MARATHON MARTINEZ BIOFUEL REFINERY FIRE: WHY AN IMPATIENT TRANSITION FROM FOSSIL FUELS TO BIOFUELS WON'T WORK

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

In early 2021, Marathon Petroleum Corporation received approval to convert its crude oil refinery in Martinez, California (part of the San Francisco Bay Area), into a biofuel facility using animal fat, soybean oil, and corn oil as renewable feedstocks from the state (Marathon Petroleum Corporation, 2021). On November 19th, 2023, overheated piping carrying hot biodiesel and hydrogen ruptured in a reactor charge furnace at the Martinez biofuel refinery, igniting a severe fire that forced operators to evacuate and shut down the facility. The materials in the ruptured pipe left the field operator, who was sent to respond to the alarms, with life-threatening burns (U.S. Chemical Safety and Hazard Investigation Board, 2024). Why did the newly converted Martinez refinery suffer a major fire in 2023, and what systemic factors allowed this to happen? This question matters because federal agencies, particularly the Federal Aviation Administration (FAA), are aggressively promoting the production and use of sustainable fuels. Understanding the causes behind this refinery failure can help prevent similar disasters, ultimately saving lives and protecting industry resources.

I argue that the Martinez refinery fire was not an isolated failure of human judgment but the result of a systemic breakdown caused by three interrelated pressures: chronic understaffing and insufficient training at the corporate level, workforce disruptions triggered by the COVID-19 pandemic, and political pressure to meet unrealistic government targets for biofuel production. I use Actor-Network Theory (ANT), a science, technology, and society (STS) framework that traces the interconnections between human and non-human actors, refinery workers, government policy, machinery, and infrastructure, to show how each played a role in the incident to analyze these dynamics.

My analysis agrees with current articles and safety investigations that insufficient internal company staffing and training were a cause, but the true cause is much more elaborate. When the pandemic was winding down and demand for fuel began increasing, the industry lacked the experienced workers that it once had, and much needed to operate the refineries in a safe manner because the workers were not actively doing their job and remaining knowledgeable on the procedures. The erosion of institutional knowledge and safety readiness, driven by pandemic layoffs, made a technological failure not just possible but likely, as newer workers lacked the experience to respond effectively to equipment malfunctions. Federal and state programs and policies have been put in place to incentivize the fuel processing industry to transition to renewable feedstocks for the conversion of biofuels. Unfortunately, the fuel industry doesn't have the capacity to make this transition abruptly without society feeling growing pains.

Current sustainable biofuel goals, like the FAA's Grand Challenge Roadmap, call for unachievable production goals and deadlines that also encourage a rushed transition. These aggressive mandates, combined with outdated safety regulations and limited oversight of biorefineries, created an environment where cutting corners became a survival strategy rather than a deliberate choice. Due to the failures of many different actors, a major refinery incident was inevitable, and unfortunately, the Marathon Martinez refinery fire was the victim of the Swiss cheese model of system safety, a model that explains how various minor failures can align to produce a massive tragedy. As I argue through the research and analysis in this paper, an impatient and forced transition to biofuels in the United States will not keep Americans safe nor create an effective work environment.

To understand the factors that are a part of the Marathon Martinez Refinery fire, I use the actor-network theory (ANT) science, technology, and society (STS) framework as an

organizational and analytical tool. ANT was developed in the late 1980s in an engineering research center by Michel Callon, Bruno Latour, Madeleine Akrich, Antoine Hennion, and John Law (Muniesa, 2015). An actor-network is a collection of actors, human and non-human, that frame how the actors interact to explain their behavior or success (Callon, 1987, p. 92-97). In the case of the Marathon Martinez Refinery fire, ANT will be used to explain why the interaction between the lack of company policy, the industry impact of the COVID-19 pandemic, and political pressure led to the failure. I analyze information primarily from various news articles and vehicle and aviation administration fuel guideline publications. For example, I use reports from KQED on the Martinez refinery employee layoffs and closure in 2020 to understand a lack of post-pandemic worker experience and the industry-wide delayed transition from crude oil to biomass as well as the Federal Aviation Administration's (FAA) publication of the Sustainable Aviation Fuel (SAF) Grand Challenge Roadmap (Goldberg, 2020; Sparling, 2020; U.S. Department of Energy, 2022). I argue that the fire was not simply the result of human error, but a systemic failure driven by three interconnected factors: insufficient internal staffing and training, pandemic-induced disruption of refinery expertise, and regulatory pressure from unrealistic government biofuel targets.

