STUDY OF FUEL PRICES AND LEGISLATIVE INITIATIVES FOR THE STATE OF HAWAII

Prepared By

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For

The Department of Business, Economic Development and Tourism

Energy, Resources and Technology Division

August 5, 2003

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Stillwater Associates conducted meetings with industry participants and prepared this report using reasonable care and skill in applying methods of analysis consistent with normal industry practice. All results are based on information available at the time of presentation. Changes in factors upon which the report is based can affect the results. Forecasts are inherently uncertain because of events that cannot be foreseen, including the actions of governments, individuals, third parties and competitors. NO IMPLIED WARRANTY OF MERCHANTABILITY SHALL APPLY.

ACKNOWLEDGEMENTS

This report is the result of a cooperative effort between key staff personnel of the Energy, Resources, and Technology Division of the Hawaii Department of Business, Economic Development and Tourism, and Stillwater Associates as the contractor working for the State of Hawaii. Particular thanks go out to Mr. Maurice Kaya, Dr. John Tantlinger and Mr. Douglas Oshiro of ERT, whose insights and contributions were essential to the success of this study.

Further thanks are due to the many participants in a series of meetings that were conducted, often at short notice, with stakeholders in Hawaii's petroleum industry, such as refiners, jobbers, dealers, industrial consumers of petroleum products, and also government organizations, staff specialists and service providers. The free and open atmosphere in which these meetings were conducted provided Stillwater Associates with crucial insights in the functioning of the Hawaii fuels markets.

Stillwater specifically would like to recognize the considerable contribution to the report provided by Ed Aitken of The Process Group, an Irvine, CA, engineering firm, who provided the modeling for Hawaii's two refineries and was instrumental in evaluating the possibilities for upgrading and cost reduction.

CHARTER

In 2002, following the settlement of the lawsuit against the local oil companies, the legislators of the State of Hawaii enacted a bill intended to create a preventative framework and protect the State's gasoline consumers from supra-competitive prices in an oligarchy with limited competition. Besides price caps, Act 77, Session Laws of Hawaii 2002, also called for further study of the issues surrounding Hawaii's fuels market, as outlined in the excerpt below:

> (3) Require the department of business, economic development and tourism to:
>
> (A) Review and analyze the unsealed documents in Anzai v. Chevron et al. (the recently settled gasoline antitrust legislation) and other appropriate materials;
>
> (B) Gather and analyze empirical data to determine whether Oil Price Information Service index or other appropriate benchmarks are applicable to Hawaii's markets;
>
> (C) Review options available to the legislature, including wholesale and retail price caps and the potential effects of imposing price caps; and
>
> (D) Report findings and recommendations to the legislature before the convening of the 2003 regular season, including implementing legislation, as appropriate;
>
> (4) Require the attorney general and the legislative reference bureau to assist the department by conducting legal and policy analysis, as appropriate, and in drafting legislation; and
>
> (5) Appropriate $250,000 out of the public utilities commission special fund to the general fund, and appropriate the same amount to the department of business, economic development and tourism to contract with one or more petroleum experts to assist the department.

This Study was performed within the specific framework of the Legislation, to answer as a minimum the questions asked. In addition, Stillwater Associates, the consulting firm retained by the DBEDT to perform the work, proposed to extend the study to include other fuels besides gasoline to produce a comprehensive overview of Hawaii's cost and pricing structure for refined products.

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GLOSSARY

ANS	Alaska North Slope, term used to designate crude oil of that region
ASTM	American Society for Testing of Materials
BHP	Broken Hill Proprietary Company, an Australian mining and oil company that owned the Tesoro refinery from 1989 - 1998
CAA	Clean Air Act of 1977
CAAA	Clean Air Act Amendments of 1990
CAAA Title V	Section of the CAAA requiring Operating Permits, promulgated in 1992
CARB	California Air Resources Board
CARBOB	California Reformulated gasoline Blendstock for Oxygenates Blending
CEC	California Energy Commission
CMAI	Chemical Markets Associates, Inc.
Coker	A refinery unit which converts a heavy residue into more valuable lighter components plus a solid carbon by-product, petroleum coke or “pet coke”
cpg	Cents per Gallon
cpl	Cents per Liter, where referenced in the context of Canadian price controls implying Canadian cents, or Australian cents, as the case may be
DBEDT	Department of Business, Economic Development and Tourism of the State of Hawaii
DTW	Dealer Tank Wagon, a price basis for fuels delivered to retailers
EIA	Energy Information Administration
EPCA	Energy Policy and Conservation Act of 1976 as amended
ERT	Energy, Resources, and Technology, a division of the DBEDT
ETBE	Ethyl Tertiary Butyl Ether, an oxygenate produced from ethanol and isobutylene
FCC	Fluidic Catalytic Cracker, primary gasoline producing unit in a refinery
FTC	Federal Trade Commission
GPY	Gallon per Year
HIRI	Hawaii Independent Refining, Inc., original owner of the refinery now operated by Tesoro at Ewa Beach
HVR	High Volume Retailer, a gasoline station selling 500,000 gallons per month or more and generally operated on low margins by discount retail operations such as Costco, Wal-Mart or large grocery chains
IPI	Import Parity Indicator, an indicative marker for prices including all import cost used by Australian regulators
IPP	Independent Power Producer, a non-utility commercial power generator who sells power to a distribution utility usually under long term contract for the majority of its production
Jobber	Independent distributor of petroleum products

LP	Linear Programming, a method used to optimize refinery operations
LSFO	Low Sulfur Fuel Oil
LSWR	Low Sulfur Waxy Resid, a feedstock sourced mainly by Chevron from Indonesian refineries
LUST Tax	Leaking Underground Storage Tank Tax, currently 0.012 cpg
MB	Thousand barrels
MOPS	Mean of Platt's Singapore, a Singapore spot market reference price reported by Platt's
MTBE	Methyl Tertiary Butyl Ether
MON	Motor Octane Number, a measure for the anti-knock properties of gasoline derived from engine tests
MSFO	Medium Sulfur Fuel Oil, residual fuel with a sulfur content between 0.5 and 5.0% as defined by HECO (see http://www.hawaii.gov/dbedt/ert/hes2000/glossary.html)
NYMEX	New York Mercantile Exchange
OPA 90	Oil spill Prevention Act of 1990
OPIS	Oil Price Information Service
p.a.	Per annum
PRI	Pacific Refining Company, original owner of the refinery now owned by Tesoro
PADD	Petroleum Administration for Defense District; PADD V includes Hawaii, Alaska, Washington, Oregon, California, Arizona and Nevada
PUC	Public Utilities Commission, the agency charged with the oversight of regulated utilities
RFG	Reformulated Gasoline meeting the requirements of the CAAA
ROCE	Return on Capital Employed, free cash flow divided by total capital employed to generate the cash flow
RON	Research Octane Number, a measure for the anti-knock properties of gasoline based on laboratory testing
RVP	Reid Vapor Pressure, a measurement of the volatility of gasoline
SARA	Superfund Amendments and Reauthorization Act of 1986
TBD	Thousand Barrels per Day
TGP	Terminal Gate Pricing, a marker price used by Australian regulators for the cost plus return on assets for imported gasoline
TPY	Ton Per Year, usually referring to US short tons of 2000 lbs
USGC	US Gulf Coast
UST	Underground Storage Tank, which currently means a double walled tank with a leak detection system and vapor recovery
VLCC	Very Large Crude Carrier, a tanker capable of carrying 1.5 – 2 million barrels
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound(s) and emissions thereof

APPROACH

The central tenet of this study was that the gasoline market, which represents only 17% of the total petroleum products consumed in Hawaii, cannot be regarded in isolation, but can only be evaluated in the dynamic context of refinery operations and markets for the other products. The approach taken by Stillwater for this study was to:

(i) Collect information from stakeholders in the Hawaii fuels market, such as refiners, jobbers, branded and unbranded dealers, traders, providers of logistics services, and legislators.

(ii) Collect data pertaining to the Hawaii fuels markets from all available sources, including in particular the public information pertaining to Anzai vs. Chevron et al.

(iii) Analyze the intrinsic nature of the gasoline pricing structure in Hawaii within the broadest possible context of local refinery economics, supply and demand imbalances, and international arbitrage.

(iv) Identify physical and commercial barriers to supply, or other market forces preventing an efficient functioning of the Hawaii fuels markets.

(v) Identify all measures available to Hawaii State Legislature to reduce gasoline prices.

(vi) Evaluate the likely effectiveness of the various measures to reduce prices.

(vii) Estimate the required resources in terms of people and money required to manage and administer each of the options under consideration.

(viii) Establish the overall cost effectiveness in terms of benefits and cost of the proposed measures.

(ix) Present the final conclusions and recommendations to the legislature.

Although redacted documents generated in the course of the lawsuit brought by the attorney general versus several refiners were used to analyze market structures and mechanisms in Hawaii, it was expressly not the intent of this study to investigate any alleged restrictive marketing practices.

The team that prepared this report consists of a cross section of professional skills and hands-on experience in the oil industry: refining, supply & logistics, engineering, international trading, econometric analysis and retail marketing. An interdisciplinary approach has proven essential in analyzing Hawaii's petroleum infrastructure.

EXECUTIVE SUMMARY

This study is the result of foresight on the part of Hawaii's legislature when drafting Act 77, Session Laws of Hawaii (SLH) 2002, to reserve resources for a more in depth analysis of the issues at stake. Although the primary focus of Act 77 was on gasoline price caps, the legislature directed DBEDT to perform a more comprehensive analysis of Hawaii's petroleum industry.

The Hawaii fuel markets indeed pose some unique problems that can only be resolved when looking at the petroleum industry in its entirety, and in the context of global market dynamics. Thus, the scope of the study broadened as it progressed and the conclusions and recommendations presented here aim to provide a framework for legislative measures that can effectively address the intrinsically high costs of production and distribution of all fuels in Hawaii.

In this way, hopefully the legislative initiative of Act 77 will result not only in lowering the costs to consumers of Hawaii's gasoline, but also of other petroleum products and electrical power. Additionally, it is thought that this study can contribute to more constructive cooperation between government and petroleum industry, which is needed to overcome the significant challenges that lay ahead.

The primary conclusions and recommendations of the study are summarized below:

(i) **Hawaii's Petroleum Industry**. The high profitability of Hawaii's gasoline market relative to other markets is indicative of the use of market power in an oligopoly. Yet despite high margins in gasoline, and contrary to public perception, the petroleum industry in Hawaii overall does not realize excessive profits. Non-refining marketers are likely to be more profitable than the local refiners, who face significant challenges in the near future.

   a. Hawaii's refineries produce a product slate that consists primarily of low margin products such as fuel oil and jet fuel, which depress overall profitability. Although only a small fraction of total production, gasoline retail profits historically made up for high costs of operations and for low margins on the bulk of the production (See Sections 1.1.1 and 3.5).

   b. Recent shifts in market power, whereby non-refining marketers have access to gasoline at import parity and pass on some of the cost savings to consumers through High Volume Retail outlets, cause an erosion of the profit base for the refiners in both volume and price of their own branded retail (See Section 4.4.4).

   c. The small scale and high cost in the distribution and retail of gasoline effectively makes it difficult to create diversity of supply and introduce more competition. In fact, it can be

argued that the overhead cost for each of the six major marketers, the large number of retail outlets and the small average throughput per dealer with stations occupying high cost real estate, all contribute to the high cost of gasoline (See Section 4.2.4).

d. In their current form, the Hawaii refineries are ill equipped to compete with large export refineries in the Pacific Rim. Rising crude oil cost, dwindling supplies of the light, sweet crudes which the Hawaii refineries require, and the need to comply with lower sulfur specifications by 2006, are all factors that will shift the competitive balance even further towards economical obsolescence of the Hawaii refineries (See Section 3.1).

e. Essentially, within ten years or less, Hawaii will have to choose between lowering consumer gasoline costs and the economic benefits derived from the refineries in terms of jobs, local taxes, and added value. An alternative to this either/or choice may be available in the form of an extensive upgrade of the refineries as outlined below.

(ii) **Price Caps.** The Act 77 price caps should not be implemented. The main reasons not to implement the caps are:

a. The price caps are not expected to have any significant beneficial effect for Hawaii's gasoline consumers (See Section 6.1). In fact, recent analysis suggests that they would increase consumer costs.

b. Price caps are likely to bring unwanted volatility and seasonality to the Hawaii market. The price cap formula links Hawaii prices to the California market. California's gasoline market moves to more stringent and unique specifications, resulting in increasing import dependency and higher gasoline cost for that state. This would harm Hawaii under the current price formula (See Section 6.1.4 and 6.1.5).

c. A comprehensive examination of price cap regulations implemented elsewhere failed to identify any examples where such schemes resulted in clear consumer benefits (See Section 6.2).

d. The retail cost structure varies significantly for many locations in the islands. To match these location differences, price caps would require very complex regulations and expert application. A likely impact of price caps is that essential fuel services in rural areas would significantly decline and, potentially, disappear (See Section 4.2.4).

e. The price caps project an anti-business image for the State of Hawaii, which is detrimental to the investment climate in general and to specific investments in Hawaii's energy infrastructure in particular.

(iii) **Divorcement**. The current divorcement legislation should be repealed. The key factors that lead to this recommendation are:

a. Extensive studies in other gasoline markets show that this type of regulation is anti-competitive and have, over time, resulted in higher prices.

b. The regulation lowers the value of lessee dealerships because it prevents one class of buyers, the gasoline supplier, from buying out the leasehold. In particular for stations that are only marginally profitable, private buyers of a dealership are hard to find. In the past, suppliers reported that if they wanted to retain their market share in a particular area, they had to continue to operate the station because they couldn't find a dealer to take over the business.

c. The regulations are not effective in protecting dealers from competition by wholesale suppliers in lucrative locations, because the rules are in fact "anti-encroachment" only, and do not prohibit the building of company operated stations outright.

Transparency and Oversight. In the context of gasoline prices, a transparent market is one where market observers can see the various elements of the market and readily explain why prices are at their current level. In order to create transparency, the State will collect, analyze and report volume and price information about gasoline. In this context, oversight is exercised by agencies with enforcement authority who are empowered to look into perceived market abuses.

The current provisions of the Hawaii Trade Regulations and Practice Code, Chapter 486J, need to be modified to create transparency for the petroleum industry in Hawaii. Moreover, DBEDT currently lacks the means to actually fulfill the tasks with which it was entrusted under the current regulations. It is recommended that Hawaii's legislators allocate the necessary resources to enable effective monitoring of the Hawaii petroleum industry at all classes of trade. The primary considerations are:

a. The limited scale of Hawaii's fuel markets and the high fixed costs of market participation effectively prevent entry by more competitors. With a high level of concentration in multi-tiered fuels markets that have complex cost structures, it will be beneficial for both the oil industry and the government if the latter can maintain an accurate and up-to-date picture of the financial performance of the different segments of the industry. Such understanding may help to jointly resolve energy security issues, prevent costly law suits inspired by perceived lack of competition, enable more effective energy policy making, and is likely to create a more open atmosphere in which industry

and government can jointly face the significant challenges posed by Hawaii's unique energy needs.

b. Transparency needs to be created to provide a basis for a government oversight role, not necessarily for the industry's normal commercial practices. Moreover, it needs to be comprehensive, covering all fuels across all classes of trade, not just retail gasoline. Existing price publication services, although not always accurate, already provide a level of transparency for transportation fuels.

c. The volume requirements of petroleum volumes data under the former Chapter 486E, HRS, have not resulted in the availability of more accurate information. With manual data collection, incomplete reporting by the oil industry, and without sufficient resources to analyze the data, assure their accuracy, and present summary reports and conclusions to decision makers, just gathering the numbers is not effective as a monitoring mechanism.

d. An electronic data collection system needs to be created in consultation with the industry, whereby volume and pricing data is either entered on-line by the participants or uploaded in standardized file format. Checks can be built in to ensure accuracy of data reporting.

e. A system has to be designed, developed, and implemented. Resources will have to be allocated to analyze the reported volume and cost data on a monthly basis, to allow an analysis of profit taking at each segment of the petroleum industry.

f. More specific powers can be provided for gubernatorial action than those already embedded in the petroleum emergency provisions of Chapter 125C, HRS, so that if warranted by drastic changes or particular circumstances as identified by the periodic analysis of the Hawaii fuels markets, immediate action can be taken to address the situation.

(iv) **Petroleum Commissioner**. Act 77 established the position of State Petroleum Commissioner, tasked with monitoring the petroleum industry and conducting audits of suppliers of petroleum products. DBEDT is not a regulatory agency and is not equipped to conduct inspections and audits. Moreover, the enforcement role conflicts with DBEDT's primary role as a promoter of new investments and economic development. Audit and enforcement responsibilities are already vested in other State agencies. Considering all these factors, it is recommended that the position of Petroleum Commissioner be eliminated. The authority to collect and analyze data should be returned to the Director of DBEDT. Similarly, the requirement for audits should be eliminated.

(v) **Integrated Energy Strategy**. While the effort to increase transparency should result in a better understanding of the fundamental workings of the Hawaii petroleum industry, it will not result in a reduction of the intrinsically high cost associated with the State's current energy infrastructure. Preliminary analysis conducted as part of this study indicates that technically and economically feasible solutions may exist to structurally lower the cost of energy for Hawaii consumers. This reduction would not be just for petroleum products but also for electrical power, while reducing the industry's overall impact on the environment. The projects required to realize these benefits are not only highly complex and capital intensive, but are also to a large degree mutually interdependent. It is therefore recommended that DBEDT take a pro-active role in formulating an Integrated Energy Strategy for the State. (See Section 8.2)

(vi) **Reconciliation of Study Results and Public Perception**. Over the years, Hawaii's high energy prices, official investigations and lawsuits have been a fertile ground for rumors and misperceptions, probably as a result of oversimplification of complex issues. For instance, the press widely reported that ChevronTexaco earned 22% of its corporate profits over a considerable period from its Hawaii operations, although these represented only 3% of its sales. In fact, these data referred only to lessee dealer gasoline sales, not to ChevronTexaco's overall corporate profit. As such, the story says more about the dismal results for lessee dealer sales in the rest of the country at the time than about Hawaii's performance (See 3.5.3.).

1 HAWAII FUEL SUPPLY AND DEMAND

The overriding consideration in the analysis of the local supply and demand of gasoline is the insular nature of Hawaii. Supply shortfalls require imports over great distances at considerable expense, while excess supply may result in higher cost per unit for the remaining fuels sold in Hawaii because exports may not be economical and may have to be subsidized by the local sales. In this respect, Hawaii is different from almost all other US States, which for the most part are interconnected by an extensive network of common carrier product pipelines, inland waterways, and rail or truck distribution.

Also, while certain states are large excess producers and others lack any in-state refining capacity and import all products, Hawaii's supply and demand for gasoline are closely balanced. In a near balanced situation, occasional small volumes of imports or exports will have to carry the full cost of maintaining the necessary infrastructure, such as the cost for deepwater terminal facilities and docks. A detailed analysis will therefore be presented below of how the supply and demand balance affects prices of fuels.

1.1 Supply

The majority of petroleum products consumed in Hawaii are supplied by the local refineries. Imports are significant only for jet fuel and fuel oil, the primary products of the local refineries. The crude usage and the product mix of the Hawaii refiners are two factors that are unique to Hawaii.

1.1.1 Refining Capacity in Hawaii

Hawaii's two refineries are located in the Campbell Industrial Park at Barbers Point, at the southwestern tip of Oahu, and are owned and operated by ChevronTexaco and Tesoro respectively.

The ChevronTexaco refinery is the older of the two and was started up in 1962 with a capacity of 33,000 bpd. It has since been expanded to its current capacity of 55,000 bpd. The ChevronTexaco refinery occupies 248 acres of land and employs 196 full-time employees and 63 contractors.[1]

When it started up in 1970, the refinery currently owned by Tesoro was built with assistance from the State of Hawaii with the objective to introduce an element of

[1] Foreign Trade Zone Board, *FTZ No. 9 Annual Report 2002*, January 21, 2003.

competition into the local market, as well as for strategic reasons related to energy security for the State. The refinery, then owned by Pacific Resources, Inc. (PRI) and operating under the name Hawaii Independent Refining, Inc. (HIRI), was built under the Small Refiners Exceptions Regulations of that period, which limited its capacity to just under 30,000 bpd. Its current capacity is 95,000 bpd. It occupies 203 acres in the Campbell Industrial Park and employs 215 full time employees plus a further 860 contractors [2].

In 1989, the refinery was acquired for $380 million from PRI by Broken Hill Proprietary Co. (BHP), an Australian mining and minerals company. In 1998, BHP sold the refinery to its current owner, Tesoro, for $275 million at the time of purchase plus a further $50 million in promissory notes becoming due as of 2009, subject to meeting certain profitability targets. In a separate deal, BHP had already sold the Synthetic Natural Gas (SNG) facility for $100 million to Citizens Utilities, Inc. of Vermont.[3]

Table 1.1 – Current Hawaii Refining Capacity[4]

	ChevronTexaco		Tesoro	
	bbl/ stream day	bbl/ calendar day	bbl/ stream day	bbl/ calendar day
Atmospheric Distillation	57,000	54,000	95,000	93,500
Vacuum Distillation	31,300	31,300	43,000	43,000
Catalytic Cracking, fresh feed	22,000	21,000	-	-
Cat Hydrotreating*	3,500	3,500	12,000	12,000
Cat Hydrocracking	-	-	18,000	17,500
C4 Isomerizer	3,200	3,200	-	-
Alkylation	5,000	5,000	-	-
LP Catalytic Reforming	-	-	13,000	13,000
Thermal Cracking & Visbreaking	-	-	13,000	13,000
Asphalt & Road Oil	1,500	1,500	1,000	1,000
Sulfur (short ton/day)	-	-	34	34
Hydrogen (MM scf/day)	3	3	18	18

* Chevron Hydrotreater includes resid, Tesoro hydrotreats only the naphtha feed to the reformer

Table 1.1 above shows the current configuration and the unit capacities for Hawaii's two refineries. Stream day capacity is the maximum rated capacity for a unit in a single

[2] Foreign Trade Zone Board, *FTZ No. 9 Annual Report 2002*, January 21, 2003.

[3] R. Lynch, R. Daysog, *Texas firm to buy BHP*, Honolulu Star-Bulletin, March 19, 1998.

[4] EIA, Annual Refining Data 2002

day. Calendar day capacity is the annual production capacity taking into account certain outages for maintenance or operational reasons, divided by 365 days. The actual product output of the various products for the refineries will depend on the crude slate and operating conditions. Currently, the refineries operate at 85 to 90% of their nameplate capacity. An estimate of the typical current output for the two Hawaii refineries at this operating rate is given in Table 1.2 below.

Table 1.2 – Typical Product Slate for the Hawaii Refineries[5]

	ChevronTexaco	Tesoro	Total
	bpd	bpd	bpd
Propane	1,500	1,500	3,000
Gasoline	14,000	14,000	28,000
Naphtha	6,000	7,000	13,000
Jet Fuel Kerosene	13,000	26,000	39,000
Diesel	5,000	14,000	19,000
Fuel Oil*	14,000	23,000	37,000
Asphalt	500	500	>2,000
	54,000	86,000	140,000

* Includes fuel oil consumed in the refinery: ChevronTexaco 1,000 bpd, Tesoro 2,000 bpd (estimated)

Within certain ranges, the refiners can adjust the product slate to match market conditions and feedstock costs. Such decisions involve many variables and are resolved by both refiners by running a Linear Programming (LP) model. In general, the refineries operate to maximize the production of jet fuel and minimize gasoline and naphtha. However, refinery units can only adjust outputs within certain limitations. For instance, certain gasoline producing units, such as ChevronTexaco's Fluidic Catalytic Cracker (FCC), have minimum operating rates below which the process cannot function.

In practice this means that unless a certain minimum quantity of gasoline can be sold on the islands, the refiners face the choice of reducing production of jet fuel and fuel oil to match the corresponding reduction in gasoline output, or to export the excess

[5] Source: DBEDT statistics, information received from Chevron and Tesoro, and Stillwater's evaluation of typical refinery unit performance.

gasoline. If gasoline sales fall below the minimum operating range of the units, then the refinery has to export the gasoline or shut down the affected units.

The product slate of the Hawaii refineries is markedly different from that of the average of US refineries as a whole.

Figure 1.1 – Product Yields from a Barrel of Crude, US vs. Hawaii[6]

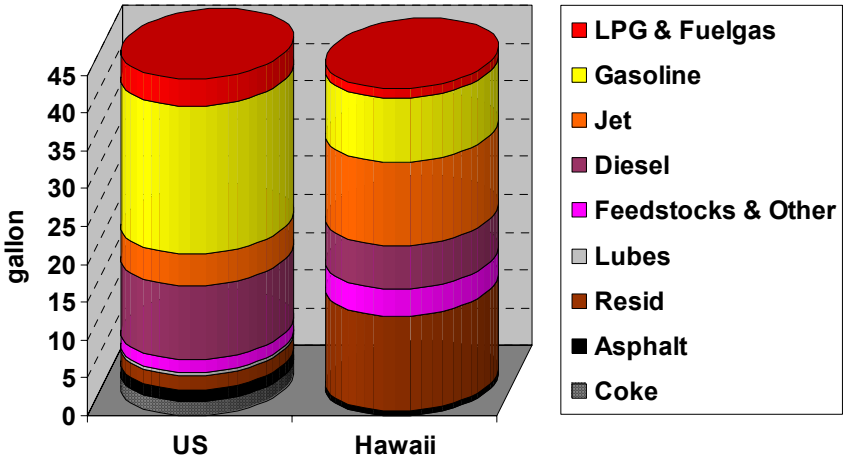


Figure 1.1 shows the average yield of products from one barrel (42 gallons) of crude oil for all refineries in the US compared to the total output from the Hawaii refineries. While refineries in the US can minimize the production of residual fuel to less than 2 gallons per barrel (4%) as a result of investments in coking and FCC capacity, the Hawaii refineries still produce 11.7 gallons of fuel oil from each barrel of crude (27%). Production of the most valuable product, gasoline, is 44% of total refinery output for the US as a whole, and only 19% in Hawaii. In California, refineries are capable of producing as much as 60% of gasoline from their heavy crude input.

Not only do the Hawaii refineries produce less of the valuable products from a barrel of crude, they also have a lower overall product yield. Whereas the US refineries on average produce 44.6 gallons of products from a 42 gallon barrel of crude, the Hawaii refineries produce less than 43. The increase in volume, called the processing gain, is caused by the lower density of the lighter products versus crude oil, as well as the addition of blending components other than crude oil during the refining process.

[6] US Data: American Petroleum Institute, year 2000 numbers; Hawaii data based on DBEDT numbers.

1.1.2 US West Coast Production

The US West Coast has been regarded as a reference framework for the Hawaii fuels market, possibly for reporting convenience because Hawaii is part of Petroleum Administration Defense District V (PADD V). This causes Hawaii's production and consumption numbers to be grouped together with those of the western continental states. Moreover, the two Hawaii refiners, ChevronTexaco and Tesoro, as well as marketers Shell and ConocoPhillips also operate refineries in California and Washington, and may have opportunities for optimization of feedstocks and products within their systems. Until the mid nineties, when the US West Coast still had a net excess of products available and US flag shipping was not as expensive as today, the refiners exchanged products in Hawaii and the West Coast on a regular basis. However, taking into account the overall supply and demand balance, there are few natural linkages left between Hawaii and the US West Coast markets.

Table 1.3 – US West Coast Refined Products Supply & Demand[7]

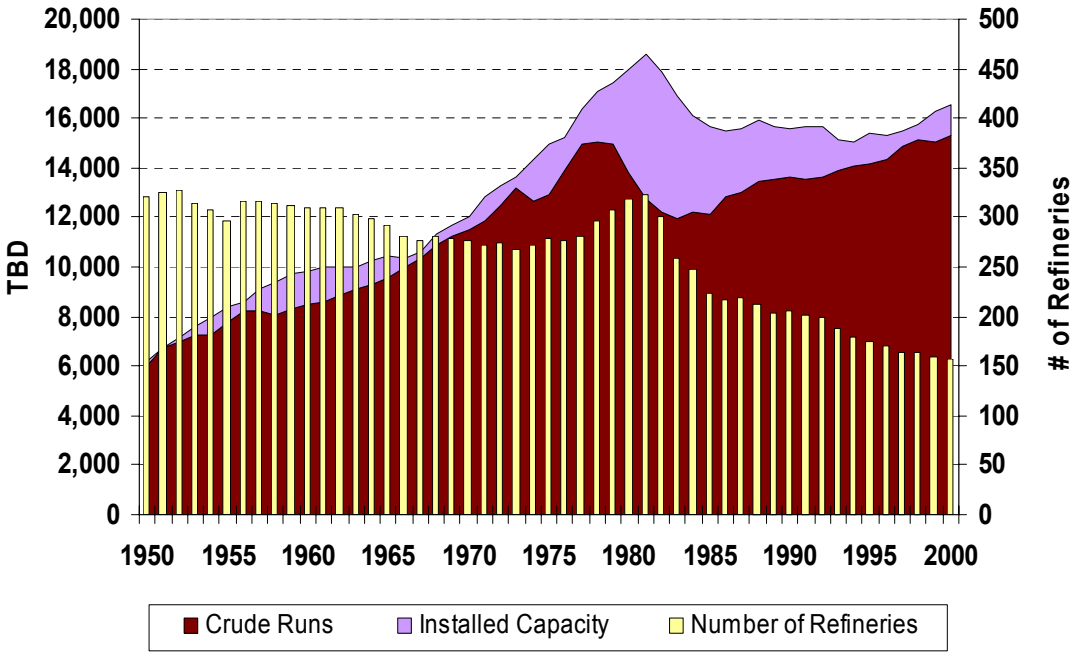
TBD	2001	Gasoline	Diesel	Jet Fuel	Resid
Alaska	Production	19	22	22	2
	Demand	19	22	26	2
	Balance	0	0	-4	0
Washington	Production	270	137	116	71
	Demand	182	59	68	25
	Balance	+88	+78	+48	+46
Oregon	Production	0	0	0	0
	Demand	98	44	17	5
	Balance	-98	-44	-17	-5
California	Production	1,049	291	240	58
	Demand	996	231	282	112
	Balance	+53	+60	-42	-54
Arizona	Production	0	0	0	0
	Demand	142	52	29	0
	Balance	-142	-52	-29	0
Nevada	Production	0	0	0	0
	Demand	55	24	25	0
	Balance	-55	-24	-25	0
West Coast	Production	1,341	450	378	131
	Demand	1,492	432	447	144
	Balance	-150	+18	-69	-13

[7] Demand data EIA. Production data Stillwater estimates based on crude runs and refinery configurations, thousands of barrels per day (TBD).

As can be seen in Table 1.3, the US West Coast as a whole is currently a net importer almost across the entire barrel. Within the western states however, Washington and the Bay Area are exporting centers, while Oregon, Nevada and Arizona entirely depend on imports, lacking any significant in-state refining capacity. Southern California is a net importer, but at the same time, the LA Basin refiners export considerable volumes of non-CARB grade fuels by pipeline to southern Nevada and Arizona.

The western states are not the only region that is becoming more and more import dependent. Refining capacity in the US as a whole is well short of demand for most products. Small inefficient refineries continue to close while larger refineries are increasing capacity and utilization rates, gradually removing the overcapacity that was built between 1977 and 1981 when the petroleum industry was regulated, as shown in Figure 1.2.

Figure 1.2 – US Refining Capacity and Utilization, 1955 - 2000[8]



In addition to its massive imports of crude oil, the US as a whole is currently a net importer of refined products. This increasing overall import dependency, combined with growing influence of local community interests that make it unlikely that a new

[8] Source of data: EIA.

grassroots refinery could ever be built again anywhere in the US, are key factors when considering whether Hawaii should link its volume and pricing policies for petroleum products to the US mainland or to international markets.

The import dependency of the US as a whole and the West Coast in particular, means that if a West Coast refiner ships products to Hawaii, then these volumes need to be replaced somewhere else in the western states with imports from outside the region. This in turn means additional transportation costs, because movements between the US mainland and Hawaii require American flag shipping, which is at substantially higher cost then foreign flag trades. An example is given in Table 1.4 below.

Table 1.4 – Additional Shipping Cost for West Coast Supplies to Hawaii

From	To	Jones Act	Distance (N. miles)	Voyage* (days)	Freight** (cpg)
Primary Cargo					
Puget Sound	Honolulu	Yes	2,652	6	8
Replacement Cargo Options					
US Gulf Coast	Los Angeles	Yes	4,488	14	12
E. Australia	Los Angeles	No	6,780	16	7
Korea (Pusan)	Los Angeles	No	6,763	16	7
Singapore	Los Angeles	No	8,510	20	9
Persian Gulf	Los Angeles	No	12,946	31	11
	Total freight for indirect supply to Hawaii				**15 to 20**
Direct Supply Options					
E. Australia	Hawaii	No	4,508	11	5
Korea (Pusan)	Hawaii	No	4,474	11	5
Singapore	Hawaii	No	6,020	14	6
Persian Gulf	Hawaii	No	9,584	23	11
	Total freight for direct imports into Hawaii				**5 to 11**

* Assuming an average speed of 17.5 kts. ** Estimates based on recent market conditions.

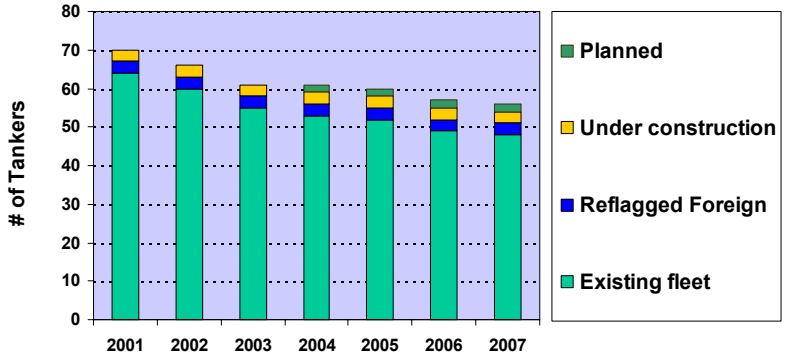
Table 1.4 shows that the petroleum industry will incur a penalty of approximately 10 cpg if it moves products from the West Coast to Hawaii, when these volumes subsequently will have to be replaced by additional imports into the western states with Los Angeles as the most likely destination. It is more cost effective to import products directly into Hawaii, especially since Hawaii sits astride the import routes for cargoes

into the US West Coast from export sources in Australia, the Far East and the Persian Gulf.

Besides the overall volume balance, another reason why US sources cannot compete with foreign sources for supplying Hawaii lies in the Jones Act, a cabotage law enacted in 1920 that requires that all cargoes moved between ports on US soil must be carried in US built ships manned by US citizen crews. Subsequent to the Exxon Valdez spill in 1999, federal regulations came into effect under the Oil Spill Prevention Act of 1990 (OPA 90) requiring double skin hulls on American flag vessels carrying crude oil and petroleum products. The cost of building such vessels in American shipyards is rapidly becoming prohibitive.

Because the high costs make fleet replacements uneconomical, the existing Jones Act fleet has been reduced by attrition. The process of non-replacement of retiring Jones Act vessels is expected to continue over the next several years (see Figure 1.3). During the nineties, both Texaco and Unocal retired their US flagged vessels from the service between the US mainland and Hawaii.

Figure 1.3 - Phase Out of Jones Act Product Tankers[9]



Currently, the freight rates for Jones Act vessels are almost twice those of foreign flag vessels for the same distance. This cost difference and the overall shortfall of refined products for the US as a whole and the West Coast in particular are expected to increase. It is for these reasons that a market participant in Hawaii, who wants to base its volume and pricing strategy on external markets, should look to foreign sources rather than the mainland US.

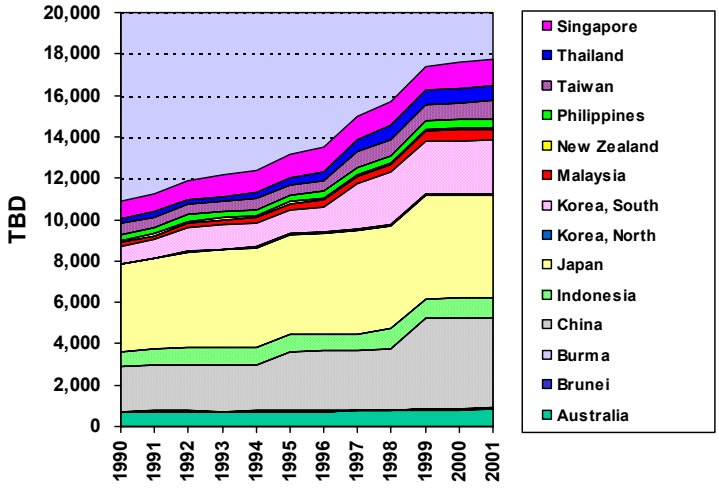
[9] Source: Maritime Administration (MARAD), US Department of Transportation

1.1.3 Foreign Sources of Fuels for Hawaii

The natural export markets from which Hawaii could draw imports of refined products are the Pacific Rim refining centers in Singapore, Korea, Taiwan and to a certain extent, mainland China. Australia and more remote sources in the Middle East also have potentially better supply economics for Hawaii than the US sources.

During the nineties the Asia Pacific region saw a dramatic expansion of refining capacity in Korea and Taiwan, and an upgrading of conversion capacity through the installation of cracking and coking technologies[10] at existing refineries. Mainland China has also upgraded its coastal refineries to the point that gasoline streams are regularly exported. This expansion of capacity was the results of investment decisions taken before the collapse of the Asian economies in 1997, with actual utilization in the recession years being much lower than anticipated. Moreover, the Asian markets are driven primarily by demand for diesel and kerosene, with domestic gasoline markets slow to catch up with the expanded capacity. Figure 1.4 below shows the refining capacity for key countries in the Pacific Rim.

Figure 1.4 – Refining Capacity in Pacific Rim Countries, 1990 - 2001[11]



Contrary to the US, where increases in capacity at individual refineries have come about through debottleneck projects and additions of units such as crackers and cokers, the capacity additions in the Far East have largely been in the form of new grass roots refineries, many of which are of a scale that places them amongst the

[10] Both "cracking" and "coking" refer to the conversion of the residual fuel into lighter products in special units.

[11] Source of data: EIA International Petroleum refinery Capacity Data.

largest in the world. Other countries, such as India and several oil producing countries in the Persian Gulf, are currently considering building refining capacity for export purposes.

Table 1.5 – Large Export Refineries in Singapore and S. Korea[12] (TBD)

TBD	Crude Distil.	Vacuum Distil.	Coking	Thermal cracking	Cat cracking	Cat Reform.	Hydro cracking	Hydro treating	Alky
Singapore									
ExxonMobil	580	167	-	118	-	89	34	288	-
Shell Eastern	405	75	-	60	34	37	30	197	3
SPC	285	71	-	30	31	14	30	92	4
	1,270	313	-	208	65	140	94	577	7
South Korea									
Hyundai Daesan	310	41	19	-	-	20	22	39	-
Hyundai Inchon	270	18	-	-	-	28	-	115	-
Caltex Yosu	634	10	-	-	63	71	-	288	-
SOC Onsan	520	160	-	-	60	43	71	258	-
SKC Ulsan	817	79	-	-	45	70	27	316	5
	2,551	308	19	-	168	232	120	1,016	5

During the nineties Singapore, which had been a hub for trading in crude oil, fuel oil and distillates since the sixties emerged as a blending center and supply point for gasoline and blending components. As a result, Singapore became the pricing basis for gasoline bought and sold in the region. MOPS[13] is used as a reference point for evaluating gasoline and other products from Japan, Korea, Taiwan and Australia, as well as for Singapore itself. Wholesale purchase contracts in Hawaii now take Asian markets into consideration.

Aloha Petroleum completed its terminal expansion at Barbers Point in 1998, although it began to import gasoline in 1997 through the Unocal and Shell terminals in Honolulu. Purchases from BHP, which was Aloha's supply source at the time, were becoming uneconomical under a newly proposed supply contract. Aloha was left with three options: to get out of the business, to sell gasoline at a loss at retail level, or to look for a supply source outside Hawaii. In partnership with Texaco, Aloha chose the third alternative and expanded its Barbers Point terminal to 0.5 million barrels, so that it

[12] Source of data: Oil & Gas Journal/ Dec 2001

[13] MOPS – Mean of Platts Singapore, with "Platts" being the name of the primary petroleum pricing publication used for contract purposes in the region.

could receive full size cargoes, often combinations of gasoline and diesel, at a landed cost that allowed it to compete in the market.

Significant is that from 1997 through 1998, Aloha's most economical sources for gasoline were the Pacific Rim refiners rather than US West Coast, confirming the issues outlined in section 1.1.2 above. The Aloha import experience further demonstrates that the U.S. West Coast is not the primary supply area for Hawaii gasoline.

The Pacific Rim refiners that form Hawaii's most likely source of imported fuels are driven by refining and market economics on a different order of magnitude than those in Oahu, or even those of the US West Coast. Typically, the large Singapore, Korean and Taiwanese refineries enjoy significant cost advantages over the Hawaii refiners.

Table 1.6 – Typical Refinery Cost Differentials*

	Hawaii	**US West Coast**	**Pac Rim**
	55 – 90 bpd	100 – 260 bpd	500 – 800 bpd
Crude	Base	- 3 $/bbl	- 1 $/bbl
Processing Gain**	Base	- 2 $/bbl	- 1$/bbl
Blendstocks	None	+ 1 $/bbl	
Operating Expense	Base	- 1 $/bbl	- 2 $/bbl
Capital recovery	Base	+ 1 $/bbl	+ 1 $/bbl
Freight to Hawaii	0	+ 3 $/bbl	+ 2 $/bbl
		- 1 $/bbl	- 1$/bbl

*See 3.1 for details. **Effect of lower crude use per bbl of product because of blendstocks and higher processing yields

In actual fact, competitive conditions in the Far East markets do not always allow for full cost recovery of operating and capital cost. Market factors such as an imbalance for local refiners to maximize diesel production while being unable to sell the corresponding amount of co-produced gasolines often lead to more prices that are more advantageous for the buyer than the seller. This "buyer's market" situation adds credence to the likelihood that these Asian refineries can serve as primary sources for gasoline imports into Hawaii, if imports are needed.

1.1.4 Supply Reliability

Unlike California, Chicago and other "island" markets with boutique fuels, Hawaii does not have a history of price volatility caused by supply shortages. On average, the refiners have between 7 and 10 days' worth of crude oil consumption in storage, with a further 20 days' supplies en route for Hawaii in tankers.

For the main products of Hawaii's refineries, jet fuel and fuel oil, the main consumers keep significant inventories in addition to those held by the refiners. Hawaii Fueling Facilities Corporation, HFFC, the jet fuel purchasing consortium, tries to maintain a minimum inventory of 35 days of supplies. In all its years of operation, it has seen only one occasion in which through a series of unexpected circumstances and shipping delays, its stocks were down to 5 days. HFFC has since added additional tankage to prevent recurrence.

HECO, the main consumer of LSFO for its three fuel oil fired power plants on Oahu, has 3 tanks of 300,000 bbl each adjacent to the ChevronTexaco refinery. Including tankage at the power plants and black oil tanks at the refineries, an average inventory equal to 30 days of consumption is usually on hand.

Gasoline stocks as reported by the EIA typically range between 550 and 900 MB, or 20 to 35 days of supply. Distillate fuel inventories range between 400 and 600 MB, which also translates in 20 to 35 days of supply. In terms of days of supply, California refinery and bulk terminal inventories are on average less than half of those in Hawaii.

Besides stocks there are other factors that contribute to security of supply and price stability in Hawaii:

- The refining system in the US as a whole and in California in particular is strained to maximum capacity. Imported gasoline is needed to meet consumer demand. The Hawaii refineries, however, have 5 to 10% spare capacity. This means that they can make up for lost production and maintain inventories at the high end of the normal operating range.

- Hawaii does not have unique fuel specifications and can source products from refineries all over the world.

In summary, supply reliability is not a significant concern in Hawaii and planned or unplanned outages do not contribute to high prices.

1.2 Demand

Demand for refined products is driven by underlying economic factors such as population growth and improvements in per capita revenue, while technology development, such as improved fuel economy, may help to offset increases in demand. Behavioral factors such as consumer preferences for SUVs or responses to higher prices and availability of public transportation may play a role either way.

1.2.1 Historical Trends in Hawaii Fuel Demand

Demand for petroleum products in Hawaii has remained fairly stagnant over the last decade. Yamaguchi et al[14] in 1993 still predicted fairly robust growth based on the rapid expansion of the sixties and seventies, and a brief flare up in the late eighties. But unfortunately the economy of Hawaii hardly participated in the economic boom experienced by most regions of the continental US in the nineties and as a result, demand for most products has remained flat, or has actually decreased.

