JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

NADINE Y. ANDO
DIRECTOR | KA LUNA HO'OKELE

DEAN NISHINA
ACTING EXECUTIVE DIRECTOR

STATE OF HAWAII | KA MOKUʻĀINA ʻO HAWAIʻI
DIVISION OF CONSUMER ADVOCACY
DEPARTMENT OF COMMERCE AND CONSUMER AFFAIRS
KA ʻOIHANA PILI KĀLEPA
335 MERCHANT STREET, ROOM 326
P.O. Box 541
HONOLULU, HAWAII 96809
Phone Number: (808) 586-2800
Fax Number: (808) 586-2780
cca.hawaii.gov/dca/

February 24, 2023

The Honorable Chair and Members of
the Hawaii Public Utilities Commission
Kekuanaoa Building
465 South King Street, 1st Floor
Honolulu, Hawaii 96813

Dear Commissioners:

RE: Docket No. 2022-0009 – Instituting a proceeding to investigate integrated resource planning for the Gas Company, LLC dba Hawaii Gas

The purpose of this letter is to transmit the Division of Consumer Advocacy's ("Consumer Advocate") comments and feedback regarding the current status of and available documents related to The Gas Company, LLC, dba Hawaii Gas ("Hawaii Gas" or "Company") and its Integrated Resource Planning ("IRP").

Background

As noted in the Public Utilities Commission's ("Commission") Order No. 38189, Instituting a Proceeding to Investigate Integrated Resource Planning for Hawaii Gas, filed on January 19, 2022, in Docket No. 2022-0000 ("Order No. 38189"),

As a condition of approval in [Decision and Order No. 38068, filed on November 12, 2021, in Docket No. 2020-0158], the Commission required Hawaii Gas to develop and implement an IRP Report, finding that "the Commission has strong concerns about Hawaii Gas' dependency on synthetic natural gas ("SNG"), as well as [Par Hawaii Refinery, LLC ("PHR")] feedstock and infrastructure to produce SNG."

In addition, in response to House Bill No. 1143, proposed in the 2021 legislative session, the Commission offered in testimony before the House Committee on Energy and Environmental Protection that instituting a proceeding to establish an IRP for Hawaii Gas would effectively address Hawaii Gas' ability to "meet more aggressive, longer-term [Renewable Portfolio Standard ("RPS")] targets and address ongoing risks to the utility's fuel supply security. An approved IRP could also be used to inform future RPS targets to be established by the Legislature for the gas utility.

As a result of Order No. 38189, a number of stakeholders, including the Consumer Advocate, have been participating in various advisory group and technical meetings that have been scheduled as part of the IRP proceeding that is being conducted pursuant to the Revised IRP Framework.[1]

Discussion

The Consumer Advocate is offering these comments in order to memorialize its general assessment of the current status of the advisory group process and in the hopes that some of the concerns that will be outlined might be addressed to mitigate the possibility or probability that, during the formal phase of this proceeding, there will be issues that could have been avoided during the advisory group discussions. Recently, the initial version of the IRP Report dated February 6, 2023 ("February 6 Draft Report"), was made available for review. The Consumer Advocate is still reviewing this draft but, given the Commission's recent Order No. 38848, (1) Modifying the Procedural Schedule Established in Order No. 38189 and Further Amended by Order No. 38263, and (2) Providing Additional Instructions to the Gas Company, LLC, the Independent Entity, and Independent Facilitator, filed on February 7, 2023 ("Order No. 38848"), the Consumer Advocate believes and hopes that these comments will be useful in helping to improve Hawaii Gas' final IRP Report.

For further context, the Consumer Advocate notes that, in its Statement of Position re: Hawaii Gas' Proposed Work Plan, the Consumer Advocate offered a number of observations and concerns. In summary, the Consumer Advocate stated that, while Hawaii Gas had offered a good start, the work plan was:

> …somewhat high level and appears to require modifications to better reflect key milestones, such as key deliverables that will be required for each phase, as well as to better reflect the intent to take advantage of the advisory group process and the need for some reiterative loops to allow feedback to be appropriately provided, incorporated, and refined as needed.

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[1] The Revised IRP Framework was adopted by the Commission pursuant to Decision and Order, filed on March 14, 2011, in Docket No. 2009-0108. The Revised IRP Framework replaced the original Framework for Integrated Resource Planning ("IRP Framework"), adopted in Decision and Order No. 11523, on March 12, 1992, and as amended in Decision and Order No. 11630, filed on May 22, 1992, in Docket No. 6617.

Consistent with those earlier comments, the Consumer Advocate offers that it has posed many questions such as sources of data and assumptions, the reasonableness of certain high-level or gross assumptions, and whether robust analyses supported many of Hawaii Gas' reported outcomes. The Consumer Advocate believes that the recently provided draft action plan has already faced questions and concerns because of unaddressed questions and concerns related to the underlying assumptions, data, and analyses. The Consumer Advocate believes that the February 6, 2023 IRP Report will likely face similar questions and concerns.

The attached memo from Synapse Energy Economics, Inc., the Consumer Advocate's consultant for this proceeding, highlights a number of remaining concerns. As summarized in the attached memo, there are concerns with:

- Whether the preferred resource options are the product of reasonable and acceptable assumptions;
- Whether the scenarios were appropriately constructed, reflect reasonable outcomes, and/or consistent with Hawaii's policy goals;
- Whether the modeling has incorporated adequate consideration of risks, including customer migration.
- Whether a robust set of alternatives – that are not simply slight variations of the status quo – have been adequately developed and analyzed.

Generally, the Consumer Advocate is concerned that, based on the draft Action Plan provided, addressing some of the express objectives of this proceeding, i.e., addressing fuel supply risks associated with PHR and the basis for developing a renewable (or carbon) portfolio, will not occur. As is, it appears that the plan generally assumes that PHR will continue to facilitate reliance on the synthetic natural gas plant and that movement towards renewable or decarbonizing activities will not occur until after 2030. The Consumer Advocate is concerned with the absence of more analysis and actions to address these objectives and the concerns that gave rise to these objectives. While the Consumer Advocate recognizes that immediate actions may be somewhat limited, given that the action plan is a five-year planning horizon, the Consumer Advocate believes that the action plan should reflect more steps and activities related to the identified objectives.

In addition, the Consumer Advocate urges Hawaii Gas to allocate additional attention and effort to provide more detailed discussion and supporting analyses to assist the Commission in addressing the factors that are outlined in Hawaii Revised Statutes § 269-6(b), especially if the Company's plan may include importing fuel, whether fossil-fuel based or renewable, as well as procuring carbon offsets from non-local sources. The Consumer Advocate notes a brief discussion of some of the factors identified in HRS § 269-6(b) on pages 12 and 20 of the February 6 Draft Report but offers that the Company's discussion does not appear to provide sufficient basis to determine that the fuel supply risk and import of fuel or carbon offsets have been reasonably considered in supporting the currently proffered action plan. The Consumer Advocate also contends that additional analysis of price volatility for renewable fuels and carbon offsets should be

considered given that the market for both commodities will likely face changes in market conditions in the future.

