016 Risk Assessment Report). The 2016 Risk Assessment Report is available on the CAISO website page dedicated to the Aliso Canyon Gas-Electric Coordination stakeholder initiative: <http://www.caiso.com/informed/Pages/StakeholderProcesses/AlisoCanyonGasElectricCoordination.aspx>.

² 2016 Risk Assessment Report at 7. The other three gas storage fields are the Honor Rancho, La Goleta, and Playa del Rey facilities. *Id.*

³ *Id.* at 7-8.

⁴ *Id.* at 10.

On October 23, 2015, a significant gas leak was detected at Aliso Canyon, which was not sealed until February 18, 2016. Based on discussions with SoCalGas, the CAISO understands that slightly over 20 cubic feet of gas (Bcf) is being stored at Aliso Canyon as an actual working gas inventory. SoCalGas currently has only limited ability to withdraw gas from Aliso Canyon.

On January 6, 2016, the Governor of California issued an Emergency Proclamation that included a number of directives related to the leak, including the continuation of a moratorium on gas injections into Aliso Canyon established following the leak until a comprehensive review of the “safety of the storage wells and the air quality of the surrounding community is completed,” and a directive that the California Public Utilities Commission (CPUC) and the California Energy Commission (CEC), in coordination with the CAISO, “shall take all actions necessary to ensure the continued reliability of natural gas and electricity supplies in the coming months during the moratorium.”⁵ Among the actions taken pursuant to the latter directive were the organization of an Inter-Agency Task Force and the preparation and issuance of the 2016 Risk Assessment Report and the 2016 Reliability Action Plan,⁶ as well as other materials discussed below, by the members of the Inter-Agency Task Force – the CPUC, CEC, CAISO, SoCalGas, and the Los Angeles Department of Water and Power (LADWP).

Gas pipeline companies impose daily gas balancing requirements, based on the difference between nominated gas flows and actual gas demand (*i.e.*, burned gas), that are commonly referred to in southern California as operational flow orders (OFOs) and emergency flow orders (EFOs). Gas customers that exceed the balancing requirements by a specified tolerance band may have to pay penalties.⁷ Gas-fired resources often manage these gas balancing requirements in part by bidding their commitment costs and energy offers into the CAISO real-time market at levels intended to ensure that the gas burns resulting from CAISO acceptance or non-acceptance of their bids will allow them to stay within the tolerance band, thus avoiding such penalties. For example, in

⁵ Emergency Proclamation at ¶¶ 7, 10. The Emergency Proclamation is available at <https://www.gov.ca.gov/news.php?id=19264>.

⁶ Aliso Canyon Action Plan to Preserve Gas and Electric Reliability for the Los Angeles Basin Prepared by the Staff of the California Public Utilities Commission, California Energy Commission, the California Independent System Operator, and the Los Angeles Department of Water and Power, at 20 (2016) (2016 Reliability Action Plan). The 2016 Reliability Action Plan is available on the same CAISO website page as the 2016 Risk Assessment Report.

⁷ A gas pipeline company will issue a “high” OFO or EFO when the gas pipeline pressure is increasing because the amount of nominated gas is higher than the actual gas demand; to enable the pipeline to balance the pressure at a more sustainable level, gas customers must either decrease their nominated flows or reduce their demand. Conversely, a gas pipeline company will issue a “low” OFO or EFO when the gas pipeline pressure is decreasing because the amount of nominated gas is lower than the actual gas demand; to enable the pipeline to balance the pressure at a more sustainable level, gas customers must either increase their nominated flows or increase their demand.

situations in which a resource receives an OFO or EFO that puts the resource at risk of incurring a penalty if the resource burns an amount of gas above the tolerance band, the resource may seek to hold or decrease its gas burn by bidding higher costs into the CAISO real-time market, so that the CAISO real-time market is less likely to dispatch the resource up. Conversely, in situations where a resource receives an OFO or EFO that puts the resource at risk of incurring a penalty if the resource burns an amount of gas below the tolerance band, the resource will seek to not be dispatched down so that it does not decrease its gas burn, by bidding lower costs into the CAISO real-time market.

C. Analyses of and Actions Taken to Address the Potential Consequences of Limited Operability of Aliso Canyon and Limitations on the Gas System in Southern California

1. Analyses and Actions for 2016-2017

The limited operability of Aliso Canyon caused gas-balancing conditions in southern California to become more strained, over both the SoCalGas and SDG&E gas systems, and these conditions were expected to worsen during the summer of 2016. As detailed in the 2016 Risk Assessment Report and the 2016 Reliability Action Plan, the Inter-Agency Task Force performed analyses that identified the risks to the SoCalGas operating region starting that summer. To address the risks, the Inter-Agency Task Force proposed a total of 18 mitigation measures, including changes to the CAISO market to improve gas-electric coordination.

The CAISO and other entities in California took a number of actions to address the risks presented by the limited operability of Aliso Canyon. In the May 9, 2016 tariff amendment the CAISO filed in Phase 1 of its Aliso Canyon stakeholder initiative (Aliso Phase 1 tariff amendment),⁸ the CAISO explained that while it expected these actions to prove instrumental in mitigating the challenges posed, significant electric grid reliability concerns remained that stemmed from the interaction between gas balancing requirements and the reliance on gas-fired resources to serve load in southern California. The CAISO stated that it proposed the Phase 1 tariff revisions both to address these reliability concerns and to avoid exacerbating issues caused by an already constrained gas system.⁹ Most of those tariff revisions went into effect on June 2, 2016, with more of the tariff revisions going into effect on July 6, 2016.

The CAISO also established an ongoing practice of holding biweekly calls with the gas companies regarding outage planning. In addition, during normal

⁸ The four phases of the Aliso Canyon stakeholder initiative are described further in section I.C of the transmittal letter for this filing.

⁹ Transmittal letter for Aliso Phase 1 tariff amendment at 2-5; attachment C to Aliso Phase 1 tariff amendment.

operations, the CAISO provides two-day-ahead and one-day-ahead gas burn schedules to the gas companies, holds daily calls with them regarding the gas burn schedules, and notifies the gas companies if real-time gas burns are higher than the gas burn schedules. When peak operations are necessary during a day, the CAISO issues flex alerts or imposes restricted maintenance operations, holds peak-day reliability calls that include the gas companies, the Peak Reliability Coordinator (Peak RC),¹⁰ participating transmission owners, and neighboring balancing authorities, and holds peak-day market calls with all market participants.

When gas limitation conditions occur in the SoCalGas service territory, CAISO personnel follow a CAISO procedure addressing gas-electric operations coordination under such conditions.¹¹ Pursuant to the procedure, if SoCalGas notifies the CAISO of a gas curtailment watch, the CAISO can manage the electric system by using gas constraints, adjusting internal transfer capability, or issuing exceptional dispatch instructions to resources. In the event that SoCalGas notifies the CAISO of a *pro rata* gas curtailment, or the CAISO has reason to believe that constrained gas conditions may cause electric reliability issues, the CAISO can manage the electric system using gas constraints or issuing exceptional dispatch instructions. The CAISO issues market notifications when it takes such action.

Based on the 2016 Inter-Agency Task Force winter assessment, the CAISO expected that Aliso Canyon would not be operational through the end of 2016 and during the bulk of 2017.¹² The Inter-Agency Task Force performed analyses that identified the risks presented by the limited operability of Aliso Canyon for winter 2016-2017.¹³ In particular, the CAISO and LADWP used gas curtailment estimates to determine how much of a gas curtailment the electric generators could absorb and whether electric service interruptions could occur. Their analysis concluded that, although the risk to electric reliability was expected to be less than it was the preceding summer, challenges for electric reliability would continue through the winter 2016-2017 due to the limited operability of Aliso Canyon.

¹⁰ Peak RC is the reliability authority for the CAISO balancing authority area.

¹¹ SoCalGas Service Area Limitations or Outages Procedure 4120C, available on the CAISO website at <http://www.caiso.com/Documents/4120C.pdf>.

¹² See <http://www.argusmedia.com/pages/NewsBody.aspx?id=1324396&menu=yes>.

¹³ See the Aliso Canyon Winter Risk Assessment Technical Report Prepared by the Staff of the California Public Utilities Commission, California Energy Commission, the California Independent System Operator, the Los Angeles Department of Water and Power, and Southern California Gas Company (Aug. 22, 2016) (2016 Winter Risk Assessment Report); and the Aliso Canyon Gas and Electric Reliability Winter Action Plan Prepared by the Staff of the California Public Utilities Commission, California Energy Commission, the California Independent System Operator, and the Los Angeles Department of Water and Power (Aug. 22, 2016) (2016 Winter Action Plan), both available on the same CAISO website page as the other reports described above.

The CAISO and LADWP used gas curtailment estimates to determine how much of a gas curtailment the electric generators could absorb and whether electric service interruptions could occur. Their analysis concluded that, although the risk to electric reliability was expected to be less than it was the prior summer, challenges for electric reliability would continue through the winter of 2016-2017 due to the limited operability of Aliso Canyon.

Specifically, the analysis found that gas-fired electric generation could be susceptible to gas curtailments during the winter without Aliso Canyon under certain conditions. Although electric load is generally lower in the winter compared with the summer, the availability of electric generation supply may be reduced during the winter due to the commitment of fewer generators on-line and outages for scheduled maintenance. The analysis determined that any gas curtailments occurring that winter were not expected to result in electric load interruption, even with reduced availability of electric generation, so long as gas supply and receipt point utilization remained approximately 84 percent or higher (corresponding to a system capacity of 4.1 billion cubic feet per day (Bcfd) of gas) on peak gas demand days. At or above this 84-percent level, the CAISO and LADWP expected to be able to secure sufficient generation outside of the SoCalGas and SDG&E service territories to avoid interrupting electric load. If, however, the gas supply and receipt point utilization fell below the 84-percent level, there was a risk that system capacity would not be sufficient to source gas to meet all customer needs. In that event, absent withdrawal of sufficient gas from Aliso Canyon to make up the shortfall, gas curtailment of electric generation might occur, potentially interrupting service to electric load.¹⁴

The CAISO and LADWP analyzed their ability to absorb a potential gas curtailment of 0.7 Bcf, which was the amount that would need to be curtailed if a 1-in-10-year winter peak demand event occurred based on SoCalGas's planning criteria for meeting gas demand of all customers (core and non-core). The analysis found that the CAISO and LADWP could absorb most but not all of a potential 0.7 Bcf gas curtailment, if: (1) electric transmission import capability remained unimpaired, (2) no gas-fired generation that was needed outside of the SoCalGas service area was out of service, and (3) every generating resource that the CAISO and LADWP sought to use had natural gas to operate.¹⁵

The CAISO and LADWP would need a small amount of additional gas to support minimum generation requirements, such as those requirements needed to maintain transmission system reliability or respond to local contingencies.

¹⁴ 2016 Winter Risk Assessment Report at 30-40. This analysis assumed that multiple outages would not occur on the electric and gas system. *Id.* at 40. The 2016 Winter Risk Assessment Report also discussed the consequences of various scenarios with levels of system capacity different from the 4.1 Bcfd amount discussed above.

¹⁵ 2016 Winter Action Plan at 4-5, 17-18.

There also remained some risk of electric service interruption due to reliability rules that require balancing authorities such as the CAISO and LADWP to maintain operating reserve margins. Gas-fired resources are used normally to maintain these operating reserves because they can respond rapidly to operating instructions. Even if the CAISO and LADWP can serve all electricity demand without using gas-fired resources, they need some gas to serve resources providing the operating reserves. If the CAISO and LADWP have no natural gas because of a gas curtailment, they could be required to shed load, thus resulting in the curtailment of electricity service to meet the operating reserve requirement.¹⁶

In addition to the mitigation measures for the summer referenced above, the 2016 Winter Action Plan “identifie[d] 10 new measures to help reduce, but not eliminate, the possibility of gas curtailments large enough to cause electricity service interruptions th[at] winter”:

- SoCalGas establishing a gas demand response program.
- Further efforts by SoCalGas to establish a gas conservation messaging campaign.
- Continuing a set of tighter gas balancing rules for non-core customers that was established pursuant to a settlement approved by the CPUC and that was scheduled to expire on November 30, 2016.
- Establishing gas balancing rules applicable to SoCalGas core customers.
- SoCalGas submitting reports to the CPUC describing rapid progress in restoring pipeline service during maintenance outages.
- Exploring the feasibility of purchasing liquefied natural gas for delivery into the SDG&E system.
- Exploring what, if anything, natural gas producers could do to increase deliveries into the SoCalGas system.

¹⁶ *Id.* at 5. The risks related to gas capacity limitations discussed above were a primary driver of the threat to electric reliability that winter. A lesser though still-present risk was that posed by gas imbalances from non-core customers for gas, which include gas-fired electric generators. The majority of demand for gas shifts in the winter from non-core customers to core customers (*i.e.*, residential and small commercial and industrial customers), with core customers using approximately 60 percent of gas supply. Also, demand for electricity is lower in the winter and there is more flexibility to shift responsibility to resources located outside of Southern California for providing electricity into Southern California, subject to transmission and generation outages. Non-core electric generators will, however, be the first to be curtailed if on-system gas is needed to meet core demand in the winter. See 2016 Winter Risk Assessment Report at 6-7, 14-16; 2016 Winter Action Plan at 10-12, 17-20.

- The CPUC updating a protocol that would apply if and when some of the gas stored being held at Aliso Canyon were withdrawn.
- The CEC monitoring refinery gas use and operations and California Attorney General monitoring gasoline prices for potential price manipulation.
- The CAISO using a maximum limit on electric generator gas burns in advance of very cold days.¹⁷

Based on these findings, the CAISO concluded that maintaining authority to employ the maximum natural gas constraint would allow the CAISO to use the constraint in advance of very cold days as recommended in the 2016 Winter Action Plan. The 2016 Winter Action Plan also recognized that efforts to make changes to the CAISO market to improve gas-electric coordination were ongoing.¹⁸ The Commission approved the CAISO's proposal to maintain the mitigation measures through November 2017.¹⁹

The various actions that the CAISO and other entities took were effective in addressing the risks presented by the limited operability of Aliso Canyon during summer 2017. With regard to the markets operated by the CAISO, the market results for June through August of 2017 indicated that suppliers scheduled in a more conservative manner than they had for those months in 2015 to bring sufficient gas on-line, and did not drive real-time imbalances causing more gas to be demanded in real-time than day-ahead.