Figure 1.5 – Hawaii Fuel Demand, 1960 - 2001

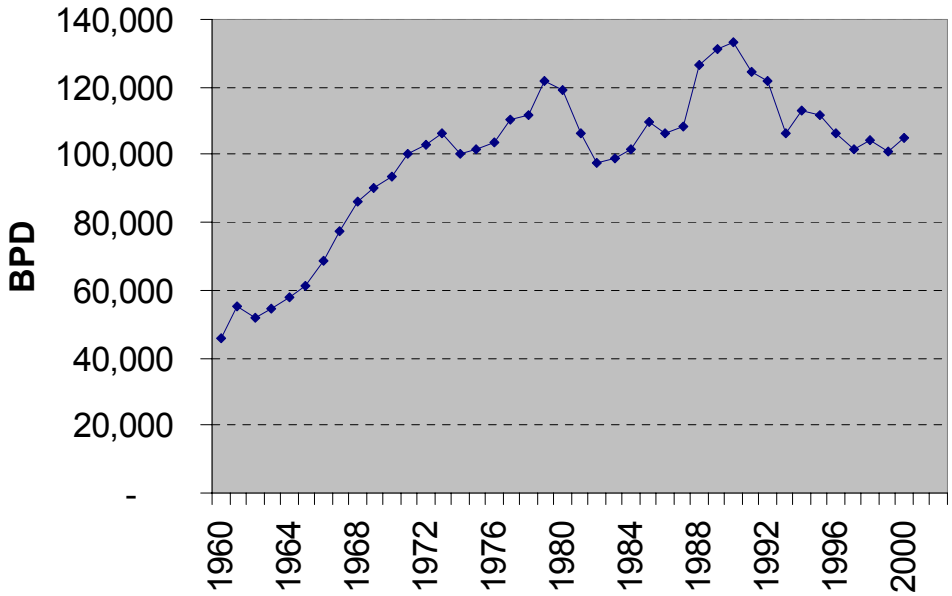
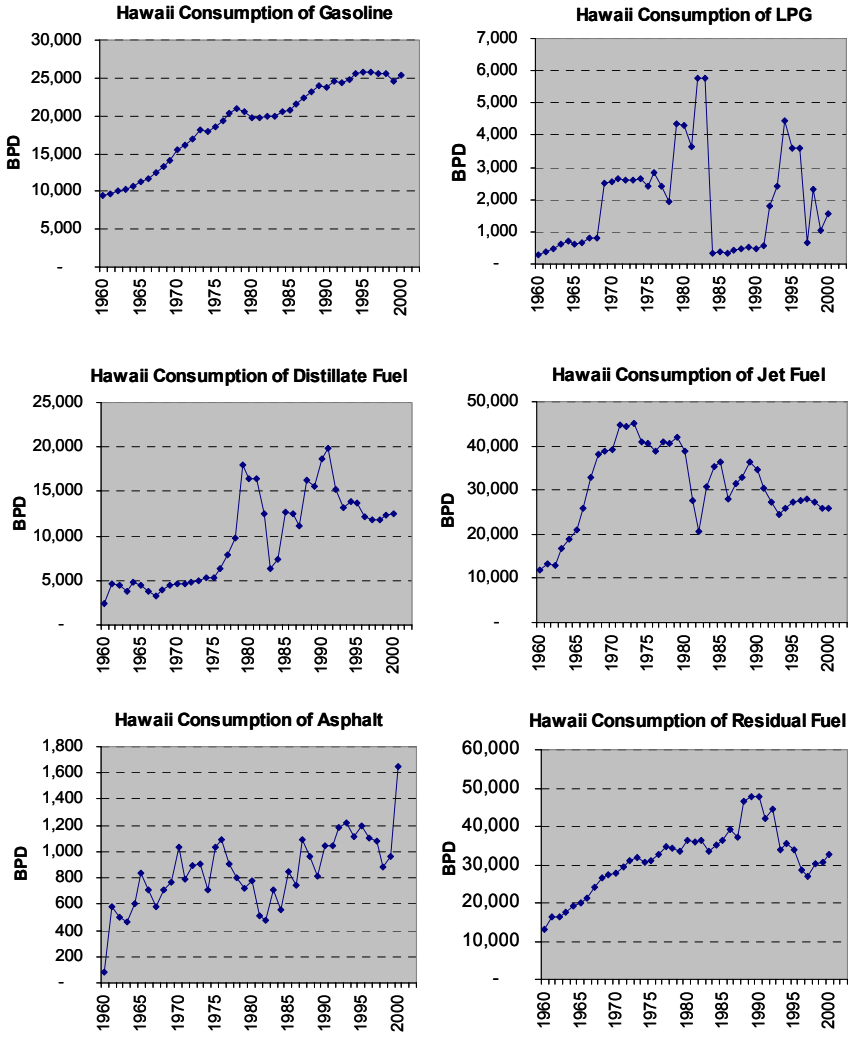


Figure 1.5 shows how Hawaii's total consumption of petroleum products has declined from its historical high in the late eighties. However, some of the apparent decline in

[14] Nancy D. Yamaguchi, David T. Isaak, *Hawaii Energy Strategy Project 2, Fossil Energy Review*, DBEDT publication December 1993

the total demand appears to be due to a change in reporting whereby certain numbers were withheld to avoid release of data that could have anticompetitive effects, because of the limited number of market participants. Data reported to the US Energy Information Administration show that since the early nineties, total demand of petroleum products in Hawaii has been essentially flat. To examine the trends in more detail, Figure 1.6 below shows the consumption for each of the main refined products in Hawaii as reported by the EIA.

Figure 1.6 – Hawaii Fuel Demand by Product, 1960 – 2001



Some underlying trends can be clearly recognized:

- **Gasoline**. The underlying long-term growth of the Hawaii gasoline market from 1960 through present is 2.5%. In recent years, growth has been slower and year to year numbers have been more erratic.

Table 1.7 – Hawaii and Total US Gasoline Demand Growth[15]

	Average Annual Growth Rate %	
	Hawaii	**Total US**
1960 – 1980	3.8%	2.8%
1980 – 1990	1.8%	0.9%
1990 – 1995	1.7%	1.6%
1995 – 2000	-0.3%	1.8%
	2.5%	1.9%

Gasoline demand in Hawaii is expected to grow at 1.4% per year according to the Hawaii Energy Strategy 2000[16]. Gasoline demand in the US is expected to grow 2.1% per annum[17]. The downside cases presented by DOE are 1.9% per annum for their Low Economic Growth case and 1.8% per annum for their High World Oil Price sensitivity.

In the absence of strong economic growth, with a fairly stable population profile and limited room for urban sprawl, it is unlikely that Hawaii will see significant increases in gasoline demand in the near future. This means that it is unlikely that Hawaii will have a structural need for gasoline imports any time soon.

- **LPG**. The data over the most recent years show a credible average growth of 3.5% per year over the period 1982 through 2001.

- **Distillate Fuels**. The increase in diesel usage mainly stems from increased use for power generation.

- **Jet Fuel**. Since reaching a historic high in the early seventies, the consumption of jet fuel in Hawaii has remained essentially flat. The reason is the greater fuel efficiency of later generation airplanes and the advent of jets capable of crossing the Pacific non-stop.

- **Residual Fuel**. Similar to the demand for jet fuel, the consumption of residual fuel in Hawaii has remained essentially flat since the early eighties. This can be

[15] EIA data

[16] DBEDT, 2002.

[17] Annual Energy Outlook 2003, Energy Information Administration, US DOE.

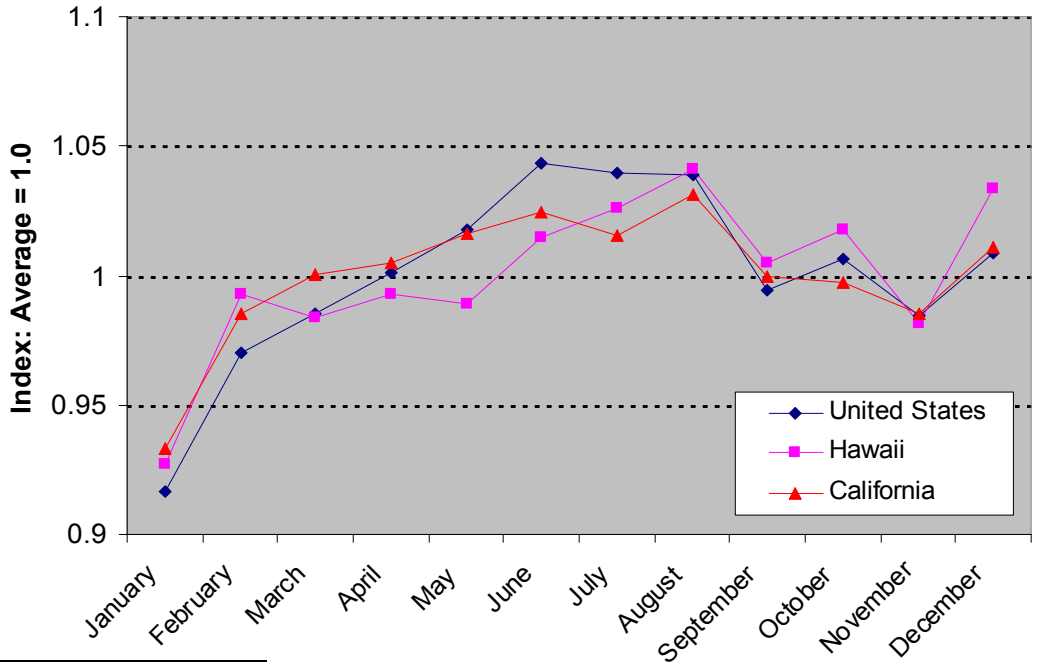
ascribed to a successful effort by the Hawaii power generators to develop new capacity primarily using diesel, naphtha, coal and renewable sources. The expectation is for this trend to continue. The possibility of substitution of resid as power fuel by Liquefied Natural Gas (LNG) is discussed in Section 4.3.2

Overall, the conclusion seems justified that the main fuels markets in Hawaii, jet fuel and residual fuel, are stagnant or even in decline, while gasoline may see continued slow growth. Diesel and LPG show stronger growth, but are not leveraging in the overall refining and marketing economics. This means that essentially, in the near future the current cost and revenue structure of the industry can be expected to remain similar to that currently observed.

1.2.2 Seasonal Effects

The demand for gasoline in Hawaii has a similar seasonality pattern as gasoline demand in California and the rest of the US. A calculation of monthly seasonal adjustment factors[18] (Figure 1.7) indicates that gasoline demand is highest in the summer months and lowest in the winter. The exception is the December holiday season.

Figure 1.7 – Comparative Monthly Seasonal Demand Factors



[18] Season adjustment performed by the ratio-to-moving average method by Stillwater Associates.

Unlike most other fuel markets in the US, the seasonality of the demand in Hawaii does not translate into seasonal pricing differentials, probably because Hawaii does not have separate summer and winter gasoline grades. A more detailed comparison of seasonal fluctuations in gasoline pricing in Hawaii and California is provided in Section 6.1.5.

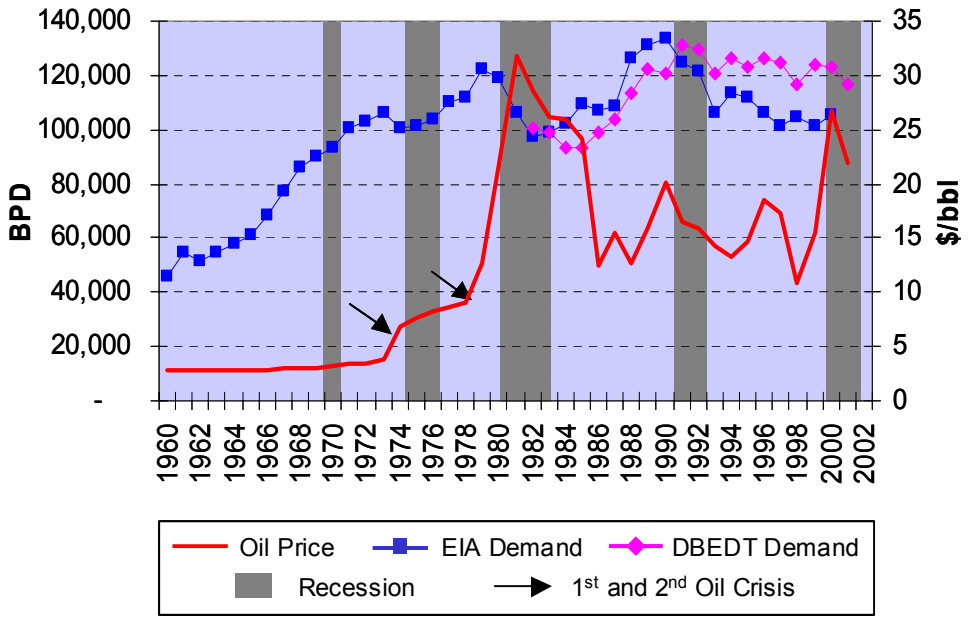
1.2.3 Price Sensitivity

Generally, the demand for most petroleum products, and gasoline in particular, is highly inelastic, that is to say that significant changes in price only result in small changes in demand. Most economists make a distinction between short-term price elasticity and long-term, whereby the long-term behavior is more elastic because over time, substitutes can be developed such as public transportation or more fuel efficient cars.

In general, short-term price elasticity numbers as reported by economists are in the range of -0.05 to -0.20 which means that a 100% increase in price would lead to a 5 to 20% decrease in demand. In Hawaii, the State derives approximately 25% to 30% of its domestic product from tourism. Tourists are price sensitive to airfares, which are impacted by jet fuel prices, but less sensitive to other costs once they reach their destination.

Table 1.7 below shows historical trends for the total consumption of petroleum products in Hawaii and the world oil price in nominal dollars. At the time of the first Oil Crisis in 1973/1975, when oil prices roughly doubled, demand for petroleum products in Hawaii fell by approximately 8%. The second Oil Crisis of 1979, when prices tripled, caused a drop in demand of 24%. As a rough indication, it would therefore appear that Hawaii's overall demand for petroleum products exhibits price elasticities in the range of -0.04 to -0.08, which is at the low end of the range reported from various industry studies. In other words, despite its heavy dependence on discretionary spending from tourism, Hawaii's petroleum markets are relatively constant, even with price shocks.

Figure 1.7 – Oil Price Impact on Hawaii Petroleum Demand[19]



Although crude oil markets are currently in turmoil due to various geopolitical events, the long-term forecast for crude oil prices as prepared by the DOE is for crude to remain in the mid-20 $/bbl range in constant dollar pricing, corresponding to OPEC's target price range. At this price level, and given the relative inelasticity of demand for petroleum products even longer term, it is unlikely that in the near future, demand for conventional petroleum products would either be suppressed or stimulated to where significant shifts in the supply and demand balance would result.

[19] Source of data: EIA Consumption Data by State, First Purchase US Average Crude Oil Price, Nominal $; DBEDT.

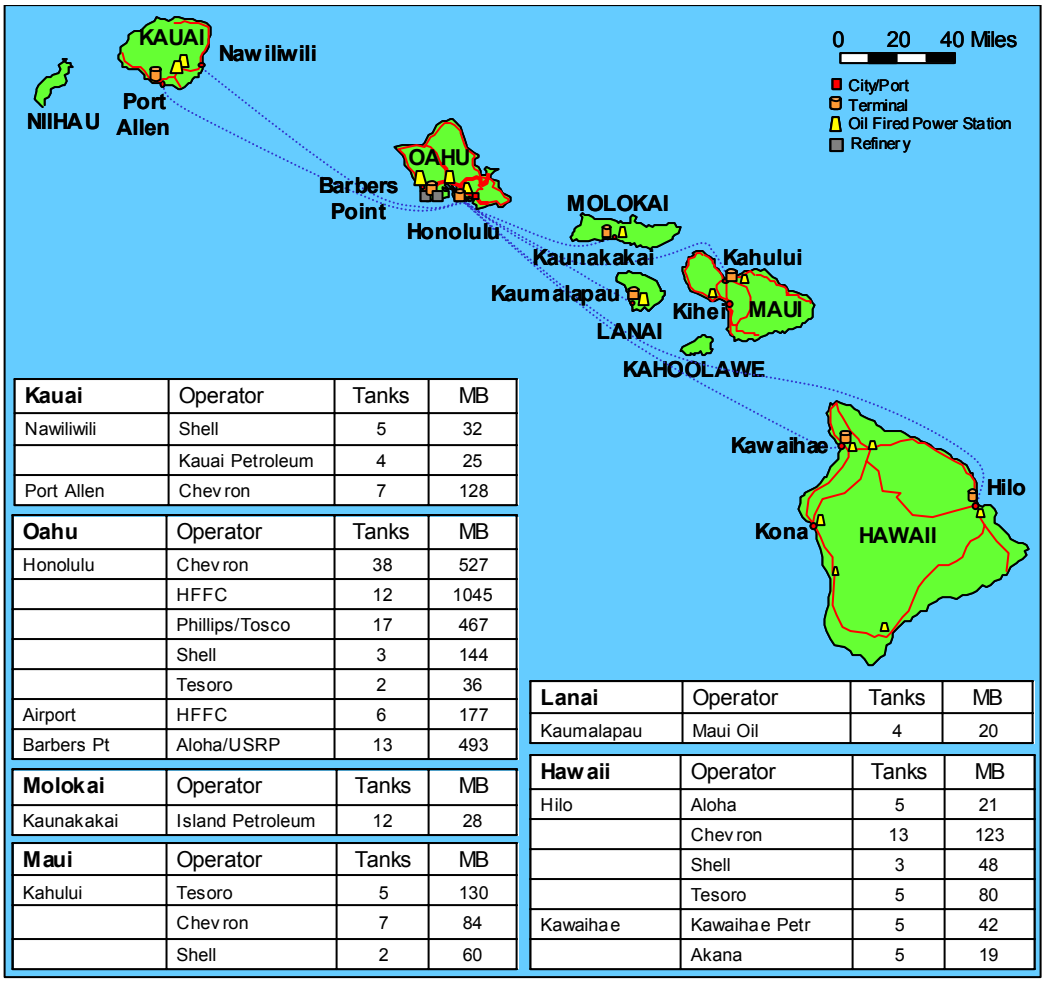
2 HAWAII PETROLEUM INFRASTRUCTURE

Besides the two refineries on Oahu, the infrastructure for petroleum products in Hawaii consists of pipeline systems on Oahu, bulk liquid terminals on all major islands, inter-island barges, trucks, and retail stations. Below, an overview will be provided of locations, capacities and typical costs.

2.1 General Overview

The Hawaii petroleum infrastructure is in fact a hub-and-spoke distribution system, in which the refining system in Oahu is the hub, while the neighboring islands are served from Oahu by barge through small terminals along routes as shown in Figure 2.1 below.

Figure 2.1 – Hawaii Petroleum Infrastructure



Kauai	Operator	Tanks	MB
Nawiliwili	Shell	5	32
	Kauai Petroleum	4	25
Port Allen	Chevron	7	128

Oahu	Operator	Tanks	MB
Honolulu	Chevron	38	527
	HFFC	12	1045
	Phillips/Tosco	17	467
	Shell	3	144
	Tesoro	2	36
Airport	HFFC	6	177
Barbers Pt	Aloha/USRP	13	493

Molokai	Operator	Tanks	MB
Kaunakakai	Island Petroleum	12	28

Maui	Operator	Tanks	MB
Kahului	Tesoro	5	130
	Chevron	7	84
	Shell	2	60

Lanai	Operator	Tanks	MB
Kaumalapau	Maui Oil	4	20

Hawaii	Operator	Tanks	MB
Hilo	Aloha	5	21
	Chevron	13	123
	Shell	3	48
	Tesoro	5	80
Kawaihae	Kawaihae Petr	5	42
	Akana	5	19

The various locations and capacities of marine petroleum terminals in Hawaii Figure 2.1 are based on public information, such as that published by Hawaii's Department of Transportation, and the Foreign Trade Zone administration, as well as information from industry sources.

2.2 Oahu Infrastructure

Oahu has a sophisticated and complex infrastructure for petroleum products, linking the Barbers Point refineries with the terminals in Honolulu Harbor twenty miles to the East. In addition to the commercial infrastructure, there is also a system of military petroleum installations, although most of these are no longer active.

Figure 2.2 – Oahu Petroleum Infrastructure

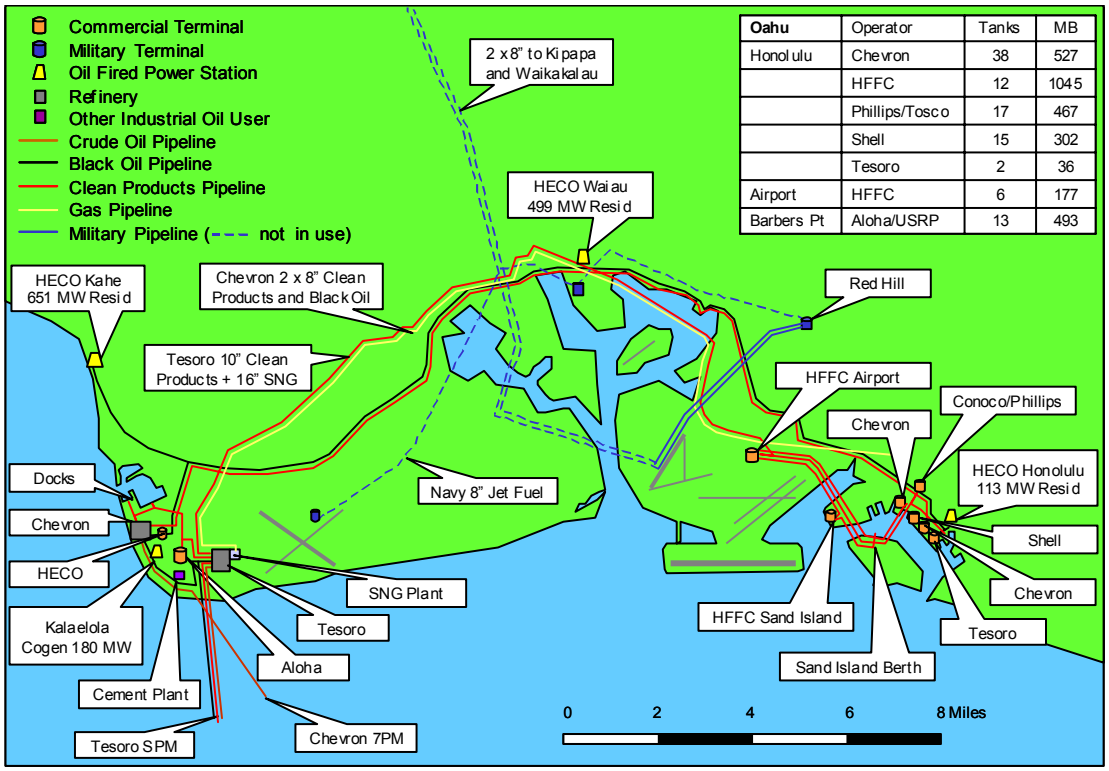


Table 2.1 – 2001 Oahu Consumption of Petroleum Products[20]

BPD	Asphalt	Resid.	Distillate	Jet Fuel	Av Gas	Gasoline	Naphtha	LPG
Oahu	**1,280**	**30,400**	**9,500**	**42,600**	**70**	**17,300**	**2,300**	**3,000**

[20] Source of data: DBEDT 2001

2.2.1 Refinery Infrastructure

Each refinery at Barbers Point has its own offshore mooring system to offload crude oil. ChevronTexaco employs a 7-point mooring system and Tesoro a more modern Single Point Mooring (SPM). Both buoys have a maximum deadweight restriction of 150,000 ton, limiting cargo sizes to approximately 750,000 bbl. The mooring buoys are sometimes also used to receive other products, or to load exports.

The refineries have their own storage, which obviously has as its primary function the handling of feedstocks, intermediates and final products to support refinery operations. However, the refinery tankage is also used for receiving imported products or making export shipments. Section 2.5 below provides a more detailed overview of inventories maintained by the industry in Oahu.

2.2.2 Oahu Pipeline Systems

The backbone of the Oahu petroleum infrastructure is formed by two pipeline systems linking the Barbers Point refineries to the Honolulu terminals and to some key industrial consumers as shown in Figure 2.2. The first link is provided by ChevronTexaco's two pipelines, each 8" in diameter, one of which is in black oil service (capacity 800 bbl/hour, not in continuous service) and the other in clean products (1,700 bbl/hour). The second pipeline system is that of Tesoro, which consists of a 10" clean products line (2,800 bbl/hour) in a joint right-of-way with an 18" line for Synthetic Natural Gas (SNG).

ChevronTexaco's black oil line provides Low Sulfur Fuel Oil (LSFO) with 0.5% sulfur to the Kahe, Waiau, and Honolulu power plants, and to the black oil terminals in Honolulu Harbor that serve to load fuel oil on barges for the neighboring islands, as well as for blending of bunkers for ships in the ports of Hawaii. The pipeline to the Kahe station is owned by HECO, along with a fuel oil terminal in the Campbell Industrial Estate at Barbers Point. Some power plants on the Neighbor Islands use Medium Sulfur Fuel Oil (MSFO; 0.5% to 5% sulfur), which is loaded directly at the Barbers Point barge dock. At Barbers Point, the refineries also provide LSFO oil by pipeline to the cogeneration unit and to the cement plant.

HECO is currently considering laying a new, smaller fuel oil pipeline to serve its Waiau and Honolulu power plants in a continuous mode. The current 8" line owned by ChevronTexaco is so big that it has to be operated batch wise. Since fuel oil would

solidify in the pipeline when a minimum flow rate is not maintained, the contents of the pipeline must be replaced by lighter oils, so-called cutter stock, every time deliveries are stopped. According to HECO, the significant costs for the new pipeline would be justified by savings in operating and maintenance expense.

The military pipeline system runs from the Red Hill reserves around the Lochs of Pearl Harbor to the former Barbers Point naval air station and to the various fueling points of the Pearl Harbor installations. The military system is linked into the Tesoro clean products line. A connection with the ChevronTexaco system is blinded off. Most of the system is no longer operational, and its potential value in commercial use is limited because the current pipelines are not constrained and can handle the existing volumes without any reported problems.

2.2.3 Oahu Terminals

The terminals in the port of Honolulu are interlinked, and receive products or load barges over Pier 29, 30, 33 or 37. Jet fuel is brought in by the Hawaii Fueling Facilities Corporation (HFFC) at Pier 51A on Sand Island, where the company operates a terminal that is linked into storage across the Kalihi Channel as well as tankage at the airport.

At Barbers Point, Aloha Petroleum and US Restaurants Properties (USRP) jointly own a terminal with a total capacity of 0.5 million barrels, which is linked to the barge docks and the deepwater berths in Barbers Point Harbor. Aloha is thus the only non-refiner wholesaler in Hawaii capable of directly receiving full cargo size vessels (250,000 to 300,000 bbl) and has in the past imported cargoes purchased from MIECO, an international trading company. Currently, half the storage is rented out to ChevronTexaco on a temporary basis while ChevronTexaco is performing major maintenance.

In addition to the Aloha/USRP clean products terminal, HECO maintains inventories of fuel oil at Barbers Point in tankage that is adjacent to the ChevronTexaco refinery and serves as the starting point for the fuel pipelines.

In recent years, Oahu has seen a reduction in available storage. The use of land in the area of the port of Honolulu where the terminals are concentrated, around Berth 29, 30 and 31, is the subject of reevaluation as land values increase. BHP's terminal (now

Tesoro) used to have 9 tanks for a total of 249 MB, but is now reduced to two tanks totaling only 36 MB. Tesoro now shares space in the ConocoPhillips terminal.

On Oahu, truck loading racks are provided at the Aloha terminal and at the Honolulu terminals. Besides the truck fleets owned and operated by the refiners or jobbers, there are two tank truck companies at Oahu, one of which is very small. Truck freight is regulated by the Hawaii Public Utilities Commission. The current freight rate is 2.5 cent per gallon (cpg), which is high compared to mainland truck freight rates over similar distances in an urban environment, which would be no higher than 1.5 to 2 cpg.

2.3 Neighbor Islands

Even on the bigger islands such as Hawaii and Maui, the infrastructure for petroleum products is limited when compared to Oahu and is generally characterized by small terminals capable of barge traffic only, with internal distribution on the island by truck. Pipelines are limited to connections between docks and shore tanks, and no large tanker capable terminals exist on any of the other islands.

2.3.1 Hawaii

The Big Island has two ports with petroleum terminals, Hilo and Kawaihae. With four terminals for a total of 272 MB, Hilo is the main entry point for petroleum products. A smaller center at Kawaihae has two terminals which are operated by ConocoPhillips and Akana Petroleum, which are limited to gasoline and diesel service. Jet fuel for the Kona airport and other fuels are trucked over from Hilo. This is an eight hour roundtrip when loading and discharge times are included.

Table 2.2 – 2001 Hawaii Big Island Consumption of Petroleum Products[21]

BPD	Asphalt	Resid.	Distillate	Jet Fuel	Av Gas	Gasoline	Naphtha	LPG
Hawaii	**NA**	**1,200**	**1,435**	**1,147**	**9**	**4,349**	**1,200**	**614**

Gasoline is marketed in the Big Island by ChevronTexaco, Tesoro, Aloha, Shell and ConocoPhillips under the 76 brand. Residual fuel is burned in three power stations

[21] Source of Data: DBEDT, 2001

owned by HELCO, while the naphtha is serves as low sulfur gas turbine fuel in a station owned by an Independent Power Producer (IPP).

In Kawaihae, the terminal owned by Akana used to have a capacity of 70,000 bbl with access to the dock for waterborne receipts, but when ChevronTexaco sold the terminal to Akana (ChevronTexaco's jobber), they took out the dock connections and reduced the storage to 19,000 bbl. Akana now uses the terminal for gasoline and diesel, which is trucked over from ChevronTexaco's terminal in Hilo.

The limited access for petroleum products across the docks that also serve general cargo was cited as a problem that can only be managed by careful planning.

Hawaii's average inventories for petroleum products excluding LPG, when estimated at 60% of total storage capacity, equate to approximately 24 days' worth of consumption.

2.3.2 Maui

There are three terminals in Maui, all in Kahului. The small terminal owned by Shell is leased out to provide a service for diesel fuel for local power generation usage. The other two terminals are owned by ChevronTexaco and Tesoro respectively.

Table 2.3 – 2001 Maui, Molokai and Lanai Petroleum Products Use[22]

BPD	Asphalt	Resid.	Distillate	Jet Fuel	Av Gas	Gasoline	Naphtha	LPG
Maui	**NA**	**428**	**2,073**	**2,889**	**16**	**4,851**	**NA**	**525**

Jet fuel is trucked from the port of Kahului to the airport. The short distance between the port and the airport, and increasing volumes of jet fuel as more long distance flights arrive directly in Maui versus indirect flights through Honolulu, might justify a pipeline in order to reduce costs as well as truck traffic through the town. However, the area to be traversed is ecologically sensitive and the permitting climate in Maui is not conducive to projects of this nature.

[22] DBEDT data 2001

Although Shell and ConocoPhillips have access to product in Maui through their supply agreements with Tesoro, the fact that only two marketers have terminals in Maui limits the market diversity and may contribute to the fact that Maui gasoline prices in relative terms appear to be higher in Maui than elsewhere in the islands. This issue is addressed in more detail in Section 4.

When estimated at 60% of total storage capacity, average inventories for petroleum products in Maui, Molokai and Lanai, excluding LPG, equate to approximately 19 days' worth of consumption. Although still adequate by most operational standards, this is less than for the other islands, and reflects the limited access through a smaller number of terminals held by fewer market participants than is the case for Oahu and Hawaii, the two other larger markets.

2.3.3 Lanai

Lanai is served by a small 20,000 bbl terminal in Kaumalapau, which is owned and operated by Maui Oil, a jobber for ChevronTexaco. The breakwater in Kaumalapau was damaged by a tropical storm and cannot safely accommodate the typical 30,000 to 70,000 bbl barges. Lanai is therefore served by a small 4,000 bbl barge, adding an estimated 5 to 10 cpg to the costs of fuels on the island.

2.3.4 Molokai

Inter Islands Petroleum, a jobber for ChevronTexaco in Lanai and Kauai, and a dealer for Tesoro on the Big Island, operates a 28,000 bbl terminal in Kaunakakai.

2.3.5 Kauai

Although small, Kauai has two import centers for petroleum products. Shell and Kauai Petroleum operate respectively 32,000 and 25,000 bbl terminals in Nawiliwili, while ChevronTexaco operates a 128,000 bbl terminal in Port Allen.

Table 2.4 – 2001 Kauai Consumption of Petroleum Products[23]

BPD	Asphalt	Resid.	Distillate	Jet Fuel	Av Gas	Gasoline	Naphtha	LPG
Kauai	**NA**	**-**	**1,158**	**428**	**1**	**2,363**	**NA**	**265**

The total storage capacity for petroleum products excluding LPG equates to 47 days of usage. The usable average inventories are estimated at 28 days.

2.4 Inter Island Barging Operations for Petroleum Products

Between Oahu and the other islands, petroleum products are mostly transported in dedicated towed multi-compartment bulk product barges.

Table 2.5 – Overview of Inter-Island Petroleum Barges

Company	Name	Service	Bbl	Charter
Hawaiian Tug & Barge	No Petroleum Barges.			
Sause Brothers	Pepeekeo	Clean Products 24 compartments	53,000	Chevron to Port Allen, Kahului and Hilo
Smith Brothers (Hawaiian Inter Island Towing)	Holokai	Fuel Oil 11 compartments	30,000	Tesoro (now ended)
	Hui Mana	Clean Products 10 compartments	40,000	Tesoro to Nawiliwili, Hilo, Kahului, Kawaihae
	Namoku	Clean Products 9 compartments	37,000	Aloha to Hilo Tesoro to Nawailiwili, Kahului
	Noa	Combo Diesel/Fuel Oil 12 compartments	70,000	MECO/HELCO to Hilo, Kahului Maui Petroleum to Kahului
	No'eau	Clean Products 12 compartments	30,000	Aloha to Hilo Tesoro to Nawiliwili, Kahului
	Nuuanu	Combo diesel/bunkers 10 compartments	30,000	Tesoro bunker service
	Tara	Clean Products 6 compartments	4,000	Owned by Lanai Oil, operated by Hawaiian Inter Island
Gasco	Hukikai	Propane	10,000	Nawiliwili, Kahalui, Hilo
	Ponokai	Propane	15,600	Nawiliwili, Kahalui, Hilo

[23] 2001 data DBEDT

The barging operations in the Hawaii waters represent a high-cost link in the distribution chain. Currently, under the requirements of OPA 90, barge fleet operators are in the process of phasing out single hull barges to replace them with double hull vessels. Typically, a new, US built multi-compartment double hull clean products barge with a capacity of 70,000 bbl requires an investment of $8 million. Industry sources reported that West Coast ship yards are fully occupied, causing delays and increased cost for new barges. In addition to the barge, freight rates also cover the costs of a tug, which for a standard 4,000 HP tug will add another $4 million to the equation.

Typical costs for barging are around 5 cpg, with the low end of the range at 3 to 4 cpg for short hauls, while small cargoes to Lanai with delays in discharging can add up to 10 or 11 cpg. In addition to the charter rates paid to the barge owners, the oil companies incur additional cost associated with barge deliveries, such as the cost for a tankerman on the barge, and flying out inspectors to supervise the discharge of the cargoes at the Neighbor Islands.

Typically, tows are scheduled to complete multi-port deliveries, carrying up to 5 different products and grades. The scheduling is tight, because in most ports petroleum handling has to compete for usage of public docks with general cargo and cruise ships.

2.5 Adequacy of the Hawaii Petroleum Infrastructure

Hawaii's petroleum infrastructure is in general adequate, and with a few exceptions affecting inter-island distribution, physical barriers to supply do not seem to contribute to Hawaii's high fuel prices. There have been no reported stock-outs, although it was reported that on one occasion Oahu's jet fuel stocks were reduced to five days' worth of supplies. Pipelines, trucking and barging capacity is readily available and the average inventories for petroleum products, expressed in terms of days of consumption, are high when compared to most mainland US markets.

Table 2.6 – Average Days of Supply of Petroleum Products[24]

2001	Asphalt	Resid.	Distillate	Jet Fuel	Av Gas	Gasoline	Naphtha	LPG
Supply (BPD)	989	35,101	20,531	43,184	101	27,380	12,966	2,771
Inventory (bbl)	60,582	1,823,471	693,695	1,567,579	6,131	775,435	1,308,433	15,702
Days	61	52	34	36	61	28	NA	6

[24] Source of Data: DBEDT production and consumption data, and average monthly closing inventories.

Table 2.6 shows how average month end stocks for petroleum products in Oahu amounted to one or sometimes even two months' worth of supplies. The exception is LPG, which is stored in pressurized tanks that are more expensive than atmospheric storage. Stocks for crude oil supplies over the same period averaged just over 2 million barrels, or 15 days of supplies. The higher than industry average inventories reflect Hawaii's isolated geographical position, and the conservative approach taken by its suppliers to ensure that adequate supplies are on hand to cover unforeseen production outages.

The more ample inventories reflect additional cost for Hawaii's refiners and marketers of petroleum products. Hawaii's average inventories of all petroleum products are approximately 15 days more than those in mainland US markets, representing a value of $75 million in additional working capital. If the cost of this capital is taken at 8% per year, the additional costs amount to $6 million per year, or approximately 0.3 cpg.

2.6 Potential Role of Public Terminal

In 2002, gubernatorial candidate D.G. "Andy" Anderson proposed a publicly owned import terminal[25]. The concept was to create a public body, the Hawaii Fuel Authority, which would own and operate an import terminal, buy cargoes of gasoline in the world market and resell these at cost. The proposal was based on a preliminary engineering study for a new terminal with three tanks of 100,000 bbl each at Barbers Point, the costs of which were estimated at $10 million. The study estimated that about 3 cpg would have to be charged for the usage of the terminal to cover operating cost and debt service, while overheads and administration would require additional revenue of 1 cpg. These costs seem to be realistic as order of magnitude estimates.

In principle, the creation of a public terminal would not necessarily have to involve the construction of new storage tanks. Assuming the State of Hawaii had the required capital and the motivation to enter into the petroleum business, the import terminal jointly owned by Aloha and USRP could conceivably be purchased for this purpose. Since Aloha was able to arrange for local supplies at prices equivalent to import parity, this terminal has seen only occasional use. Aloha/USRP have rented out space in the past to third parties and use of the available storage at Barbers Point would make more sense than building new tankage. Moreover, at

[25] D.G. Anderson, *An Ownership Strategy for Stability*, undated position paper, and discussions with Dr H. Ogburn.

500,000 bbl total capacity this terminal would offer more flexibility and security of supply, since the 300,000 bbl foreseen under the Hawaii Fuel Authority plan would be on the small side given that full cargoes for product tankers are between 250,000 and 300,000 bbl, so that the tanks would need to be nearly empty every time a vessel is expected to arrive.

However, as will be shown further on in this study, bringing down gasoline prices to full import parity will have significant impact on the Hawaii economy. The likely effect would be closure of the two refineries. If such a policy is pursued, the most effective logistical solution would be to use the tankage from one of the shut down refineries as the public terminal.

The public terminal principle could also be applied to the Neighbor Island facilities. Under such a scenario, legislation would have to be passed to make all terminals in the islands open access, common carrier infrastructure, for which tariffs would be set by the Public Utilities Commission, similar to regulations governing major distribution pipeline networks elsewhere in the US.

A public terminal would not address the intrinsic high cost of marketing and distribution of gasoline in the islands, an issue that will be discussed below.

3 COST & REVENUE STRUCTURE OF THE HAWAII PETROLEUM INDUSTRY

An approximation will be provided below of the cost to produce and market gasoline in Hawaii, both from a stand-alone perspective and in comparison with other gasoline markets, notably those of the US West Coast. In order to do so, certain assumptions will be made to enable a generic approach. Actual cost and revenue factors are likely to differ substantially from time to time.

In previous studies, mostly carried out in support of litigation, the focus of any cost analysis was mostly retroactive, consisting of a detailed analysis of actual historical data. In the context of this study, it seems more appropriate to focus on the structural differences between Hawaii and its competing markets, and to identify the direction of likely future trends. As an illustration of actual cost, 2001 data will be used, not only because it is the last full year for which complete data are available, but also because with average cost of landed crude oil for the refiners in the $25/bbl range it is a year that fits the long range price forecast for crude oil as projected by the Energy Information Administration.

3.1 Refining

The cost structure of a refinery is highly complex, but in general will consist of the following broad categories:

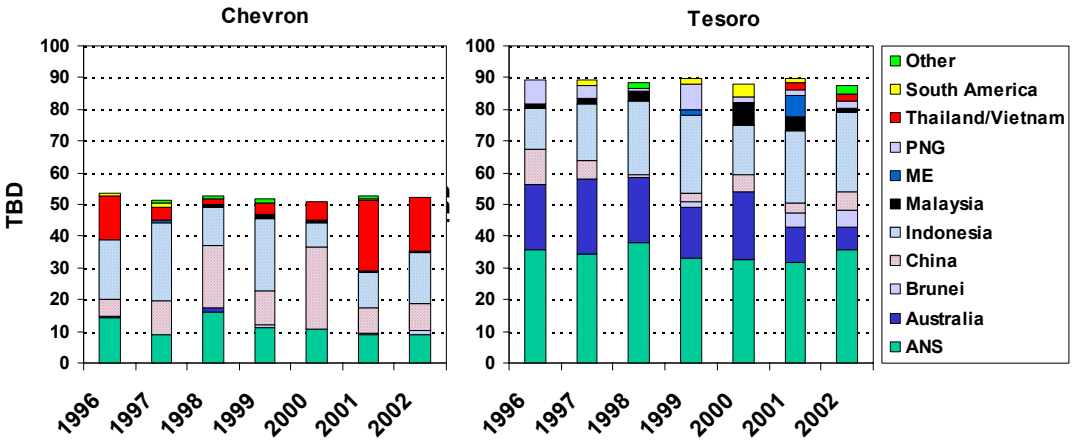
- Crude oil, which at 80 to 90% of total cost is the single largest cost factor
- Other feedstocks, which for some refineries may include residual fuels or unfinished oils, and purchased blendstocks, such as MTBE, alkylates and ethanol.
- Variable operating cost, such as the cost of utilities, chemicals and catalysts.
- Fixed operating expenses, such as payroll, maintenance, insurance, and leases of land and equipment.
- Taxes, including property taxes, payroll taxes, and local income taxes. Local taxes are usually treated as fixed operating expense.
- Overheads, including corporate charges.
- Capital recovery costs, which includes a return on equity employed as well as interest expense and debt repayment.

Refiners are likely to use sophisticated activity based accounting systems that allocate costs per product based on the cost of operating the individual units.

3.1.1 Crude Oil Cost

Figure 3.1 below shows the annual composition of the crude slate used by Hawaii refiners in recent years.

Figure 3.1 - Crude Slate Hawaii Refineries, 1996 - 2002[26]



At the height of Alaska's oil production in the mid to late eighties, Hawaii received over half of its crude oil from that state. Since then the production of North Slope oil has been in decline but in recent years, the consumption of ANS in Hawaii has stayed relatively constant at approximately 30% of the total demand. ANS typically has an API gravity of 27 and around 1% sulfur.

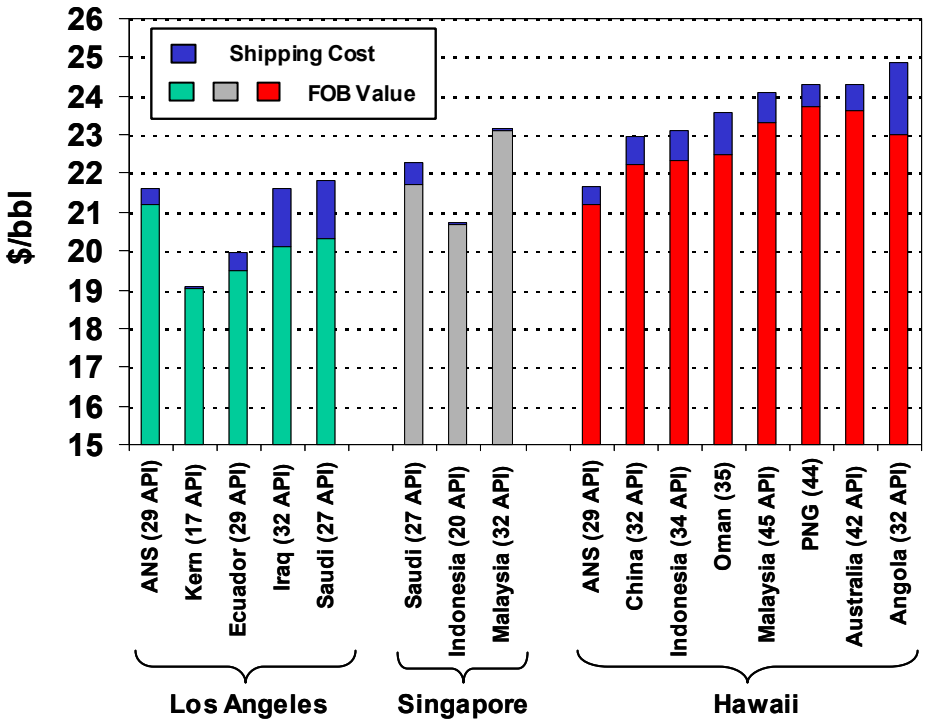
The remaining 2/3 of the local crude runs consists of light sweet crudes, typically with API gravities of 35 and higher, and very low sulfur concentrations in the range of 0.1 to 0.2%. These crudes are purchased from Pacific Rim countries, primarily Indonesia, Australia, and China. However, production in Australia and Indonesia is in decline, and in recent years China has become an overall net importer of crude oil, forcing Hawaii's refiners to increasingly purchase crude oil from alternative sources such as Brunei, Vietnam and Thailand. Also, an increasing trend can be observed in occasional purchases of sweet and light crude oil from remote locations such as the Persian Gulf, Angola and even Norway.