Furthermore, the Consumer Advocate notes that, in the Company's February 6 Draft Report, it asserts that

> ...Hawaii Gas agreed to a number of conditions, ..., to the approval of the proposed change in control that were required to be addressed during the present proceeding.... Hawaii Gas notes that discussions with the Consumer Advocate and the Hawaii State Energy Office pertaining to the conditions are ongoing. Nonetheless, Hawaii Gas believes that it has satisfied some of the conditions that were required to be addressed in this proceeding, with others requiring further development as part of the ongoing IRP proceeding, as described in further detail below.

The Consumer Advocate appreciates the discussion that the Company offers and acknowledges that, since the proceeding is still ongoing, many of the conditions are still in the process of being addressed. The Consumer Advocate notes, however, that it appears that Hawaii Gas is asserting that it has satisfied the conditions related to the impairment analysis (see pages 129 – 130 of February 6 Draft Report) and energy efficiency analysis (see pages 139 and 140 of February 6 Draft Report). As noted earlier and in the attached memo, there are questions and concerns that have been raised, especially the concerns related to the lack of integration of customer defection analysis into the modeling, lack of substantial analysis of stranded assets, lack of assessment of risks, and definition of the limited defection with stable customer base criterion. The Consumer Advocate offers that a finding that the condition related to impairment analysis has been satisfied without addressing many remaining questions and concerns should be unlikely. Thus, the Consumer Advocate encourages Hawaii Gas to improve its analyses and support in these areas so that the Commission might find that the required condition is met. The Consumer Advocate assumes that the Hawaii State Energy Office will offer its own assessment of the conditions that the Company asserts have been satisfied.

The Consumer Advocate believes that, with the additional time in this proceeding's phase 1 that has been created with the Commission's Order No. 38848, there is an opportunity for Hawaii Gas to address the concerns raised in this letter and attached memo, some of which are mirrored in comments from other stakeholders and also mentioned by the Independent Entity.

The Consumer Advocate strongly urges Hawaii Gas to address these concerns to improve the confidence in the future drafts of the IRP Report to come.

Sincerely yours,

/s/ Dean Nishina
Dean Nishina
Acting Executive Director

DN:sts

cc: Carlito Caiboso, Esq.
David Jordan, Esq.
Dean Yamamoto, Esq.
Wil Yamamoto, Esq.

Memorandum

TO: DEAN NISHINA, HAWAII DIVISION OF CONSUMER ADVOCACY

FROM: ALICE NAPOLEON, ELLEN CARLSON, KENJI TAKAHASHI

DATE: FEBRUARY 17, 2023

RE: COMMENTS ON HAWAII GAS INTEGRATED RESOURCE PLANNING MODELING—DRAFT

In this memo, Synapse Energy Economics (Synapse) raises issues and makes recommendations regarding the Integrated Resource Planning (IRP) model materials provided to the IRP Advisory Group by Hawaii Gas (HG) and HG's consultant, Black and Veatch (B&V). We address the assumptions and methodologies described in HG's draft action plans and associated Excel-based IRP rate model workbook. The first draft of the action plan was provided to the Advisory Group prior to the January 11th meeting, along with a draft rate model and summary of the results of the IRP model. On January 25th, HG provided an updated Draft Action Plan (Action Plan) and Rate Model (Rate Model) in advance of the February Advisory Group meeting, along with the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model; Energy Efficiency Rationale Memo; and SNG (synthetic natural gas) Utility Focus Rationale memo. On February 7, the initial version of the IRP Report dated February 6, 2023 ("Draft IRP Report") was made available to the Advisory Group for review. This memo focuses on the Draft IRP Report, as well as the Rate Model released on January 25th.

Summary

Below we provide an overview of our findings and recommendations regarding the IRP modeling and results.

- Resource options
    - Many of the assumptions for the resources included in the modeling are problematic.
    - The resource options considered were unduly limited, and key resources were not included.
- Scenarios
    - Two of the scenarios—the Technically Feasible Mix without Par Resource Plan and Maximum Green Hydrogen and renewable natural gas (RNG) Sensitivity Resource Plan—are not viable as specified in the model.

- The Status Quo Resource Plan does not support Hawaii's greenhouse gas (GHG) reduction policies.
- The Technically Feasible Mix without Par Resource Plan does not appear to employ any strategies to mitigate the impacts of the loss of the Par Resource.
- The omission of resource options effectively limits the scenarios to just one viable option, creating a false choice.

- Model design
  - The model does not integrate the customer defection analysis, a key analysis, in a meaningful way. Likewise, it does not optimize the results.
  - The model fails to articulate a vision for how HG's commodity can be directed to the best and most valuable uses.
  - The modeling and action plans completely neglect the risks that lie ahead for the Company. Customer migration due to electrification or moving to unregulated gas service is a real risk.

- Criteria for selection of alternatives
  - HG's definition of the Limited Defection with Stable Customer Base criterion (previously the Sustainability of HG Business criterion) is problematically tied to HG's current business model. The definition of this criterion reflects the lack of flexible and creative thinking that has permeated the entire IRP process.
  - HG's selected criteria have substantial overlaps.
  - The net present value of revenue requirements criterion suggested by the Independent Evaluator is a more transparent criterion than the affordability metric.

- Consumer Advocate Conditions of Agreement
  - There are insufficient details to assess whether the Consumer Advocate's Condition of Agreement (CA_COA) No. 1 has been satisfied.
  - In light of the numerous, substantial concerns with the customer defection analysis and how that analysis is not incorporated into the IRP modeling, HG has not met our expectations for an impairment analysis, as required under CA- COA No. 6. Further, we do not believe that the IRP included a reasonably comprehensive review of the options and do not find that HG's preferred alternative represents an optimal solution. Therefore, we do not find that the provided bill and rate impact analysis provides a reasonable estimate of the impacts that the State's climate goals will have on HG customers.

We recommend that, with the additional time in this proceeding's phase 1 that has been created with the Commission's Order No. 38848, HG should address the issues identified herein. Our high-level recommendations are as follows:

- Resource Options
    - HG should incorporate the emissions characteristics of distinct renewable natural gas (RNG) types into the modeling. HG should also provide a detailed description of what emissions are included in each lifecycle step (End-User, Transmission & Distribution, and Upstream Emissions) and the associated GREET inputs and assumptions.
    - To address the risk that externally sourced offsets are not eligible for compliance with the GHG emissions policy, HG should develop a scenario that does not include externally sourced offsets. HG should also provide transparency about assumptions about local offsets versus externally sourced offsets in the existing scenarios and all new scenarios. Further, the cost of offsets should be reflected in each scenario's revenue requirement and customer rates, and HG should revise its emissions scoring criteria to recognize that offsets should not be compared apples-to-apples with actual GHG emissions reductions. In addition, HG should correct the apparent double-counting of the emissions reductions relative to the Status Quo case.
    - HG should provide a high-level assessment of suitable electrolyzers and develop appropriate cost estimates for Hawaii. HG should analyze costs of hydrogen infrastructure, including but not limited to new pipes and the pipe degradation from high hydrogen exposure. All of these costs and risks should ultimately be reflected in the overall economic assessment of scenarios that require high levels of hydrogen.
    - If system expansion is included as a resource option, the increase in risk of future stranded assets should be made clear.
    - HG should redesign its scenarios to include viable resource options, including heat pump water heaters and solar hot water systems.
- Scenarios
    - HG should provide analysis of the risk that the Par Hawaii Refinery (Par) may retire on a different timeframe than considered or that the price of Par feedstocks may increase significantly over the period of analysis.
    - HG should include at least one scenario that contains electrification and solar hot water as measures for addressing demand and should assess the performance of this scenario against other plans.

