EGAPE Lab

Economic analysis of market impacts of resuming oil and gas production from the Santa Ynez Unit

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Introduction

Sable Offshore Corp ("Sable") plans to restart oil and gas production from three offshore platforms that comprise the Santa Ynez Unit ("SYU"), located in federal waters off the southern coast of Santa Barbara County. The company claims that restarting the SYU will reduce the need to import foreign oil and that, without SYU production, foreign imports and domestic production will increase.[2]

An economic analysis shows little evidence to support these claims. By contrast, well-established economic models of oil supply and a statistical evaluation of the SYU show that (1) foreign imports are not likely to increase in the absence of SYU production and (2) restarting oil production will have limited to no impacts on California oil markets through 2045.

The most substantial impacts of restarting the SYU are on emissions: if production resumes, global greenhouse gas emissions are likely to increase by 2.5 million tons of CO_2e, given higher greenhouse gas intensity of SYU oil and gas production compared to the typical blend of crude oil around the world.

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[2] Based on Sable's statement to the County of Santa Barbara Planning Commission on October 30, 2024: "In our case, we're gonna be displacing a million barrels a month of foreign-based crude tankering into our ports in LA and San Francisco. The carbon index on the SYU crude is 3.5. You're displacing Iraq, Iranian, Iraqi crude at 12.6 or Libya… so that's up to a fourth cleaner fuel. And that's greenhouse gases. So when we bring the cogen on, that's already factored into it. So if it's a global issue then it's actually a net benefit to the environment by bringing this project back on." Video for the statement can be found here, starting at 6:30:32: https://sbcounty.granicus.com/player/clip/4837?view_id=3&redirect=true

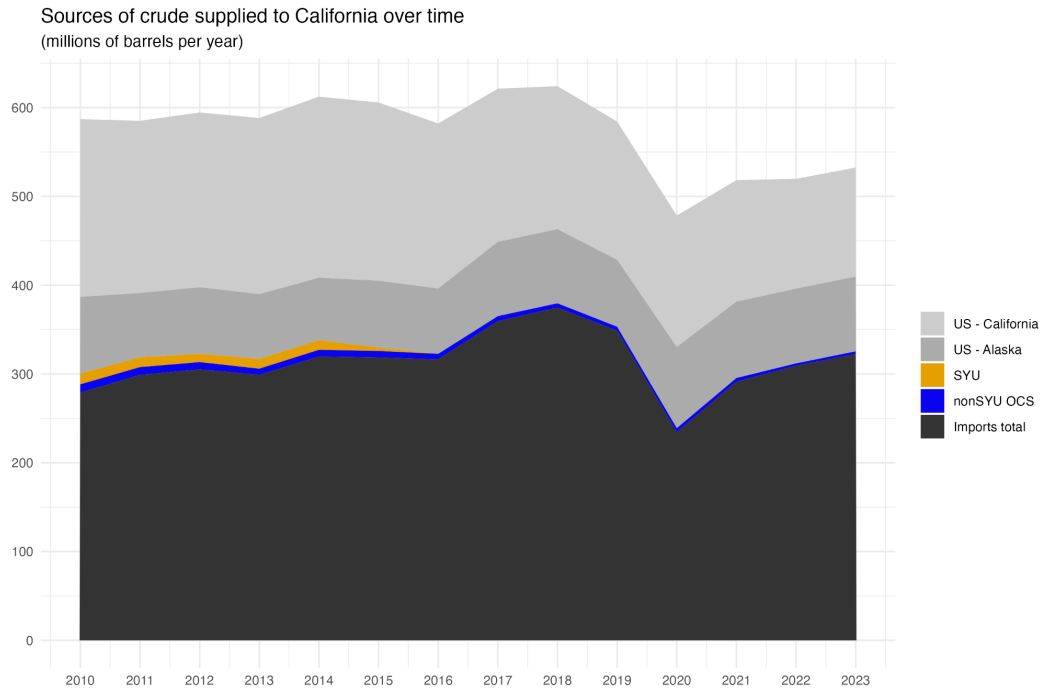

Figure 1: SYU production within overall crude oil supply to California, 2010-23
Author analysis. Data Sources: CARB, Enverus PRISM

SYU production in historical perspective

Production from the SYU averaged 29,000 barrels of oil per day and 27 million cubic feet of gas per day in 2014, the last complete year of production prior to the 2015 pipeline spill and subsequent pause in extraction.[3] This is roughly 30% of peak production from the SYU in 1996, consistent with expected depletion of the reservoir.