Research Methods and Results

The COVID-19 pandemic impacted every industry in the world, including the fuel and refinery industries. Worldwide, the fuel demand was dropping due to decreased travel and trade, which would result in reduced transportation. In the United States, there was a 40% decrease in motor gasoline usage from January 2020 to April 2020. Distillate fuel oil had the least dramatic decrease in usage, but it still had a substantial decline of 20%. The fuel type with the largest percentage decline during the beginning of the pandemic was jet fuel; a lack of air travel due to

company restrictions and lack of consumer necessity led to a 62% decrease in barrels of fuel consumed from January to April (U.S. Energy Information Administration, 2020). This decrease in demand led to many oil refinery company layoffs and refinery closures, including Marathon's idle then shutdown of the Martinez refinery, at the time a crude oil refinery, resulting in over two thousand five hundred people being out of work for an "indefinite period of time" (Goldberg, 2020). Among these people out of work were roughly one thousand contract workers, including electricians, pipefitters, and other skilled workers (Sparling, 2020). Around the same time in 2020, when the refinery's status was set to idle by the company, Marathon was spending money and attention on the important global issue of COVID relief. They donated roughly one million dollars to the American Red Cross Disaster Relief and roughly six hundred thousand N95 respirator masks to healthcare facilities (Yarbrough, 2021). In 2023, three years after the Marathon Martinez refinery was idled to limit company losses due to a massive decrease in fuel demands worldwide, refinery capacity increased slightly after a constant downward trend over 2021 and 2022. The U.S. annual atmospheric crude oil distillation capacity had decreased by roughly one million barrels per day (from nineteen million barrels on January 1st, 2020, to eighteen million barrels on January 1st, 2023) (U.S. Energy Information Administration, 2023).

Multiple emergency investigating agencies, as well as workers' organization groups, have voiced concerns over the role that Marathon Martinez Renewables Corporation played in the refinery fire in November 2023. Tracy Scott, the president of United Steelworkers Local 5, told KQED reporters that before the incident, union leaders were worried that the company wasn't conducting proper training courses and was greatly understaffed during the refinery's transition to biofuel production post-COVID. Scott also told the reporters that employees voiced concerns to their bosses about the "deficient" current training programs as well as the staffing issue. New

workers were especially concerned with the minimal time provided to learn the proper operating procedures for their respective jobs (Goldberg, 2023). Allegedly, Contra Costa County, the local land permitting authorities who are responsible for decision-making and the lead agency on the California Environmental Quality Act, “ignored community concerns and stonewalled robust public participation in the environmental review of the projects” (Hughes, 2023). The California Division of Occupational Safety and Health (Cal/OSHA) hit the corporation with nine citations for violating safety regulations following the refinery fire, one of which stated, “they failed to immediately remove exposed employees from imminent hazards” (Goldberg, 2024), created by the problematic furnace unit. They also stated that Marathon didn’t provide sufficient safety information to working crews for scenarios such as units overheating. Workers were even trained on components that were not installed (Goldberg, 2024). The surface-level investigation and public organizations deemed Marathon responsible for the fire due to unsafe working conditions.