- Model design
    - The customer defection analysis should be revised as detailed herein. Considering the large bill impacts that could occur if HG's residential customers start to defect, HG should include a "high defection" demand sensitivity that would show how this would affect HG's system and rates. Also, customer defection should be assumed in all scenarios.
    - HG should study the customer classes or end uses that are least likely to defect or electrify, which could be one potential strategy for HG to sustain part of its current business if residential customers trend towards electrification.
    - HG should provide a comprehensive plan for managing the risk of stranded assets (such as by minimizing new investments that may be stranded in the future, and pairing strategic retirement of existing assets with alternative depreciation schedules). Also, HG should propose a plan for transitioning to a business model that is consistent with Hawaii's policy objectives.
    - HG should conduct a sensitivity analysis of higher or lower RNG prices or availability.
- Criteria for selection of alternative
    - We recommend that the criteria be defined to minimize overlap, to allow consideration of alternative business models, and to more transparently and accurately reflect costs.
- Consumer Advocate Conditions of Agreement
    - HG should provide additional information, including a breakdown of IRP-proposed capex by the more granular categories used in the previously filed capex proposal.
    - HG should address the concerns we discussed herein regarding the resource options, scenarios, model design, and criteria for selection before selecting and recommending a specific plan, which should inform the capital additions that underlie the bill and rate impact analysis called for in CA_COA No. 6.

Resource Options

Below, we discuss issues with HG's assumptions for specific resource options, as well as resource options that were not included in the modeling.

Problematic Assumptions for Resources Included in the Model

Renewable natural gas

In order to model impacts on GHG emissions from different resource mixes, HG calculated the life-cycle emissions of each potential supply resource, including RNG. The primary candidates for new RNG supply

developments in Oahu are landfill gas, wastewater treatment facilities, and construction and demolition waste.[1] HG used Argonne National Laboratory's 2022 GREET model to calculate life-cycle GHG emissions, including emissions associated with the production, transmission and distribution, and consumption of the resource.

In the Action Plan and Rate Model, HG assumes that all RNG has the same GHG emission rate, regardless of RNG feedstock or project type.[2] Each type of RNG supply in the Rate Model has different cost characteristics; however, HG does not similarly distinguish the emissions characteristics of distinct RNG types in the modeling, even though different RNG feedstocks and processes have different emissions impacts. For example, the 2019 ICF RNG supply report that HG uses for RNG cost assumptions estimates a positive lifecycle GHG emissions intensity of 25 to 55 grams of carbon dioxide equivalent (CO2e) per megajoule of fuel from municipal solid waste (equal to 26,376 to 58,028 grams of CO2e per MMBtu) and 18 to 34 grams of CO2e per megajoule for landfill gas projects (13,716 to 30,597 grams of CO2e per MMBtu).[3] In contrast, the total emission rate used by Hawaii Gas for all RNG projects is -11,894 grams of CO2 per MMBtu.[4] HG has not fully explained or justified the data sources and assumptions that lead to a negative or "offsetting" GHG emissions factor for RNG, or why it assumes that all RNG types have the same emissions factors.

Assumptions about RNG emissions rates have a potentially large impact on scenario emissions results. For example, if we assume that HG's RNG resources do not provide a negative emissions impact, and instead result in net-zero emissions, emissions for HG's Preferred Resource Plan (the Technically Feasible with Par scenario) would increase by over 10,000 metric tons each year. Considering that some types of RNG have emissions that are as high as fossil gas, impacts on the emissions of individual scenarios might be even larger. For this reason, we strongly recommend that HG incorporate the emissions characteristics of distinct RNG types into the modeling.

HG provided the GREET model file to the Advisory Group to review in advance of the February 1st meeting. HG should have provided the Advisory Group with this file much earlier in the process, to allow the Advisory Group more time to review this file and to ask questions on it. Based on our review, we find that the file is not accessible or transparent. HG provided no technical documentation, nor did it provide any explanation of which parameters are GREET model defaults that HG did not change and which were edited by HG. It is not clear which model pathways and outputs yield the emissions factors presented in the tab labeled "15. Emissions" in the Rate Model. To support thorough review from the Advisory

[1] Draft IRP Report, p.56.

[2] Rate Model, Tab "15. Emissions", and Phases 1-3 Summary Memo page 38, Table 10: Estimated Life-Cycle Emissions for Each Supply Source.

[3] See ICF 2019. Renewable Sources of Natural Gas: Supply and Emissions Reduction Assessment. Prepared for American Gas Foundation. Available at https://gasfoundation.org/2019/12/18/renewable-sources-of-natural-gas/.

[4] HG uses the unit CO_2 (short for carbon dioxide) in its Draft IRP Report and Rate Model, rather than CO_2e, meaning carbon dioxide equivalent. The Draft IRP report indicates that the modeling considers Scope 1, 2, and 3 emissions, which include methane emissions during production, liquefaction, transportation, transmission, and distribution, as well as carbon dioxide emissions post-combustion. HG should confirm that the modeling captures all lifecycle emissions associated with its product (including methane); if so, the unit should be changed throughout to "CO_2e."

Group, HG should provide a detailed description of what emissions are included in each lifecycle step (End-User, Transmission & Distribution, and Upstream Emissions) and the associated GREET inputs and assumptions.

HG uses supply curves for landfill gas and a combined RNG supply curve for average U.S. RNG production facilities as the basis of the RNG supply cost assumptions.[5] The combined RNG supply-cost curve presented in the cited ICF report is for ICF's "high resource potential scenario."[6] This scenario may be too optimistic. We discuss risk related to RNG resources in the section of this memo on Lack of Assessment of Risks.

Offsets

Representing one metric ton of CO2e emissions reduced, an offset is a purchasable credit from a project intended to reduce GHG emissions, increase carbon storage, or increase GHG removals from the atmosphere. HG incorporates offsets into its modeling to allow each scenario to reach zero emissions.

Our concerns with offsets fall into four categories: eligibility of offsets for compliance with Hawaii statutes, issues with the legitimacy of emissions reductions associated with offsets, costs of offsets, and offset incorporation into the model.