For the last full year of production, SYU oil supply averaged 1.8% of total statewide crude oil supply, including domestic and foreign imports (Figure 1).[4] These data also show that crude oil supplied to California has noticeably declined since 2018, reflective not just of the pandemic shock in 2020 but a reduction in consumer demand for petroleum products.[5]

[3] Sable Offshore Corp. (2024) *Investor Presentation November 2024*. Accessed in February 2025 from https://sableoffshore.com/events-and-presentations/default.aspx.
[4] CARB, *Major Sources of Crude Supplied to California*. Updated 2024, Accessed in February 2025 from https://ww2.arb.ca.gov/sites/default/files/2024-12/LCFS%20Crude%20Sources_0.xlsx.
[5] California Energy Commission. (2024). *Report - Draft 2024 Integrated Energy Policy Report Update*.

The SYU pause had no statistical effect on imports of foreign oil

Historical data on oil supply offers an opportunity to assess whether not restarting SYU production would lead to increases in foreign supply, given that markets responded to the loss of production from the SYU in 2015.

Data on crude oil supplied to California refineries from 2010 to 2023 show that domestic supply declined from 2010 to 2023, while imports increased over the same timespan (Figure 1). The primary shift in foreign import supply came during the 2010-2014 period of high prices, as foreign sources of crude exceeded domestic supply in 2011. Aside from a peak in imports in 2017-2019, and the pandemic collapse in 2020, foreign import levels in 2023 were roughly the same as in 2014-2015 (Figure 2). Looking at the period directly after the SYU went offline, there was no increase in foreign imports: imports actually fell to 316 million barrels in 2016 from 320 million barrels in 2014 and 318 million barrels in 2015.

Applying a statistical model to the data shows that the pause in SYU production since May 2015 did not significantly impact changes in foreign imports despite declining domestic supply. Specifically, using the difference-in-difference estimator widely used in statistics and econometrics,[6] modeling indicates that the SYU pause caused a modest annual increase in imports by 463,936 barrels per year, though the increase is not statistically distinguishable from a scenario in which the pause had no effect.[7]

To put this number in perspective, all three SYU fields produced roughly 11 million barrels in 2014. Putting these numbers together, for every 1 barrel not produced from SYU fields, there was only a 0.04 barrel replacement by foreign imports to California refineries; the remaining 0.96 barrels to account for the loss of SYU production were offset by reduced demand, and to a lesser extent, increased Alaskan oil supply.[8]

Comparing non-SYU OCS production to imports also shows little impact. Here a model is applied to estimate how changes in non-SYU OCS production influence imports pre/post SYU pause. Results from this model show that declining production from non-SYU OCS had no statistical effect on changes in imports over the 2015-2023 period.[9]

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[6] Abadie, A. (2005). Semiparametric difference-in-differences estimators. *Review of Economic Studies*, 72(1), 1-19.
[7] The model-estimated increase in foreign imports relative to declining domestic imports is 463,936 barrels per year with a p-value of 0.917, indicating that the difference in imports is not statistically significantly different from 0.
[8] Based on data from the California Energy Commission, crude oil supply to California from Alaska increased from 70.4 million barrels in 2014 and 73.6 million barrels in 2015 to 84.2 million barrels in 2023, though this increase primarily replaced the loss of crude oil supply from California (onshore and state offshore) over the same period. See footnote 3 for a review of declining consumer demand over time.
[9] The model-estimated effect on foreign imports relative to declining non-SYU OCS production is 30,237 barrels per day with a p-value of 0.759, indicating that the difference in imports is not statistically significantly different from 0.