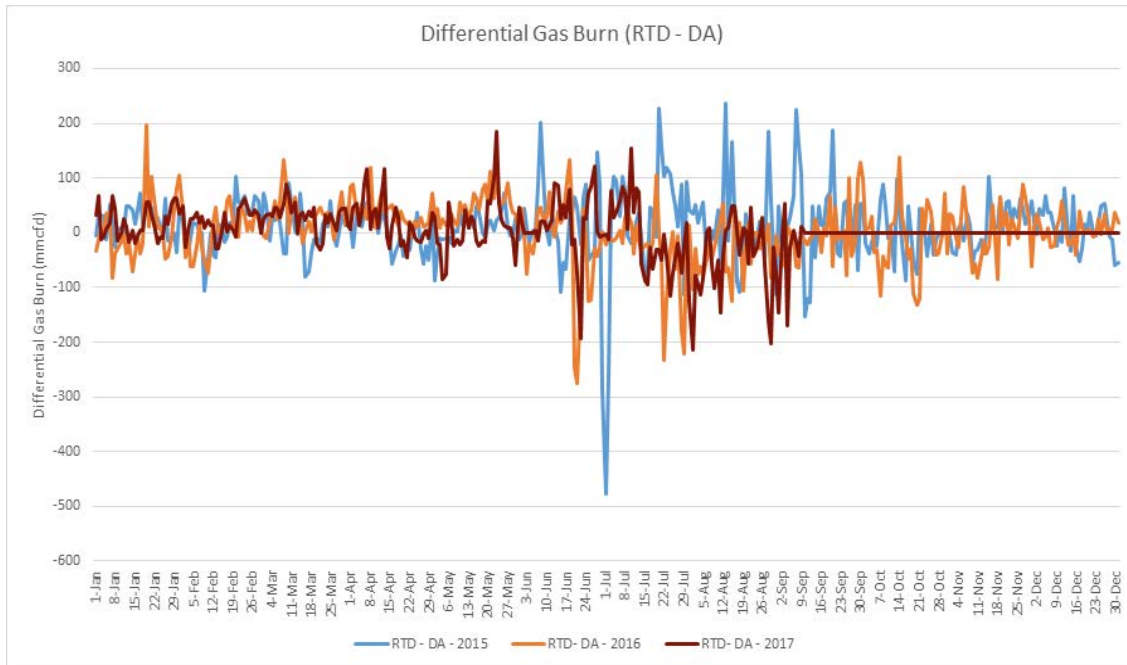
These market results are shown in Figure A below. In Figure A, the orange lines represent the difference (*i.e.*, imbalance) between the gas burn amounts on the SoCalGas system between the CAISO's five-minute real-time dispatch and residual unit commitment process schedules. When the orange line falls below zero for a given day, that day had a negative imbalance. A negative imbalance means that the CAISO scheduled greater amounts of power in the day-ahead market and that suppliers either (i) scheduled gas accordingly or (ii) were not able to schedule gas but did bid effectively to reduce their output consistent with their scheduled gas.

¹⁷ 2016 Winter Action Plan at 5, 20-25.

¹⁸ *Id.* at 24.

¹⁹ See section I.C of the transmittal letter for this filing.

Figure A



The CAISO believes that the exceptional gas-electric coordination and advanced electric planning, as well as the totality of the measures adopted by the CAISO pursuant to the Commission’s Aliso Phase 1 and Phase 2 orders discussed in section I.C of the transmittal letter for this filing, resulted in the limited number of days depicted in Figure A on which modest positive imbalances occurred from June through August. Overscheduling gas prior to real-time likely supported both gas and electric reliability risk, as the reliability risk was largely that there would be insufficient gas on the SoCalGas system when electric demand required gas to the fuel generating resources on that system.

In early 2017, the staffs of the CPUC, CEC, CAISO, and LADWP (collectively, the Aliso Canyon Technical Assessment Group or ACTAG), with input from SoCalGas, continued to assess the risks to electric reliability in the greater Los Angeles and Southern California area during the summer months due to the limited operability of Aliso Canyon. The ACTAG jointly issued a report on May 19, 2017.²⁰ The 2017 Risk Assessment Report calculated the system

²⁰ Aliso Canyon Risk Assessment Technical Report Summer 2017 Assessment Prepared by the Staff of the California Public Utilities Commission, California Energy Commission, the California Independent System Operator, the Los Angeles Department of Water and Power, with Input from Southern California Gas Company (May 19, 2017) (2017 Risk Assessment Report). The 2017 Risk Assessment Report is available at http://docketpublic.energy.ca.gov/Public Documents/17-IEPR-11/TN217639_20170519T104800_Aliso_Canyon_Risk_Assessment_Technical_Report_Summer_2017_Asses.pdf.

capacity of the SoCalGas/SDG&E gas transmission system, based on peak hour(s) supportable demand, and determined the ability for the electric balancing authorities to maintain power system reliability during a 1-in-10-year peak summer electric load.

The 2017 Summer Risk Assessment Report found that the CAISO and the LADWP's ability to meet the 1-in-10-year peak summer electric load is dependent on the amount of SoCalGas/SDG&E's system receipt point utilization and withdrawal capability from storage facilities other than Aliso Canyon.

To summarize, the hydraulic analyses discussed in the 2017 Risk Assessment Report produced several findings:

- The maximum gas "sendout" that can be supported based on the inputs provided to SoCalGas without Aliso Canyon is 3.638 Bcfd. Of this total, 2.2 Bcfd is available to support electric generation. Achieving this maximum sendout requires: (1) that no other transmission or storage facility outage occurs; (2) 100 percent utilization of receipt point capacity; and (3) needed withdrawal capacity is available at the other three fields (which assumes those fields hold sufficient storage inventory to support that full withdrawal).²¹
- Any loss of flowing supply from 100 percent of the current receipt point utilization will reduce sendout capacity on a one-to-one basis.²²

The electric analysis produced the following findings:

- Based on 3.373 Bcfd gas system capacity, which represents 90 percent flowing pipeline supplies and maximum storage withdrawal rate capability of 1.470 Bcfd during peak hours excluding Aliso Canyon, the LADWP/CAISO joint 2017 power-flow study found that there was sufficient gas to meet the minimum electric reliability requirement. This assumes there is enough energy supply outside Southern California and sufficient electric transmission import capability into Southern California.²³
- As with last summer, during peak summer load conditions and historical electric transmission utilization patterns, incremental gas-fired generation may be required to meet electric reliability. If gas supply is insufficient to meet the increased gas demand, access to replacement energy may require emergency assistance from

²¹ *Id.* at 5.

²² *Id.*

²³ *Id.*

neighboring balancing authorities, and electric load shed in the Southern California region may be necessary.²⁴

- This analysis assesses the minimum generation needed to maintain reliability and minimize gas burns. However, this dispatch does not represent the least-cost dispatch for meeting 1-in-10-year peak summer load. Electric reliability is planned daily based on least-cost generation resources to meet load. Economic operation of the generation assets would require gas usage above the outcome of the reliability study. Using resources other than those that are most efficient and economic would result in increased energy dispatch costs and higher electricity prices to ratepayers.²⁵
- If transmission import capability decreases or demand response resources are limited, the electricity system needs more gas to avoid service interruptions. Should storage withdrawal or flowing gas supplies also drop, the electricity system will not be able to get that gas and will be at risk.²⁶

2. Analyses and Actions for 2017-2018

Based on the analyses conducted previously and discussed above, the CAISO expected limited operability of Aliso Canyon in the remaining months of 2017, and continuing in 2018 that could adversely affect reliability of the electric system. Therefore, on September 29, 2017, the CAISO filed the tariff amendment in the Aliso Phase 3 proceeding discussed in section I.C of the transmittal letter for this filing. As discussed therein, in the Aliso Phase 3 Order issued on November 28, 2017, the Commission accepted the CAISO's proposal to maintain some of the tariff measures on a temporary basis until November 30, 2018 but rejected the CAISO's proposal to implement the balance of the tariff measures, as modified, on a permanent basis. The Commission also expressly invited the CAISO to submit a filing to make the previously approved versions of those latter measures effective on a temporary basis until November 30, 2018.

On November 28, 2017, the Aliso Canyon Technical Assessment Group (ACTAG), whose members include technical experts from the CPUC, CEC, CAISO, and LADWP, with input by SoCalGas, issued its most recent report to assess the reliability challenges of delivering energy to Southern California for the winter of 2017-18 and concluded that "the region faces new challenges and greater uncertainty compared to last winter."²⁷ The ACTAG's Winter 2017-2018

²⁴ *Id.*

²⁵ *Id.*

²⁶ *Id.* at 5-6.

²⁷ Aliso Canyon Winter Risk Assessment Technical Report 2017-18 Supplement (Nov. 28, 2017) at 3 (Winter 2017-18 Supplement, or Supplement). The Winter 2017-18 Supplement is

Supplement articulates the risks the electric and gas systems face this coming winter and beyond. Although the Supplement recognizes that the availability of Aliso Canyon will likely be greater than it was last year, the Supplement highlights that, because of known (*i.e.*, existing or planned) and unplanned outages on other parts of the Southern California gas system, there is a significant risk of curtailments of non-core customers, which include gas-fired generation facilities.

The Winter 2017-18 Supplement provides a number of crucial findings that bear on the importance of this tariff amendment filing and the need for immediate Commission action to ensure the CAISO has the tools it needs to maintain reliability of the electric system:

- The primary challenge is that three SoCalGas natural gas transmission pipelines are out of operation. SoCalGas relies on these pipelines to serve core customers.
 - Line 235-2 ruptured on October 1, 2017, also damaging the nearby Line 4000. This outage reduces maximum system capacity by 800 million cubic feet per day (MMcfd).
 - Maintenance scheduled at the Playa del Ray gas storage field from November 7, 2017, through December 18, 2017 reduces maximum system capacity by 260 MMcfd.
 - The risk of additional unplanned outages could further reduce maximum capacity on the SoCalGas system.
 - SoCalGas has adopted mitigation measures to address these outages, which in part depend on deliveries on alternative pipelines.
- This winter's minimum generation requirement (*i.e.*, the gas needed by the electricity system operators to maintain electric system reliability) estimated by LADWP and the CAISO is higher than it was for 2016-17.
 - The increase is due to higher demand forecasts.
 - LADWP is postponing a planned transmission line outage until February 1, 2018 because of gas constraints. Once the LADWP line goes out of service, LADWP will require additional gas-fired resources in the Los Angeles Basin to meet electric reliability needs.

also provided in attachment D to this filing, along with a companion summary of the Supplement entitled Aliso Canyon Update Winter 2017-18 (Nov. 28, 2015) (Winter 2017-18 Update) and a notice of availability of the Supplement issued November 28, 2017. All of these documents are available on the CEC's website at http://www.energy.ca.gov/2017_energy_policy/documents/#05222017.

- Between now and February 1, 2018, 38 MMcfd is needed to meet the total minimum generation requirement for the CAISO and LADWP balancing authority areas. If the balancing authority areas experience a contingency event, 112 MMcfd is needed to meet electricity demand. After February 1, 2018, those numbers will increase to 219 MMcfd and 293 MMcfd.²⁸
- Absent the gas to meet the minimum generation requirement, electric reliability is threatened.
- Increased pressure to conserve gas use because of low storage inventory means that SoCalGas will not have the field pressures needed to withdraw enough gas to serve core customers.
 - Curtailments of non-core customers may occur in December to preserve inventory needed for core customers on cold days.
- Although the ACTAG considers mitigation measures in its assessment, it is not clear that these measures will suffice to avoid gas curtailments to non-core customers this winter.

To mitigate the identified risks to the extent feasible, the ACTAG proposed maintaining all of the previously implemented mitigation measures described above and instituting the following additional measures:

- Delaying transmission upgrade work by LADWP until February 2018;
- Using more gas from Aliso Canyon than last winter;
- Customers taking more conservation measures, such as turning thermostats down and deploying more smart thermostats;
- Implementing an emergency moratorium on new gas hookups in Los Angeles County;
- Having electricity generators more frequently shift generation to facilities located outside the SoCalGas system in order to preserve gas inventory;
- Slightly increasing the volume of gas that can be stored at Aliso Canyon pursuant to an update to Aliso Canyon's report under section 715 of the California Public Utilities Code;

²⁸ Last year, those numbers were at 22 MMcfd and 96 MMcfd.

- Acquiring liquefied natural gas for delivery to Otay Mesa if it turns out to be infeasible to deliver pipeline supply to Otay Mesa using the North Baja and Gasoducto Baja Norte pipelines; and
- Monitoring and communicating constantly, including to the public.²⁹

In sum, the gas system capacity and maximum supported demand will vary this winter depending on when the pipelines can return to operation during the winter and on system mitigation actions that may be taken.³⁰ But in any event, absent the availability of gas from Aliso Canyon, a shortfall occurring this winter on a 1-in-10-year demand day will require curtailments of non-core customers, including electric generators, even if the generators reduce their output to a minimum.³¹ The ACTAG warned:

While the ACTAG offers several mitigation measures in this assessment, including using gas at Aliso Canyon, it is not clear that they and the prior measures already in place will be sufficient to avoid gas service curtailments to noncore customers in Southern California this winter. Assuming no additional gas system or electric transmission system outages and that full supplies arrive at the pipeline receipt points, the need for curtailments depends entirely on the weather and by how much customers can decrease gas demand.³²

The Winter 2017-18 Supplement makes plain the increased risks to reliability this winter due to the continued limited operability of Aliso Canyon and outages on the gas pipelines in Southern California.

D. Constraints on the Gas System in the CAISO Balancing Authority Area

The gas constraints identified in the ATCAG's Winter 2017-2018 Supplement are likely to occur in other parts of the CAISO balancing authority area as a result of more stringent safety and reliability measures for all in-state natural gas storage facilities recently adopted by the State of California. These restrictions may develop over time due to potential impacts on gas systems to comply with California Senate Bill No. 887 (SB 887), which augmented requirements on gas storage facilities in response to the Aliso Canyon incident (September 2016), and new California Air Resource Board (CARB) rules aimed at combatting emissions from methane leaks (March 2017).

²⁹ Winter 2017-18 Supplement at 25-26, 29-30; Winter 2017-18 Update at 8.

³⁰ Winter 2017-18 Supplement at 3-5; Winter 2017-18 Update at 5.

³¹ Winter 2017-18 Supplement at 17-19; Winter 2017-18 Update at 6.

³² Winter 2017-18 Supplement at 27. See also Winter 2017-18 Update at 9.

