

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII

-----In the Matter of-----)
)
PUBLIC UTILITIES COMMISSION) Docket No. 2022-0009
)
Instituting a Proceeding to)
Investigate Integrated Resource)
Planning for The Gas Company,)
LLC, dba Hawaii Gas.)
)
)

INDEPENDENT FACILITATOR'S ADVISORY GROUP REPORT:
FINAL REPORT ON HAWAII GAS INTEGRATED RESOURCE PLANNING
ADVISORY GROUP PROCESS

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Independent Facilitator's Advisory Group Report: Final Report on Hawaii Gas Integrated Resource Planning Advisory Group Process

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Table of Contents

Introduction	1
Hawaii Gas Overview	2
Regulatory Context	4
Advisory Group Process	6
Hawaii Gas' Work Plan	8
Overview of Hawaii Gas' Approach to IRP Development	10
Feedback from the Advisory Group	20
Hawaii Gas' Response to Advisory Group Feedback	23
Draft IRP Report: Comments from Advisory Group	28
Hawaii Gas' Responses to Draft IRP Comments	29
Conclusion	29
Appendix 1: Summary of Advisory Group Meetings	31

Introduction

The Hawaii Public Utilities Commission (Commission), in Decision and Order No. 38068, directed Hawaii Gas to file an Integrated Resource Plan (IRP). This Decision arose out of the Commission's concerns about Hawaii Gas' dependency on synthetic natural gas (SNG), as well as Par Hawaii Refinery's feedstock and infrastructure to produce SNG.¹ Subsequently, the Commission opened Docket 2022-0009 to address the IRP Report and related Action Plan.² Docket 2022-0009 was divided in two phases, with Phase 1 addressing the development and submission of an IRP Report, and Phase 2 addressing review of the submitted IRP Report.

This report summarizes the IRP development process and related Advisory Group process conducted as part of Phase 1 of Docket 2022-0009. This report is distinct from certification

¹ [Decision and Order No. 38068](#), issued November 12, 2021 in Docket 2020-0158.

² [Document Management System Website for HPUC Docket 2022-0009](#).

reports filed by the Independent Entity (IE) in Docket 2022-0009.³ This report is intended to provide an introduction to Hawaii Gas, summarize Hawaii Gas' approach for IRP development, synthesize Advisory Group feedback, and offer observations from the Independent Facilitator (IF), Gridworks, on the process and next steps. Gridworks holds editorial responsibility for the content of this report. Statements contained herein do not necessarily reflect the views of the IE, Hawaii Gas, the Advisory Group members individually or as a whole, nor the Commission.

Hawaii Gas Overview

Established in 1904, Hawaii Gas is the only regulated gas utility serving the state.⁴ However, Hawaii Gas differs from a typical monopoly utility because its services compete with those of electric utilities, non-regulated propane providers, and other energy sources.⁵ The utility distributes a blend of SNG through more than 1,100 miles of underground pipelines on Oahu and utilizes a network of liquefied propane gas (LPG) systems to serve all islands. This IRP process is the first for Hawaii Gas in over 20 years.

Supply Chain and Delivery

A vast majority of Hawaii Gas' supply chain is dependent on a byproduct from the Par Hawaii Refinery on Oahu called naphtha. Hawaii has no natural reserves of oil or natural gas so Hawaii Gas leverages naphtha to manufacture SNG composed of a mixture of approximately 85% methane, 10-12% hydrogen, and 3-5% other gasses. The SNG plant has an estimated potential capacity of approximately 110,00 therms per day (Hawaii Gas' daily SNG usage ranges from 65-84,000 therms/day).⁶

Hawaii Gas' supplies flow through two types of utility gas distribution systems: (1) the SNG system located on Oahu and (2) the LPG systems (Figure 1). The SNG system is primarily served by Hawaii Gas' SNG Plant and provides service to customers along the southern transmission corridor on Oahu. A small amount of imported liquified natural gas (LNG) and renewable natural gas (RNG) also flow through the SNG system, as available. The LPG systems serve customers on Oahu located away from the SNG system and all Neighbor Islands (Hawaii, Maui, Molokai, Lanai, and Kauai). There are over 250 holder tanks on 184 separate LPG utility

³ The Independent Entity is responsible for periodically reporting to the Commission at key stages in the IRP Process. For reference, see reports filed September 28, 2022 ([Attachment 1](#) and [Attachment 2](#)), December 19, 2022 ([Attachment 1](#) and [Attachment 2](#)) and February 23, 2023 ([Attachment 1](#) and [Attachment 2](#)) in Docket 2022-0009.

⁴ Hawaii Gas also operates an unregulated bottled gas service. The unregulated business operations, including any potential interaction with the regulated business operations, have not been considered in any analyses for the IRP Report.

⁵ [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, page 21.

⁶ [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, pages 30-31.

systems (some systems have more than one holder tank) that serve approximately 7,700 utility customers. Holder tanks are refilled by LPG supply vehicles.⁷

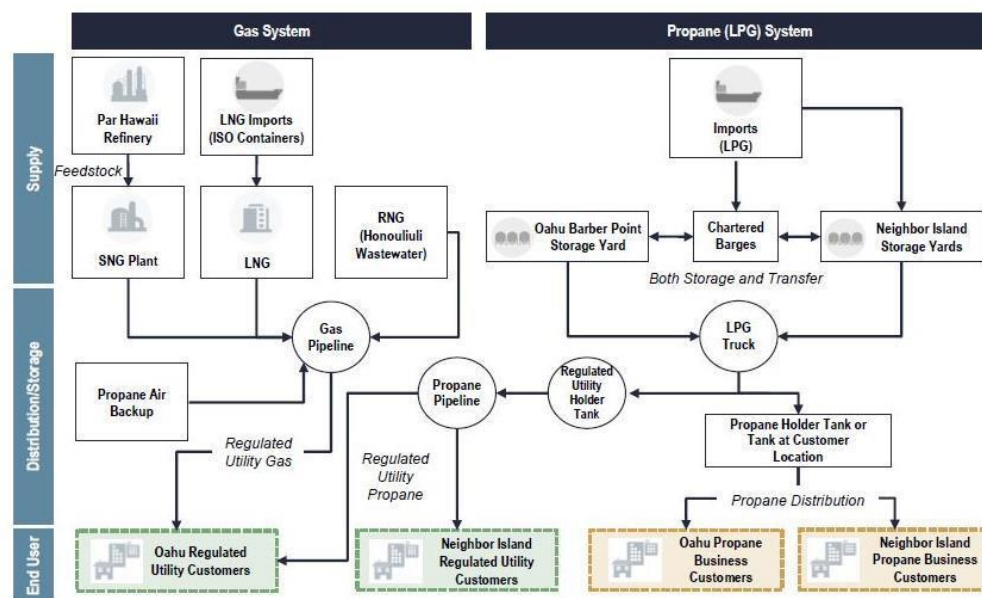


Figure 1. Hawaii Gas Supply Chain Summary⁸

Customer End Uses and Gas Demand

As of early 2022, there are approximately 36,000 customers across all islands receiving SNG or LPG, with about 80% of customers located on Oahu (Figure 2). Residential customers represent nearly 90% of customers, but only approximately 13% of total gas sales (Table 1).⁹

Residential customers use an average of 10 therms per customer per month for water heating, cooking, and clothes drying. Commercial and industrial customers (which includes agriculture, restaurants, hospitality, military, and government) primarily use natural gas for water heating and cooking. Demand from commercial customers is affected by exogenous factors such as tourism, the local economy, and overall weather. Other customer end uses include food processing (including drying and roasting), greenhouse climate control, laundry steam and drying, asphalt and aggregate/sand drying, sterilization, desiccant systems, and outdoor lighting.¹⁰

Hawaii Gas experiences relatively limited variability (10-15%) in gas demand on a daily and seasonal basis. The small seasonal fluctuation in gas demand throughout the year is well within the normal operating production range of the SNG plant on Oahu. Additionally, on a daily

⁷ [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, pages 33-35.

⁸ Hawaii Gas Presentation to the IRP Advisory Group, April 6, 2022, slide 8.

⁹ Table 4-1 of [Hawaii Gas 2023 Integrated Resource Planning Report](#), data as of December 31, 2022.

¹⁰ [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, page 40.

basis, the demand curve is relatively consistent, with demand beginning around 5am and increasing to the mid-afternoon. There is another peak around 8-9pm for cooking and water heating.¹¹

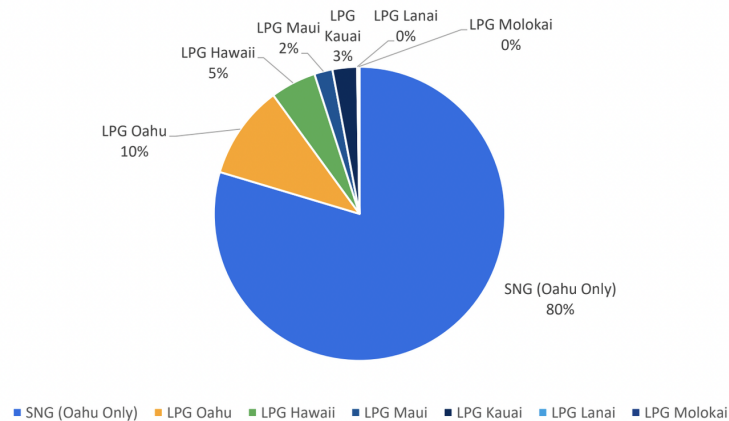


Figure 2. Proportion of Hawaii Gas Utility Customers by Island¹²

Table 1. Gas Demand by Island (Therms)¹³

	Commercial & Industrial		Residential		Proportion of Total Demand
	Demand	Number of Customers	Demand	Number Customers	
Oahu	26,280,568	3,393	3,509,716	28,460	88%
Hawaii	2,141,708	329	427,731	1,710	7.6%
Maui	893,190	113	130,601	713	3%
Lanai	0	0	17,220	25	0.03%
Molokai	0	0	11,709	83	0.05%
Kauai	116,559	44	168,499	1,075	0.8%
Total	29,432,025	3,883	4,265,476	32,066	
Proportion of Total	87.3%	10.8%	12.6%	89.2%	

Regulatory Context

As prescribed in Order 38189 opening the Hawaii Gas IRP Docket (Docket 2022-0009), Hawaii Gas is responsible for developing an IRP Report and Action Plan, in alignment with the 2011

¹¹ Hawaii Gas Response to Comment No. 90.

