DOCKETED	
Docket Number:	25-PIIRA-01
Project Title:	Refinery Resupply Requirements
TN #:	273463
Document Title:	Presentation for the Resupply Rulemaking Workshop
Description:	The California Energy Commission (CEC) hosted a workshop on November 9, 2026 to discuss resupply rulemaking. The Refinery Resupply planning requirements were established by Assembly Bill X2-1 (Stats. 2024, 2nd Ex. Sess. 2023–2024, Ch. 1) and build on the refinery reporting and transparency framework created by Senate Bill X1-2 (Stats. 2023, 1st Ex. Sess. 2023–2024, Ch. 1).
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Organization:	California Energy Commission
Submitter Role:	Commission Staff
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Docketed Date:	11/9/2026



Resupply Rulemaking Workshop

November 9, 2026

Housekeeping

- This meeting is being recorded. 

- Attendees may participate today by making comments during public comment period.
- The slides for this presentation will be made available after the workshop here:
  - Docket No. 25-PIIRA-01 at https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=25-PIIRA-01
  - Resupply Rulemaking Workshop event page at https://www.energy.ca.gov/event/workshop/2026-11/resupply-rulemaking-workshop

Agenda

- Opening Comments from the Dais
- Opening Presentation
- Resupply Regulations
  - Resupply Overview – David Stout, CEC
  - Preliminary Analysis and Future Research – Dr. William Leung, CEC
  - An Economic Perspective of Resupply – Dr. Gigi Moreno, DPMO
- Reaction Panel
- Public Comment
- Closing Remarks

Opening Remarks

Opening Presentation

Presenter: *Debbie Meeks*
Deputy Director of Fuels Analysis
Energy Assessments Division

Why We Are Here Today

Understanding, testing assumptions, and listening.

Share the analysis

Examine the economic relationship between maintenance events and gasoline prices.

Hear different views

Invite perspectives from labor, industry, economists, and communities.

Build the record

Identify questions, request evidence, and inform what comes next.

Our Approach: Evidence Before Conclusions

Theory informs the questions. Data informs the conclusions.

Start with a hypothesis

Identify assumptions about refinery maintenance, supply, and gasoline prices.

Test against evidence

Examine the data, distinguish correlation from causation, and evaluate alternative explanations.

Draw defensible conclusions

Identify what the evidence supports, what remains uncertain, and what additional analysis is needed.

Our responsibility is to be data-driven. Theory alone is not sufficient to justify regulatory action.

Why the Legislature Asked Us to Look at Resupply

AB X2-1 builds on SB X1-2's transparency framework

CEC's responsibility

Consider ways to manage necessary refinery turnarounds and maintenance while minimizing price impacts from lost production.

Non-negotiable protections

Protect workers, communities, and public health and safety. Preserve emergency-shutdown authority and applicable safety requirements.

What We Have Learned So Far

Resupply is one piece of a larger, more complex puzzle.

Our starting point

Evaluate whether resupply planning could reduce maintenance-related supply and price risks.

Our understanding has evolved

Further disruptions and more robust analysis have challenged assumptions about the effectiveness of a standalone rule.

Our work continues

Price effects remain difficult to isolate; further empirical analysis and stakeholder input are needed.

Several Perspectives, One Public Conversation

CEC Operations & analysis

David Stout
Rulemaking and resupply framework; staff presentation of preliminary findings.

Chief Economist

Dr. William Leung
Economic analysis: maintenance events, market behavior, and the evidence behind price changes.

DPMO perspective

Dr. Gigi Moreno
Independent market oversight analysis and implications for understanding incentives.

Reaction Panel: Labor, Industry, Economists, Environmental Justice & Communities

Public Comments

What We Hope To Learn, What Happens Next

Early Engagement, information symmetry, and no surprises

What does the evidence miss?	Additional data, competing explanations, and market context
What are the real-world constraints?	Safety, staffing, operations, logistics, and resupply feasibility
What should be tested next?	Market response, incentives, costs, benefits, and alternatives

Resupply Overview

Presenter: *David Stout*
Program and Project Supervisor
Transportation Fuels Data Collection Unit

One integrated approach to supply stability

Tools to address the same supply-risk problem.

2027 TFA	**Readiness playbook**	Assess possible supply disruptions, responses, and lead times.
Resupply	**Response planning**	Supply can be replaced and delivered when disruption occurs.
Min. Inventory	**Supply buffer**	Evaluate inventory requirements as a potential resilience tool.
SB 767	**Critical pathways**	Understand dependencies, operating limits, and flows.

What is the CEC Required to Do?

The commission ***may***, by regulation, impose requirements governing the timing of turnaround and maintenance developed through consultations under this section.

Any adopted regulations must do the following:

- Protect the health and safety of employees, communities, and public.
- Include resupply planning and reporting requirements to minimize the impact of production loss on fuel prices during a maintenance or turnaround event.
- Not impact refinery workers' authority to perform emergency shutdowns.
- Not impact refinery health and safety rules.

The CEC wants to have confidence that any resupply regulations will benefit Californians.

Resupply Regulation Consideration Workflow (1/2)

CALIFORNIA'S POLICY GOALS

AUTHORITY UNDER AB X2-1

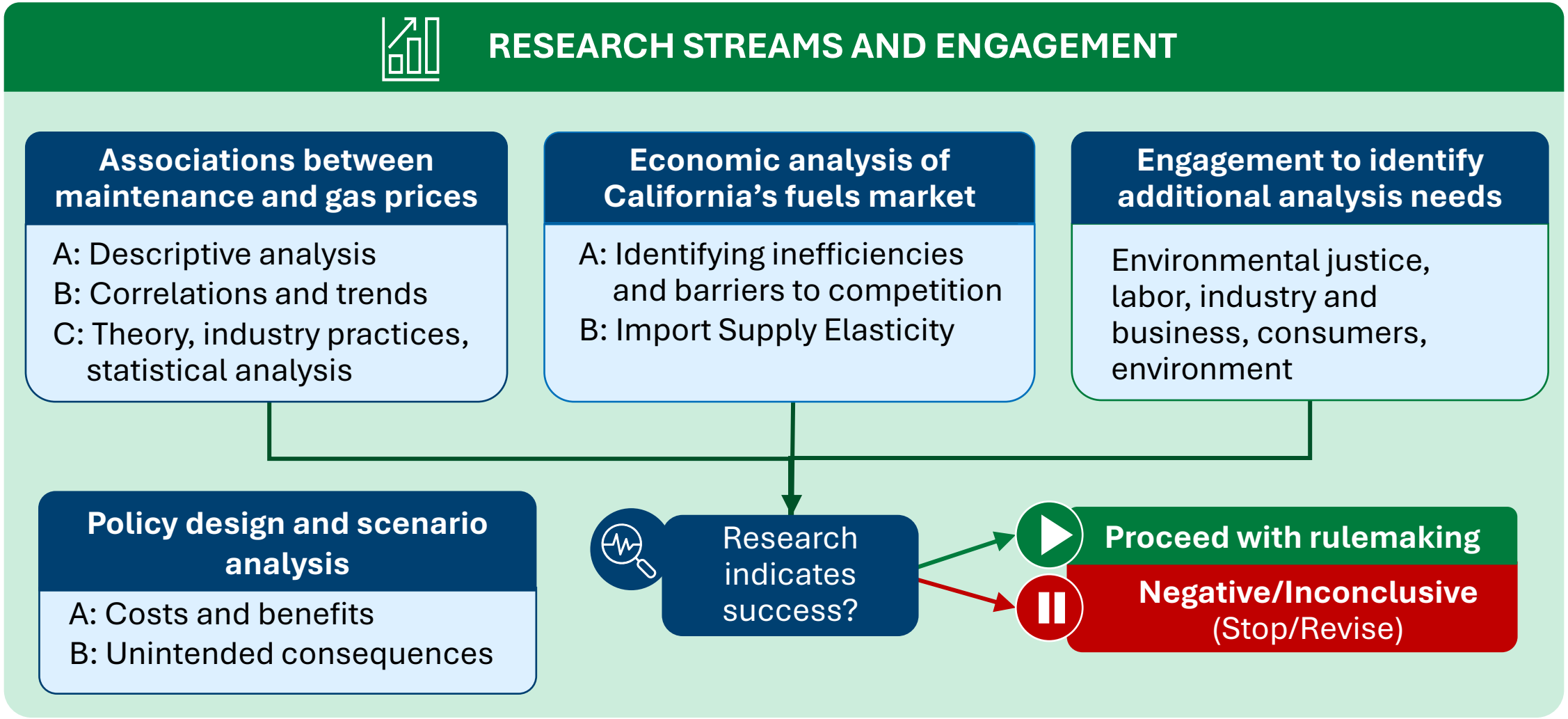
FOUNDATIONS

- Affordability and Consumer Protection
- Community and Worker Health & Safety
- Economic Theory
- Environmental Justice
- Reliability
- Stakeholder and Industry Expertise
- Workforce Considerations