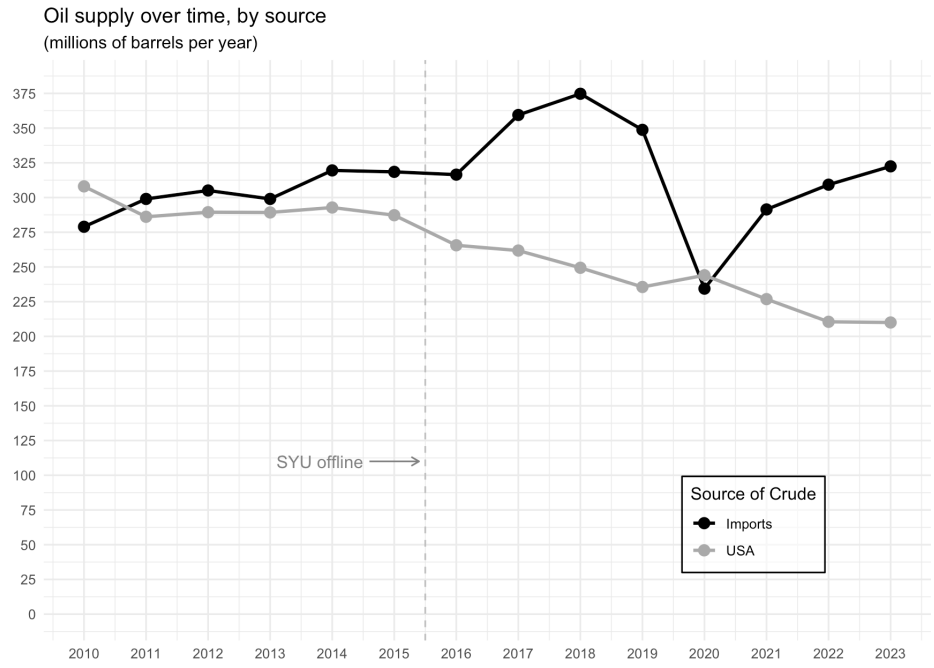

Figure 2: Foreign vs. domestic supply to California before and after SYU pause in 2015
Author analysis. Data Source: CARB.

Future SYU production will not displace foreign imports on a cost basis

One objection to the above finding would be that SYU barrels would replace production from California onshore fields given SYU's lower operating costs on a per-barrel basis. Purely from an operating cost and up-front capital cost perspective, the SYU is more cost-competitive than roughly 80% of California's onshore oil fields using data from a widely-used industry database.[10]

These figures are likely underestimated given non-accounting of remediation and retirement costs, which the BSEE estimates to range between $34,700,743 and $38,149,826 per platform given the SYU's platform depths of 850'-1,200', which are roughly 10 times the remediation costs for onshore California wells on a per-well basis.[11]

[10] This estimate is a comparison of Sable's projected costs from the November 2024 Investor Presentation (see footnote 1), and statewide data from Rystad Energy's UCube. Sable's projected revenues from a low-estimate base forecast of 133 total MMBoe of oil, gas, and NGL resources give an estimated present value cash flow of $2.3 billion assuming a 10% discount rate. Backing out operating costs based on Sable's market price assumptions gives an estimated break-even price between $41 and $47 per barrel, depending on assumed depletion rates over a 5-year period. By comparison, the cost curve for California's onshore and state-water offshore fields projected out to 2030 indicates that roughly 20% of fields have a break-even price below $44/barrel.
[11] Bureau of Safety and Environmental Enforcement and ICF International, *Decommissioning*

Yet even without accounting for retirement costs, SYU's barrels are not more cost-competitive than existing *foreign* suppliers to California. Assuming operating costs of roughly $44/barrel for SYU,[12] this would still exceed average per-barrel total costs—including capital expenditures, taxes, transport, and administrative costs—for California's top foreign suppliers of oil. This includes Saudi Arabia ($9/barrel), Iraq ($11/barrel), Colombia ($11/barrel), Ecuador ($7-$20/barrel), and Brazil ($21-28/barrel).[13]

This suggests that restarting SYU production would not lead to a reduction in imports on a strictly economic basis.

SYU production will have limited impacts on statewide oil consumption

From a demand perspective, there is limited opportunity cost to consumption for not restarting SYU oil production. This is because there is no "perfect substitution" of supply and demand in global oil markets at the local level: one barrel not produced locally is not perfectly replaced by one barrel produced elsewhere to fill local demand. As a result, a production shock tends to reduce demand despite the relative fungibility of global oil markets.

This pattern particularly holds for oil produced in California, where studies estimate that for every barrel of oil not produced in California, oil consumption declines by between 0.2 and 0.6 barrels.[14] This estimate is consistent with a broad range of economic models from government sources, think tanks, energy consultants, and academic researchers, showing that a one-barrel loss in production corresponds to an average reduction in consumption by 0.5 barrels.[15] Extrapolating these results to the

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Methodology and Cost Evaluation. BPA No. E13PA00010. These estimates are based on an assumed 60 wells per platform, which is roughly in line with Sable's development plans given 112 existing wells and 102 infill drilling and step-out opportunities across three platforms.

[12] See footnote 10 for sources on estimated opex at $44/barrel. Even sell-side models which reflect a lower opex in the $27/barrel range would show that SYU crude is still not competitive with imports, with the exception of a small range of Brazilian crudes.