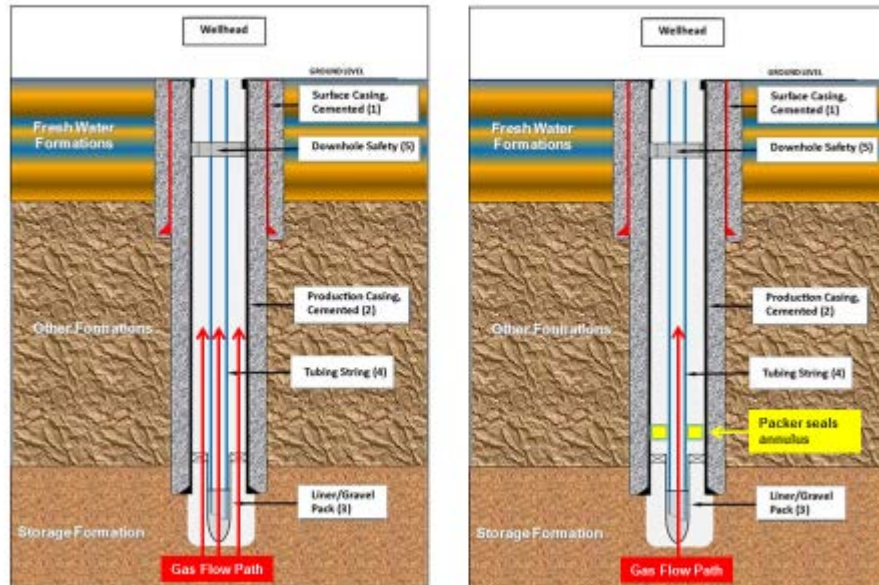
SB 887 stated that “[t]he standards for natural gas storage wells need to be improved in order to reflect 21st century technology, disclose and mitigate any risks associated with those wells, recognize that these facilities may be in locations near population centers, and ensure a disaster like the Aliso Canyon leak does not happen again.” Both SB 887 and the CARB rules on methane leaks will likely result in potential significant changes to gas storage operations in Southern California (and elsewhere in the state).

Further, SB 887 established new safety standards for underground gas storage facilities and more stringent mechanical testing regions. In promulgating regulations related to SB 887, the California Division of Oil, Gas & Geothermal Resources is required to consider enhanced design, construction, and maintenance measures that limit gas pipelines’ use of the outer casings of pipeline facilities for production (referred to as “Tubing and Packer”). This will change the way in which the California-regulated pipelines provide system storage capability and availability. This requirement is likely to have the most impact on gas availability because it restricts the usage of concrete outer casings for injection and withdrawals from storage facilities and requires that extractions be limited to using the inner tubing. It is prudent that the CAISO’s systems be prepared to deal with any limitations that arise from these known upcoming requirements.

The left-hand picture in the diagram below demonstrates capacity on extraction facilities with the concrete casing shown using the three red arrows, which in the right-hand picture is reduced to the tubing alone as demonstrated by the single red arrow.



PG&E Typical Storage Well Gas Flow Without Packer and With Packer



The upcoming requirements will affect all state-regulated storage facilities in California, including those located in Southern California, and are important safety measures to prevent leakages such as those experienced at Aliso Canyon, which will significantly affect gas availability for gas-fired resources in the state.

**Attachment D – Winter 2017-18 Supplement, Winter 2017-18 Update,
and notice of availability of the Supplement
Filing to Temporarily Re-Implement Approved and Recently Expired
Measures to Address Potential Gas Limitations Related to the
Limited Operability of the Aliso Canyon Gas Storage Facility
California Independent System Operator Corporation**

Aliso Canyon Winter Risk Assessment Technical Report 2017-18 Supplement

Prepared by the Staff of the California Public Utilities Commission, the California Energy Commission, the California Independent System Operator, and the Los Angeles Department of Water and Power

November 28, 2017

CEC-100-2017-002

Aliso Canyon Winter Risk Assessment Technical Report 2017-18 Supplement

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EXECUTIVE SUMMARY

After dozens of steps taken in response to the Aliso Canyon natural gas leak and significant energy conservation by residents, this assessment evaluates the reliability challenges of delivering energy to Southern California for the winter of 2017-18. This assessment concludes that the region faces new challenges and greater uncertainty compared to last winter.

The primary challenge this upcoming winter is that three natural gas transmission pipelines Southern California Gas Company (SoCalGas) relies on to serve its customers are out of operation. One ruptured October 1, and the uncertain return to operation of that pipeline raises significant concerns. Moreover, necessary maintenance on electricity transmission lines to reduce reliability risks begins February 1, 2018. Combine these factors with unexpected but possible events, and this assessment finds that it is likely that the natural gas reserves at the Aliso Canyon storage facility will be needed and under extreme cold weather events there may be insufficient gas supplies to meet demand even relying on withdrawals from all the storage fields. The largest risk to the system is not from a single day with high gas demand, and instead is from multiple days of higher demand that will draw down storage inventories to a point where storage could not be used to meet gas demand later in the winter. As a result, Southern California residents will be called on to turn down thermostats and conserve both electricity and natural gas at a rate greater than a year ago.

Additional factors such as efficiency increases gained from scheduling changes and securing electricity imports from outside the region, could help balance the supply and demand of energy. Yet, cold weather or unexpected deficiencies in either the natural gas or electricity delivery systems would create concerns.

This assessment, a supplement to the 2016-2017 winter technical report,¹ was developed by the Aliso Canyon Technical Assessment Group (ACTAG), which is composed of technical experts from the California Public Utilities Commission (CPUC), the California Energy Commission (Energy Commission), the California Independent System Operator (California ISO), and the Los Angeles Department of Water and Power (LADWP). The ACTAG has also conferred with SoCalGas about circumstances this winter but has largely prepared this analysis independently of SoCalGas.

The 2017-18 winter supplement begins with the same hydraulic modeling inputs and results for the natural gas system as last winter's assessment, which resulted in a maximum system sendout of 4,567 million cubic feet per day (MMcfd).² This figure assumes withdrawals from SoCalGas' other three storage fields but none from Aliso Canyon.³ This figure is then reduced by 200 MMcfd as Line 2000 has

¹ See Aliso Canyon Winter Risk Assessment Technical Report, August 23, 2016. The 2016 report provides background information and an explanation of the hydraulic analysis referenced in this supplement. The 2016 report can be found at http://docketpublic.energy.ca.gov/PublicDocuments/16-IEPR-02/TN212913_20160823T090035_Aliso_Canyon_Winter_Risk_Assessment_Technical_Report.pdf

² Ibid, page 19, Table 1: Supply and Demand for the 1-in-10 Scenarios and Curtailment Requirements

³ This figure assumes that Line 3000 will remain out of service throughout the winter. According to Envoy, SoCalGas' electronic bulletin board, Line 3000 will not be back in service until May 1, 2018.

been operating at lower pressures since 2011 (pending hydrostatic testing), which reduces the throughput to 80 percent of design capacity.⁴ The resulting maximum system capacity is then 4,367 MMcfd. (This reduction was not incorporated into the previous winter analysis.) In addition, SoCalGas Line 235-2 ruptured on October 1, 2017, simultaneously damaging the nearby Line 4000. The resulting outages further reduce maximum system capacity by 800 MMcfd, decreasing maximum system sendout capability to 3,567 MMcfd. In addition, maintenance is scheduled at the Playa del Ray gas storage field from November 7, 2017, through December 18, 2017. This work will reduce maximum system capacity another 260 MMcfd to 3,307 MMcfd.

SoCalGas estimates that Line 4000 will return to service on December 30, 2017.⁵ The utility has not yet provided an estimate of when Line 235-2 will return to service. In response to the outages, SoCalGas has implemented two mitigation measures to increase capacity, allowing customers to bring in more supplies.⁶ The first mitigation measure temporarily increases capacity at Kramer Junction by 150 MMcfd on an interruptible basis until Line 4000 returns to service. The second measure is aimed at using the full capability of the Southern Zone by obtaining firm pipeline capacity to bring in 200 MMcfd at Otay Mesa.⁷ Once Line 4000 returns to service, SoCalGas' system capability increases by 350 MMcfd. At that time, however, the 150 MMcfd of interruptible capacity at Kramer Junction will be discontinued.⁸ This cessation results in total maximum sendout without Aliso Canyon of 4,117 MMcfd (with mitigations). Table 1 summarizes how SoCalGas' maximum system capacity is expected to change during the winter with the various outages, mitigations, and service returns. While Table 1 summarizes known outages, there is a risk that additional unplanned outages could further reduce SoCalGas' system capacity.⁹

⁴ SoCalGas Envoy reports the reduction as 202 MMcfd, which has been rounded to 200 MMcfd for this analysis.

⁵ This information is based on SoCalGas Envoy, Line 4000 Maintenance Update, October 13, 2017.

⁶ SoCalGas Gas Acquisition purchases gas for core customers, consisting of primarily residential and small commercial customers.

⁷ As of November 8, 2017, SoCalGas Gas Acquisition has authority to contract for up to 200 MMcfd of capacity from December 1, 2017, through February 28, 2018, to deliver gas at Otay Mesa via the North Baja and Gasoducto Baja Norte pipeline systems. Historically, the Otay Mesa receipt point has been used infrequently because it is typically more expensive to bring gas supplies there. This winter assessment assumes that this supply will continue through the winter months.

⁸ The 150 MMcfd at Kramer Junction is available only when the other pipelines are out of service. When Line 4000 returns to service, it will increase the system pressure to the point that it is no longer possible to deliver the extra 150 MMcfd of gas to Kramer Junction.

⁹ The Independent Review Team recommended in the Aliso Canyon summer 2017 assessment that the probability of an additional unplanned outage be included.

Table 1: SoCalGas Feasible System Sendout¹⁰ (MMcfd) for Winter 2017-18

	Period 1: Present- 12/18/2017 Outage on Lines 3000, 4000, and 235-2; Maintenance at Playa del Rey	Period 2: 12/18/2017- 12/30/2017 Outage on Lines 3000, 4000, and 235-2	Period 3: Post 12/31/2017 Outage on Lines 3000 and 235-2 (Line 4000 Returns to Service)
(MMcfd)			
Maximum Feasible System Capacity Without Gas System Mitigations	3,307	3,567	3,917
Maximum Feasible System Capacity With Gas System Mitigations	3,657	3,917	4,117

This winter’s minimum generation requirement, or gas needed by the electricity system operators to maintain electric system reliability, is higher than that of 2016-17.¹¹ The season-long increase is due to higher demands forecasted on the west side of Los Angeles for LADWP than assumed in last winter’s analysis. The minimum generation requirement increases on February 1, 2018, when LADWP begins work to upgrade a key transmission line.¹² While the transmission line is out of service, LADWP will require additional gas-fired generation in the LA Basin to meet electric system reliability requirements. Before February 1, 2018, the California ISO and LADWP combined minimum generation level will require 38 MMcfd. If a contingency event affecting both balancing areas were to occur during this period, 112 MMcfd would be needed to meet demand from electricity generators. After February 1, 2018, a minimum of 219 MMcfd is required under normal conditions, and 293 MMcfd would be needed under a contingency event. These amounts compare to estimates for last winter of 22 MMcfd of gas under normal operations and 96 MMcfd if both the California ISO and LADWP experienced contingency events on their electric systems.

To be clear, moving electric generators to minimum generation is not easy or desirable. The generators need notice to do it. It means shifting generation to less desirable sources and, depending on notice timing and available resources, places both the California ISO and LADWP into one or more levels of

¹⁰ Previous assessments have called this “maximum supported demand.” The revised nomenclature is intended to be more descriptive.

¹¹ Last winter, neither California ISO nor LADWP had to drop to minimum generation levels. SoCalGas did informally ask the two balancing authorities on January 24 and 25, 2017, if they could shift resources to reduce their gas load. Both authorities were able to accommodate that request. Those were the two days that SoCalGas had a curtailment watch posted and withdrew a small amount of gas from Aliso Canyon.

¹² LADWP had planned to begin this work by December 1, 2017, but has postponed it due to the Line 235-2 outage. Electric utilities typically perform transmission maintenance and upgrades during the winter, which is their off-peak season. LADWP in fact has a series of upgrades planned over each of the next several winters designed to increase its capability to import renewable resources and meet the City of Los Angeles’ as well as the states’ mandates to increase renewable generation.

Energy Emergency Alerts.¹³ Moving to minimum generation also assumes that gas is available at the replacement plants and that transmission and energy are available at the quantity and duration necessary to replace the generation and that no other outages occur among electric facilities. It is an accommodation should be limited to extreme circumstances on the gas system.

Should the gas system be unable to provide the gas required to support minimum generation levels (either because demand is higher than assumed, other outages occur, or supply is not delivered to the receipt points) electric reliability is threatened. Prior reliability action plans looked to withdrawals from Aliso Canyon to reduce this risk. As with last winter's assessment, reducing electricity-generator use to these minimum levels is feasible only if all electric transmission lines are fully operational and generation is available outside the LA Basin which the California ISO and LADWP would use as a source for imported electricity.

The other key caveat about system capacity and the maximum feasible sendout pertains to storage inventory levels and the related impact on achievable withdrawals. Hydraulic analysis looks only at a day and does not simulate use of storage over the entire winter. If storage inventory is drawn below certain thresholds, SoCalGas will not have the field pressures to withdraw enough gas to serve core customers¹⁴ should a 1-in-35 extreme peak day occur. Both the gas balance analysis released by SoCalGas on October 30 and the one prepared by the Energy Commission and presented in this assessment show that curtailments of noncore customers may well be needed in December to preserve inventory needed for core customers to protect for the possibility of very cold days in January.¹⁵

This need to preserve inventory means that under normal weather conditions, it is not clear SoCalGas can avoid December curtailments, even if SoCalGas uses some gas from Aliso Canyon.¹⁶ Were a 1-in-10 cold winter to occur, significant curtailments of gas service to noncore customers would be needed even using gas from Aliso Canyon. On an extreme winter peak day, with 1-in-35 demand by core customers, the deliverability balance remains positive, but only if sufficient inventory has been preserved to support the assumed withdrawal of 2.0 billion cubic feet (Bcf) from storage (including 400 MMcfd from Aliso Canyon) and all the pipeline receipt points into the SoCalGas system are full, with no additional outages or capacity loss of any kind.¹⁷ It also assumes that electricity generators reduced their load to minimum levels.

¹³ Energy Emergency Alerts are defined at <http://www.nerc.com/pa/Stand/Reliability%20Standards/EOP-011-1.pdf>.

¹⁴ Core customers are the owners of residential homes and small businesses. Noncore customers are larger commercial customers, some of which burn natural gas to produce electricity.

¹⁵ SoCalGas' assessment can be found at http://docketpublic.energy.ca.gov/PublicDocuments/17-IEPR-11/TN221652_20171101T105131_103017_SoCalGas_Response_Letter_to_CPUC_CEC_with_Attachment_AE.pdf.

