100% Renewable or Fossil Fuel Lock-in?

WHY LNG IS A CRITICAL MISSTEP

DECEMBER 2025

Introduction

The State of Hawaii faces a critical decision on how it will deliver affordable and secure energy . The state adopted a 100% Renewable Portfolio Standard (RPS) by 2045 because *Hawaii's dependency on imported fuel drains the State's economy of billions of dollars each year. A stronger local economy depends on a transition away from imported fuels and toward renewable local resources that provide a secure source of affordable energy*.[1] Whether Hawaii can provide affordable and secure energy may be determined by its potential decision on whether it commits to importing liquid natural gas (LNG). This working paper evaluates the proposal to utilize Liquefied Natural Gas (LNG) as a transitional fuel for power generation on Oahu, specifically analyzing 'Alternative 3A' as presented by the Hawai'i State Energy Office (HSEO). This strategy entails significant capital investment, estimated between $700 million — $1 billion in import terminals, subsea pipelines, and Floating Storage Regasification Units (FSRU).

The most critical, yet under-analyzed, risk of Alternative 3A is the operational incompatibility between large-scale LNG infrastructure and grid primarily reliant on low cost renewable generation. By committing this capital to this specific asset class, the proposal introduces a structural rigidity that directly jeopardizes the ability of the state to leverage low cost renewable energy to deliver secure and affordable electricity.

While the proposal forecasts significant ratepayer savings (Net Present Value of $867 million), our analysis finds this economic justification relies on highly sensitive volume assumptions and an unrealistic baseline of widespread biofuel conversion. We argue that the capital expenditure required for LNG infrastructure establishes a 'lock-in' effect, generating perverse incentives to delay renewable deployment. This paper proposes that a direct reallocation of capital toward renewable energy and storage offers a more financially robust and risk-averse pathway to the state's electricity affordability and energy security goals.

1 Act97, 2015, the 100%RPS Law — https://www.capitol.hawaii.gov/sessions/session2015/bills/HB623_CD1_.htm

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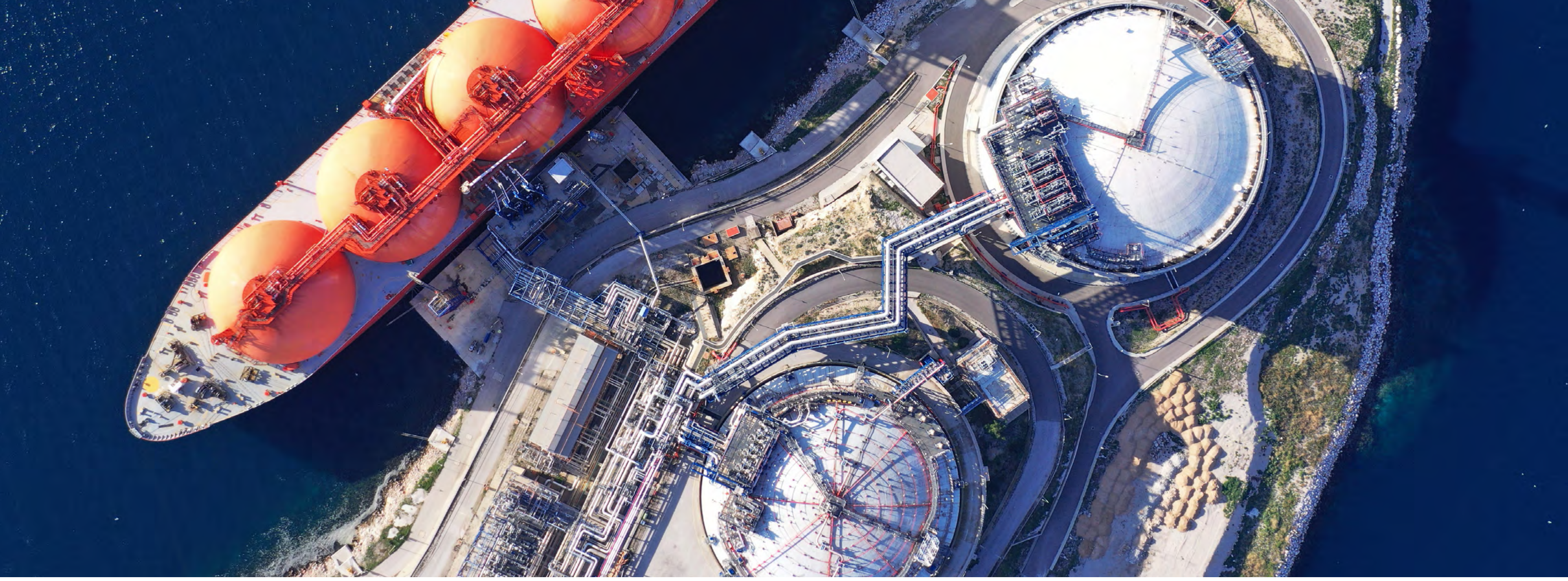