¹² Hawaii Gas Presentation to the IRP Advisory Group, April 6, 2022, slide 3.

¹³ Table 4-1 of [Hawaii Gas 2023 Integrated Resource Planning Report](#), data as of December 31, 2022.

Revised IRP Framework and any subsequently approved exception from that Framework. The 2011 Revised IRP Framework prescribes that IRP development include an Advisory Group process. Advisory Group members are selected by the Commission through an open solicitation process and may act as individuals with no requirement for group decision-making. Additionally, the utility is encouraged to collaborate with the Advisory Group, but ultimately is not required to accept Advisory Group recommendations.¹⁴

Concurrent with the IRP process, the Commission approved a proposed change of control of Hawaii Gas in Docket 2021-0098, with specific Conditions of Approval (COAs). Hawaii Gas negotiated these COAs in separate settlement agreements with the Consumer Advocate and Hawaii State Energy Office (HSEO). The COAs address a wide array of issues related to the change of control, including ratepayer benefits, risk mitigation, competition, corporate governance, state clean energy goals, and Hawaii Gas' clean energy transformation. Adopted COAs specifically related to this IRP proceeding include:

- Capital Expenditure Commitment: Hawaii Gas will commit to a minimum level of clean energy transformation capital expenditures to be determined by the IRP Proceeding (CA COA No. 1; SEO COA No. 9);
- Impairment Analysis: Hawaii Gas commits to undertake an impairment analysis as part of the IRP proceeding (CA COA No. 6; SEO COA No. 10);
- Bill and Rate Impact Analysis: Hawaii Gas shall 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 its IRP proceeding (CA COA No. 7; SEO COA No. 11);
- Credit Facilities: Hawaii Gas shall maintain the current net amount of credit facilities to help ensure sufficient liquidity until the IRP proceeding is concluded (CA COA No. 9);
- Feedstock/Fuel Management Plan: Hawaii Gas shall complete a feedstock/fuel management plan as part of the IRP proceeding, or within one year following consummation of the Proposed Change of Control, whichever comes sooner. The report will discuss, among other things, diversification of feedstock, risk reduction of fuel supply interruptions, and the transition to renewable or cleaner feedstock (CA COA No. 12; SEO COA No. 13);
- Carbon Transition Portfolio Standard (CTPS): Hawaii Gas commits to developing a CTPS in the IRP proceeding (SEO COA No. 1);
- Renewable Gas Tariff: Hawaii Gas commits to study a renewable gas tariff as part of the IRP proceeding and to implement a renewable gas tariff if it is determined to be reasonable and in the public interest by the Commission (SEO COA No. 4); and
- Energy Efficiency: Hawaii Gas commits to study energy efficiency as part of the IRP proceeding and to implement an energy efficiency commitment if it is determined to be reasonable and in the public interest by the Commission (SEO COA No. 5).¹⁵

¹⁴ [2011 Revised IRP Framework](#) at page 30.

¹⁵ [Decision and Order 38478](#), issued June 29, 2022.

Advisory Group Process

Establishing the Advisory Group

On January 19, 2022, the Commission issued Order No. 38189 to open the Hawaii Gas IRP docket, establish roles for various entities in the docket, and invite interested persons, agencies, and organizations to submit applications to participate in the Advisory Group.¹⁶ The Order named Hawaii Gas and the Consumer Advocate as parties to the docket. As parties, Hawaii Gas and the Consumer Advocate participated in the Advisory Group. The Order also established that an IE and IF would administer the Advisory Group process.

During March and April, 2022, through three Commission Orders, the Commission appointed an IRP Advisory Group composed of 22 member organizations representing a diverse set of interests and expertise.¹⁷ Representatives from the following organizations, listed in alphabetical order, participated in the Advisory Group:

- American Gas Association
- City and County of Honolulu, Office of Climate Change, Sustainability and Resiliency (CCSR)
- Coalition for Renewable Natural Gas (RNG Coalition)
- County of Hawaii Research and Development
- County of Kauai, Economic Development Energy Program
- Division of Consumer Advocacy (Consumer Advocate)
- Earthjustice
- Hawaii Harbors Users Group
- Hawaii Lodging and Tourism Association
- Hawaii Natural Energy Institute
- Hawaii Teamsters & Allied Workers Local 996
- Hawaii Restaurant Association
- Hawaii State Energy Office
- Hawaiian Electric Company
- Life of the Land
- Par Hawaii
- Simonpietri Enterprises LLC
- State of Hawaii, Department of Transportation, Harbors Division
- State of Hawaii, Greenhouse Gas Sequestration Task Force
- State of Hawaii, Office of Planning and Sustainable Development
- Ulupono Initiative
- University of Hawaii Economic and Research Organization (UHERO)

¹⁶ [Order No. 38189](#).

¹⁷ [Order No. 38263](#), issued March 7, 2022; [Order No. 38292](#), issued March 31, 2022; and [Order No. 38299](#) issued on April 5, 2022.

Order No. 38263, issued March 7, 2022, established Carl Freedman of Haiku Design and Analysis to serve as the Independent Entity (IE), and Gridworks to serve as Independent Facilitator (IF).¹⁸

Meetings Summary

Throughout the course of IRP and Action Plan development, the Advisory Group met 11 times, generally on the first Wednesday of the month. Additionally, three supplemental technical sessions were held to discuss analysis assumptions, approaches, and results in greater detail. Throughout the process, Advisory Group members were also invited to present to the Advisory Group on topics pertaining to their expertise. A summary of meeting dates, topics, and presentations is provided in Appendix 1.

Participation Among Advisory Group Members

Advisory Group members volunteered a substantial amount of time and effort to participate in the process and support the development of Hawaii Gas' IRP Report and Action Plan. Advisory Group members ranged in experience with regulatory processes, with some members having experience participating in regulatory dockets across the county, some being regular participants in Commission dockets in Hawaii, and some being completely new to participating in energy regulatory dockets.

All Advisory Group members were invited to all meetings, were invited to present to Hawaii Gas and the Advisory Group to share their perspectives and expertise, and were always welcome to speak and provide input during meetings. Nonetheless, some participants were more active than others in commenting throughout the process, and those comments comprise the majority of feedback summarized in this report. The reasons for differences in participation are unclear though they likely vary by participant. For example, some members may have preferred to observe and learn through the process, or wait until Phase 2 of the IRP docket to comment, rather than actively participating in Phase 1. Additionally, members may not have felt comfortable responding to technical analytics but wanted to remain engaged to track progress and higher level conclusions. The IF plans to issue a post-report survey to Advisory Group participants to better understand experiences and feedback on the Advisory Group engagement process. For the purposes of this report, while a good faith effort has been made to solicit diverse input across a variety of stakeholders throughout the IRP development process, there may still be underrepresented perspectives among the feedback summarized in this report.

¹⁸ [Order No. 38263](#) at page 4.

Interactions between the IF and Hawaii Gas

As needed, the IF spoke directly with Hawaii Gas to support Advisory Group coordination. On a few separate occasions, the IF had more targeted discussions with Hawaii Gas and their consultant, Black and Veatch.

Beginning in November 2022, the IF instituted a new procedure to enhance the efficacy of Black and Veatch's presentations to the Advisory Group. In advance of each Advisory Group meeting, the IF met with Black and Veatch for one hour to review their presentations, discuss how best to methodically and clearly present technical analyses, and practice responding to anticipated Advisory Group questions. Both the IE and Commission noted that this improved Advisory Group members' understanding of Black and Veatch's work products.

The IF also met collectively with Hawaii Gas, the IE, and Commission staff twice. As a party to the proceeding, the Consumer Advocate was invited to these discussions, but did not always attend. The dates and primary discussion topics for those conversations are as follows:

- November 1, 2022: Discussion of first IE Report, including work the IE found to be incomplete and potential next steps to address gaps; and
- December 16, 2022: Update from Hawaii Gas on progress towards completing the draft Action Plan and potential changes needed to the timeline for the remainder of Phase 1.

Hawaii Gas' Work Plan

On April 21, 2022, Hawaii Gas filed its Proposed Work Plan.¹⁹ The Proposed Work Plan included six phases for IRP development:

1. Development of IRP Planning Objectives and Metrics (May 4 - July 5, 2022)
2. Review and Develop Key Planning Assumptions and Forecasts (July 6 - August 2, 2022)
3. Scenario Development (August 2 - September 6, 2022)
4. Develop Analysis and Models for IRP Plan (September 7 - November 30, 2022)
5. Develop Action Plan (December 1, 2022 - January 3, 2023)
6. File IRP Report (January 3 - March 13, 2023)

On May 4, the Advisory Group met to discuss Hawaii Gas' Proposed Work Plan. The Advisory Group's feedback on Hawaii Gas' Proposed Work Plan is summarized in the IF's Advisory Group Report: Advisory Group Comments on Hawaii Gas' Proposed Work Plan.²⁰ Additionally, on May 19, 2022, the Consumer Advocate filed its Statement of Position commenting on Hawaii Gas' Work Plan.²¹

¹⁹ [Hawaii Gas' Proposed Work Plan](#), filed April 21, 2022.