Eligibility of generic offsets to comply with the statute. HG's emissions scoring relies heavily on purchased carbon offsets. On page 24 of the Action Plan, HG notes that offsets from *local* sequestration of atmospheric carbon and GHG emissions are mentioned in HRS § 225P-5.[7] This statute does not specifically mention offsets that are not local. While we are not lawyers, we read the law's geographic specification as indicating that carbon offsets derived from projects in other jurisdictions will *not* satisfy Hawaii's requirements. This was a conclusion of the Greenhouse Gas Sequestration Task Force Report, which found that because Hawaii's Zero Emissions Clean Economy target requires that local carbon sequestration exceeds the state's greenhouse gas emissions, "no offsets from outside of Hawai'i should be used to meet this goal."[8] While the question of which types of offsets will count toward Hawaii's emissions reduction policy is outstanding, the more prudent course of action would be to plan as if externally sourced offsets are not eligible. To address the risk that externally sourced offsets are not eligible for compliance with the GHG emissions policy, HG should develop a scenario that does not include externally sourced offsets. While the Draft IRP Report mentions resource plans without offsets, HG did not provide any quantitative details or graphs showing the impact that excluding externally sourced offsets has on the cost or performance of the scenarios. Excluding offsets has no apparent

[5] Phases 1-3 Summary memo, pages 28-31.

[6] ICF International. 2019. Renewable Sources of Natural Gas: Supply and Emissions Reduction Assessment. Prepared for American Gas Foundation. Available at https://gasfoundation.org/2019/12/18/renewable-sources-of-natural-gas/.

[7] "Zero emissions clean economy target." Hawaii Revised Statute § 225P-5. Available at: https://www.capitol.hawaii.gov/hrscurrent/Vol04_Ch0201-0257/HRS0225P/HRS_0225P-0005.htm

[8] State of Hawaii Office of Planning. 2019. Feasibility and implications of establishing a carbon offset program for the State of Hawaii. Available at https://planning.hawaii.gov/sustainability/carbon-offset-program/.

impact on the model.[9] HG should also provide transparency about assumptions about local offsets versus externally sourced offsets in the existing scenarios and all new scenarios.

Legitimacy of emissions reductions from offsets. Many offsets on the market today fall short on one or more of the following criteria for ensuring that claimed emissions reductions actually occur: permanence, additionality, verifiability, enforceability, and realness.[10] Failing to achieve any one of these criteria may mean that the offset does not actually lead to GHG emissions reductions. Indeed, verified carbon offset registries receive heavy criticism for lack of transparency regarding the actual impacts of their carbon offset projects. As one example of the problems with lack of permanence seen with verified offsets available on the market, a satellite analysis released in December 2022 detected no real climate benefit from 10 years of forest carbon offsets administered by the American Carbon Registry and the Climate Action Reserve in California.[11]

As another example of concerns with offsets, they do not represent a reduction in carbon emissions unless they are additional, that is, they would not occur without the support provided by the offset revenue. Problems with lack of additionality are widespread: according to a study of the United Nation's Clean Development Mechanism, 85 percent of the certified emissions reduction projects analyzed were unlikely to be additional.[12]

We note that concerns have been raised in other proceedings before the Hawaii Public Utilities Commission (HPUC) regarding the veracity of carbon offsets.[13] It is our understanding that these concerns have not been resolved to the satisfaction of the commission.

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[9] IRP Draft Report, p. 80.

[10] *Permanent* means the emissions reductions or removals should not be reversible, i.e., a reduction in emissions now will not be followed by an equivalent increase in emissions later.

Additional means that the offset project represents new emissions reductions. Offsets are additional if they enable carbon reduction to occur that would not otherwise occur without the offset funding.

Verified emissions reductions from offsets are regularly monitored by an independent third party.

Enforceable means that only one credit can be claimed for the offset.

Real means that an offset represents one ton of carbon emissions reduced as the result of the offset project without displacing the emissions elsewhere.

[11] Coffield, Shane and James Randerson. 2022. "Satellites detect no real climate benefit from 10 years of forest carbon offsets in California." *The Conversation*. December 1. Available at: https://theconversation.com/satellites-detect-no-real-climate-benefit-from-10-years-of-forest-carbon-offsets-in-california-193943; Coffield, S.R., Vo, C.D., Wang, J.A, Badgley, G. Goulden, M.L., Cullenward, D., Anderegg, W.R.L, & Randerson, J.T. 2022. "Using remote sensing to quantify the additional climate benefits of California forest carbon offset projects". *Global Change Biology* (Vol. 28, Issue 22). Available at: https://onlinelibrary.wiley.com/doi/10.1111/gcb.16380.

[12] Cames, M., Harthan, R. O., Füssler, J., Lazarus, M., Lee, C. M., Erickson, P., & Spalding-Fecher, R. 2016. *How additional is the clean development mechanism? Analysis of the application of current tools and proposed alternatives*, 2017-04. CLIMA.B.3/SERI2013/0026r. https://www.verifavia.com/uploads/files/clean_dev_mechanism_en.pdf.

[13] See, Docket No. 2017-0122, D&O No. 38395, p. 128.

Cost of offsets. In the most recent version of the Rate Model, HG added information on carbon offset costs to the "Supply Portfolio (Live)" tab.[14] HG assumes a cost of $50 per metric ton of carbon emissions, which would equal approximately $5 to $7 million dollars each year from 2040 to 2045 in HG's Preferred Resource plan. Importantly, this cost is not incorporated anywhere else in the Rate Model and does not impact rates or system costs. Incorporating the benefits of offsets without their costs is erroneous and would likely skew the analysis to favor scenarios that rely heavily on offsets for achieving net-zero emissions. The cost of offsets should be incorporated into the cost of each scenario that relies on them and should be reflected in each scenario's revenue requirement and customer rates. Further, the price of offsets should not be assumed to be flat. According to a report cited in HG's Action Plan,[15] the costs of offsets are expected to grow over time. This report, authored by Trove Research and University College London, projects that the marginal cost of creating the offsets will range from $20–$50/ton (2020 dollars) by 2030, and the cost will increase to approximately $100/ton by 2050.[16]

Incorporation of offsets into the model. As mentioned by other Advisory Group members (such as the Independent Entity) HG's emissions reductions scoring criteria does not distinguish between actual emissions reductions and purchased carbon offsets. Three out of the four Resource Plans modeled by HG (all except the Status Quo scenario) receive identical scores of 5 for emissions impact, signifying that they are expected to achieve the greatest emissions reductions. However, these scenarios have dramatically different emissions reductions from direct actions by HG relative to the Status Quo: 25 percent for the Technically Feasible Mix with Par resource plan, 73 percent for the Technically Feasible Mix without Par resource plan, and 100 percent for the Maximum Green Hydrogen and RNG Sensitivity resource plan. However, as discussed above, offsets suffer from problems that shed doubt on their effectiveness at reducing GHG emissions. The equal scoring of these three plans in terms of emissions does not make sense and is misleading. The Technically Feasible with Par scenario (HG's Preferred Plan) is given a score of 5 under GHG emissions impacts, yet relies on offsets for the majority of its emissions reductions in 2045 at a high cost. HG should revise its emissions scoring criteria to recognize that offsets should not be compared apples-to-apples with actual GHG emissions reductions.