The configuration of Hawaii's refineries is relatively simple, with complexity factors that are not only well below that of the California refineries (which are amongst the most

[26] Source: EIA Crude Oil Company Level Imports, and Hawaii port statistics.

sophisticated refineries in the world), but also when compared with more recently built refineries in the Pacific Rim. Most modern refineries are designed to minimize the production of residual fuels even when running heavy crudes, for example by using cokers to convert heavy bottom streams into more valuable lighter products. Moreover, the metallurgy of most modern refineries is designed to deal with sour crudes, while desulfurization units such as hydrotreaters remove sulfur from various product streams.

Figure 3.2 – Selected Crude Prices, Average Oct 2001 – Oct 2002[27]



Since Hawaii's electrical power generation market provides a convenient outlet for heavy fuel oil, and since the primary product of the Hawaii refineries is jet fuel which does not have a stringent sulfur specification, the Hawaii refineries can get by without having to invest in heavy oil upgrading capacity such as cokers or additional hydrotreaters. Yet certain air quality restrictions apply, and in order to meet the sulfur specifications and obtain the required product mix, the Hawaii refiners need to purchase light sweet crudes. These superior quality crudes often have to be brought in from remote locations at substantial premiums, and the net effect is that on average,

[27] Source: Petroleum Intelligence Weekly and various import statistics.

the crude oil costs for the Hawaii refiners exceed those of refineries in California or other Pacific Rim locations, as shown in Figure 3.2 above.

Declared values for foreign imports of crude oil as per FTZ data[28] over the period October 2000 through September 2001, and crude oil import volumes as recorded by DBEDT for the same months, put the average landed cost of foreign crude oil over that period at $26 to $27 per bbl. Based on the 2001 distribution of supplies, oil prices as published by Petroleum Intelligence Weekly (PIW), and estimated freight rates, the weighted average landed cost for crude oil in Hawaii over the period October 2001 through September 2002 would be around $23/bbl, versus $22/bbl in Singapore and $20/bbl in Los Angeles. The PIW numbers may be on the low side because of freight cost differentials, while the FTZ numbers may be off versus the EIA crude cost estimate for 2001 because of the three month reporting period differential. For the actual landed crude cost for the Hawaii refiners in reference year 2001, a price of $25/bbl will be assumed.

In general the conclusion is justified that the premium paid by Hawaii refiners for their crude oil over reference markets in California is in the order of $3/bbl, while competing Pacific Rim refiners enjoy a cost advantage of $1/bbl. The freight rates shown assume cargo sizes of 250 to 500,000 bbl for crudes coming in from Pacific Rim ports, 500 – 750,000 bbl from South America and Alaska, and VLCC plus lightering when applicable for Middle East crudes into California.

Several factors indicate that the premiums which Hawaii refineries are paying over their counterparts on the US West Coast and elsewhere on the Pacific Rim are likely to increase rather than decrease in the near future:

- Crude oil exporters practice differential pricing strategies. For instance, in Figure 3.2 it can be seen how the Saudis price their crude differently for exports to Los Angeles than for Singapore, in order to be competitive in both markets. California and Pacific Rim refiners have purchasing leverage because of the availability of alternative crude supplies and the refiners' capability to process a broad spectrum of crudes. The Hawaii refiners have no such leverage.

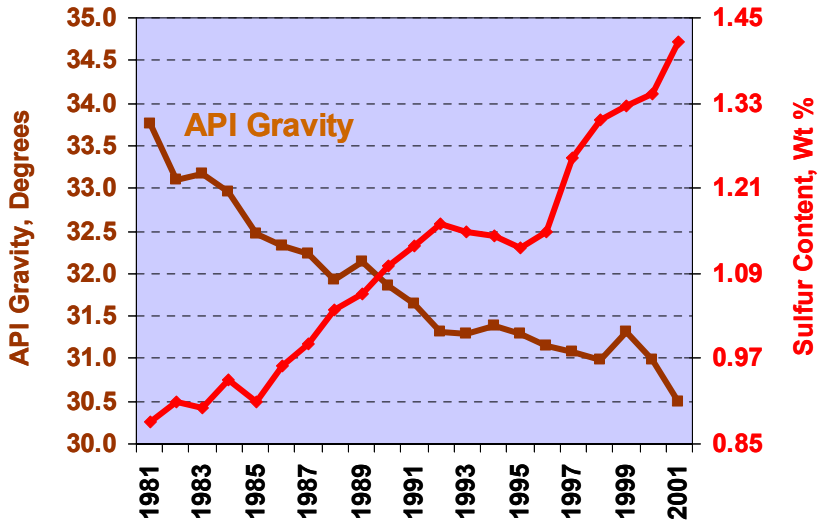
[28] Foreign Trade Zone Board, *FTZ No. 9 Annual Report 2001*, January 22, 2002.

- The Hawaii refiners intend to meet the upcoming requirements for lower sulfur levels in gasoline and diesel (June 2006) by purchasing even better quality crudes. This strategy is driven by the hope to avoid capital investment and permitting issues associated with installing desulfurization capacity, as well as the absence of a local sulfur market and the implied cost of exporting sulfur.

- The general trend of crude oil supplies in the world is for the API gravity to come down and the sulfur content to go up, as shown below in Figure 3.3. The Hawaii refineries on average need crude oils with an API gravity of more than 30 and a sulfur content of less than 0.5%, a quality that even in 1981 was hard to find.

In summary, it can be concluded that the impact of Hawaii's need for high quality crude oil adds a cost of up to $3/bbl over the average crude oil cost of a California refiner, or more than 7 cpg of product. The disadvantage versus the large, exporting Pacific Rim refineries is 2 to 3 cpg.

Figure 3.3 – Global Trends in Crude Oil Quality[29]



Relative to both markets, the crude oil cost penalty for Hawaii refiners is likely to increase in the near future, as the average quality of crude produced globally continues to worsen (See Figure 3.3).

[29] J. Shore, *Refining Challenges: Changing Crude Oil Quality and Product Specifications*, World Fuel Conference, Washington DC, September 2002

3.1.2 Other Feedstocks

Besides crude oil, the only other feedstock brought in on a regular basis is residual fuel. ChevronTexaco brings in some Low Sulfur Waxy Resid (LSWR) of Indonesian origin, in order to optimize fuel quality for HECO. Tesoro occasionally exchanges residual oils with its West Coast refineries.

Not having a need to import other feedstocks is where the Hawaii refiners have a significant cost advantage over some California refiners, who may have to buy expensive blendstocks in order to meet highly specialized gasoline specifications. The cost for other feedstocks is included in the operating expense as analyzed below.

3.1.3 Operating Expense

Despite their relative simplicity, both Hawaii refineries are high cost operations because of their small size and other factors such as the use of fuel oil as their primary source for the heat required in refinery processes. Most US refineries use natural gas which on average is $1 to $1.5/MM Btu cheaper than fuel oil. At 0.5 MM Btu/bbl of average fuel use, this translates in a cost disadvantage for the Hawaii refineries of $0.5 to $0.75/bbl.

Publicly available material such as the redacted documents pertaining to the State's anti-trust lawsuit, financial information made public by the refiners[30], and general insights into refinery economics, indicate that the typical operating costs for the ChevronTexaco refinery when running at a feed rate of 54,000 bpd with a crude price (= fuel cost) of $25/bbl, is $62 million per year, or $3.15 per bbl of crude. For the Tesoro refinery, these numbers would be $266 million and $3.05/bbl respectively.

Included in the above operating expenses would be all variable and fixed operating costs, including payroll, contract labor, maintenance, leases, local taxes, depreciation and amortization. Not included are corporate income taxes and cost of capital (debt service and returns on shareholder equity).

3.1.4 Overall Refining Cost Comparison

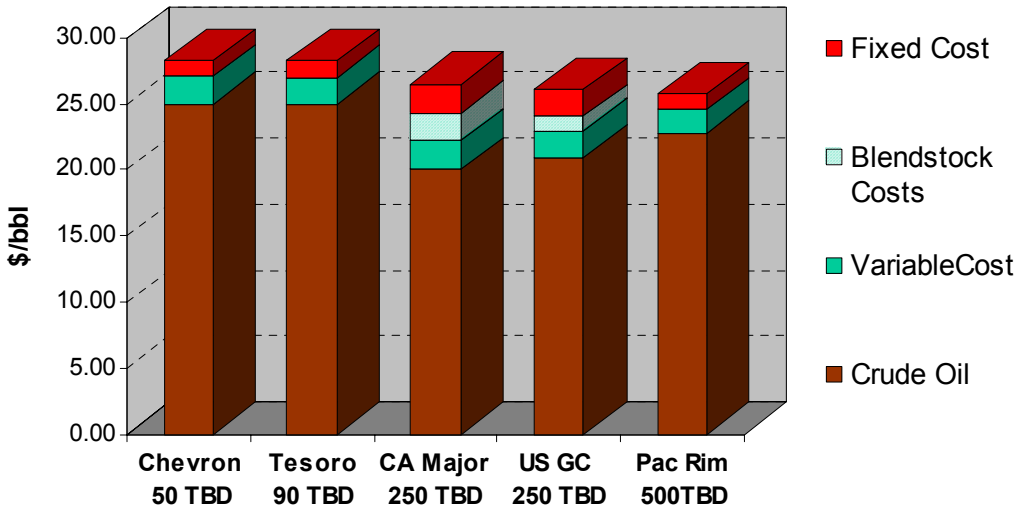
Based on the crude oil cost differentials and operating cost numbers for the Hawaii refineries, and typical refinery cost in formation such as that published periodically by

[30] For instance, Tesoro Public Stock Offering Prospectus – Lehman Brothers et al, February 2002.

Economic Insight, Inc.[31], the Oil & Gas Journal and other publications, as well as Stillwater's own analysis of the operations of the Hawaii refineries, a cost comparison can be made between Hawaii's refining costs and those typical for the most relevant reference markets, the US Gulf Coast, California and the Far East.

The cost comparison shown in Figure 3.4 below is on a basis of cost per total barrels of product output and takes into account the lower processing gain of the Hawaii refineries. The examples shown for a typical large refinery in California and the US Gulf Coast, the cost of purchased blending components is taken into account. Fixed costs include a provision for depreciation, but none of the examples include capital recovery and debt service.

Figure 3.4 – Comparison of Refining Cost



On a pure cost basis, the Hawaii refineries have a cost disadvantage of more than $2/bbl versus the other examples shown. When debt service and the need to provide a return on equity are taken into account, this differential is reduced to approximately $1/bbl.

3.2 Marketing Expenses

In addition to the refining cost, the refiners and the other local marketers incur certain cost related to marketing. Examples of such costs are that portion of station lease costs not charged

[31] Pacific West Oil Data

to dealers, costs of operating company credit card systems, payroll and overheads for a sales force and administrative personnel, allocated corporate charges, local legal and public relations staff, and cost of offices.

Factors that contribute to significant variations in marketing expenses between companies are the ratio of dealer owned versus lessee dealers or company operated stations, whether the company owns assets such as stations and terminals or leases them, and whether assets were recently acquired or have been owned for a long time. All these factors can materially affect depreciation of marketing and distribution assets, or the amount of lease cost that the company cannot recover from a dealer.

From a review of the redacted documentation pertaining to the State's anti-trust lawsuit and from other public information as well as general industry knowledge, it is estimated that ChevronTexaco's marketing expenses in the islands are $22 million, while Tesoro's cost are in the order of $34 million. These expenses are net of non-product marketing revenues, such as rent received from leased stations.

It is further estimated that approximately 80% of the refiner's marketing expenses are related to their branded retail sales and small quantity sales of fuels to jobbers. Bulk wholesale, such as the sales of jet fuel to the airline consortium and the sales of fuel oil to the utilities, is inherently less cost intensive. Based on 2001 sales volumes as reported to DBEDT, it can be calculated that for both companies, the marketing cost for gasoline and diesel other than to large wholesale accounts, is in the range of 12 to 13 cpg. Without credit for station rents, the costs are in the 18 cpg range, consistent with the margin allowed under the Act 77 price cap formula.

Financial information gathered as evidence in the course of the State's anti-trust lawsuit puts the high end of the range for marketing related expenses at 18 cpg, which was the case for a smaller scale marketer with a high proportion of lessee dealers and a high capital base.

3.3 Distribution Costs

Most distribution costs are transportation charges that are allocated directly to volumes sold, such as trucking, terminalling and barging cost, to derive at so-called netback prices at the refinery gate. These costs are discussed in Section 2 above and are 2 cpg for trucking in Oahu and 11 cpg for the Neighbor Islands (barging 6 cpg, terminal charges 3 cpg, trucking 2 cpg). With 70% of all gasoline sold in Oahu, the weighted average distribution cost of gasoline in the islands is approximately 5 cpg.

In addition to direct transportation cost, some distribution and logistics cost are not directly allocated to product sales nor treated as marketing expense. These indirect logistics costs may include the costs of Oahu terminals and pipelines, while practices to allocate these costs vary from company to company. Overall, these costs are believed to be around 1 cpg for the two refiners, while the non-refining marketers include all logistic cost in their marketing expense.

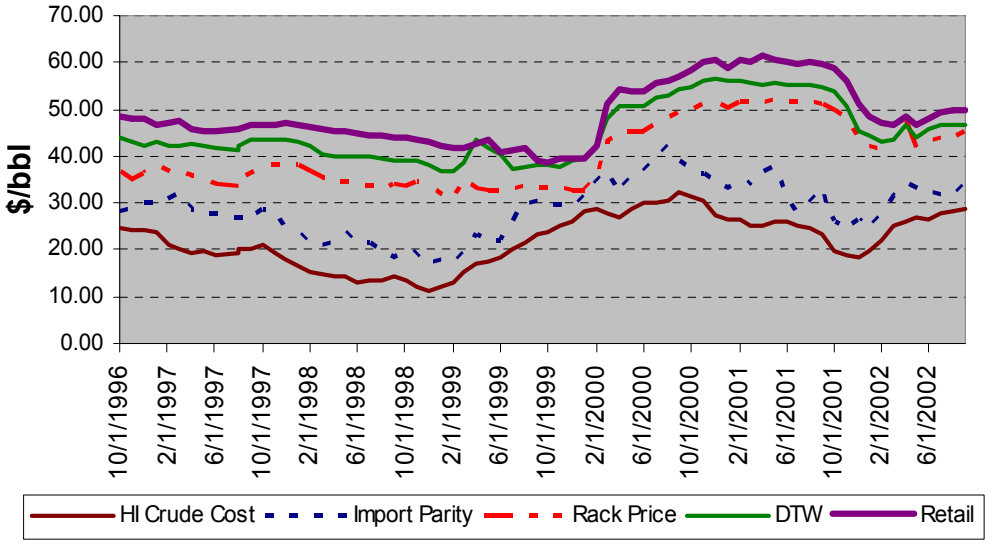
3.4 Prices

For the evaluation of revenues, prices for petroleum products will be determined in the light of historical differences over crude oil.

3.4.1 Gasoline Prices

In the absence of a published spot market price, which defines the current price for prompt barrels traded in bulk between producers and marketers, and with very little volume transacted at the rack (the sales of gasoline to jobbers, who collect product in their own trucks), the most significant price marker in Hawaii is the Dealer Tank Wagon (DTW) price. The DTW is the watershed which divides the profit taking between the retail dealers on the one side, and the refiners, marketers and jobbers who supply the dealers on the other side.

Figure 3.5 – Hawaii Gasoline Price Differentials 1996 - 2002[32]



[32] EIA Monthly Petroleum Marketing Reports

Figure 3.5 shows the differentials of the EIA reported prime seller prices for retail, rack and DTW, over the estimated acquisition cost of crude oil of the Hawaii refiners. In the absence of publicly available material for landed crude oil cost in Hawaii, the average acquisition cost for US refiners of API 35 crude oil as reported by the EIA was taken as the basis, to which was added $1 per barrel representing a freight and low sulfur penalty. This price matched well with the available data points of actual landed cost of crude for the Hawaii refineries. Also shown is an import parity price based on the Mean of Platt's Singapore plus $2.50 (6 cpg) freight and $0.80 (2 cpg) terminal and handling fees. Table 3.1 below shows the average differentials over the same 6 year period.

Table 3.1 – Average Gasoline Price Differentials over Crude

	Import Parity	Co-Supplier	Rack	DTW	Retail Ex-Tax
$/bbl	5.84	7.52	17.43	22.68	26.42
cpg	13.9	17.9	41.5	54.0	62.9

The import parity price is for regular only, while the EIA prices are composite numbers for sales of all grades. For the DTW sales, average netbacks to the refiners are 49 cpg, based on weighted average distribution cost of 5 cpg as calculated in 3.3 above.

3.4.2 Prices for Fuels Other than Gasoline

Figure 3.6 – Hawaii Prime Seller Prices for Jet, Distillate & Resid

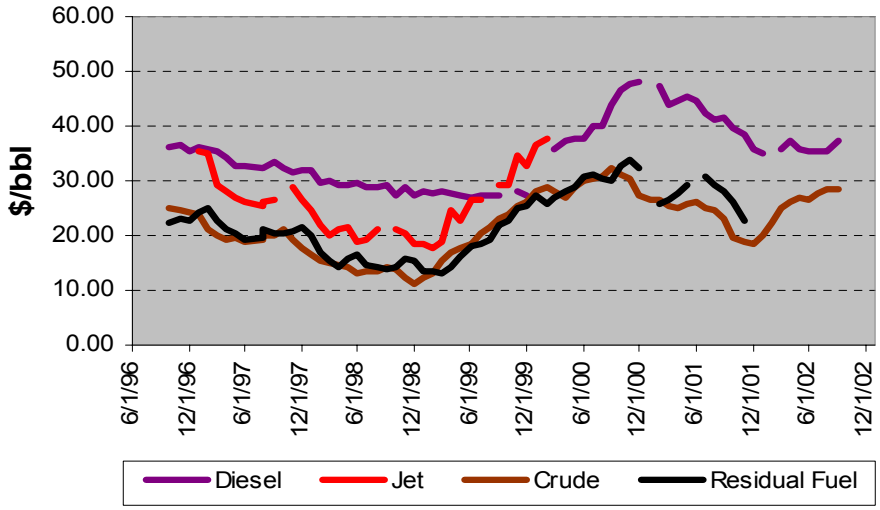


Figure 3.6 shows the prices reported to EIA by prime sellers (refiners, major marketers) for the primary commercial fuels. Numbers are no longer reported for all fuels in recent years, but other sources were available to confirm pricing of jet fuel and resid in Hawaii, notably from the consumers of these fuels.

3.4.3 Residual Fuels Prices

Average prices realized for residual fuels by the Hawaii refiners have historically been at best at parity with their cost of crude oil. This means that prices for residual fuels in Hawaii are relatively high, because Hawaii crude prices are on average $1 to $2/bbl above world crude marker prices, while residual fuel in most of the world trades at a discount to crude oil. After all, residual fuels are essentially the leftovers from crude oil after all the valuable light components have been removed, and residual fuel is more difficult to handle than most crude oils (it has to be kept heated in order to be able to pump it). If fuel oil is not trading at a discount to crude, power plants could simply switch to burning crude oil, which they sometimes do, notably in Japan.

In recent years, the premium which the utilities are paying for their LSFO, MSFO and diesel seems to have increased. For MSFO consumed in Maui and the Big Island, the cost to the utilities has increased to prices corresponding to crude cost plus $3/bbl. After subtracting 5 cpg barging cost the resulting netback to the refiners is crude costs plus $1/bbl.

The reported price to the EIA paid by the utilities for LSFO consumed in Oahu has recently increased to crude cost plus $7/bbl. The average differential between LSFO and refiners crude cost over the past five years has been $3.20.

Table 3.2 – Average Residual Fuel Netback over Crude, 1996 - 2001

	Import Parity	Co-Supplier	MSFO	LSFO
$/bbl	0.00	NA	1.00	3.20
cpg	0.00	NA	2.4	7.6

The current spike in prices paid for LSFO is primarily caused by a prolonged shutdown of 14 nuclear power plants owned by Tokyo Electric Power Corporation (TEPCO) after alleged breakdowns in inspection procedures. The lost capacity has to be made up by

Japan's fossil fuel based plants. Moreover, a general shortage in shipping capacity has driven up freight rates to unprecedented levels.

These extraordinary circumstances are not expected to last and for the evaluation of the overall costs and profitability of Hawaii's fuel energy markets, the historical price differentials will be used. These differentials are in itself higher than in most international market, where very often, there is no marked pricing difference between low and medium sulfur fuel oil grades.

3.4.4 Distillate Fuel Prices

The average netback for diesel sold for power generation over the period 1996 – 2001 is $11 over the price of crude oil, based on prices paid by the utilities and transportation costs. The prices paid for diesel in other applications vary substantially, with the highest prices being realized in street retail, for which DTW and rack pricing is similar to that of regular gasoline. Equally, sales of diesel for on-road usage by the refiners to non-refining marketers are based on import parity, and diesel has been imported notably by Aloha. Industrial off-road accounts are served primarily through jobbers at rack prices.

Table 3.3 – Average Distillate Fuel Differentials over Crude, 1996 - 2001

	Import Parity	Co-Supplier	Power	Rack	DTW	Retail Ex-Tax
$/bbl	4.62	6.30	11.00	11.76	21.42	25.20
cpg	11.0	15.0	26.2	28.0	51.0	60.0

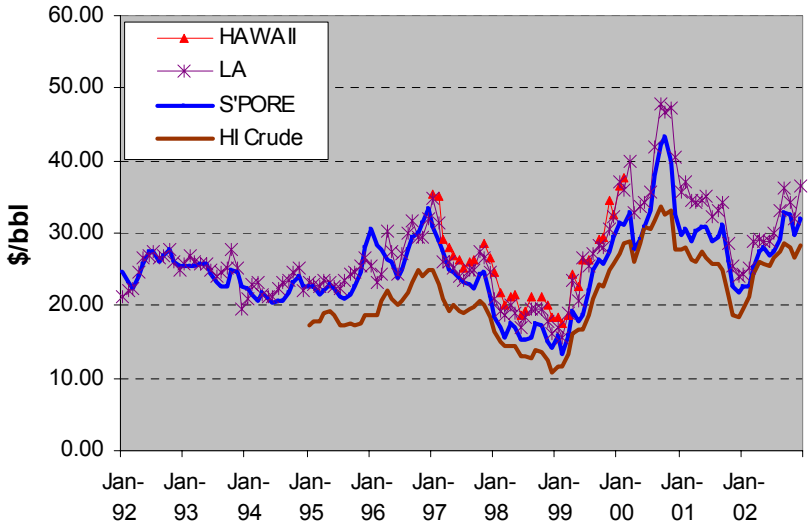
3.4.5 Jet Fuel Prices

Prices for jet fuel in Hawaii on average are at import parity and in balance with world market pricing. Because jet fuel is such a widely traded, readily fungible commodity with globally operating powerful buyers, differences in jet fuel prices between the various supplying and consuming regions are never far from international arbitrage.

Figure 3.7 below shows how the jet fuel prices in Los Angeles, Singapore and Hawaii tracked very closely over a ten year period. For more than 90% of the time, the spread between the prices is equal to or less than the transportation cost differential of

approximately $2/bbl. The average margin for jet fuel over crude in Hawaii for the period 1996 – 2001 has been about $6/bbl, which is slightly higher than Los Angeles.

Figure 3.7 – Jet Fuel Prices[33]



3.4.6 Naphtha Prices and other Unfinished Oils

The refineries produce a number of intermediate products that can either be further processed in on-site installations or sold as is. The decision to sell rather than process these streams depends on the unit capabilities, the processing capacities and the value obtainable in the market as is.

The Hawaii refineries routinely export naphtha, a light straight run cut at the low end of the gasoline boiling range with poor octane properties. The primary export market is Japan, where the product is sold as a feedstock for steam crackers in petrochemical plants. Based on Platt's prices for naphtha CIF[34] Japan, the average differential between Japan's delivered naphtha prices and Hawaii's landed crude oil cost over the period 1996 through 2001 was only $1.64/bbl, with a high of $4.04/bbl and a low of -$0.96/bbl. Given the transport cost of around $2/bbl, naphtha exports are for the most part an unprofitable way to dispose of an unwanted by-product of the refining process.

[33] Source: EIA daily price series, averaged by month. Monthly pricing for Hawaii and for crude.

[34] Cost , Insurance, and Freight, a standardized delivery term defined by the International Chamber of Commerce (INCO)

Naphtha is also sold locally. When produced during block runs of low sulfur crudes, the product is very low in sulfur and is used in two gas turbine power plants, one in Hawaii and one in Kauai. Finally, a mixture of naphtha and other light components, such as butanes and pentanes, is supplied by the Tesoro refinery across the fence to the neighboring Synthetic Natural Gas (SNG) plant operated by The Gas Company. Based on information received from these local consumers, it appears that the refiners are able to recover crude cost plus refining expenses, i.e., their netbacks average crude oil plus approximately $4/bbl.

3.4.7 LPG Pricing

Liquefied petroleum gases consist of mixtures of propane and butane, with propane being the primary component. Because propane has to be transported and stored either at very low temperatures (around -50 ^{0}F) or at high pressure (over 200 psi), the costs for distribution and handling of propane are substantially higher than those for other petroleum products. Since in most end markets, LPG has to compete with other fuels on a Btu basis, wholesale propane prices tend to be well below the prices of other fuels and in fact, propane wholesale prices for the US as a whole have been in the range of 40 to 50 cpg, some $10/bbl below the cost of crude oil.

In Hawaii, price indications received from wholesale buyers and from documents pertaining to the State's antitrust lawsuit indicate that the local producers are able to charge wholesale prices at $2/bbl above their cost of crude oil, well above prices seen in the rest of the US.

3.4.8 Asphalt Pricing

Little information could be obtained about asphalt pricing in Hawaii, but the data points that were provided by a review of the documents pertaining to the State's antitrust lawsuit indicate that on average, asphalt and road oil netback prices to the refiners are around $2/bbl above the cost of crude oil.

3.5 Revenues and Margins

With known sales volumes, historical price differentials of products over crude, and cost data as available in the public domain, an estimate can be prepared of the profitability of the main market segments, the local refiners, the major marketers, distributors and retailers.

3.5.1 Profitability Hawaii Refiners

Table 3.4 below shows a pro forma profit and loss statement for the Hawaii refiners.

Table 3.4 – Pro Forma P/L Statement for the Hawaii Refiners

Crude Oil Cost 25 $/bbl

CHEVRON				TESORO			
REVENUE	**bpd**	**$/bbl**	**$ 000**	**REVENUE**	**bpd**	**$/bbl**	**$ 000**
Motor Gasoline				Motor Gasoline			
DTW	6,200	45.60	$ 103,193	DTW	5,380	45.60	$ 89,545
Military Retail	10	36.76	$ 134	Military Retail	2,060	36.76	$ 27,640
Fleet Retail	-	36.76	$ -	Fleet Retail	330	36.76	$ 4,428
Jobbers	990	36.76	$ 13,283	Jobbers	960	36.76	$ 12,881
End Users	70	36.76	$ 939	End Users	240	36.76	$ 3,220
Co-marketers	6,510	31.30	$ 74,373	Co-marketers	5,120	31.30	$ 58,493
	13,780	38.16	$ 191,923		14,090	38.15	$ 196,207
LS Diesel				LS Diesel			
Branded Retail	50	44.32	$ 809	Branded Retail	190	44.32	$ 3,074
Military Retail	-	36.76	$ -	Military Retail	10	36.76	$ 134
Fleet Retail	-	36.76	$ -	Fleet Retail	40	36.76	$ 537
Jobbers	500	36.76	$ 6,709	Jobbers	600	36.76	$ 8,050
End Users (Ag)	20	35.00	$ 256	End Users	720	35.00	$ 9,198
Power Generation	3,400	36.00	$ 44,676	Co-marketers	60	36.00	$ 788
	3,970	36.20	$ 52,449		1,620	36.84	$ 21,781
HS Diesel				HS Diesel			
Retailers	-	39.00	$ -	Retailers	770	39.00	$ 10,961
Jobbers	770	33.00	$ 9,275	Jobbers	1,100	33.00	$ 13,250
End Users (Ag)	210	34.00	$ 2,606	End Users (Ag)	8,650	34.00	$ 107,347
Co-marketers	-	30.00	$ -	Co-marketers	270	30.00	$ 2,957
	980	33.21	$ 11,881		10,790	34.15	$ 134,513
Jet Fuel	12,500	31.00	$ 141,438	Jet Fuel	28,750	31.00	$ 325,306
LS Fuel Oil				LS Fuel Oil			
Power Generation	11,850	28.20	$ 121,972	Power Generation	8,260	28.20	$ 85,020
Own Use	1,160	-	$ -	Non Utility	7,050	28.20	$ 72,566
	13,010	25.69	$ 121,972		15,310	28.20	$ 157,586
MS Fuel Oil				MS Fuel Oil			
Power Generation	1,600	26.00	$ 15,184	Bunkers	4,610	27.00	$ 45,432
Jobbers	10	26.00	$ 95	Jobbers	10	26.00	$ 95
Own Use	-	-	$ -	Own Use	2,300	-	$ -
	1,610	26.00	$ 15,279		6,920	18.02	$ 45,526
Aviation Gasoline	90	50.00	$ 1,643	Aviation Gasoline	-	50.00	$ -
LPG	1,590	27.00	$ 15,669	LPG	1,250	27.00	$ 12,319
Asphalt	540	27.00	$ 5,322	Asphalt	430	27.00	$ 4,238
Unfinished Oil (Naphtha)				Unfinished Oil (Naphtha)			
Domestic Exports	6,300	25.00	$ 57,488	Domestic Exports	-	25.00	$ -
Foreign Exports	1,430	25.00	$ 13,049	Foreign Exports	7,000	25.00	$ 63,875
Sales	300	29.00	$ 3,176	Sales	1,400	29.00	$ 14,819
	8,030	25.15	$ 73,712		8,400	25.67	$ 78,694
Total	**56,100**	**30.83**	**$ 631,287**	**Total**	**87,560**	**30.54**	**$ 976,170**
COSTS				**COSTS**			
Crude	53,600	25.00	$ 489,100	Crude	87,400	25.00	$ 797,525
Other Feedstocks	1,200	26.00	$ 11,388	Other Feedstocks	1,400	24.00	$ 12,264
Operating Expense			$ 62,000	Operating Expense			$ 97,000
Marketing Expense			$ 22,000	Marketing Expense			$ 34,000
Indirect Distribution			$ 9,000	Indirect Distribution			$ 9,000
			$ 593,488				**$ 949,789**
Operating Profit before Tax		**1.85**	**$ 37,799**	**Operating Profit before Tax**		**0.83**	**$ 26,381**
Corporate Income Tax			**$ 12,852**	**Corporate Income Tax**			**$ 8,970**
Depreciation			**$ 7,000**	**Depreciation**			**$ 15,000**
Caretaker & Maintenance Capex			**$ 10,000**	**Caretaker & Maintenance Capex**			**$ 10,000**
Net Cash Flow			**$ 21,947**	**Net Cash Flow**			**$ 22,412**
Capital Employed				**Capital Employed**			
Inventories & receivables - payables			$ 100,000	Inventories & receivables - payables			$ 160,000
Refinery Assets			$ 50,000	Refinery Assets			$ 180,000
Marketing Assets			$40,000	Marketing Assets			$20,000
			$ 190,000				**$ 360,000**
Return on Capital Employed			**12%**	**Return on Capital Employed**			**6%**

For ChevronTexaco, the overall return on capital employed has been reduced from around 20% in the early to mid nineties to the low teens currently. The main reason for the reduced profitability is a loss of volume in the gasoline retail segment, the most profitable market segment. ChevronTexaco's capital base in refinery and marketing assets is assumed to be fairly level, with new caretaker and maintenance capital compensating for depreciation. The significant capital employed in inventories is a conservative estimate for approximately 4 MM bbl at $25/bbl. This value will fluctuate with crude prices and operating cost. The marketing capital estimate is based on $0.5 million per retail station (50% of replacement cost), plus a conservative estimate of $2.5 million for terminals and other assets.

For the refinery now operated by Tesoro, historical returns have been less than 5% for prolonged periods and the highest public number found was around 8%, which is the reason that two prior owners divested these assets. Estimates for capital employed follow the same principles as outlined above for ChevronTexaco. In fact, in a note to Assistant Attorney General Michael Lee dated March 4, 1995, Dr Leffler, one of the State's expert witnesses pointed out that "*the refineries in Hawaii do not earn a profit or income disproportionate to that earned by refineries in California*[35]".

A return on capital employed in the 12 to 20% range is not excessive for an industry that incurs market and operating risk. For refining operations however, these returns are better than industry average. For instance, for the years 2000 and 2001, the EIA's Financial Reporting System (Form EIA-28) shows a range of -5.5% to +16.7%. The last time refining was really profitable in the US was when the industry was regulated in the late seventies. Since the deregulation in 1981, the number of operating refineries in the US has been reduced from 324 to 158, with most of the closed down refineries looking very similar to those in Hawaii: small, unsophisticated refineries with high crude cost and a product slate consisting primarily of low margin products.

Returns on capital that are less than the cost of debt service in a highly leveraged company such as Tesoro are unacceptable and it is not surprising to see that Tesoro is currently involved in aggressive cost cutting programs.

In the context of this study however, it is the absolute level of profitability that is of interest rather than the relative performance versus the industry in general. The level of

[35] Dr Keith B. Leffler, *Analysis of Hawaii Refinery Prices and Margins*, March 4 1995, pp.8.

profitability is indicative of how much lower prices can go before the local refineries would have to shut down. Examples of scenarios that would lead to likely closure of the refineries are:

- When all refinery ex-gate prices for gasoline and diesel are reduced to import parity, this would result in negative returns of -7% for ChevronTexaco and -9% for Tesoro, with annual cash losses in of $12 and $34 million respectively.

- When all LSFO sold in Oahu would have to be exported after substitution of LSFO by LNG, into Asian markets at parity to Singapore prices and with $2/bbl freight, returns for ChevronTexaco's results would drop to cash breakeven with a 0% ROCE while Tesoro would likely run cash losses of $13 million. Dr Fesharaki in a recent study[36] also concluded that introduction of LNG means that the refineries will have to export their residual fuel oil, but this did not quantify the economic impact on the refineries.

- When both above scenarios happen, the refiners each would run cash losses in the order of $40 million for ChevronTexaco and $80 million per year for Tesoro, numbers which are obviously not sustainable.

It will be clear from these numbers that in their current configuration, the local refineries are ill equipped to compete with the large export refineries in the Pacific Rim, and will face significant problems in the future if the current trend towards import parity in gasoline retail continues.

Losing their sales of residual fuels to natural gas in power generation and having to compete with large refineries and imports for all fuels sold is why refineries similar to those of ChevronTexaco and Tesoro either had to invest in full upgrading capability or were shut down in most of the US during the eighties.

3.5.2 Profitability of Non-refining Marketers

Non-refining marketers, companies who maintain distribution and retail organizations in Hawaii but do not own a local refinery, are actually in a better position than the refiners. They obtain their products under term contracts at prices close to or at import parity.

[36] Dr F. Fesharaki et al., *Hawaii Hydrocarbon Outlook*, Report prepared for Hawaii Energy Forum by Facts Inc., January 2003

Table 3.5 below shows estimated sales, margins and cost for two non-refining marketers, one (Company X) of which is representative for a large jobber operation, with a diversified sales slate, while the other (Company Y) is typical for a non-refining major whose primary focus is on maintaining a branded retail presence. Both have approximately equal total sales volumes, and are assumed to have a similar capital commitment in the islands.

Table 3.5 – Pro Forma P/L Statement for Non-refining marketers

Pro Forma P/L Statement Hawaii Co-Marketers

Crude Oil Cost 25 $/bbl

COMPANY X				
REVENUE	**bpd**	**$/bbl**		**$ 000**
Motor Gasoline				
DTW	2,014	45.60	$	33,521
High Volume Retail	1,174	36.76	$	15,752
Gov & Military	146	36.76	$	1,051
Fleet	37	36.76	$	497
Com, Ind & Ag	78	36.76	$	1,051
Jobbers	96	36.00	$	1,268
	3,546	41.06	$	53,141
LS Diesel				
DTW	99	44.32	$	1,599
Gov & Military	87	36.76	$	1,165
Fleet	40	36.76	$	539
Com, Ind & Ag	102	35.00	$	1,304
Jobbers	130	36.00	$	1,704
	458	37.79	$	6,311
Total	**4,003**	**40.69**	**$**	**59,451**
COSTS				
Gasoline Purchases	3,546	31.00	$	40,121
Diesel Imports	458	29.00	$	4,843
Marketing Expense			$	8,000
Indirect Distribution			$	1,000
			$	**53,964**
Operating Profit before Tax		**3.76**	**$**	**5,487**
Corporate Income Tax			**$**	**1,866**
Depreciation			**$**	**1,000**
Caretaker & Maintenance Capex			**$**	**200**
Net Cash Flow			**$**	**4,421**
Capital Employed				
Inventories & receivables - payables			$	4,000
Marketing Assets			$	33,000
			$	**37,000**
Return on Capital Employed				**12%**

COMPANY Y				
REVENUE	**bpd**	**$/bbl**		**$ 000**
Motor Gasoline				
DTW	4,047	45.60	$	67,359
High Volume Retail	-	36.76	$	-
Military Retail	-	36.76	$	-
Fleet Retail	-	36.76	$	-
Com, Ind & Ag	-	36.76	$	-
Co-marketers	-	36.00	$	-
	4,047	45.60	$	67,359
LS Diesel				
DTW	11	44.32	$	172
Military Retail	-	36.76	$	-
Fleet Retail	-	36.76	$	-
Com, Ind & Ag	-	35.00	$	-
Co-marketers	-	36.00	$	-
	11	44.32	$	172
Total	**4,058**	**45.60**	**$**	**67,531**
COSTS				
Gasoline Purchases	4,047	33.00	$	48,746
Diesel Purchases	11	36.00	$	140
Marketing Expense			$	11,000
Indirect Distribution			$	1,000
			$	**60,886**
Operating Profit before Tax		**4.49**	**$**	**6,645**
Corporate Income Tax			**$**	**2,259**
Depreciation			**$**	**2,000**
Caretaker & Maintenance Capex			**$**	**200**
Net Cash Flow			**$**	**6,185**
Capital Employed				
Inventories & receivables - payables			$	4,000
Marketing Assets			$	32,000
			$	**36,000**
Return on Capital Employed				**17%**

For marketers, the capital base used to determine the ROCE is largely determined by terminals and retail station investments, and the numbers shown here would be representative for a marketer with 50 to 60 stations in the State, each at a capital base of $0.5 million, or half of replacement cost. A recent entrant may have much higher capital than the numbers shown here. To move the volumes shown here, 4,000 bpd or 5 million gallons per month, will require 60 retail stations, even at the high end of typical

monthly dealership volumes for Hawaii. At $1.5 million average cost, replacement capital for 60 stations could approach $100 million.

The entry of BC Oil in Hawaii in 1999 and its subsequent rapid demise may serve as an example of the importance for gasoline marketers to keep their capital cost base low and their fuel supply contracts within a range where they can compete.

A more detailed analysis of the cost structure of the retail business is provided in Section 0.

3.5.3 Profit Margins and Public Perception

Although Hawaii's petroleum industry is certainly profitable in most segments, it is unfortunate that public perception of the profitability of the industry has been such that high gasoline prices have been identified with excessive profit taking and price gouging, and have resulted in costly investigations and lawsuits, costs which ultimately will be carried at least in part by the consumer.

It is not relevant within the scope of this study to examine public relations efforts by the industry or to assign blame where none may be due. Yet it is relevant for the general acceptance of the results of this study to offer some explanations for the disconnect between perception and reality, such as those that have emerged from the stakeholder meetings, review of documents pertaining to the State's antitrust lawsuit, and the quantitative analysis of industry performance.

- Whereas Tesoro seems willing to speak up for itself[37], ChevronTexaco especially in the past appears not to have bothered trying to reconcile perception and reality. For instance, the company apparently never saw fit to react to the widely aired statement that it allegedly realized 22% of its corporate profits from its Hawaii business, representing only 3% of its sales. This statement can be traced back to an analysis of ChevronTexaco's 3 Party Dealer segment[38] and referred to lessee dealer gasoline sales only, not to ChevronTexaco's overall corporate profits. It tells more about the dismal results for lessee dealer sales in the rest of the US at the time than about Hawaii's performance. The statement ignores the fact that a refiner's financial

[37] Faye Watanabe Kurren, *Tesoro What Profits?,* Honolulu Advertiser, October 21, 2002

[38] Barry Pulliam, *Expert Witness Report for the Plaintiff*, June 23, 2000, pp. 11 Item H and Exhibit 26.

performance is not determined by gasoline sales alone. Lessee dealers are not generally regarded as the most cost efficient sales channel and make up only 7% of ChevronTexaco's total branded stations in the US, but 74% of the Hawaii stations[39]. ChevronTexaco could have refuted some of the public charges. However, its omission to do so early has created a significant public relations problem not only for the company itself, but for the petroleum industry in Hawaii as a whole.

- The Hawaii petroleum industry, because it is small, has many market segments that are not reported publicly. The EIA and other agencies such as the US Army Corps of Engineers who collect shipping statistics, will withhold numbers if there are too few market participants. DBEDT collects volume data, but not all participants cooperate. In stakeholder meetings conducted as part of this study, some market participants were extremely reluctant to part with information, even if it would serve their case. The intransparency of the market and refusal of participants to share information, even under confidentiality agreements, create the impression that excess profits are being made.

- Few people realize how capital intensive the petroleum industry is. It is perhaps recognized that refineries represent a significant investment, but the capital tied up in inventories and receivables, and the cost of retail stations is not well understood.

- Consumers in Hawaii do not appreciate the real octane needs for their cars. Proportionally, use of Premium and Midgrade in Hawaii (35% of purchases) is significantly higher than that for the US as a whole (25%). Consumers can lower their gasoline cost by as much as 20 cpg by simply following the instructions regarding octane requirements in the owner's manual of their cars. This could be as much as $96 per year per car, assuming the car is driven 12,000 miles per year and gets 25 miles per gallon.

- The level of taxation is generally not well understood by the public. Hawaii's gasoline taxes are on average 12.5 cpg higher than the average of the US as a whole.

[39] Chevron Trade Class Comparison January 20, 2003.

4 HAWAII FUELS MARKETS

The gasoline market in Hawaii has been the subject of various studies and investigations for more than a decade. The focus of most of these studies was to gather and rationally present facts related to past practices of market participants. The focus of the current study will be to analyze the fundamental market forces, restraints and limitations of the Hawaii gasoline market in its overall dynamic context. The term, "dynamic context" refers to the interaction of geographically separated markets in the Pacific Rim, to the interplay of refining, supply and distribution economics and their price impact, to the components of that price and how it affects players up and down the value chain, and finally to the unique and historic role that government has played in shaping the petroleum industry in Hawaii.

4.1 Gasoline Wholesale Market

At the level of the major marketers, the wholesale market for gasoline in Hawaii consists primarily of term contracts concluded between the two refiners and the non-refining marketers. ChevronTexaco supplies Aloha, Shell, and the former BC Oil stations formerly operating under the ARCO brand, while Tesoro supplies ConocoPhillips (76 brand) and most of the military and government requirements.

4.1.1 Gasoline Wholesale Pricing Mechanisms

Through the mid to late nineties, most of the supply agreements between the island refiners and the mainland refiners who wanted to participate in the Hawaii market (at that time Shell, Unocal, Texaco) were exchange agreements whereby product was made available in Honolulu and returned to ChevronTexaco, PRI or BHP on the US West Coast. The non-island refiners paid an additional exchange fee of 4 to 5 cpg reflecting the avoided transport cost and the higher cost of refining in Hawaii.

Since the late nineties, the exchange agreements have been replaced by straight sales contracts, some of which are based on foreign import parity (i.e., pricing formula includes Singapore pricing plus freight), some have links to domestic markets (i.e., US Gulf Coast), or combinations thereof. The premiums paid over import parity at the major supplier wholesale level have virtually disappeared since Aloha and Texaco expanded the Barbers Point terminal and started importing cargoes in 1997 and 1998.