²⁰ [Independent Facilitator's Advisory Group Report: Advisory Group Comments on Hawaii Gas' Proposed Work Plan](#), filed May 19, 2022.

²¹ [Consumer Advocate Statement of Position](#), filed May 19, 2022.

On June 6, 2022, Hawaii Gas filed its response to the Consumer Advocate's Statement of Position and the Advisory Group Report as well as its Amended Proposed Work Plan.²² The Amended Work Plan added primary tasks for Phases 3 and 4, and modified the schedule so that Advisory Group members would have two opportunities to review the draft IRP Report in early 2023 before it is filed with the Commission.²³

On June 20, 2022, the Commission issued Order 38434 accepting the Amended Work Plan and providing the following guidance:

- Principle Issues and Objectives: "The Commission expects Hawaii Gas to develop more detailed and clearly stated objectives and measures of attainment attentive to and consistent with the Specific Planning Guidelines in the Revised Framework" (page 15).
- Addressing and Further State Policies: "[T]he purposes of the IRP process include providing information and analysis that will inform decision-makers regarding the feasibility and economics of addressing and further State policies. The scope of relevant analysis is not limited to existing laws to which Hawaii Gas must comply, but also includes developing information regarding the feasibility and economics of Hawaii Gas' role in the State meeting its broader policy goals and informing decision-makers regarding development of policies that may affect Hawaii Gas" (page 17).
- Demand Side Management Resource: "The Hawaii Gas IRP analysis should include assessment of the effectiveness and economics of demand-side resources to meet the identified planning objectives" (page 18).
- Work Plan Timeline: "[I]t is Hawaii Gas' responsibility to provide sufficient resources and priorities to implement its IRP process consistent with the provisions in the IRP Framework in a timely manner while working with the IF to provide opportunity for useful input from the Advisory Group" (pages 18-19).²⁴

Delays to Work Plan Timeline

Due to a variety of factors, Hawaii Gas fell behind schedule based on the timeline laid out in the company's Amended Work Plan. This became most apparent towards the end of 2022. The Amended Work Plan indicated Hawaii Gas would discuss its draft Action Plan during a meeting with the Advisory Group on December 16, 2022. Hawaii Gas shared its draft Action Plan with the IF after business hours on the night of Friday, December 23, 2022. Due to the Christmas holiday, the Advisory Group received a copy of Hawaii Gas' draft Action Plan from the IF on Monday, December 26, 2022. Feedback on the draft Action Plan was the primary focus of the January 11, 2023 Advisory Group meeting; approximately one month behind the schedule outlined in the amended Work Plan. During the January 2023 meeting, Hawaii Gas also noted

²² [Hawaii Gas Response to the Consumer Advocate's Statement of Position and Advisory Group Report](#), filed June 6, 2022.

²³ [Amended Proposed Work Plan](#) at pages 4-7.

²⁴ [Order No. 38434](#).

that additional supplemental materials were forthcoming. No date for circulation of those materials was initially identified. The Advisory Group decided to review those supplemental materials and discuss any further feedback on the draft Action Plan at its February 1, 2023 meeting, which was originally intended to focus on a discussion of the draft IRP Report. The IF posted comments on the Advisory Group shared drive on January 18, 2023 expressing procedural concerns related to these delays. A copy of these comments was also provided to the Commission and Hawaii Gas.

Hawaii Gas' Amended Work Plan suggested that the Advisory Group would have an opportunity to review and provide feedback on the draft IRP Report during two meetings over the course of January and February (a draft was to be provided in December 2022). Hawaii Gas instead provided a draft of the IRP Report to the Advisory Group on February 7, 2023. Aside from the February 1, 2023 Advisory Group meeting which focused on the draft Action Plan and supplemental materials, no additional Advisory Group meetings were scheduled before the IRP Report filing date of March 7, 2023. Hawaii Gas shared that technical sessions could be made available to Advisory Group members. The IF scheduled a technical session for February 24, 2023, seven business days before the IRP filing deadline.

To ensure the Advisory Group was afforded sufficient time to review Hawaii Gas' draft materials, the Commission issued Order 38848 modifying the procedural schedule initially outlined in Order No. 38189.²⁵ This new schedule introduced additional steps for Advisory Group feedback. Most notably, it altered the March 7 deadline to require a "draft" IRP filing followed by a "final" IRP filing a month later on April 6. Advisory Group members were offered the opportunity to provide informal written comments on the draft filing.

Overall, the IF finds that these timeline delays likely had two primary impacts. First, they constrained the Advisory Group's ability to thoroughly review materials, ask questions, and provide feedback. Many of Hawaii Gas' IRP materials were significantly technical in nature and were not easy for the layperson to immediately understand and evaluate. Second, the timeline delays limited Hawaii Gas' ability to reflect on and potentially incorporate the feedback received from Advisory Group members.

Overview of Hawaii Gas' Approach to IRP Development

Governing Principles / Planning Objectives

Commission Order No. 38189 opening the docket introduced topics the Commission expected Hawaii Gas to address in its IRP.²⁶ Hawaii Gas reiterated these as objectives for the IRP Report

²⁵ [Order 38189](#).

²⁶ [Order No. 38189](#) at page 6.

in its Proposed Work Plan.²⁷ More specifically, after input from the Advisory Group, Hawaii Gas established the following Planning Objectives:

- Address how Hawaii Gas can further State policies, including greenhouse gas (GHG) emissions reductions and decarbonization goals
 - Assessing the most effective pathway to meaningfully reduce the utility's GHG emissions to further the State's carbon neutrality goal described under HRS Chapter 225P, with a focus on both demand-side efficiency measures and lower carbon intensive fuels, while balancing safety, customer affordability, reliability, equity, and sustainable growth of the business
 - Recognizing technologies and programs for demand-side resources are less developed and/or prevalent in gas markets, exploring innovation and pilot programs/projects in areas of demand-side management/demand-response programs, energy efficiency, load management programs, and/or energy storage resources including participation rates
 - Establishing a pathway to increase the proportion of renewable resources in Hawaii Gas' fuel mix, including determination of an achievable carbon transition portfolio standard (or other metric) by 2030
 - Studying a renewable gas tariff and implementing the same if it is determined to be reasonable and in the public interest by the Commission
 - Conducting an impairment analysis and stranded asset analysis to determine how the State's GHG emissions reduction and decarbonization goals may impair and/or strand Hawaii Gas assets
- Assess supply chain reliability and resilience for Hawaii Gas
 - Reducing reliance on imported feedstock or fuels
 - Cost effectively maintaining or increasing supply chain reliability and resilience
 - Considering the effect of the cessation of operations at the Par Hawaii refinery and planning for possible Par Hawaii refinery cessation of operations
- Ensure customer energy affordability
 - Assessing cost sensitivity, price elasticity, and possible customer defection and its impact on customer rates²⁸

Additionally, during the August 3, 2022 Advisory Group meeting and in its IRP Report, Hawaii Gas shared principle issues the utility is facing including:

- Relatively small customer base and high number of low-volume residential customers;
- Reliance on Par Refinery for a large proportion of SNG feedstock; and
- Maintaining customer affordability during a time of increasing uncertainty (in energy commodity rates).²⁹

²⁷ [Hawaii Gas Proposed Work Plan](#) at page 2.

²⁸ [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, pages 22-23.

²⁹ [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, page 39.

Focus on Oahu and the Synthetic Natural Gas Plant

Hawaii Gas elected to focus its IRP on its pipeline system in southern Oahu and the SNG plant because this system comprises the majority of demand and interconnected infrastructure. Specifically, the SNG plant on Oahu supplies nearly 80% of utility therms sold statewide each year. Additionally, the SNG plant is the primary supply point for the SNG utility gas system on Oahu, making incorporation of renewable fuels less complex and more cost-effective relative to the rest of the system. According to Hawaii Gas, given the concentration of demand and interconnected infrastructure, at least in the near-term and for the purposes of the five-year Action Plan, the SNG plant represents a more cost-effective point of intervention to decarbonize Hawaii Gas' system relative to the LPG systems distributed across Oahu and the Neighbor Islands.³⁰

Gas Demand

To forecast demand for the purposes of IRP development, Hawaii Gas applied a demand projection model (Figure 3). Key drivers impacting forecasted gas demand include commodity price, consumer price index, nation gross domestic product, total visitors to Hawaii, and impacts of global warming / climate change (Figure 4).

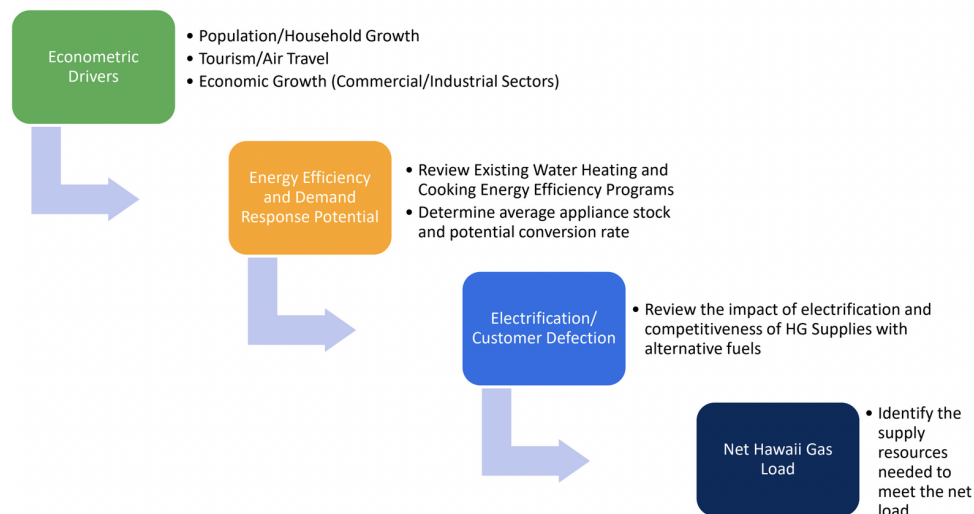


Figure 3. Hawaii Gas Demand Projection Model³¹

³⁰ [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, pages 173-174.