Additionally, there appears to be an error in the emissions calculation. In all except the Status Quo scenario, offsets are purchased to achieve a hypothetical net-zero emissions supply portfolio. HG calculates "Emissions Reductions" for the years 2035 to 2045 as the difference between Status Quo emissions and scenario emissions for each year. HG assumes for the years 2040 through 2045 that carbon offsets will cover any remaining emissions. However, HG calculates the amount of carbon offsets to reach zero metric tons CO2 by subtracting the Emissions Reductions from the Scenario Emissions,

[14] 01/25/2023 Rate Model, tab "Supply Portfolio (Live)", rows 126-128.

[15] Action Plan, p. 26.

[16] UCL News. Ten-Fold Increase in Carbon Offset Cost Predicted. June 4, 2021. Available at https://www.ucl.ac.uk/news/2021/jun/ten-fold-increase-carbon-offset-cost-predicted.

thus double-counting the emissions reduction relative to the Status Quo case. HG should correct this error.

Hydrogen

Green hydrogen is one of the potential supply resource options HG is considering. On page 19 of the Action Plan, B&V defines the "Maximum Green Hydrogen and RNG Sensitivity," which has "no consideration of technical feasibility or cost." However, there are physical and technical limitations to incorporating hydrogen into the existing gas system. Traditionally, gas planners have assumed that the maximum percent of hydrogen that can safely be incorporated into standard pipelines is 20 percent by volume, which is equal to 7 percent by energy content. However, recent research is calling that assumption into question: a report to the California Energy Commission found that only 5 percent hydrogen by volume, or 1.75 percent by heat content, is safe.[17] While HG is currently already incorporating concentrations of hydrogen to up to 15 percent of its gas stream by volume,[18] the California research suggests that further analysis should be conducted to understand system vulnerabilities given the specific conditions and fuels to be used in Hawaii.

The latest version of the Rate Model provides the percent share of RNG and green hydrogen in the supply resource mix for each scenario.[19] However, it does not break out hydrogen from RNG, and thus the technical feasibility of hydrogen resource options is still not immediately clear. Additionally, this tab is set up to select Green Hydrogen (row 47) to meet demand unmet by Existing Supply inputs or RNG additions, without a constraint on the maximum percent of hydrogen allowed in the supply mix. For example, the Technically Feasible without Par scenario incorporates hydrogen immediately into the HG system in 2040 with a 25 percent share of demand, and then raises that share to 27 percent in 2045 and thereafter. And in the Max RNG and Green Hydrogen Scenario, hydrogen reaches up to 40 percent of supply in the Base Demand Scenario. These high levels of hydrogen would require substantial upgrades to the distribution system and customer end-use equipment. Hydrogen is not visible when it burns and thus requires special end-use equipment, which will incur additional cost for customers.[20] Likewise, there are safety issues with even modest concentrations of hydrogen in the existing distribution system, because metal pipes exposed to hydrogen become embrittled and more susceptible to cracking or breaking.[21]

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[17] Penchev, M., T. Lim, M. Todd, O. Lever, E. Lever, S. Mathaudhu, A. Martinez-Morales, and A.S.K.Raju. 2022. *Hydrogen Blending Impacts Study Final Report*. Agreement Number:19NS1662. California Public Utilities Commission. Available at:https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M493/K760/493760600.PDF.

[18] HG Remand RT-1, page 13.

[19] 1/25/2023 Rate Model, tab "Supply Portfolio (Live)", row 130.

[20] Melaina, M., Antonia, O., Penev, M. 2013. *Blending Hydrogen into Natural Gas Pipeline Networks: A Review of Key Issues.* National Renewable Energy Laboratory Technical Report NREL/TP-5600-51995. Available at: https://www.nrel.gov/docs/fy13osti/51995.pdf.

[21] Penchev, M., T. Lim, M. Todd, O. Lever, E. Lever, S. Mathaudhu, A. Martinez-Morales, and A.S.K.Raju. 2022. *Hydrogen Blending Impacts Study Final Report*. Agreement Number:19NS1662. California Public Utilities Commission. Available at:https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M493/K760/493760600.PDF.

HG is planning to convert its system from steel to polyethylene pipe. In the Action Plan, HG provides information on the pipeline materials in its current system. Of HG's Oahu pipeline system mains, 85 percent are made of either cathodically protected, coated steel or plastic (polyethylene).[22] HG notes that polyethylene pipe is generally less prone to corrosion and leakage. As discussed below, however, the number of miles of unprotected metal pipe is large and at the current rate of replacement would still be present when hydrogen concentrations would increase in two of the scenarios.

For hydrogen production, HG assumes a 100 MW electrolyzer operating at 70-percent capacity, with an initial upfront cost of $106 million in 2022.[23] HG uses the International Energy Agency's (IEA) 2019 report on hydrogen for cost assumptions. However, the costs of electrolyzers vary by the type of electrolyzer: according to the IEA report, the capital expenditure for a 100 MW alkaline electrolyzer could range from $70 to $140 million and $90 to $180 million for a PEM electrolyzer.[24] HG's $106 million cost estimate is at the low end of the cost for a PEM electrolyzer and about average for an alkaline electrolyzer, without any cost adjustment for Hawaii. HG should provide data sources and assumptions behind the $106 million capital cost estimate, and consider which type of electrolyzer is most suitable for HG's applications. HG and B&V should provide a high-level assessment of suitable electrolyzers and develop appropriate cost estimates for Hawaii.

In addition to the upfront costs of the electrolyzer facility, HG has omitted any discussion of its assumptions about the costs of hydrogen infrastructure, such as new pipes or the risk of pipe degradation from high hydrogen exposure. These costs and risks should ultimately be reflected in the overall economic assessment of scenarios that require high levels of hydrogen. In particular, without properly incorporating risk analysis, pipeline and safety investments, and a technically feasible percent of hydrogen, the Max Green Hydrogen scenario is simply unrealistic and does not represent a possible future for HG. While HG apparently conducted a sensitivity to consider uncertainty in the price of hydrogen, it is not clear whether this sensitivity applies to all scenarios that utilize hydrogen or how the sensitivity impacts the model results—if at all.[25]

System expansion

On page 21 of the Action Plan, "Utility System Expansion" is listed as a potential non-supply resource option. System expansion will increase rate base and could cause potentially larger stranded costs in the future if customer defection, increasing supply costs, and/or regulation leads to unsustainable rate increases. If system expansion is included as a resource option, the increase in risk of future stranded assets should be made clear.

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[22] Page 22, Draft Action Plan. January 25th, 2023.

[23] Phases 1-3 Summary memo, pages 34-35.

[24] International Energy Agency. 2019. *The Future of Hydrogen – Sizing today's opportunities.* Table 3, page 45. Available at: https://iea.blob.core.windows.net/assets/9e3a3493-b9a6-4b7d-b499-7ca48e357561/The_Future_of_Hydrogen.pdf

[25] Draft IRP Report p. 69, Figure 43.

Omitted resource options

Some technologies were not included as resource options, including electric heat pump water heaters and solar hot water systems.[26] These measures are standard for inclusion in non-pipeline alternatives, which some states require utilities to consider before traditional supply-side projects will be permitted or before their costs can be recovered in rates.[27] These measures can reduce GHG emissions relative to gas water heating systems running on the current, SNG-heavy supply mix. Solar hot water would provide emissions reductions compared to gas water heating systems running on the lower-GHG gas supply contemplated in HG's three alternative scenarios. Heat pump water heaters would likely reduce emissions relative to water heating with lower-GHG gas too, if reasonable assumptions are used regarding the emissions reductions from different types of RNG.