¹⁶ SoCalGas' October 30 winter assessment cites a minimum inventory requirement of 43.3 Bcf. The ACTAG has no independent confirmation of this figure.

¹⁷ SoCalGas Advice Letter No. 5139, May 19, 2017, projects Aliso Canyon withdrawal capability on October 1, 2017, to be 0.670 MMcfd based on 14.80 Bcf inventory. The withdrawal capability was based on the number of wells

The higher risk of curtailments this winter are largely the result of significant and unprecedented unplanned outages on SoCalGas pipelines combined with a series of other planned maintenance requirements and delays in returning facilities to service. Had these outages not occurred the system would be more able to respond to peak demand.

All the mitigation measures put in place last winter will need to continue. Several new ones have been added or are being considered. Most significantly, LADWP has delayed planned transmission upgrades until February 1, 2018. This delay will reduce LADWP's minimum gas requirements early in the winter while SoCalGas' system capability is lower due to maintenance and outages. The CPUC is pursuing additional requests for gas demand response and conservation programs using smart thermostats and is investigating an emergency moratorium on new gas service connections in Los Angeles County served by Aliso Canyon. Furthermore, the ACTAG offers several other potential mitigation measures later in this report, including greater outreach for energy conservation.

INTRODUCTION

This supplement focuses on the impacts to the gas and electric systems during winter 2017-18. It relies on the same gas system hydraulic modeling assumptions and results as presented in the previous Aliso Canyon Winter Risk Assessment Technical Report (released August 23, 2016). It also recognizes that SoCalGas released its own technical assessment on October 30, 2017, as part of its response to the October 19 request from CPUC President Michael Picker and Energy Commission Chair Robert Weisenmiller. The ACTAG has engaged in discussions with SoCalGas about its analysis as well as the analysis completed by the ACTAG. While the ACTAG treats certain assumptions on the SoCalGas system slightly differently than SoCalGas, the two assessments reach similar conclusions about the risk of gas curtailments this winter and impacts to electric generation.

The key update in this winter's analysis is the incorporation of recent outages that together reduce pipeline capacity from 3,325 MMcfd to between 2,325 MMcfd and 2,675 MMcfd and storage supplies by 260 MMcfd depending on the timing of repairs. The analysis also incorporates two key gas system mitigation measures that replace some of the lost capacity, increasing system capacity by 350 MMcfd. This results in an effective total system capacity without Aliso Canyon for the upcoming winter that ranges from 3,657 at the beginning of the winter to 4,117 MMcfd after December 30, 2017.¹⁸

On the electricity side, this supplement still assumes that all transmission lines are in service except for LADWP's Valley-Rinaldi Lines 1 and 2 (post-February 1, 2018) and able to import incremental energy that would otherwise be generated inside the balancing area with natural gas. It also assumes that there is sufficient energy available from external suppliers at the quantity and duration necessary to meet these energy import requirements. The minimum gas required is similar to last winter's until February 1, 2018,

SoCalGas expected to bring back to service. However, the number of wells in service is likely less than included in its projection this past May.

¹⁸ This higher number reflects the current estimated return-to-service date for Line 4000, which is December 30, 2017. The actual return-to-service date could vary significantly.

when LADWP begins planned upgrades to the conductors on one of its key in-basin transmission lines. This work increases LADWP's gas requirements in the short term, but in the longer term will allow LADWP to import more renewable energy generated from outside its service area and reduce its gas requirement.

This supplement also presents an updated gas balance simulating operations over the winter season for normal 1-in-2 year weather conditions, 1-in-10 year cold and dry conditions, and an extreme peak winter day with 1-in-35 year demand by core customers. The gas balance provides a detailed analysis of the capacity assumed available and the capacity-related mitigation measures. It also simulates the impact of storage withdrawals, calculating month-end inventory.

Current Operating Status of SoCalGas System

The maximum gas sendout the SoCalGas system can achieve depends on its system conditions (i.e., demand, available operating pipeline capacity, and the ability to withdraw gas from storage) and any facility outages in effect. The results from the 2016-17 winter assessment found that SoCalGas maximum system sendout without Aliso is 4,668 MMcfd assuming 100 percent pipeline utilization with no outages. With Line 3000 remaining out of service, system capacity is reduced to 4,567 MMcfd. This figure is then reduced by 200 MMcfd since Line 2000 has been operating at 80 percent capacity since 2011. This reduces system capacity to 4,367 MMcfd absent delivery of additional supply into SoCalGas' Southern Zone via Otay Mesa. (This reduction was not incorporated into the previous winter analysis.) On October 1, 2017, SoCalGas Line 235-2 ruptured, simultaneously damaging the nearby Line 4000. Together, these outages further reduced SoCalGas system capacity by 800 MMcfd. Planned maintenance at the Playa del Rey storage field reduces supply by another 260 MMcfd between November 7, 2017, and December 18, 2017. Line 4000 is expected to remain out of service until December 30, 2017, at which time 350 MMcfd of the lost 800 MMcfd in capacity is expected to be restored. The utility has not yet indicated when Line 235-2 will return to service.

In response to the outages, SoCalGas and its customers implemented mitigation measures to increase supplies into its system. The first mitigation measure temporarily increases capacity at Kramer Junction by 150 MMcfd of interruptible capacity until Line 4000 returns to service. The operational capacity above firm is available subject to system operating conditions. Under current system operating conditions and gas nomination flow patterns, Kern River says it can deliver 700 MMcfd to Kramer Junction.¹⁹ The second mitigation measure is aimed at using the full capability of the Southern Zone by obtaining capacity to bring in 200 MMcfd at Otay Mesa. Supplies at Otay Mesa are anticipated to be delivered from the El Paso system via the North Baja and Gasoducto Baja Norte pipelines.²⁰ Table 2

¹⁹ Energy Commission staff contacted Kern River Gas Transmission (Kern) on November 3, 2017, to understand how often Kern can deliver the full 700 MMcfd instead of the normal 550 MMcfd. Kern indicated that it can do so daily "under current system operation conditions and gas nomination patterns."

²⁰ If these supplies do not materialize, SoCalGas would still have the option of bringing LNG to Costa Azul and delivering it into San Diego Gas & Electric (SDG&E) at Otay Mesa. Previously, the ACTAG believed as much as 400 MMcfd could be delivered via Otay Mesa, capped by daily demand on the SDG&E system. Recently the ACTAG has learned that the line capacity west of Moreno is inadequate to move all of the 1010 MMcfd deliverable at

presents the adjusted pipeline capacity and supply assumptions with and without supply-side mitigation measures.

Table 2: Adjusted SoCalGas Sendout Assumptions (MMcfd)

	Period 1: Present- 12/18/2017 Outage on Lines 3000, 4000, and 235-2; Maintenance at Playa del Rey	Period 2: 12/18/2017- 12/30/2017 Outage on Lines 3000, 4000, and 235-2	Period 3: Post 12/31/2018 Outage on Lines 3000 and 235-2
(MMcfd)			
Supported Gas Demand from Table 1 of the 2016 Winter Assessment (Includes Line 3000 Outage)	4,567	4,567	4,567
Combined Outage Lines 4000/235-2	(800)	(800)	(450)
Playa del Rey Maintenance	(260)	0	0
Reduced Operating Pressure at Ehrenberg	(200)	(200)	(200)
Total Supported Demand: No Mitigation	3,307	3,567	3,917
Mitigation 1: Otay Mesa	200	200	200
Mitigation 2: Kramer Junction (Interruptible)	150	150	0
Total Supported Demand with Mitigations	3,657	3,917	4,117

* All scenarios assume 100% pipeline utilization and no withdrawal from Aliso Canyon.

The ACTAG has assumed that the additional outages reduce system capacity on a one-for-one basis. This is consistent with the prior hydraulic analyses. On that basis, the ACTAG believes that a new hydraulic analysis is not required. The Independent Review Team concurs that the assumed one-for-one reduction in system capacity from the additional outage is reasonable and that a new hydraulic analysis is therefore not required. The ACTAG has nonetheless requested a new hydraulic analysis from SoCalGas. That analysis is not yet complete, and the ACTAG will supplement this assessment as needed should that analysis show different results.

If Southern California experiences a peak cold day before Lines 4000 and 235-2 and Playa del Rey return to service, SoCalGas will be unable to meet demand without using some gas from Aliso Canyon. Even using gas from Aliso Canyon, the withdrawal capability will only be sufficient to meet the higher extreme

Ehrenberg into the LA Basin. See p. 58 of February 24, 2004, proposal of SoCalGas and SDG&E in Order Instituting Rulemaking (R.) 04-01-025. This means that some SDG&E demand must be served via Moreno if the full 1010 MMcfd comes in at Ehrenberg. The consequence is that 400 MMcfd could only be delivered via Otay Mesa on a very high-use day in San Diego; roughly 200 MMcfd can be delivered and placed on a firm basis.

peak day demand if enough inventory has been preserved in all four storage fields to support the higher withdrawal needed on such a day.²¹

The current system outages impact SoCalGas' ability to inject gas into its storage fields before the beginning of the winter season. However, during the summer season SoCalGas injected gas into its storage fields to prepare for winter. As of November 1, 2017, the inventory at SoCalGas' storage fields including Aliso Canyon was 67 Bcf. At this time last year, its storage fields held 60.9 Bcf. However, this higher level is more than offset by operational failures on the SoCalGas pipeline system.

LADWP AND CALIFORNIA ISO JOINT IMPACT ANALYSIS AND RESULTS

At the request of the CPUC and CEC, the California ISO and LADWP updated their joint winter seasonal assessment to analyze the natural gas requirements in the LA Basin and Southern California regions during the winter of 2017-18. This analysis determines how much natural gas the power plants must have in order to maintain transmission system reliability under normal and unexpected contingency conditions. The analysis was conducted for two time periods, one before LADWP begins its planned transmission upgrades and the other after LADWP begins the transmission upgrade work. LADWP postponed its transmission upgrades until February 1, 2018, in response to the outages on SoCalGas' system.

The minimum gas burn by electricity generators calculated here is significantly lower than the electricity-generator gas burn under normal circumstances. It is the absolute, extreme minimum that electricity generators must have to maintain electric reliability. This reduction in gas use from normal to minimum levels is effectively a curtailment of gas service to electricity generators. Replacing the generation that would have occurred with this gas means the electricity balancing authorities have replaced generation to other, less-desirable, and more expensive facilities in order to reduce their gas requirement and the stress on the gas system.

Assumptions

The key assumptions on the electricity side consist of a) the electricity load forecast, b) available electricity imports, and c) the impacts of an N-1 contingency, or outage, event.

- A. Electricity Load Forecast. The 1-in-10 peak winter load electricity demand forecast for Southern California totals 21,571 MW. It breaks down as follows:
 - SCE = 13,888 MW
 - SDG&E = 3,184 MW

²¹ SoCalGas Advice Letter No. 5139, May 19, 2017, projects Aliso Canyon withdrawal capability on October 1, 2017, to be 670 MMcf based on 14.80 Bcf inventory. The withdrawal capability was based on the number of wells SoCalGas expected to bring back to service. However, the number of wells in service is likely less than included in their projection this past May. An inventory level higher than 14.8 Bcf will increase the withdrawal capacity of individual wells and partially offset a reduction in the number of wells available. Without a flow test, the ACTAG has no better estimate of the current withdrawal capability at Aliso Canyon.

- LADWP = 4,499 MW
- B. Imports. The analysis assumes Southern California imports of 15,701 MW of electricity. This is higher than the 13,000 MW of winter imports achieved historically and is based on available transmission capacity. The actual level of imports achievable will depend on the availability of transmission and energy on the days and hours when needed.
 - c. Outages. The analysis takes into account planned transmission outages. For unplanned facility outages, the analysis reflects an N-1 contingency event assumed to reduce energy available by 503 MW for LADWP and 2,000 MW for the California ISO.²²

Results

The results below are split into a minimum gas requirement under normal conditions versus a higher gas requirement should electricity system N-1 events occur.

Normal conditions, before LADWP starts their transmission upgrades (Before February 1, 2018)

The total gas burn required to support electric generation in Southern California is projected at 38.2 MMcfd. This is under normal conditions and excludes gas required by Qualifying Facilities (QFs).²³ Of this, 15.8 MMcfd is required by LADWP and 22.4 MMcfd is required by the California ISO. The two balancing authorities must be able to obtain at least this amount of gas in order to maintain electricity reliability.

To recover from an N-1 contingency (Before February 1, 2018)

A contingency (outage event) that would impact both LADWP and California ISO is the most severe electric contingency that could occur in the Southern California region. The gas requirement increases in order to recover from an N-1 electric contingency event as gas-fired generation must be available to replace the lost electricity system component. This higher gas requirement lasts until the lost component can be restored. This gas quantity from an outage event is assumed to be available in the event of an electric system contingency to meet NERC reliability requirements.

The most severe N-1 contingency equates to a loss of 2,000 MW for the California ISO and 503 MW for LADWP. Replacing this lost energy means the California ISO will require an additional gas requirement of 74 MMcfd of natural gas; for LADWP the gas requirement will increase by 53 MMcfd. The total gas needed to cover the additional (non-simultaneous) worst contingency for the ISO and LADWP above normal conditions is based on the higher of the two requirements shown in the following formula:

$$\max (74 \text{ MMcfd}, 53 \text{ MMcfd}) = 74 \text{ MMcfd}$$

Table 3 presents a summary of the minimum generation gas requirements before February 1, 2018.

²² N-1 is the loss of any generator, transmission line, transformer, or shunt device without a fault or single pole block on a high voltage direct current (HVDC) transmission line

²³ A qualifying facility is a qualifying cogeneration facility or qualifying small power production facility, as defined in the Code of Federal Regulations, Title 18, Part 292.

Table 3: Minimum Generation Gas Requirements Before February 1, 2018 (MMcfd)

Condition	CAISO	LADWP	Total
Normal	22.4	15.8	38.2
N-1	74	53	38.2 + 74 = 112.2

Figure 1 below shows the hourly minimum daily generation needed in both the LADWP and the California ISO balancing authorities to meet normal conditions and to recover from a non-simultaneous contingency on a peak winter day. The generation need is translated into a gas requirement of 38.2 MMcfd and 112.2 MMcfd without the QFs under normal and N-1 contingency conditions, respectively. Table 4 shows the peak hourly generation and gas burn by zone in the SoCalGas area.