Although the arm's length sales agreements and the introduction of import parity pricing have resulted in more supply diversity and access to lower priced gasoline for High Volume Retailers (HVRs), Hawaii's wholesale market will not become liquid and

naturally transparent for reasons outlined below. The price and volume reporting requirements that stemmed from Act 77 and the measures proposed in this report aim to remedy the intrinsic lack of transparency.

4.1.2 Differences between Hawaii and Other Wholesale Markets

Actively traded wholesale markets, such as New York, Rotterdam and Singapore, see a high volume of daily competition between buyers and sellers, creating ever-changing supply and demand patterns. The liquidity in these markets is so great that it has led to the emergence of derivative markets such as options, futures and other risk management instruments. Even smaller local markets, such as those in Los Angeles and the San Francisco Bay Area that lack sufficient liquidity to allow separate classes of derivatives, are liquid enough in prompt trades to allow buyers and sellers to discover the daily price level that corresponds to current and actual supply and demand forces. This is not so with the Hawaii gasoline wholesale market for a combination of reasons:

- **Lack of a scale**. At 27 TBD, the total daily market in Hawaii is roughly the size of a single pipeline "piece", the quantity most commonly traded in West Coast pipeline markets. Trading organizations need a certain minimum market size so that average trading margins will cover at least their overheads.

- **Lack of a centralized physical delivery point**. Hawaii is not a single market, but an archipelago of poorly connected smaller markets. In the major market centers, trades evolve because market participants have the physical means to back up the paper trades based on an extensive and highly interconnected infrastructure of refineries, terminals and pipelines.

- **Lack of international arbitrage**. Although import facilities for gasoline exist, supply and demand for gasoline in Hawaii are balanced. Imports are at best an occasional event. Gasoline imports therefore do not create the continuous connectivity between Hawaii and the international cargo markets, such as is the case for jet fuel cargoes coming into HFFC on a regular basis.

- **Lack of price information**. Price reporting through price reporting services such as those of Lundberg exist, but reportedly are of little value to the participants. In actively traded markets, participants would have on-screen real-time pricing information at the pipeline wholesale (spot) level, as well as at

truck rack level. In addition to a lack of real time data, Hawaii also lacks an active industry monitoring or reporting system that allows retroactive analysis.

- **Lack of independent wholesalers**. Hawaii does currently have only one independent wholesale gasoline marketer capable of tapping into international supply[40].

- **Lack of unbranded retailers**. Hawaii has only a small number of independent retail buyers who might purchase unbranded gasoline from a third-party terminal.

The restraints identified above are fundamental and are intrinsic to the Hawaii gasoline market. While legislative measures can improve transparency, there is little that can be done in practical terms to remove the other restraints.

4.1.3 Jobbers

Most of the major marketers prefer to hand off small volume bulk sales to independent distributors known as jobbers, who operate their own truck fleets, and sometimes own small distribution terminals or a couple of retail outlets.

Table 4.1 – Overview of Key Jobbers in Hawaii

Jobber	Supplier(s)	Islands	Remarks
Akana	Chevron	Hawaii	Owns terminal in Kawaihae
Aloha	Aloha (Chevron)	Oahu, Hawaii	Major marketer
Diamond Head	ConocoPhillips	Oahu	Diesel only, 6 trucks
Fuelman	Tesoro	Oahu	Diesel and lubes, 5 trucks
Garlow	Chevron	Oahu	60% diesel, 40% mogas, 4 trucks
Inter Island/Senter	Chevron, Tesoro	Hawaii, Kauai, Molokai	Molokai terminal, Tesoro in Hawaii,
Island Fuels	Chevron	Oahu	
Kauai Petroleum	ConocoPhillips	Kauai	Lihue Terminal, gas, diesel, jet
Leeward	Multiple	Oahu	Diesel + gasoline
Maui Oil	Shell	Maui	Operates300 bpd cardlock in Maui
Maui Petroleum	ConocoPhillips	Maui, Hawaii	Also operates for Shell
USRP	Chevron	Oahu	Supplies former BC Oil stations

[40] Aloha Petroleum is capable of cargo receipt capacity at their Barbers Point terminal.

As shown in Table 4.1 above, the presence of most jobbers is limited to one or two islands. Most work on an exclusive basis with one of the major suppliers. Typically, the jobbers make deliveries to industrial, agricultural, and government sites, and to remote retail stations that are supplied in small quantities. Since diesel is the dominant fuel for commercial and industrial accounts, some jobbers specialize in distillate fuels and lubricants, and do little gasoline volume.

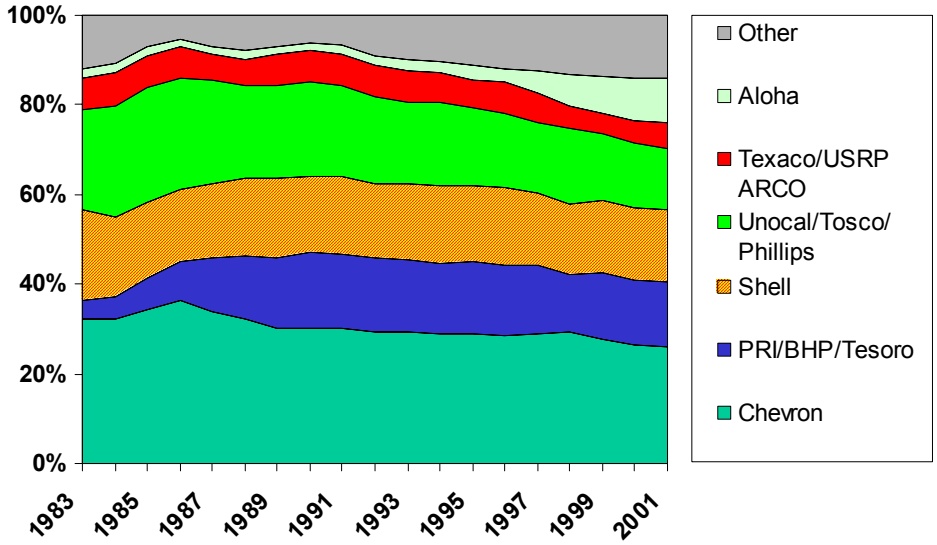
4.2 Retail Gasoline Market

Like the refining infrastructure and the wholesale market, Hawaii's retail market is also quite unique in the way it operates, and is also suffering from diseconomies of scale and intrinsically high costs.

4.2.1 Market Share

Figure 4.1 below shows the development of retail gasoline market shares in Hawaii over the past two decades.

Figure 4.1 – Market Shares 1983 - 2001[41]



It is clear to see how after a hesitant entry during the first years after the start up of the PRI/HIRI refinery in 1981, PRI and later BHP vigorously pursued market share in the period 1985 through 1989, primarily at the expense of the independent retailers. This

[41] Source of data: Various documents pertaining to Anzai vs., Chevron et al.

was the expansion through the Gas Express brand that led to the subsequent moratoria on new supplier owned stations. Chevron, who initially not only defended its share but even managed to increase it, had to give up volume during that period, as did Unocal.

The early nineties saw a consolidation of market share by Chevron, BHP and Shell, with the independent segment, including the military retail at the PX stores making a comeback at the expense of primarily Unocal. Unocal, later Tosco, reportedly at the time had a higher cost base than its competitors and considered exiting the market but could not find a buyer willing to make a satisfactory offer.

The next significant event occurred when BHP and Aloha failed to reach mutually satisfactory terms for renewal of their supply agreement after the State forced the closure of their shared terminal in Honolulu in the mid nineties. Aloha decided to create a partnership with Texaco to expand the terminal at Barbers Point to full cargo import capability. After Aloha started importing in 1997, Chevron proposed a supply agreement at import parity pricing, to avoid the cost of having to export its own production. With its new, very competitive price base, Aloha subsequently increased its share by selling to High Volume Retailers (HVRs), notably Costco. Aloha's gain in market share and the recovery of the independent sector over recent years has come to some extent at the expense of Texaco's former share, now in the hands of USRP (primarily sold under the ARCO brand) after the demise of BC Oil in 1999 forced closure of stations.

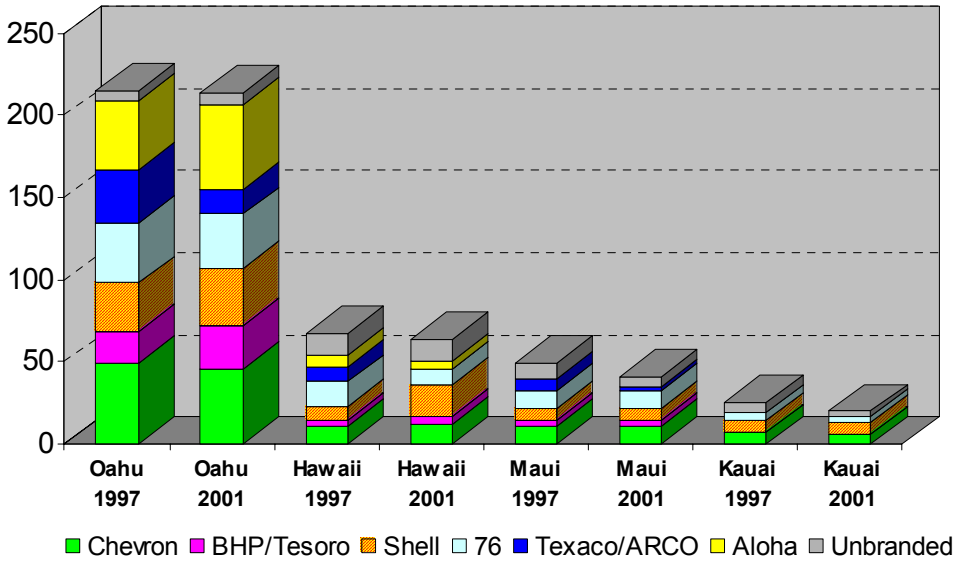
In recent years, Chevron, Tesoro and ConocoPhillips have all seen a gradual erosion of market share while Shell, who had a credible threat of imports, and Aloha, who actually imported, managed respectively to defend and expand their share. As this process continues, the refiners see their revenue base in retail gasoline, their single largest source of profitability, diminish. To compensate for the loss in volume, the pressure to create more efficient retail channels increases. But with every Chevron or 76 dealer that closes, market share is also lost because location and convenience play a large role in sales.

4.2.2 Inter Island Market Differences

There are notable differences in market share for each of the principal distributors between the various islands. Not all marketers have access to all islands, and most of the Neighbor Island markets would in fact be too small to support too much

fragmentation in the supply chain. Figure 4.2 below shows the station count for the main islands for each of the major marketers.

Figure 4.2 – Gasoline Station Count by Marketer, 1997 & 2001



Source of data: Various documents pertaining to Anzai vs., Chevron et al.

On Oahu, the main shift in station count is the reduction of the Texaco stations after BC Oil took these over under the ARCO brand in 1999 and soon afterwards had to file for bankruptcy, resulting in the loss of 27 stations. The net winners were Aloha, Tesoro and Shell, who added 10, 6 and 6 stations respectively. Chevron lost 3 stations over the same period, while recently Chevron lost another three stations when dealers walked away from their leases[42]. This confirms a shift in market shares and is one more confirmation of the shifting market powers, with Shell and Aloha gaining access to Chevron supplies at import parity and Tesoro needing to create captive outlets for its gasoline after the loss of the Aloha volumes.

On the Big Island, all major marketers are represented, and besides the branded retailers, there is a Costco. Unlike Oahu, where Texaco was forced by the FTC to divest its stations to an independent, in Hawaii the former Texaco stations went to Shell with the Shell/Texaco joint venture, Equilon. This gave Shell a significant share of the station count in the Big Island.

[42] Tim Ruel, *Gas Dealers Go Under*, Honolulu Star Bulletin, January 2, 2003

The market in Maui is in principle less concentrated than Kauai. Only Aloha is absent in Maui, while in Kauai, Aloha, Tesoro and ARCO/USRP have no presence. However, prices in Maui are the highest of all the islands. Market concentration in both Maui and Kauai increased through the closure of unbranded stations, which in Maui were reduced from 9 to 6 between 1997 and 2001, while in Kauai, the unbranded segment fell from 6 to 3. The Costco on Maui does not have a gas station because their normal supplier, Aloha, has not been able to secure access to a terminal.

The most likely explanation for the higher prices in Maui is exercise of market power in a market that, based on tax revenues per inhabitant, is generally 25% more affluent than Kauai[43]. Knowledgeable Maui gasoline consumers have a lower price alternative in the form of two card-locks operated by Maui Petroleum and Maui Oil respectively. Although primarily designed for business accounts and fleets, they are increasingly used by cost-conscious private individuals. The card-locks are similar to HVRs in terms of the price differential to traditional retail and volumes handled. So even in Maui, despite the absence of Aloha and Costco, a two-tier pricing structure seems to be developing.

4.2.3 Trends in Gasoline Retail

The pump price at a station is not only determined by competition amongst nearby stations but also by the services provided by the individual dealership. There is no such thing as a generic station in Hawaii and many factors affect competitive interaction.

The location of a station is the single most important factor in determining throughput volumes. A station in a more densely populated area and well traveled location generally will have higher volumes. Higher volumes will bring greater revenues and a lower per gallon cost base, which in turn will attract more customers, and thus a success spiral is created. Other location factors include nearness to shopping centers, ease of entrance and exit, and services other than gasoline purchases.

Historically most gasoline stations started as automobile repair service shops when a mechanic supplemented his income by selling gasoline. Repair shops however do not have to be at highly-traveled major intersections because service and repair decisions

[43] County Economic Conditions, http://www.hawaii.gov/dbedt/qser/index.html

are not taken at the spur of the moment and are not too frequent – or so one would hope when buying a car.

Repair shops involve low volume traffic with high transaction amounts per visit. Repair shops however are still fairly marginal businesses that have to be cost conscious. This is why repair shops have moved to lower rental areas that may not be a good location for a gasoline station. On the other hand, convenience stores, as the name implies, do require easy access at main thoroughfare locations with a high volume of traffic. Thus, on the mainland, a trend started in the eighties to replace service bays with convenience stores and to operate repair shops as stand alone facilities in less expensive locations. Additionally, car dealers have recognized that repairs can be a significant profit center and have moved strongly into the repair space. Cars have become more complicated, requiring more technician training and expensive test equipment, creating barriers to entry for a local repairman.

It was reported by industry participants that the initiative towards convenience stores by the major brands coincided with BHP's push for market share under the Gas Express brand. It is possible that many of Hawaii's traditionally minded dealers, focused on auto repair, rejected the concept of convenience stores because it coincided with a time of increased competition. In an extensive survey of the market conducted in 1992 by Julia Schoen [44] it was noted that of the 391 stations then operating in the islands, 197 still were "*traditional service stations; that is, stations which do repairs*".

Schoen's study also compares the Hawaii situation to that of San Francisco, where rising cost of land had made many gas stations uneconomical, and where between 1982 and 1992, the number of stations had decreased from 294 to 136. Clearly, when facing rising land costs and increased competitive pressure in the retail market, dealers will either have to close or find another source of revenue. Currently, of Hawaii's 339 retail stations, 157 operate convenience stores[45], or 46%. According to Schoen's study, in 1993, only 122 stations out of 391 operated c-stores or mini-marts, for a total of 31%.

Today, service stations in Hawaii derive revenues not just from the c-stores that first replaced the service bays, but from multiple sources, ranging from car rental to fast

[44] Julia E. Schoen, *The Consumer and Gasoline Marketing in Hawaii*, Department of Commerce and Consumer Affairs, State of Hawaii, 1993

[45] 2002 National Association of Convenience Stores, *State of the Industry 2002*.

food, and discount stores to car washes. The gasoline retail landscape today can be summarized by the following generic categories:

- **High Volume Retailers.** HVRs such as Costco, Albertson and Wal-Mart have made tremendous inroads into gasoline retailing in much of the continental US. Typical volumes per outlet range from 500,000 to 1,000,000 gallons per month with volumes often only limited during prime hours by the nozzle count and maximum length of waiting lines. HVRs don't have to be at high-priced major intersections because they attract traffic in their own right. The personnel cost and overheads benefit from economies of scale never before seen in gasoline retailing, and allow HVRs to derive a positive cash contribution from gasoline sales at margins of 3 cpg. However, their presence is limited to the more densely populated urban areas. In Hawaii, Costco, with two locations (a 3rd will be opening later this year), falls into this category.

- **Super Jobber/Dealers**. This designation refers to gasoline distributors who supply 50 -100 stations which they own or lease in their own right. Although usually branded under the name of their supplier, they may be open dealers or independents using their own brand. Super jobber/dealers benefit from purchasing leverage for their gasoline and c-store supplies, achieve economies of scale in their overheads, and are usually savvy and competitive in the market place. Their retail margins may not be substantially different from smaller retail operations, but they make their money on the bulk purchase leverage. In Hawaii, Aloha falls in this category.

- **Major Dealers**. These are branded lessee or owner operated dealerships with two or three stations in good locations, with c-stores and additional services such as car washes generating a good part of total revenues. Typical sales are between 100,000 and 150,000 gallons per month. Although facing a tough competitive environment, these dealerships can survive in Hawaii on dealer margins of 8 to 10 cpg because of the additional revenues generated in the side activities, and because their suppliers are willing to absorb a portion of the lease cost for the land.

- **Card Locks**. Card locks are pumps set up to dispense gasoline and diesel to commercial and industrial buyers. They are stand alone operations generally without attendants. Qualified customers sign a contract with a card lock operator and are issued a special credit card. Card lock volumes are generally

higher than station operations. Other than pumps, few improvements are necessary to the property, which can be in a cheaper location. Although intended for sales to industrial users, card locks are increasingly used by cost conscious private buyers, and as such are similar to High Volume Retailers, operating at similar volumes and margins.

- **Company Ops**. Retail stations that are owned by the branded supplier and operated by salaried personnel. Some majors have moved away from company operated stations, because the costs of company operated stations tends to be higher when majors apply their large corporation management style to small scale retail. The notable difference with company operated stations versus lessee dealers is that no artificial split needs to be made in who gets to absorb what part of the cost of land and improvements. In Hawaii, Tesoro has mostly company operated stations, a legacy of BHP's push for market share under its Gas Express brand.

- **Commissioned Retailers**. Certain c-stores, notably 7-11, sell gasoline on a commission basis without taking ownership of the product at any time, or assuming market risk for price differentials between DTW and retail prices. The branded supplier provides the pumps and tanks at the retailer's property, and provides the inventories. The retailer takes a small commission to cover cost of sales (personnel, credit card charges, overheads).

- **Small Dealers**. These are single station dealerships in less prominent locations, with either a less well frequented or small surface c-store or service bays. Typical sales are around 70,000 gallons per month or less. These dealers can only survive on 9 cpg dealer margins by subsisting on little income for themselves. The value of such dealerships is virtually nil when a tenant dealer decides to leave. A significant portion of the islands gasoline retail falls into this category.

- **Rural Area Mom & Pops**. Small rural stations have typical sales of 20,000 gallons per month or less, and are often only capable of receiving small quantity deliveries by jobbers rather than full truck loads from major suppliers. Their main revenue is generated from general stores, service and repairs, and tourist services, with gasoline sales only a secondary consideration. Even so, they only survive on small margins because of low overheads and by not

charging the full economic rent of land value for mostly wholly owned property. The small rural stations often fulfill a clear local need.

4.2.4 Differences in Consumer Preference

One of the features that make Hawaii unique is the preferences which some Hawaii consumers seem to have for more expensive type of services such as buying premium or midgrade gasoline, or using local neighborhood stations despite higher prices. Some of these preferences are seen in other markets too, while others are unique to the Hawaii gasoline market, setting the Hawaii consumers apart from gasoline consumers elsewhere in the US. The clearest example of this is the disproportionate fraction of midgrade and premium sales in the islands.

Gasoline consumers in Hawaii buy a substantially larger share of premium gasoline than the average US consumer. The average is 26% from 1995-2002. While the proportion has decreased from 31% to 25% it still remains about ten percentage points above the US. When mid-grade and premium are combined, Hawaii consumers choose 62% of their sales as regular grade, while the average US consumer chooses 73%, as shown in Table 4.2 below.

Table 4.2 – Hawaii and Total US Gasoline Mix

	Proportion (%) of Gasoline Purchases By Grade					
	Hawaii			US Average		
	Regular	Midgrade	Premium	Regular	Midgrade	Premium
1995	56	13	31	67	13	20
1996	59	13	28	70	12	17
1997	60	13	27	72	12	16
1998	60	13	27	71	11	18
1999	62	11	27	72	11	17
2000	66	10	24	77	9	14
2001	67	10	23	78	9	13
2002 p	66	9	25	78	8	14
	62	11	26	73	11	16

Most analysts would question whether the Hawaii consumer requires the extra octane implied by these numbers. As a hypothetical exercise, the consumer gasoline bill for Hawaii was calculated as if the Hawaii consumer had matched the US grade mix. From

1995-2002, the total annual gasoline bill averaged $664.3 Million. With the different gasoline mix, the bill would have been $7.9 Million per year lower on average, a savings of 1.2%. While this amount may appear small at first glance, it is approximately the savings that Hawaii would receive if the price caps were applied frictionless and efficiently (two unlikely assumptions) over the same time period.

Customer behavior and customer segmentation has long been the subject of marketing studies. A 1995 study by Mobil[46] showed that only 20% of gasoline buyers are price shoppers who see price as the primary criteria. In the 1992 study of the Hawaii gasoline retail market, Julia Schoen[47] found that only 30% of the surveyed customers considered price the most important reason to select a particular gasoline station, well behind the 53% who stated that convenience was their first concern.

When BC Oil entered the Hawaii market in 1999 after leasing the 27 stations USRP had purchased from Texaco, pursuing a low pricing strategy under the ARCO brand, they lost as much as 20% of their sales despite the low street prices because they could not offer a branded credit card.

This shows that price is not the only consideration in gasoline retail. It is not even the most important consideration in most areas. This is why even after the emergence of HVR chains and card-locks, there will be sufficient diversity of supply in gasoline retail, with street prices that can show as much as 20 cpg difference between a branded retailer in a high cost but convenient location and the Costco less than a mile away.

Gasoline marketers continuously evaluate volume versus price decisions, and some deliberately choose to serve a class of customer who wants convenience or cleanliness, or any number of other service attributes rather than price. Almost all markets of consumer goods and services show at least some degree of differentiation. Cheaper gasoline at the wholesale level in Hawaii has enabled the entry of Costco, but does not necessarily reduce retail prices across the board.

[46] Allanna Sullivan, Mobil Bets Drivers Pick Cappuccino over Low Price, Wall Street Journal, January 30, 1995.

[47] Julia E. Schoen, *The Consumer and Gasoline Marketing in Hawaii*, Department of Commerce and Consumer Affairs, State of Hawaii, 1993

4.2.5 Retail Cost Structure

The retail cost structure will be different from station to station, and is markedly different for company operated stations, lessee dealer stations and jobber operated retail. The most common form of retail in Hawaii are lessee dealer stations, for which the marketing company provide the dealer with the complete station, including the land, the buildings, tanks, canopy and a completely furbished c-store.

Table 4.3 – Comparison of Retail Profitability

	LA			Oahu			Rural		
Volume Sold (gln/month)	**200,000**			**100,000**			**40,000**		
REVENUE	gln	$/gn		gln	$/gn		gln	$/gn	
Regular	156,000	0.94	$ 146,640	65,000	1.17	$ 76,050	26,000	1.33	$ 34,580
Midgrade	14,000	1.02	$ 14,280	10,000	1.23	$ 12,300	4,000	1.39	$ 5,560
Premium	30,000	1.10	$ 33,000	25,000	1.31	$ 32,750	10,000	1.47	$ 14,700
	200,000	0.97	$ 193,920	100,000	1.21	$ 121,100	40,000	1.37	$ 54,840
Convenience Store			$ 75,000			$ 75,000			$ 30,000
Service Bay			$ -			$ -			$ 12,000
Other			$ 2,000			$ 2,000			$ 2,000
			$ 270,920			**$ 198,100**			**$ 98,840**
COST OF GOODS SOLD									
Regular	156,000	0.88	$ 137,280	65,000	1.08	$ 70,200	26,000	1.24	$ 32,240
Midgrade	14,000	0.94	$ 13,160	10,000	1.13	$ 11,300	4,000	1.26	$ 5,040
Premium	30,000	1.01	$ 30,300	25,000	1.20	$ 30,000	10,000	1.36	$ 13,600
	200,000	0.90	$ 180,740	100,000	1.12	$ 111,500	40,000	1.27	$ 50,880
Convenience Store			$ 54,000			$ 54,000			$ 21,600
Service Bay			$ -			$ -			$ 6,000
Other			$ -			$ -			$ -
			$ 234,740			**$ 165,500**			**$ 78,480**
GROSS PROFIT			**$ 36,180**			**$ 32,600**			**$ 20,360**
			18.1 cpg			**32.6 cpg**			**50.9 cpg**
OPERATING EXPENSES									
Lease			$ 8,000			$ 12,000			$ 5,000
Interest expense			$ 2,500			$ 1,500			$ 1,000
Other Fixed Expense									
Payroll & Benefits			$ 9,600			$ 8,600			$ 6,400
Insurance			$ 250			$ 250			$ 100
License & Permits			$ 400			$ 400			$ 200
Depreciation			$ 200			$ 200			$ 500
			$ 10,450			$ 9,450			$ 7,200
Semi-variable									
Credit card expense			$ 4,064			$ 2,972			$ 1,483
Utilities & Telephone			$ 1,350			$ 1,500			$ 800
Bad debt & Cash Shortage			$ 80			$ 80			$ 30
Discounts & Refunds			$ 70			$ 50			$ 30
			$ 5,564			$ 4,602			$ 2,343
Discretionary Spending									
Professional services			$ 300			$ 300			$ 100
Training			$ 100			$ 100			$ 150
Advertising			$ 100			$ 50			$ 50
Repairs & Maintenance			$ 900			$ 1,000			$ 500
Supplies & Uniforms			$ 600			$ 400			$ 500
Other			$ 700			$ 600			$ 300
			$ 2,700			$ 2,450			$ 1,600
Total Monthly Expenses			**$ 29,214**			**$ 30,002**			**$ 17,143**
			14.6 cpg			**30.0 cpg**			**42.9 cpg**
PROFIT BEFORE TAX			**$ 6,966**			**$ 2,599**			**$ 3,217**
			3.5 cpg			**2.6 cpg**			**8.0 cpg**

In Hawaii, again as a general rule, the marketing company will not own the land, but will lease it under long term contract. These contracts have provisions for periodic lease rate increases, and some even have clauses that at renewal, the lease rate can not go down, even if the land value may have dropped over the intervening period.

What is relevant here is to look at the total cost of building and operating the station, regardless of who owns what, and whether capital values are discounted as a lease or as debt service and a return on equity.

Table 4.3 compares the profitability of three typical lessee dealer operations in Los Angeles, Honolulu and a rural location in a neighboring island.

The basis for the revenue numbers is a Honolulu DTW price for regular gasoline of $1.08 per gallon, a 20 cpg differential over LA, and historical differentials for regular and premium or midgrade pricing. The dealer margins between ex-tax retail prices are 6 cpg for regular in LA, versus 9 cpg for regular in Hawaii. Dealer margins for midgrade and premium are 2 to 3 cents above regular for all three locations.

The convenience store revenues and margins for LA and Honolulu represent the national average for all c-stores[48], while revenues for the rural location convenience store and service bay are based on local information. The assumption that c-store revenues are the same for the LA example and the Oahu station is conservative in the sense that it is more likely that the average Oahu c-store at a gas station sees less volume than its LA counterpart. In Hawaii, especially in Honolulu, there is significant competition from convenience stores that are not associated with gas stations, while that is not the case in LA.

The category “Other Revenues” can include income from billboards, car rentals or sales, tourist services and the like, and are taken as a net income stream. Some stations may not have the opportunity to realize such additional revenues, but again, the conservative assumption with regard to how much an average dealer has to rely on gasoline income is that all three examples have at least some form of additional revenue.

The lease rates are typical numbers based on information from stakeholder meetings and public documents pertaining to the State’s anti-trust lawsuit. For the LA case, it is

[48] National Petroleum News, *2002 Market Facts*

assumed that the lessee purchased the leasehold for $0.5 million, of which 50% was financed at 12%. For the Honolulu case, a purchase price of $300,000 is assumed, although currently the value of the business may be nil.

Payroll and benefits assume 24 hour operations for LA and Oahu, with a minimum of 2 people during the day shift. Labor for the rural location assumes night closure and a six day work week for the mechanic. All costs shown will of course vary from station to station, but in general are representative for the industry. The higher costs for several items in the rural operation stem from the service bay. It is clear to see how gasoline retail has evolved into a business in which the fuel sales are no longer the primary profit center. Gasoline sales contribute only 30 to 40% of gross profits.

The overview provided in Table 4.3 is for lessee dealers, i.e., stations for which the cost of land and all improvements, such as the cost of building the station and the convenience store, are born by the fuel supplier from whom the dealer leases the station. These costs are shown in Table 4.4 below.

Table 4.4 – Comparison of Retail Capital Requirements

		LA	Oahu	Rural
Volume Sold (gln/month)		**200,000**	**100,000**	**50,000**
CAPITAL INVESTMENT				
Site				
Area (acres)		0.5	0.5	0.5
Land Value ($/acre)		$ 1,000,000	$ 4,000,000	$ 800,000
Value of site		$ 500,000	$ 2,000,000	$ 400,000
Ownership		Fee Simple	Leasehold	Leasehold
Improvements				
2 x UST, installed		$ 350,000	$ 400,000	$ 450,000
Grading & Paving		$ 50,000	$ 60,000	$ 30,000
Dispensers, console		$ 200,000	$ 220,000	$ 140,000
Canopy, buildings		$ 300,000	$ 330,000	$ 330,000
Miscellaneous		$ 100,000	$ 120,000	$ 120,000
		$ 1,000,000	$ 1,130,000	$ 1,070,000
COST OF CAPITAL				
Leases & debt service				
Land	12%	$ 5,000	$ 20,000	$ 4,000
Improvements	12%	$ 15,000	$ 31,300	$ 14,700
		$ 15,000	$ 31,300	$ 14,700
Income from Lessee		$ 8,000	$ 12,000	$ 5,000
NET COST TO MARKETER		**$ 7,000**	**$ 19,300**	**$ 9,700**
		3.5 cpg	**19.3 cpg**	**19.4 cpg**

The capital numbers are for a bare minimum station, with two Underground Storage Tanks, one of 20,000 gallons for regular and one of 10,000 gallons for premium, midgrade is mixed inline while pumping, and no diesel. Real estate values are based on discussions with commercial realtors. Dispensers are budgeted at $15,000 each, with a console at $30,000. Miscellaneous expenses include c-store cabinets, refrigerated stores, etc. The higher project costs in Hawaii reflect the additional expense of specialist labor, which is flown out to the islands.

The unabsorbed cost of station ownership of 3.5 cpg in LA is consistent with the 3 to 4 cpg "Competitive Allowance" which the branded marketers offer to dealers in the LA area who own their stations. The 18 to 19 cpg of unabsorbed costs in Hawaii is consistent with information received from stakeholders familiar with the economics of new stations. The average cost of marketing, as taken into account for the profitability analysis, was only 13 cpg, but this reflects the fact that many stations in Hawaii have been largely depreciated, while others may be on cheaper land. Overall, the numbers derived at here are also consistent with the 18 cpg "marketing cost" included in the price cap formula enacted by Act 77.

The marketing cost factor is often overlooked. For instance, in his proposal for a State operated import terminal, gubernatorial candidate D.G. "Andy" Anderson estimates the total cost for "operations and delivery" at 4 cpg [49], an amount that would not even cover the weighted average distribution cost of 5 cpg let alone the cost of building and maintaining a retail chain. Hawaii's marketing and distribution system with its 339 gasoline stations, terminals, barges, and trucks, represents an investment and labor cost factor which is of equal magnitude to the money and people employed in the refineries.

4.2.6 Reconciliation of Gasoline Cost Structure

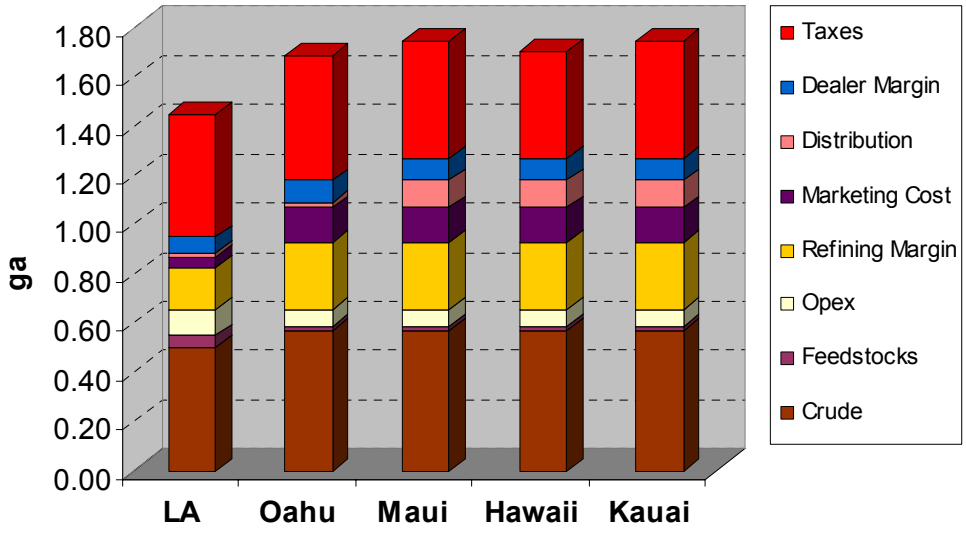
It is now possible to construct a picture of the cost throughout the entire gasoline supply chain in Hawaii.

In an environment where Hawaii crude cost is $25/bbl, and allowing for a 12% Return on Capital Employed for the most efficient supplier in the market, the expected price differentials between street prices for regular gasoline in LA and in Hawaii would be 25

[49] D.G. Anderson, *An Ownership Strategy for Stability*, undated position paper, and discussions with Dr H. Ogburn.

to 30 cpg, with Maui the highest. Actual observed differentials over the past 5 years are indeed in that range as will shown later in Section 6.1. (Table 6.1)

Figure 4.3 – Comparison of Retail Cost at $25/bbl Crude and 12% ROCE



It is important to realize that Figure 4.3 above represents costs rather than actual market prices. Maui's prices on average are higher than the cost differentials would explain.

4.3 Markets for Other Fuels

For the Hawaii refiners, the primary products are jet fuel and fuel oil, while diesel represents a growing market. Although the primary focus of this study is on gasoline, the market factors that impact the larger volume fuels have tremendous leverage in the refining economics and hence on the profits refiners require to take in gasoline.

4.3.1 Jet Fuel

Jet fuel demand in Hawaii long ago outpaced the production capacity of the two local refineries. Currently, of the 43,000 bpd of jet fuel used by the airlines in Hawaii, about 37,000 bpd is produced locally and 6,000 bpd is imported, primarily from the Far East. Prior to the slump in air traffic caused by the 9/11 events and the economic downturn,

imports of jet have been almost double the current levels in the peak years. Concern about SARS has caused a short term drop in jet fuel demand.[50]

This ongoing process of importation reflects the smooth functioning of a highly-liquid and competitive market. Refiner prices are kept in check by the steady influx of cargoes from Asia, the Caribbean, etc. The twenty percent of imported jet fuel tempers the price of the eighty percent produced by local refiners.

The domestic and international airlines formed a consortium to own and operate storage and distribution facilities in the U.S. after the oil embargo of the seventies. Until that time, the airlines would rely upon local refiners at major hubs across the U.S. to supply their needs. Tank farm and pipeline networks were owned and operated exclusively by the oil companies. It was impossible for an airline such as United or JAL to purchase a cargo of jet fuel on the international market and store it in San Francisco, LA, Seattle or Honolulu.

The oil embargo highlighted the pitfalls of this logistical dependency. The lack of access to distribution assets was recognized as a vital threat. As an airline ran low on inventory allocated by their contractual oil company, it became impossible to plan for future ticket sales, not knowing whether jet fuel supply would be available at any price, even at the most critical airports. And yet, cargoes were available in Singapore, Japan and Rotterdam. Shipping was available on the spot-charter market. But terminal space at the receiving end was in the hands of the oil companies who were not in the business to help them import. The airlines got together and took destiny into their own hands by buying and building storage facilities, such as LAX Fuels in Los Angeles, and HFFC on Sand Island, Hawaii.

This story is told to illustrate the importance of market access from international sources through third-party terminals. It is the same lesson that was learned in the island gasoline markets of the U.K, Australia, Japan and Korea, as outlined in Section 4.4.4. The Aloha/USRP terminal in Barbers Point may have had a similar dampening effect on gasoline prices. But that effect may be limited over the long term by the facts that:

[50] Tesoro press conference, April 2003

- Hawaii's two refineries produce sufficient gasoline to supply the islands' demand without imports.

- Gasoline imports put pressure on the refiners to either reduce crude runs, or export an equivalent volume of gasoline. Reduced crude runs create imbalances on the jet fuel and fuel oil side that would have to be made up by additional imports.

- Unique specifications, such as a "no de minimis MTBE retains" provision on stored gasoline was adopted by importers. The specification at State level is standard ASTM[51] quality.

- Unlike jet fuel, the downstream retail market is contractually committed to island refiners and therefore is not free to purchase imported gasoline, even if it is competitively priced. Of the 339 gas stations in Hawaii, only 29 are non-branded.

- Even with an import terminal at Oahu, access to Maui and the Big Island is still restricted.

The outlook for the jet fuel market is that it will continue to operate smoothly at import parity, but that it will be difficult for gasoline to achieve the same status for the reasons outlined above.

4.3.2 Residual Fuels

Of the residual fuel produced by from Hawaii's two refineries, the Low Sulfur Fuel Oil (LSFO, with sulfur concentrations < 0.5%) is primarily sold under long term contracts to Hawaii Electric Co. (HECO) for its three main power plants in Oahu, with delivery by pipeline. Medium Sulfur Fuel Oil (MSFO, with sulfur between 0.5 and 5%) is sold to utilities in Maui and Hawaii. Other fuel consumers are the refiners themselves, a cogeneration unit at Barbers Point and a cement plant at the same location. Some high sulfur fuel oil is produced batch wise by Tesoro and is blended as bunker fuel for ships.

In Section 3.4.3, it was explained how historically, residual fuels trade at prices below crude oil, but how in recent years, fuel oil prices in Hawaii have increased as a result of

[51] ASTM = American Society for Testing of Materials

new contract terms and an increased demand for fuel oil due to the prolonged shutdown of over forty nuclear power plants in Japan.

This situation is not expected to continue into the medium term future. Japan's nuclear power plants will come back online as inspections are completed and the substitution of fuel oil by coal and natural gas will continue. The same substitution process started in the US and Europe in the late seventies, and now the net production of fuel oil in the US as a whole is less than 4% of refinery outputs while in California, which has some of the most sophisticated refineries in the world, it is around 2%. By contrast, residual fuel oil production in Hawaii is 30%.

The reduction of net fuel oil production is achieved through additional refining processes, in particular coking and thermal or catalytic cracking, which are capital intensive and increase operating cost. The refiners in Hawaii have not had to consider investing in such units while they had a convenient outlet in the local power plants and fuel oil therefore plays a pivotal role in Hawaii's petroleum markets.

Fuel oil's relevance derives from the fact that it has been a money-losing commodity for refiners throughout the world for decades. Like other disposal commodities, such as scrap metal and textile cuttings, the manufacturer (refinery) does not expect to earn a profit from fuel oil commensurate with the pro-rated costs of producing it. What sets Hawaii apart from other refining centers in this regard is the disproportionate percentage of total refining capacity that fuel oil occupies in the production slate. But even when trading at a discount to crude oil, as the price of crude oil continues to increase, which is particularly true for the light, sweet crudes required by the Hawaii refineries, the price of fuel oil for power generation becomes more and more expensive versus the alternatives of coal and natural gas.

As the availability of Liquefied Natural Gas (LNG) in the Pacific Rim continues to grow, and as the cost of processing, shipping and regasification of LNG keeps coming down while the cost of the light, sweet crudes needed by the Hawaii refineries keeps increasing, it is possible that within the next five to ten years, it will be cost-effective and advantageous for the HECO power plants at Oahu to switch to LNG. This change would be driven by the economics of LNG, for which technology improvements are expected to continue to lower the costs, while the cost of sweet, light crude oil is expected to continue to rise as reserves dwindle.

If the local users of LSFO switch to LNG, to remain viable the Hawaii refineries will have to convert their production of residual fuels into lighter components by investing in refinery facilities that can upgrade residual fuel to higher value products. The alternative of exporting their fuel oil to Asia, especially in the context of a global shift away from the use of residual fuels, is unlikely to offer the Hawaii refiners economical product values (see Section 3.5.1).

4.4 Market Mechanisms

In general, markets for refined petroleum products behave as can be expected for typical non-differentiated commodities:

- Since economies of scale are the only way to gain intrinsic competitive advantage, competing for market share results in oversupply.
- In an oversupplied market, the price will be cost based and settle at the cash cost of the leading producer or the variable cost of the laggard producer, whichever is higher.
- In an undersupplied market, prices can quickly rise to the level of the real consumer value of the product, which can be multiples of cost based pricing. Occasional periods of undersupply occur when demand is growing, but depressed pricing prevents investment needed for capacity additions.
- Brief periods of undersupply and high pricing will result in overbuilding of new capacity, causing prices to fall back to cost related levels. Such capacity expansion is inevitably followed by a period of industry rationalization, during which uneconomical units are shut down.
- The degree of cyclicality caused by the expansion and rationalization periods is determined by such factors as market growth rate, capital intensity, barriers to expansions and price elasticity of demand.
- The underlying trend through the business cycles is for the price of the commodity in constant currency to come down over time, as learning curve cost savings are passed on to the consumer.

If kept in isolation, the Hawaii fuel markets will not behave in this fashion for a number of reasons, notably that the market lacks the size to allow multiple competitors trying to gain economies of scale, and there is little or no growth to drive cyclical shortages. The natural state

for the Hawaii petroleum industry is indeed that of an oligopoly under constant scrutiny. The historical role of government in Hawaii is discussed below.

4.4.1 History of Government Involvement in Hawaii's Fuels Market

Government has long been actively involved in Hawaii's petroleum industry, originally with the objective of ensuring energy supply for the islands, then to protect certain classes of trade, and finally to encourage lower pricing, essentially shaping the gasoline market through legislative action.

The first significant event in the time line was the commissioning of Hawaii Independent Refinery. Inc. (HIRI), which is now Tesoro, on the Ewa Plains of Western Oahu in 1972. The genesis of HIRI is a story of government and private entrepreneurship working hand-in-hand to overcome insurmountable obstacles in order to build Hawaii's second refinery. It also conveys the historic relationship between the Gas Company and the two existing refineries. That relationship is pivotal to refinery profitability and cannot be excluded from an objective analysis of Hawaii's gasoline market.

Honolulu Gas Company built Hawaii's first refining facility in 1950. Located in the Iwilei neighborhood near Honolulu Harbor, the plant made the equivalent of natural gas out of petroleum feedstocks for Honolulu's pipeline utility system[52]. Expansion to a more complex petroleum refinery would not be an easy task. A tariff system on foreign crude oil was in place during the 1960's that restricted imports. Allocations were written into federal regulations that were based on historical import demand for pre-existing U.S. refiners. From this standpoint alone, the idea of a new refinery in Hawaii was a non-starter on pure feedstock economics. Standard Oil, now ChevronTexaco, was able to draw upon that allocation to fuel the refinery it had constructed back in 1959 at Campbell Industrial Park. In constructing that plant Standard purchased the Gas Company's entire petroleum infrastructure, along with its asphalt business and signed a ten-year supply contract for feedstocks and butane that enabled the gas company to maintain stable prices without owning a refining facility.

By 1968 high energy prices caused public resentment against Standard, the only physical supplier of gasoline on the Islands. The Legislature, meanwhile discovered that Standard was shipping part of the gasoline produced in Hawaii to the Pacific

[52] The History of PRI – Fifteenth Anniversary booklet.

Northwest, where it was sold at a lower price. Although this set of circumstances did not generate specific government action, the sentiment had been planted that another refinery would be needed in Hawaii for both security of supply, and price competition. Costs of crude oil; however, under the aforementioned tariff system, was still prohibitive. To overcome this obstacle Hawaii's Governor Burns, August 1968, petitioned the U.S. Secretary of Commerce to establish Foreign Trade Zone No. 9 (FTZ) in Oahu. This would exempt any future refinery in the zone from the tariff.