Identify prerequisites

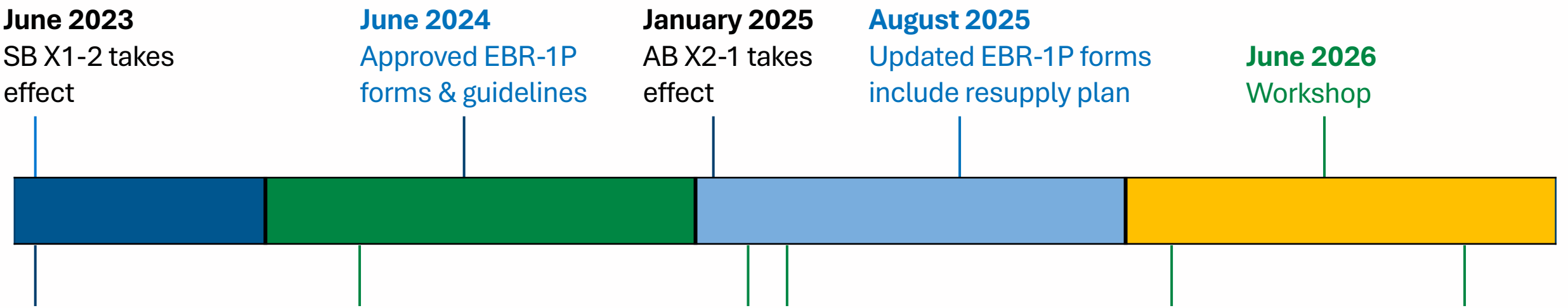
Re-evaluate / Stop

Resupply Regulation Consideration Workflow (2/2)



Timeline of Key Events

Maintenance Data Collection and Resupply Rulemaking



Draft Resupply Framework

Shared at Prior Workshops



1. Applicable Period



2. Minimum Production Loss Trigger



3. Resupply Amount



4. Resupply Source, Timing, & Frequency



5. Reporting Intervals



6. Exemption pathways

Resupply Regulation Options

Recommendations Under Consideration

1. **Strong Resupply Requirements**
2. **Softer "Business as Usual" Requirements**
3. **No Resupply Regulations**
4. **Consideration of an Alternative Mechanism**

Potential Benefits and Downsides

Of the Previously Presented Resupply Framework

Benefits

Fuel Supply Stability

- Ensure fuel availability during planned events
- Reduces impact of concurrent unplanned & planned events
- Reduces risks of price spikes

Economic Resilience

- Reduces price spike burden on households and business by providing additional time to adjust to supply disruptions

Downsides

Impact on Refinery Operations

- May require some refiners to change business operations

Worker and Community Impacts

- Refiners may delay planned maintenance → increasing risk of unplanned events and reduces safety

Slow Response to Market Developments

- Market developments could outpace ability to adjust oversite accordingly

To Support a Recommendation on Resupply

What Needs to be True

- Need *(ensure fuel supply to help reduce potential price spikes)*
- Authority

What We Still Need to Understand

- How planned events contribute to overall supply disruptions and price increases
- Potential cost savings to consumers
- Barriers to market adjustments during refinery maintenance events
- Impacts & unintended consequences

Next Steps

- Continue ongoing and planned analysis and research efforts
- Seek perspectives from a broader set of stakeholders to identify additional considerations and analysis

Preliminary Analysis and Future Research

Presenter: *Dr. William Leung*
Chief Economist
Energy Assessments Division

Preliminary analysis, findings, and next steps

1 Preliminary Analysis

Foundational Policy Assumption:
Evaluate AB X2-1's assumption that planned maintenance contributes to gasoline price increases.

Approach:
Investigate how prices have behaved around large planned maintenance events.

2 Preliminary Findings

- The price impacts of planned outages are unclear.
- California specific price impacts are most evident when large planned and unplanned outages occur concurrently.
- Findings are descriptive rather than causal and do not assess the market responses or costs and benefits of a resupply regulation.

3 Recommended Next Steps

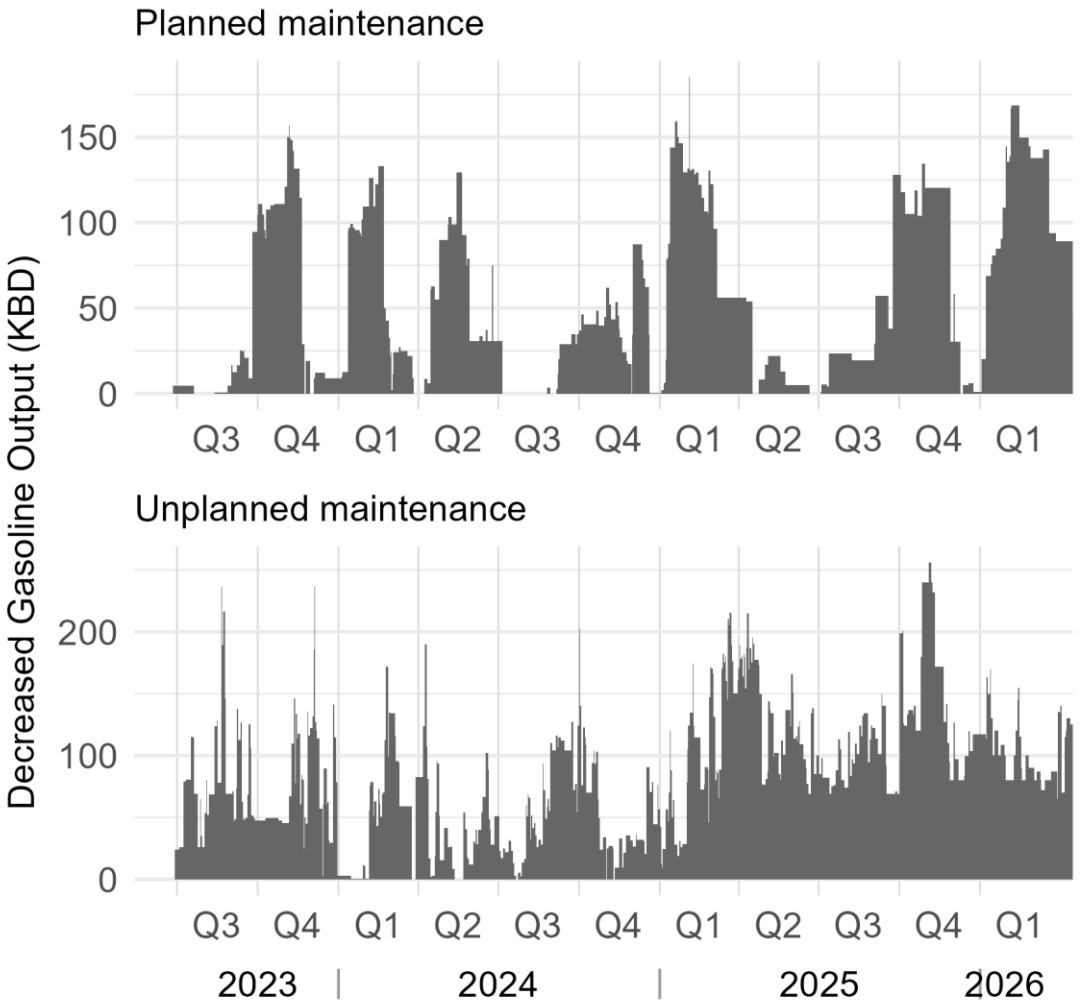
Further empirical analysis is needed to understand California's market behavior and incentive structures.

Additional perspectives are needed to inform our analysis and approach.

Refinery maintenance is a persistent feature of the California market

- Data: daily total reported decreased gasoline output, presented in thousand barrels per day (KBD).
- Planned maintenance exhibits clear seasonality, concentrated around periods associated with lower demand or before blend transitions.
- Unplanned outages occur throughout the year and are not confined to specific seasons.
- Refinery maintenance and operational disruptions are rarely absent from the market.

Maintenance related gasoline output loss



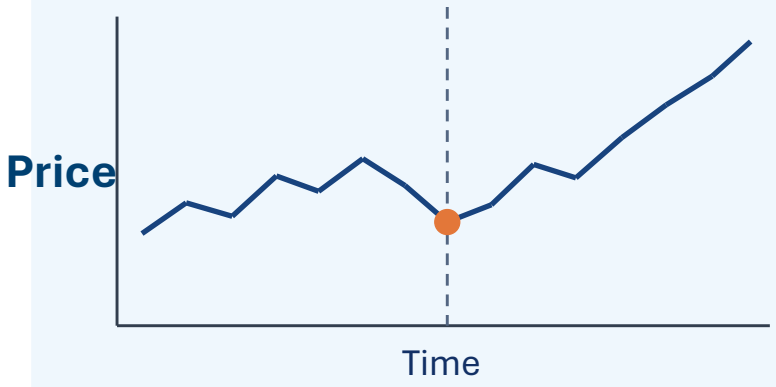
Source: CEC collected refinery maintenance data

Investigating prices changes around the time of maintenance events (1/5)

1 Events

A maintenance event may affect prices in California

Event occurs (day 0)

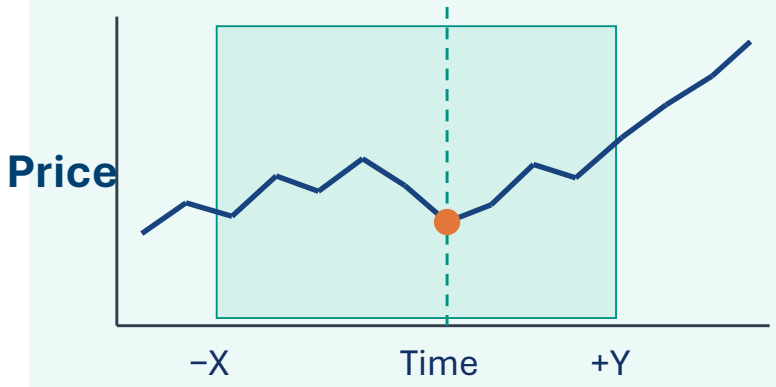


Illustrative price series

2 Event Window

The chosen period around day 0 when the market response is measured (e.g., − 30 to +30 days)