Underlying Strategic Flaw is the Opportunity Cost

The immediate economic incentive to spend the estimated $700 million to $1 billion on the temporary LNG infrastructure is significantly diminished if that capital were instead spent on projects that unlock permanent renewable energy (RE) capacity. The core challenge to RE deployment is no longer financing, as IPPs have demonstrated the ability to secure capital on favorable terms, but rather transmission and permitting bottlenecks.

The leading strategic question is whether the money spent on an import terminal would be better spent on a combination of projects that directly address the grid's constraints, such as investments in T&D infrastructure to high-renewable zones, maximizing flexibility from current distributed resources (customer solar plus storage), enabling new demand management (managed EV charging), and supporting emerging long-duration energy storage (LDES) solutions. Committing all of the capital now to a time-limited fossil fuel facility risks locking out these more flexible, high-impact opportunities necessary for a low cost, permanent, secure and low cost renewable grid.

While Alternative 3A forecasts significant ratepayer savings (estimated at $867 million NPV and 15.2% residential savings), this is contingent on several optimistic assumptions: sustained **high LNG purchases (more than a million tons per annum (mtpa)), displacement of expensive planned fuels such as biodiesel, and successful future reuse of LNG infrastructure for hydrogen (H2) by 2045**. If contracted volumes drop below this level (e.g., to the 0.4 mtpa range), the unit cost of the LNG skyrockets (tariff doubles), severely eroding the economic justification and turning the investment into a financial loss.

Our review highlights that if any of these conditions are not met, the economic benefits disappear.

Key Concerns and Risks:

- **Volume Sensitivity:** The most significant risk embedded within the LNG proposal (particularly Alternative 3A) is the economic necessity of volume lock-in, which is increasingly detached from current energy reality.

  The regasification tariff and per-MMBtu cost are highly sensitive to the volume of LNG. The LNG proposal is essentially "**locking in**" the island to fossil fuels, forcing the island to purchase a fixed, large volume of fossil fuel (estimated between 0.7 and 1.0 mtpa) for the next 15 years simply to make the $700 million infrastructure investment financially viable.

  This creates a powerful economic incentive - a "take-or-pay" dilemma to prioritize consuming the expensive contracted LNG over deploying new, zero-fuel-cost renewables. Any gigawatt-hour generated by a new solar farm is a gigawatt-hour not generated by the LNG facility, risking financial penalties and forcing the utility to either slow RE projects or ask ratepayers to cover the cost of unused LNG capacity.

  Investing the same capital in renewables today, builds permanent clean capacity that accelerates the energy transition without the burden of long-term fossil fuel procurement obligations.