Incentives are available from Hawaii Energy for solar hot water systems. Especially with rebates and tax incentives from the 2022 *Inflation Reduction Act* (IRA), electric heat pump water heaters are cost- effective and an attractive alternative to gas water heating. With likely technology advances, heat pump water heaters will become increasingly cost-competitive and/or see reductions in the total cost of ownership. Costs of heat pump water heaters are discussed further in the Model Design section of this memo.

HG has not justified excluding these technologies from the resource options available to meet its demand. The omission of these resource options is a serious flaw. This leads to an unbalanced, incomplete set of scenarios and, in turn, modeling that does not reflect the full set of options for addressing the energy needs of HG's ratepayers. HG should redesign its scenarios to include these resource options.

Scenarios

Three of the scenarios used in the modeling lack viability or consistency with state policy. The presentation of these scenarios, only one of which (the preferred plan) is a practical possibility, presents serious concerns.

As discussed above, the level of hydrogen in the existing distribution system can only rise to a relatively small percentage of the gas stream before triggering safety concerns. Two scenarios (Maximum Green Hydrogen and RNG and Technically Feasible without Par scenarios) use a level of hydrogen that cannot

[26] HG did include electric heat pump water heaters in the customer defection analysis. However, HG did not include heat pump water heaters (individually or as a portfolio of measures) as a resource that could meet projected gas demand.

[27] For example, in New York non-pipeline alternatives are integrated into the gas utilities' planning processes for both specific avoidable projects in a particular area of the distribution system, as well as for reducing overall demand and the need for infrastructure investment system-wide. These NPAs include electrification, clean demand response, temporary supply, and energy efficiency. Criteria for identifying NPAs are proposed by utilities but generally include emissions and environmental impact, reliability, practicality, and cost. (New York Public Service Commission. Order Instituting Proceeding. Case 20-G-0131: Proceeding on Motion of the Commission in Regard to Gas Planning Procedures. March 19, 2020. *See also,* New York Public Service Commission. Order Adopting Gas System Planning Process, Case 20-G-0131, May 12, 2022.)

be safely accommodated in the existing distribution system. Further, neither scenario appears to incorporate the costs to upgrade the distribution system to accommodate these high levels of hydrogen. While HG intends to continue replacing metal pipe in is system, it has about 90 miles of unprotected steel pipe remaining according to Pipeline and Hazardous Materials Safety Administration data. The current replacement rate is only 1–3 miles per year. Optimistically, assuming that HG will replace 3 miles of pipe per year, it will take HG about 30 years to convert all of its unprotected steel pipe to plastic. This timeline for phasing out unprotected steel pipe does not mesh with the timeline assumed by these two scenarios, which both incorporate large shares of hydrogen in the gas stream starting in 2040—only 17 years from now.

Based on the capital expenditure (CapEx) plan provided by HG, it does not appear that HG proposes to increase the speed of pipe replacement, although the CapEx plan is somewhat opaque. Specific CapEx investments are not identified in the Draft Action Plan or Rate Model. The tab "HG Capex Plan" in the Rate Model aggregates CapEx investments into generic budget categories. On page 43 of the November 30th Phases 1-3 Summary memo, it says "Black & Veatch utilized Hawaii Gas' latest filed capital expenditure (or CapEx) projection as the initial starting point for 2022 through 2026," but there are no citations or links to any of those documents in the Excel model or Summary memo. This makes it difficult for Advisory Group members to fully review capital expenditure assumptions and calculations. This is another area of the model that lacks proper feedback or iteration. Replacement of the distribution system and end-use equipment to accommodate higher concentrations of hydrogen involves very high costs, and avoiding these costs would provide great benefits to ratepayers. If HG does not increase the rate of pipe replacement, two of the scenarios are not viable as specified in the model.

Another problem with the scenarios is the lack of consideration of a real alternative that is responsive to the risk that Par will no longer be available to provide the SNG feedstock. The Technically Feasible without Par scenario is identical to the Technically Feasible with Par scenario through 2034. In reality, the prudent course of action would likely involve diversifying the supply mix before SNG feedstock is no longer available from Par.

Likewise, the analysis does not adequately address the possibility that Par may retire on a different timeframe than considered or that the price of Par feedstocks increases significantly. The Rate Model allows users to select different years for Par retirement. However, HG has not provided any quantitative analysis of the impacts of earlier Par retirement dates in its Draft IRP Report or provided a scenario in which Par retires much earlier than HG assumes. The analysis also lacks consideration of dramatic increases in Par costs within the timeframe of the Action Plan. HG should provide an analysis of these risks.

Further, we note that the Status Quo Resource Plan is not consistent with Hawaii's GHG reduction policies. This scenario includes neither investment in technologies to reduce GHG emissions, nor GHG emissions offsets.

According to HG's modeling, the chosen scenario is the only viable option. However, the failure to include viable resource options (as discussed above) means that there are potentially preferable

scenarios that were not considered. Lacking consideration of these technologies, the analysis presented by HG cannot be considered a comprehensive or objective plan. HG should include at least one scenario that includes electrification and solar hot water as measures for addressing demand.

Model design

The model does not integrate the customer defection analysis, a key analysis, into a meaningful way. Likewise, it does not optimize the results. The modeling does not articulate a vision for how HG's commodity can be directed to the best and most valuable uses, nor does it adequately consider stranded costs. Each of these points are discussed further below.

Lack of Integration of Customer Defection Analysis into Modeling

The integrated Rate Model includes a "Customer Defection" tab comparing the total cost of ownership of gas-fired water heating and cooking with non-gas alternatives based on assumptions of appliance and installation costs. These assumptions are not included in the Draft Action plans but are described in the November 16th Customer Impact and Optimization memo. In the latest Rate Model, HG assumes an installation cost of $1,500 for a heat pump water heater. These costs appear to be high. According to a 2021 literature review by Lawrence Berkeley National Laboratory, the installation labor costs for a heat pump water heater range from $635 to $965.[28] Even with a 32 percent cost of labor adjustment to account for higher costs in Hawaii, the cost (approximately $835 to $1,275) would still be lower than HG assumes.

HG's analysis does not differentiate between existing homes and new construction for any appliance, which would affect the installation cost assumptions. HG assumes an installation cost of $1,000 for a traditional electric water heater. We expect the cost of a traditional water heater to be less than the cost of a heat pump water heater, and thus this estimate seems too high. Additionally, HG does not include any installation cost for a natural gas water heater, which means that upfront costs for electric and natural gas water heaters are not compared on an apples-to-apples basis.