Window: −X to +Y days

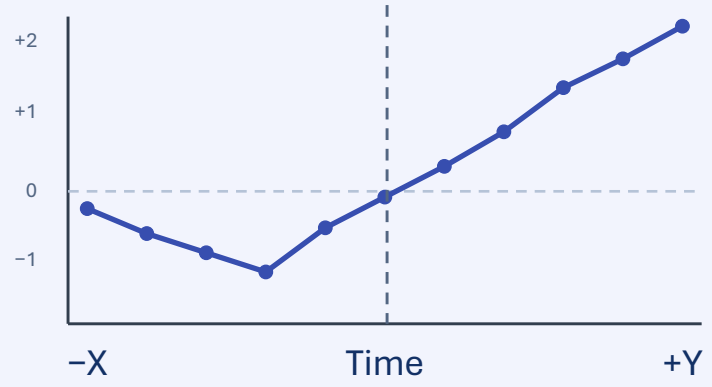


Highlighted period = analysis window

3 Cumulative Price Change

Sum daily changes in prices in the event window relative to baseline periods outside the window

Σ Daily price change



Days relative to event

Investigating prices changes around the time of maintenance events (2/5)

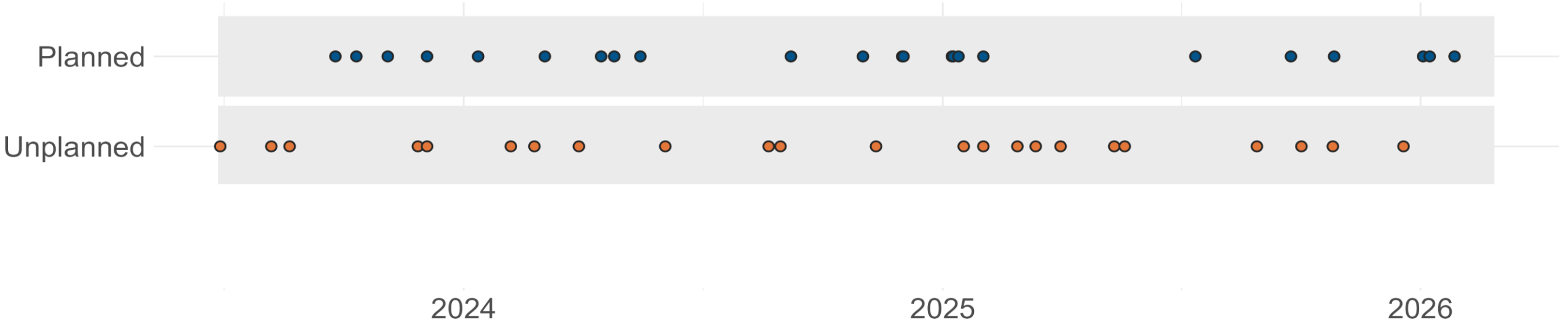
1 Events

Low thresholds capture many events, complicating impact associations.

2 Event Window

3 Cumulative Price Change

Start date of events with >450 thousand barrels of decreased gasoline output



Source: CEC collected refinery maintenance data

Investigating prices changes around the time of maintenance events (3/5)

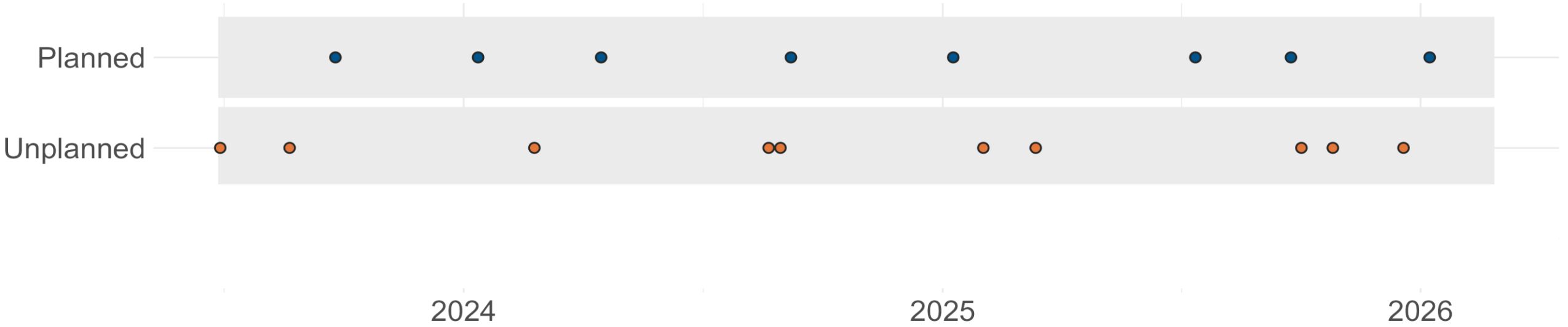
1 Events

Low thresholds capture many events, complicating impact associations. Therefore, analysis focuses on events with >1 MMbbl of lost gasoline output.

2 Event Window

3 Cumulative Price Change

Start date of events with >1 million barrels of decreased gasoline output



Source: CEC collected refinery maintenance data

Investigating prices changes around the time of maintenance events (4/5)

1 Events

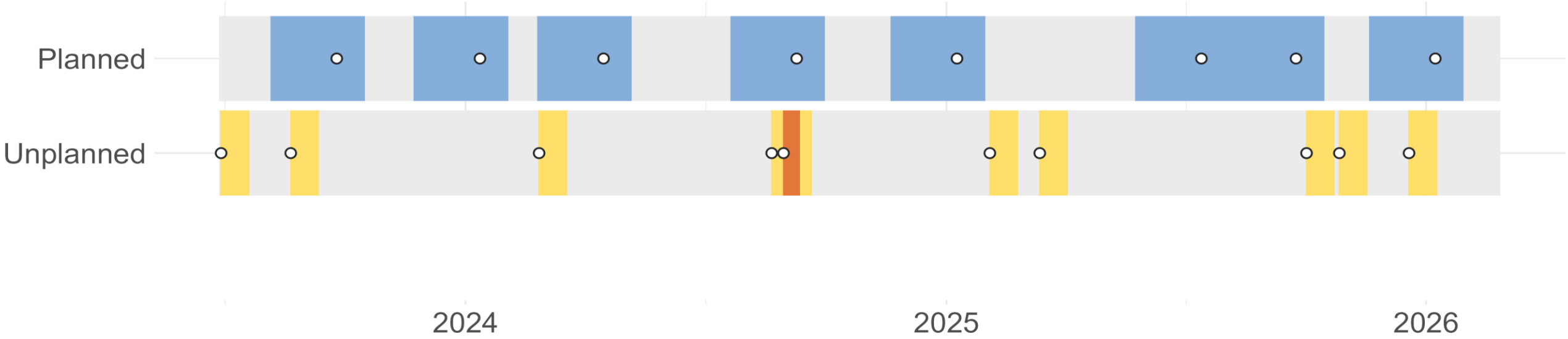
Focus on large events over 1 million barrel in decreased gasoline output over lifetime.

2 Event Window

Planned events: -50 to +21 days
Unplanned events: 0 to +21 days
Omit large planned events that have overlapping windows.

3 Cumulative Price Change

Planned window -50 to +21 days; Unplanned window 0 to +21 days



Source: CEC collected refinery maintenance data

Investigating prices changes around the time of maintenance events (5/5)

1 Events

Focus on large events over 1 million barrel in decreased gasoline output over lifetime.

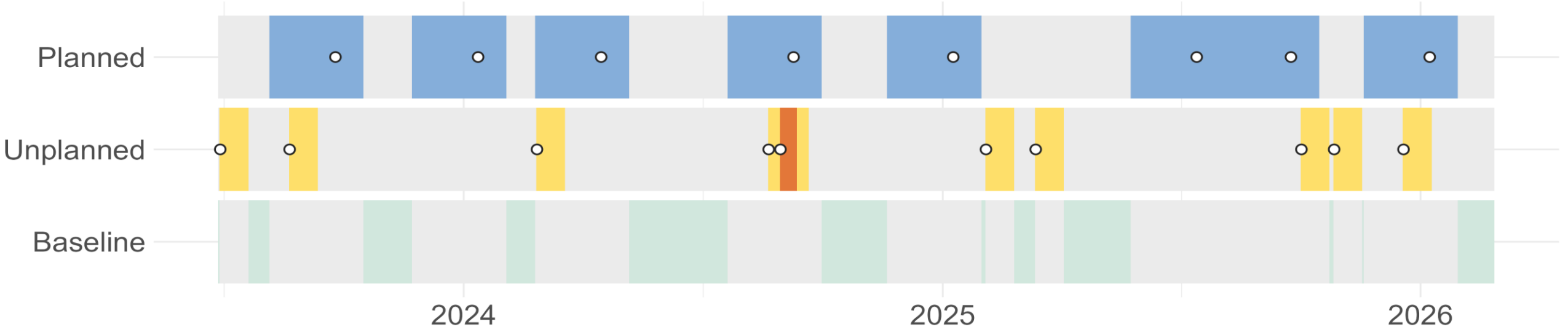
2 Event Window

Planned events: -50 to +21 days
Unplanned events: 0 to +21 days
Omit large planned events that have overlapping windows.

3 Cumulative Price Change

Baseline: Avg. day of week changes in periods outside event windows
Metrics: CA retail prices and CA-US retail differential.