- **Stranded Asset Risk:** There is a risk that LNG-specific infrastructure will become stranded as the state continues to install low cost renewables. The LNG infrastructure would be expected to be operational around 2030 (HSEO timeline). By this time, the island grid will have already integrated a significant volume of RE from the current project pipeline, leading to a fundamental collapse in the volume of dispatchable fuel needed
- **High Upfront Costs and Risks:** Large capital expenditures are required for LNG infrastructure (floating regasification unit, subsea pipelines, onshore works), ranging from $400 -$700M. Cost overruns, which are common in Hawaii and in today's uncertain economic environment, can quickly degrade economic viability.
- **Fuel Displacement Assumptions:** The financial viability of LNG, as presented in Alternative 3A, rests on a highly unrealistic and financially flawed premise. The projected savings are largely due to LNG displacing expensive and high volumes of biofuels which are planned but not currently widely used, and <u>some utility-scale solar projects</u>, rather than just less expensive fossil fuels (LSFO). This inflates the perceived benefits, as the LNG is not being compared against today's baseline. Furthermore, the timeline for delivering measurable fuel cost savings is highly problematic: public promises of immediate cost impact contrast with the analysis showing that fuel could not be delivered until ~2030, and the major financial benefits are speculative and backloaded, accruing only in the final years when mass biofuel conversion is assumed to occur. Overall, the reliance on these speculative savings means the debt-financed LNG project fails to provide the assured, near-term cost relief expected by the public.
- **Optimistic H2 Transition:** The viability of LNG relies heavily on the assumption that its infrastructure can be repurposed for H2 by 2045. However, H2 is currently not commercially viable, and projections indicate green H2 will be significantly more expensive than LNG or even biofuels in 2040. H2 is also notoriously difficult to transport.

- **Regulatory and Permitting Challenges:** The complexities of FSRU charter/purchase, Jones Act concerns[2], and lengthy permit timelines introduce significant schedule and legal risks.
- **Fuel-Price and Contract Risk:** LNG pricing formulas are susceptible to changes, and fluctuations in oil prices can significantly impact costs.

Long-Term Economic Implications: Import Dependency vs. Local Generation

The biggest question facing Hawaii will be what this decision will mean for its residents' long-term future. The state's laws direct the state to achieve *increased energy security and self-sufficiency through the reduction and ultimate elimination of Hawaii's dependence on imported fuels for electrical generation and ground transportation*.[3] This is also the purpose of the state's RPS, which *will ensure that Hawaii moves beyond its dependence on imported fuels and continues to grow a local renewable energy industry*.[4] The fundamental question facing the state is not which fuel to import, but rather, how quickly can it end its reliance on importing imported fuels toward a renewables based grid.

If Hawaii chooses to make a long-term bet on LNG, investing all the required capital in transport, pipeline, and generation infrastructure, the state will remain dependent on imported fuel. This holds true even in the most optimistic scenario where innovation enables hydrogen (H2) to become financially viable and transportable at scale to replace the LNG. This means in 2046 and every year afterward, the state will still be exporting hundreds of millions or billions of dollars annually in fuel costs.

However, if Hawaii chooses to continue to invest in local renewable generation to meet the intent of its laws, it means in 2046 and every year afterward, Hawaii will meaningfully end the cost of importing fuels and will no longer be exporting significant dollars. Renewables like solar, storage, and geothermal have zero fuel cost. While biofuels still have a cost of production and could still play a future role in Hawaii, those dollars could be re-invested in Hawaii's economy in local jobs, agriculture, and infrastructure, instead of exported out of state.

An Alternative Solution

A $700m investment directly into renewables instead of LNG infrastructure buys **permanent capacity** and goes directly to meet 100% Renewable Portfolio Standard (RPS) goal by 2045, rather than a "bridge infrastructure spend". The same spend can allow the state to build ~175 MW of new solar capacity paired with 160 MW of 4hr battery energy storage systems (BESS).

In fact, if we include the additional capital requirement of new combustion turbines and combined cycle power plants that are not included in the $700m estimate, we would have an additional ~$1b available to transition to solar+BESS.

2 The Jones Act prevents foreign-flagged ships from carrying cargo between the contiguous U.S. and certain noncontiguous parts of the U.S., such as Hawaii. https://www.cbp.gov/sites/default/files/2024-12/Jones%20Act%20ICP_Complete_04DEC24.pdf

3 (HRS 226-18(2))

4 (Act 97, 2015 — (Hawaii's 100% RPS law) https://www.capitol.hawaii.gov/sessions/session2015/bills/HB623_CD1_.htm)

The HSEO study reference permitting challenges as one of the drivers behind the LNG option. The logic is, that LNG infrastructure could, in theory, be delivered more predictably than the many separate renewable projects facing long permitting queues and interconnection studies. However, if the same permitting streamlining is extended to renewable energy projects then the economics shift significantly. Easing permits makes renewables more viable, and directly challenges the "immediacy" argument for LNG in the HSEO document. If renewable energy projects can be deployed more quickly due to streamlined permitting, the need for LNG as a "firm" dispatchable power source while renewables are being built becomes less urgent and less economically attractive. **The economic incentive to spend $1b on the temporary LNG infrastructure is significantly diminished, if the ease of permitting is also extended to renewable build out**.