Figure 1: Winter Generation in the SoCalGas area (without QFs) before February 1, 2018

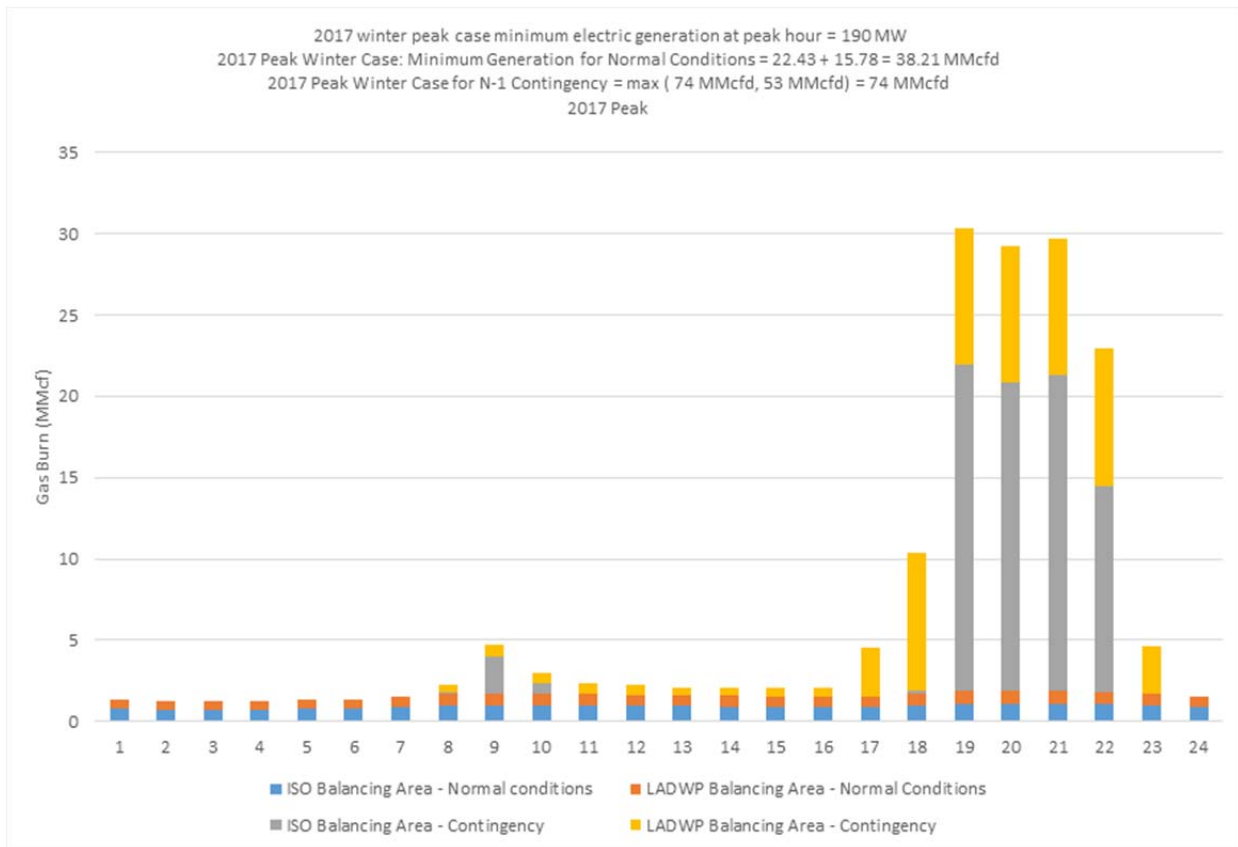


Table 4: 1-in-10 Peak Winter Case without QFs: Peak Hour Energy (MW) and Gas Burn (MMcf per hour) for SoCalGas Area Before February 1, 2018

Zone	Gen (MW)	Gas Burn (MMcfh)
Burbank	0.00	0.00
Coastal	0.00	0.00
Glendale	0.00	0.00
Inland	0.00	0.00
LA Basin	0.00	0.00
LADWP	75.00	0.73
Riverside	45.00	0.44
SDG&E	0.70	0.01
SJV	69.40	0.67
Grand Total	190.10	1.85

Normal conditions, after LADWP starts their transmission upgrades (After February 1, 2018)

After February 1, 2018, the total gas burn required to support electric generation in Southern California is projected to be 219.3 MMcfd. This is under normal conditions and excludes gas required by Qualifying Facilities (QFs). Of this, 196.9 MMcfd is required by LADWP, while the California ISO requirements remain the same at 22.4 MMcfd as presented in Table 5.

Table 5: Minimum Generation Gas Requirements After February 1, 2018 (MMcfd)

Condition	CAISO	LADWP	Total
Normal	22.4	196.9	219.3
N-1	74	53	219.3 + 74 = 293.3

To recover from an N-1 contingency after February 1, 2018

The gas requirement to recover from an N-1 electric contingency event is the same pre- and post-February 1, 2018: 74 MMcfd.

Figure 2 below shows the hourly minimum daily generation needed in both the LADWP and the California ISO balancing authorities to meet normal conditions and to recover from a non-simultaneous contingency on a peak winter day after February 1, 2018. The generation need is translated into a gas requirement of 219.3 MMcfd and 293.3 MMcfd without the QFs under normal and N-1 contingency conditions, respectively. Table 6 shows the peak hourly generation and gas burn by zone in the SoCalGas area.

Figure 2: Winter Generation in the SoCalGas Area without QFs After February 1, 2018

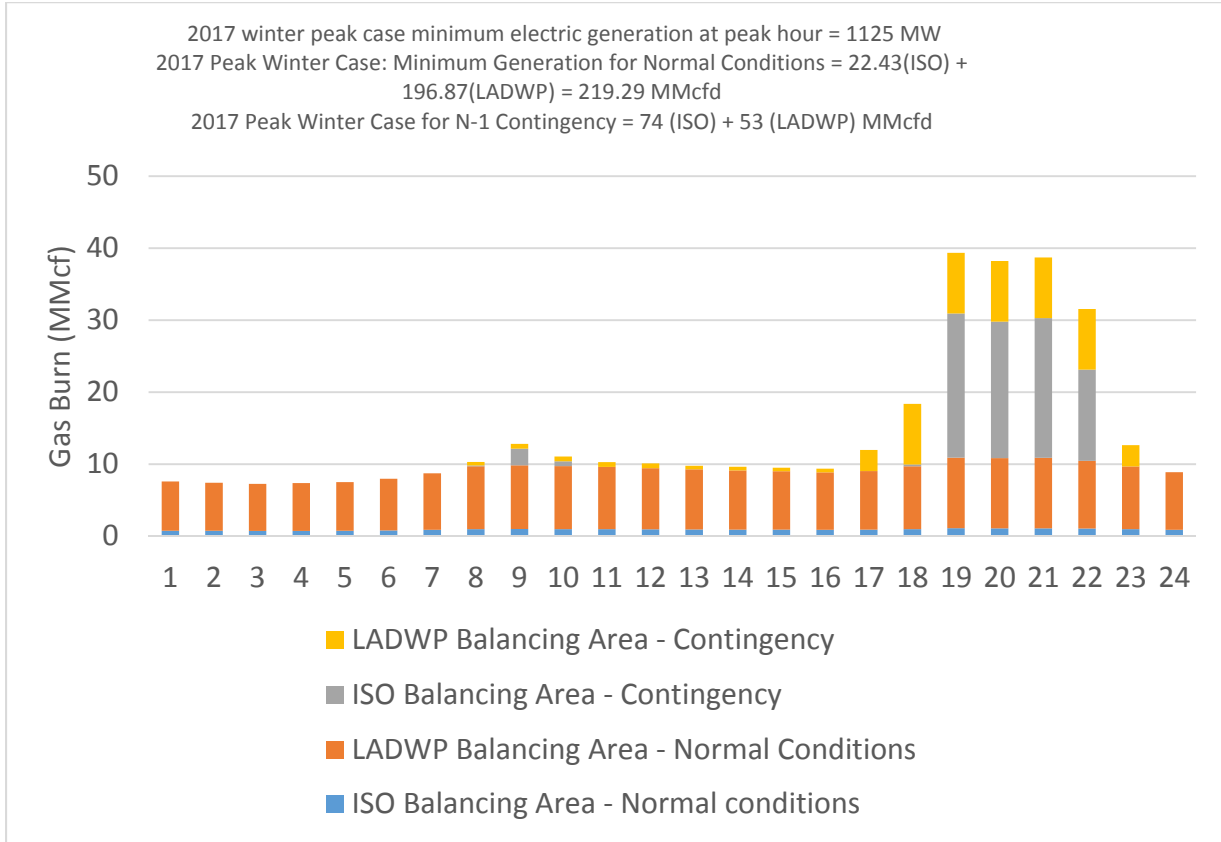


Table 6: 1- 10 Peak Winter Case without QFs: Peak Hour Energy (MW) and Gas Burn (MMcfd) for SoCalGas area After February 1, 2018

Zone	Gen (MW)	Gas Burn (MMcfd)
Burbank	165.00	1.60
Coastal	0.00	0.00
Glendale	15.00	0.15
Inland	0.00	0.00
LA Basin	0.00	0.00
LADWP	830.00	8.06
Riverside	45.00	0.44
SDG&E	0.70	0.01
SJV	69.30	0.67
Grand Total	1125.00	10.93

Table 7 provides a summary of electric impact on the 2017-2018 winter gas assessment.

Table 7: Summary of Electric Impact on 2017-2018 Winter Gas Assessment

Row	Description	Formula	Before February 1, 2018	After February 1, 2018
1	Actual ISO SoCalGas system gas burn on January 14, 2013 (MMcfd) ²⁴		685	685
2	Actual LADWP balancing area gas burn on January 14, 2013 (MMcfd)		200	200
3	Combined actual ISO and LADWP gas burns (MMcfd)	row 1 + row 2	885	885
4	ISO SoCalGas system gas burn with minimum generation — with all transmission lines in service and no outages (MMcfd)		22	22
5	LADWP balancing area gas burn with minimum generation — with all transmission lines in service and no outages (MMcfd)		16	197
6	ISO SoCalGas system gas burn to cover additional worst contingency (MMcfd)		74	74
7	LADWP balancing area gas burn to cover additional worst contingency (MMcfd)		53	53
8	Combined ISO and LADWP minimum generation gas burn including the higher of the additional worst contingency from LADWP and ISO (MMcfd)	row 4 + row 5 + max(row 6, row 7)	112	293

Difference between 2016-2017 analysis and 2017-2018 analysis (Before February 1, 2018)

In the 2016-17 winter assessment, the extreme minimum gas burn was 0 MMcfd for LADWP and 22 MMcfd for the California ISO based on the assumption that all transmission lines were in service with import energy to meet load requirements. The ACTAG anticipated that these very low gas burn requirements were sustainable only for a short period of time and such a reduction would occur infrequently because they would be limited to the most extreme conditions on the gas system.

In the 2017-18 winter assessment, the extreme minimum gas burn for LADWP increases to 15.8 MMcfd. The extreme minimum for the California ISO remains at 22.4 MMcfd under normal conditions. The increase in LADWP minimum generation was due to the Westside demand for Los Angeles being greater than the previous Aliso Canyon study case and thus the N-1 contingency of Tarzana-Olympic 230kV Line 3 stresses Tarzana-Olympic 138kV Line 1. This revised minimum generation estimate uses the

²⁴ January 14, 2013, was chosen for this analysis because it was the highest peak day in recent years. The winter 2016-17 assessment uses this same day.

Scattergood (RS-L) Phase Shifting Transformer to its maximum capability to unload the stressed transmission; even so, some generation is still required.

Difference between 2016-17 analysis and 2017-18 analysis (After February 1, 2018)

After February 1, 2018, the extreme minimum gas burn for LADWP increases to 197 MMcfd, and the California ISO’s remains at 22.4 MMcfd. This increase in estimated minimum gas burn is caused primarily by transmission work planned on the LADWP system, which increases LADWP’s reliability must-run (RMR) generation requirement.²⁵ Table 8 shows that the LADWP RMR requirements after February 1, 2018, are more than five times greater than in 2016-17.

Table 8: LADWP RMR Generation After February 1, 2018

Plant	2016-17 Study, MW	2017-18 Study, MW
Haynes	0	500
Scattergood	25	100
Valley	0	230
Burbank	165	165
Glendale	0	15
Total	190	1,010

Last winter, all LADWP circuits were available. On February 1, 2018, LADWP plans to begin upgrades to its 138/230kV LA Basin Transmission System: Valley-Rinaldi Lines 1 and 2. These outages are necessary to increase the ratings of the circuits by upgrading their conductors, which will increase the ability to import energy, but it is work that must be performed with the circuits de-energized. This work is the first phase of LADWP’s transmission system infrastructure improvement program that will require similar season-long outages on other circuits over the next several winter seasons.

These infrastructure improvements are necessary to mitigate existing transmission congestion in the LA Basin. In the future, they will allow LADWP to import more renewable energy into the LA Basin from the north and east. However, during the extended outages on these presently congested paths, far more RMR generation is required to be on-line in the LADWP portion of the LA Basin than in the winter of 2016-17 to: (1) relieve increased flow on remaining circuits that become more heavily loaded during the outages, and (2) prevent exposing other circuits to damaging overloads following the most critical transmission contingency.

Because of these extended outages, the most severe electric contingency for LADWP differs from that of 2016-17. The most critical contingency in the 2016-17 analysis was the loss of the Pacific DC intertie (PDCI), while the most critical loss in the 2017-18 analysis was the Adelanto-Toluca 500kV line 1. Since LADWP’s RMR generation is projected to be much higher in winter 2017-18 than in the past, LADWP’s recovery from loss of the PDCI requires no additional gas-fired generation to be dispatched from LADWP’s fleet. Due to the extended outages described above, loss of LADWP’s Adelanto-Toluca 500kV Line 1 is more critical than loss of the PDCI, and recovering from it requires more generation as shown in

²⁵ Reliability Must-Run (RMR) generation is the amount of generation required to provide transmission reliability.

Table 9. Under normal conditions, 1,010 MW of RMR generation is required, but under N-1 contingency conditions 1,513 MW of RMR generation is required, an increase of 503 MW.