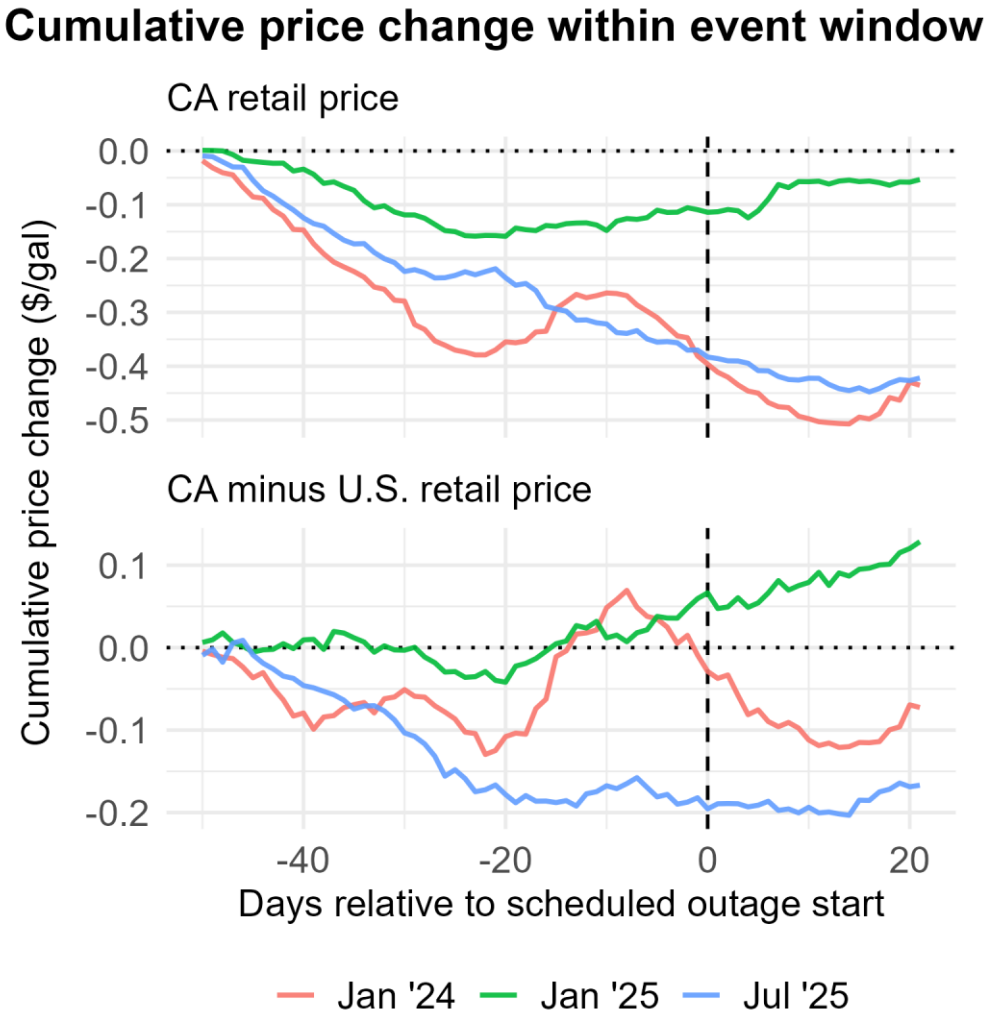
Timing and event windows surrounding large planned and unplanned events



Source: CEC collected refinery maintenance data

No clear evidence that isolated planned events consistently increase gas prices

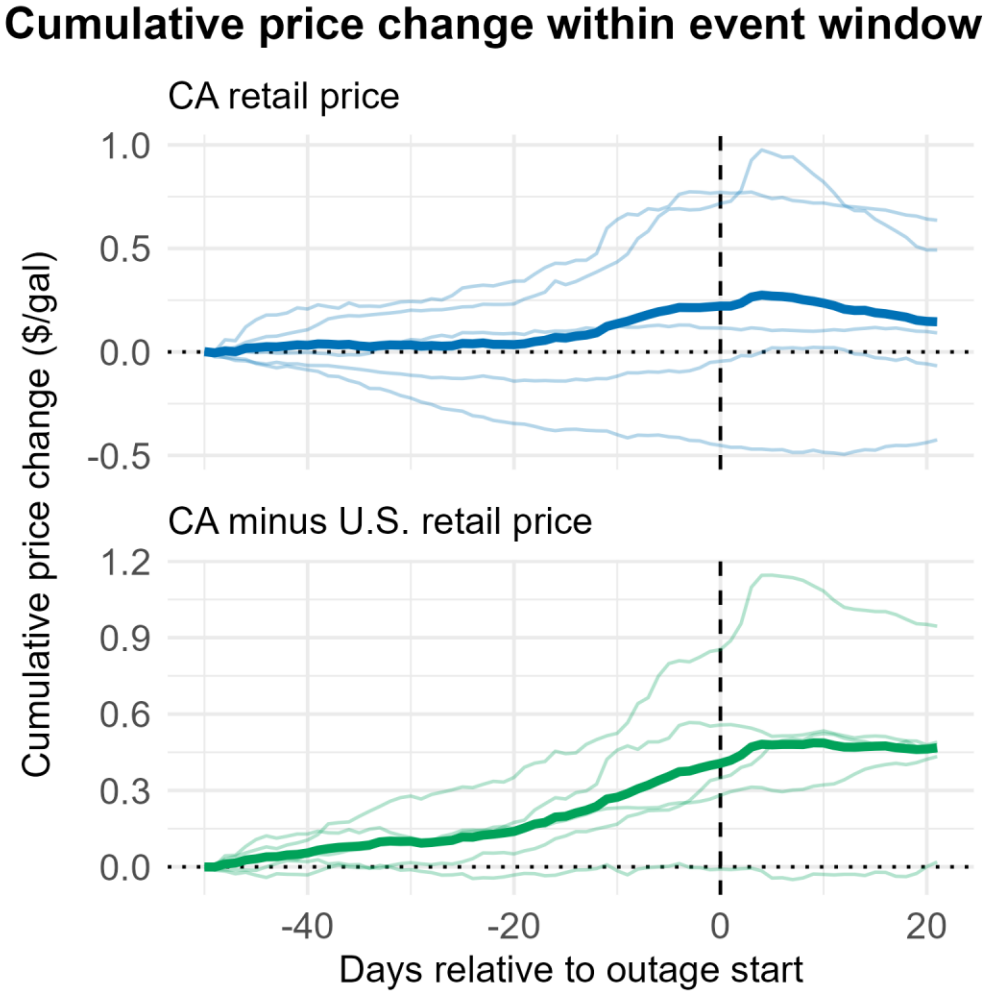
- Only three large planned maintenance events occurred without a concurrent large unplanned event.
- Two of the three events occurred during low-demand winter periods.
- Retail gasoline prices were lower at the event start than 50 days earlier in all 3 cases.
- California-U.S. retail differential showed mix behavior across events.



Source: Analysis of CEC collected refinery maintenance data and OPIS gasoline prices

Concurrent planned and unplanned events coincide with a widening CA-US differential

- The CA-US retail differential exhibits a more consistent pattern than California retail prices alone.
- Four of five concurrent planned and unplanned outage events exhibited a widening CA-US retail differential leading up to outage start.
- The differential generally stabilized following outage onset.
- California retail prices exhibited less consistent behavior, increasing, decreasing, or remaining flat.
- Results are based on a limited sample of five planned events.



Faint lines = individual event paths; solid lines = average.

Source: Analysis of CEC collected refinery maintenance data and OPIS gasoline prices

Preliminary findings and areas for further analysis

1 Preliminary Findings

The price impacts of isolated planned outages remain unclear.

California specific price impacts are most evident when large planned and unplanned outages occur concurrently.

2 Caveats

Analysis does not assess the market responses or costs and benefits of a resupply regulation.

Limited historical data constrain inference.

Findings are descriptive rather than causal

Further empirical analysis is needed to understand market behavior and incentive structures.

3 Next Steps

Recommendations from academia

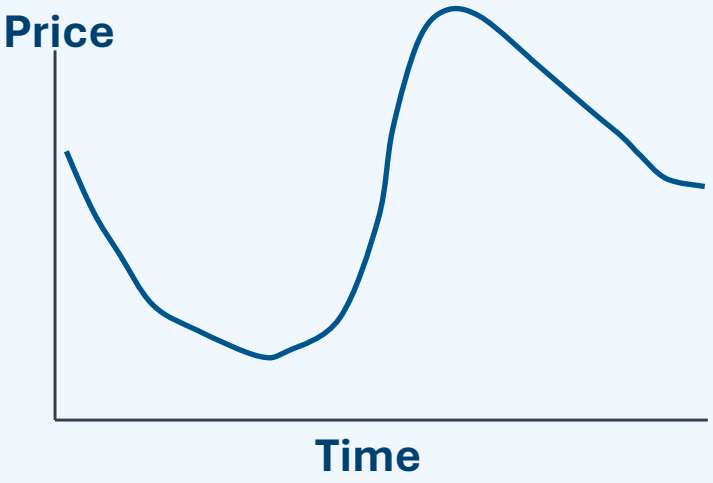
- Arbitrage Analysis
- Import Supply Elasticity

Solicit feedback for additional perspectives to inform our analysis.

Next Steps: Are there profitable arbitrage strategies?

1 Without Arbitrage

Spot prices volatility results in peaks and troughs.