[13] Saudi and Iraqi oil costs are drawn from Rystad Energy; Colombia estimates are from Ecopetrol via the *Rio Times*; Ecuador estimates are from PetroAmazonas via the Baker Institute; and Brazil estimates are drawn from Enverus data on pre-salt breakeven costs, plus an assumed $3/barrel administrative and transportation cost. For a list of all foreign suppliers to California, see California Energy Commision, *Foreign Sources of Crude Oil Imports to California*, Accessed from: https://www.energy.ca.gov/data-reports/energy-almanac/californias-petroleum-market/foreign-sources-crude-oil-imports

[14] Erickson, P. and Lazarus, M. (2018). *How limiting oil production could help California meet its climate goals*. Stockholm Environment Institute discussion briefing report; Erickson, P. and Lazarus, M. (2014). Impact of the Keystone XL pipeline on global oil markets and greenhouse gas emissions. *Nature Climate Change*, 4(9). 778–81.

[15] Wolvovsky, E. and Anderson, W. (2016). *OCS Oil and Natural Gas: Potential Lifecycle Greenhouse Gas Emissions and Social Cost of Carbon*. BOEM OCS Report 2016-065. U.S. Department of Interior, Bureau of Ocean Energy Management; Metcalf, G. (2016). The Impact of Removing Tax Preferences for U.S. Oil and Gas Production. Council on Foreign Relations; ICF and Ensys (2014). *The Impacts of U.S. Crude Oil Exports on Domestic Crude Production,*

SYU based on hypothetical production at 10 million barrels per year in 2025, this suggests that on average there would be a 0.93% reduction in annual statewide consumption if production from the SYU is not restarted.[16]

Looking at future consumption, there is no support in existing demand models for additional supply needed over time. Modeling by the Institute for Transportation Studies (ITS) shows that under a conservative business-as-usual forecast—based on historical demand and future demand in the absence of new policies—there is an expected 30% decline in fuel consumption, from roughly 19 billion gasoline gallon-equivalent (GGE) in 2020 to roughly 13 GGE in 2045, corresponding to a 1.5% compound annual decline rate.[17] In this scenario, demand is still driven predominantly by petroleum-based fuels, but consumption declines due to efficiency improvements. In more extreme cases with substantial fuel replacement, such as the CARB 2022 Scoping Plan, demand reduction for liquid petroleum fuels declines 94% from 2020 to 2045, for a 10.9% compound annual decline rate.[18]

In either extreme—from business-as-usual with no change in statewide policy to a considerable shift in energy policy to achieve carbon neutrality—the impact of the loss of supply from not restarting the SYU is outweighed by declining consumer demand. Instead, it is likely that the over-time economic gains Sable aims to achieve from restarting the SYU will come from exporting the oil from California to other markets.

Restarting the SYU will increase global greenhouse gas emissions

If production were to resume from the SYU, estimates from the Oil Production Greenhouse Gas Emissions Estimator (OPGEE) used by CARB suggest that per-unit emissions from production from the Hondo, Pescado, and Sacate fields would be roughly 87% higher than per-unit emissions from the onshore Aliso Canyon fields in LA

GDP, Employment, Trade, and Consumer Costs. ICF International for the American Petroleum Institute; Bordoff, J. and Houser, T. (2015). *Navigating the U.S. Oil Export Debate*. Columbia University, Center on Global Energy Policy and Rhodium Group; and Rajagopal, D. and Plevin, R. J. (2013). Implications of market-mediated emissions and uncertainty for biofuel policies. *Energy Policy*, 56 75–82.

[16] SYU annual production of 10 million barrels/year is estimated from an expected 28,100 barrels/day production once online, from Sable Offshore Corp. (2024). *Investor Presentation September 2024*, accessed from https://sableoffshore.com/events-and-presentations/default.aspx. This is compared to 2023 statewide consumption of 532 million barrels based on CARB data.

[17] Brown, A. L; Sperling, D.; Austin, B.; DeShazo, JR; Fulton, L.; Lipman, T., et al. (2021). *Driving California's Transportation Emissions to Zero*. UC Office of the President: University of California Institute of Transportation Studies. http://dx.doi.org/10.7922/G2MC8X9X.

[18] California Air Resources Board. (2022). *2022 Scoping Plan for Achieving Carbon Neutrality*. Data extracted from: https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-PATHWAYS-data-E3.xlsx

County.[19] Existing models of the greenhouse gas intensity of oil and gas production show that these carbon intensity levels are underestimated as they do not capture methane emissions and poorly estimate emissions from flaring.[20] Nonetheless, they provide a comparison on an emissions basis to the SYU.