When the FTZ was finally approved, after intensive lobbying by government policy makers and potential private investors, the tariff barrier was finally circumvented. Another element of the newly conceived refinery's start-up economics was the Federal "Small Refiners' Bias Program" that authorized a refinery of less than 29,500 barrels per day of capacity to sell product to the Federal Government at favorable prices. HIRI was engineered to fall within that limit and to qualify for the program. Jet fuel and specialty fuel oil for the military would be the target off-take products. "*Without the military business and a residual fuel market, there was no way to justify a 29,500 barrel per day refinery in Hawaii*."[53]

The initial production profile of the new refinery would be 15% Liquid Petroleum Gas (LPG), 15% Jet Fuel, 10% Diesel, 60% Low Sulfur Fuel Oil. The points in the story that relate to today's gasoline market and the price cap law are:

- The state government of Hawaii has had a direct role in shaping the petroleum industry for nearly a half century.
- Gasoline was originally a secondary product in the overall scheme of things.
- The "USWC plus freight" mentality that is evident in Act 77's price cap formulas has its roots in bygone days.
- Jet Fuel and Fuel Oil have been dominant components of refinery profitability since the two plants were originally constructed.

Today's circumstances are radically different and legislators favoring continued involvement of the State in shaping the future of Hawaii's petroleum industry will have to recognize the historical parallels as well as the new conditions.

[53] Ibid. page 15

4.4.2 Market Liquidity

The term "liquidity", as applied to commodity markets, denotes the relative ease with which buyers and sellers are able to conduct business, resulting in more frequent transactions. A high level of liquidity implies fungible specifications, price transparency, readily available transportation, open access to storage facilities, ease of entry for new competitors, and a lack of significant trade barriers. It denotes the relative convenience of converting a long position (inventory or production) into cash on the sellers' side. On the buyers' side liquidity implies a range of supply options that forces sellers to compete for the business.

Measured against these standards Hawaii exhibits a low level of liquidity in gasoline, while the Hawaii jet fuel market is quite liquid from an international supply perspective. It is instructive to consider both commodities in order to recognize the fundamental difference between them.

The lack of liquidity in local gasoline markets is obviously related to Hawaii being an island economy and the small size of the overall market, but these factors alone do not fully explain the situation. One way to evaluate the relative liquidity of Hawaii's gasoline market is to compare it with other petroleum products on the islands, and to gasoline markets in other regions, as shown in Table 4.5 below. Given the nature of the factors limiting liquidity in the Hawaii gasoline market, there is little that can be done to improve the market.

Table 4.5 – Comparison of Market Liquidity Factors

Product	Common Specs	Price Trans-parancy	Ease of Entry	3rd Party Terminals	Brokers & Traders	Forward Market	Liquidity
Hawaii Gasoline	Yes	Low	Low	Small	None	None	**Poor**
CA Gasoline	No	Fair	Poor	Limited Access	Some	Little	**Fair**
Hawaii Jet Fuel	Yes	Fair	Good	Some	Some	Broad & Deep	**Good**
NY Gasoline	Yes	Good	Excellent	Large	Many	Broad & Deep	**Excellent**
Singapore Gasoline	Yes	Good	Excellent	Large	Many	Broad & Deep	**Excellent**

Liquidity can be a two-edged sword. Large wholesale markets, such as LA or NY Harbor have much more liquidity than Hawaii, but also more price volatility. The more insulated a market is, the less it will be exposed to daily fluctuation in crude and products prices, and the more likely it will be that its average price will be buffered 'above' rather than below the international arbitrage. There is no economic incentive for market participants to protect a low price area. Hawaii might be able to achieve higher levels of market liquidity and transparency in its gasoline markets by adopting certain recommendations suggested in this report, but such measures could introduce more price volatility to the islands. The downside ramifications should also be considered.

4.4.3 Price Reporting

Interviews with stakeholders in Hawaii and with oil price publications that report on the Hawaii market indicate that price information is not transparent. No stakeholders were found who believe that published prices are entirely accurate. At best, reported prices are seen as approximations based on random sampling. At worst, market participants indicated that price reporting can be used to improve bargaining positions. For instance, when dealers report lower than paid DTW prices, they improve their chances of obtaining lower prices from their supplier.

There is no spot market in Hawaii where pipeline shipments change hands in buy/sell transactions. There are no posted independent rack prices, as are common across the rest of the U.S. There are no futures or forward markets. As a result, market analysts including public officials are left only with street prices by which to compare Hawaii to mainland markets.

Furthermore, both DTW and JTW prices[54] are proprietary between suppliers and customers. Refiners are reluctant to discuss pricing issues with industry publications and each segment of the transaction chain is protected by contractual confidentiality; from refiners to dealers and jobbers, as well as the supply agreements between refiners and the other main marketers.

Reference to wholesale market pricing indicators on the mainland does not imply that those larger and more liquid markets are entirely transparent at the downstream level.

[54] Dealer Tank Wagon and Jobber Tank Wagon prices

DTW pricing, particularly with respect to "branded racks" are becoming more elusive to price reporters. Liquidity and transparency at dealer and jobber level can be skewed by various discounts and allowances that can elude media price reporters but allow branded dealers to compete with HVR's (High Volume Retailers) such as Costco, Safeway, etc. Exclusive contractual agreements and additive packages restrict gasoline from changing hands downstream of the wholesale market.

In Hawaii though, there is no liquidity in the wholesale market that might be used as a reference point. With HVR's capturing a rapidly increasing market share, the integrated oil companies have found it necessary to resort to targeted DTW discounts and aggressive zone pricing to keep their branded dealers competitive with the low-priced hyper-marketers.

These comments are only offered for comparison and contrast purposes. They illustrate that petroleum pricing is an inexact science. The wholesale price is a barometer of ever-changing levels of supply costs and market competition. Those economic pressures are quantified and distributed downstream through Jobber and Dealer pricing strategies. Finally, street pricing introduces another level of competition with additional forces at work, such as land costs, brand value, sales promotions, etc. Hawaii lacks the population density to make head-to-head competition with hyper-markets a daily priority for pricing managers in the integrated oil companies. It is more likely that the oil companies will simply cede a certain market share to the volume discounters, such as Costco and Safeway. From a strategic standpoint they recognize that:

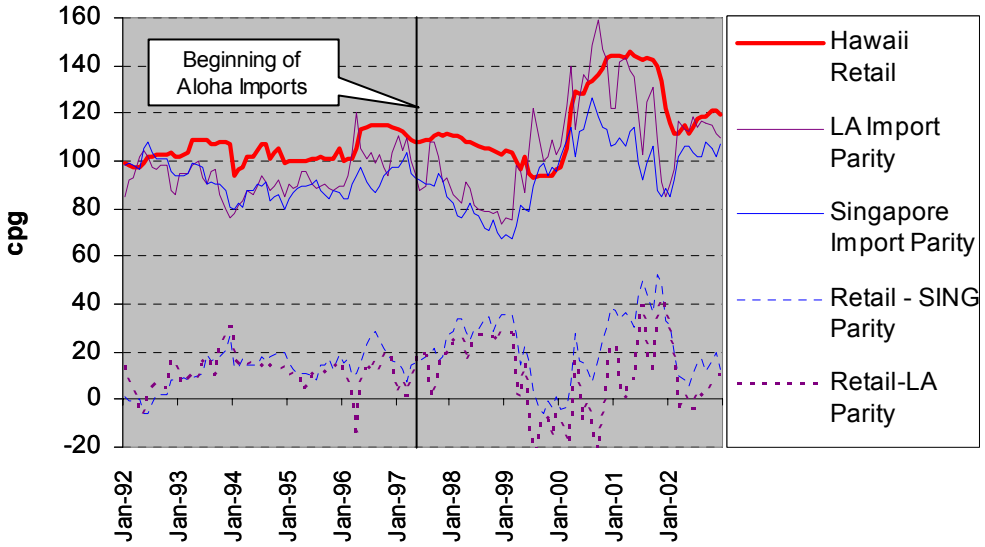
- Gasoline marketing is not the primary business of the hyper-marketers.
- The operating cost structure and the net profit margin objectives of the HVR's are entirely different from those of traditional gas station and convenience store models. Cheap gasoline is merely an enticement for member motorists to get out of their cars and purchase bigger ticket items inside. Income is derived from annual membership fees, rather than on the gasoline margin.
- Oil companies can estimate the saturation point at which the hyper-markets can no longer be absorbed in a given demographic radius and adjust their internal pricing, and retail investment strategies accordingly.

4.4.4 Effect of Market Isolation

With a proliferation of boutique fuels[55] across the United States, the term "island economy" in gasoline has come into vogue among journalists commenting on the trend, and economists studying its market consequences.[56] These so called, "islands" are segregated, in self-imposed isolation, from contiguous markets by unique fuel specifications adopted by local regulators.

The isolation of the Hawaii Islands on the other hand is primarily caused by its remote geographical position in the mid Pacific. Despite that geographical isolation it can be demonstrated, through the efficient operation of its jet fuel market[57] that Hawaii can be more interconnected to external sources of gasoline supply by ship, than Chicago is to Houston by pipeline. Fungible product specifications and adequate water-access storage capacity are components of that connectivity. With this thought in mind, it is useful to consider Hawaii's gasoline prices prior to the opening of an independent products terminal (Aloha/USRP at Barbers Point), to those same relationships after the terminal came on stream.

Figure 4.4 – Pre and Post Independent Terminal Prices in Hawaii



[55] Boutique fuels is the name adopted by Industry journalists to describe special gasoline specifications written into the environmental regulations of various urban areas.

[56] See Environmental Protection Agency Report: www.epa.gov/otaq/regs/fuels/p01004.pdf or Energy Information Administration Report: http://tonto.eia.doe.gov/FTPROOT/service/question8.pdf

[57] Jet fuel is an international commodity. Prices charged by Hawaii refiners are kept in check through the regular importation of cargoes from Singapore and other regions. (See section 3.4.5)

Figure 4.4 shows the Hawaii average retail price for regular gasoline and the hypothetical price Hawaii retail might have seen if it had been importing its gasoline from either California or the Pacific Rim over this time, using constant differentials for shipping (6 cpg), terminalling (2 cpg), and applying the current average distribution cost (5 cpg), marketing cost (13 cpg), and dealer margin (9 cpg). The differentials between the historical Hawaii retail prices and hypothetical import parity is shown as dotted lines in the graph. It can be seen how the differentials range between -20 cpg to +40 cpg. The average value over the period is approximately 18 cpg, which corresponds to the additional margins which the local refiners need to compensate for their higher cost and unfavorable product slate.

In most island markets, when import terminals were opened, prices quickly fell to import parity. Examples include the UK, Australia, and to a certain extent Japan and Korea, where import terminals already existed but where it took deregulation of the market to let importers compete with local producers. In Hawaii the wholesale market (which was never too far from import parity in any case because it had its origins in West Coast exchanges), also dropped quickly to full import parity.

The retail market in Hawaii has not followed the wholesale market. Although retail price behavior has become more volatile, and at times was below import parity, on average it did not follow the wholesale market down. The most likely reason for this market behavior, absent of collusion, is that Hawaii is in principle self-sufficient in terms of gasoline supply, allowing the local refiners to offer the importers supply deals at import parity for their current market requirements.

If the importers had wanted to grow their market share aggressively at the expense of the local refiners, they would have had to make considerable investments in additional stations. In the case of an aggressive pricing war, these investments would unlikely have yielded acceptable returns. So the Nash equilibrium is for the local refiners to concede a little market share and revenue base, but protect their principal source of revenues that keeps their refineries afloat, while the importers increase their market share and profits, while refraining from risky expansion.

4.4.5 Effects of Inventories and Supply Disruptions

In sharp contrast to most gasoline markets in general and California in particular, Hawaii has seen little or no price instability. The reasons for this are largely technical rather than commercial:

- Hawaii's refineries and marketers maintain on average more ample inventories than their mainland counterparts. This has been explained by inventory managers as a precaution given Hawaii's isolated position and long supply routes.

- Hawaii's refineries run below nameplate capacity. Unlike the US as a whole and once again California in particular, Hawaii is usually in a position to make up for lost production with its own capacity rather than additional imports, which means that inventories get rebuilt more quickly after unplanned outages.

- Hawaii has fungible fuel specifications and although isolated, Hawaii is in fact closer to most export sources in the Pacific Rim than California.

- Although both California and Hawaii lack liquidity in forward markets that would allow hedging of import trades, Hawaii's stable and high prices offer less financial risk to importers than California's volatile market, which means that import decisions can be taken sooner, at smaller price differentials.

All in all, there is no indication whatsoever that Hawaii's high prices are related to or in part caused by supply disruptions.

5 IDENTIFICATION OF SUPPLY BARRIERS

The obvious fact that Hawaii consist of isolated islands in the middle of the Pacific Ocean is often cited as the beginning and the end of all explanations regarding its high gasoline prices. But it bears to be repeated that the size of the total gasoline market in Hawaii is only 27,000 BPD. A typical cargo size for a products tanker is about 300,000 bbl, sufficient to supply all of Hawaii for 11 days, and 3 ships per month would be sufficient to supply the market in full import mode. The terminal capacity is available to handle such volumes, and Hawaii prices are above import parity for prolonged periods at stable levels that would pose little price risk for importers. Obviously, some barriers must stand in the way of imports.

Barriers to supply indeed often are the cause of higher prices in isolated markets than allowed by the natural arbitrage, the pricing differential that would allow goods from one market to be shipped profitably to another market. When compared to many other markets that are isolated either geographically, commercially (i.e., through import tariffs), or lack of product fungibility (unique fuel specifications), Hawaii – although geographically isolated, does not have significant supply barriers. The barriers that were found to exist are explained below.

5.1 Lack of Volume in Imports

Because Hawaii is in principle self-sufficient in gasoline an occasional import cargo would have to bear the full cost of maintaining an import infrastructure (bulk terminal with deep water access). If used routinely, i.e., the monthly throughput equals the tank volume (which in industry parlance is referred to as one “tank turn” per month), the terminal fee in general can be as low as 1 cpg.

The required tankage is determined by cargo size (300,000 bbl) plus some spare capacity needed for scheduling flexibility and supply security. The Aloha/USRP terminal was expanded to 500,000 bbl for that purpose. This terminal could easily supply up to 60% of Hawaii’s gasoline demand, and with careful scheduling, possibly the entire market. However, if only used for the requirements of one importer, i.e., 4,000 BPD, then the terminal would see only five shipments per year, and costs would be 4 to 5 cpg.

However, because there is no real need for imports, to the contrary when gasoline is imported the local refiners have to re-export their production at a cost, or throttle back the whole refinery, supply agreements were done between the local refiners and the non-refining marketers at or close to import parity pricing. In a sense, these supply agreements can be referred to as “virtual imports”. Because of the credible threat of imports, the non-refining marketers have the leverage to achieve import parity pricing without actually bringing in cargoes. These “virtual

imports" do not come without a cost. Regardless of actual imports, the non-refining marketers who own the import terminal do incur a higher cost than other marketers.

Interestingly, even before the non-marketers had actual import capability, the wholesale price level for term contracts between refiners and non-refining marketers were never too far above import parity. Until the late nineties, most of these contracts were structured as exchange agreements, whereby the Hawaii refiners were compensated for their local supplies to non-refiners in equal quantities of gasoline made available to them on the US West Coast, plus a freight compensation of 4 to 5 cpg. In the early nineties, the US West Coast was still a competitive exporter.

In summary, the fact that the Hawaii market is balanced in terms of internal supply and does not need imports has not prevented inter supplier deals to be done at close to import parity because the credible threat of imports is sufficient leverage to obtain local supplies at prices that make them "virtual imports".

5.2 Lack of Import Infrastructure

As outlined above, the available import terminal is more than capable of handling a significant part of Hawaii's total gasoline requirements and as such there is no lack of import infrastructure. Hawaii's inter-island infrastructure however has several bottlenecks, notably in Maui and in Kawaihae. In all islands, port priorities for general cargo and passenger vessels over petroleum barges at shared docks, and lack of tankage and dock lines are a cause for concern.

5.3 Lack of Market Liquidity

The lack of market liquidity is discussed in 4.4.2 above. It is reintroduced here as one of the supply barriers common to most constricted markets. The existence of forward markets and access to price hedging instruments are elements of liquidity that do not exist at all in Hawaii. However, because Hawaii does not have unique gasoline specifications, it is possible to hedge cargoes of gasoline for Hawaii against standard reformulated gasoline on the NYMEX.

The lack of physical liquidity, in particular the absence of a spot market, is however a barrier to supply. Contrary to for instance New York or Los Angeles, a trader cannot just bring in a cargo to Hawaii and sell it into a daily spot market as pricing allows. Imports can only be absorbed by those invested in the local market, and in control of captive retail outlets.

5.4 Lack of Market Access

As described above, physical infrastructure now exists on Oahu to enable access by gasoline importers, although such access must pass through the hands of proprietary asset owners. But downstream from the wholesale price, at Jobber and Dealer level, a network of exclusive supply contracts reduces the liquidity of that wholesale supply. For example, if an offshore supplier where to lease space in a Hawaii marine terminal and import gasoline at twenty cents per gallon below the prevailing market, few if any Jobbers or Dealers would be free to take advantage of that availability on a spot basis. This problem is addressed in more detail in Section 8.5 below.

6 PRICE CONTROLS

Below, an analysis is provided of Hawaii's current pricing structure and the likely impact that the price caps legislated with Act 77 will have on future pricing. Equally important is to analyze how other price control initiatives legislated in other markets have impacted pricing in the past.

6.1 Analysis of Prices and Impact of Price Caps

Act 77 establishes maximum wholesale and retail prices beginning July 1, 2004, when price restrictions will apply to self-serve regular only. The initial adjustment factors are subject to annual review.

The formula for the pre-tax wholesale price cap for Oahu is:

> Oahu Baseline = Simple average of OPIS Daily spots (5-days in prior week) for LA, SF, and PNW + 4 cpg location adjustment + 18 cpg marketing margin factor

The formula for the Neighbor Islands (NI) wholesale price caps is:

> NI Baseline = Oahu baseline + 4 cpg NI location adjustment + 4 cpg NI marketing margin factor

The formula for pre-tax retail price is:

> Island pre-tax wholesale baseline + 16 cpg retail marketing margin (In practice this means that the retail margin is applicable statewide without adjustment factors at the retail level).

The final pump price is determined by adding in all applicable taxes (Gross Excise Taxes, Federal and State Excise, Island fuel taxes):

- G.E.T. 4.5% (4% at the consumer, 0.5% at wholesale)
- Federal excise 18.4 cpg
- State excise 16 cpg
- Fuel taxes (Oahu 16.5 cpg, Maui 13.0 cpg, Kauai 13.0 cpg, Hawaii 8.8 cpg)
- Environmental response tax 0.119 cpg

The price caps as specified in Act 77 have a number of potential problems:

- The caps will impart more volatility to gasoline prices than is currently seen in Hawaii. The linkage to California spot prices could impart large price swings as a result of California refinery disruptions.
- The caps only cover regular self serve gasoline.
- The caps may encourage dealers to lower their prices slowly when caps are not binding in order to capture some of the loss they experienced when the price caps were binding.
- The caps will impart California's seasonal price pattern to the non-seasonal Hawaii prices.
- The caps may cause potential shortages when caps are binding at levels below production costs.

Each of these factors will be analyzed in more detail below.

6.1.1 Characteristics of Hawaii Gasoline Prices

Table 6.1 below shows how Hawaii prices compare to those in other key markets.

Table 6.1 – Retail Gasoline Prices for Selected Cities, 1997 - 2002

$/gallon	Los Angeles	San Francisco	Anchorage	Seattle	Salt Lake City	Honolulu	Hilo	Wailuku, Maui
Average	1.47	1.70	1.41	1.46	1.31	1.69	1.82	1.91
Standard Deviation	0.24	0.25	0.19	0.20	0.17	0.17	0.17	0.20
Std. Dev/Mean (Volatility)	16%	15%	13%	14%	13%	10%	9%	10%
Range (High-Low)	1.06	1.00	0.71	0.72	0.76	0.58	0.63	0.66

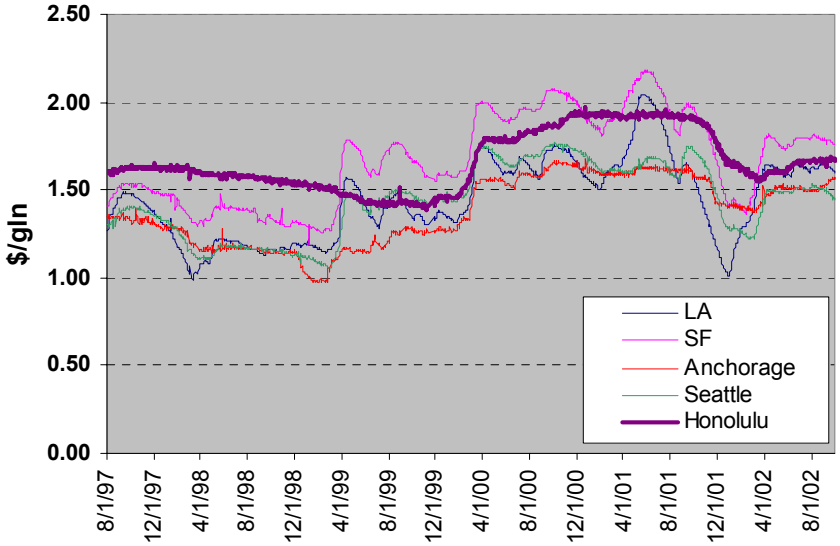
From Table 6.1, it will be clear that retail gasoline prices in Hawaii are higher on average than typical mainland cities, with average regular gasoline prices ranging from $1.31 for Salt Lake City to a high of $1.70 for San Francisco while ranging from $1.69

to $1.91 for typical Hawaii locations. As explained in Section 4.2.6, the reasons for these price differentials are:

- Higher taxes (excise and sales taxes)
- Higher cost of living
- Higher cost of doing business
- Exercise of market power
- Higher intrinsic cost refining operations
- Higher internal distribution cost

Prices are less variable and volatile in Hawaii than in most markets. The range (difference between the high and low for the period) of mainland prices was about $0.75 for non-California cities, $1.00 for California and about $0.60 for Hawaii.

Figure 6.1 – Retail Regular Gasoline for Five Cities[58]



A useful measure of volatility is the ratio of standard deviation of prices to the mean, which shows that Hawaii has lower volatility than the comparison cities. California cities show 50% more volatility than cities in Hawaii. Honolulu gasoline prices have the lowest correlation between any pairs of cities.

[58] Source of Data: OPIS

Table 6.2 below shows the coefficient of correlation between the gasoline retail prices in the same cities. It will be clear that while Los Angeles and San Francisco are strongly related, there is only a weak relationship between the current Hawaii prices and those in other West Coast markets.

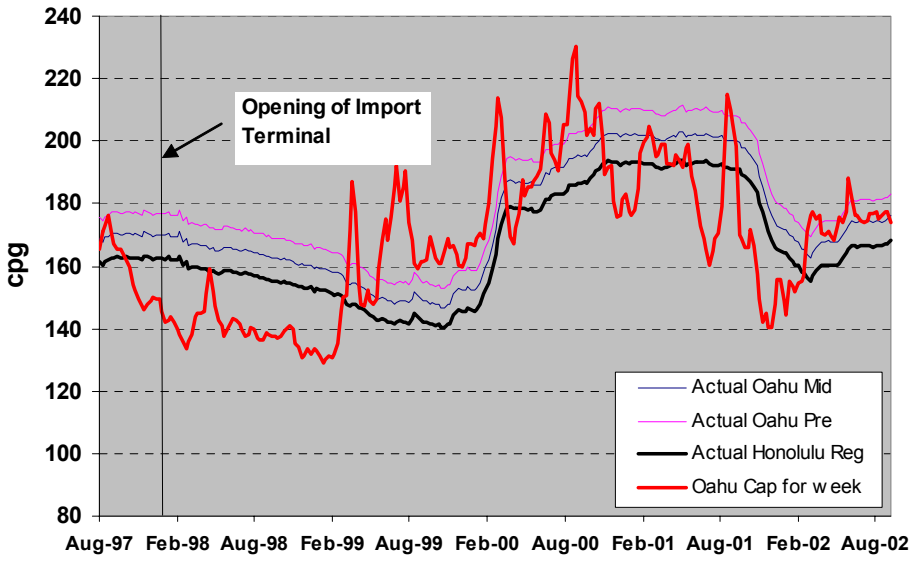
Table 6.2 – Correlation between Retail Prices in Selected Cities

	LA	*SF*	*ANK*	*SEA*	*HONO*
LA	**1**				
SF	**0.92**	**1**			
ANK	**0.79**	**0.87**	**1**		
SEA	**0.83**	**0.96**	**0.88**	**1**	
HONO	**0.63**	**0.74**	**0.85**	**0.72**	**1**

6.1.2 Comparison of Historical Prices with Proposed Price Caps

Using the price cap methodology laid out in Act 77, one can observe the impact on retail prices had price caps been employed historically.[59]

Figure 6.2 – Honolulu Retail Gasoline versus price Caps



[59] The Lundberg Survey analyzed Honolulu prices versus the proposed Cap in their May 29, 2002 newsletter, "Fantasy Island" Hawaii to "Fix" Gasoline Prices." Their methodology, however, used Lundberg data where this analysis uses OPIS data and averages daily data according to the methodology specified. The conclusions are similar.

Figure 6.2 shows a comparison of Honolulu actual retail gasoline prices over the period 1997 through current, with what the maximum allowable prices would have been had the price caps been in place, with the same for the Hilo and Maui markets in the graphs below.

Figure 6.3 – Maui Retail versus Price Cap

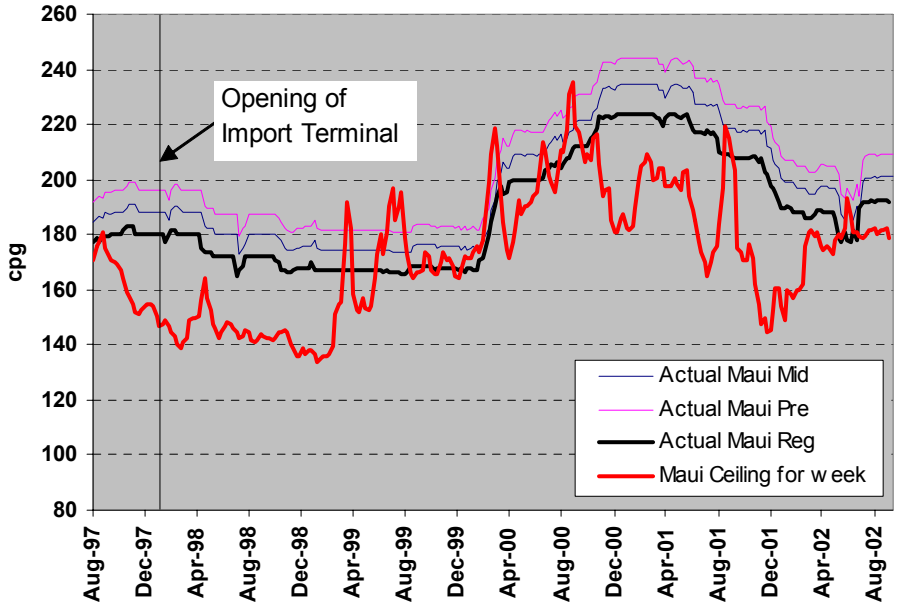
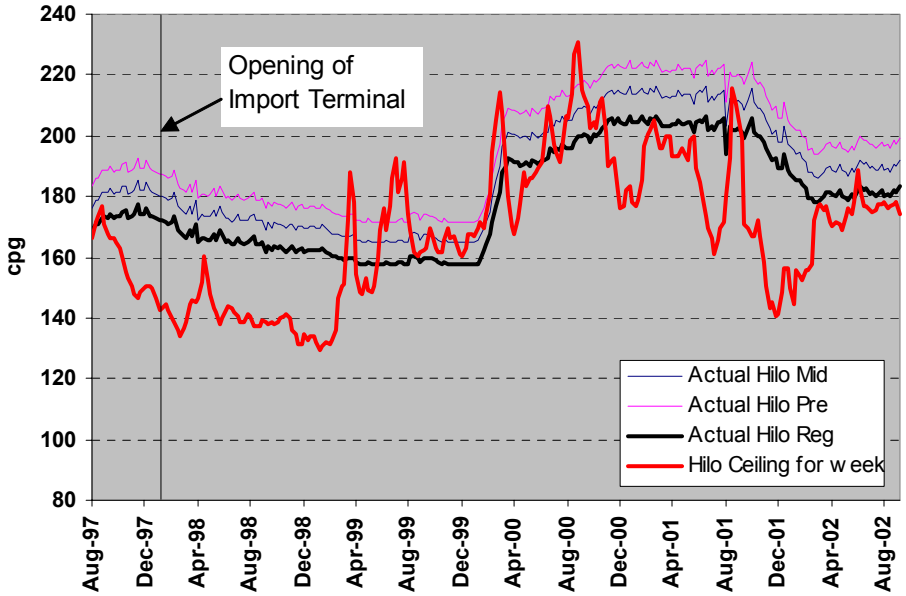


Figure 6.4 – Hilo Retail Gasoline Prices versus Price Cap



For the same period as shown graphically above, Table 6.3 below summarizes the percentage of time that prices would have been above or below the historical prices if the price cap formula had applied from 1998 to 2002.

Table 6.3 – Retail Prices versus Price Caps

	Percent of Time Actual Price Exceeds Calculated Caps (Price Caps are binding)
Honolulu	33%
Hilo	67%
Maui	76%

The percentage of time that the price caps are below the historical prices varies from 33% in Honolulu to 76% in the Neighbor Islands. This has certain implications:

- The calculated location differential is likely to be insufficient to allow for current market differentials (for instance, the 4 cpg location factor + 4 cpg marketing allowance do not cover the average 11 cpg freight plus true marketing cost).

- The opportunity for "gaming" is high. Whenever the price cap is not binding, that is, higher than the actual price would be in the absence of the cap, some retailers will take the opportunity to move prices closer to the cap. When the cap is binding for a while, retailers might be reluctant to pass cost decreases on for fear they will not capture cost increases later on.

6.1.3 Economic Impact of Price Caps

The net economic benefit from price caps can be calculated as the consumer benefit minus the producer benefit, minus the cost of monitoring prices and managing the price controls. A first approach to determine the order of magnitude of the societal benefit is to just look at the difference in gasoline bill to the Hawaii consumers.

Table 6.4 shows the price effects on consumers that would have resulted theoretically if the Act 77 price caps would have been in place since 1998, when the Aloha terminal was opened. On the left hand side, it is assumed that when the caps were not in force, i.e., when the market was below the cap, the market would fall to the same lows even if caps had previously curtailed profit taking. The numbers on the right hand side assume that after suppliers had to limit pricing under caps, they would continue to price at the

cap even when supply and demand would otherwise have dictated a lower price. The latter is the more likely scenario based on information gathered during Stakeholder meetings and experiences in other markets with price caps.

Table 6.4 – Annual Consumer Gasoline Price Change 1998 – 2002

Island	Reduction to Consumers Caps + Actual Lows $ MM/year	%	Reduction to Consumers Caps + Recovery $ MM/year	%
Oahu	10.7	2.3	-8.0	-1.7
Hawaii	6.5	5.5	2.7	2.3
Maui	7.1	7.6	4.1	4.4
Other	0.7	2.6	0.3	1.1
State Total	25.0	3.6	-0.9	-0.1

Minus sign means higher prices. Note that Oahu pays more in the second case

6.1.4 Impact of Ties to California Market

California gasoline markets have been highly volatile since the introduction of CARB Phase II gasoline in 1996. Since then, California has experienced a large number of refinery disruptions which have caused spot prices to fluctuate widely. Other more recent events such as the ban on MTBE will likely maintain this volatility. A recent report to the California Energy Commission cataloged these disruptions and illustrated the impact on gasoline prices.[60]

In California, refinery disruptions with measurable impact and duration occurred roughly monthly over the five-year period, 1996 – 2000. The disruptions averaged 21 TBD and lasted 2.7 weeks on average. Each bar in Figure 6.5 represents disruptions on a weekly basis. For example if a disruption is 20 TBD over two weeks, it would appear as two side-by-side bars of 20 TBD each. If a disruption of 20 TBD in one refinery occurs during the same week as a 30 TBD disruption in another refinery, it would be shown as a bar of 50 TBD. Notice the concentration of disruptions in spring 1999 and to a lesser extent in late 2000.

[60] Anthony Finizza, *Economic Benefits of Mitigating Refinery Disruptions*, AJF Consulting, July 4, 2002. (www.energy.ca.gov)

Figure 6.5 – Refinery Disruptions in California

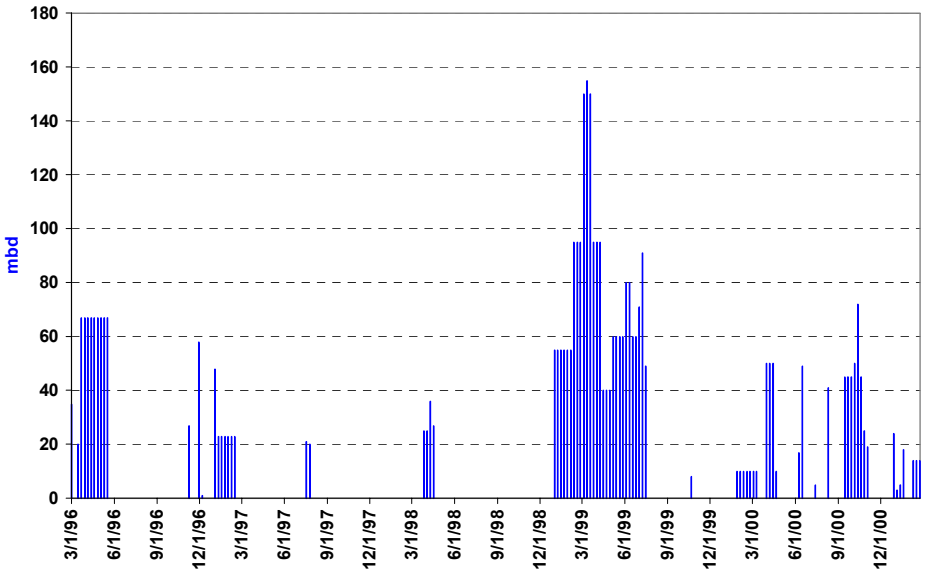


Figure 6.6 – Number of California Refineries Experiencing Disruptions

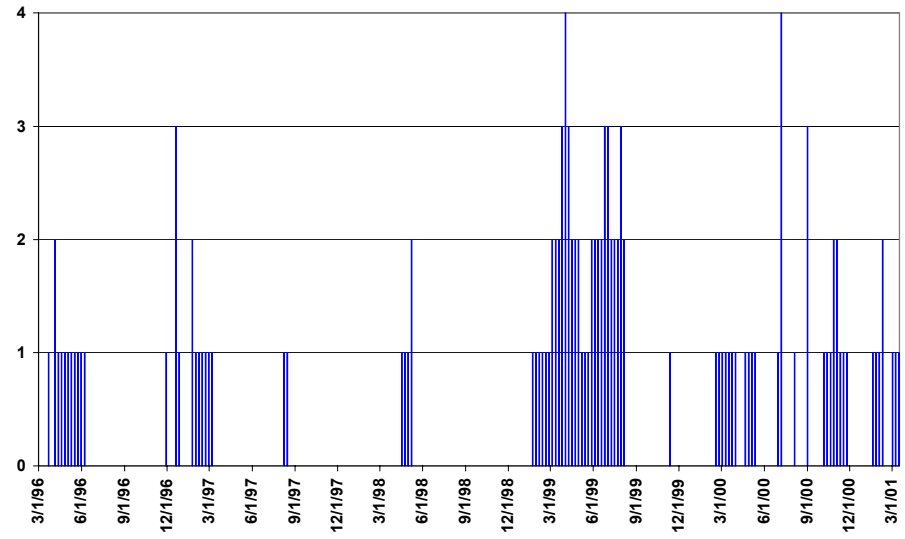


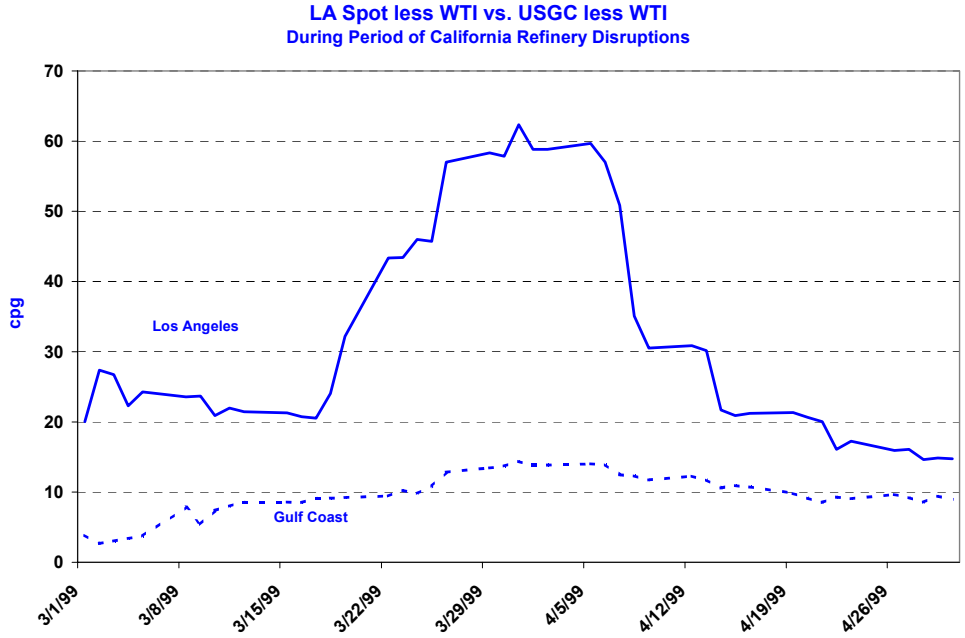
Table 6.5 – Summary Statistics of California Refinery Disruptions

	Average	Median	Standard Deviation	Range
Size of Disruption (TBD)	21	19	15	1 – 67
Duration (weeks)	2.7	1.0	3.9	1 – 11
Interval between Disruptions (days)	38	7	64	0 - 259

California refineries experienced eight disruptions in 1996 after the introduction of CARB Phase II gasoline. The frequency of occurrence abated in 1997 and 1998, falling by 60% over the 1996 rate. The frequency of disruptions intensified in 1999 and 2000 before falling again in 2001. The 1999 episodes were particularly painful due to the duration of an average disruption (5.7 weeks) more than twice the average (2.7 weeks) over the sample period.

Another feature of refinery disruptions is that they can occur simultaneously. During the 263-week sample, disruptions occurred at four refineries at the same time twice, three refineries at the same time seven times, and there were 221 weeks where there were two refinery outages simultaneously. As Figure 6.7 illustrates, once a disruption occurs the spot price rises substantially. It is not transmitted to any regions that are not linked to California.

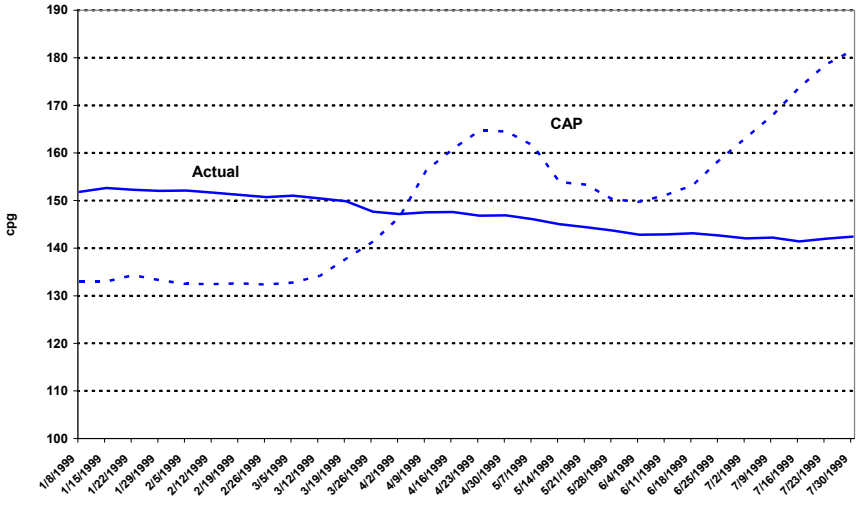
Figure 6.7 – Typical Spot Price Spike during a Refinery Disruption



Since the basis for price caps in Hawaii is spot gasoline prices in Los Angeles, San Francisco, and the Pacific Northwest, and since prices in San Francisco and Los Angeles track closely, even if only one of the two refining centers is affected by the outage, a disruption in California immediately impacts California spot prices and with a week lag, Hawaii price caps would increase to levels well above those that would have been expected based on local supply and demand.

The hypothetical price cap for the first half of 1999, the most volatile period in California prices is depicted in Figure 6.8. It is clear to see that under the price cap formula of Act 77, Hawaii's consumers would be directly exposed to refinery disruptions in California.

Figure 6.8 – Honolulu Actual vs. Cap during CA Refinery Outage



6.1.5 *Seasonality Effects*

One of the features of Hawaii gasoline prices is that they do not exhibit seasonal swings as does Los Angeles.

Figure 6.9 – Seasonality Hawaii Retail Gasoline Price ex-Tax

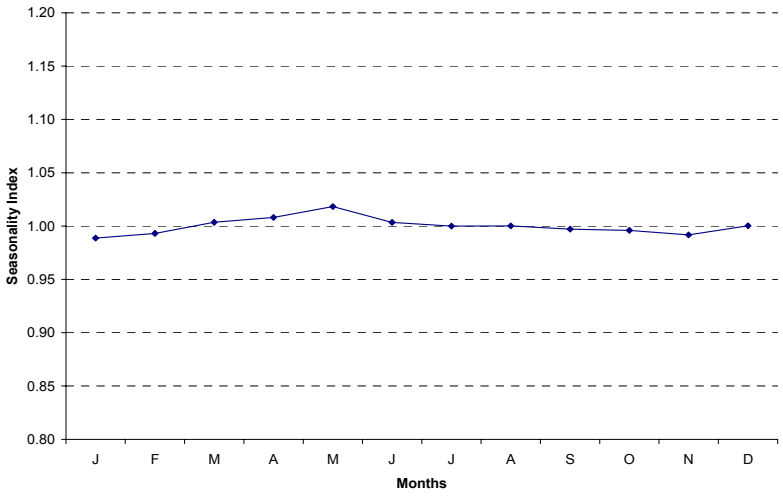
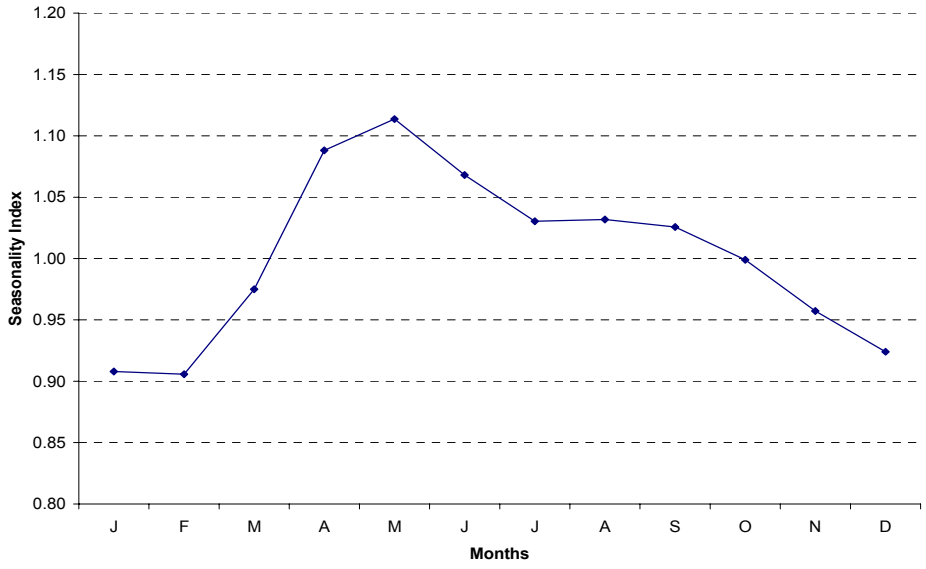


Figure 6.9 and Figure 6.10 show the derived seasonal adjustment factors[61] for gasoline prices in Hawaii and California. The seasonal factors are close to 1.0 in Hawaii throughout the year. In contrast, California prices in California are statistically higher in the summer months, the "driving season", than throughout the rest of the year. In essence, use of the price cap rule will impose California's gasoline price seasonality on the Hawaii gasoline market, if it is assumed that prices will track closely to the caps.

The seasonality of the California market is not just driven by demand, with greater demand in the summer season, but the seasonality also has a supply component. The State has two blending seasons for gasoline, a high RVP winter season which lasts 3 – 4 months for southern and northern California respectively, and low RVP summer season required for the rest of the year. The lower RVP specification required during the summer blending season makes this gasoline more costly to produce and reduces supply. This is an issue which will be aggravated by the phase out of MTBE and the introduction of ethanol.