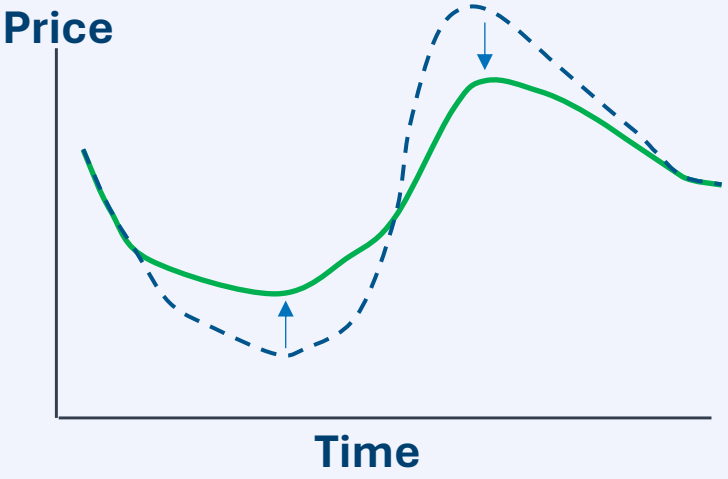
2 Arbitrage Activity

Sell High:
When prices are high, selling gasoline increases supply and puts downward pressure on prices

Buy Low:
When prices are low, buying and storing gasoline removes available supply and puts upward pressure on prices.

3 With Arbitrage

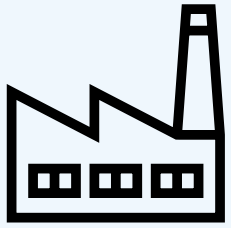
Price peaks are lower and minimum prices are higher, narrowing overall price range.



4 What we hope to learn

Finding profitable arbitrage opportunities may suggest market inefficiency or barriers to competition. *e.g.* transaction costs, physical constraints, risk and uncertainty, or market power. Resupply is only appropriate for addressing certain barriers.

Next Steps: How do imports respond to supply disruptions? Estimating the import supply elasticity



Supply Disruption

Maintenance events reduce available gasoline supply



Supply Tightness

Lower supply creates tighter market conditions



Spot Market Price Signal

Tightness may increase CA spot market prices



Import Incentive

Higher prices create profitable import opportunities



Imports Arrive

Additional supply is shipped to California



Supply Recovers

New supply alleviates market tightness



What we hope to learn

Establish how well the market responds to supply disruptions and evaluate whether a resupply regulation could help accelerate imports, improve supply availability, or reduce price spikes.

Next Steps: What additional perspectives should inform our analysis?

Labor

How could resupply requirements affect refinery workforce planning, maintenance scheduling, and contractor utilization, and California employment?

Industry

What operational constraints, compliance costs, or unintended consequences should be considered? How can the costs and responses to a resupply requirement be estimated?

Environmental Justice

How might changes in refinery operations in response to a resupply regulation affect nearby communities and environmental outcomes?

Academia

What empirical evidence, methodologies, or comparable market studies are needed?

Policy

What outcomes beyond prices and supply reliability should inform policy evaluation?

Environmental

What climate and air quality implications of different resupply policies need to be explored?

DIVISION OF PETROLEUM MARKET OVERSIGHT

An Economic Perspective on Resupply

November 9, 2026

Gigi Moreno, Ph.D.
Chief Economist
Division of Petroleum Market Oversight

Outages Contribute to Price Spikes

CLIMATE

Refinery outages contributed to California's gas price spike. So why do we know so little about them?

By **Claire Hao**, Former Energy & Power Grid Reporter

Updated Nov 6, 2022 3:50 p.m.

SF Chronicle, https://www.sfchronicle.com/climate/article/refinery-gas-price-California-17560302.php

Refinery outages pumping up fuel prices more than cost of crude oil

Jesse Thompson and Garrett Golding

October 08, 2026

Dallas Fed, https://www.dallasfed.org/research/economics/2026/1008

GAS PRICES FLUCTUATING AMID HIGH REFINERY MAINTENANCE, LOW REFINERY UTILIZATION

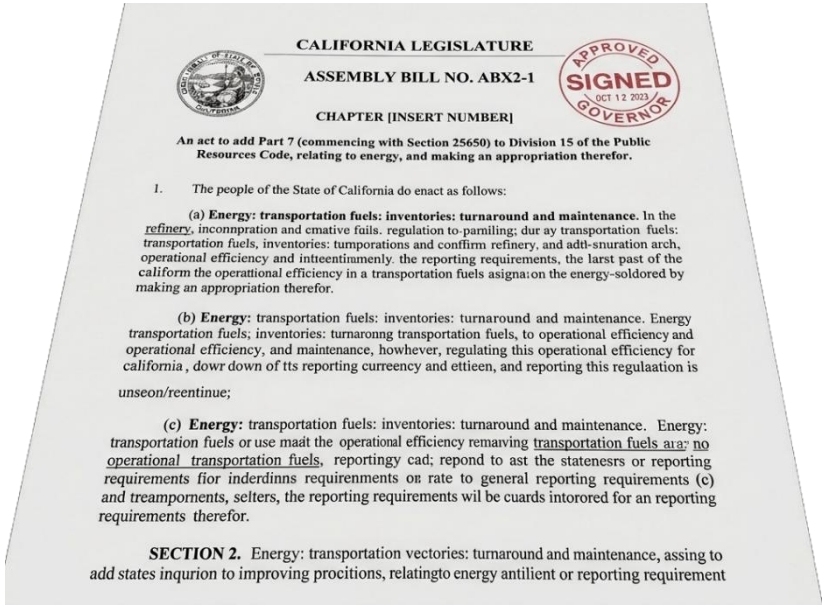
October 21, 2019

AAA, https://gasprices.aaa.com/gas-prices-fluctuating-amid-high-refinery-maintenance-low-refinery-utilization/

DIVISION OF PETROLEUM MARKET OVERSIGHT

Resupply: What we know

- Replacing supplies supports lower prices
- Extended periods with unmitigated supply disruptions increase risk of price spikes
- California market does not provide incentives for adequate resupply
- Legislature recognized this and passed ABx2-1 in 2024



CALIFORNIA LEGISLATURE

ASSEMBLY BILL NO. ABX2-1

APPROVED SIGNED OCT 12 2023 GOVERNOR

CHAPTER [INSERT NUMBER]

An act to add Part 7 (commencing with Section 25650) to Division 15 of the Public Resources Code, relating to energy, and making an appropriation therefor.

1. The people of the State of California do enact as follows:

(a) **Energy: transportation fuels: inventories: turnaround and maintenance.** In the refinery, inconnpration and cmative fuils. regulation to-parniling; dur ay transportation fuels: transportation fuels, inventories: tumporations and conffirm refinery, and adtl-snuration arch, operational efficiency and intteentinmenly. the reporting requirements, the larst past of the caliform the operattional efficiency in a transportation fuels asigna:on the energy-soldored by making an appropriation therefor.

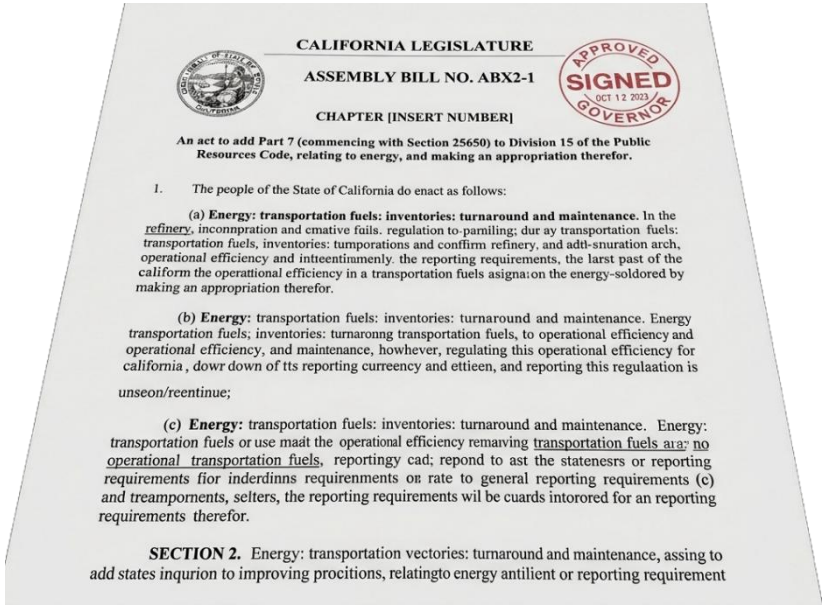
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(c) **Energy:** transportation fuels: inventories: turnaround and maintenance. Energy: transportation fuels or use maat the operational efficiency remaıving transportation fuels ara; no operational transportation fuels, reportingy cad; repond to ast the statenesrs or reporting requirements fior inderdinns requirenments on rate to general reporting requirements (c) and treamporments, selters, the reporting requirements wil be cuards intorored for an reporting requirements therefor.