The U.S. Chemical Safety and Hazard Investigation Board (CSB) outlined six critical safety issues that led to the refinery fire in their final report of the incident: safe operating limits, worker proximity to fired heater, low flow through fired heater, burner operation, valve misalignment, and corporate oversight (U.S. Chemical Safety and Hazard Investigation Board, 2025b). The CSB listed the first critical safety issue, safe operating limits, due to the lack of alarms that would warn the workers when unit temperatures exceeded their design limits. They declared that this led to unsafe problem-solving practices, like attempting to manually shut down the fired heater instead of remotely (U.S. Chemical Safety and Hazard Investigation Board, 2025b). Second, worker proximity to fired heater: a worker was sent to shut off the fired heater when safer options were available, showing poor management. Third, Marathon had not identified the potential for the safety system that detects low flow conditions to fail in its hazard

analysis. Fourth, incorrect burner operation resulted in the blocked air supply, eventually resulting in the unit overheating and the tube rupturing. Fifth, a misaligned valve resulted in poor material flow, also contributing to the tube rupture. The sixth and last critical safety issue, ultimately the most substantial: Marathon failed to bring the Martinez facility up to company standards before restarting operations as a biofuel manufacturer after the closure due to the pandemic. CSB declared that this corporate failure resulted in safety deficiencies (U.S. Chemical Safety and Hazard Investigation Board, 2025b). According to the CSB's 2025 final report, Marathon did not have adequate safe operating limits and alarms equipped to alert the workers when the system was experiencing emergency conditions paired with unsafe operating conditions to start (U.S. Chemical Safety and Hazard Investigation Board, 2025a).

State and federal government policy and objectives are requiring and incentivizing the production of biofuels for public transportation and personal vehicle use, while California state law is struggling to keep up. The California legislature passed a bill in 2024 removing references in existing law to 'petroleum refinery' and instead referring to them as simply 'refinery'. The bill expanded the definition of refinery from establishments that produce petroleum fuels to those that produce any type of fuel, specifically biofuel and renewable fuels (California State Legislature, 2024). Before the passing of this bill, biorefineries were not subject to follow safety regulations that were directed to petroleum refineries because they did not fall under that umbrella, leading to cutting corners regarding safety procedures. Starting in 2024, off-road vehicle fleets that use diesel fuel are required to use only renewable diesel fuel, with very limited exceptions (California Air Resources Board, 2023). The Low Carbon Fuel Standard (LCFS), administered by the California Air Resources Board (CARB), mandates a gradual reduction in the carbon intensity of transportation fuels distributed, sold, or supplied within California

through 2030. Under this regulation, fuel producers and importers are required to adhere to specific average carbon intensity targets. The scope of the LCFS encompasses a variety of fuel types, including natural gas, electricity, hydrogen, ethanol-blended gasoline, biodiesel, and propane (U.S. Department of Energy). By 2030, the LCFS will require a 30% reduction in the carbon intensity of transportation fuels after California regulators voted on tighter low-carbon fuel policy in November 2024 (Reuters, 2024). The federal government has also made similar long-term demands on the fuel industry.

In 2021, the U.S. Department of Energy (DOE), the U.S. Department of Transportation (DOT), and the U.S. Department of Agriculture (USDA) released the Sustainable Aviation Fuel Grand Challenge Roadmap with the Federal Aviation Administration (FAA). The purpose of this roadmap is to scale up sustainable aviation fuel, now called synthetic aviation fuel, nationwide to meet several short and long-term fuel consumption goals. These goals are summarized by three broader, industry-wide goals: a minimum of a 50% reduction in life cycle emissions compared to conventional fuel, three billion gallons per year of domestic synthetic aviation fuel produced by 2030, and thirty five billion gallons of synthetic aviation fuel produced per year to satisfy 100% of domestic demand by 2050 (U.S. Department of Energy, 2022). Since the announcement of the Grand Challenge Roadmap in 2021, domestic fuel production and imports grew from five million gallons to only fifty-two million gallons annually through June 2024 (U.S. Department of Energy, 2024).

Actor-Network Theory as a Tool

Actor-network theory provides a comprehensive framework for understanding the factors that led to the Marathon Martinez refinery fire and the near-fatal injuries sustained by a worker during the incident. ANT examines networks formed by interconnected human and non-human

actors, focusing on how their interactions shape technological outcomes, organizational processes, and system-level failures. Unlike traditional social theories that prioritize human agency, ANT treats non-human entities, such as machines, infrastructure, policies, and environmental conditions, as equally influential in shaping outcomes (Callon, 1987, p. 92-97). A key concept in ANT is translation, which refers to the way the goals or pressures of one actor are interpreted, reshaped, and passed on to others, often in ways that distort their original intent and generate systemic consequences (Callon and Latour, 1981, p. 279).