Table 9: LADWP Post-Contingency Generation After February 1, 2018

Plant	LADWP RMR Generation in MW Before Loss of Adelanto-Toluca Line 1	LADWP Generation in MW Required to Recover from Loss of Adelanto-Toluca Line 1	Increase in LADWP Generation in MW to Recover from Loss of Adelanto-Toluca Line 1
Haynes	500	950	450
Scattergood	100	100	None
Valley	230	283	53
Burbank	165	165	None
Glendale	15	15	None
Total	1,010	1,513	503

Potential Gas Curtailment for Electric Generation

Determining the potential gas curtailment for electric generation is a two-step process. The first step is to calculate an adjusted winter peak day gas demand incorporating the minimum electric generation requirements. The next step is to compare the adjusted winter peak demand to the SoCalGas supportable demand or system sendout as shown in Table 2 (above). The impact on electric generation, shown in Table 7 (above), is based on the post N-1 contingency minimum generation combined gas burn of 112.2 MMcfd for the LADWP and California ISO before February 1, 2018, and 293.3 MMcfd after February 1. The analysis considers the amount of electric generation that can be curtailed from what the gas burn would otherwise be on a 1-in-10 peak gas demand day.

Table 10 shows the gas demand that SoCalGas estimates to be needed for normal electric generation on a 1-in-10 peak day (900 MMcfd). It also shows the minimum gas demand necessary to support electric generation under N-1 contingency conditions before and after February 1, 2018, as calculated by LADWP and the California ISO. Before February 1, 2018, electric generation can be curtailed by as much as 788 MMcfd below normal on a peak winter day and still maintain electric reliability that allows the ability to import curtailed gas generation from external generation resources. After February 1, 2018, electric generation can be curtailed by up to 607 MMcfd while maintaining reliability.

Table 10: 1-in-10 Winter Peak Day Demand, Normal and Minimum Electric Generation (MMcfd)

Winter Demand (MMcfd)	1-in-10 Peak Day Normal Electric Generation ²⁶	1-in-10 Peak Day Minimum Electric Generation, N-1 Contingency, Present to Jan. 31, 2018	1-in-10 Peak Day Minimum Electric Generation, N-1 Contingency; LADWP Maintenance Work, Post Feb. 1, 2018
Core	3,250	3,250	3,250
Noncore, Non-Electric Generation	805	805	805
Noncore, Electric Generation	900	112	293
Total	4,955	4,167	4,348
Estimated Implied Electric Generation Curtailment ²⁷	N/A	788	607

Operating the electricity system at these minimum levels assumes importing electricity to avoid using local gas-fired electric generation, resulting in an increased cost to serve electric load. It also assumes there is sufficient energy available from external suppliers at the quantity and duration necessary to meet the energy import requirements.

Table 11 compares the SoCalGas system sendout shown in Table 2 (above) to the adjusted winter peak day demand shown in Table 10. The results show supported demand without Aliso Canyon is insufficient to meet the 1-in-10 customer demand, even when it is adjusted to put electric generators at minimum levels. The resulting shortfalls range from 50 MMcfd to 510 MMcfd depending on the time period. The time period reflects the various gas system outages in place during that time and whether LADWP has begun its transmission maintenance work. Shortfalls of this magnitude are serious and imply curtailments of gas service to other noncore customers, such as refineries and large manufacturers. Should a 1-in-10 day occur the options come down to either withdrawing gas from Aliso Canyon or curtail other noncore customers, as any or cut in electric generation once generators are at their calculated minimum would result in electric load shed.

²⁶ Default reference values estimated by SoCalGas to show readers the magnitude of the voluntary curtailment.

²⁷ This represents the maximum voluntary reduction in gas use by EG

Table 11: Shortfall on a 1-in-10 Peak Day with Minimum Electric Generation and an N-1 Contingency

(MMcfd)	Present- 12/18/2017	12/18/2017- 12/30/2017	12/30/2017- 1/31/2018	Post- 2/1/2018
1-in-10 Customer Demand with Generation Adjusted to Minimum Levels	4,167	4,167	4,167	4,348
Supported Demand without Aliso Canyon	3,657	3,917	4,117	4,117
Shortfall without Aliso Canyon	-510	-250	-50	-231

Winter Gas Balance Analysis

The Energy Commission updated the gas balances it prepared for last winter’s technical assessment. A gas balance allows one to assess the gaps between capacity and demand that must be met with gas from storage and to see the impacts of storage drawdown over the course of the winter season. The three tables below present balances for a 1-in-2 normal temperature condition winter, a 1-in-10 “cold and dry” winter, and an extreme winter peak day with 1-in-35 year demand for core customers. All three demand cases come from the gas demand forecast from the 2016 California Gas Report prepared by California’s gas utilities with some oversight by staff at the CPUC and Energy Commission.²⁸ Note that the gas balance is not meant as a projection of what will happen; rather, it is a tool to demonstrate what would happen if the demand, supply, and storage assumptions shown in fact occur.

Another caveat is to recognize that the demand forecasts used are for average daily consumption for each month. Individual days will have higher and lower demand than the averages shown. Weekends can be expected to be lower; days closer to the end of December and beginning of January will likely be higher.

In last winter’s analysis, the gas balance showed the storage withdrawals needed to meet demand could be made while achieving a 10 percent “reserve” margin. For this winter, the balance reflects 2,385 MMcfd of pipeline capacity being available on a firm basis, before reflecting the mitigation measures. Capacity at individual receipt points is the same as in the summer 2017 analysis and is broken out in detail in the gas balance tables allowing one to easily assess alternate assumptions. The gas balance also assumes 67 Bcf of storage in inventory on November 1.²⁹ Any higher inventory that SoCalGas achieves above this level will mitigate these results somewhat. Likewise, any higher pipeline capacity that SoCalGas can achieve, either by getting lines back into service or on an interruptible basis, will mitigate these results, as will weather that is warmer than normal.

²⁸ SoCalGas’ October 30 Assessment states that it also used a demand forecast from the 2016 California Gas Report. SoCalGas has confirmed to the ACTAG that it used the forecast for months from November 2016 to March 2017 instead of November 2017 to March 2018. SoCalGas also converted the data to monthly totals and in so doing applied 28 days to January and 31 to February.

²⁹ Daily operating data posted on the SoCalGas Envoy electronic bulletin board showed a total inventory in gas storage of 67 Bcf on November 1, 2017, versus a 61 Bcf inventory on November 1, 2016 (including gas stored at Aliso Canyon).

The first finding from this winter’s analysis is that, even with the mitigated capacity level of 2,660 MMcfd assumed available on a firm basis due to SoCalGas’ current pipeline outages (at least until December 30 when it increases to 2,935 MMcfd), the 10 percent reserve margin cannot be maintained. The balances instead show storage withdrawals to achieve 0 percent margin. The withdrawal quantities shown are those required to meet demand, within general average daily maximums, and end of season inventory. The balances break out approximate withdrawals and inventories for the other three fields (OTFs) versus those for Aliso Canyon. This effectively identifies the demand that cannot be served absent withdrawals from Aliso Canyon. The balance does not constrain the Aliso Canyon withdrawals or the minimum inventory there except to try and use prudent levels of average withdrawals from the other three fields first.

In the normal weather case, storage inventory is drawn down to 47 Bcf at the end of December and 41 Bcf at the end of January. The balance projects a small amount of gas — an average of 41 MMcfd — to be needed from Aliso Canyon in December. Not using gas from Aliso Canyon would mean curtailing noncore load. Otherwise, the additional capacity at Kramer Junction combined with delivering 200 MMcfd at Otay Mesa appears adequate to avoid curtailments of gas service to noncore customers, looking only at average demand for each month and assuming no other outages, with full deliveries at each receipt point.

The cold winter demand case provides starker results. Withdrawals to serve all load in November and December would pull total inventory down to 32 Bcf and would draw Aliso Canyon inventory below even the 15 Bcf maintained there since January 2016. January 2018 looks better as Line 4000 comes back into service. This, however, leaves storage virtually empty by the end of February — a full month early —with inadequate inventory to provide protection to electricity generators until some gas can be reinjected.

On an extreme peak day, which reflects a temperature condition and core customer load expected to occur once in 35 years, the assumed draw from storage is the same as in last winter’s analysis: 2,040 MMcfd.³⁰ Given the storage inventory level shown at the end of December in even the normal demand case, it is not clear that SoCalGas would have enough pressure in its storage fields to be able to withdraw the assumed amount.³¹ Preserving the ability withdraw at this level appears to require curtailing noncore load in December. That being said, if electricity generators can reduce their demand to the 112 calculated by CAISO and LADWP shown in Table 3, the deliverability balance stays positive with a margin of 465 MMcfd. Recall that the balance for an extreme peak day is a one-time single event rather than an event of month-long duration. The storage withdrawals shown are sustainable only for a

³⁰ This figure represents an assumed 300 mmcf from Playa del Rey, 340 MMcfd from La Goleta, 1,000 MMcfd from Honor Rancho, and 400 MMcfd from Aliso Canyon. These are generally the maximum withdrawals that could be achieved.

³¹ SoCalGas, in its October 30 Technical Assessment, cited inventory requirements of 43.3 Bcf as the level needed at the end of December to support the maximum withdrawals needed should an extreme peak day event occur in January. The technical assessment team knows of no publicly-vetted analysis that verifies the 43.3 Bcf or the relationship between storage withdrawal capability and inventory.

few days and only if sufficient volumes are held in inventory. In terms of arithmetic, should a withdrawal of 2,040 MMcfd not be achievable, the deliverability balance shown would decrease on a one-for-one basis.

The gas balances run through next summer and fall. This yields a first look — if the weather and outages require storage inventories to be drawn, as projected here, to very low levels this winter — at what the refill might look like. The longer-term look assumes that Line 3000 comes back into service May 1 and that getting some gas back into storage early is important to maintaining protection to electric generation should a summer peak day for electricity occur. The balances suggest reasonable inventory levels can be achieved by the end of May.

Table 12: Normal (Average Temperature) Winter Gas Balance by Month With Gas System Mitigation

SoCalGas Monthly Gas Balance NORMAL WEATHER		2017		2018											
CGR Demand (MMcfd)		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Core		1,077	1,490	1,428	1,386	1,148	1,004	751	692	630	608	628	714	1,072	1,483
Noncore including EG		1,124	1,153	1,158	1,140	1,033	1,049	1,063	1,089	1,362	1,408	1,526	1,270	1,100	1,136
Wholesale & International		423	518	505	510	419	401	358	377	374	374	392	391	422	521
Co. Use and LUAF		33	40	39	38	33	31	27	27	30	30	32	30	33	40
Subtotal Demand		2,657	3,201	3,130	3,074	2,633	2,485	2,199	2,185	2,396	2,420	2,578	2,405	2,627	3,180
Storage Injection (Other Three Fields)		0	0	0	0	0	100	135	100	0	0	0	0	0	0
Storage Injection (Aliso)		0	0	0	0	0	50	10		0	0	0	0	0	0
Storage Injection Total		0	0	0	0	0	150	145	100	0	0	0	0	0	0
System Total Throughput		2,657	3,201	3,130	3,074	2,633	2,635	2,344	2,285	2,396	2,420	2,578	2,405	2,627	3,180
Supply (MMcfd)															
California Line 85 Zone		60	60	60	60	60	60	60	60	60	60	60	60	60	60
Wheeler Ridge Zone		765	765	765	765	765	765	765	765	765	765	765	765	765	765
Blythe (Ehrenberg) into Southern Zone		1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010
Otay Mesa into Southern Zone		100	200	200	200	0	0	0	0	0	0	0	0	0	0
Kramer Junction into Northern Zone		625	625	550	550	550	550	550	550	550	550	550	550	550	550
North Needles into Northern Zone		0	0	350	350	350	350	350	350	350	350	350	350	350	350
Topock into Northern Zone		0	0	0	0	0	0	0	0	0	0	0	0	540	540
Sub Total Pipeline Receipts		2,560	2,660	2,935	2,935	2,735	2,735	2,735	2,735	2,735	2,735	2,735	2,735	3,275	3,275
Storage Withdrawal (Other Three Fields)		97	500	195	139	0	0	0	0	0	0	0	0	280	220
Storage Withdrawal (Aliso)		0	41	0	0	0	0	0	0	0	0	0	0	0	225
Total Supply		2,657	3,201	3,130	3,074	2,735	2,735	2,735	2,735	2,735	2,735	2,735	2,735	3,555	3,720
DELIVERABILITY BALANCE (MMcfd)		0	0	0	0	102	100	391	450	339	315	157	330	928	540
Reserve Margin		0%	0%	0%	0%	4%	4%	17%	20%	14%	13%	6%	14%	35%	17%
OTF Month-End Storage Inventory (Bcf)	45	42	27	21	17	17	20	24	27	27	27	27	27	18	12
Aliso Month-End Storage Inventory (Bcf)	22	22	21	21	21	21	22	23	23	23	23	23	23	23	16
Total Storage Inventory	67	64	47	41	37	37	42	46	49	49	49	49	49	41	27

Table 13: Cold Winter Gas Balance by Month with Gas System Mitigation

SoCalGas Monthly Gas Balance Cold Yr WEATHER	2017		2018												
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
CGR Demand (MMcfd)															
Core	1,189	1,704	1,627	1,566	1,281	1,100	787	712	637	610	633	742	1,183	1,696	
Noncore including EG	1,174	1,212	1,226	1,199	1,075	1,109	1,122	1,201	1,473	1,492	1,616	1,325	1,150	1,188	
Wholesale & International	450	566	558	557	459	435	389	388	384	382	398	399	453	577	
Co. Use and LUAF	35	44	43	42	35	33	29	29	31	31	33	31	35	44	
Subtotal Demand	2,848	3,526	3,454	3,364	2,850	2,677	2,327	2,330	2,525	2,515	2,680	2,497	2,821	3,505	
Storage Injection (Other Three Fields)	0	0	0	0	0	0	108	305	110	120	45	80	0	0	
Storage Injection (Aliso)	0	0	0	0	0	50	300	100	100	100	10	0	0	0	
Storage Injection Total	0	0	0	0	0	50	408	405	210	220	55	80	0	0	
System Total Throughput	2,848	3,526	3,454	3,364	2,850	2,727	2,735	2,735	2,735	2,735	2,735	2,577	2,821	3,505	
Supply (MMcfd)															
California Line 85 Zone	60	60	60	60	60	60	60	60	60	60	60	60	60	60	
Wheeler Ridge Zone	765	765	765	765	765	765	765	765	765	765	765	765	765	765	
Blythe (Ehrenberg) into Southern Zone	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	
Otay Mesa into Southern Zone	100	200	200	200	115										
Kramer Junction into Northern Zone	625	625	550	550	550	550	550	550	550	550	550	550	550	550	
North Needles into Northern Zone	0	0	350	350	350	350	350	350	350	350	350	350	350	350	
Topock into Northern Zone	0	0	0	0	0	0	0	0	0	0	0	0	540	540	
Sub Total Pipeline Receipts	2,560	2,660	2,935	2,935	2,850	2,735	2,735	2,735	2,735	2,735	2,735	2,735	3,275	3,275	
Storage Withdrawal (Other Three Fields)	288	500	500	150	0	0	0	0	0	0	0	0	86	500	
Storage Withdrawal (Aliso)		366	19	279	0	0	0	0	0	0	0	0	0	270	
Total Supply	2,848	3,526	3,454	3,364	2,850	2,735	2,735	2,735	2,735	2,735	2,735	2,735	3,361	4,045	
DELIVERABILITY BALANCE (MMcfd)	0	0	0	0	0	8	0	0	0	0	0	158	540	540	
Reserve Margin	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	19%	15%	
OTF Month-End Storage Inventory (Bcf)	45	36	21	5	1	1	1	5	14	17	21	22	25	22	9
Aliso Month-End Storage Inventory (Bcf)	22	22	11	10	2	2	4	13	16	19	22	23	23	23	14
Total Storage Inventory	67	58	32	15	3	3	5	18	30	36	43	45	47	45	23