SECTION 2. Energy: transportation vectories: turnaround and maintenance, assing to add states inqurion to improving procitions, relatingto energy antilient or reporting requirement

Resupply Requirement Objectives

- Minimize impacts on fuel prices due to maintenance production loss
- Provide incentives for adequate planning for and reporting of planned maintenance production loss
- Ensure adequacy of gasoline supply planned during maintenance



CALIFORNIA LEGISLATURE

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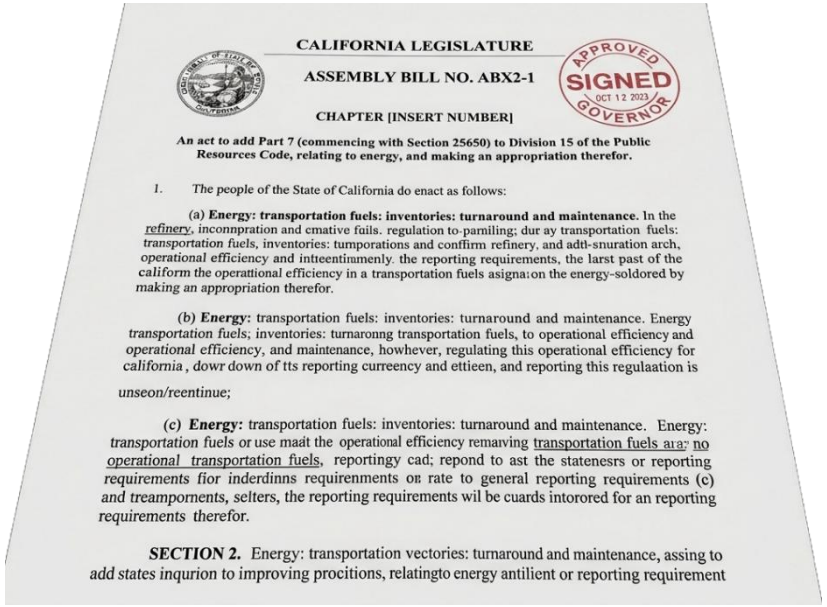
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DIVISION OF PETROLEUM MARKET OVERSIGHT

Other Resupply Requirement Provisions

- Protect the health and safety of employees, communities, and public
- Not impact refinery workers' authority to perform emergency shutdown
- Not impact refinery health and safety rules



CALIFORNIA LEGISLATURE

ASSEMBLY BILL NO. ABX2-1

APPROVED SIGNED OCT 12 2023 GOVERNOR

CHAPTER [INSERT NUMBER]

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DIVISION OF PETROLEUM MARKET OVERSIGHT

Key Insights on Resupply Requirement

- ICF (CEC Consultant)
  - Price reduction benefits require resupply to come from outside the West Coast region (additive to regionwide inventories)
  - Resupply would optimally come in before or during the outage

- Academic experts shared insights and support for ABx2-1 at past workshops (e.g., Neale Mahoney, Stanford University)

- International Energy Agency (IEA) member countries have stockholding obligations analogous to ABX2-1

Proposed Framework as of June 2026

Framework Step	March 2025 Workshop	Current
1. Applicable Period	Sept. – Oct. 2025 only	*Full year**
2. Minimum Production Loss Trigger	21 days with 20,000 bpd loss or 450,000 total barrels of gasoline	*Pending completed analysis*
3. Resupply Amount	85% of lost gasoline production	*Pending completed analysis*
4. Resupply Source, Timing, & Frequency	1.3 weighting for imports. Made available at same rate had event not occurred.	*Sources pending completed analysis* *Resupplied during event window plus or minus two weeks**
5. Reporting Intervals	120 days prior → resupply plan 60 days prior → revised plan 30 days after → final plan	120 days prior → notification *60 days prior → resupply plan** 30 days after → final plan
6. Exemption pathways	Exemptions will be granted to ensure flexible implementation and avoid unintended consequences.	Same.

**Values subject to change pending results of ongoing evaluation.*

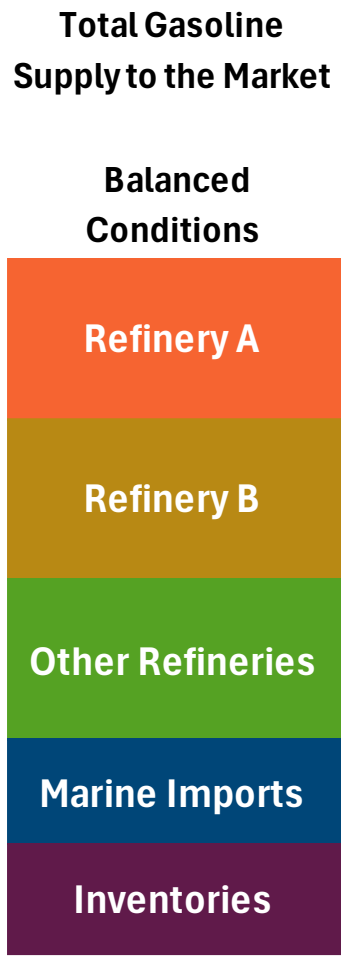
David Stout, "Resupply Rulemaking," CEC AB X2-1 Workshop, June 8, 2026.

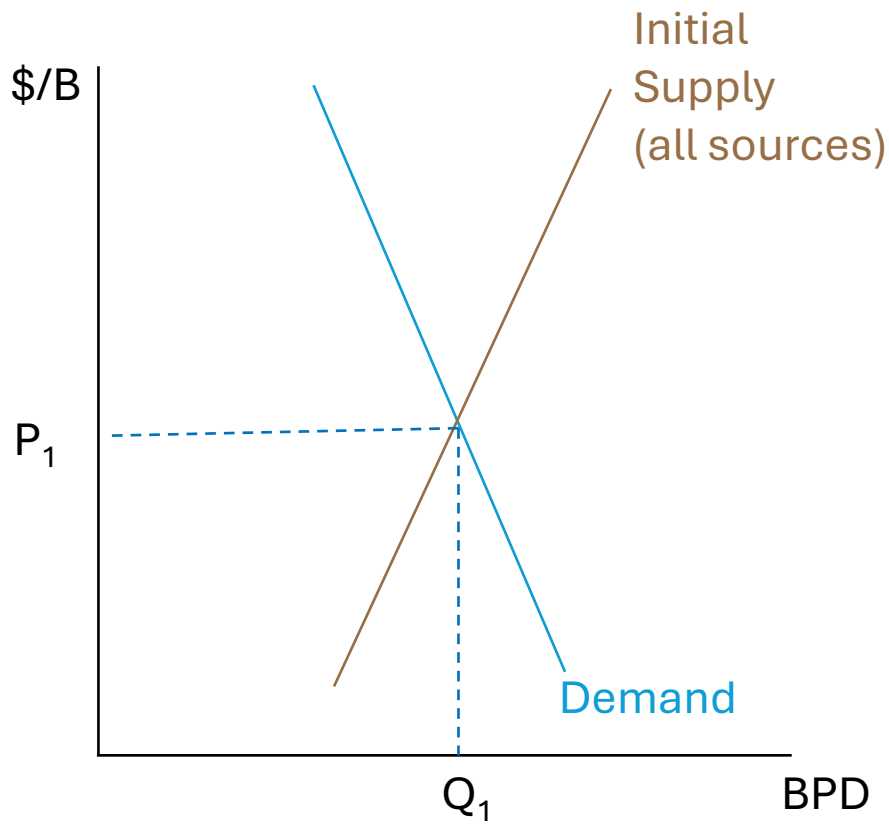
Evaluating Resupply Framework: What do we still need to know?

- How do outages affect fuel markets?
- How do planned and unplanned refinery maintenance interact ?
- How do markets respond to different types of maintenance events?
- What is the size and duration of the impact of an outage to trigger resupply requirements?

DIVISION OF PETROLEUM MARKET OVERSIGHT

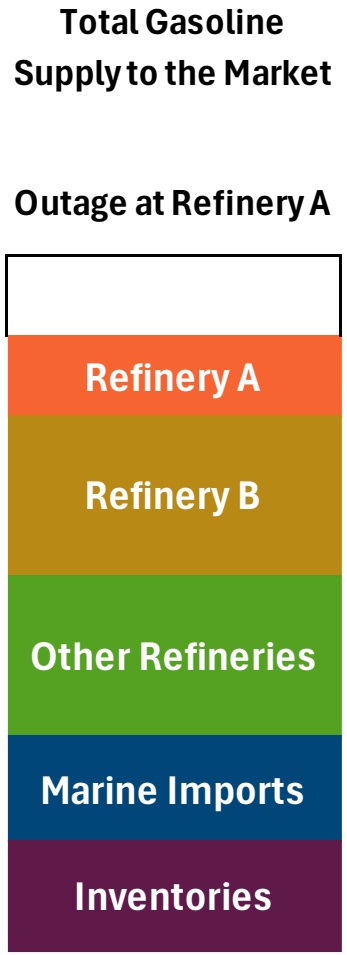
All Sources of Supply Determine Market Price for Gasoline