The actor-network in this case includes human actors such as refinery workers, union leaders, company executives, and government regulators, as well as non-human actors including the refinery's technological infrastructure, biofuel feedstocks, safety protocols, pandemic-driven economic constraints, and political mandates for fuel transition. This configuration helps explain how insufficient staffing and training, compounded by pandemic-induced labor disruptions, left refinery personnel unable to manage technical failures effectively. At the same time, non-human forces such as compressed conversion timelines, rigid decarbonization targets from programs like the FAA's Sustainable Aviation Fuel Grand Challenge Roadmap, and outdated safety regulations in California created an environment where systemic breakdown was likely.

By viewing the Martinez fire through this networked lens, it becomes clear that the incident was not simply the result of human error or equipment malfunction but a flowing failure born from the interaction of structural, technical, and regulatory vulnerabilities. ANT reveals how political goals were translated into aggressive production targets at the corporate level, which were then operationalized through inadequate staffing, limited training, and technological shortfalls, ultimately placing pressure on the refinery's weakest links. This approach emphasizes that failure emerges not from isolated mistakes but from misalignments across the actor-network.

Recognizing these relational dynamics is critical to understanding how future industrial transitions, especially those pushed by climate policy, can avoid replicating the same dangerous conditions. The Martinez refinery fire, then, cannot be reduced to a single technical error or managerial oversight; it was the result of cascading translations between political urgency, corporate compliance, and human vulnerability within a fragile actor-network strained beyond capacity.

Fact-Based Analysis

The Marathon Martinez refinery fire in November 2023 resulted from the effects of actor influence and goal translation of insufficient internal company staffing and training, disruptions caused by the COVID-19 pandemic, and intense political pressure from government entities aggressively pushing for carbon emission reduction. Analyzing these interconnected factors provides insight into the systemic vulnerabilities that ultimately led to the incident.

First, the COVID-19 pandemic significantly disrupted the refinery industry, creating conditions for safety failures. The global reduction in travel and transportation during the pandemic drastically reduced fuel demand, resulting in economic strain on refineries like Marathon's Martinez facility, which was forced to idle operations and lay off thousands of skilled employees and contractors. The extended period of inactivity not only diminished the workforce but also eroded crucial institutional knowledge and experience. When demand began to recover in 2023, Marathon attempted to restart refinery operations amid a critical shortage of experienced workers. Specific details from the CSB report indicate that workers were making decisions based on a lack of knowledge and emergency procedure experience. Although this is ultimately the responsibility of the corporation, a lack of workplace knowledge, especially in life-threatening scenarios, is partially due to the inexperienced workforce.

This lack of experience and familiarity with essential safety procedures left the Martinez refinery ill-equipped to manage technological and procedural challenges, making it vulnerable to incidents such as the furnace rupture. Along with a young workforce, Marathon had diverted some of its resources and attention to supporting communities during the pandemic, which, unfortunately, were resources and attention that could have been spent on planning for the global return to post-pandemic fuel consumption. Once the world began ramping up operations, fuel demand spiked quickly, leaving the fuel production industry frantically trying to keep up. Post-pandemic refinery fires can be categorized and explained under the title of growing pains, as the procedure was renewed. COVID-19 is an actor who primed the refinery industry for instability, which then created an environment with little defense and ability to self-balance against aggressive goals set by political actors.