³¹ Hawaii Gas presentation Hawaii Gas IRP Phase 2 - Review and Develop Key Planning Assumptions and Forecasts, July 6, 2022, slide 12.

Drivers	Definition	Impact on Gas Demand	Potential Range of Uncertainty
Commodity Prices (Oil, Diesel, and Natural Gas)	<ul style="list-style-type: none"> West Texas Intermediate Crude Oil Price (\$/barrel) Pacific Census Region Gasoline (\$/gallon) Henry Hub Natural Gas Price (\$/MMBtu) 	<ul style="list-style-type: none"> Based on historical analysis, higher commodity prices have had a negative impact on overall system consumption 	<ul style="list-style-type: none"> Utilize EIA AEO 2022 High Oil/Low Supply Price Scenario/Reference Case to determine range of uncertainty
Consumer Price Index (All Urban Consumers)	<ul style="list-style-type: none"> Federal Reserve Bank of St. Louis Economic Data (1982-2022) Chained to 1984 	<ul style="list-style-type: none"> Based on historical analysis, higher spending has had a positive impact on gas consumption on the HG system 	<ul style="list-style-type: none"> Utilize latest Federal Reserve, Federal Planning Bureau, Industry Survey to estimate on CPI Long-term CPI Growth Range (2.1%-2.8%)
National Real Gross Domestic Product (Monthly)	<ul style="list-style-type: none"> Federal Reserve Bank of St. Louis Economic Data (2002-2022) Chained 2022\$, Billions 	<ul style="list-style-type: none"> National economic growth drives local consumption as well as tourism spending 	<ul style="list-style-type: none"> Utilize latest Federal Reserve, Congressional Budget Office (CBO) projections on real GDP. (0.6-2.9%)
Total Visitor Arrivals Data	<ul style="list-style-type: none"> Hawaii Tourism Authority – Visitor Arrivals (Lower 48 & International) 	<ul style="list-style-type: none"> Higher level of visitors will increase regional gas consumption tied to cooking and water heating 	<ul style="list-style-type: none"> Utilize latest Hawaii Tourism Authority estimates Low Range: 6.78 MM (2021 Levels) High Range: Hawaii DBEDT Quarterly Tourism Forecast (2025 – 10.33MM)
Global Warming Impact	<ul style="list-style-type: none"> Incremental warming will impact water heating related consumption 	<ul style="list-style-type: none"> Lower heating degree days (HDDs) will lead to lower water heating consumption for homes and pools 	<ul style="list-style-type: none"> High Scenario: Increasing 0.3 degrees F every decade Low Scenario: Average 30 Year historical

Figure 4. Key Drivers for Hawaii Gas Demand³²

Supply-Side Resources

In its supply-side analysis, Hawaii Gas considered four categories of resources:

- Existing Supply: Supply sources used to meet demand needs where no incremental infrastructure is needed to continue to deploy these sources in the long-term;
- Reliability Supply: Diversified backup supply systems dispatched when other supply sources become unavailable;
- Incremental Supply: Certain supply sources that could be increased in volume by expanding supply sources, existing storage and transportation infrastructure to accommodate larger volumes of existing supply sources; and
- New supply: Emerging low carbon sources that could be incorporated into the supply portfolio in the future.

Hawaii Gas analyzed five supply-side resources in its IRP Report.³³ They included:

1. Synthetic natural gas (firm and interruptible)
2. Propane air
3. Liquefied natural gas (imported)
4. Renewable natural gas (local and imported)
5. Hydrogen (local and imported)

³² Hawaii Gas presentation Hawaii Gas IRP Phase 3 - Scenario Development, August 3, 2022, slide 7.

³³ Note that liquid propane gas (LPG) is also a supply-side resource on Oahu and the Neighbor Islands; however, it seems that given the IRP Report's focus on Oahu and the SNG system, LPG was not analyzed as part of the IRP.

Each of these resources were evaluated based on costs; capital and operational expenditures on Hawaii Gas' system; level of emissions; reliability, fuel stability, and diversity considerations; and other issues of significance (Figure 5). Key sensitivities and uncertainties were also considered (Figure 6).

Supply Resource Evaluation	Synthetic Natural Gas (SNG)	Imported Liquefied Natural Gas (LNG)	Propane Air	Renewable Natural Gas (RNG)	Hydrogen (Green)	Liquefied Propane Gas (LPG) or Bio LPF	Other Technically Feasible Supply Sources
Project Cost and Technical Availability of each Resource (2025, 2030, 2035, 2040, and 2045)	<ul style="list-style-type: none"> B&V/HG Methodology <ul style="list-style-type: none"> Utilize publicly available forecasts and assessments whenever possible Utilize results from previous RNG RFPs, B&V Technical Team to estimate RNG potential and costs Review and examine SNG supply costs at different utilization levels Incorporate suggestions from AG on other reputable sources for technically feasible supply or costs 						
Project Incremental Capital and Operational Expenditure on the HG System Associated with Each Supply Resource (2025, 2030, 2035, 2040, and 2045)	<ul style="list-style-type: none"> B&V/HG Methodology <ul style="list-style-type: none"> Identify capital investment and operational change needed to accommodate each supply resource Estimate incremental CapEx, and annual OpEx at different level of supply penetration, if necessary 						
Project Levels of GHG emissions associated with each supply source	<ul style="list-style-type: none"> B&V/HG Methodology <ul style="list-style-type: none"> Develop a unit rate of emission by supply source based on publicly available data (NREL, AGA, CA ARB) Calculate the GHG Scope 1, Scope 2 and downstream Scope 3 Emissions associated with each supply resource 						
Reliability/Fuel Diversity/Fuel Stability	<ul style="list-style-type: none"> B&V/HG Methodology <ul style="list-style-type: none"> Identify any reliability issues with each supply resource, and quantify the probability of supply disruption Estimate additional costs (CapEx and OpEx) to firm each supply resource to equivalent reliability or stability (for example, extra RNG capacity, back-up capabilities using propane air or LNG imports) 						
Estimate Qualitative Impact on Hawaii Gas Operations	<ul style="list-style-type: none"> B&V/HG Methodology <ul style="list-style-type: none"> Identify any other issues associate with each supply resource Qualitatively assess the significance of these issues 						

Figure 5. Current Hawaii Gas Supply Portfolio and Evaluation Methods³⁴

Drivers	Key Inputs	Potential Range of Uncertainty
Commodity Prices (Oil, Diesel, and Natural Gas, LNG)	<ul style="list-style-type: none"> West Texas Intermediate Crude Oil Price (\$/barrel) Pacific Census Region Gasoline (\$/gallon) Henry Hub Natural Gas Price (\$/MMBtu) 	<ul style="list-style-type: none"> Utilize EIA AEO 2022 High Oil/Low Supply Price Scenario and Reference Case to develop the Pacific Census Region Unleaded price projection.
SNG Plant Availability and Cost	<ul style="list-style-type: none"> Projected O&M Costs at Different Utilization Rates Feedstock/Bio Feedstock Capabilities 	<ul style="list-style-type: none"> Based on the utilization levels of the SNG Plant, develop a range of O&M costs associated with each level of utilization
Renewable Natural Gas Supply	<ul style="list-style-type: none"> Estimated RNG available to be produced \$/Therm 	<ul style="list-style-type: none"> Develop a range of RNG potential resource potential and costs based on AGA resource estimates
Green/Other Hydrogen Supply	<ul style="list-style-type: none"> Estimated Green/Other Hydrogen available \$/Therm Firm/Interruptible 	<ul style="list-style-type: none"> Develop a range of Green/Other hydrogen costs based on electrolysis/renewable energy Costs

Figure 6. Key Supply Sensitivity Drivers and Ranges of Uncertainty³⁵

³⁴ Hawaii Gas presentation Hawaii Gas IRP Phase 2 - Review and Develop Key Planning Assumptions and Forecasts, July 6, 2022, slide 3.

³⁵ Hawaii Gas presentation Hawaii Gas IRP Phase 3 - Scenario Development, August 3, 2022, slide 15.

Additionally, Hawaii Gas considered a set of "non-resource options," which refers to options that could assist Hawaii Gas in (1) providing the same level of end-user service, (2) reducing GHG emissions across systems, and (3) improving overall system efficiency. Non-resource options considered include:

1. Demand reduction (e.g., energy efficiency programs)
2. Utility system/distribution system/customer expansion
3. Asset integrity investment (e.g., leak detection and repair, line replacement and maintenance)
4. Operation improvement (e.g., SNG plant efficiencies and replacement of higher emitting equipment)
5. Investment in expanding resource options (e.g., programs or procurement measures to expand the availability of RNG; harboring and/or storage improvements)
6. Non-operational GHG emission reduction (e.g., GHG offsets; carbon capture, storage, and disposal; direct air capture projects)

Hawaii Gas took unique approaches to exploring the opportunities and challenges of each of the non-resource options. Ultimately, the majority of the non-resource options were considered to have low or minimal impact on Resource Plans. The exceptions include SNG plant retirement and/or efficiencies, programs or procurement measures to expand RNG availability, and carbon offsets.³⁶ These options were considered in the development of Resource Plans.