For appliance costs, HG obtained equipment prices from the Home Depot website for Hawaii.[29] The modeling assumed a 50-gallon natural gas water heater would cost $729, and a traditional 50-gallon electric water heater would cost $800. Synapse reviewed the website's equipment prices. The price range on the website is $729 to $1099 for a 50-gallon gas water heater with a 12-year warranty, with an average price of $960. However, for a 50-gallon electric water heater with a 12-year warranty, the price ranges from $759 to $950, with an average price of $867.[30] HG should provide additional details on all of

[28] Walker, Iain, Brennan Less, Nuria Casquero-Modrego, and Leo Rainer. 2021. "The Cost of Decarbonization and Energy Upgrade Retrofits for US Homes." https://doi.org/10.20357/B7FP4D.

[29] Black & Veatch and Hawaii Gas, Customer Bill Impact and Supply Optimization (Update) memo, November 16th, 2022.

[30] It is important to note that some of the electric water heater models also have a built-in WiFi enabled control and monitoring system. These control systems can facilitate energy savings by enabling users to easily turn down temperature settings when hot water is not needed.

the water heater models considered and clarify how it calculated the appliance price to ensure that electric and natural gas water heaters are compared on equal terms.

The IRA offers Efficiency Tax Credits for 30 percent of the cost of qualified energy efficiency projects, up to $2,000 for heat pump water heaters.[31,32] The IRA also created the High-Efficiency Electric Home Rebate Program. Under this program, households earning less than 80 percent of the area median income are eligible for a rebate of up to $1,750 for heat pump water heater installation; households earning up to 150 percent of the area median income can receive a rebate of up to $875 for that measure.[33] Income-eligible households can use the tax credit and claim the rebate. In the latest version of the Rate Model, HG applies the 30 percent rebate to the appliance cost and the installation cost for a total rebate of $1,050. However, the analysis does not consider the full range of other rebates or tax credits available to residential customers. For example, Hawaii Energy offers a $500 instant rebate for heat pump water heaters.[34] Also, we note that HG has provided analysis of heat pump water heaters, but not solar hot water heaters. The Hawaii Energy source[35] that HG uses to compare annual water heater energy usage includes solar hot water heaters as an option, and Hawaii Energy offers an instant rebate of $1,250 for solar hot water heating, not including state or federal tax credits.[36]

Even with these omissions, the customer defection analysis reveals that the total cost of ownership of natural gas water heating becomes more expensive than electric heat pump water heaters by 2031. These economics suggest that customer defection could become an issue within 10 years, well within the period of analysis. If we add the $500 Hawaii Energy rebate on heat pump water heaters into the model, the total cost of ownership for the electric water heater becomes competitive with gas water heating even sooner—by 2025 rather than 2031.

Finally, the Rate Model lacks sufficient feedback loops, specifically regarding the customer defection analysis. HG's customer defection analysis lacks a quantitative assessment of the actual potential loss of customers or demand from electrification of customer end uses, which makes the question of stranded assets and a potential "death spiral" a qualitative comparative analysis instead of an-depth analysis of HG's potential futures. In the latest Rate Model, HG added a Customer Defection Impact section to the "Supply Portfolio (Live)" tab, which calculates the annual residential bill increase if 5, 10, 20, or 30

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[31] American Council for an Energy-Efficient Economy. 2022. "Policy Brief: Home Energy Upgrade Incentives." https://www.aceee.org/sites/default/files/pdfs/home_energy_upgrade_incentives_9-27-22.pdf.

[32] Note: the IRA 25C tax credit includes electric upgrades needed to switch to heat pumps.

[33] House Committee on Ways & Means and House Committee on Energy & Commerce. 2022. "The Inflation Reduction Act: Information on Energy Rebates and Tax Credits Available to Constituents to Help Them Save Money." Available at https://larsen.house.gov/uploadedfiles/11.29.22_inflation_reduction_act_ira_energy_rebate_and_tax_credit_information_fact_sheet.pdf.

[34] "Hawaii Energy - Water Heating Rebates." n.d. Accessed December 15, 2022. https://hawaiienergy.com/for-homes/rebates/water-heating.

[35] "Hawaii Energy - Water Heating Types." n.d. Accessed December 15, 2022. https://hawaiienergy.com/for-home/water-heating/water-heating-types.

[36] Hawai'i Energy. n.d. "The Cost of a Solar Water Heating System." Accessed December 15, 2022. https://hawaiienergy.com/for-homes/solar-water-heating/the-cost-of-a-solar-water-heating-system.

percent of residential customers leave the HG system.[37] Bill impacts range from approximately $27 to $33 for the 5-percent defection case, to over $250 in the 30-percent defection case (a 43 percent increase). While this addition is helpful for understanding the potential impacts of defection for HG, these calculations are not iterative, nor are they directly related to the analysis of payback periods and total cost of ownership on the "Customer Defection" tab. Considering the large bill impacts that could occur if HG's residential customers start to defect, HG should include a "high defection" demand sensitivity that would show how this would affect HG's system and rates. HG has not provided any analysis of what customer classes or end uses may be least likely to defect or electrify, which could be one potential strategy for HG to sustain part of its current business if residential customers trend towards electrification.

In addition, the model should incorporate customer defection in all scenarios. As discussed above, customer defection will be a challenge for the utility within 10 years, even in the Status Quo Plan. Given the influence of the IRA and other factors, it is not reasonable to assume that load will continue to reflect only historical trends.

Failure to Consider Most Critical Uses of Limited Resources

The modeling does not consider that certain uses of gas may be more expensive or difficult to power using alternatives, such as with electrification. For example, while electric water heating measures are readily available and efficient models are increasingly cost-competitive, electric alternatives for heavy- duty vehicles are generally not available or cost-effective.

The failure to consider the value of gas for different end uses may stem from HG's lack of data on how its customers use its product. In early Advisory Group meetings, HG indicated that it does not have breakdowns of consumption by end user type. In the November 14th technical session, B&V mentioned an estimate that 70 percent of residential customer consumption is for water heating. The estimate of sales for water heating is helpful but was not accompanied by any information about the source of or HG's confidence in the assumption. A survey of gas end uses by customer type would enable the state to consider which energy uses, and associated emissions, most highly value remaining on gas.

Lack of Substantial Analysis of Stranded Assets

An Impairment Analysis and Bill and Rate Impact Analysis are required by the change of control regulations to determine "how the State's climate goals will impact Hawaii Gas through new capital additions."[38] In the Draft IRP Report, HG indicates that it "believes it has satisfied CA COA No. 6/SEO COA No. 10 from Docket No. 2021-0098."[39] As mentioned earlier, HG has incorporated a Customer Defection tab into the Rate Model but has not comprehensively analyzed potential system impacts of

[37] 01/25/2023 Rate Model, tab "Supply Portfolio (Live)", rows 144-154.

[38] Decision and Order No. 38478. Docket No. 2021-0098 (June 29, 2022).

[39] Draft IRP Report, p. 130.

large defection rates and stranded assets. We also note numerous problems with the customer defection analysis, described above. These problems must be remedied first. Given that the current customer defection analysis shows that heat pump water heaters will be cost-competitive within several years, we expect that the revised analysis will show an even greater risk of customer defection in the near term. Sustained declines in sales, such as may result from electrification, can result in increasing rates (to recover the capital invested, now over fewer unit sales). Accordingly, HG should provide a comprehensive plan for managing the risk of stranded assets (such as by minimizing new investments that may be stranded in the future, and pairing strategic retirement of existing assets with alternative depreciation schedules). HG's plan should also include transitioning to a gas utility business model that is consistent with Hawaii's policy objectives.