Using Aliso Canyon as an emissions-intensity comparison, the operational emissions intensity of production from the SYU would be roughly 440 kg CO_2e per barrel of oil and barrel-equivalent of gas using the OCI+ metrics of emissions intensity.[21] This is considerably higher than nearly all other fields rated by OCI+, which typically range between 80 kg CO_2e/mboe and 400 kg CO_2e/mboe. Iraqi crude, for example, has intensities of 175 CO_2e/mboe (Rumaila, medium oil), 234 CO_2e/mboe (Ahdab, medium/heavy oil), and 255 CO_2e/mboe (Fakka, heavy oil), all of which include emissions from production, gathering, storage, and transportation.[22]

The quality of SYU crude is a mix of heavy oil (18° API gravity) from the primary reservoir and light oil (37° API gravity) from the secondary reservoir.[23] Comparisons by quality also show that the greenhouse gas intensity of SYU crude exceeds that of commensurate foreign imports. Among heavy oil comparisons, SYU greenhouse gas intensity would be higher than any field rated by OCI+.[24] Among light oil comparisons, SYU greenhouse gas intensity exceeds all estimated fields with the exception of four that are not currently exported to California.[25]

Compared to production from Elk Hills in Kern County—which produces medium/light oil that is near global averages in emissions intensity taking methane emissions into account, and approximately equivalent to SYU barrels in terms of estimated break-even

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[19] CARB. (2023). Estimated Carbon Intensity Values for the Crude Lookup Table, App. F to Proposed Amendments to the Low Carbon Fuel Standard Regulations. These values are roughly double what Sable stated at the October 30, 2024, Planning Commission hearing (see footnote 1). The 2010 carbon intensity (gCO2/MJ) for Hondo, Pescado, and Sacate is estimated at 6.84, 6.13, and 4.85, respectively, with a production-weighted average at 6.09 gCO2/MJ. This is compared to Aliso Canyon with carbon intensity of 3.26 gCO2/MJ.

[20] RMI, *Oil Climate Index plus Gas Model v.2.1.0* (2024); Mohammad S. Masnadi et al., Global carbon intensity of crude oil production. *Science* 361,851-853 (2018); Scarpelli, T. R., Jacob, D. J., Grossman, S., Lu, X., Qu, Z., Sulprizio, M. P., Zhang, Y., Reuland, F., Gordon, D., and Worden, J. R.: Updated Global Fuel Exploitation Inventory (GFEI) for methane emissions from the oil, gas, and coal sectors: evaluation with inversions of atmospheric methane observations. *Atmos. Chem. Phys.*, 22, 3235–3249 (2022).

[21] Based on data from the Oil Climate Index plus Gas (OCI+), accessed from https://ociplus.rmi.org/analysis. Aliso Canyon is rated at 235.84 kg CO2e/mboe industry GHG emissions intensity.

[22] Ibid.

[23] Based on information for Platform Hondo from: Air Pollution Control District, Santa Barbara County. (April 2024). *Draft Permit to Operate 9100 – R8 and Part 70 Operating Permit 9100: Sable Offshore – SYU Project Platform Hondo*. Accessed in February 2025 from https://www.ourair.org/wp-content/uploads/Draft-PT-70-09100-R8-Platform-Hondo-4-8-2024.pdf

[24] The highest intensity rated among heavy or extra heavy oil is Canada Peace River at 419 CO2e/mboe. Data drawn from OCI+ (see footnote 21).

[25] The exceptions are industry GHG intensities of 490 CO2e/mboe (Gabon Koula), 639 CO2e/mboe (Iran Agha Jari), 806 CO2e/mboe (Russia Kuyumbinskoye), and 964 CO2e/mboe (Mexico Teotleco). Data drawn from OCI+ (see footnote 21).

price per barrel—every barrel of oil from SYU would add 245 kg CO_2e above and beyond emissions from barrels from Elk Hills (195 kg CO2e/mboe). Considering the anticipated annual volume of production, this translates to roughly 2.5 million tons of CO_2e above what would be emitted if the SYU were not producing.

Conclusion

An overview of the economic analysis performed here of the market impacts of production from the SYU finds support for the following three claims:

(1) Restarting SYU production will not reduce foreign imports, based on both statistical analysis of the 2015 pause and an economic analysis of costs compared to major suppliers of crude;

(2) Not restarting SYU will not have significant impacts on consumer markets over time, given declining demand for petroleum products in California through 2045 outpaces the loss of supply from SYU production;

(3) Production from the SYU will increase global greenhouse gas emissions given the higher greenhouse gas intensity of operations compared to industry averages for operations from commensurate fields.