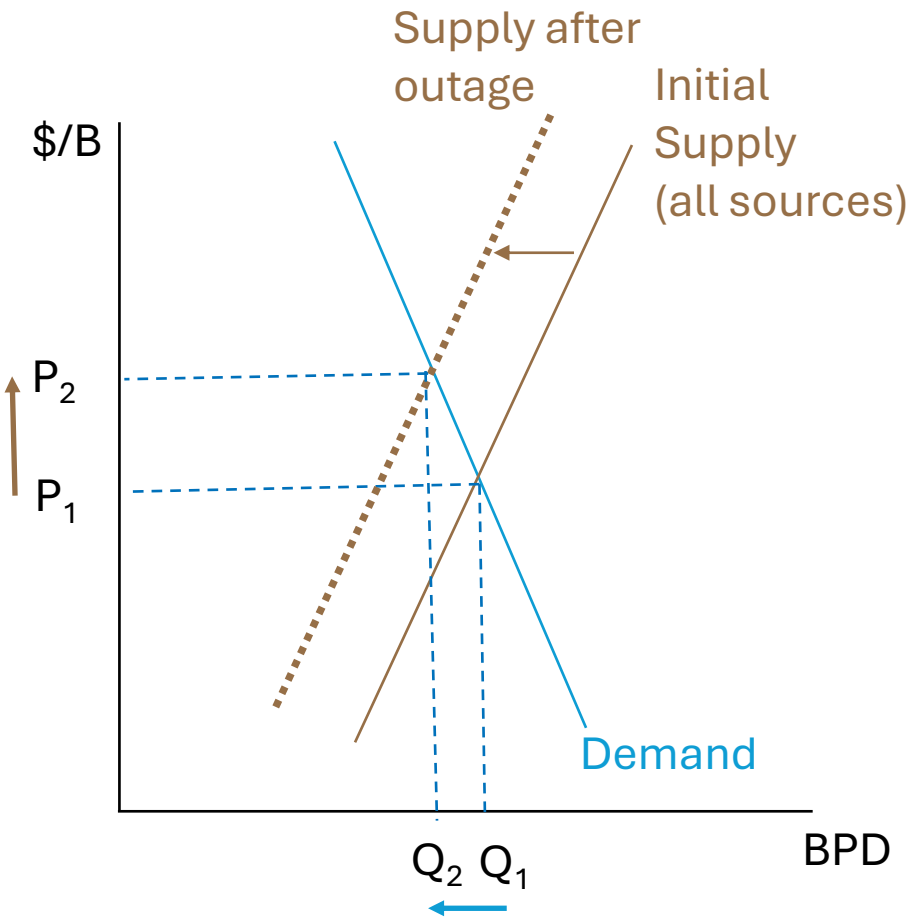




Market is in balance

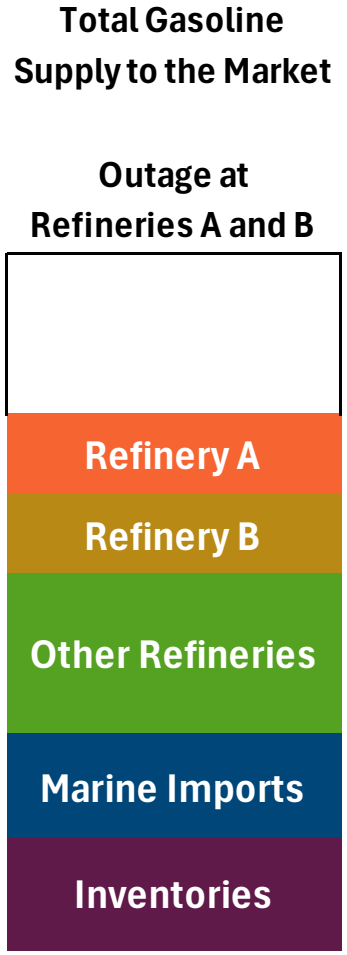
Price impact from supply disruption depends on ability to offset lost supply

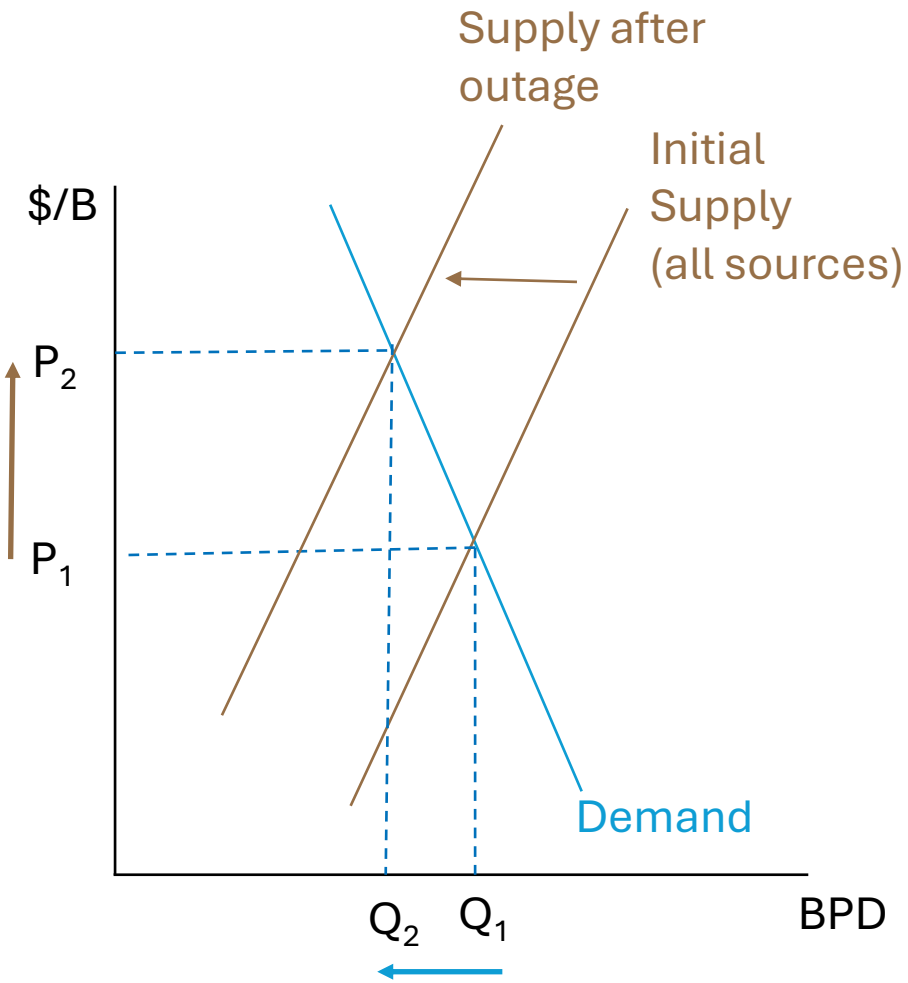




Extent of price increase depends on how much of Refinery A's disruption can be offset by other sources.

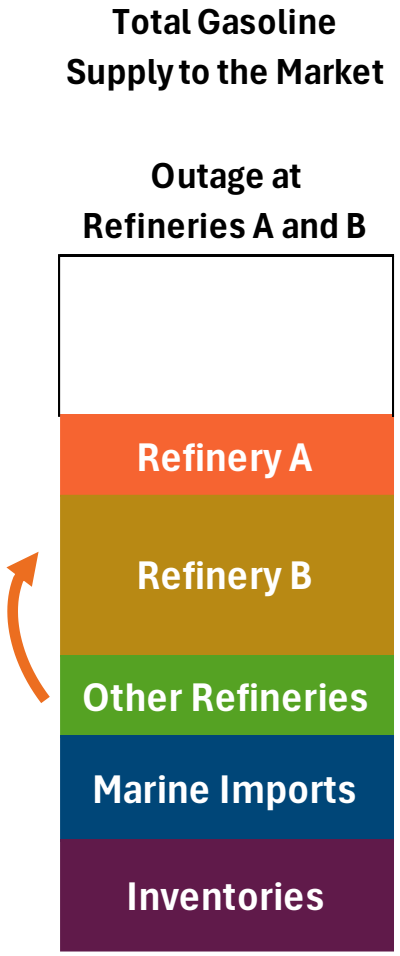
Larger total supply disruptions are harder to offset

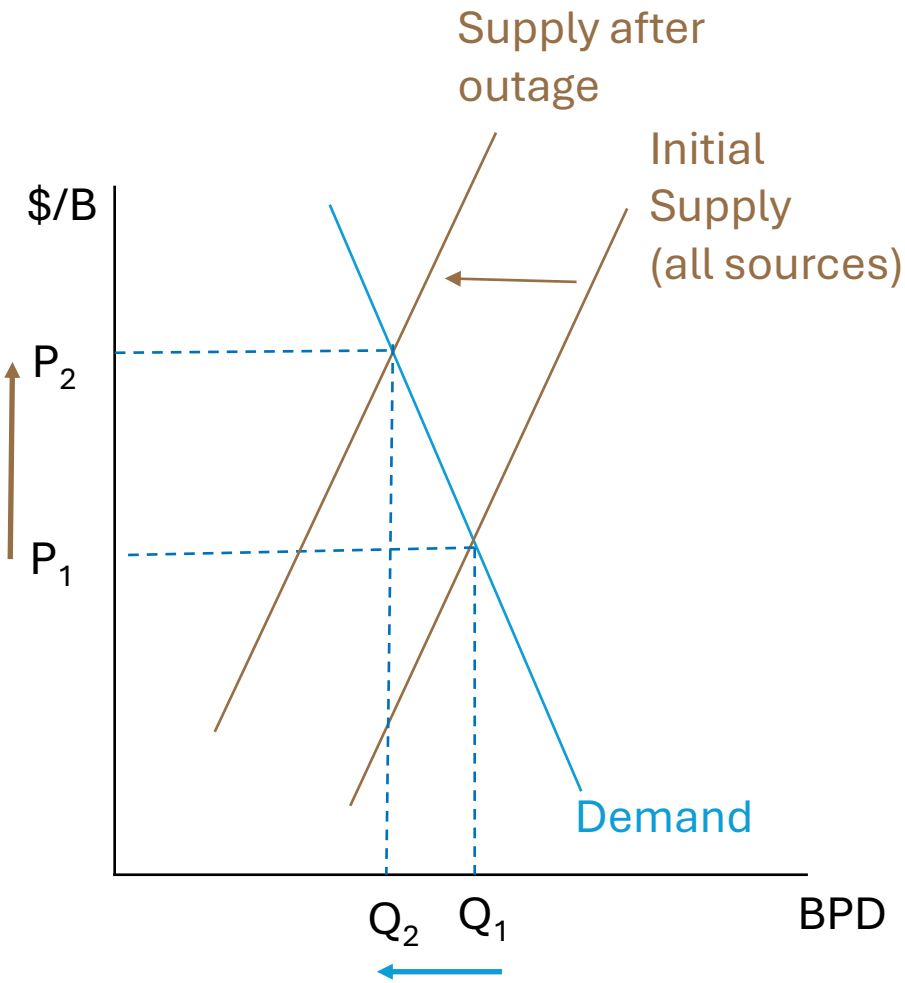




Price increase larger when supply is already tight because lost supply is larger and harder to offset.