Figure 6.10 – Seasonality California Retail Gasoline ex-Tax



[61] The seasonal factors were derived by the Ratio-to-Moving Average method (multiplicative) using monthly data over a 5 year period. A seasonal factor greater than 1.0 indicates that the price is stronger than average in that month; a number below 1.0 indicates the opposite. The author can provide an Excel template for the interested reader.

6.2 Analysis of Other Price Control Initiatives

There have been a number of attempts at price controls in fuels markets in the United States and other countries. Below, an analysis is provided of the experience gained from these attempts, and their relevance for the legislation enacted for Hawaii.

6.2.1 Theoretical Arguments for Price Controls

The few economists who have prescribed price controls generally posit a set of industry characteristics under which price controls may prove potentially effective. In an article written after the price control experience in the United States, D. Quinn Mills[62] developed a schematic that illustrates possible conditions that might suggest the use of price controls. He identified four principles of price controls:

1. Prices of products cannot be set and maintained by decree against the pressure of supply and demand in product markets. He notes, as do many commentators on economic history, that price controls often breed substitutes for price changes, such as black market sales, bartering, gaming, redefinition of products, loss of quality, and reduction in output.

2. Price levels set by a price control program must be agreed upon with the producers. This is because producers have the means to alter their product slate and undertake other unintended consequences.

3. Price control authorities must take care to adjust the prices of output. In the case of gasoline, this implies actions to adjust prices for other gasoline grades and co-products of production.

4. The regulation of price must be made to fit market conditions or structure. Controls cannot get far away from the unencumbered market solution.

Against the backdrop of these principles, Mills concludes that there are some conditions under which government intervention to stabilize prices in the short run could contribute to some extent to stability. The four conditions are:

1. The industry behaves like an oligopoly.

[62] D. Quinn Mills, "Some lessons of price controls in 1971-1973, *Bell Journal of Economics,* pp. 3-49.

2. Demand is highly inelastic.

3. Supply is highly inelastic.

4. The industry has profits in excess of what is required to attract capital for capacity expansion.

Of these conditions, the Hawaii gasoline market meets all but the fourth.

6.2.2 Nationwide Petroleum Price Controls, 1971-1981

Price controls on petroleum products began in the US on August 15, 1971, when President Nixon imposed general economy-wide wage and price controls. Price controls were removed in 1973, except on petroleum products. They remained until President Reagan lifted them on January 20, 1981. President Carter had lifted controls in 1979 in a phased-in manner, but the removal was not complete until Reagan's release immediately upon taking office.

Controls on petroleum and products had been extended beyond 1973 as the country panicked over the rapid rise in imported oil prices as a result of shocks in the Middle East. When price controls were binding during specific disruptions in the aftermath, dealers could not raise their prices in line with their increased costs. In a competitive market, as was the case for gasoline then, the imposition of a price ceiling interferes with the price rationing mechanism. If the price cap is binding as was during the seventies, the price required to equilibrate supply and demand was above the cap, causing non-price rationing.

Consequently, drivers bought gasoline on a first-come first-served basis and had to endure long lines. Many of us still have the images of long gasoline lines that led many states to adopt "odd-even" days to allocate gasoline buyers on the basis of the last digit of their license plate numbers. In his widely-accepted and quoted analysis of energy disruptions, Philip Verleger[63] concluded that consumers did not receive any long-term benefits from price controls. While it is difficult to quantify the actual cost of these price controls, economists are lined up on the side of this episode being an economic loss.

[63] Dr Phillip Verleger,. *Oil Markets in Turmoil*, Ballinger Publishing, 1982.

6.2.3 Australian Experience

The Australian public rejected a Commonwealth control over retail gasoline prices in a referendum in 1973. The country, however, did have controls on wholesale prices that were abandoned on August 1, 1998, as part of the nationwide move toward deregulation of industry. There was a general view that the wholesale price caps had become "targets" rather than ceilings.

The Australian Competition and Consumer Commission (ACCC) is charged by the Federal Government with investigating anti-competitive behavior in local markets. The ACCC used an Import Parity Indicator (IPI) prior to deregulation to determine maximum wholesale prices. The IPI consisted of three components:

- **Import Parity Component.** The 7-day rolling average of Singapore Motor Gasoline 95 RON Unleaded + Freight + Wharfage + Insurance + Exchange Rate Correction
- **Local Component.** Downstream Terminal Fee + Marketing Costs + Distribution Costs + return on Assets in Sector.
- **Applicable Taxes.** Excise Taxes + Goods & Services Tax (GST) - State Subsidies.

There was no correction for different fuel specifications in the benchmark. The ACCC had not been in favor of price caps because of the risk of setting inappropriate levels for the price caps. They expressed concern that a cap set too high may result in discriminatory prices, while a cap set to low might inhibit investment.

The ACCC currently monitors gasoline, diesel, and other motor fuels across the country. They maintain an extensive website (www.accc.gov.au) to disseminate information to the public. There current aim is to increase the public's awareness of price cycles. The government asked ACCC in early 2001 to examine price caps on retail prices. After a wide consultation with the industry, consultants, and stakeholders, the ACCC rejected price controls and recommended[64] that:

[64] "Reducing Fuel Price Variability," Australian Competition and Consumer Commission, December 2001.

- There should be an initiative to increase consumer understanding of price cycles and how to purchase gasoline more cheaply. This is done primarily through the website cited above.

- Options such as once a day pricing or capping the daily increase should NOT be implemented.

- The Terminal Gate Pricing arrangements in Western Australia and Victoria should be monitored (see next section).

- The Government should get more involved with industry to discuss reform.

The ACCC evaluated a Terminal Gate Pricing (TGP) system as one of the price cap options available to it. The TGP is calculated similarly as the IPI, using as the landed cost of product (Import parity) the 7-day rolling average of Singapore Platt's Motor Gasoline 95 RON Unleaded + Exchange rate adjustment + Transportation to the terminal plus return on terminal assets + Excise and GST (Goods and Services Tax).

The options ranged from simply publishing the TGP to requiring that refiner must offer the price to all comers and not discount below this price. In an extensive consulting report commissioned by the ACCC, Frontier Economics[65] concluded that TGP would be unlikely to limit price cycles and would likely result in higher average retail prices.

Table 6.6 – Below Import Parity Indicator Before and After Deregulation[66]

	Period Before Deregulation January-June 1998 % Days below IPI	Period After Deregulation January-June 2001 % Days below IPI
Sydney	37%	82%
Melbourne	88%	76%
Brisbane	55%	90%
Adelaide	50%	82%
Perth	24%	90%

[65] "Economic Implications of Terminal Gate Pricing," report to the Australian Competition and Consumer Commission, Frontier Economics, October 2001.

[66] Source: *ACCC, Reducing Fuel Price Vulnerability*.

As shown in Table 6.6 above, it is interesting to note that prices in major Australian cities were more often below the IPI after deregulation than before deregulation, with Melbourne being the only exception. This shows that on average, prices were more often below import parity after deregulation, and infers that transparency and watchdog schemes can be as effective if not more so than price caps.

6.2.4 Western Australia Experience

The state of Western Australia instituted Terminal Gate Pricing (TGP) arrangements in April 2001, revised it in August 2001, and after finding a major flaw in the scheme, revised it again at the end of 2002 in order to improve the transparency of three grades of gasoline and diesel prices. This scheme replaces the Maximum Wholesale Price scheme described in the section above. Their TGP is based on a formula similar to the one above, with an additional feature to correct for different fuel specifications and any other costs approved by the Prices Commissioner.

The wholesale supplier can add cost such as delivery, branding, credit, etc ("post terminal gate services") on top of the TGP as long as they are itemized on invoices. The state publishes the TGPs on a website (www.fuelwatch.wa.gov.au) for retailers and distributors to use. The website also has information on the best possible retail price by cities in the state for consumers to access. Each terminal must post the TGP, last month's average price, and the current spot price.

The TGP will be the maximum price for product sold on the spot market, and is the price at which suppliers must supply under certain conditions. In addition, retail prices are only allowed to change once in 24 hours. Since this system is new, it not yet possible to assess its success or failure. The Frontier Economics report cited earlier, however, predicted that this form of TGP would:

"… likely compress the range of wholesale prices. It will most likely increase wholesale prices in areas where short-term price fluctuations are more prevalent."

A similar prediction was made for retail prices. Indeed, in the early period the TGP did not appear to be working as intended. Apparently the TGP was set too low initially (5-7 cpl) so that suppliers did not wish to sell fuel at the price. After the August 2001 revision, it appears that the TGP may have been set too high so that retailers and wholesalers refused to buy at that price. The experience since the end of 2002 is unknown at this time. The prohibition of having more than one price change in a 24

hour period also allowed the seller to choose that price or the prior day's price. This loophole was ultimately closed.

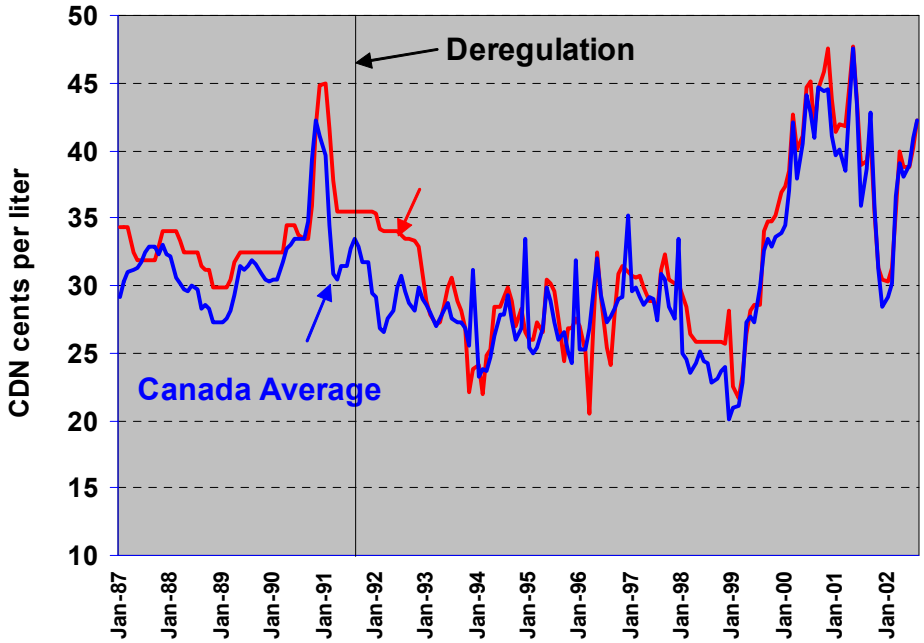
The State of Victoria instituted similar price arrangements as Western Australia in 2001 after the nationwide wholesale price controls were dropped.

6.2.5 *Nova Scotia Gasoline Price Controls*

Nova Scotia had price controls under their Gasoline Fuel and Licensing Act until July 1991 at which time prices were decontrolled. Not much is written on their experience. The Ervin Report[67] claims that retail pump prices were historically higher than neighboring provinces and that after deregulation, pump prices fell to reflect market conditions.

Figure 6.11 seems to confirm this, although the availability of data available for the period prior to deregulation was limited to only four years. It certainly is clear that within one year after deregulation, Halifax prices came fully in line with gasoline prices in Canada as a whole.

Figure 6.11 – Nova Scotia Prices Pre and Post Deregulation



6.2.6 Quebec Experience

Since November 1997, the *Régie de l'Énergie,* a Public Corporation for the Regulation of Energy, has set the minimum retail gasoline prices in the province of Quebec, Canada. The Régie has a quasi-judicial role to ensure the energy needs of Quebec consumers. The minimum price was established to "protect the dealers and preserve competition." An often cited statistic is that the number of gas stations fell 31% from 1981 to 1997. In addition to establishing the minimum pump price, the Régie publishes in written form and on its website, comprehensive information on average pump prices, and the volatility in retail prices throughout the province.

The minimum price is calculated as the Montreal Rack price (Bloomberg Oil Buyer's guide) + Federal excise tax (currently 10 cpl) + Provincial gasoline tax (currently 10.55 cpl) + Transportation cost (varies by 126 cities in the 17 provincial administrative regions) + Additional operating cost allowance (1.5 cpl for 43 cities, 0 for the rest) + Federal sales tax (currently 7%) + Provincial sales tax (currently 7.5%).

The average pump price and the minimum pump price ran about 6 cpl higher than the minimum pump price during 2000-02.

6.2.7 Prince Edward Island – Canada

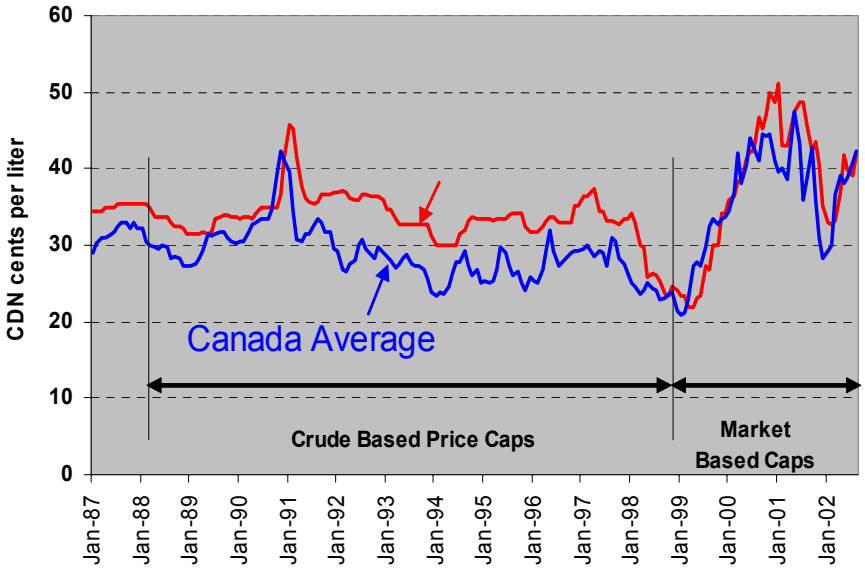
In a reaction to perceived price gouging, Prince Edward Island (PEI) established price controls in 1988 to ensure a "just and reasonable price" for motor fuel and heating oil. Prices are currently regulated by the Island Regulatory and Appeals Commission, an independent commission that combines the traditional Public Utilities Commission, Land Use Commission, and the Office of the Director of Residential Rental Property. The Commission reports to the Legislature through the Minister of Education. The eight-person (three full-time) Commission hears appeals on land use, property tax, sales tax, and land ownership issues in addition to regulating electric utilities and the petroleum industry.

The Commission's pricing system for petroleum products was originally developed using crude oil as a benchmark. Recently, in early 2002, they recognized that PEI was served by products for which prices are based on the New York Harbor market. The

[67] M.J Ervin and Associates, Canadian Retail Petroleum Markets Study, 1997.

enabling legislation and regulation established the principle of a minimum as well as maximum price to ensure that wholesalers were not squeezed out of the market.

Figure 6.12 – Prince Edward Isl. vs. Canada Average ex-Tax Pump Prices



The current price calculation for gasoline in Prince Edward Island is the following:

- Each brand had a historical pump price. This is changed monthly by the "indicated" change in gasoline prices in New York Harbor, corrected for exchange rates, and converted to a liter basis. The small differences are striking.

Table 6.7 – Approved Prince Edward Island Pump Prices, Jan 2003

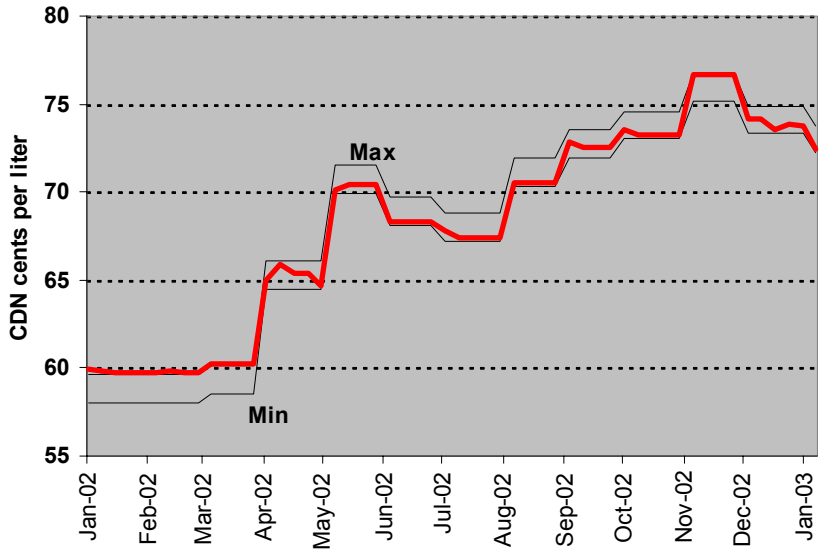
Brand	Minimum Pump Price Canadian cent/gallon	Maximum Pump Price Canadian cent/gallon
Ultramar	72.4	74.0
Shell Canada	72.1	73.7
Imperial Oil	72.4	74.0
Irving Oil	72.2	73.8
Petro-Canada	72.1	73.7
Wilson Fuels	72.0	73.6
Average	**72.2**	**73.8**

- The new pump price allows a retail margin between 4.0 and 5.5 cents per liter for self serve and 5.0 to 6.5 cents per liter for full serve. Dealers may price anywhere within the ranges provided that allowable dealer markups are consistently applied to all grades of gasoline. For split-serve outlets, self serve prices are at least one cent per liter below full-serve prices.

- The Commission issues a Petroleum Price Notice every month. A wholesaler or wholesaler-retailer can request a change in price by filing an application with the Commission.

The Ervin Report noted that in the 1992 to 1995 period, Prince Edward Island – the only regulated market in Canada at the time – consistently experienced higher ex-tax pump prices than in neighboring provinces and Canada as a whole. Figure 6.12 compares the ex-tax pump price in Charlottetown versus the Canada average. From 1987 through mid-1999, Charlottetown prices were well above the national average. Since mid-1999, the differences have narrowed, in part due to the change in the pricing formula from a crude pricing basis to the current NY harbor gasoline price basis. It is clear from Figure 6.12 that the introduction of market based caps has lowered pump prices in Charlottetown.

Figure 6.13 – Prince Edward Island Gasoline Prices



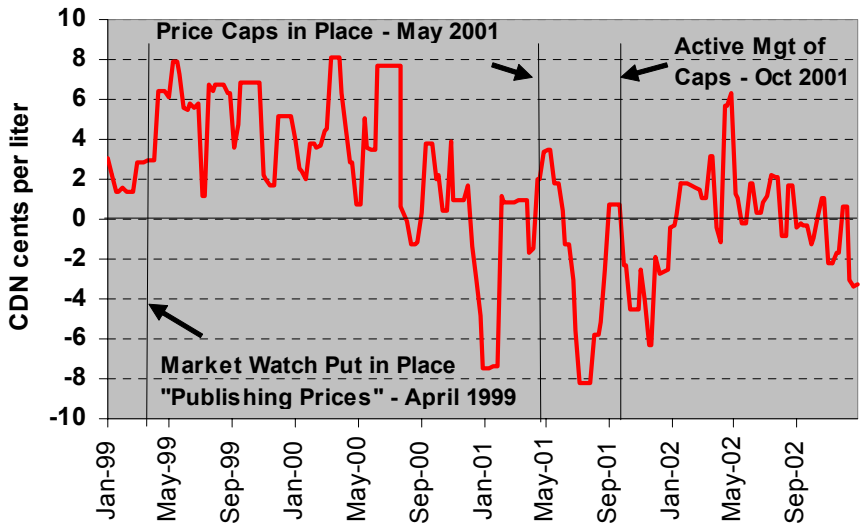
As shown in Figure 6.13, actual pump prices bounce between the narrow range of minimum and maximum price caps, which are frequently binding. In the absence of a minimum, it is likely that prices would actually have been lower for more than 50% of the time (based on the percentage of time that prices were at the lower limit).

6.2.8 Newfoundland and Labrador

The Canadian province of Newfoundland[68] instituted price controls on petroleum products in May 2001 in response to complaints of unnecessary price volatility and unexplained variation in prices across the province. The local dissatisfaction with gasoline price behavior dates back to the mid-nineties when an organization, NAGG (Newfoundlanders Against Gas Gouging) was formed. Their chief complaint was not the level of prices, although they did object to them, but to the differential across the province.

The civic action prompted an investigation of industry pricing practices. The so-called "Browne Report", written by Dennis Browne concluded that there was "*no evidence to support price regulation*". He recommended a program of awareness and monitoring of price differentials across the province. The provincial government adopted this approach and from early 1999 published the price of gasoline in various parts of the province. (See Figure 6.14)

Figure 6.14 – Newfoundland vs. Atlantic Canada ex-Tax Pump Prices



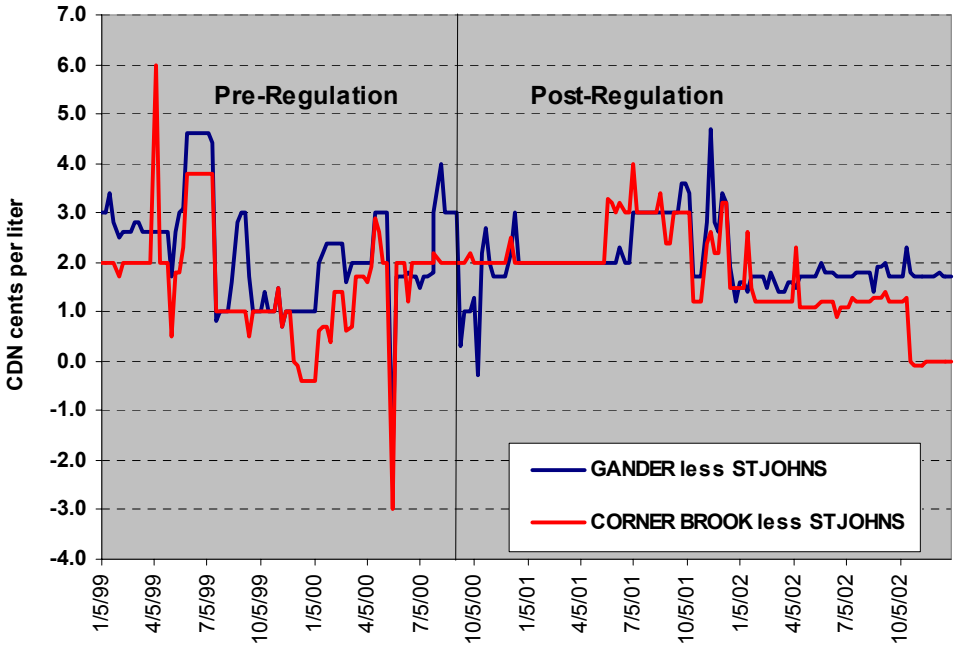
Separately, the federal government of Canada commissioned a Conference Board of Canada study that echoed the Browne report, claiming that Canadian consumers were well served by the market system determining gasoline prices.

[68] The official name of the province is Newfoundland and Labrador. The term Newfoundland will be used here to refer to the entire province, not just the island of Newfoundland.

Despite these reports, the Newfoundland government surprisingly enacted price caps in May of 2001. They did not actively manage prices until mid-October of 2001, as shown in Figure 6.14. The Petroleum Products Act established the Petroleum Products Pricing Commission with a Commissioner and a small staff. The current (and only) commissioner is George Saunders who holds a masters degree in Education. The Commission has a staff of six persons and uses the help of a part-time consultant, who has over 25 years experience in the petroleum refining industry.

As suggested, the location differences among the far-flung sites in Newfoundland prompted much of the public outcry against gasoline prices. The Commission currently has to maintain location differentials for 25 zones. As Figure 6.15 shows, average location differentials have not dropped significantly, although the variability has been reduced. The location differential for Corner Brook, the site of the Commission, has been zero since late October 2002 while its historical average was about 2 cents per liter. The differential was reduced after completion of a marine infrastructure study.

Figure 6.15 – Location Differentials in Newfoundland



The location differentials reflect the transportation costs for current market participants, As such, they preclude the entry of others, such as North Atlantic Refining, who may wish to enter the market but have higher transportation costs.

The pricing basis is made up of five components:

- Fuel component
- Marketing (wholesale and retail) margin
- Applicable Taxes
- Service differential
- Zone differential

The fuel component is benchmarked to petroleum product market prices in New York Harbor, defined as Platt's New York Cargo Unleaded 87, etc. The Canadian legislators felt that crude based benchmarks would introduce an unnecessary time lag and would not directly relate to product market conditions in Newfoundland. This fuel component will change according to movements in refined products in the broader market.

A marketing margin, comprised of a wholesale and retail margin, is added on top of the fuel component. This mark-up reflects transportation, distribution, and storage costs and was established as 12 cents per liter through an historical examination of information. This estimate has been used since then without change.

Next, applicable excise taxes are applied. The federal excise tax is 10 cents per liter (cpl) and the provincial excise tax is 16.5 cpl.[69] Finally, a sales tax (15%) is added.

Table 6.8 – Sample Calculation of Maximum Newfoundland Pump Price

Component	Cents per liter
Fuel Component (Platt's NY Unleaded 87 adjusted for exchange rates)	34.0
+ Marketing Margin (Wholesale and Retail)	12.0
= Maximum Price (excluding tax)	46.0
+ Federal Excise tax	10.0
+ Provincial Fuel Tax	16.5
+ Harmonized Sales Tax (15%)	10.9
= Maximum Retail Price (Regular Unleaded Self Serve)	83.4
+ Service Adjustment	3.0
= Maximum Retail Price (Regular Unleaded Full Serve)	86.4

[69] The Canadian consumer is more heavily taxed than the U.S. consumer, and less than the European consumer. The total tax in U.S. dollars for a U.S. gallon equivalent of regular unleaded self serve gasoline in Newfoundland (Table 6.8) is about $1.00 whereas the average in the US at the same time was about $0.50.

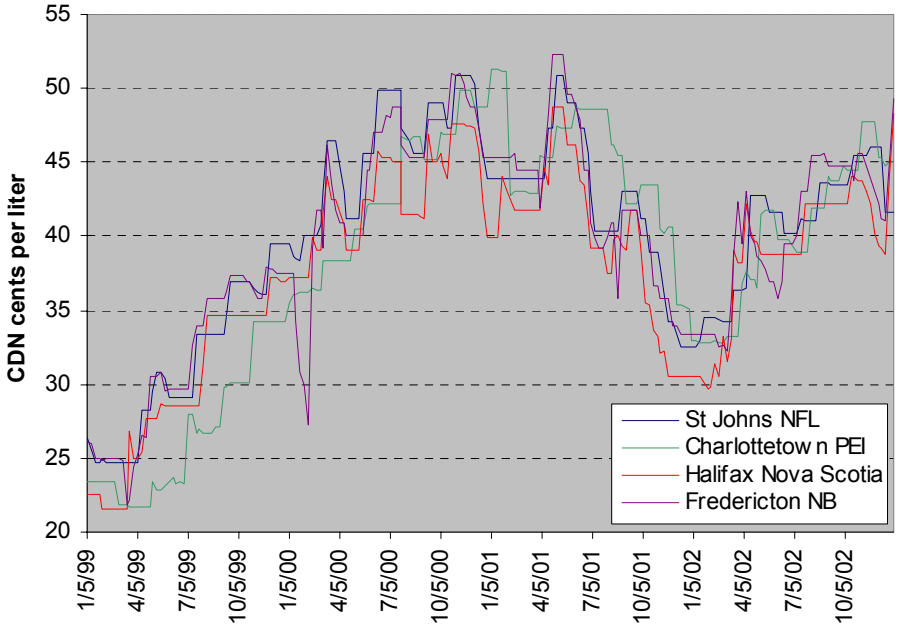
A zone differential is added to account for the required transportation cost to supply fuel to the wide spread regions of the province. The length of the province, from the northern tip of Labrador to the southern tip of Newfoundland Island, is over 1000 miles (Prince Edward Island is only about 100 miles in length). Currently, there are 14 zones and 11 sub-zones for which maximum pump prices are calculated. The zone adjustment can also contain an optional (and subjective) factor to reflect varying economic conditions in the various 24 zones. The number of zones can change and has changed over time.

A similar calculation is made for mid-grade and premium gasoline, and for low sulfur diesel fuel. A sample calculation of this build-up for regular unleaded gasoline in zone 1 (site of the provincial capital, St. Johns) for the November 15, 2002 period is given in Table 6.8.

Since 1998, in particular since 2001, ex-tax gasoline pump prices show a convergence. Figure 6.16 shows how Prince Edward Island has had the lowest pump prices since 1998 but the gap has narrowed substantially. This is a different pattern than shown for 1992-95 in the Ervin Report.

Figure 6.16 – Regular Unleaded Pump Prices ex-tax in 4 Canadian Cities

1998-2002



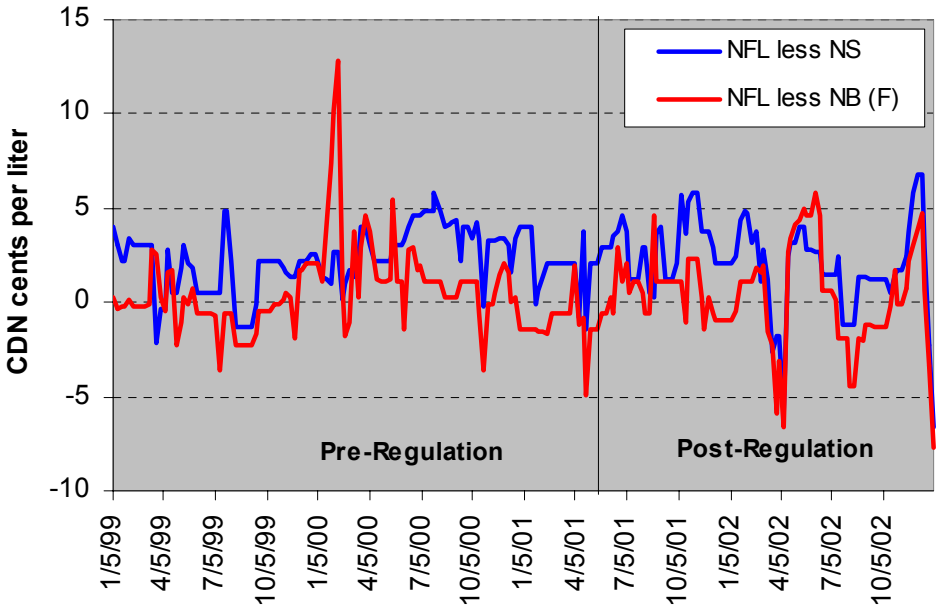
It is interesting to note that the differential in gasoline pump prices in Newfoundland has narrowed sharply from the two nearest regulated markets since the introduction of price controls. The price differentials paid the regulated provinces over nearby unregulated markets is analyzed in more detail in Table 6.9 and Figure 6.17 below.

Table 6.9 – Newfoundland and Neighboring Unregulated Markets

	Differential (cents per liter)	
Newfoundland less:	Before Price Controls	After Price Controls
New Brunswick	1.3	- 0.4
Nova Scotia	3.0	1.7

Expressed in US cents per gallon, the premium that Newfoundland consumers pay over the neighboring provinces was reduced by an average 6 cpg since the introduction of price caps, a significant reduction. Figure 6.17 below also shows how the reduction of the price differentials since the introduction of price caps is larger and more persistent than earlier periods when the premiums paid by Newfoundland consumers were small.

Figure 6.17 – Newfoundland Gasoline Prices vs. Neighboring Markets



6.2.9 *Effectiveness of the Newfoundland Program*

Since the active management of price caps in October of 2001, gasoline prices in Newfoundland have been at the caps allowed. MJ Ervin and Associates, who conduct a weekly phone survey of gasoline prices for 44 Canadian cities, find that dealers often tell them mistakenly that they "have to price at the caps."

The Newfoundland Price Cap "experiment" has had mixed reviews. Price controls can work somewhat well when the environment is steady. The true test comes when the market becomes turbulent. The recent environment in Newfoundland illustrates this difficulty. As a result of the recent oil market events, wholesalers in Newfoundland were unable to recover costs of sharply rising international prices. A number of rural communities in the province experienced outages or short supply. In an unprecedented move, the Petroleum Pricing Commissioner George Saunders increased prices six Canadian cents per liter (14.8 US cents per US gallon) in advance of his regular review, as allowed by the legislation under certain circumstances. This action, although illustrating flexibility, has angered a number of anti-gasoline groups. The Government Services and Lands Minister is calling for a review of the legislation.

Figure 6.18 – Recent Price Changes Regulated and Unregulated Cities

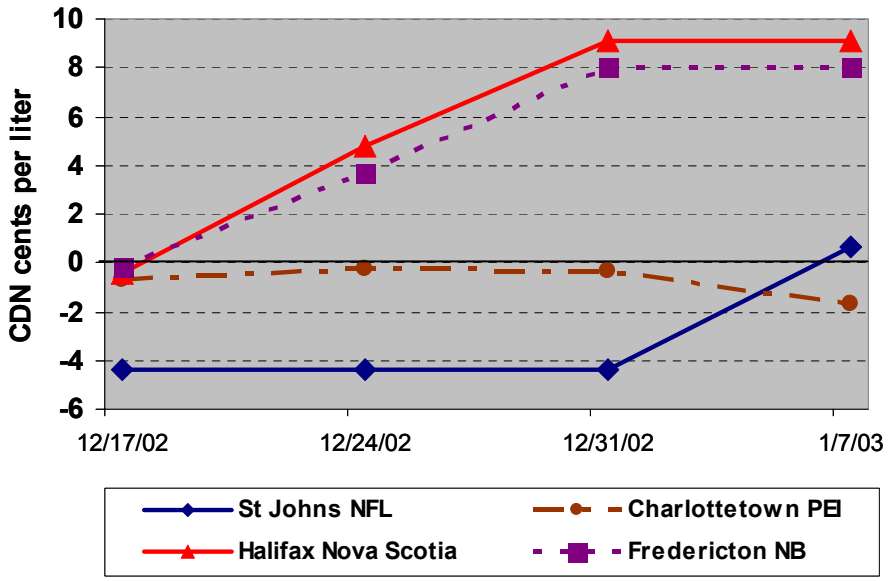


Figure 6.18 illustrates one of the problems with regulated markets. Over a four week period starting in mid December 2002, prices in unregulated markets moved up 8 to 9 Canadian cents per liter (20 – 22 US cents per gallon), while the regulated prices remained flat, until the intervention in the Newfoundland price mentioned above. Market derived price movements are not captured in time. Both regulated markets in Canada did not raise prices as international fuel prices rose. The retroactive pricing formulae would work in favor of the regulated marketers when prices in the international markets begin to fall again, but if international market forces cause a prolonged steady rise as illustrated in Figure 6.18, wholesale marketers are unable to secure volumes at prices they can pass on, and the market runs dry. Shortages occurred in Newfoundland prior to their recent change. It is unclear if the response in Prince Edward Island will match the price cap moves of Newfoundland.

In an unrelated issue, the Commissioner also nearly doubled the fee placed on gasoline to pay for the regulation from 0.04 cents per liter to 0.07 cents per liter. The move was prompted by the under-collection of the tax, according to the Commissioner, or by overspending according to other sources. The Commission requires $470,000 CDN to run the operation and they had major shortfall from estimates. One of the marketers, Ultramar, claims this would raise their fees form $110,000 to $200,000 CDN.

6.2.10 Comparison of Canadian Price Controls with Hawaii's Act 77

Attachment A shows a detailed comparison of the structure put in place by the two Canadian provinces that have enacted price controls, and the regulatory framework contained in Act 77. As can be seen in this comparison, some of the key differences are:

- The Canadian price caps apply to all grades.
- The caps are based on NY spot market prices plus historical differentials. The NY spot market and Canadian markets are linked through arbitrage, whereas Hawaii and West Coast prices are not.
- Monthly posting of caps brings transparency to the Canadian markets, with strong reporting requirements, controls and oversight.

- The Canadian legislation provides for an adjustment mechanism rather than a suspension option.

6.2.11 Summary of Canadian Experience

In summary, the Canadian experience does not seem to have produced measurable consumer advantages. Although there is evidence in some cases of slightly lower prices or reduced differentials, in other instances it produced no effect or even led to increases. What can be clearly seen however is that price caps produce a number of undesirable side effects:

- Price caps require a complex system to administer and control, especially when zoned pricing and frequent updates are required. Calculation of location differentials is cumbersome and controversial.

- Price caps increase price volatility which is often perceived by the consumer as worse than higher, but steady pricing.

- Produces shortages at various times, when market distortions prevent supply to price limited regions.

- Lags market conditions, which offers the opportunity to game the system.

7 SUMMARY OF STAKEHOLDER MEETINGS

One of the primary considerations of the Hawaii Fuels Study was to fully involve the various stakeholders in the industry in the early stages of the study, with the objective to collect opinions and ideas through a series of meetings with individual stakeholders.

The purpose of these meetings was not to form an opinion on the facts and circumstances pertaining to the lawsuit that was brought by the Attorney General against several industry participants and settled out of court by the defendants, but to obtain a comprehensive picture of the marketplace as the grounds for market-based recommendations.

Below, a summary will be presented of the main findings of the stakeholder meetings, in such a form that the confidential nature of the information received will not be disclosed, i.e., results will only be presented in their aggregate form.

7.1 Participants

From late November through early March 2003, DBEDT and its contractor, Stillwater Associates, met with Legislators of the State of Hawaii and with representative participants in the Hawaii petroleum industry, either in person or through conference calls. In this way, input was selected from:

- The Attorney General's Office, two State Senators and three Representatives, who all were actively involved in the process of drafting of the bill that was passed as Act 77.

- The two refiners in Hawaii, ChevronTexaco and Tesoro. With Tesoro, several meetings were held in Hawaii, involving a broad representation of the local operational and commercial staff, as well as a tour of the refinery. For ChevronTexaco, the meeting was held with corporate staff in Chevron's headquarters in San Ramon, CA, with participation of local Hawaii personnel by conference call, and a later meeting in Hawaii with government relations staff. All meetings were cooperative, open and constructive.

- Two refiners operating facilities outside Hawaii but marketing products in Hawaii through purchase agreements with the local refiners, notably ConocoPhillips (operating in Hawaii under the 76 brand) and Shell.

- One major Hawaii jobber with import facilities capable of receiving cargoes from international sources, Aloha Petroleum.

- Eight smaller jobbers, some of whom operate small terminals in the neighboring islands.
- Several branded dealers and dealer organizations, representing the vast majority of dealers on the islands.
- One High Volume Retailer with stations in Hawaii, Costco.
- One major international trader who has imported fuels and blendstocks into Hawaii in the past, MIECO.
- The airline purchasing and storage consortium for jet fuel in Hawaii, HFFC, and other major fuel purchasers such as HECO, The Gas Company and the Kauai power cooperative.
- Two companies providing logistic services in Hawaii, a surveyor and a barging company.
- Several qualified academics, well-established petroleum consultants and government staff who have studied the issues involved.
- Two industry pricing publications, Lundberg and OPIS.
- Representatives of legislative agencies involved in several Canadian price cap initiatives, as well as refiners and other participants in the affected markets.
- A commercial real estate broker.

7.2 Act 77 – Impact of Price Caps

With very few exceptions, all parties spoken to, including the legislators and staff involved in drafting the bill, considered Act 77 seriously flawed as far as the price caps are concerned. Shortcomings cited were:

7.2.1 Price Impact

According to information received during the Stakeholder Meetings, the price cap formula is likely to result in pricing that is on average higher than historical prices:

a) Preliminary analysis by Lundberg[70] confirms that for the most part, the price cap formula results in caps above historical prices. As calculated by Lundberg, over the past three years, the price caps would have resulted in street prices that are 10.4 cpg higher than the historical actual prices.

b) Discussions with jobbers and dealers revealed that the caps would be perceived as a license to price at these levels. Dealers explained how they may be caught in price reversals on the upswing of a price spike, and would have to leave prices at cap levels to recoup losses and as a protection against further price surges. They also point out that the regulations, as presently written, will help the oligopoly interests that they were intended to harness, rather than control them. The smaller dealers will be hurt, particularly those on the neighboring islands.

c) The inclusion of US West Coast prices in the price formula, in particular the Los Angeles and Bay Area pricing, is likely to significantly inflate the price caps when the introduction of CARB Phase III specifications and the phase out of MTBE in California will result in a supply shortfall estimated at 10 to 12%, which will have to be covered by the major refiners through worldwide sourcing of expensive blendstocks. There is evidence that California prices are likely to surge initially to levels that are 50 to 100% over their current values, and will remain substantially above other gasoline markets for the foreseeable future. [71, 72]

7.2.2 Competitive Environment

The price caps do not promote a more competitive environment. To the contrary, they are likely to result in a more restrictive environment in which the majority of the increased margins resulting from the higher than historical prices under the caps will flow to the suppliers:

a) At the supplier level, which essentially is limited to the two local refiners, the two other majors and one large jobber under supply agreements, the price caps provide a legitimate ceiling up to which prices can be set. Given the concentration of market power in the supplier segment, and given the need for refiners to make

[70] Lundberg Letter, *Fantasy Island: Hawaii to "Fix" Gasoline Prices*, Volume XXiX, No. 10, May 29, 2002.

[71] Stillwater Associates, *MTBE Phase Out*, http://www.energy.ca.gov/reports/2002-03-14_600-02-008CR.PDF

[72] P. Verleger, Ph.D., LA Times, November 18, 2002

substantial additional investments in their facilities to meet new regulatory requirements such as low sulfur specifications for gasoline and diesel, and given the lack of profitability of the sector in general, the suppliers will have both opportunity and motive to price at the allowable ceiling. This is likely to improve the profitability of the suppliers.

b) At the level of smaller jobbers and dealers, which is already a highly competitive market segment although concentrations exist on some islands, the price caps will provide uncertainty over returns on investment and reduce the value of dealer owned assets. In this climate, it is unlikely that new investments will be made which will serve to broaden competition.

c) At the level of High Volume Retailers, the price caps will have little or no impact. The HVRs use formula pricing which results in substantial differentials with less efficient marketing channels, but their presence is limited to concentrated population centers and their volumes are limited by supply agreements and physical limitations such as the number of pumps and nozzles.

d) At the level of small "Mom & Pop" retailers in remote locations, the price caps could force these outlets to sell below cost and force them to abandon gasoline sales.

e) Feedback received from participants in other markets where price caps are in place, notably Newfoundland, confirm that the result is higher average prices with less volatility.

7.2.3 Security of Supply

The price caps in force in the US during the late seventies prior to the deregulation of the petroleum industry in 1981, led at the time to supply limitations and queues at the pumps. From the discussions with stakeholders, there is no evidence that the proposed price caps for Hawaii can cause similar unwanted consequences for the State as a whole, although local situations may differ:

a) For reasons mentioned above, the price caps are likely to result in higher rather than lower prices. If refiners have historically been able to realize above average industry returns, they will certainly be able to do so in the future.

b) The link to West Coast gasoline prices contains an indirect link to crude oil cost. It is unlikely that price differentials between the crude slate of the Hawaii refiners and the crudes processed by the West Coast refiners could inverse to a point where the Hawaii refineries would be forced to cut crude runs because the capped prices do not allow recovery of the cost of crude.

c) Locally, in its current form, the price cap formula could cause loss of supply to remote locations served by small volume retailers with intrinsic high cost of supply.

d) Some stakeholders believe that price caps, and the antagonistic relationship between government and the oil companies, could cause one of the refiners to pull out of Hawaii altogether. The risk vs. reward ratio for continuing to do business in the state may have swung too far to the negative. Capital may be better re-deployed elsewhere.

7.3 Act 77 - Oversight

Besides the price caps, Act 77 calls for increased oversight of the industry, in particular with regard to pricing practices. The conclusion from the Stakeholder Meetings is that current reporting structures and available staff resources are inadequate to enable adequate oversight of the industry.

7.3.1 Market Data and Price Transparency

Wholesale and retail prices are reported by Lundberg and OPIS, but given the limited liquidity of the Hawaii gasoline market, most market participants did not attach great value to the numbers and considered the data unreliable. Moreover, the single largest refiner and marketer on the islands, ChevronTexaco, confirmed that they will not report any market information to market information publishers for fear of being sued for price signaling.

The price paid by jobbers is not public, nor are the terms of the exchange or supply agreements between the two local refiners and the other refining majors who participate in the Hawaii fuels markets. Pricing information is reported by EIA on a State level, but if EIA cannot maintain the confidentiality of the company, the data is withheld and the data collected is from a sample of companies. This lack of readily reliable data makes it difficult to monitor the petroleum industry's prices.

7.3.2 Resources

From interviews with legislators and staff, it is clear that in the past, the State lacked the resources to adequately monitor the fuels market and detect dislocations in pricing structures between market segments in time to allow corrective action without major interference in the market. As a result, mounting legal action against the defendants in Anzai vs. Chevron et al. required a massive effort in terms of data collection and market analysis.

So far however, it is unclear whether the funds can be appropriated to strengthen the transparency and oversight function. Meetings with legislators made it painfully clear how difficult it is for a small state like Hawaii to allocate available funds between competing requirements.