Energy Efficiency Analysis

To assess energy efficiency potential in Hawaii, Hawaii Gas reviewed residential, commercial, and industrial program offerings in California and conducted a survey of national energy efficiency programs in warm weather climates. Hawaii Gas noted that as a single-fuel utility in a tropical climate, it faced more limited energy efficiency opportunities than some gas utilities (e.g., far less potential for savings from space-heating efficiency improvements). From this program review, Hawaii Gas identified that a water heater program may be a cost-effective energy efficiency offering in Hawaii.³⁷ Hawaii Gas also noted that its energy efficiency customers must focus on commercial customers for a meaningful impact to occur. The best opportunities for commercial energy efficiency include water heating and boilers in hotels and gas cooking equipment in the food service industry.

Hawaii Gas also indicated that it "plans to conduct a cost-benefit analysis to determine which energy efficiency program(s) assessed as part of the Energy Efficiency Summary will help achieve or even surpass the projected demand and corresponding GHG emissions decrease, in balance with the cost required to implement said program(s)."³⁸

³⁶ Table 6-2: Non-Resource Supply Options - Impact and Incorporation to IRP Analysis, [Hawaii Gas 2023 Integrated Resource Planning Report](#), at pages 55-56.

³⁷ Hawaii Gas Response to Comment 295.

³⁸ [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, page 51.

For the purposes of the IRP Report, the Integrated IRP Model includes a statewide demand decrease over the 2021-2045 period based on an assumption that Hawaii Gas will either incorporate a residential energy efficiency program or that customers will gradually adopt more efficient appliances as they retire older appliances.³⁹

The IF notes that per the COAs, Hawaii Gas committed to study energy efficiency as part of the IRP proceeding and to implement an energy efficiency commitment if it is determined to be reasonable and in the public interest by the Commission (SEO COA No. 5).⁴⁰

Considerations for Incorporation of RNG and Hydrogen

Hawaii Gas has indicated that challenges of RNG projects include:

- Connecting them to the existing pipeline;
- Consistency of output and resource reliability; and
- Access to contracts - wastewater treatment plants/cities/counties bid out the resource and Hawaii Gas competes for purchase.⁴¹

Nonetheless, Hawaii Gas identified three primary candidates for new RNG supply development on Oahu: landfill gas (LFG), gas from wastewater treatment plants, and construction and demolition waste (CDW). RNG supply curves incorporated into the IRP Report include:

- For LFG and gas from wastewater treatment plants: Beginning in 2025 and continuing every five years thereafter, a project of a minimum size of 2,000 therms per day per project will be placed in service; and
- For CDW: Beginning in 2030 and continuing every five years thereafter, 20% of the resource potential (equal to approximately 15,000 therms/day) will be developed.⁴²

Hawaii Gas' hydrogen analysis focused on the costs of producing "green" hydrogen via a 100MW electrolyzer generating at 70% capacity. This can produce approximately 40,000 therms per year of hydrogen and would require 643,862 MWh of electricity per year. At a 40% capacity factor, the electrolyzer power requirement could be met with an additional 184 MW of wind or potentially solar capacity. Hawaii Gas assumed that there would be a dedicated renewable source integrated with an electrolyzer.⁴³

³⁹ [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, page 51.

⁴⁰ [Decision and Order 38478](#), issued June 29, 2022.

⁴¹ Memo: Hawaii Gas IRP - Customer Bill Impact and Supply Optimization (Update), dated November 16, 2022, page 11.

⁴² [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, pages 82-83.

⁴³ [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, page 89.

Lifecycle Greenhouse Gas Emissions Analysis

Hawaii Gas conducted a lifecycle emissions analysis for each potential gas supply portfolio, including each individual supply option, using Argonne National Lab's 2022 GREET Model (Greenhouse Gas, Regulated Emissions, and Energy Use in Technologies). The analysis estimated Scope 1, Scope 2, and Scope 3 emissions from each supply source by examining:

- Upstream production and transportation-related emissions from the Hawaii Gas facility - customized model pathways to consider upstream oil and gas for liquefied natural gas, global crude oil sources for naphtha, and gathering and processing emissions;
- Transmission and distribution network emissions - incorporated estimated distance and mode of transportation into the model projections;
- Fuel refining and processing - based on Par Hawaii Refinery and Hawaii Gas SNG Plant processes to estimate the emissions related to the process to product SNG from naphtha and crude oil; and
- End user consumption across Hawaii Gas' utility customers - includes water heating, cooking, and power generation; based on each model pathway, reflects emissions factors for each supply source.⁴⁴

Hawaii Gas includes information on the lifecycle emissions assumed for each supply source in its IRP Report. It should be noted that Advisory Group members asked that these values be expressed in a more common metric like grams per megajoule to allow for comparison to other resources, but Hawaii Gas continued to use grams/MMBtu.

Bill Impacts

Hawaii Gas developed an Excel-based model that estimates future customer bills for key customer classes under different demand scenarios and supply portfolios (Figure 7). The model is not intended to forecast exact customer bills into the future, but to assess the incremental cost to customers of expanding existing supply options or introducing new ones.⁴⁵

Hawaii Gas based its bill impact analysis on rate case data filed in 2017 for Test Year 2018. Under Test Year 2018, Hawaii Gas' revenue requirement was approximately \$106 million dollars, with 74% (\$78 million) in operating expenses. Of the \$78 million, 75% (\$58.5 million) are fuel costs, which reflect the cost of gas delivered to all Hawaii Gas customers.⁴⁶

⁴⁴ Memo: Hawaii Gas IRP - Customer Bill Impact and Supply Optimization (Update), dated November 16, 2022, page 16-17.

⁴⁵ Memo: Hawaii Gas IRP - Customer Bill Impact and Supply Optimization (Update), dated November 16, 2022, page 3.

⁴⁶ Memo: Hawaii Gas IRP - Customer Bill Impact and Supply Optimization (Update), dated November 16, 2022, page 1.

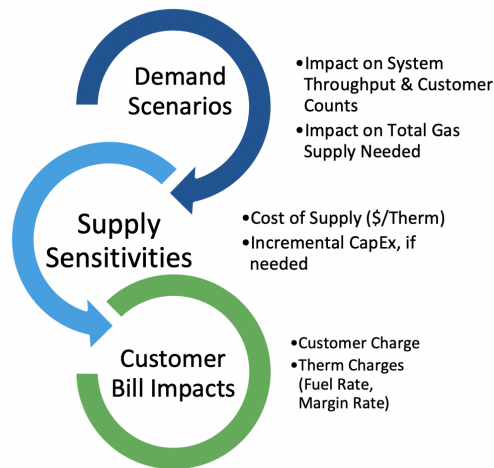


Figure 7. Bill Impact Analysis Method

The following costs were analyzed to evaluate bill impacts across each supply portfolio option:

- Upstream supply cost - based on gas supply resource estimate; represented in \$/MMBtu;
- Transmission and distribution costs - based on estimated Hawaii Gas revenue requirements and billing determinants; represented as a fixed customer charge (\$/month) and a variable charge (\$/MMBtu);
- Reliability costs - based on incremental investments and gas supply resource costs; represented in \$/MMBtu; and
- Emissions costs - based on a societal cost of carbon.⁴⁷

Customer Defection Analysis

Hawaii Gas also conducted a customer defection analysis intended to examine how rising gas rates and/or declining appliance electrification costs might alter the cost-effectiveness of natural gas alternatives. In addition to electricity, Hawaii Gas customers could also defect to unregulated tank and bottled propane which would not require a change in appliances. This analysis calculated both the 10-year payback period and total cost of ownership for the equipment, installation, and fuel costs of a handful of technologies. For Hawaii Gas' Preferred Resource Plan, the total cost of ownership of a gas water heater is on par with an electric alternative until the early- to mid-2030s and the payback period for switching from a gas water heater to electric is 14 years.

It should be noted that the results of this analysis for each scenario did not then feed back into that scenario's demand assumptions. Thus, the impacts of defection on remaining customers' rates and bills were not examined.

⁴⁷ Hawaii Gas IRP Work Plan Phase 1 Summary presentation, dated August 2, 2022, slide 19.

Scenario Development

The Revised IRP Framework defines scenarios as "a range of possible futures reflecting potential energy-related policy choices, uncertain circumstances, and risks facing the utility and its customers which will be the basis for the plans analyzed."⁴⁸ Hawaii Gas identified four scenarios for IRP analysis (Figure 8). These scenarios were analyzed using Hawaii Gas' Integrated Model, which consolidated the analysis approaches summarized above (Figure 9).