Renewables paired with Battery Energy Storage Systems (BESS) offer a cleaner, faster, and lower-risk pathway to meet Hawaii's energy needs securely and affordably.

Conclusions and Recommendations

The analysis suggests that "Alternative 3A" presents a high risk of fossil fuel lock-in. The economic benefits are contingent on delaying renewable deployment to satisfy LNG volume constraints and relying on speculative future fuel prices (Biofuel and Hydrogen).

While LNG is considered a near-term bridge option in some analyses, its economic and environmental benefits are highly risky and subject to substantial risks and uncertainties. LNG infrastructure is characterized by high fixed capital costs and relatively lower marginal fuel costs. To ensure economic viability and amortize the initial capital outlay, the facility requires a high capacity factor, essentially, it must run frequently and at high volumes to keep the unit cost of energy affordable. This economic imperative creates a "must-run" status for fossil fuel generation. In a grid increasingly saturated with variable renewable energy, the ideal backup resource is highly flexible, low capital cost generation that can remain idle when renewable production is high. LNG represents the opposite - it is a high capital asset that penalizes idleness.

The fundamental distinction between these pathways is the long-term marginal cost of energy. If Hawaii maintains a dependency on imported fuels, it accepts a permanent requirement for annual capital outflow to global markets. In contrast, prioritizing local renewable generation shifts the economic burden to upfront capital investment. Once these local assets are amortized, the marginal cost of production is near-zero, effectively ending the state's century-long exposure to imported fuel costs and price volatility.

Policy makers should consider a "Direct Renewable Investment" scenario. Redirecting the LNG infrastructure capital toward utility-scale solar, BESS, and grid transmission upgrades avoids the volatility of global fuel markets and the risk of stranded assets, providing a more secure pathway toward the state's goals of cheaper electricity and eliminating its dependence on imported fuels.

Source Documents:

1. Alternative Fuel, Repowering, and Energy Transition Study, HSEO (Jan 2025)
2. Testimony of MARK B. GLICK, Chief Energy Officer before the House Committee On Energy & Environmental Protection (Mar 2025)
3. Economics of Accelerating Hawaii's Energy Transition via LNG and other Alternative Fuels, FGE (Aug 2024)

APPENDIX A

Background and Assumptions detailed in Alternative 3A:

The implementation of Alternative 3A follows a three-stage operational timeline:

- **Today–2030:** Existing LSFO and biofuels fill the gap.
- **2030–2040:** LNG imports displace LSFO + biodiesel + some solar; LNG infrastructure operates at scale.
- **Post-2040 toward 2045:** Infrastructure assumed to be converted to handle hydrogen (or similar).

Alternative 3A's attractive NPV (~$867m and 15.2% ratepayer savings) is largely generated by challenging the existing regulatory baseline.

- The dramatic savings are generated by assuming LNG displaces expensive biofuels and solar projects that would otherwise be approved and built under Hawaiian Electric's current plans. The modeling suggests that achieving high cost savings requires displacing some utility scale PV projects. This is why 3A looks much more favorable than Alternative 1A or 2A (where LNG only displaces LSFO). Without that displacement, the savings shrink dramatically (comparable to Alt. 1A with NPV ≈ $150M).
- Renewable Diesel (RD), is shown to cost 190% to 236% the price of LSFO in 2024 (and more in 2040).
- Widespread biofuel use for power generation is misleading. The true comparison should be limited to displacing the current fossil fuel (LSFO) - in which case the benefits will be minimized.
- Assumes the LNG infrastructure can be successfully transitioned to H2 by 2045. Also, FGE report projects Green H2 will cost 284% the price of LSFO in 2040. This extreme cost makes it highly improbable that hydrogen will be the economic fuel of choice for large-scale grid firming by 2045.
- The promised reuse of pipelines is partial. The H2 supply chain using ammonia as a carrier requires additional infrastructure (+ more permitting, etc).