7.4 Act 77 – General Impact

Several sources provided factual and anecdotal evidence that Act 77 is perceived in broad circles as an anti-industry measure that reinforces Hawaii's image as a difficult place to do business. It is difficult to quantify the secondary consequences from this legislation to Hawaii's economy in general, but several cases of deferred or cancelled investments were quoted. Because the petroleum industry is such a widely publicized business, Hawaii draws attention to itself through price controls in this sector, which may be out of proportion to the law's intrinsic intent.

7.5 Divorcement

Feedback obtained from all segments of the market indicates that the divorcement law, enacted in 1993 at the instigation of dealers who were at that point under pressure from aggressive market penetration strategies by BHP and an initiative by Chevron to replace service bays by convenience stores, has backfired and brought the dealers grief rather than relief.

Many lessee stations in Hawaii are not economically viable. Volumes are too low, costs are too high and competition is too competitive to allow a decent income for the dealer. Even without divorcement, the resale value of the leasehold would have been close to zero. Apparently in the past, in particular in other parts of the US, there were times when a class of buyers existed who were willing to buy stations that would not make any money because buying a business was a way to obtain US residency. This has not been the case in Hawaii where most dealers are locals. And whereas previously, a company might have stepped in and offered the

departing dealer some money to take back the station, under divorcement that option is gone too.

Complaints from dealers therefore centered mainly on the fact that the regulation severely limits opportunities to sell a dealership, essentially reducing the value of a dealership to near zero. When a dealer abandons a station, integrated suppliers such as jobbers and refiners can still pick up the station and run it for a period of two years, which they will usually do to protect market share. ConocoPhillips, who market under the 76 brand, currently operate 10 of their 58 stations under such temporary arrangements. It is often not possible to bring in a new dealer within two years. Nearby other dealers would welcome the shutdown of a station to boost their own sales and serve as a public watchdog to ensure enforcement of the two year limit. Nevertheless, examples were quoted of stations that were once dealer operated and are now entering their fifth year of being run as a refinery station despite the regulation.

Moreover, unlike the earlier moratoriums it replaced, the regulation does not prevent integrated suppliers of building new stations. It merely restricts the distance to the nearest dealer owned station. The Federal Trade Commission (FTC) refers to this type of regulation as "anti-encroachment" rather than divorcement. That testimony is included in this report as Attachment B. FTC presented that testimony in conjunction with the presentation of preliminary findings of this analysis in a public information hearing of the Hawaii State Legislature in January 2003.

7.6 Barriers to Entry

Barriers to entry can be physical as well as commercial, and examples of both kinds were found during interviews.

7.6.1 Physical Barriers to Supply

On Oahu, the State has adequate infrastructure to enable imports of gasoline and blending components if necessary, and the regular imports of jet fuel do not experience any undue restraints. However, at the level of the individual markets in the neighboring islands, the inability to find terminal space prevents new entrants to participate in the local markets.

The size of the markets in Maui and the Big Island could possibly support a more diverse group of dealers and jobbers than are currently active on these islands, but the number of terminals and their capacity, in particular on Maui, prevents additional participants from entry.

7.6.2 Commercial Barriers

A number of commercial barriers were identified:

a) **Market balance**. The Hawaii refiners are comfortably capable of supplying all of the local gasoline demand. Since the refineries are primarily run for jet fuel production, any imports of gasoline will cause either a cutback in local crude runs and loss of local jet fuel production because not all locally produced gasoline can be sold, or the excess local production of gasoline has to be exported.

b) **No Local Spot Market**. A foreign refiner or trader may be able to import a cargo of gasoline into Hawaii well under local wholesale prices and land it in Oahu by renting the under-utilized import terminal space controlled by Aloha and BC Oil. However, they would have great difficulties selling the cargo locally because Hawaii lacks a spot market with sufficient liquidity to absorb a cargo of the size needed for economical shipment. The two outside majors have long term exchange or supply agreements with the local refiners and with almost all jobbers and dealers under term long term contracts with the established suppliers.

c) **Product Specifications**. At the time when Aloha was importing cargoes from foreign sources, MIECO, the trader who supplied Aloha imposed as a precaution a *de minimis* specification for MTBE on incoming cargoes handled through the common carrier distribution system. Such a specification, which limits the trace amounts of MTBE that can result from previous MTBE containing gasoline cargoes in vessels or shore tanks, is not practiced by Chevron elsewhere, and at the time, Chevron was and still is, widely manufacturing and selling MTBE containing gasoline. The likely reason for imposing this specification was that it made it difficult and risky for traders selling gasoline to Aloha, and that it increased Aloha's cost of supply.

d) **Fuel Oil.** Meetings with former employees of Tosco and PRI confirmed that in the past, HECO has been seeking outside supplies of fuel oil, which led ultimately to complex exchange agreements. Currently, HECO and other non-utility generators who use fuel oil obtain their supplies exclusively from the local refiners under term contracts with crude oil related pricing.

7.7 Market Mechanisms

A good deal of the discussions in the Stakeholder Meetings centered on the forces at work in the Hawaii fuels markets. For the purpose of this study, it was not relevant to follow up on allegations of anti-competitive behavior of market participants in the past, but to identify market mechanisms and structures that underlie the behavior of market participants.

7.7.1 Gasoline Market Structure

The Hawaii gasoline market has a layered structure that is in certain ways different from markets elsewhere in the US:

- **Supplier Level**. Unlike most markets in the US, Hawaii does not have a spot market where prompt or future deals are concluded between regular trading partners with sufficient liquidity to allow posting of a marker price. In Hawaii, at the supplier level, exchange agreements rather than sales agreements exist, and these are long term rather than spot. Thus, at the supplier level, the Hawaii market is not transparent.

- **Jobbers**. Jobbers are independent service providers in the fuels distribution sector who buy fuels from the primary suppliers at a truck loading rack at the refinery or a terminal. Jobbers usually own a fleet of trucks and may operate their own distribution terminals or fuel depots. The price at which a jobber buys the fuel from the primary supplier is referred to as the “rack” price. In most markets, there is a difference between “branded rack price” and the “unbranded rack price”, depending on whether or not the jobber is distributing the fuels under a refiner’s brand, or for his own account. In Hawaii, substantial differences exist in the range of services provided by jobbers. The largest jobber, Aloha Petroleum, operates an import terminal at Oahu, a distribution terminal at the Big Island, and arranges for its own barge and truck transportation. Smaller jobbers may operate a distribution terminal at one or two neighboring islands, or just a truck fleet on Oahu. Because of the differences in the range of services provided and because jobbers buy their fuels from the primary suppliers mostly under long term supply agreements, there is no meaningful rack price in Hawaii. Therefore, at the jobber level, in the absence of posted rack prices, the Hawaii market is also not transparent.

- **Dealer Tank Wagon**. The price of gasoline delivered to a retail site is termed Dealer Tank Wagon ("DTW"). In Hawaii, DTW prices are reported to Lundberg by dealers as the buyers and by the jobbers and refiners as the sellers. For Hawaii, many dealers participate in the weekly survey of gasoline and diesel prices, but indications from participants were that reporting is often seen as a way to manipulate the market. For instance, if a dealer reports a lower price than he actually paid, the average reported price will come down, providing the dealer with an argument in negotiations for a lower price with the supplier in the next cycle. Because all participants know how the games are being played, few reported attaching much importance to the reported pricing.

- **Retail Market**. The retail market is where pump prices are posted. Street prices are normally set relative to prices of other local gasoline stations. Recently, a new force in retail is emerging in the form of High Volume Retailers ("HVR"), which are operated by large chain stores that aim at large volumes with low margins. HVR's tend to price their gasoline on cost, rather than local competition.

7.8 Conclusions from Stakeholder Meetings

The initial phase of the study consisted of interviews and survey meetings with a total of 48 industry participants, including legislators and State staff, the two local refiners, suppliers from outside the State, traders, jobbers, dealers, logistic service providers and other stakeholders. The primary conclusions from these meetings are that:

- All Stakeholders, including the legislators who sponsored the bill, consider the current price cap structure contained in Act 77 seriously flawed and realize that implementation as is may result in higher prices for consumers, an even more restrictive competitive landscape at the supplier level, and loss of consumer choices in the remote service areas.
- Divorcement has not resulted in protection for independent dealers, but has eroded the resale value of dealerships.
- Physical and commercial barriers to supply exist, for individual neighboring islands as well as for Hawaii as a whole. Some of these barriers can be addressed but others are intrinsic to the size and insular nature of the Hawaii fuels markets.
- The dealer segment is likely to see significant changes in the near future, whereby retail markets in the population centers will be divided between High Volume Retailers and

company operated stations, with the role of jobbers and independent dealers reduced to serving niche markets or remote locations.

- At the supplier and jobber level, the market lacks transparency. A lack of transparency combined with insufficient resources in the State's designated supervisory function for the industry prevents effective oversight.
- The relationship between the petroleum industry on the one side, and the legislators and the Attorney General's Office on the other side, is perceived to be antagonistic. Many stakeholders are looking to the results of this particular study to help close the knowledge gap and to foster market-based solutions.

8 EVALUATION OF OTHER OPTIONS AVAILABLE TO LEGISLATURE

If the State wishes to pursue a pro-active role in protecting consumers of fuels in Hawaii, other potential measures are open to the legislators besides the price caps as contained in Act 77. A number of alternatives are offered for consideration below, some just for the sake of completeness, along with an analysis of benefits and costs.

8.1 Transparency and Oversight

In the context of gasoline prices, a transparent market is one where market observers can see the various elements of the market and readily explain why prices are at their current level. In order to create transparency, the State will collect, analyze and report volume and price information about gasoline and other petroleum products. In this context, oversight is exercised by agencies with enforcement authority who are empowered to look into perceived market abuses.

Act 77 created the role of Petroleum Commissioner and assigned it to the Administrator of DBEDT's Energy, Resources, and Technology Division. Act 77 also reassigned several major functions that were previously the responsibility of the DBEDT Director to the Petroleum Commissioner. One of these major functions is to implement the data requirements under Chapter 486J, HRS. Generally, the requirements include: collect, analyze, and report detailed data covering imports, exports, supply, demand, inventories, transportation, storage, and sales of petroleum products, as well as monthly weighted average prices for most types of products and certain, but not all classes of trade. Chapter 486J-5 (a) (8) also requires the "development of a petroleum and petroleum products information system."

Today, DBEDT still collects the type of data in the forms previously required under Chapter 486E HRS, which was repealed and replaced by Chapter 486J. Passage of Chapter 486J significantly expanded DBEDT's data functions, which were further expanded by Act 77. However, no resources were allocated to implement these functions. Resource inadequacies and other factors, such as the statutes' requirement of administrative rule-making to implement these functions, have precluded implementation of the comprehensive data functions in Chapter 486J.

Therefore, on a monthly basis, DBEDT collects information pertaining to volumes and inventories into a simple, unsophisticated database. The data is entered manually from paper forms, a massive amount of work that with the limited resources available, does not even allow

time to examine and evaluate the data, or verify reported data entries. As a result, the database today has only limited utility, since queries addressed to it need to be examined carefully and even then the discrepancies cannot always be resolved. The problems stem from such fundamental issues as non-reporting by certain market participants, double counting of volumes by prime suppliers and resellers, lack of product definition, use of multiple units of measurement, and more.

Even if accurate volume reporting were available, transparency is still impossible to achieve without adequate pricing information. Pricing information for gasoline and diesel at the retail level can be purchased from specialized price information consultants. The EIA also collects and publishes volume and pricing information on a monthly basis, but because their information is made available to the general public, information is withheld if the number of buyers and sellers is too low to mask the results of individual companies. This is the case in Hawaii for residual fuel and jet fuel, the two largest volume products. However, to obtain transparency in a highly complex, multi-tiered industry, pricing information is needed for all products and all classes of trade. The authority to collect the additional pricing information is only partially provided for in Chapter 486J, HRS, and the resources to implement effective data collection and analysis are sorely inadequate.

For these and other relevant more detailed reasons discussed below, policy-makers, relevant state agencies, and even the DBEDT analysts, themselves, do not have a complete understanding of the market. What is needed is greater market transparency and with it oversight – heightened vigilance from a clearer perspective. Fundamentally, market transparency that can permit this oversight includes having access to and analyzing data in such a way as to have the ability to:

- Assess and understand profitability by industry sector, by product, and class of trade.
- Track and understand the market flows (volumes) and value streams of each product from the barrel of crude being off-loaded from the tanker; through the refinery and production yields from that crude oil by product; through the pipeline, storage tank and tanker truck; what's sold to whom and what level at what price; and, to be able do so all the way to, for example the consumer’s gas tank, or back aboard a tanker as exported product.

In short, market transparency requires a comprehensive "balance sheet" for crude and product flows and prices coming and going and all points in between, by product, class of trade, and end use/sales sectors.

Transparency will be created by a professional staff with various skill sets who can provide the heightened vigilance by their ability to accurately analyze, interpret and report the data by

transforming it into useful *information*; i.e., relevant facts, trends, statistics, graphs, tables, produced in various formats and levels of detail and sensitivity, relevant and appropriate for the particular information user. Oversight by the enforcement agencies will be facilitated by the information created by DBEDT.

For example, the general public could benefit in very practical terms – purchase decisions – with access to average by grade gasoline price information, for their island, especially if it could be provided on a weekly basis. However, legislators and energy analysts would also be interested in price margins on each grade of gasoline by class of trade to be able to gauge profitability within the industry. Neither of these examples of information could be produced by implementing the Chapter 486J, HRS, data functions as currently prescribed. Thus, even if implementation of the state's existing statutory data structure (Chapter 486J, HRS) could start today, the market transparency and oversight that appears to be what was sought by the Legislature, would not be possible.

8.1.1 Proposed Alternative Reporting and Transparency Function

The data collected by DBEDT today is primarily the "volumes" data previously required under Chapter 486E HRS, which was repealed and replaced by Chapter 486J. This data, with the addition of the limited pricing information as mandated under current provisions of Chapter 486J HRS, does not have sufficient level of detail to allow a full analysis of the profitability by industry sector, a key element of market transparency. Authority should be given to DBEDT to collect data for each product and each class of trade, which would require amendments to Chapter 486J.

Specifically, for example, amendments of Chapter 486J-3 (a) (5), and (6), HRS, are recommended to appropriately expand DBEDT authorization to collect retail gasoline and diesel prices and sales volumes from all classes of trade, not just from "company-operated retail outlets", as currently prescribed. It will also be necessary to expand the requirement to report this and other data gathered under Chapter 486J-3, to all industry sectors, not solely "distributors", as currently prescribed. Without these other sectors' data, comprehensive industry profitability cannot be made transparent.

To more fully understand the flows of all petroleum products and, therefore, provide more transparency of the larger market and system, another example amendment to Chapter 486J-3, HRS, would be to add definition and clarity by requiring reporting of certain products not covered by the statutes reporting structure. For example, all unfinished oils, including a separate category for naphtha, internal consumption of

refinery fuels, and, if exported from the State, volumes and prices should also be reported.

These are examples of the type of detailed amendments of the current data reporting structure in Chapter 486J that should be considered. Without these and other revisions to be recommended in the legislative measures to be proposed, it will not be possible to obtain the market transparency described above. Additional recommendations will be provided in the form of proposed legislative language, as required by the Act 77 analysis mandate.

Resource requirements of transparency will be addressed in greater detail in Section 8.1.2. However, in addition to addressing such fundamental operational needs, another option that could expedite acquisition of petroleum industry data, would be for the Legislature to reconsider whether development of administrative rules should remain a requirement for DBEDT to implement its data functions under Chapter 486J, HRS.

This is suggested, because the previous statute (Chapter 486E) under which DBEDT acquired petroleum data for years, albeit limited in scope and type, did not require administrative rules as a prerequisite for implementing those data functions. The additional requirements of developing administrative rules, together with insufficient resources to implement these expansive data functions are factors that have inhibited implementation. Based on Stillwater Associate's review of DBEDT's current and past data functions, rule-making does not seem necessary if the statute provides the type of clear guidance for the data functions (which is recommended), as the previous law did.

The problem with additional reporting requirements is that the current inefficient means of collecting and processing the data, and the lack of resources assigned to this task, do not allow for effective transparency. If a requirement to collect pricing data were to be added to today's volume reporting without improving the efficiency of collecting and processing the information, it probably would lead to a deterioration of insight in what goes on in the petroleum industry rather than an improvement. The proposed alternative is therefore to:

1. Work with industry participants to determine and develop the most efficient way to collect the data electronically. More than one method may be required. Options are to create a secure website where participants can log in under password and enter or upload data, which could then be assembled and processed automatically. To avoid duplication of reporting effort, wherever

possible industry should be allowed to submit volume and price data which is already reported to the EIA, assuming, for example, EIA and DBEDT formats are compatible.

2. Educate suppliers on the proper use of data entry formats. Currently many instances of double counting exist, maybe because some users are unclear on the concepts.

3. Create a system to process the data and conduct volume and price checks. Overall production, receipt, sales and inventory changes should balance and sales and purchases between classes of trade should match, taking into account inventory changes. Significant discrepancies should be automatically red-flagged.

8.1.2 Required Resources for Transparency and Oversight

It is imperative for the effectiveness of the system that DBEDT will be allocated sufficient resources to evaluate the collected data on a routine basis in order to achieve the degree of transparency and oversight described in Section 8.2, above.

The skills and experience level in the analysis and oversight function should be such that DBEDT's staff will be sufficiently informed and qualified to effectively communicate with industry counterparts to ensure that the state retains the capability to analyze and interpret data ideally on par with industry. This will provide information users, like policy-makers, access to this essential data in such depth and format to have useful and useable information for developing critical State energy policies.

It is estimated that it will take approximately 12 to 18 months to complete steps 1 through 3 as outlined above. Development would be by a team of oil industry experts and information technology specialists. It is estimated that the reporting structure can be created for $300,000. The result will be a reporting system that is highly automated, allowing maximum time for analysis, instead of data entry.

Once the reporting structure is in place, it would take one full time staff person at DBEDT to ensure that companies timely submit their data, screen information on a monthly basis, and file monthly reports outlining any significant changes in market behavior to senior DBEDT staff. The person responsible for administering the system

must have a good enough understanding of the petroleum industry in Hawaii to be able to liaise with industry counterparts

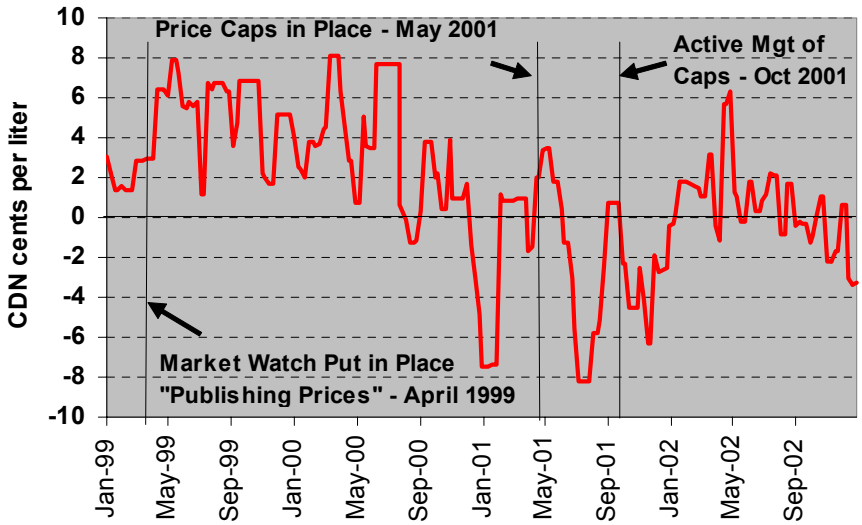
The resource requirements for the ongoing monitoring have been estimated at $250,000 per year by Mr. Matthew Brown of the National Conference of State Legislatures, based on similar operations elsewhere and corrected for Hawaii pay scales. This amount would cover the cost of one experienced industry specialist, one more junior data analyst, plus some part time administrative assistance. A small budget for periodically engaging industry expert consultants is also included in this annual cost estimate.

8.1.3 Benefits of Transparency and Oversight

One benefit of transparency will be that staff will be better able to respond to inquires by the Legislature or the public about high gasoline prices. In the regions in the Pacific where prices are not regulated but closely watched, local regulators seem to have had no reason to move from observation to active control. The only known instance where a monitoring program was followed by an active price cap regulation is Newfoundland. Figure 8.1 shows how after May 1999, when Newfoundland put in place a “Market Watch” program with published prices, differentials with Prince Edward Island which was already regulated at the time, slowly started to descend and had already arrived at levels where they stayed after active caps were activated in October of 2001.

An additional example was provided in Table 6.6, where it was shown how the Australian Price Watch system with published Import Parity Pricing proved more effective than market regulation. It seems that effective oversight, based on full price and volume transparency of the petroleum markets, will have the effect to prevent excess profit taking when circumstances would allow.

Figure 8.1 – Price Differential Newfoundland – Prince Edward Island



Moreover, while oversight is likely to prevent excess profit taking, it would not have the unwanted side effect of published price caps, namely to be considered by the industry as a license to price at the cap level, even if supply and demand would normally have resulted in lower pricing. Another advantage of a comprehensive industry oversight program is that it would apply to all fuels and all segments of the industry, whereas the price caps only regulate self service regular gasoline.

A reasonable estimate seems to be that a properly managed, effective oversight program based on full transparency of the industry can have a more positive effect as that of price caps, with less effort and less risk of market distortions. Table 6.4 showed that the estimated annual consumer price change from Act 77 price caps versus historical prices, would probably result in a price increase for consumers.

8.1.4 Pros & Cons of Transparency and Oversight

Pros:

- Avoids periodic costly investigations and lawsuits: information is collected on an ongoing basis rather than once every five to ten years under subpoena.
- Gives legislators, “enforcement agencies” (AG, Consumer Advocate, PUC, and Department of Taxation) and the public appropriate market information upon which to make more informed decisions relevant to their roles in the market.

- Allows "soft touch" protection of consumers against potential excessive profit taking in Hawaii's oligopoly markets.
- Does not create a rigid framework with price caps under which prices may be higher, as well as result in other unintended consequences this report has outlined, such as the transfer of California's price volatility to Hawaii.
- More efficient to administer than caps.
- Does not create the potential for gaming of price cap rules.
- Will also be needed to develop Integrated Energy Strategy, because market concentration will not change while complexity of refinery economics will increase.
- Useful for comprehensive energy planning and modeling by DBEDT, including energy emergency preparedness planning.

Cons:

- Although cheaper than caps, still requires resources in times of budget difficulties.
- The reporting requirements may be perceived as costly and onerous by the petroleum industry.

8.2 Integrated Energy Strategy

Hawaii not only has some of the highest gasoline prices in the US, its electricity and utility gas prices are also amongst the highest in the nation. Moreover, Hawaii's dependence on petroleum not just for its transportation fuels but also for most of its power generation has been a source of concern over the years, as geopolitical events continue to destabilize the global petroleum market. There is currently considerable interest from several major oil and gas companies to supply Liquefied Natural Gas (LNG) to Oahu's power plants and other consumers of residual fuel oil. There is also some interest in producing ethanol from sugarcane and biomass in the State of Hawaii, while nationwide, major development efforts are ongoing to develop a viable energy infrastructure based on hydrogen. Continuously improving technologies in many energy related fields of science open up an array of interesting options by which the State could benefit from an intrinsically lower energy cost structure.

However, the energy infrastructure in Hawaii is closely integrated and a holistic approach will be needed to ensure that improvements in one area do not cause deterioration in another. For instance, as pointed out in Section 3.5.1, replacement of residual fuel by LNG means that the two refineries could face significant financial difficulties. Another example is the introduction of ethanol blending, which reduces petroleum dependency and would force more exports of light gasoline components at lower values. In order to develop effective policy recommendations that result in lower overall energy costs to the State, it will be necessary to evaluate all options in a coherent and comprehensive way.

8.2.1 Policy Options for an Integrated Energy Strategy

Many of the individual options contemplated in the context of an Integrated Energy Strategy are highly complex and capital intensive projects, and their execution is predominantly the domain of the private industry. However, because of the need to coordinate overall energy needs and the key function which energy security and affordability play in the economy of Hawaii, there is an important role to play for the State. Towards this purpose, the State's legislators have at their disposal a broad range of policy options, some of which are listed below in order of increasing State involvement:

- **Planning**. DBEDT conducts periodic reviews of energy infrastructure needs for which it collects industry data, including projections about anticipated demand and capacity. The enhanced data collection proposed as part of this study's recommendations would help DBEDT in its planning role. A clearly defined long term plan with realistic goals for which industry input is solicited would help to foster a better investment climate, especially in an environment where relationships between government regulatory and enforcement agencies, legislators, and certain sectors of industry leaves something to be desired,

- **Coordination**. DBEDT already coordinates with industry and other relevant stakeholder groups in relation to Hawaii's energy initiatives. DBEDT engages with industry when it comes to virtually all strategic energy partnerships. The LNG Task Force in which DBEDT representatives participate is an example.

- **Facilitation**. The State has many tools at its disposition to facilitate energy infrastructure projects. For instance, for projects that fulfill a need as identified in the State's long term energy plan, fast track permitting or blanket permit

procedures may be considered, with central coordination of all permit application and processing. Currently even small projects, such as maintenance work on pipelines, require permits from many different agencies.

- **Intervention**. For projects that are of importance to the State and fit within the overall long term energy plan, the State can intervene on behalf of the industry with federal agencies whose approval is needed. Examples could be approval by FERC of LNG storage, or approval by the FTC of an exchange of refinery streams from new process units, which could result in substantial cost savings.

- **Infrastructure**. In particular when it comes to physical and commercial logistics infrastructure such as ports, roads, Foreign Trade Zones, etc., public funding and policy making plays an important role. Currently, especially in the ports, the needs of the energy sector seem to be assigned a lower priority then some of the other sectors, which has resulted in loss of terminal capacity and dock access.

- **Stimulus**. The State has many options at its disposal to assist private industry in the realization of projects that are in the interest of the general public. Although some of these options can be a drain on scarce public finances (for instance the production credits and excise tax credits to stimulate ethanol production), other options such a loan guarantees have little direct financial impact.

- **Participation**. The State can participate in projects, or in the extreme case, assume the full responsibility for energy sector projects, as has been proposed in the past in the form of a State owned import terminal with the State entering into the retail gasoline business.

An Integrated Energy Strategy to be formulated by DBEDT should consider in particular the following options:

- **LNG**. The Pacific Rim has abundant reserves of natural gas that are too far removed from markets to be developed other than through liquefaction and transportation as LNG. Based on typical cost structures for LNG, and preliminary analysis for this study, it should be possible to deliver LNG into Oahu's power plants at savings of as much as $80 to $100 million versus the

current cost of Low Sulfur Fuel Oil. Although still an imported fossil fuel, replacing LSFO by LNG would reduce Hawaii's petroleum dependence by up to 30%.

- **Refinery Upgrades**. As outlined in Section 3.5, preliminary analysis indicates that the long term economic viability of Hawaii's refineries is questionable should they lose their ability to sell LSFO to the local power producers. Based on modeling studies performed for Stillwater by The Process Group, an Irvine, CA engineering consultancy, preliminary indications are that significant refinery cost savings and revenue increases could be achieved by upgrading their capabilities. Since the configuration of these two refineries' processing units is complementary, full advantage of the upgrades would mean that the refineries would exchange feedstocks for processing into gasoline, jet fuel, and diesel. The refining option could result in exports of special grade gasolines to California, offering economies of scale for Hawaii's gasoline production and facilitating local blending of ethanol as well as ethanol exports to California. Preliminary indications are that potential savings from reduced crude oil cost and additional revenues could be as much as $200 million per year for an investment of $430 million.

- **Renewable Energy**. Currently, Hawaii derives between 6 and 7% of its primary energy use from non-fossil sources. The Governor's stated goal is to achieve 20% by 2020. Many options for renewable energy should be considered on their own merits as standalone projects, but in particular ethanol from sugarcane or biomass is a renewable fuels option that is tightly connected to Hawaii's gasoline market and could benefit substantially from an integrated approach. One of the problems with the introduction of ethanol in the current situation is that for each gallon of ethanol blended into the gasoline pool, the refiners would have to remove an equal volume of light components to be downgraded as refinery fuel or exported as naphtha. Under a scenario where the refineries are upgraded and routinely export high value blendstocks to California, local blending of ethanol would free up more high value export volumes, while exports of ethanol itself would benefit from economies of scale in shipping.

- **Distributed Generation**. Local production of ethanol could leave significant quantities of biomass residues available for conversion to power in local power

production units. New techniques for combustion of wet and dry biomass reduce emissions and increase efficiency. These technologies should be considered as an integral part of any long term energy infrastructure plans, in particular for the Neighbor Islands, where electricity generated by biomass could displace expensive imported diesel fuel.

- **Hydrogen**. As part of the proposed refinery upgrades, additional hydrogen capacity would be needed. It would seem to be relatively inexpensive to size the equipment slightly larger to produce excess hydrogen, which could be used in a pre-commercialization project for hydrogen powered vehicles. The Bush Administration through the DOE has announced a FreedomCAR & Fuel Initiative to develop partnerships with the DOE, car manufacturers and energy companies to accelerate the development of hydrogen powered vehicles to replace the conventional powered automobile fleet. The aggressive program is aimed at helping the auto industry to reach an early commercialization decision by 2015. The overall program goals are to have fuel cell vehicles in the showroom and hydrogen at service stations by the year 2020. As part of the program, a consortium of automakers and hydrogen suppliers will have to demonstrate the economic viability of vehicles and a start-up hydrogen infrastructure in a controlled environment prior to commercialization. The ideal location would be one in which hydrogen is readily available, where the consumers face fewer issues related to using a new technology for long-distance travel, and where other variables can be held constant to the extent practical. The island of Oahu presents an ideal test environment because of the natural isolation of its car fleet. Currently, the most economic way to manufacture hydrogen is steam reforming, which would be available as part of the refinery upgrades that could be considered under the Integrated Energy Strategy. There is significant research on other hydrogen pathways from renewable feedstocks as well.

- **Energy Contingency Planning**. A holistic approach to Hawaii's energy infrastructure should also consider security of supply issues under various scenarios, and build in contingencies to deal with eventualities such as natural disasters and geopolitical events. Features of the proposed Integrated Energy Strategy could improve energy security because they would seek to diversify supply, increase the share of renewable fuels, build in a cushion because of

export oriented production and significantly reduce overall petroleum dependency.

8.2.2 Benefits of an Integrated Energy Strategy

Preliminary analysis conducted by Stillwater Associates indicates that the elements of the proposed Integrated Energy Strategy could reduce petroleum dependency by 30%, and lower the State's energy bill by as much as $300 million per year. At the primary energy level, preliminary estimates indicate that the refinery upgrade and LNG project could generate very significant benefits for the State of Hawaii.

If all elements of the Strategy could be executed at cost estimates assumed, the State's economy would benefit from the very significant investments by the private energy sector. These benefits are estimated in the order of $400 to $450 million for the refinery projects, $200 million for LNG and associated infrastructure improvements, and $100 million for ethanol. If Hawaii became a net exporter of gasoline to California, Hawaii's gasoline market would also benefit from economies of scale. The projects could assure the competitive position of the Hawaii refineries for some time, and maintain the employment of thousands of people directly or indirectly dependent on these industries.

If Hawaii could become a net exporter of gasoline to California, it could open up economies of scale for shipping locally produced ethanol to that state, or alternatively, blend the ethanol into the local gasoline pool to free up more gasoline for exports. If LNG could be introduced cost-effectively at the appropriate level of capacity, it could be considered for substitution of diesel in public transportation with Compressed Natural Gas (CNG). Such a scenario would also require additional analysis, which would be just one component of the comprehensive feasibility analyses envisioned under the proposed Integrated Energy Strategy.

8.2.3 Pros & Cons of the Integrated Energy Strategy

Pro:

- Significant energy cost savings
- Reduced petroleum dependence
- Reduced air pollution, notably carbon dioxide and sulfur oxides

- Maintains existing and adds new high quality employment
- Structurally reduces the cost of refining for gasoline
- With steady gasoline exports to California, Hawaii would be able to realize economies of scale on exports of ethanol

Con:

- Multi-year project, not easy to realize, which requires political will
- More technically and commercially complex refining infrastructure
- Refinery integration will have to be realized within a commercial framework acceptable to the FTC and local regulators.
- The project requires a complicated, sophisticated and successful stakeholder consensus-building approach
- Significant hurdles must be overcome in the site selection and permitting process
- Requires very significant private sector investment

8.3 Consumer Education

Hawaii consumers, despite occasional signs of outrage in local newspaper editorials, in general seem fairly complacent about their high cost of gasoline. An example of complacency is that a disproportionate amount of drivers in Hawaii (35% versus total US 20%) fills up with midgrade or premium. There is no evidence that indicates that the Hawaii car fleet composition justifies this buying behavior. Anecdotal evidence gathered during Stakeholder interviews and gas station surveys suggests that the buying behavior is largely the result of drivers not being fully informed about octane requirements of their cars.

8.3.1 Potential Role for Government in Consumer Education

An easy way to reduce the average cost of gasoline to the Hawaii consumer would be to encourage consumers to shift from midgrade and premium gasoline to regular grade, as their owner's manual probably recommends. The State could launch a consumer awareness program, potentially involving schools and other public

institutions, to educate Hawaii drivers about octane requirements for their cars. Alternatively, gasoline retailers could be required to post a sticker on their pumps that urges consumers to check their owner's manuals for the correct octane for their cars.

8.3.2 Cost of Consumer Education

As marketers know all too well, changing consumer behavior is not easy. Advertising campaigns and promotional materials need to be well designed and used in high visibility media in order to be effective, and can quickly amount to several hundred thousand dollars even for modest exposure. This is an area where, a budget can be set within whatever the State's means are, with the effectiveness proportional to the money spent. A reasonable cost for a modest campaign seems about $100,000 [See 8.4.1].

8.3.3 Benefits of Consumer Education

If the total consumption of premium and midgrade gasoline in Hawaii were to be reduced from its current level of 35% to the US average of 20%, Hawaii consumers would save $7 million per year at historical price differentials. It is unlikely that with a low budget approach, all consumers could be persuaded to change. It is however not unreasonable to assume that, even on a low budget, 15% of the consumers can be persuaded to switch to the octane grade their car actually needs, which would result in a saving of $1 million per year.

8.4 Subsidies and Incentives

Hands-off policy making between government and private industry is usually recommended by advocates of free markets. A major reason for Hawaii's high gas prices is that gasoline must carry the burden of generating a profit to the refiners, despite its relatively small ratio to overall refinery production. Fuel oil and jet fuel, the primary products currently do not generate a proportional contribution towards cash cost of production.

If gasoline prices must be artificially suppressed for social or political reasons, then one alternative to price caps would be to shift some of the burden to fuel oil or jet fuel. Fuel oil is already part of the problem rather than the solution, because it is an expensive power fuel in comparison to coal and possibly liquefied natural gas, and Hawaii already has some of the highest electricity costs in the US. A tax on imported jet fuel, on the other hand, would shift some of the gasoline segment's burden offshore.

8.4.1 Jet Fuel Tax

If a 5 cpg tax on imported jet fuel were to be imposed, then this would in principle allow the local refiners to raise their jet fuel prices by a corresponding amount while it would still not trigger domestic substitution. This higher cost, on a volume of approximately 30 TBD, would be borne by customers of inter-island and inter-state carriers. Given that this volume is of the same order as gasoline production, a 5 cpg increase in jet would allow a gasoline price reduction by 5 cpg, while still maintaining the profitability of the refiners. Instead of importing jet fuel for domestic consumption, the airlines would buy the fuel at a price near import parity plus slightly less than the 5 cpg tax. All the import duty would do is raise the cost of import parity.

8.4.2 Costs of Raising a Jet Fuel Tax

The jet fuel consumers are to a large extent a captive market. Planes have to refuel at the islands, although improved efficiencies have reduced the need. However, the tourist industry is competitive and demand is price sensitive. A 5 cpg increase in jet is likely to raise airfares to Hawaii by about 2%. If airfares are assumed at 25% of total trip cost (based on $1600 in-State average visitor expenditure[73] and $400 average airfare), then a 2% increase in airfare would result in a 0.5% increase in the cost of the average Hawaii holiday package. This increase would apply only to consumers flying in from the continental US, as well as inter-island passengers (about 60% of total traffic), since foreign flights would use bonded fuel.

If further a demand elasticity of -1 is assumed for holiday tourism in competition with other destinations, then a 0.5% increase in cost would result in a decrease in the number of visitors of 0.5%. With annual visitor expenditures of $11 billion, of which an estimated 5 billion is spent by US visitors, a 0.5% reduction in visitors equates to a $25 million loss of revenues for the State. In addition, a reasonable assumption is that such a program would require at least the same resources as a price cap management system, i.e., $0.5 million per year with a $0.3 million initial charge to create an effective volume and cost reporting system.

[73] State of Hawaii, *Facts and Figures 2000*

8.4.3 Benefits of Raising a Jet Fuel Tax

If the jet fuel price increase is fully contributed to gasoline price reductions as outlined above, the benefits to the Hawaii gasoline consumer would be $21 million. This gasoline consumer benefit has to be offset by the penalty to the Hawaii consumers in terms of higher jet fuel cost for intra-state flights and when flying to the continental US. With about 10,000 BPD of intra-state jet usage, the consumer loss in higher fares would be at least $8 to 10 million, leaving a net consumer benefit in the order of $11 to $13 million. This benefit should be compared versus a loss of visitor revenues of $25 million, estimated above.

8.4.4 Pros and Cons of a Jet Fuel Tax

Pros:

- A way to shift some of the cost of refinery inefficiency from the Hawaii population to visitors, but only Mainland visitors.

Cons:

- Rough estimate of impact on tourism would leave a net loss to the overall economy of the State.
- Half of what consumers might gain in lower gas prices they would lose on higher intra-state and domestic US airfares.
- Sends the wrong message.
- Ensuring that the refiners' benefits from higher jet prices would flow to gasoline consumers requires a separate set of measures.
- Hawaii residents will pay higher inter island and Mainland airfares.

8.5 Aggressive Measure to Achieve Import Parity

There is a potential measure the State could envisage that would force the gasoline and diesel markets down to full import parity. Such a measure would have to extend to not just import facilities, but would also require significant intervention in the distribution and retail structure because it is unlikely that the refiners, who are deeply invested in the islands, would give independent importers access to their branded stations. Nor would the non-refining marketers,

who already have access to all the volumes they need at import parity and could import more if they wanted to, voluntarily yield their market position in retail.

8.5.1 Option to Achieve Import Parity

To force the market to full import parity, an option could be the creation of a public terminal, as proposed by legislators in the past. This option could be realized by acquiring, or leasing under long term contract, the largely idle Aloha/USRP terminal. Since this terminal alone would not give access to retail other than the unbranded dealers on Oahu, the State would also have to invest in distribution infrastructure and retail outlets, either by buying existing assets or by building new facilities.

The State could purchase gasoline from importers or from the refiners at an import parity value and store it in the rented terminal. Obviously, this is an unusual step that would likely meet considerable resistance. For the sake of completeness the costs and benefits will be evaluated below.

8.5.2 Benefits of Full Import Parity

At full import parity, based on historical price differentials over the period 1992 – 2001, and assuming 6 cpg shipping, 2 cpg terminalling, 13 cpg marketing, 5 cpg average Oahu plus inter island distribution and 9 cpg retail margin, gasoline and retail diesel prices would have been 15 cpg lower for retail sales of gasoline and diesel. If at 30% market share, the State's sales are sufficient to bring the entire market to import parity, then the total consumer savings over 27,000 BPD of retail gasoline and 2,000 BPD of diesel, would amount to approximately $67 million per year.

This number is indeed a significant consumer benefit, but is more than the operating profit of the refineries on their current volume of sales, estimated at $64 million. With the loss of 30% market share in gasoline and the need to export the corresponding volumes at marginal cost, the likely result will indeed be closure of at least one, but possibly both local refineries.

8.5.3 Costs of Full Import Parity

The cost of closure of the local refineries is more difficult to estimate. In the absence of an integrated model that tracks all the economic effects of industry actions, economists turn to rough multipliers to capture the direct and indirect effects of a decrease in

employment on the economic conditions of the region. Sample multiplier estimates range from 1.5 to 2 times. We can apply this range to the option of closing refineries. The Hawaii refineries employ about 500 full-time personnel and an equal number of contractors. Not all of these jobs would be lost in this option when at least one refinery's tankfarm were to be used as the import terminal after closure of the refinery. If we assume that it will take 50 people to run the terminal, the net job loss would be 950 employees and contractors. With a multiplier of 1.5, the ripple effect would be about 1,400 jobs lost, or 0.2% of Hawaii's total workforce.

In terms of overall loss of income to the State, the refinery operating expenses are estimated at $233 million per year. Not all of those expenses flow to or through parties residing in Hawaii and some of the expenses would continue for the terminal operation. A reasonable estimate for the net loss of local revenue is $150 million per year, which includes payroll and benefits, maintenance contractors, local taxes and fees, small supplies and services, local utilities, etc. Economists also use multipliers to calculate the indirect effects of output loss within a regional economy, with sample output multiplier estimate of 2.7 times the direct impact. The potential impact of the loss of $150 million per year can translate into an indirect loss of about $400 million.

If import parity were to be achieved through a State owned or controlled import terminal and retail chain, additional costs would be involved. The cost of renting the terminal space is actually only a minor component in the context of the other expenses. Generally acceptable commercial rates for term leases of storage capacity in large bulk terminals are around $0.50 per barrel of capacity per month in other markets. This would place the cost of renting the terminal at $3 million per year.

The cost of securing access to retail is a different story. If the State wanted to make inexpensive gasoline available to the Hawaii consumers, it cannot do so only to a select few. For such a policy to have its desired effect, it must be able to supply a significant share of the market, i.e., 30%, or 8000 BPD, a volume which could comfortably be handled through the 500,000 bbl terminal. Even if the State would be able to successfully secure high volume retail locations capable of moving 30,000 gallons per day on average, it would still require at least 10-12 stations at an estimated $2.0 million each, or $20 million. If the State wanted to sell the gasoline at other islands besides Oahu, the costs of smaller distribution terminals would have to be added. Moreover, the State would incur the cost of working capital, with inventories and payables minus receivables estimated at $20 million.

In summary, the cost of achieving full import parity is in the order of $400 million per year, including the loss of 1,400 jobs, without capital expenditure in case of low price caps, or the same revenue and job loss plus $40 million in capital and $3 million in operating expenses, in the case of the State controlled import terminal. In the case of the latter, the State of course would also incur the actual costs of running the stations, but it is assumed that these would be covered in the import parity retail price and that the state would be at least as cost efficient as the remaining private operators.

8.5.4 Pros and Cons of Achieving Full Import Parity

Pros:

- Significant consumer benefits of up to $67 million per year.
- Lower overall emissions and energy usage in the State.
- Land at Barbers Point available for redevelopment.

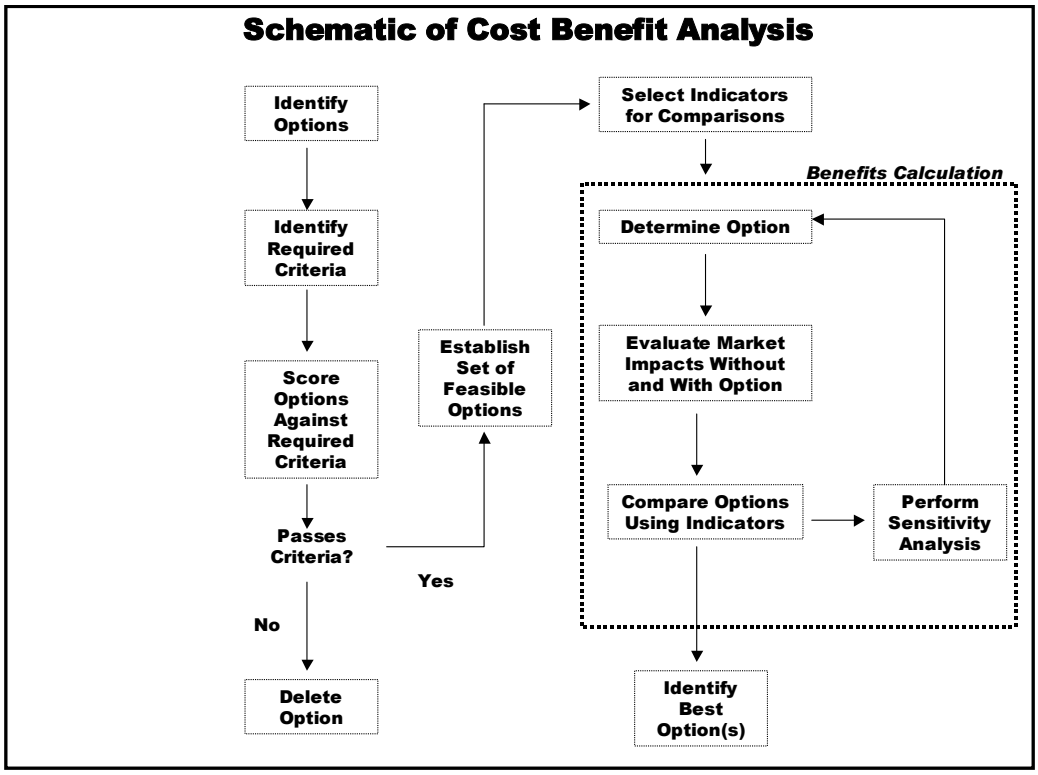
Cons:

- Direct and indirect loss of 1,400 jobs and $400 million in economic contribution.
- Overall petroleum dependency shifted from one product, crude oil, to complex slate of products ranging from LPG through asphalt, which, like gasoline, would need to be imported directly to Hawaii. This would likely increase the frequency of tanker visits, heightening risk exposure, especially with residual fuel, and increase the complexity of the marine logistics infrastructure.
- If achieved through State controlled terminal and State owned distribution, will require at least $40 million in capital and $3 million in annual terminal expenses with no return on investment other than consumer savings.
- Likely to trigger expensive litigation with dubious chance of success for the State because of unlawful takings.