Lack of assessment of risks

The modeling completely neglects the risks that lie ahead for the Company. For the reasons provided in this memo, customer migration due to electrification or moving to unregulated gas service is a real risk to HG, and by extension, to its ratepayers.

In addition, there is a substantial risk that the RNG resources will not develop on the scale or timeframe that HG anticipates. Alternatively or in addition, RNG may be more expensive than predicted. This could be a source of risk for HG and its customers in the future, which is not addressed by HG in its modeling. HG evaluates each of its four scenarios with high and low price sensitivities to examine the impact of commodity prices on customer bills, using Energy Information Agency high and low price projections.[40] However, these price sensitivities only affect the prices of conventional fuels (LNG, SNG). HG should conduct a sensitivity analysis of higher or lower RNG prices or availability.

Criteria for selection of alternative

Overlap between Criteria

There are substantial overlaps between HG's chosen criteria. As defined, reliability is tied to the need to deploy more expensive propane air and is more indicative of costs than of a change in the reliability of service. Likewise, the Customer Affordability and the Limited Defection with Stable Customer Base criteria both reflect costs. The potential for HG customers to defect based on costs of electric appliance alternatives is directly related to the gas bill costs they face compared to alternative energy costs. In Table 5-1: Preferred Resource Plan Quantitative Evaluation Matrix (page 29 of the Draft Action Plan), the rationale for a score of 4 is that the total cost of ownership for gas water heaters is higher than electric starting in 2030, and it has payback periods greater than 10 years. The Limited Defection with Stable Customer Base evaluation criterion is scored based on affordability for customers, not an actual representation of whether HG's customer base is stable or has limited defection.

[40] Draft IRP Report, p. 81.

Definition of the Limited Defection with Stable Customer Base criterion

HG's definition of the Limited Defection with Stable Customer Base criterion (previously the Sustainability of HG Business criterion) is problematically tied to HG's current business model. On page 14 of the Action Plan, HG lists the Limited Defection with Stable Customer Base criterion as a key evaluation metric and claims that it is consistent with HPUC guidance. HPUC guidance does not specifically state that the sustainability of HG's business is a goal *per se*; rather, it is through the goal of providing safe and reliable utility service at reasonable cost that the health of the utility matters.[41]

HG says that the intent of the Limited Defection with Stable Customer Base criterion is to "assess the longer-term impact of different Resource Plans and corresponding energy bills" on customers and the utility itself. HG gives this criterion a weighting of 10 percent, as opposed to the 30-percent weighting for the other criteria (customer energy affordability, emissions reduction impact, and reliability). Yet, without a proper analysis of the potential for defection, stranded assets, and high rate impacts, the interpretation of the Limited Defection with Stable Customer Base criterion as maintaining throughput and customers undermines HG's ability to find the optimal plan to comply with state policy requirements. The least-cost, lowest-emissions, most affordable and most reliable scenario might involve a downsized system with HG serving the end uses for which alternatives to gas do not exist or are cost-prohibitive. We find that the definition of this criterion—and its tie to maintaining a system very similar to the system that exists today—reflects the lack of flexible and creative thinking that has permeated the IRP process. This criterion should be deleted or revised to allow for consideration of alternative business models that are more consistent with Hawaii policy than is the gas system of today.

Net present value of revenue requirements

The Independent Evaluator's recent report recommends a net present value of revenue requirements criterion. This metric would provide a more direct and more transparent representation of cost, since it would not involve the allocation of cost to rate classes.

We recommend that the criteria be defined to minimize overlap, to allow consideration of alternative business models, and to reflect costs more transparently and accurately.

Consumer Advocate Conditions of Agreement from the Change of Control Proceeding

Two Consumer Advocate Conditions of Agreement from the Change of Control proceeding, CA_COA No. 1 and CA_COA No. 6, are particularly relevant for the IRP process. [42]

[41] Order No. 38189, Docket No. 2022-0009.

[42] Decision and Order No. 38478, Docket No. 2021-0098.

Along with a rate credit requirement, CA_COA No. 1 requires HG to commit to a minimum level of clean energy transformation capital expenditures, to be determined in the IRP proceeding. In the Draft IRP Report, HG points to its estimate of annual expenditures to support the implementation of options selected as evidence that this COA is satisfied. However, we find that HG has not provided adequate details on its proposals for clean energy transformation capital expenditures in the IRP process, or how the proposed IRP capex investments differ from what HG previously provided to the Commission in its capex plan. The IRP capex investments are bucketed into relatively high-level categories, including intangible plant, production plant, storage plant, transmission plant, distribution plant, and general plant. Notably, the categories provided in the IRP capex projection are not the same categories used in the previously filed capex plan.[43] These high-level categories do not provide sufficient detail to assess whether the proposed investments are likely to be sufficient to support any specific clean energy commitment.

We also note that the assumptions for the high RNG capex investment under the IRP are generic for hypothetical landfill gas and construction waste debris projects. As explained above, we have concerns that about HG's emissions assumptions for RNG. The basis for these assumptions should be made more transparent and should be justified to the AG. If the proposed RNG does not reduce emissions, the proposed capex cannot be reasonably called "clean energy transformation capital expenditures."

We conclude that there are insufficient details to assess whether this COA has been satisfied. HG should provide additional information, including a breakdown of IRP-proposed capex by the more granular categories used in the previously filed capex proposal.

CA COA 6 calls for HG to "undertake an impairment analysis as part of the IRP Proceeding" and to "undertake a bill and rate impact analysis of how the State's climate goals will impact Hawaii Gas through new capital additions as part of the IRP Proceeding." This memo identifies numerous, substantial concerns with the customer defection analysis and how that analysis is not incorporated into the IRP modeling. Given those concerns, HG has not met our expectations for an impairment analysis.

Regarding the bill and rate impact analysis, we have concerns with cost and investment assumptions, as discussed above. Further, we do not believe that the IRP included a reasonably comprehensive review of the options and do not find that HG's preferred alternative represents an optimal solution. Therefore, we do not find that the provided bill and rate impact analysis provides a reasonable estimate of the impacts that the State's climate goals will have on HG customers. HG should address the concerns we discussed herein regarding the resource options, scenarios, model design, and criteria for selection

[43] The filed capex plan included planned spending for computer projects, equipment/tools/other, facilities, maintenance/renewals, meter tank regulator & new connections, new business, safety and environmental compliance, SNG plant, vehicles, and RNG. The categories provided in the filed capex plan are somewhat more descriptive about the nature of the proposed investments than the IRP projected categories. See, HG CapEx tab, HG BV IRP Rate Model DRAFT v9 01.06.23.xls.

before selecting and recommending a specific plan, which should inform the capital additions that underlie the bill and rate impact analysis called for in this COA.

The foregoing document was electronically filed with the State of Hawaii Public Utilities Commission's Document Management System (DMS).