Second, intense political pressures from both state and federal governments played a decisive role in creating the conditions that caused the fire by taking advantage of the industry's instability. Ambitious sustainability initiatives such as California's Low Carbon Fuel Standard (LCFS) placed stringent requirements on fuel producers, compelling them to reduce the carbon intensity of transportation fuels significantly by 2030. This regulatory framework intensified pressure on Marathon to convert its Martinez refinery to biofuel production. Additionally, the Sustainable Aviation Fuel Grand Challenge encouraged mandates to scale synthetic aviation fuel production, despite the industry lacking adequate infrastructure or labor support to meet them safely. The aggressive timelines and goals set by these programs created a feeling of uncontrollable stress felt by refinery operators who were then compelled to accelerate production timelines, often at the expense of safety standards and thorough worker training. Through the process of translation, political actors' ambitious sustainability goals were reinterpreted and

internalized by Marathon as production deadlines, pressures that were ultimately passed down to refinery workers through unsafe staffing levels, rushed training, and inadequate infrastructure upgrades. Furthermore, prior regulatory gaps allowed biorefineries, like Marathon Martinez, to operate without adhering to safety regulations initially intended for petroleum refineries, further compounding operational risks and incentivizing corner-cutting behaviors to meet mandated targets quickly. Since the Grand Challenge had a slow start, increasing domestic production and imports to only fifty-two million gallons per year (1.7% of the 2030 annual goal) in 2024, the refineries felt greater political pressure to catch up, especially in historically sustainability-driven California. Marathon felt the pressure from the powerful government organizations and had the ability to further pass on the pressure and stress to the least influential actors in the chain, the refinery workers.

Finally, internal staffing and training deficiencies significantly worsened the risks within the Marathon Martinez Refinery during its transition from a crude oil refinery to a biofuel facility. Before the fire, refinery workers and union representatives had voiced repeated concerns about inadequate training programs and chronic understaffing. New employees were provided minimal training time, which proved insufficient to prepare them for handling complex operational procedures, especially under emergency conditions. Even though these actors brought to light the gaps in the plan of execution to meet the political actors' goals, their voice was too weak to be heard at the political level. Investigations conducted post-incident revealed the severe gaps in safety management practices. Cal/OSHA cited Marathon extensively for multiple safety violations, including failure to remove workers from imminent hazards and inadequate training on critical equipment. Additionally, the U.S. Chemical Safety and Hazard Investigation Board (CSB) identified specific operational oversights, such as the absence of

critical alarms for temperature exceedance, inappropriate manual intervention in shutting down overheating equipment, and incorrect burner operation caused by poor equipment alignment. These oversights were symptoms of Marathon's broader inability to reestablish safe operational standards after the prolonged shutdown, reflecting deep-rooted inadequacies in corporate oversight and worker preparedness. Whether Marathon was intensely distracted by near-impossible government policy or was purposefully working within the dated California refinery safety policy to deflect the responsibility to the weakest actors, employee safety and well-being were not prioritized.

Collectively, the Marathon Martinez refinery fire illustrates how systemic vulnerabilities arise from the complex translation of actor goals among insufficient staffing, pandemic-induced operational disruptions, and external political pressures driving the ambitious yet poorly supported transitions to renewable fuels. Actor-network theory emphasizes how interconnected human and non-human actors, ranging from regulatory policies and workforce dynamics to pandemic-induced economic constraints and technological infrastructure, collectively influenced this catastrophic event. Ultimately, recognizing and addressing the integrated nature of these vulnerabilities is essential for preventing similar refinery incidents in the future, ensuring safer working conditions, and achieving sustainable, realistic transitions toward renewable energy sources.

The Bigger Picture

The Marathon Martinez refinery fire is not just a cautionary tale for one facility, it is a reflection of the broader systemic cracks in the approach to transitioning from fossil fuels to renewable alternatives in the United States. The incident shows that well-intentioned policy goals, when paired with poor regulatory adaptation and uncoordinated industrial execution, can

produce outcomes that are both dangerous and counterproductive. This matters because the push toward renewable fuels, especially under initiatives like the FAA's Sustainable Aviation Fuel Grand Challenge and California's Low Carbon Fuel Standard, is accelerating nationwide. If this push continues without acknowledging the operational, human, and institutional gaps exposed by Marathon Martinez, similar disasters are likely to follow.