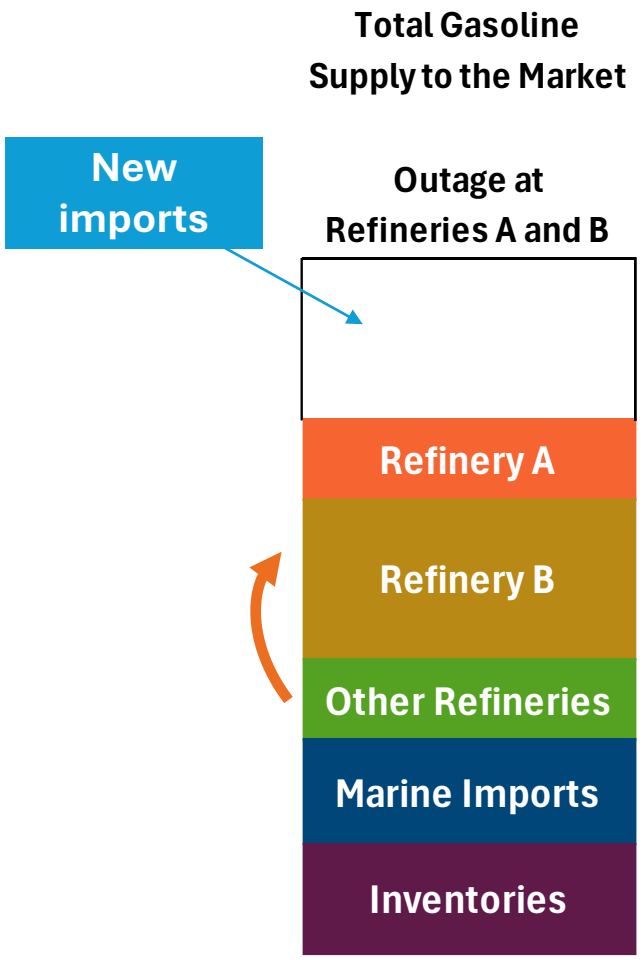
Within-Market Supply Movements Do Not Offset Outage Price Shocks

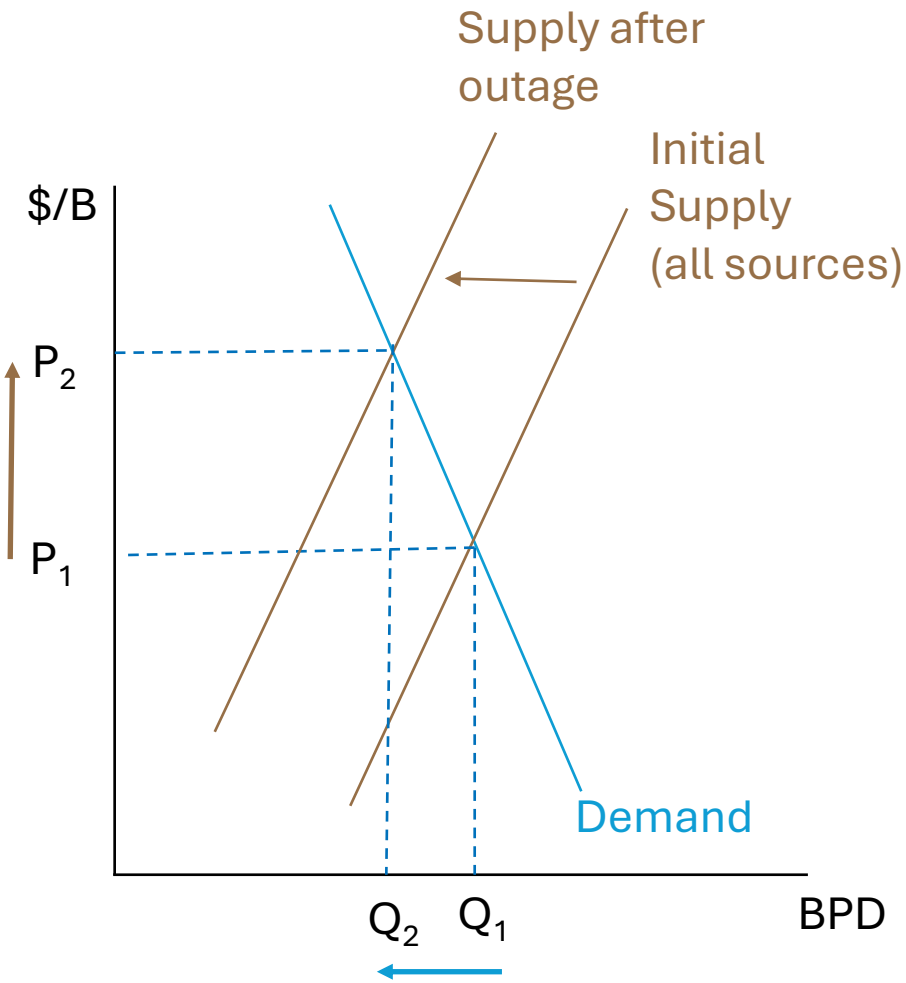




Within-market resupply does not change overall supply or price impact.

Effective Resupply Comes from Outside Market

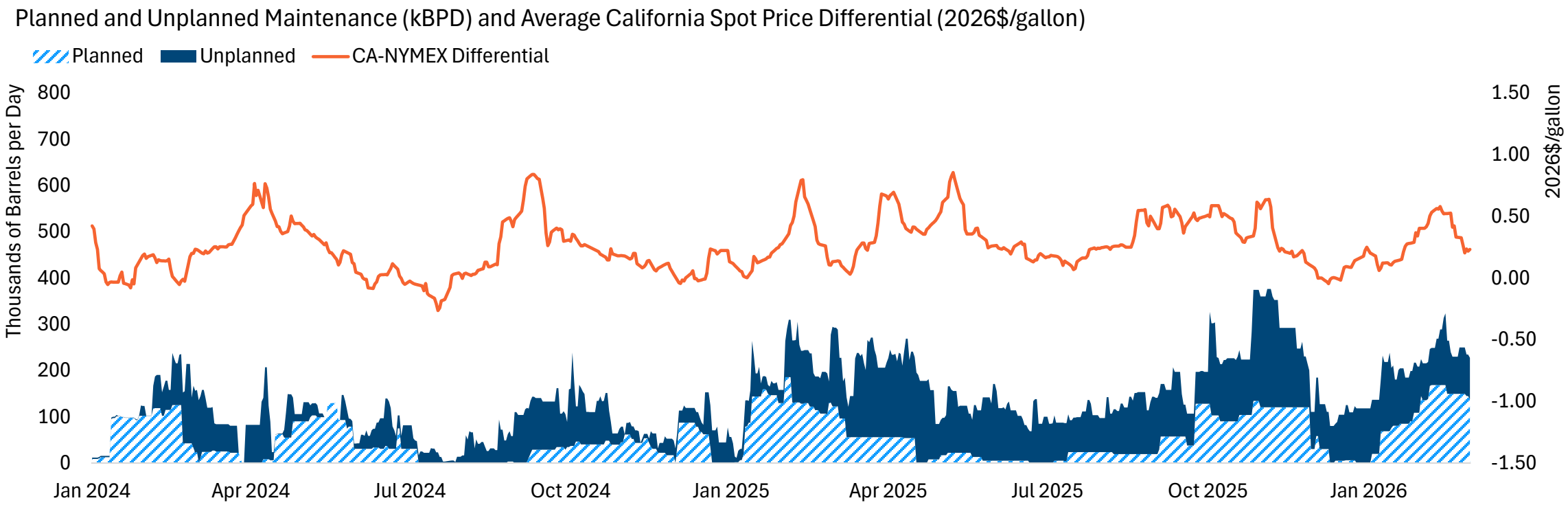




Within-market resupply does not change overall supply or price impact.

Resupply needs to come from outside.

Unplanned and Planned Outages Coincide



DPMO analysis of CEC EBR 1 U/P data and OPIS spot market data.

Market Structure Affects Resupply Incentives

Firms as Profit-Maximizing Actors

- All firms are profit-maximizers
- Public companies obligated first to investors
- Price stability and supply reliability are secondary

Market Power & Misaligned Incentives

- Market power creates incentives to decrease supplies
- Decreasing supplies increases prices and profits
- Creates disincentive to buffer the market from supply disruptions

Result: Supply Volatility & Price Spikes

- Price volatility becomes market feature
- Market has disincentive to buffer supply disruptions
- State intervention (including AB X2-1 tools) realigns incentives

Recommendations for CEC's Analysis

- Account for total supply of gasoline available to the market during outage
- Account for co-dependencies of planned and unplanned maintenance events
- Consider role of market power in response to outages and to resupply rules
- Evaluate cost and benefits of resupply rules to a market without resupply rules

DIVISION OF PETROLEUM MARKET OVERSIGHT

Reaction Panel

Moderator: Colin Murphy, Ph.D., University of California, Davis

- *Mike Smith, United Steelworkers*
- *Matthew Zaragoza-Watkins, Ph.D., UC Davis*
- *Faraz Rizvi, Asian Pacific Environmental Network*
- *Sandeep Sayal, Turner, Mason & Company*
- *Steve Konig, Marathon Petroleum*

Public Comment

Public Comment Period

Zoom App/Online

- Click “raise hand”

Telephone

- Press *9 to raise hand
- Press *6 to mute/unmute

When called upon

- CEC will open your line
- Unmute on your end
- Spell name and state affiliation, if any
- 3 minutes or less per speaker, 1 speaker per entity

3-MINUTE TIMER



Written Comments

Please submit written comments to:

- Docket No. 25-PIIRA-01 at https://efiling.energy.ca.gov/EComment/EComment.aspx?docketnumber=25-PIIRA-01
- Subject: Refinery Resupply Requirements
- Deadline: ~~November 23, 2026~~, **December 4, 2026** by 5:00 PM

➢ The slides for this presentation will be available after the workshop.

Closing Remarks