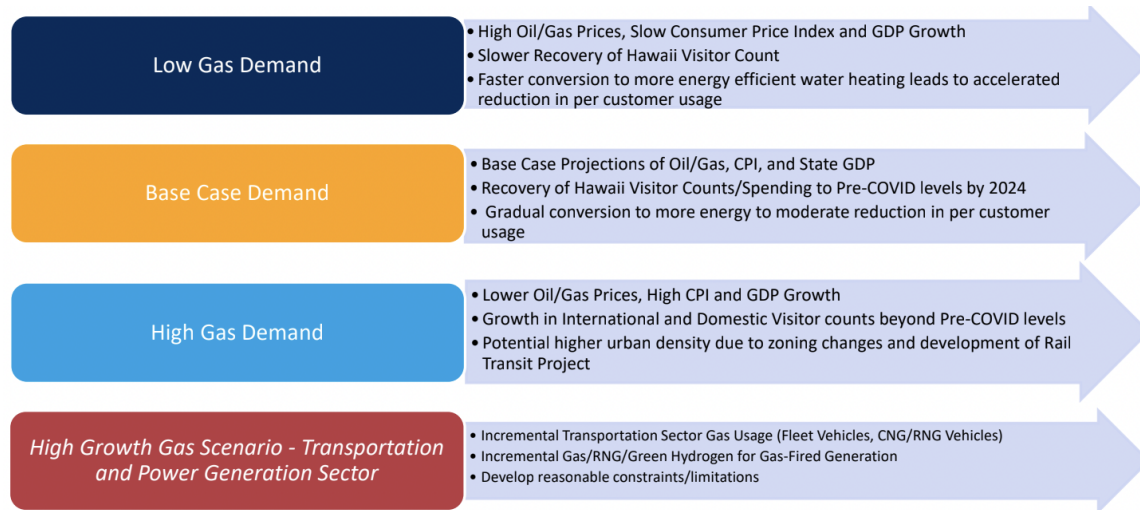


Figure 8. Scenarios for IRP Analysis

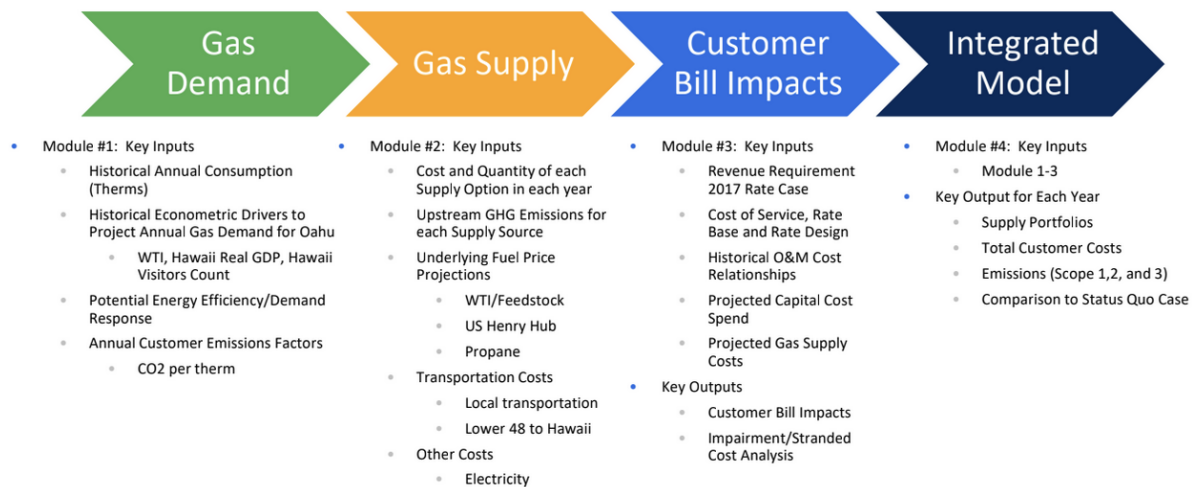


Figure 9. Hawaii Gas IRP Integrated Model Summary

⁴⁸ Revised IRP Framework at page 46.

Feedback from the Advisory Group

Throughout meetings, Advisory Group members asked Hawaii Gas and its consultant, Black & Veatch, detailed questions regarding analysis methods, assumptions, and models. Following each meeting, Advisory Group members were invited to submit comments to the IE and IF for Hawaii Gas' response. Comments were welcome at any point throughout the process, and comments received within one week were addressed by Hawaii Gas in the following meeting. Hawaii Gas maintained an ongoing comment log responding to comments from the Advisory Group.⁴⁹

Major themes of Advisory Group comments provided throughout the period of Advisory Group meetings are summarized in this section. As previously noted, some Advisory Group members were more active than others in commenting. Therefore, comments summarized below do not necessarily represent the perspectives of each individual Advisory Group member, nor the Advisory Group as a collective. Comments are intentionally not attributed to specific Advisory Group members.

Principle Issues

In the May 4, 2022 meeting, Advisory Group members discussed Hawaii Gas' Proposed Work Plan and the Principle Issues to be addressed in the IRP Report; these comments are summarized in the Independent Facilitator Report on Advisory Group Comments on Hawaii Gas' Proposed Work Plan. Additionally, the Consumer Advocate's May 19, 2022 Statement of Position on Hawaii Gas' Proposed Work Plan also commented on the identified Principle Issues.

The Advisory Group's questions and comments regarding Principle Issues requested that Hawaii Gas add more specificity to the Principle Issues. For example, an Advisory Group member identified a specific list of state policies and programs that Hawaii Gas should consider in the IRP, including Hawaii's Climate Change Mitigation and Adaptation Initiative, the Hawaii Clean Energy Initiative program, electrification goals, the emphasis in HRS Section 269-6(b) on increasing energy efficiency and renewable energy generation, and others. Additionally, other Advisory Group members recommended that Hawaii Gas explicitly consider a zero-emissions target (or 100% renewable) by 2045 in its IRP.

State Energy Policies

As noted under Principle Issues, Advisory Group members suggested that Hawaii Gas clearly identify the specific existing and/or anticipated state policies that its IRP is developed to support. For example, some Advisory Group members suggested that Hawaii Gas develop its IRP to meet a 100% Renewable Portfolio Standard for the gas utility, although no such state or local policy is currently adopted. Additionally, one member requested that Hawaii Gas help the Advisory Group better understand policies needed at the state and local level to achieve a net

⁴⁹ See Appendix A, Part 1 of [Hawaii Gas 2023 Integrated Resource Planning Report](#).

zero goal for the utility. Further, an Advisory Group member presented a set of state policies and Conditions of Approval established in the Change of Sale Docket (2021-0098) it believes are relevant to IRP development.

Demand

Several Advisory Group members provided input and feedback on Hawaii Gas' demand forecast. For instance, several members noted that it would be helpful to understand demand by customer segment and/or rate class to better understand where there may also be opportunities for efficiency savings. Hawaii Gas noted that it agrees that this type of data has value but that it does not have the system nor data to determine that type of segmentation at this time. Customer rates are determined by volume of gas consumed; however, the specific end uses driving demand are not tracked.⁵⁰

Regarding potential increases in gas demand, members suggested including the transportation sector in the demand forecast, either as RNG or hydrogen (which uses gas as feedstock). Additionally, an Advisory Group member noted that an assumption of higher gas demand from the transportation and power sectors should only be made if RNG and green hydrogen become available, and that careful consideration should be given to the projected costs to import these fuels to Hawaii.

Demand-side Management

Advisory Group members posed questions about the scope of analysis of demand-side management (e.g., energy efficiency and demand response) potential. Specifically, members asked:

- Will there be a market analysis to evaluate demand-side resources for the Advisory Group's consideration?
- Will Hawaii Gas review participation rates of gas demand-side management programs?
- Will commercial demand-side management programs be considered?

These questions suggest that Advisory Group members find that a detailed study of the market potential for demand-side management programs should be incorporated into the IRP analysis.

RNG Potential

Various Advisory Group members provided suggestions regarding RNG. On July 6, 2022, RNG Coalition presented on fundamentals of RNG and included the following table from *Resources for Renewable Natural Gas Production in Hawaii*, prepared by the Hawaii Natural Energy Institute (Figure 10).

⁵⁰ Hawaii Gas Responses to Comments 231, 232, and 235.

Resource Type	Maui	Kauai	Hawaii	Honolulu	State Total
Livestock Manure	*	*	*	*	*
Wastewater Treatment Plants	–	0.02	0.06	1.8	1.9
Landfill Gas	2.2	1.0	0.6	2.5	6.2
Food Waste portion of MSW	1.8	0.5	2.3	0.5	5.1
Combustible portion of MSW	12.7	6.8	18.9	3.8†	42.3
CDW	-	-	-	28.5	28.5
Agricultural and Forestry Residues	‡	‡	‡	‡	‡
Energy Crops	§	§	§	§	§
Totals‡§	>17	>8	>22	>37	>84

* Insufficient number and size of animal feeding operations to justify methane production and recovery
 † Estimated amount that is currently landfilled exclusive of HPOWER use
 ‡ Insufficient available agricultural residues and ongoing forestry harvesting residues
 § Underutilized agricultural land resources in the State could support substantial RNG production from dedicated energy crops (~1,000 to 2,000 therms per acre per year)
 ‡§ Totals would be larger with implementation of energy crop based RNG production

Figure 10. Summary of RNG Resources and Potentia (million therms RNG/year) I in Hawaii⁵¹

Additionally, an Advisory Group member suggested that Hawaii Gas may consider the incorporation of specific procurement policies for RNG, like those recently adopted in other states. RNG standards from California and Oregon were noted, as well as clean heat standards from Minnesota and Colorado.

On October 5, 2022, Simonpietri Enterprises LLC presented *What RNG Suppliers Need to Succeed*, which spoke to how renewable natural gas can contribute to state goals and objectives and how local suppliers could be supported in that effort. Recommendations include having fuel supply agreements that are bankable, reliable, and incentivized to compete against fossil fuels. Customers (demand for RNG) must be available to sign contracts quickly but also have flexibility and patience to go through the permitting process.

Greenhouse Gas Analysis

Many Advisory Group members commented on the need to carefully conduct lifecycle GHG analysis as part of the IRP Report. Example suggestions include:

- Conducting holistic, in-state and lifecycle GHG accounting
- Conducting lifecycle carbon intensity analysis
- Considering non-GHG emissions, such as NOx and SOx

Additionally, the Advisory Group raised several questions including:

- What baseline/benchmark will be used for the current SNG supply
- Whether a social cost of carbon will be applied to total emissions

⁵¹ Table ES-1 from [Resources for renewable natural gas production in Hawaii](#), Hawaii Natural Energy Institute, May 2021, page i.