Current practices focus heavily on meeting carbon reduction deadlines and production targets without sufficient attention to workforce readiness, facility adaptation timelines, or regulatory consistency. Policies encourage rapid biofuel conversion but fail to enforce safety standards tailored to biofuel operations, leaving converted facilities in a regulatory grey area. Meanwhile, refinery operators are expected to overhaul operations using fewer resources, less experienced labor, and outdated hazard analyses. This fragmented system undermines the very goal it seeks to achieve: safe and sustainable energy.

Based on this research, things must change in three major ways. First, regulatory frameworks must evolve to reflect the reality that biorefineries are not simply modified fossil fuel facilities; they require new safety protocols, updated training procedures, and stricter oversight. California's delayed legislative catch-up, only recently addressing this gap in 2024, should serve as a warning to other states and federal bodies. Second, workforce development must become a core pillar of the renewable energy transition. Investment in green infrastructure means little without investment in the people who will operate and maintain it. Third, national energy transition strategies must strike a balance between ambition and feasibility. Aggressive production targets should be paired with equally aggressive support systems for industry compliance and not left to refineries to navigate alone under intense political and economic pressure.

Going forward, research should focus on how policy can be designed to incentivize not only production volume but also safety, training, and infrastructure readiness. Future studies should evaluate how refinery conversion timelines correlate with incident rates and whether facilities that adopt phased, well-resourced transitions experience fewer safety violations. Additionally, researchers and agencies should investigate the role of non-human actors in these transitions, such as digital control systems, automated safety alarms, and design limitations, to assess how technology interacts with human staffing and oversight in these complex systems.

If this research were to continue, the next question would be: *How can a standardized federal framework be created to regulate and support biofuel refinery conversions while accounting for local infrastructure, workforce conditions, and community concerns?* The path to a sustainable energy future depends not just on what we produce but on how we produce it and whether people are kept safe in the process. The Martinez refinery fire reminds us that technical breakdowns are often symptoms, not causes, of manifestations of deeper systemic stress. Without better coordination between policy goals, industrial capacity, and human labor, cascading translations of pressure will continue to compromise safety. In a strained and poorly aligned actor-network, disaster is not an accident, it is an inevitability.

Bibliography

California Air Resources Board. (2023, August 29). *Fact sheet: Renewable diesel fuel requirements*. California Air Resources Board. https://ww2.arb.ca.gov/resources/fact-sheets/fact-sheet-renewable-diesel-fuel-requirements

California State Legislature. (2024). *Assembly Bill No. 3258, Chapter 978: An act to amend Sections 7851, 7852, 7853, 7855, 7856, 7872, and 7873 of the Labor Code, relating to safety in employment.* Sacramento, CA: Legislative Counsel Bureau. Retrieved from https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240AB3258

Callon, M. (1987). *Society in the making: The study of technology as a tool for sociological analysis*. In W. E. Bijker, T. P. Hughes, & T. J. Pinch (Eds.), *The social construction of technological systems: New directions in the sociology and history of technology* (pp. 83-103). MIT Press.

Callon, M., & Latour, B. (1981). *Unscrewing the big Leviathan: How actors macro-structure reality and how sociologists help them to do so*. In K. Knorr-Cetina & A. V. Cicourel (Eds.), *Advances in social theory and methodology: Toward an integration of micro- and macro-sociologies* (pp. 277–303). Routledge & Kegan Paul.

Goldberg, T. (2020, August 3). *Shutdown of Marathon's Martinez refinery prompts calls for 'just transition' for oil workers*. KQED. https://www.kqed.org/news/11831607/shutdown-of-marathons-martinez-refinery-prompts-calls-for-just-transition-for-oil-workers

Goldberg, T. (2023, December 5). *Federal agency probes Marathon's Martinez refinery after two large fires last month*. KQED.

https://www.kqed.org/news/11968786/recent-fires-at-marathons-martinez-refinery-spark-major-safety-concerns