Table 14: Winter Peak Day (1-in-35 Core Demand) Balance with Gas System Mitigation

SoCalGas Peak Day Gas Balance		
	Dec	Jan
Demand (MMcfd)		
Core	2,944	2,944
Noncore, Non-electricity generators	1,019	1,019
Electricity generators (Redispatched to Minimum with N-1 protection)	112	112
Total Demand	4,235	4,235
Supply (MMcfd)		
California Production	60	60
Wheeler Ridge Zone	765	765
Blythe (Ehrenberg) into Southern Zone	1,010	1,010
Otay Mesa into Southern Zone	200	200
Kramer Junction into Northern Zone	625	550
North Needles into Northern Zone	0	350
Topock into Northern Zone	0	0
Total Flowing from Receipt Points	2,660	2,935
Storage Withdrawal		
Three Others (PdR 300 +Goleta 340+HR 1000)	1,640	1,640
Aliso Canyon	400	400
Subtotal Gas from Storage	2,040	2,040
Total Supply	4,700	4,975
DELIVERABILITY BALANCE (MMcfd)	465	740
Reserve Margin %	5%	17%

ADDITIONAL MITIGATION MEASURES

All of the mitigation measures implemented previously will remain in place to help manage potential natural gas curtailments for the upcoming 2017-18 winter. (Certain of those measures are implemented via changes to California ISO's tariff and require approval by the Federal Energy Regulatory Commission.³²) As indicated previously, LADWP has delayed until February the transmission upgrade work it had planned to begin in December, during its off-peak load season. This delay significantly reduces natural gas demand this winter. Beginning that work in February should allow LADWP to complete it in time for its summer peak.

The ACTAG expects, based on this assessment, SoCalGas will need to use gas from Aliso Canyon more this winter than last. First, the recent pipeline outages have furthermore significantly strained the SoCalGas system. Second, the minimum gas required to support electric generation is higher this winter. Last winter's analysis assumed the other three storage fields were used to the maximum extent achievable. With reduced pipeline capacity and the slightly higher minimum generation requirements from electric generators, the non-Aliso Canyon fields will likely be insufficient to serve all demand this winter. The likelihood of needing to use gas from Aliso Canyon is higher this winter than last and even that may not allow gas customers to avoid curtailments.

Several additional mitigation measures are under consideration. One is to launch greater outreach to encourage gas conservation by core customers and expand programs that use smart thermostats for demand response. On November 16, 2017, the CPUC asked SoCalGas to develop a program for implementation in December to allow dispatch of the thousands of smart thermostats that are already in place in the SoCalGas service area. It also asked that the program allow dispatching during several events per season, including during early morning and evening event periods; allow thermostat set point changes; enroll as many smart thermostat customers as possible (throughout the SoCalGas service area, not limited to the LA Basin); and increase the rebates to customers to facilitate enrollment and participation.³³ The CPUC will also work with both SoCalGas and Southern California Edison to continue current thermostat rebate programs.

Another potential measure is for Los Angeles County to implement an emergency moratorium on new natural gas service connections in the areas of the county served by Aliso Canyon. A moratorium on new connections would avoid increased demand for natural gas by residential, commercial, and industrial customers. Los Angeles County has allowed continued housing construction, for example, in the Porter Ranch area, where home prices average more than \$1,000,000, and the costs of alternatives to gas heating (ground mount geothermal heat exchangers, as an example) are easily absorbed. One practical

³² See <http://www.caiso.com/informed/Pages/StakeholderProcesses/AlisoCanyonGasElectricCoordination.aspx>

³³ See November 16, 2017, letter from CPUC Energy Division Director Ed Randolph to SoCalGas. http://docketpublic.energy.ca.gov/PublicDocuments/17-IEPR-11/TN221814_20171117T141213_Letter_from_CPUC_to_SoCal_Gas_re_Demand_Response.pdf

amendment could allow large gas customers seeking a connection to sponsor demand response and energy efficiency efforts to offset their connection. The CPUC is investigating its ability to impose an emergency moratorium in the event the County is unwilling to act.

Another potential mitigation measure is for electricity generators to more frequently shift generation to facilities located outside SoCalGas system to reduce its gas use in December. This could allow SoCalGas to preserve storage inventories deeper into the winter. Doing so would increase the cost of electricity (and for the California ISO may require additional FERC approval), but smaller reductions in gas burns by electricity generators early in the winter could push off the need to implement minimum generation levels until later in the winter. Both CAISO and LADWP are prepared to respond to requests from SoCalGas to voluntarily reduce gas demand to the extent possible. The idea here is to perhaps expand the frequency of those requests in hopes of reducing their magnitude. This measure could also have implications for core gas procurement cost that the CPUC would need to approve: core would use flowing supply coming in at the receipt points that might cost more than the gas it has in storage.

Another potential measure would be to slightly increase the volume of gas that can be stored at Aliso Canyon in order to maintain energy reliability in the region. Aliso Canyon has reached the maximum inventory, 23.6 Bcf, allowed under what is known as the Section 715 report.^{34, 35} That maximum was calculated assuming one natural gas transmission line being out of operation, not three, and focused more on the withdrawal needed on a single day than on inventory needed through the winter. The ACTAG recommends updating the Section 715 report analysis to explore increasing the maximum target inventory by 1 Bcf to 3 Bcf in order to avoid virtually empty storage reserves at the end of a colder than normal winter.

Next, the supply-side mitigation measures in the gas balance (and in SoCalGas' October 30 analysis) assume 200 MMcfd of additional supply will be delivered via Otay Mesa. Should it be infeasible to deliver pipeline supply to Otay Mesa using the North Baja and Gasoducto Baja Norte pipelines, the assessment anticipates that SoCalGas will initiate efforts to instead acquire liquefied natural gas (LNG) for delivery via Otay Mesa. Noncore customers can also arrange to deliver supply and use the Otay Mesa receipt point and should in general prepare for interruption to gas supply.

Lastly, the situation this winter will require constant monitoring and weekly communication. The CPUC and Energy Commission have already been watching natural gas prices carefully for price spikes. Staff at both agencies is monitoring daily operations, including storage inventories and receipt point deliveries, and conferring with SoCalGas frequently. The California Office of Emergency Services has been briefed and the Legislature will be briefed with the release of this assessment. Updates to the public, including requests for additional conservation on high demand days, will be made as needed.

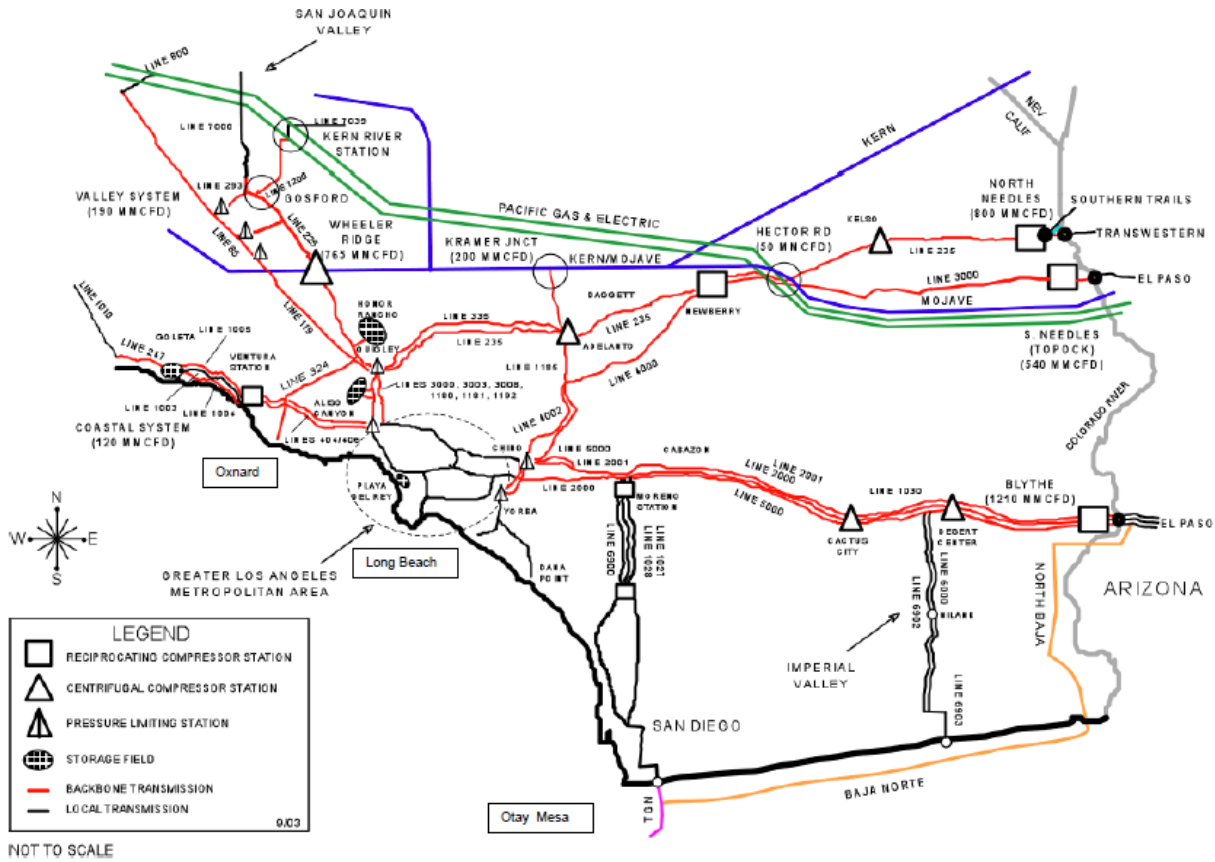
³⁴http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/News_Room/News_and_Updates/ReportReliability.pdf

³⁵ Public Utilities Code Section 715

CONCLUSION

Unprecedented pipeline outages (including an October 1, 2017, pipeline rupture) on the SoCalGas system mean that reliable natural gas service this winter to noncore customers, including electric generators, is threatened. This threat occurs even though there is more gas in storage than at this time last year. Any actions consumers take to reduce natural gas use in December will help preserve gas in storage for January (when 1-in-35 year demand days remain possible) would help. While the ACTAG offers several mitigation measures in this assessment, including using gas at Aliso Canyon, it is not clear that they and the prior measures already in place will be sufficient to avoid gas service curtailments to noncore customers in Southern California this winter. Assuming no additional gas system or electric transmission system outages and that full supplies arrive at the pipeline receipt points, the need for curtailments depends entirely on the weather and by how much consumers can decrease gas demand

APPENDIX A: SoCalGas System Map Highlighting Outages Affecting Northern Zone Receipts (Needles, Topock and Newberry)



Source: February 24, 2004 Phase I Proposal by SoCalGas and SDG&E in R. 04-01-025-

APPENDIX B: Mitigation Measures

Prudent

- Aliso Canyon Use
1. Make Available 15 Bcf Stored At Aliso Canyon to Prevent Summer Electricity Interruptions
 2. Efficiently Complete the Required Safety Review at Aliso Canyon to Allow Safe Use of the Field
 3. Implement Tighter Gas Balancing Rules
 4. Modify Operational Flow Order (OFO) Rule
 5. Call Operational Flow Orders Sooner in Gas Day

Tariff Changes

6. Provide Market Information to Generators Before Cycle 1 Gas Scheduling
7. Consider ISO market changes that increase gas-electric coordination
8. Increase Electric and Gas Operational Coordination
9. Establish More Specific Gas Allocation among Electric Generators In Advance of Curtailment

Operational Coordination

10. Determine Whether the Reliability Benefits of Deferring Any Gas Maintenance Tasks Outweigh the Safety Risks

LADWP

Operational Flexibility

11. Update Physical Gas Hedging Practice
12. Update Economic Dispatch Practice
13. Update Block Energy and Capacity Sales Practice
14. Explore Dual Fuel Capability
15. Ask customers to Reduce Natural Gas and Electricity Energy Consumption
16. Expand Gas and Electric Efficiency (EE) Programs Targeted at Low Income Customers
17. Expand Demand Response (DR) Programs

Reduce Natural Gas and Electricity Use

18. Reprioritize Existing Energy Efficiency Towards Projects with Potential to Impact Usage
19. Reprioritize Solar Thermal Program Spending to Fund Projects for Summer and by end of 2017 and add/accelerate solar PV programs
20. Accelerate Electricity Storage

Market

Monitoring Gas-targeted Programs to Further

Reduce

Usage

Winter

Operations Changes

Use of Gas from Aliso Canyon

Reduce Gas Maintenance

Downtime

Increase Gas

21. Protect California Ratepayers
22. Develop and Deploy Gas Demand Response (DR) Program
23. Develop and Deploy Gas Cold Weather Messaging
24. Create Advance Gas Burn Operating Ceiling for Electric Generation
25. Keep the Tighter Balancing Rules
26. Modify Core Balancing Rules
27. Update the Aliso Canyon Withdrawal Protocol and Gas Allocation Process

28. Submit Reports Describing Progress on Restoring Pipeline Service
29. Identify and solicit additional gas supply sources including more CA Natural Gas

Supply	Production
	30. Prepare to Buy LNG
Refineries Added Summer 2017	31. Monitor Natural Gas Use at Refineries and Gasoline Prices
	32. Increase Gas Inventories at the Other SoCalGas Storage Facilities
	33. Delay LADWP's Transmission Upgrade Work
	34. Use More Gas From Aliso Than Last Winter
	35. Turn Thermostats Down and Deploy More Smart Thermostats
	36. Use Electricity Generators' Generation Shift to Help Reduce Gas Demand/Preserve Inventory
NEW for Winter 2017-18	37. Update Section 715 Report's Aliso Canyon Inventory Target for New Circumstances
	38. Bring LNG to Otay Mesa if Cannot Acquire Pipeline Capacity
	39. Monitor and Communicate Constantly, Including to Public