9 SUMMARY OF COST/BENEFIT ANALYSIS

Cost Benefit Analysis (CBA) is an organized framework to compare alternative policies on the basis of net benefits to society. The CBA process can be separated into the following steps:

Figure 9.1 – Schematic of Cost – Benefit Analysis



1. Specify the set of feasible options.
2. Identify the required criteria for consideration of an option and score the option on meeting the required criteria.
3. Identify the set of benefits and costs to consider.
4. Identify the economic indicators to use for comparisons and evaluate the economic impacts **without** and **with** the option.
5. Perform sensitivity analysis on leveraging assumptions of the options.
6. Identify the best option(s) from the analysis.

After satisfying the necessary conditions, the resultant feasible options are then compared on the basis of benefits versus costs, that is, net benefits (benefits less costs) with the option versus without

the option. On the cost side, one must include all incremental costs, including capital costs, operating costs, working capital, etc. If there is environmental degradation, this must be monetized and included as a cost (or a negative benefit). On the benefit side, one must identify all the economic benefits that society receives with and without the option in place.

Provided below is a first pass cost-benefit analysis, for which it will be assumed that taxpayer expenditures and cost savings to gasoline consumers can be directly compared, i.e., that all taxpayers are also consumers of gasoline and other fuels, as the case may be. It is also important to realize that although certain alternatives may benefit the consumer and therefore the taxpayer, the State of Hawaii may actually see less revenue. For instance, if the State implements a transparency and oversight program at an annual expense of $250,000 which effectively lowers the price of gasoline and saves consumers $5 million per year, the State would not only have to find the money to fund the expenditures but also lose out on fuel taxes.

9.1 Set of Feasible Options

A number of options are listed below, sometimes combining several of the alternatives examined in combining several of the alternatives discussed above. They include:

- Keep Act 77 as is.
- Do not implement price controls, increase price transparency, create effective industry oversight, and educate the premium gasoline buyer.
- Implement a jet fuel import tax to subsidize gasoline sales.
- Do not implement price controls, but bring prices down to full import parity with state controlled import terminal and retail; accept closure of the local refineries, and use these as terminals to import all of Hawaii's fuel requirements.
- In partnership with industry, and other strategic stakeholders, the State should develop an Integrated Energy Strategy. Among a comprehensive mix of appropriate energy options for Hawaii, the Integrated Energy Strategy should include a complete, multi-faceted feasibility analysis of LNG imports for power generation and other energy sectors, plus refinery upgrades.

There are, of course, additional options and it is possible that some of the preferred options may face political impediments. Some of the options cited above may, in fact, do more harm than good in resolving the perceived market imperfection.

9.2 Summary of Costs and Benefits of Options

Table 9.1 summarizes the cost and benefits of the various options.

Table 9.1 – Summary of Cost Benefit Analysis of Options

Costs:	Start up / Annual			Benefits	
Option	**$MM**	**$MM/yr**	**Paid By**	**$MM/yr**	**Benefits**
Act 77 Caps	0.30	0.5	DBEDT/PUC	0 to -1	Consumer
Transparency & Education	0.30	0.25	DBEDT	1 to 8	Consumer
Oversight	0	0	AG/DoTax/PUC	-	Consumer
Jet Fuel Tax	0.30	25	State	11-13	Consumer
State Imports & Retail	43	>150	State	67	Consumer
Integrated Energy Strategy	?	?	Industry	300	State/ Consumer

The cost and benefits shown are the direct effects. Economists use multipliers to calculate the indirect effects of output loss within a regional economy, with sample output multiplier estimates ranging from 2 to 3 times the direct impact. Distinction must be made between money no longer spent within the economy and money saved on one item but likely to be spent at least on other items within the local economy, for which lower multipliers apply. This tends to widen the gap between costs and benefits considerably.

For the loss of tourism income and the local refinery operating expenditures, the moneys would no longer be spent in the islands, and a multiplier of 2.7 would put the total loss to the Hawaii economy for these cases at $67 and $400 million respectively.

For the consumer benefits derived from lower gasoline or utility costs, it will be assumed that there is no offsetting loss to the local economy in the form of lost producer benefits, that is to say, that the local producers would have exported their profits. Moreover, it will be assumed that all of the consumer benefits will remain within the local economy and be spent in segments with a greater economic multiplier (the energy business is capital intensive, not labor intensive). A reasonable estimate for the net effect of spending the consumer savings in the energy sector in other segments is 1.2, which would put the maximum for net benefits for price caps and oversight close to $10 million, and would put the estimated maximum potential benefits for the Hawaii economy from the Integrated Energy Strategy at $360 million per year.

10 CONCLUSIONS AND RECOMMENDATIONS

Clear conclusions emerge from the analysis of facts that underlie the complex cost structure of Hawaii's petroleum industry. The recommendations are formulated to address these conclusions and are presented in an order of priority that takes into account feasibility, benefits and costs.

10.1 Conclusions

10.1.1 Refining Profitability and Gasoline Cost

The profitability of Hawaii's refineries is greater than their limited configuration and high crude cost would allow elsewhere in the US, and is derived from market power in a concentrated market, notably by being able to maintain relatively high margins on gasoline sales. However, their overall profitability is not beyond reasonable returns on investment, and a long term trend can be discerned that shows eroding profitability in gasoline.

The underlying reason for this trend appears to be the fact that non-refining marketers, with an import terminal at their disposition, have access from the local refiners to product at import parity. These non-refining marketers have lower overheads than the refiners and use their cost advantage to slowly gain market share. Over the past ten years, the combined retail gasoline market share of two refiners has decreased by approximately 6%, which means that they had to shift a significant proportion of their highly profitable retail sales to wholesale, a segment in which they barely break even. If this trend continues, then ultimately the refining industry in Hawaii would disappear.

In their current configuration, with their requirement for special quality crude oil and looming stricter sulfur specifications for gasoline and diesel, Hawaii's refineries are in fact ill equipped to compete long term with the very large export refineries in the Pacific Rim. In principle, all fuels in Hawaii could be imported. In their forward energy planning and policy decisions, the Hawaii legislature faces a choice between the economic and strategic benefit derived from the continued presence of the local refineries and consumer benefit derived from lower gasoline prices.

10.1.2 Gasoline Marketing and Retail

The gasoline wholesale marketing and retail segment in Hawaii suffers from high costs and small volumes, which combine to make Hawaii significantly more expensive than

most other regions of the US. Marketers and retailers in Hawaii operate on roughly half the volume at double the cost of their counterparts elsewhere in the US, which causes the per gallon cost to be approximately four times as high. In addition, the average distribution costs in the islands are much higher than in most markets. Finally, Hawaii gasoline retailers have been late in switching from service bays to convenience stores as their complementary form of income, with the latter generating a significantly higher fraction of net retail income in most parts of the US.

10.1.3 Reconciliation of Study Results and Public Perception

Overall, a quantitative analysis of Hawaii's petroleum industry in its entirety as has been presented here, results in conclusions that are substantially different from the public perception based on gasoline prices alone. Prior integral studies, such as those conducted by the expert witnesses in the State's anti-trust lawsuit (including the State's own experts), also concluded that the overall level of profitability of the petroleum industry in Hawaii was not an issue. The AG's concerns were not based on the absolute profitability of the industry, rather on the relative profitability in gasoline, where the local suppliers had market power.

The significant departure between reality and public perception has been widened by an initial unwillingness to cooperate and provide information and by the failure of some in the industry to respond to out-of-context quotations and misquotes.

10.1.4 Price Caps and Divorcement

An extensive evaluation of price caps implemented in other markets has failed to identify examples where clear consumer benefits were achieved. To the contrary, many examples were found in which the price caps resulted in clear disadvantages to the consumer.

The Act 77 price caps would result in several undesirable consequences for Hawaii. The caps would bring volatility, market distortions, and opportunities for profiteers to game the market. They would be difficult to administer and, while on average the petroleum industry might be better off under the caps, there would likely be small retailers in remote areas who would no longer be able to provide services.

Similarly, the divorcement legislation has not brought any real benefits to Hawaii. Over time, divorcement has resulted in higher prices for consumers[74], lower resale values for marginal lessee dealerships, while it offers no real protection to those dealers other then preventing encroachment by company operated stations.

10.1.5 Transparency and Oversight

The current reporting system for volumes as maintained by DBEDT for Hawaii, as well as the data collected and published by the EIA, do not allow an easy evaluation of the operational functioning and the profitability of the petroleum industry in Hawaii.

No resources have ever been allocated to move beyond the cumbersome manual data collection process. This resource inadequacy together with burdensome administrative rule-making requirements in the law, have precluded any significant advancements of the State's data functions beyond the long ago superceded statute, Chapter 486E, HRS, which was replaced by Chapter 486J, HRS. The lack of transparency and analysis has contributed to a deteriorating relationship between government and industry, fueled by suspicion on the one hand and an unwillingness to provide information on the other.

Transparency is likely to be beneficial for both industry and government, will be a necessary function not just to monitor pricing and profitability by market segment in a highly concentrated market for essential commodities, but also to ensure long term energy security for the State. Yet the currently available resources do not allow for effective collection and analysis of the data.

10.1.6 Consumer Behavior

Hawaii has a unique market structure, with a combination of low growth and an apparent complacency about prices. Examples are the disproportional consumption of midgrade and premium gasoline, and the willingness to purchase at higher priced local dealerships for reasons other than price.

[74] Regulatory Restrictions on Vertical Integration and Control: The Competitive Impact of Gasoline Divorcement Policies, Michael G. Vita, Federal Trade Commission, 1999

10.1.7 Other Energy Sectors

Hawaii not only sees some of the highest gasoline prices in the US, but also has the dubious privilege of paying more for its electrical power and utility gas than most other states in the nation. Options may exist to cost-effectively introduce Liquefied Natural Gas (LNG) to replace the expensive Low Sulfur Fuel Oil (LSFO) burned in Oahu's main power plants and the Synthetic Natural Gas produced from naphtha. However, the loss of the fuel oil sales and the need to export the LSFO to Asia at low prices will reduce the profitability of the local refineries to a point where their continued operation is unlikely. Given the erosion of their gasoline profits as outlined above, an Integrated Energy Strategy is proposed that preliminary data indicate could possibly offer advantages of lower LNG costs while enhancing the economic viability of the local refineries.

10.2 Recommendations

10.2.1 Price Caps

Implementation of the price caps is not recommended. The current formula, with its linkage to the West Coast, is unlikely to lower prices in Hawaii and instead will impart volatility and seasonality on the Hawaii market. An extensive survey of price cap schemes practiced elsewhere has failed to identify any that resulted in clear consumer advantages. Instead evidence was found that price caps are difficult to administer effectively, and that the caps offer opportunities for gaming the markets, while causing occasional market distortions and supply difficulties.

Price cap initiatives project an anti-business image for the State and are detrimental to new investment. Consistent with the Legislature's requirement (Act 77) for this analysis prior to implementation of the price caps, it is clear that the repeal of the caps has been rationalized and should be communicated to the general public and the petroleum industry in the context of this comprehensive study, which has developed the other recommendations listed below.

10.2.2 Transparency and Oversight

The current provisions of Chapter 486J-1 through J-9 of Hawaii's Trade Regulations and Practice Code need to be modified to create an effective system for transparency and oversight of the Hawaii petroleum industry. Specific examples of all of the required

types of amendments to the law's data function structure are suggested in Section 8.1.1, and are to be included in their entirety in proposed legislative language to be provided as required by Act 77. Further recommendations are that:

- The legislators amend §486J-1 of the Trade Regulation and Practice Code to eliminate the position of Petroleum Commissioner. The duties assigned to the Commissioner throughout §486J instead should be returned to the Director of DBEDT, with the exception of §486J - 5 (b) and for which separate recommendations are made below.

- The legislators amend §486J - 5 (b) of the Trade Regulation and Practice Code to eliminate the requirement for periodic and random audits. It is recommended instead that that the Director of DBEDT give access to the data and information to agencies equipped and authorized to investigate suspected code violations, such as the Attorney General's Office, the Public Utilities Commission, Consumer Advocate, and the Department of Taxation.

- It is further strongly recommended that funds, estimated at $300,000, are provided to DBEDT to carry out the tasks assigned to it under Chapter 486J. With current resources available to DBEDT and a manual data gathering system, it is not humanly or physically possible to comply with the requirements. It is imperative that a system is created whereby data is received in electronic form so that adequate resources can be assigned to verify and analyze data. Stillwater Associates emphasizes that, <u>at a minimum,</u> the required additional resources needed for DBEDT to perform these functions are one industry expert, one data analyst, and one administrator to the task. It is reiterated that no resources were ever allocated to implement the existing data functions in Chapter 486J, HRS.

The annual expenditures for monitoring and analysis are estimated at $250,000. The benefits in terms of price control for consumers are estimated to be potentially as high as $7 million.

10.2.3 Consumer Education and Industry Relations

It is recommended that DBEDT be funded to launch a consumer education effort. Areas where consumers could benefit from being better informed are:

- Motor octane requirements. Hawaii's consumers could save as much as the hypothetical savings calculated for the price cap scheme, $7 million per year, by simply buying midgrade and premium gasoline in the same proportion to regular as do gasoline consumers in the rest of the US. This could be implemented by requiring retailers to place stickers on the gasoline pumps, placing the education burden on the oil industry.

- Cost structure of the petroleum industry. Assuming resources are allocated to develop, operate, and maintain the electronic data system recommended in Section 10.2.2, DBEDT could publish on its website margin information on a periodic basis, similar as that provided for the California consumers by that state's Energy Commission. Examples can be found at www.energy.ca.gov/gasoline/margins/index.html.

- Consumer tips about cheaper gasoline, including expansion of the website at http://www.hawaii.gov/dbedt/ert/gasoline.html or cooperation with the AAA website or "Daily Fuel Gauge Report"

- General industry information. Create a campaign which should aim at restoring a level of confidence between industry, legislature, the press and general public.

10.2.4 Intrinsic Reduction of Energy Cost and Petroleum Dependency – An Integrated Energy Strategy

It is strongly recommended that the State takes a pro-active role in the further evaluation of the technical, economical and commercial feasibility of drafting and executing an Integrated Energy Strategy, as described in more detail in Section 8.2

Although private industry can be expected to respond to the opportunity, the industry perception of Hawaii's investment climate is that clear policy signals, such as those recommended in this report, and a leadership role from government, will be needed before initiatives from the private sector can be expected.

The preliminary evaluation indicates that the State may be able to reduce its petroleum dependency by 30% and its energy bill by as much as $300 million per year. Moreover, a framework could be created that will facilitate additional elements of the Integrated Energy Strategy to be realized more easily, such as large scale ethanol production, additional power generation from biomass, and piloting a hydrogen fleet fueling

program. The consumer benefits would be achieved through technical improvements, offering intrinsically lower cost and economies of scale, rather than through legislative intervention in the markets,

Attachment A – Comparison of Canadian and Hawaii Price Controls

	Prince Edward Island	Newfoundland	Hawaii
Background			
Population (1)	135,294	512,930	1,224,398
Area - sq mi (2)	2038	133,380	6922
Supplied from	Halifax, Nova Scotia primarily, but also Saint John, New Brunswick, and Montreal, Quebec	Come by Chance Refinery (built for US market; not allowed to supply other Canadian provinces)	Chevron and Tesoro Refineries.
Refiners	0	1	2
Wholesalers	9	?	6
Retail Distributors	27 (95 trucks)	10	12
Retail stations	49	545 (1997) 70% branded	339 (310 branded)
Major Brands	5	5 Top 3 have 86% share	4
Price Controls			
Implementation	1988	2001	2004
Basis	(Was crude price based. Changed 2002.) • Benchmarked to NY Harbor spot gasoline prices • Indicative change applied to historical pump price by brand. • Dealer markup: 5-6.5 cpl FS, 4-5.5 cpl SS • Minimum and maximum prices	• Benchmarked to Platt's NY Harbor spot gasoline prices • Add 12 cpl marketing margin (historical based) (in lieu of minimum price) • Plus applicable taxes • (Any) allowed service costs not captured in other components	Act 77: • Average of OPIS West Coast spot prices (LA,SF,PNW equally weighted) • Marked up for transportation costs, marketing margin, and applicable taxes
Coverage	• Gasoline: SS and FS, RUL, MUL, PUL. • LS Diesel. • 6 brands: Ultramar, Shell, Imperial, Irving, PetroCan, Co-op, Wilson. Also, furnace fuel (max only)	• RUL, MUL, PUL gasoline • LS diesel • SS and FS • 14 zones and 11 sub-zones (zones have been added over time)	• SS Regular only
Oversight body	*Island Regulatory and Appeals Commission*. Combined PUC, Land Use Commission, and Residential Rental Property Commission. 8 commissioners (3 full time). Staff of 18. Reports to Legislature through Minister of Education.	*Petroleum Products Planning Commission*. Commissioner appointed by Provincial Premier. Only commissioner still in office. Background: M.Ed.	Public Utilities Commission
Process	Monthly posting of max/min prices	Monthly posting (mid-month) of max prices	Weekly calculation of maximum wholesale and

			retail prices
	Prince Edward Island	**Newfoundland**	**Hawaii**
Flexibility	Can adjust if conditions warrant (adjusted 3.8 cpl in 2002)	Can adjust if conditions warrant	Can adjust
Appeals	Companies can appeal to Commission	Companies can appeal to Commission (one allowed per 12 month period)	Yes
Surveillance	Random visits. Field investigator can levy fines.	None to minimal	Yes
Reporting	Requires records on daily product movements, inventory, volume, price by outlet to be available to Commission upon request.	Requires quarterly reports of volumes, average monthly prices (w/ and w/o taxes) by outlet	Yes
Funding	General Budget	Funded by $.0004 cpl fuel tax	No
Staffing	3 FTEs for fuel pricing	6 FTEs plus half-time consultant	None other than Commission
Budget	Comparable to Newfoundland	400,000-500,000 $Cdn	None
Other	License individual stations.	Concerned about reseller being squeezed	

Attachment B – FTC Testimony

Competition and the Effects of Price Controls in Hawaii's Gasoline Market

Testimony of Jerry Ellig, Deputy Director, Office of Policy Planning

Federal Trade Commission

Before the State of Hawaii

Joint Hearing

House Committee on Energy and Environmental Protection

Senate Committee on Energy and Environment

House Committee on Consumer Protection and Commerce

Senate Committee on Commerce, Consumer Protection, and Housing

House Committee on Transportation

Senate Committee on Transportation, Military Affairs, and Government Operations

January 28, 2003

Thank you for the opportunity to share the Federal Trade Commission staff's views on the likely effects of price controls and other policies in Hawaii's gasoline market.[(1)]

The Federal Trade Commission is charged by statute with preventing unfair methods of competition and unfair or deceptive acts or practices in or affecting commerce.[(2)] Commission staff have had considerable experience assessing the competitive impact of regulations and business practices in the petroleum industry, including the petroleum industry in Hawaii.[(3)] On numerous occasions, the Commission staff have offered comments on proposed state laws covering a variety of areas, including laws that would regulate gasoline prices, ban sales of motor fuels below cost, or limit competition between refiner-owned and independent gas stations.[(4)]

In May 2002, Hawaii enacted Act 77, imposing wholesale and retail price controls on regular unleaded gasoline beginning on July 1, 2004. The legislation also directed Hawaii's Department of Business, Economic Development and Tourism (DBEDT) to assess the likely impact of price controls and other alternative policies to reduce gasoline prices in Hawaii. We believe that the Legislature showed great foresight when it included this provision.

During the past several months, the staff of the FTC's Office of Policy Planning, Bureau of Economics, and the Western Region (San Francisco) have engaged in extensive conversations with staff of the Hawaii Attorney General's Office and DBEDT. We have reviewed documents from the State's price-fixing lawsuit against the oil companies,[(5)] materials from the FTC's own investigations of oil company mergers affecting Hawaii's gasoline market, and price data collected as part of an ongoing FTC gasoline price monitoring project. Based on the evidence we have seen, we offer the following observations that may be of use to Hawaii's policymakers as you consider alternative policies affecting competition and pricing in the gasoline market:

1. Hawaii's gasoline market has two refineries and six principal retail chains. Import prices for gasoline have a significant influence on its wholesale price. Several features of Hawaii's market tend to reduce retail supply and increase retail prices, including rent caps for stations operated by lessee-dealers and a retail "anti-encroachment" law restricting marketers' ability to open new company-operated stations near existing dealer-operated stations.

2. Price controls usually create shortages, reduce quality, and generate inconvenience for consumers when they are imposed in markets that could be competitive. If the price controls in Act 77 become effective and succeed in reducing retail gasoline prices, they likely will impose significant non-price costs on consumers.

3. The more consumer-friendly way to reduce gasoline prices in Hawaii would be through policies that reduce costs and/or promote competition. Policies that may deserve further consideration include repealing Hawaii's retail anti-encroachment law,

repealing the rent cap on gas stations (which may discourage refiners and marketers from establishing new dealer-operated stations), and ensuring that the Hawaii Attorney General's office has adequate resources to review mergers that may impact competition in Hawaii's gasoline market. If DBEDT's ongoing study and other evidence indicate that wholesale gas prices are not competitive, policymakers may want to consider initiatives to improve access to existing import terminals.

I will elaborate briefly on each of these points.

1. Market Structure and Costs

Hawaii's gasoline market has two refineries, owned by ChevronTexaco and Tesoro. The State's five principal marketers - ChevronTexaco, Tesoro, Shell, ConocoPhillips, and Aloha - obtain gasoline from refineries or import terminals and distribute it to retail stations. A sixth marketer, BC Oil, operated the former Texaco properties owned by United States Restaurant Properties but is now bankrupt. Retail stations can be owned and operated by marketers,[(6)] operated by lessee-dealers under contract with the marketer that owns the station, or owned and operated by independent retailers.

Hawaii's refiners import crude oil, and gasoline marketers can also import gasoline. Since Hawaii has only two refineries, both on Oahu, the ease or difficulty of importing gasoline can play a key role in determining the price a marketer pays for gasoline. The refineries in Hawaii normally have the capability to produce approximately enough gasoline to satisfy demand in Hawaii. These two refineries appear to be the lowest-cost source of supply.[(7)] Various firms occasionally have imported gasoline in the past.[(8)] Even if gasoline imports are rare, however, we would expect the cost of imports to influence the price that marketers pay for gasoline in Hawaii. A marketer with the ability to import gasoline likely will have a better chance of negotiating a favorable supply agreement with one of the local refineries, since the refinery likely would have to bear the cost of exporting gasoline if a competitor increased gasoline imports significantly.[(9)]

Act 77 was enacted shortly after settlement of the State's antitrust price-fixing suit against gasoline marketers. Antitrust laws prohibit competitors from agreeing on prices or reaching other agreements that would cause a reduction in competition. However, antitrust law does not prohibit a company from speculating about how its competitors will react to its prices and taking those expectations into account when making its own, independent pricing decisions. Parallel independent behavior, without any direct or circumstantial evidence of explicit agreement on prices or practices that may facilitate collusion, does not violate the antitrust laws.[(10)]

Several significant non-antitrust aspects of Hawaii's gasoline market tend to increase retailers' costs and discourage entry.[(11)] First, due to Hawaii's unusual land ownership regime, it is difficult to obtain fee-simple ownership to land, which may reduce the incentive to invest in station facilities sited on the land.

Second, Hawaii also has sought to enact rent cap legislation limiting the rent wholesalers could charge retail dealers who lease their stations from the wholesalers.[(12)] Wholesalers could respond to rent controls in two different ways, both of which likely would reduce the number and quality of dealer-operated gasoline stations. If rent controls have the effect of reducing the total revenues that a wholesaler receives from dealers, then the wholesaler is likely to have fewer dealer-operated stations than it would in the absence of the rent control and to spend less money maintaining the stations. Alternatively, the wholesaler might try to make up for the lost lease revenues by increasing the price it charges the dealer for gasoline (assuming the wholesale price cap on gasoline is not binding). In that case, the wholesaler effectively bears more risk, because more of its revenues would come from the sale of a commodity whose price fluctuates, rather than from rents. This increased risk increases the wholesaler's cost of selling gasoline through stations operated by lessee-dealers. The wholesaler likely would respond to this cost increase by using fewer dealer-operated stations or investing less money in maintaining the stations. In short, the rent controls likely would

reduce the number and quality of gasoline stations, increase gasoline prices, and cause inconvenience for consumers, who would have to travel farther to find gas stations.

Third, and perhaps most important, Hawaii's law prohibiting "encroachment" (and its predecessor "divorcement" law[13]) constrain the ability of both incumbents and new entrants to establish new stations. In 1991, Hawaii passed a divorcement law that imposed a temporary moratorium on the building of any new company-operated stations, which was extended in 1993 for two more years.[14] In 1995, Hawaii continued the moratorium but revised it slightly.[15] In 1997, Hawaii replaced divorcement with an anti-encroachment law barring oil companies as well as jobbers from opening company-operated stations within a radius of one-eighth of a mile around every dealer-operated station in an urban area and one-quarter of a mile in other areas.[16]

Published economic research demonstrates that anti-encroachment and divorcement laws tend to increase retail gasoline prices. A National Bureau of Economic Research study found that company-operated stations can be the most efficient form of management for high-volume, low-service gasoline stations.[17] Laws that limit marketers' ability to establish new company-operated stations thus force them to adopt higher-cost organizational forms, and these increased costs likely are passed through to consumers in the form of higher gasoline prices. The most comprehensive of the published economic studies, conducted by a senior FTC economist, found that state divorcement and anti-encroachment laws tend to increase retail prices by an average of 2.6 cents per gallon.[18] Another study found Maryland's divorcement law, the first in the nation, raised self-service gasoline prices by 1.4 to 1.7 cents and full-service prices by 5 to 7 cents per gallon at stations that were formerly company-operated.[19] We are aware of no study specifically estimating the effect of Hawaii's divorcement and anti-encroachment laws, but we know of no reason that these laws would not have effects in Hawaii similar to their effects in other states. Indeed, the FTC warned in 1985 that the divorcement law already under discussion in Hawaii "would unquestionably increase

the costs of gasoline distribution, eliminate legitimate price competition, and raise prices for motor fuel to consumers."[(20)]

Legal restrictions on a marketer's ability to establish company-operated stations also may discourage new entry. There is evidence from the record of *Anzai v. Chevron,* Hawaii's now-settled lawsuit against many of the gasoline marketers, showing that Hawaii's anti-encroachment law served to stifle the efforts of BHP, former owner of the Tesoro refinery, to embark on what it hoped would be a low-priced volume retail business.[(21)] This constraint may especially discourage retail entry by jobbers (who purchase unbranded gasoline from refiners) or smaller oil companies, which tend to rely more heavily on company-operated stations instead of franchised dealers.[(22)]

2. Likely Effects of Price Controls

Most economists and antitrust experts doubt that price controls are a viable mechanism to increase consumer welfare in markets where competition is possible, and we see no reason that competition is not possible in Hawaii's gasoline market. Historical experience demonstrates that price controls tend to create shortages, reduce quality, and generate other inefficiencies.[(23)]

The U.S. experience with gasoline price controls in the 1970s confirms the predictions of economic reasoning. In 1971, gasoline prices were regulated as part of the Nixon Administration's two-year adoption of economy-wide wage and price controls. In 1973, the federal government prohibited refiners and marketers from charging prices that exceeded their average prices on May 15, 1973, plus adjustments for changes in costs. Though not identical to the price controls in Act 77, the federal controls were similar in two key ways: (1) they applied both to wholesale and to retail prices, and (2) prices were adjusted based on costs.[(24)] A report by the Federal Trade Commission's Bureau of Economics concluded that the federal price controls led to the adoption of higher-cost production methods and sporadic shortages manifested in gasoline lines.[(25)]

Customers queued up at gasoline stations are perhaps the most visible example of the inefficiencies resulting from the shortages created by gasoline price controls, but myriad other examples actually occurred during this period: limited station hours, Sunday station closures, "odd-even" purchasing restrictions based on license plate numbers, and restrictions on the number of gallons the customer could purchase in a single trip to the gasoline station. Also noteworthy are the secondary effects of such inconveniences, which included efforts to hoard gasoline and, in some instances, an increased hazard of car fires because people began storing additional gasoline in containers in their trunks.[(26)] Some research even shows that the inconvenience and other inefficiencies associated with gasoline station lines cost consumers more than they saved as a result of regulated gas prices.[(27)]

The price controls in Act 77 likely would create shortages. Act 77 ties maximum retail prices in Hawaii to wholesale prices on the West Coast. Tying regulated prices in Hawaii to West Coast prices might not always create shortages. For example, when other sources of imported gasoline are cheaper than the West Coast, the price cap is less binding. The price controls could, however, create shortages when low West Coast prices coincide with a refinery outage in Hawaii. In that case, the price cap would discourage imports precisely when they are most needed.

Even in the absence of refinery problems in Hawaii, the specific formula in Act 77 has the potential to create shortages. For example, the transportation margin needs to reflect not just the out-of-pocket cost of transporting gasoline, but also the time value of money while the product is in transport, the risk that prices might change while the product is in transport, and the likelihood that prices will fall when an entire tanker-load of product enters the market. The assumed transportation margin of four cents per gallon may be below the efficient level. FTC staff have seen no evidence that transportation costs are this low, and evidence from Hawaii's lawsuit against certain of the incumbent gasoline marketers suggests that transportation costs may be substantially higher.[(28)]

Firms may also reduce customer convenience or quality in response to the price controls. For example, the price caps apply only to self-service regular gasoline. A retail station operator could potentially evade the price cap by offering only mid-grade, premium, or full-service. The U.S. experience with gasoline price controls reveals other ways that firms increased customer convenience or decreased quality in response to price controls. Some stations demanded "tips," while others gave customers "free" gasoline if they bought items such as rabbit's-foot key chains, will forms, or bars of soap at inflated prices. Regular customers received preferential access to gasoline. Refiners sometimes reduced octane ratings.[(29)]

In short, FTC staff believe that the costs of price controls to consumers would almost certainly outweigh any consumer benefits.

3. Alternative Policies to Reduce Costs and Prices

Policymakers concerned about gasoline prices in Hawaii might find it productive to assess the likely impact of several alternative policies that have the potential to reduce gasoline prices by reducing costs and/or enhancing competition. Possible options include:

- Repeal Hawaii's anti-encroachment law, so that incumbent refiners and jobbers could build additional company-operated stations in advantageous locations and new entrants would have the option of operating their own stations instead of using franchised dealers.

- Eliminate Hawaii's legislation mandating rent caps for lessee-operated gasoline stations.

- Under merger law, antitrust officials can challenge mergers or acquisitions likely to foster tacit or explicit collusion.[(30)] Hawaii's Attorney General should have resources sufficient to assess whether future mergers or acquisitions are likely to substantially lessen competition.[(31)]

The relationship between terminal access, import prices, and retail prices is another topic that may merit further consideration. Record evidence from Hawaii's lawsuit against the gasoline marketers, as well as economic logic, confirm that the greatest constraint on the pricing of the two local refiners is a marketer's credible threat to purchase gasoline from outside Hawaii.[(32)] If DBEDT's ongoing study and other evidence show that wholesale prices are not competitive,

then policymakers may want to consider options that would improve access to existing terminals for new entrants. Hawaii has no public or private terminal that guarantees third parties nondiscriminatory access to its docks, tanks and pipelines; the State could explore innovative ideas to ensure third party access, on a nondiscriminatory basis.

4. Concluding Comments

FTC staff recognize that gasoline prices have been a highly contentious issue in Hawaii, and that legislators often face strong pressure from citizens to take action against prices that are perceived as "too high." We urge you to consider, however, that a decision to impose price controls is also, in most cases, a decision to supplant competitive forces with direct administrative intervention. A significant body of research and experience suggests that price controls have a poor record of improving consumer welfare in markets where competition is possible, and may in fact cause more harm than good in the long term.

For this reason, we believe the Hawaii Legislature acted with great foresight when it included in Act 77 the provisions delaying the implementation of price controls, so that DBEDT could study their potential impact and assess alternative policies to reduce gasoline prices in Hawaii. Substantial evidence suggests that the alternatives to price controls would best promote consumer welfare, and we urge legislators to consider this evidence when evaluating policies intended to affect gasoline prices.

Endnotes:

1. This testimony represents the views of the staffs of the Office of Policy Planning, the Bureau of Economics, the Bureau of Competition, and Western Region (San Francisco) Office of the Federal Trade Commission and does not necessarily represent the views of the Commission or any individual Commissioner. The Commission has, however, voted to authorize staff to submit this testimony. My oral responses to your questions represent my own views.

2. Federal Trade Commission Act, 15 U.S.C. § 45.

3. *Shell Oil Co., et al.*, 125 F.T.C. 769 (1998) (consent order requiring Shell and Texaco to divest certain assets on the island of Oahu as a condition of entering into a joint venture to combine certain gasoline marketing assets); *Pacific Resources, Inc.*, 111 F.T.C. 322 (1988) (consent order issued following U.S. district court's issuance of preliminary injunction to block Pacific

Resources' acquisition from Shell Oil Company of certain petroleum terminalling and distribution assets and operations in the State of Hawaii).

In recent years, the Commission has investigated, among others, the mergers of Chevron and Texaco, Exxon and Mobil, and BP and Amoco. In 2001, the Commission investigated the proposed merger of petroleum refiners Valero Energy and Ultramar Diamond Shamrock. *See Valero Energy Corp.*, C-4031 (Feb. 19, 2002) (consent order); *Chevron Corp.*, C-4023 (Jan. 2, 2002) (consent order); *Exxon Corp.,* C-3907 (Jan. 30, 2001) (consent order); *British Petroleum Company p.l.c.,* 127 F.T.C. 515 (1999) (consent order). Moreover, the *Shell Oil Co.* consent order referenced in the preceding paragraph stemmed from the planned combination of the nationwide refining and marketing businesses of Shell and Texaco.

The Commission also has conducted nonmerger investigations and workshops involving gasoline markets, and submits public comments in regulatory proceedings. In March 2001, the Commission, using the competition analysis principles in the Merger Guidelines, completed an investigation of a spike in reformulated gasoline (RFG) prices in several Midwest states in the spring and summer of 2000. Midwest Gasoline Price Investigation, Final Report of the Federal Trade Commission (Mar. 29, 2001). Also in 2001, the Commission concluded its investigation of gasoline price increases in West Coast markets. *FTC Closes Western States Gasoline Investigation,* FTC Press Release (May 7, 2001). In addition, in August 2001, the Commission held an initial public conference to examine factors that affect prices of refined petroleum products in the United States. *FTC to Hold Public Conference/Opportunity for Comment on U.S. Gasoline Industry,* FTC Press Release (July 12, 2001). A second public conference was held in May 2002. *FTC to Hold Second Public Conference on the U.S. Oil and Gasoline Industry in May 2002*, FTC Press Release (Dec. 21, 2001). Commission staff also recently filed public comments with the Environmental Protection Agency concerning "boutique fuel" regulations. Comments of the Staff of the General Counsel, Bureaus of Competition and Economics, and the Midwest Region of the Federal Trade Commission, *Study of Unique Gasoline Fuel Blends ("Boutique Fuels"), Effects on Fuel Supply and Distribution and Potential Improvements,* EPA 420-P-01-004, Public Docket No. A-2001-20 (Jan. 30, 2002).

4. *See, e.g.*, Letter from Joseph J. Simons, Director, FTC Bureau of Competition, and R. Ted Cruz, Director, FTC Office of Policy Planning, to Gov. George E. Pataki of New York (Aug. 8, 2002) available at http://www.ftc.gov/be/v020019.pdf; Letter from Joseph J. Simons, Director, FTC Bureau of Competition, and R. Ted Cruz, Director, FTC Office of Policy Planning, to Hon. Robert F. McDonnell, Commonwealth of Virginia House of Delegates (Feb. 15, 2002) available at http://www.ftc.gov/be/V020011.htm; Letter from Ronald B. Rowe, Director for Litigation, FTC Bureau of Competition, to Hon. David Knowles, California State Assembly (May 5, 1992); Prepared Statement of Claude C. Wild III, Director, FTC Denver Regional Office, before the State, Veterans, and Military Affairs Committee of the Colorado State Senate (Apr. 22, 1992); Letter from Claude C. Wild III, Director, FTC Denver Regional Office, to Hon. Bill Morris, Kansas State Senate (Feb. 26, 1992); Letter from Claude C. Wild III, Director, FTC Denver Regional Office, to David Buhler, Executive Director, Utah Department of Commerce (Jan. 29, 1992); Letter from Thomas B. Carter, Director, FTC Dallas Regional Office, to Hon. W.D. Moore, Jr., Arkansas State Senate (Mar. 22, 1991); Letter from Jeffrey I. Zuckerman, Director, FTC Bureau of Competition, to Hon. Jennings G. McAbee, Chairman, Ways and Means Committee, Other Taxes and Revenues Subcommittee, South Carolina House of Representatives (May 12, 1989).

5. *Anzai v. Chevron Corp.*, Civ. No. 98-00792 (SPK) (D. Haw., filed Oct. 1998).

6. Marketers face significant restrictions on opening new company-operated stations; *see* pp. 5-7 *infra.*

7. *See, e.g.*, TOS 15961 (document filed in the *Anzai* litigation; estimating refinery capacity for various years); Expert Report of Dr. Jeffrey J. Leitzinger at 57 (June 23, 2000) (document filed in the *Anzai* litigation; estimating total volume of gasoline sales for residential consumers in Hawaii).

8. *See, e.g.*, Expert Report of Leitzinger, *supra* note 7, at 37.

9. *See, e.g.*, TXCC 0017473-77 (document filed in the *Anzai* litigation) ("Perhaps [Texaco's] biggest threat to [the two local refiners] is importing product."); SHB 015051-52 (document filed in the *Anzai* litigation) (Shell looking at importing as way to negotiate lower price from local refiner); HI 1093382-83 (document filed in the *Anzai* litigation) (Chevron, one of the local refinery owners, expresses concern internally about Texaco's ability to import "product and drive the market down").

10. *Theatre Enterprises v. Paramount Film Distributing Corp.*, 346 U.S. 537, 541 (1954) ("Circumstantial evidence of consciously parallel behavior may have made heavy inroads into the traditional judicial attitude toward conspiracy; but 'conscious parallelism' has not read conspiracy out of the Sherman Act entirely.").

11. This testimony focuses on factors that affect prices by affecting costs and competition. We are also aware that gasoline taxes directly affect retail gasoline prices, and that Hawaii's state and local gasoline taxes exceed the national average. (In 2002, combined state and local gasoline taxes in Hawaii averaged 35.1 cents per gallon, as compared with a national average of 23.6 cents.) *See* American Petroleum Institute, *Nationwide and State-by-State Motor Fuel Taxes* (July 2002). FTC staff have independently verified tax rate information reported in this publication.

12. The 1997 legislation circumscribing company-operated stations also imposed commercial rent control on rents that oil companies (refiner, marketer, or wholesaler/jobber) can charge lessee-dealers for the use of company-owned stations and prevents them from converting lessee-dealer stations to company-operated stations. The rent control aspects of this law have not been put into effect, pending litigation. Last year a federal court ruled that this aspect of the law is an unconstitutional regulatory taking, on the ground that the rent cap would not necessarily decrease retail gasoline prices and likely would increase them. *Chevron v. Cayetano*, 198 F. Supp. 2d 1182 (D. Haw. 2002). Act 77, enacted the following month, combines the rent cap with wholesale and retail price controls. The district court's decision is currently on appeal before the Ninth Circuit.

13. Anti-encroachment and divorcement laws both limit competition between refiners/marketers and lessee-dealers. Laws banning encroachment limit a refiner's and/or marketer's ability to establish new company-operated stations within a certain distance of existing dealer-operated stations. Divorcement laws either prohibit refiners and/or marketers from operating their own stations or prohibit them from opening and operating new stations.

14. Act 295 (S.B. No. 1757); Act 329 (S.B. No. 124).

15. Companies could open two new company-operated stations for every new dealer-operated station, and company-operated stations that were closed could be replaced by a new company-operated station within a one-mile radius of the closed station. Act 238 (S.B. No. 487).

16. Act 257 (H.B. No. 1451).

17. Asher A. Blass and Dennis W. Carlton, "The Choice of Organizational Form in Gasoline Retailing and the Cost of Laws that Limit that Choice," 44 *J.L. & Econ.* 511 (2001).

18. Michael G. Vita, "Regulatory Restrictions on Vertical Integration and Control: The Competitive Impact of Gasoline Divorcement Policies," 18 J. Reg. Econ. 217 (2000).

19. Furthermore, these stations reduced their operations by nine hours per week. Other stations in the locale of the divested stations also raised prices. John M. Barron and John R. Umbeck, "The Effect of Different Contractual Arrangements: The Case of Retail Gasoline Markets," 27 *J.L. & Econ.* 313 (1984).

20. Letter from Terry Calvani, Acting Chairman, Federal Trade Commission, to the Honorable Peter K. Apo (Dec. 23, 1985). The bill was Hawaii House Bill 1376.

21. *See, e.g.*, Parry (BHP's Vice President of Marketing in Hawaii) Dep. Tr. in the *Anzai* litigation, at 19-27.

22. For example, BHP sought to use company-operated stations in the early 1990s so that it would have more control over their image, operations, and pricing policies. *See* Dr. Sumner La Croix Dep. Tr. in the *Anzai* litigation, at 888, 897-99 and Dep. Ex. 3 at v and 63. In general, a refiner or marketer has an interest in preventing its retail stations from exploiting locational monopoly power that would enable the station operator to increase prices.

23. *See, e.g.*, N. Gregory Mankiw, *Principles of Microeconomics* 128 (2d ed. 2001) ("Economists usually oppose price ceilings and floors."); Fiona M. Scott Morton, "The Problems of Price Controls," *Regulation* at 53 (Spring 2001) ("Competition is a better tool than price controls for protecting consumers."); John E. Calfee, "Why Pharmaceutical Price Controls are Bad for Patients," *AEI on the Issues* at 1 (March 1999) ("Almost all economists hate almost all price controls.").

24. Federal regulations allowed individual firms to raise prices by an amount equal to increases in their own production costs; Act 77 adjusts prices based on changes in estimated industry-wide average costs of product and transportation for Hawaii's gasoline marketers and retailers.

25. Scott Harvey and Calvin T. Roush, Jr., *Petroleum Product Price Regulations: Output, Efficiency, and Competitive Effects*, Staff Report of the Bureau of Economics to the Federal Trade Commission (Feb. 1981). The regulations permitted refiners and marketers to pass through increases in their own costs of production with a one-month lag. Thus, when world oil prices increased because of events like OPEC price increases or the Iranian revolution, temporary shortages would occur because companies could not immediately increase prices to reflect the higher cost of crude oil. Gasoline lines and other forms of nonprice rationing were the result. In the absence of the price controls, gasoline prices would have reflected increases in

crude oil prices relatively rapidly, and most nonprice rationing would have been avoided because consumers would have reduced consumption in response to the price increase.

26. Robert L. Bradley, Jr., *Oil, Gas & Government: The U.S. Experience* 1631-34 (1996).

27. Scott Morton, *supra* note 23, at 51.

28. *See, e.g.*, THC 55 003377-79 (document filed in the *Anzai* litigation); TXU 0013405 at 0013440 (document filed in the *Anzai* litigation).

29. Bradley, *supra* note 26, at 1634-36.

30. *FTC v. H.J. Heinz Co.*, 246 F.3d 708, 716 (D.C. Cir. 2001) (merger law rests upon the theory that, where rivals are few, firms will be able to coordinate their behavior, either by overt collusion or by implicit understanding, in order to restrict output and achieve profits above competitive levels) (quoting, in part, *FTC v. PPG Indus.*, 798 F.2d 1500, 1503 (D.C. Cir. 1986)).

31. The FTC and the Hawaii Attorney General's office have twice investigated proposed mergers of incumbent gasoline marketers in Hawaii. *See Pacific Resources, Inc.* and *Shell Oil Co., et al., supra* note 3.

32. *See supra* note 9.