Goldberg, T. (2024, March 8). *Marathon's Martinez refinery hit with state fines over fire that burned worker*. KQED. https://www.kqed.org/news/11988025/marathons-martinez-refinery-hit-with-state-fines-over-fire-that-burned-worker

Hughes, G. (2023, December 14). *Court orders, refinery fires and deforestation drivers: California push for liquid biofuels ignores red flag warnings.* Biofuelwatch. https://www.biofuelwatch.org.uk/2023/court-orders-refinery-fires-and-deforestation-drivers-california-push-for-liquid-biofuels-ignores-red-flag-warnings/

Marathon Petroleum Corporation. (2021, March 2). *Marathon Petroleum to proceed with conversion of Martinez refinery to renewable fuels facility.* Marathon Petroleum. https://www.marathonpetroleum.com/Newsroom/Company-News/Marathon-Petroleum-to-Proceed-with-Conversion-of-Martinez-Refinery-to-Renewable-Fuels-Facility/

Muniesa, F. (2015). *Actor-Network Theory.* In J. D. Wright (Ed.), *International Encyclopedia of the Social & Behavioral Sciences (Second Edition)* (pp. 80–84). Elsevier. https://doi.org/10.1016/B978-0-08-097086-8.85001-1

Reuters. (2024, November 8). *California approves tighter rules for low carbon fuels policy*. Reuters. https://www.reuters.com/sustainability/climate-energy/california-vote-stricter-rules-low-carbon-fuels-policy-2024-11-08/

Sparling, N. (2020, April 23). *Unions say Bay Area refineries have dismissed more than 1,000 contract workers*. KQED.

https://www.kqed.org/news/11813844/unions-say-bay-area-refineries-have-dismissed-more-than-1000-contract-workers

U.S. Chemical Safety and Hazard Investigation Board. (2024, February 21). *Investigation update on November 2023 fire at Marathon Martinez Renewable Fuels facility (Report No. 2024-02-I-CA)*. CSB.

U.S. Chemical Safety and Hazard Investigation Board. (2025a, March). *Fired heater tube rupture and fire at Marathon Martinez Renewables Facility: Martinez, CA | Incident date: November 19, 2023 | No. 2024-01-I-CA*. U.S. Chemical Safety and Hazard Investigation Board. https://www.csb.gov/assets/1/6/marathon_martinez_2025-03-12_forpublication.pdf:contentReference[oaicite:0]{index=0}

U.S. Chemical Safety and Hazard Investigation Board. (2025b, March 13). *U.S. Chemical Safety Board issues final report.* CSB News Release. https://www.csb.gov/us-chemical-safety-board-issues-final-report-/

U.S. Department of Energy. (n.d.). *Biodiesel laws and incentives in California*. Alternative Fuels Data Center. https://afdc.energy.gov/fuels/laws/BIOD?state=CA

U.S. Department of Energy. (2022). *Synthetic Aviation Fuel Grand Challenge*. U.S. Department of Energy. https://www.energy.gov/eere/bioenergy/synthetic-aviation-fuel-grand-challenge

U.S. Department of Energy. (2024, September 11). *Just announced: Federal interagency synthetic aviation fuel progress metrics and $12 million in funding to support the advancement of integrated biorefinery technologies*. U.S. Department of Energy.

https://www.energy.gov/eere/bioenergy/articles/just-announced-federal-interagency-synthetic-aviation-fuel-progress-metrics

U.S. Energy Information Administration. (2020, April 23). *COVID-19 mitigation efforts result in the lowest U.S. petroleum consumption in decades.* U.S. Energy Information Administration. https://www.eia.gov/todayinenergy/detail.php?id=46141

U.S. Energy Information Administration. (2023, July 25). *Refinery capacity increased slightly for the first time since the COVID-19 pandemic*. U.S. Energy Information Administration. https://www.eia.gov/todayinenergy/detail.php?id=57220

Yarbrough, J. (2021, April). *COVID-19 trends among pureplay U.S. refiners*. Baker Botts. https://www.bakerbotts.com/thought-leadership/publications/2021/april/bb-energy-memo---covid-19-trends-among-pureplay-us-refiners