**California Public
Utilities Commission**



**California Energy
Commission**



**Los Angeles Department
of Water and Power**



California ISO

Aliso Canyon Update Winter 2017-18

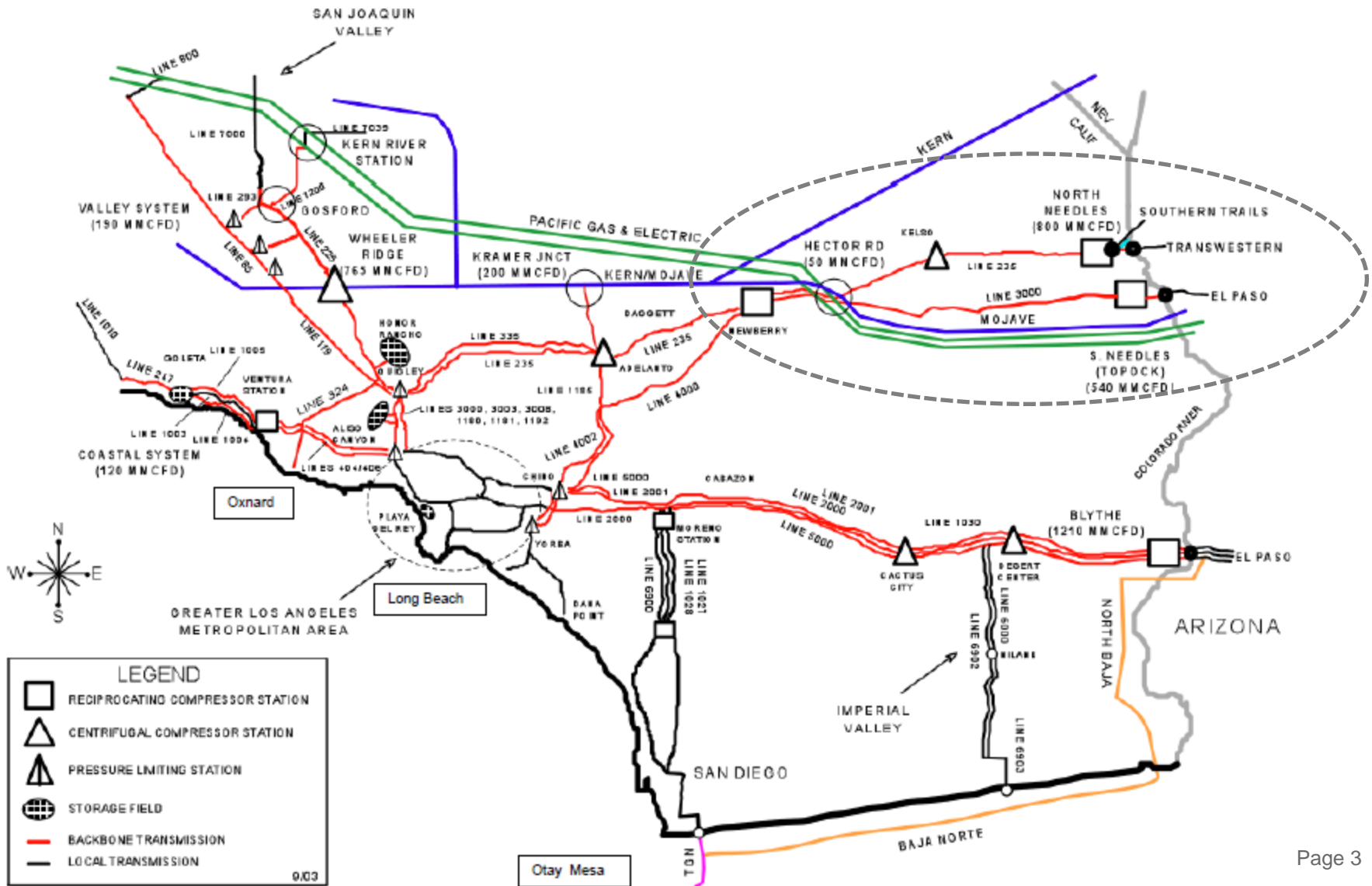
Summary

November 28, 2017

2 Years Later: Still Working to Coordinate but Three Pipeline Outages Complicate Southern California Reliability

- Initial analysis showed upcoming winter impacts much like last winter's but with a little more gas at Aliso and a major pipeline outage
- October 1 rupture of Line 235-2 also damaged Line 4000 => leaves additional ~800 mmcf/d out of service (on top of Line 3000's outage)
- October 17 Picker/Weisenmiller letter to SoCalGas asked for mitigation plan
- October 30 SoCalGas reply saying noncore winter curtailments likely
- Staff analysis differs somewhat from SoCalGas on certain quantitative assumptions but agrees curtailment risk is higher
- Bottom lines:
 - Curtailments more likely this winter than last because of the pipeline rupture
 - Conservation needed to preserve storage inventory for core
 - May curtail noncore (besides EG) to preserve storage inventory for core
 - A lot will depend on weather

Line 235 Ruptured (October 1) Near Newberry Compressor Station and Damaged Line 4000 -- Both Lines Out



NOT TO SCALE

Winter Outlook Clouded by Pipeline Outages: Normal Firm Receipt Capacity into Northern Zone of 1590 mmcf/d is NOW 550

- Outages reduce Northern Zone **firm** receipt capacity to 550 mmcf/d
 - Line 3000 out until May (out last winter, too)
 - Line 4000 back in service December 30; restores 350 mmcf/d
 - Line 235-2 rupture restoration timing unclear
 - Assume 1:1 impact from prior hydraulic analysis
- Kern River (interstate pipeline) delivering up to 150 mmcf/d more; interruptible as depends on conditions
- SoCalGas contracting for capacity to move 200 mmcf/d south from Ehrenberg then west to Otay Mesa
- Resulting maximum system capacity ranges from 3,657 mmcf/d to 4,117 mmcf/d over course of winter (break out is on next page)

System Capacity and Maximum Supported Demand Vary Depending on Outage End Dates and System Mitigations

(MMcfd)	Period 1: Present-12/18/2017 Outage on Lines 3000, 4000, and 235-2; Maintenance at Playa del Rey	Period 2: 12/18/2017- 12/30/2017 Outage on Lines 3000, 4000, and 235-2	Period 3: Post 12/31/2018 Outage on Lines 3000 and 235-2 (Line 4000 back)
Supported Gas Demand from Table 1 of the 2016 Winter Assessment (Includes Line 3000 Outage)	4,567	4,567	4,567
Combined Outage Lines 4000/235-2	(800)	(800)	(450)
Playa del Rey Maintenance	(260)	0	0
Reduced Operating Pressure at Ehrenberg	(200)	(200)	(200)
Total Supported Demand: No Mitigation	3,307	3,567	3,917
Mitigation 1: Otay Mesa	200	200	200
Mitigation 2: Kramer Junction (Interruptible)	150	150	0
Total Supported Demand with Mitigations	3,657	3,917	4,117

Compared to last winter can serve 910 mmcfd (20%) less demand; becomes 450 mmcfd once Line 4000 is back in service.

1-in-10 Demand Shows Gas System Shortfall – even with Electric Generation Reduced to Minimum Generation

Table 11: Shortfall on a 1-in-10 Peak Day with Minimum Electric Generation and an N-1 Contingency

(MMcfd)	Present- 12/18/2017	12/18/2017- 12/30/2017	12/30/2017- 1/31/2018	Post- 2/1/2018
1-in-10 Customer Demand with Generation Adjusted to Minimum Levels	4,167	4,167	4,167	4,348
Supported Demand without Aliso Canyon	3,657	3,917	4,117	4,117
Shortfall without Aliso Canyon	-510	-250	-50	-231

These shortfalls on a 1-in-10-year demand day would require curtailments of additional noncore customers even after EG goes to minimum generation.

Also Need to Preserve Storage Inventory for January – This May Require December Curtailments

- True even using some gas from Aliso
- Minimum inventory required to support possible peak day Aliso withdrawal in January of ~2 Bcfd
- SoCalGas cites 43.3 Bcf total storage inventory needed for peak day
- **All noncore** potentially at risk if inventory hits 43.3 Bcf
 - including refineries, large hospitals, manufacturing
- Inventory could drop to 43.3 Bcf before need for peak day protection passes on January 31

	SoCalGas	Joint Agencies
Average Temperature Demand	Early December	Late January
Cold Year Demand	November	Mid-December

New Mitigation Measures

- All the existing mitigation measures continue
- Suggest 8 new ones:
 - Delay LADWP's Transmission Upgrade Work until February
 - Use More Gas From Aliso Than Last Winter
 - More Conservation (Turn Thermostats Down and Deploy More Smart Thermostats)
 - Emergency Moratorium on New Gas Hookups in LA County
 - Shift EG Less but More Frequently to Preserve Inventory
 - Update Section 715 Report's Aliso Canyon Inventory Target for New Circumstances
 - Bring LNG to Otay Mesa if Cannot Acquire Pipeline Capacity
 - Monitor and Communicate Constantly, Including to Public

Comes Down to the Weather, Even With Mitigation Measures

- Natural gas service is threatened to noncore customers, including electric generators, this winter.
- This threat occurs even though there is more gas in storage than at this time last year.
- Caused by unprecedented pipeline outages (including October 1, 2017 Line 235 rupture) on the SoCalGas system.
- Any actions consumers take to reduce natural gas use in December will help preserve gas in storage for January (when 1-in-35 year extreme demand days remain possible).
- Assuming no additional gas system outages and that full supplies arrive at the pipeline receipt points, the need for curtailments depends entirely on the weather and by how much consumers can decrease gas demand to maintain inventory.

Next Steps

- Continue monitoring closely:
 - Weather (warm November already a big help)
 - storage inventory
 - pipeline outages
 - gas system mitigation success at Kramer & Otay Mesa
 - facility return dates
 - natural gas prices in Southern California
- Implement the additional mitigation measures

CALIFORNIA ENERGY COMMISSION1516 Ninth Street
Sacramento, California 95814Main website: www.energy.ca.gov

In the matter of,)	Docket No. 17-IEPR-11
)	
<i>2017 Integrated Energy Policy Report</i>)	NOTICE OF AVAILABILITY
<i>(2017 IEPR)</i>)	
)	RE: Joint Agency Technical Report on
)	Aliso Canyon Winter Risk Assessment

Notice of Availability

Aliso Canyon Winter Risk Assessment Technical Report 2017-18 Supplement

On May 22, 2017, the California Energy Commission, the California Independent System Operator, the California Public Utilities Commission, and the Los Angeles Department of Water and Power conducted a joint agency workshop to discuss energy reliability in Southern California. The workshop was conducted as part of the *2017 Integrated Energy Policy Report (IEPR)* proceeding. There was a joint agency presentation on reliability issues associated with the constrained operations at the Aliso Canyon natural gas storage facility and mitigation measures to address those issues. The joint agencies have continued to monitor reliability of California's energy system in the near-term and present an outlook for energy reliability for winter 2017-18. The *Aliso Canyon Winter Risk Assessment Technical Report 2017-18 Supplement* is now available at http://www.energy.ca.gov/2017_energypolicy/documents/#05222017

If you are interested in commenting on the report, written comments should be submitted to the Dockets Unit by **5:00 p.m. on December 05, 2017**. All written comments will become part of the public record of this proceeding.

For the 2017 IEPR, the Energy Commission is using an electronic commenting system. Visit the website at http://www.energy.ca.gov/2017_energypolicy/ and click on the “**Submit e-Comment**” link in the “Proceeding Information” box. From the drop down menu, please select the appropriate docket number, **17-IEPR-11 – Southern California Energy Reliability**.

This will take you to the page for adding comments to that docket. Please enter your contact information and comment title. Under “subject(s),” select “**IEPR 2017-05-22 Workshop**” and “**IEPR public comments**.” You may include comments in the box titled “Comment Text” or attach a file with your comments. Attached comments must be in a Microsoft® Word (.doc, .docx) or Adobe® Acrobat® (.pdf) formatted file.

The Energy Commission encourages use of its electronic commenting system, but written comments may also be submitted by emailing them to the Dockets Office, or by U.S. Mail to:

California Energy Commission
Dockets Office, MS-4
Re: Docket No. 17-IEPR-11
1516 Ninth Street
Sacramento, CA 95814-5512

If you choose not to use the electronic filing system, please include the appropriate docket number on any emailed or written comments. Comments may be emailed to docket@energy.ca.gov and copy the technical lead, Lana Wong by e-mail at Lana.Wong@energy.ca.gov.

Please note that your electronic, emailed, written and oral comments, attachments, and associated contact information (for example, address, phone, and email) become part of the viewable public record. Additionally, this information may become available via search engines such as Google and Yahoo.

Public Adviser and Other Commission Contacts

The Energy Commission's Public Adviser's Office provides the public assistance in participating in Energy Commission proceedings. If you want information on how to participate in this forum, please contact Alana Mathews, Public Adviser's Office at PublicAdviser@energy.ca.gov or (916) 654-4489, or toll free at (800) 822-6228.

If you have a disability and require assistance to participate, please contact Poneh Jones at poneh.jones@energy.ca.gov or (916) 654-4425 at least five days in advance.

Media inquiries should be sent to the Media and Public Communications Office at mediaoffice@energy.ca.gov or (916) 654-4989.

If you have questions on the technical subject matter, please contact Lana Wong at Lana.Wong@energy.ca.gov. For general questions regarding the IEPR proceeding, please contact Raquel Kravitz, IEPR project manager at raquel.kravitz@energy.ca.gov or (916) 651-8836.

The service list for the 2017 IEPR is handled electronically. Notices and documents for this proceeding are posted to the Energy Commission website at http://www.energy.ca.gov/2017_energypolicy/.

When new information is posted, an email will be sent to those on the energy policy e-mail listserv. We encourage those who are interested in receiving these notices to sign up for the listserv through the website at <http://www.energy.ca.gov/listservers/index.html>. The listserv is titled "energypolicy."

Availability of Documents

Documents will be available online at: http://www.energy.ca.gov/2017_energypolicy/ to supplement the May 22, 2017, Joint Agency Workshop on Energy Reliability in Southern California.

Date: November 28, 2017

Original Signed by:

Chair Robert B. Weisenmiller
Lead Commissioner
2017 Integrated Energy Policy Report

Mail Lists: energypolicy, electricity, naturalgas