- Whether and how offsets will be applied and how that aligns (or does not align) with state policy compliance
- Whether out-of-state offsets can be applied towards the state's goals
- What type of offsets would be considered eligible and how additionality would be demonstrated
- How offsets would be purchased and from whom

Change in Customer Base / Customer Migration

During several meetings, Advisory Group members raised questions about how Hawaii Gas would model the change in customer base and possible customer defection, particularly in light of available incentives for electric heat pump water heaters and the presence of unregulated bottle gas service in Hawaii. At the outset, Advisory Group members asked Hawaii Gas for a breakdown of usage by customer type (e.g., hotels vs restaurants) to better understand who uses how much gas for what purposes. For example, an Advisory Group member asked whether Hawaii Gas would conduct elasticity studies to help understand customer defection and, in that analysis, whether defection to non-regulated gas service would be considered in addition to electrification. Several other Advisory Group members commented on how it would be important to understand the potential rate impact that customer defection would have on remaining customers, and the potential resulting feedback loop it could create to motivate more customers to leave the gas utility. Conversely, an Advisory Group member also suggested that understanding the potential for electric customers to migrate to the gas utility would be important in the IRP Report.

Hawaii Gas' Response to Advisory Group Feedback

From the IF's perspective, Hawaii Gas remained engaged and communicative throughout the development of the IRP and made a diligent effort to document and respond to the Advisory Group's feedback, as shown in Appendix A, Parts 1 and 2 of its IRP Report.⁵² At the same time, there are several examples of feedback that the Advisory Group has provided throughout the process that have not been incorporated by Hawaii Gas (e.g., as noted in Sections 9.2 - 9.4 of Hawaii Gas' IRP Report in reference to Neighbor Island systems, a social cost of carbon, and potential for Par Hawaii to cease operations). More specifically, since early in the Advisory Group process, Advisory Group members have suggested that Hawaii Gas explicitly consider a zero-emissions target (or 100% renewable) by 2045 in its IRP. Hawaii Gas, in its IRP Report, states "Hawaii Gas agrees that it has not explicitly identified an RPS [Renewable Portfolio Standard] as a Scenario, but posits that the Resource Plan analyses would not change if such a Scenario were explicitly described."⁵³ Concerns about the absence of a robust energy efficiency analysis and a feedback loop with the customer defection analysis also remain outstanding.

⁵² See Appendix A of [Hawaii Gas 2023 Integrated Resource Planning Report](#).

⁵³ [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, at pages 21-22.

It is the IF's opinion that, from a process perspective, Hawaii Gas thoroughly responded to the Advisory Group's feedback; however, from a content perspective, Hawaii Gas did not necessarily take action to incorporate relevant feedback from the Advisory Group into the IRP Report. The Revised IRP Framework states that "the utility shall consider the input of each Advisory Group, but it is not bound to follow the recommendations of any such Advisory Group"⁵⁴ and, therefore, Hawaii Gas is acting within its dedicated autonomy.

Nonetheless, delays in Hawaii Gas' timeline may have constrained Advisory Group members' bandwidth to review and provide feedback on materials made available later in the process. More discussion during Phase 2 may be warranted for unaddressed feedback from the Advisory Group.

Resource Plans and Sensitivities

A key output of the IRP analysis is a set of Resource Plans that identify the possible resources, programs, and actions that will help the utility to achieve IRP objectives. Those Resource Plans were evaluated against a set of criteria developed by Hawaii Gas to identify the most effective pathway for the utility to reduce emissions to meet state policy goals, while balancing safety, customer affordability, reliability, equity, and sustainable growth of the business.

From its IRP analysis, Hawaii Gas identified eight Resource Plans:

1. Resource Plan 1 - Status Quo Resource Plan: Resources, programs, and actions required to meet the baseline Status Quo Scenario incorporating the continued use of existing fossil fuel based Supply Resource Options with no incremental RNG or hydrogen.
2. Resource Plan 2 - Technically Feasible Mix with Par Resource Plan without offsets (2a) and with offsets (2b): Resources, programs, and actions that balance the State's energy goals with technical feasibility, customer affordability and system reliability, and reflect current regulatory and legal environmental headwinds. Low- and medium-risk RNG projects and accelerated integration of hydrogen are considered.
3. Resource Plan 3 - Technically Feasible Mix without Par Resource Plan without offsets (3a-3c) and with offsets (3d): Resources, programs, and actions needed to incorporate technically feasible Supply Resource Options if the SNG Plant is retired in 2035, 2040, or 2045. This Resource Plan includes LNG and propane-air, as well as acceleration of RNG and green hydrogen "beyond those known to be currently feasible to meet the State's energy goals."⁵⁵ Additionally, without offsets, the Resource Plan includes Renewables and Primary LNG Firm (3a), Renewables and Primary Propane-Air Firm (3b), and Renewables and LNG/Propane-Air Firm (3c). With offsets, the Resource Plan is a mix of Renewables, LNG/Propane-Air Firm, and offsets.

⁵⁴ [Revised IRP Framework](#), Section III (Roles) Subsection F (Advisory Groups) #3

⁵⁵ [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, page 103.

4. Resource Plan 4 - Maximum Green Hydrogen and RNG Resource Plan: Resources, programs, and actions needed for Hawaii Gas to meet the State's energy goals as soon as possible, without consideration of technical feasibility or cost. The primary goal of the Resource Plan is to accelerate and incorporate as much RNG and hydrogen as possible to understand the total system impact on customer bills, GHG emissions, and system reliability.

Hawaii Gas also assessed certain sensitivities including:

1. High/Low Commodity Prices
2. Accelerated Bio-Naphtha (Resource Plan 2 only)
3. Integration of Higher-Risk Renewable Projects (Resource Plan 2 only)

Evaluation Criteria

Based on the IRP objectives, Hawaii Gas evaluated each Resource Plan to meet the projected customer demand levels based on certain evaluation criteria and metrics. This includes four quantitative and five qualitative criteria. The scoring of each Resource Plan's performance for each criteria was determined by comparing the Resource Plan being evaluated to the status quo (i.e., "Resource Plan 1: Status Quo Resource Plan").

Quantitative Criterion 1: Customer Energy Affordability, measured as increase in average residential customer bill from 2035 to 2045.

Score	1	2	3	4	5
Metric	Above 20%	15 - 20%	10 - 15%	5 - 10%	0 - 5%

Quantitative Criterion 2: GHG Emissions Reduction Impact, measured as change in total emissions from 2035 to 2045. Note that this evaluation considered the GHG reductions from offsets as equivalent to direct emissions reductions from activities like increased RNG penetration. Some Advisory Group members pushed back on this approach, instead preferring a methodology that evaluated the GHG performance of the various resource plans first without offsets included.

Score	1	2	3	4	5
Metric	Increase	No Change	1 - 20% reduction	21 - 50% reduction	51 - 100% reduction

Quantitative Criterion 3: Reliability, measured as portion of firm base fuel capacity provided by new infrastructure and/or logistics model without proven operating track record in 2035 to 2045

Score	1	2	3	4	5
Metric	100% variable supply / no firm base fuel	> 50%	≤ 50%	Majority covered by infrastructure and/or logistics model with proven track record but additional infrastructure/ storage build-out required	Majority covered by currently established infrastructure and/or logistics model with proven track record, no additional infrastructure/ storage build-out required

Quantitative Criterion 4: Limited Defection with Stable Customer Base, measured by assessing the customer bill impact/customer defection prospects of each Resource Plan compared to the Status Quo. Hawaii Gas examined potential customer defection from two perspectives. One examines the total cost of ownership for a new water heater over a seven year period. The other examines the payback period for a potential customer conversion to alternative appliances and fuels (e.g., switching from gas to electric water heating).

Score	1	2	3	4	5
Metric (Total Cost of Ownership)	Favors Electric over Gas prior to 2030	Favors Gas prior to 2030	Favors Gas prior to 2030	Favors Gas past to 2030	Favors Gas past to 2030

Score	1	2	3	4	5
Metric (Payback Period)	< 10 years	> 10 years	> 11 years	> 13 years	> 15 years

Hawaii Gas assigned each of these four quantitative criteria a weight. Customer Energy Affordability, GHG Emissions Reduction Impact, and Reliability were each assigned a 30% weighting while Limited Customer Defection with Stable Customer Base was assigned a 10% weighting.

In its Resource Plan scoring, Hawaii Gas also leveraged five qualitative evaluation criteria: safety, resiliency, supply risk, price volatility, and export of funds for fuel imports. The qualitative scoring approach is summarized in Figure 11.

Other Factors	Positive	Negative
Safety	<ul style="list-style-type: none"> Majority of Supply Resource Options come from resources with long operational safety track record 	<ul style="list-style-type: none"> Majority of Supply Resource Options come from resources with limited operational safety track record or uncertainty
Resiliency	<ul style="list-style-type: none"> Access to multiple Supply Resource Options with different supply systems 	<ul style="list-style-type: none"> Limited Supply Resource Options with similar supply systems
Supply Risk	<ul style="list-style-type: none"> Multiple Supply Resource Options to help to mitigate supply risk and limited investment in back-up baseload options (propane-air/LNG) 	<ul style="list-style-type: none"> Limited Supply Resource Options to help to mitigate supply risk and incremental investments in back-up baseload options (propane-air/LNG)
Price Volatility	<ul style="list-style-type: none"> Limited Resource Plan exposure to commodity volatility of fossil fuels 	<ul style="list-style-type: none"> High Resource Plan exposure to commodity volatility of fossil fuels
Export of Funds for Fuel Imports	<ul style="list-style-type: none"> Limited Supply Resource Option (<50%) funds for fuel exports 	<ul style="list-style-type: none"> Majority Supply Resource Option (>50%) funds for fuel exports
Overall Impact	3 or more Positives	3 or more Negatives

Figure 11. Qualitative Evaluation Criteria Scoring⁵⁶

The results of Hawaii Gas' evaluation of each Resource Plan against quantitative and qualitative criteria (Figures 12 and 13) indicate that Resource Plan 2b: Technically Feasible Mix with Par Resource Plan with Offsets, is the Preferred Resource Plan and, therefore, subject of the five-year Action Plan.

Quantitative	Affordability	Emissions	Reliability	Customer Defection	Total	Ranking
Criteria Weighting	30%	30%	30%	10%	100%	Order
RP 2a:	4.03	3.00	5.00	5.00	4.11	2
RP 2b:	3.92	5.00	5.00	5.00	4.67	1
RP 3a:	2.22	3.00	2.00	3.50	2.52	7
RP 3b:	3.28	3.00	4.00	5.00	3.59	4
RP 3c:	2.07	3.00	3.00	3.50	2.77	6
RP 3d:	2.02	5.00	3.00	3.50	3.36	5
RP 4:	1.12	4.00	1.00	3.00	2.14	8
S3:	3.22	3.00	5.00	3.50	3.72	3

Figure 12. Quantitative Scoring Results⁵⁷

⁵⁶ Table 3-1 of [Hawaii Gas 2023 Integrated Resource Planning Report](#), page 28.

⁵⁷ [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, page 111.

Qualitative	Safety	Resiliency	Supply Risk	Price Volatility	Fuel Imports	Overall Impact
Positive / Negative	Y/ N	Y/ N	Y/ N	Y/ N/Ltd	Y/ N	Y/ N
RP 2a:	Y	Y	Y	N	Y	Y
RP 2b:	Y	Y	Y	N	Y	Y
RP 3a:	N	N	N	Ltd	Y	N
RP 3b:	N	N	N	Ltd	Y	N
RP 3c:	N	N	N	Ltd	Y	N
RP 3d:	N	N	N	Ltd	Y	N
RP 4:	N	N	N	Y	Y	N
S3:	N	N	N	N	Y	N

Figure 13. Qualitative Scoring Results⁵⁸

Draft IRP Report: Comments from Advisory Group

On February 24, 2023, the Consumer Advocate filed its comments on the initial version of the Draft IRP in Docket 2022-0009.⁵⁹ Additionally, on March 21, 2023, five Advisory Group members provided informal comments to the IE and IF on the Draft IRP Report and Action Plan, which were forwarded to Hawaii Gas.⁶⁰ Major topics are summarized in this section.

Scenarios

Commenters noted that the scenarios analyzed for the IRP Report could be more nuanced to align with possible futures, including high building electrification and closure of the Par Refinery.

GHG Emissions

The Advisory Group members that provided comments on the Draft IRP Report all noted that the Report does not adequately address how Hawaii Gas will contribute to Hawaii's emissions reductions goals. For example, one Advisory Group member noted that the Preferred Resource Plan only minimally reduces direct GHG emissions, only reducing direct emissions by 3.5% by 2030 and 7% by 2045 compared to the status quo. Additionally, Advisory Group members expressed concern over the use of offsets, and how they expect that only in-state offsets would be applicable for compliance with state goals. Overall, commenters recommended that Hawaii Gas conduct a more robust analysis with greater detail and specificity for how Hawaii Gas would contribute to the State's GHG emissions reductions goals.

⁵⁸ [Hawaii Gas 2023 Integrated Resource Planning Report](#), April 6, 2023, page 113.

⁵⁹ [Memorandum: Comments on Hawaii Gas Integrated Resource Planning Modeling - Draft](#), filed February 24, 2023.

⁶⁰ See Appendix A Part 2 of [Hawaii Gas 2023 Integrated Resource Planning Report](#).

Evaluation Criteria

Evaluation criteria are broad and imprecise and require clarification and specificity. Specifically, Advisory Group members noted that quantitative criteria presented inconsistent comparisons and were more in the nature of qualitative criteria. Additionally, some Advisory Group members expressed concern over incorporating criteria for both affordability and customer defection, believing that these two criteria measured similar, but perhaps not entirely overlapping, effects. Specific recommendations related to evaluation criteria include:

- For emissions reductions, award incremental points for every 10% reduction in emissions over the status quo;
- Include a quantitative analysis of reliability such as average annual hours or days of downtime (scheduled and unscheduled) for the different supply resources, including the SNG Plant and Honouliuli Wastewater Treatment Plant; and
- Remove the Limited Defection with Stable Customer Base criterion, or revise it to allow for consideration of alternative business models that are more consistent with state clean energy policy.

Conditions of Approval Not Met

Commenters noted that the Draft IRP Report does not provide sufficient detail or does not fully address some of the Conditions of Approval that were deferred to Docket 2022-0009. For example, questions remain regarding Clean Energy Capital Expenditures, the Impairment Analysis, the Carbon Transition Portfolio Standard, RNG Tariff, and Energy Efficiency Potential. One Advisory Group member recommended that energy efficiency pilots projects and an RNG tariff pilot may help to satisfy the conditions.

Hawaii Gas' Responses to Draft IRP Comments

Appendix A, Part 2, includes Hawaii Gas' responses to Draft IRP comments. Hawaii Gas provided detailed responses to all comments; however, ultimately, did not modify its analysis nor its evaluation criteria in response to comments. The Revised IRP Framework states that "the utility shall consider the input of each Advisory Group, but it is not bound to follow the recommendations of any such Advisory Group."⁶¹

Conclusion

All parties involved in the development of the Hawaii Gas IRP, including each Advisory Group member, Hawaii Gas, Commission staff, and the IE, dedicated a substantial amount of time and effort over the last year and that, on its own, is recognized and valued by the IF. The IF also appreciates the professionalism and expertise demonstrated throughout the process and is

⁶¹ [Revised IRP Framework](#), Section III (Roles) Subsection F (Advisory Groups) #3

optimistic that this dynamic will continue through formal IRP review in Phase 2 of Docket 2022-0009.

That said, issues remain, potentially including:

- Analyzing LPG systems on Neighbor Islands and the potential for decarbonization
- Considering the social cost of carbon
- Analyzing different timelines for the potential closure of Par Hawaii
- Further exploration of feedback loops related to customer defection
- Analyzing energy efficiency opportunities, particularly in the commercial and industrial sectors
- Continued discussion and resolution of the COAs from the Change of Sale docket
- Use of offsets to reduce Hawaii Gas' emissions

Hawaii Gas has committed to continuing analysis and conversations around energy efficiency and the COAs, and it is the IF's hope that there will continue to be robust conversation around how Hawaii Gas will contribute to the state's emissions reductions goals. Ultimately, It will be up to the Commission whether to approve this IRP Report, and determine when Hawaii Gas might develop another IRP Report, if at all.

Appendix 1: Summary of Advisory Group Meetings

Date	Topic	Presentations and Presenters
April 4, 2022	Initial Meeting	<ul style="list-style-type: none"> • IRP Process Overview (Haiku Design & Analysis) • Advisory Group Process Overview (Gridworks) • Hawaii Gas System Overview (Hawaii Gas)
May 4, 2022	Proposed Work Plan Review	<ul style="list-style-type: none"> • Proposed Work Plan (Black & Veatch, Consultant to Hawaii Gas)
June 1, 2022	Analysis Introduction	<ul style="list-style-type: none"> • Hawaii Gas Work Plan (Black & Veatch)
July 6, 2022	Planning Assumptions, State Policies, and Renewable Natural Gas (RNG) Overview	<ul style="list-style-type: none"> • Hawaii Gas IRP Phase 2 - Review and Develop Key Planning Assumptions and Forecasts (Black & Veatch) • State Energy Policies (Hawaii State Energy Office) • Fundamental of RNG (RNG Coalition)
August 3, 2022	Scenarios and Sensitivities	<ul style="list-style-type: none"> • Hawaii Gas IRP Work Plan Phase 1 Summary (Black & Veatch) • Hawaii Gas IRP Phase 3 - Scenario Development (Black & Veatch) • Par Hawaii Overview (Par Hawaii)
August 16, 2022	Supplemental Technical Session on Phase 1 and Phase 3 Materials	<ul style="list-style-type: none"> • Hawaii Gas IRP Work Plan Phase 1 Summary (Black & Veatch) • Hawaii Gas IRP Phase 3 - Scenario Development (Black & Veatch)
September 14, 2022	Scenarios and Gas Demand	<ul style="list-style-type: none"> • Hawaii Gas Demand Module Overview (Black & Veatch) • Net-Zero Emissions Opportunities for Gas Utilities (American Gas Association)
October 5, 2022	Gas Supply	<ul style="list-style-type: none"> • Hawaii Gas Supply Module Overview (Black & Veatch) • What RNG Suppliers Need to Succeed (Simonpietri Enterprises LLC)
November 2, 2022	Review Integrated Model	<ul style="list-style-type: none"> • Hawaii Gas IRP - Customer Bill Impact and Supply Optimization (Black & Veatch) • Renewable Natural Gas IRP Recommendations (Perkins Cole)
November 14, 2022	Supplemental Technical Session on Model Design	<ul style="list-style-type: none"> • Draft IRP Model (Black & Veatch)
November 22, 2022	Supplemental Technical Session	<ul style="list-style-type: none"> • Customer Bill Impact and Supply Optimization (updated) (Black & Veatch)

Date	Topic	Presentations and Presenters
December 7, 2022	Combined Model Review	<ul style="list-style-type: none"> • Hawaii Gas IRP - Phase 1/2/3 Summary memo (Black & Veatch) • Draft IRP Rate Model (Black & Veatch)
January 11, 2023	Draft Action Plan	<ul style="list-style-type: none"> • Draft Action Plan (Hawaii Gas) • Model Summary Results (Black & Veatch) • Draft Rate Model (Black & Veatch)
February 1, 2023	Draft Action Plan & Supplemental Materials	<ul style="list-style-type: none"> • Draft Action Plan (updated) (Black & Veatch) • Summary of Draft Action Plan Updates and Changes (Black & Veatch) • Draft Rate Model (updated) (Black & Veatch) • Energy Efficiency Summary (Black & Veatch) • Rationale for focusing near-term on the SNG utility system (Black & Veatch)
February 24, 2023	Technical Session	<ul style="list-style-type: none"> • Draft IRP Report (Hawaii Gas)