

# ENERGY CORRIDOR IN HAWAII

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This paper deals with the concept of an energy corridor. The idea is to establish a precedent for the orderly, controlled transmission of sources of all types of energy from supplier to user. Discussion relates to funding, cost sharing, and amortization by the users; alignment and description of the corridor; administration and leasing; and the role a state can play with private enterprise in the interest of solving the complex problem of transporting energy in a safe, efficient, and environmentally acceptable manner in today's society.

•THE CONCEPT of an energy transmission system is not new; many communities across the country have such systems. But Hawaii has produced what might be a national "first"—an engineering and planning breakthrough called the energy corridor. What makes this system unique is that it was planned from the beginning under the sponsorship and direction of the state of Hawaii.

Like other U.S. cities and states, Hawaii was faced with the need to transport energy from supply sources directly to users or market-distribution points. Because of its island geography and the crucial importance of the tourist industry, the state faced significant problems concerning land conservation, environmental protection, and safety. The state legislature, recognizing both the need to establish convenient and economical means of transporting fuels and other energy sources and the need to protect the natural assets of Hawaii, believed that the state could best manage and control an energy corridor. Therefore, Act 33 was passed and signed into law in 1970. In the act, Hawaii Department of Transportation was designated to establish, maintain, operate, manage, and control the energy corridor to better conserve and use Hawaii's limited land resources in transporting energy on a nonexclusive basis directly from supply source to distribution points.

## GENERAL ALIGNMENT AND DESCRIPTION OF THE ENERGY CORRIDOR

The energy corridor is based on implementation of objectives contained in Act 33, the General Plan of Oahu, and the Foreign Trade Zones Act. Environmental and ecological considerations require that certain industrial installations and activities be located in areas distant from the residential and recreational areas of Honolulu. The General Plan of Oahu provides such an area in a large tract of industrial land at Barbers Point known as Campbell Industrial Park. An existing petroleum refinery is producing 35,000 barrels/day ( $64.4 \text{ dm}^3/\text{s}$ ), and another refinery is producing 29,500 barrels/day ( $54.3 \text{ dm}^3/\text{s}$ ). Ultimately, one or more additional plants may be constructed. Almost all of the petroleum products will require transportation in corridor pipelines. Pipeline transport is required for gas except for possible truck delivery of liquid natural gas. The alternatives for transporting the petroleum products included barge, truck, and pipeline delivery. The convenience, dependability, economics, and minimal environmental impact of pipeline delivery resulted in its selection and provided justification for the energy-corridor concept. Pipeline transport is amenable to intermediate delivery points for consumers in Pearl Harbor, Honolulu International Airport, and Honolulu Harbor areas. A state-owned energy corridor provides a means for locating pipelines of several users in a common right-of-way that might otherwise be constrained

or might be out of harmony with the development and ultimate use of traversed lands. Because all aspects of the energy corridor are state controlled, optimization of land use is ensured.

The energy corridor is 23 miles (36.8 km) long and has a nominal 30-ft (9.1-m) right-of-way over land and a 100-ft (30.5-m) right-of-way under water. The alignment is shown in Figure 1. Although numerous alternate alignments were investigated, many were rejected for economic, environmental, or technical reasons. For example, alternatives that would not connect major delivery points between Barbers Point and Honolulu, such as Waiiau Power Plant, the U.S. Navy and U.S. Air Force fuel-storage facilities at Pearl Harbor, and the Honolulu International Airport, were discarded because they did not meet the objectives of the corridor.

Colocating the pipeline facilities with highways was explored by the state. Highly improved and populated areas were avoided because of effects on improvements and displacements of families and businesses. The American Association of State Highway and Transportation Officials policy on the accommodation of utilities on freeway right-of-way also was considered in colocating with highways. Except for that portion of the energy corridor within the Interstate Highway near Pearl Harbor and the Honolulu International Airport, conditions under which utilities may be accommodated in the freeway rights-of-way could not be met.

Pipeline routes that greatly extended the length of the pipelines or that involved excessive numbers or lengths of water crossings also were discarded. Such routes would have increased opportunities for damage to the environment. An offshore pipeline was discarded early in the planning process because such a pipeline would be excessively long, and a crossing at the mouth of Pearl Harbor would be subject to damage from vessels, which could result in an oil spill that would impair the environment. In general, the potential for serious damage to ecological systems can be shown to increase when a pipeline is placed in open, unprotected water.

As shown in Figure 1, the preferred corridor alignment extends from the northeast property line of Campbell Industrial Park to terminal facilities at pier 40 in Honolulu Harbor. This terminus was chosen to facilitate connections to the harbor pipeline system. The intermediate delivery points shown in Figure 1 could be provided by users of the corridor to the military facilities in Pearl Harbor. The policy adopted was that any intermediate facilities required by users or consumers for pumping, reheating, monitoring, and measuring flow would be designed and installed under state supervision. These facilities would not be considered a part of the energy corridor.

The corridor is divided into five slots that are being leased separately. Slots were designated by the following labels: mauka 1, mauka 2, center, makai 2, and makai 1. Mauka 1 is the most northerly slot and makai 1 is the most southerly slot. A generalized section with these slots indicated is shown in Figure 2.

Although the nominal width of the corridor on land is 30 ft (9.1 m), easement requirements, obstructions, and the like have necessitated that the real corridor width vary from a minimum of 15 ft (4.6 m) to more than 40 ft (12.2 m). In addition, the standard width of the corridor easement where the alignment passes offshore beneath East Loch at Pearl Harbor and Keehi Lagoon is 100 ft (30.5 m). In many cases along the right-of-way, the corridor shares one of its right-of-way boundaries with the boundary of existing roadways. These easement lines normally are characterized by numerous jogs and irregularities caused by the requirements of bridges, property lines, and the like. In such cases, the nominal energy corridor width of 30 ft (9.1 m) was established only at salient points along the right-of-way so that the easement lines thus constructed would be relatively free of irregularities.

The user of the outside slot was anticipated to prefer to construct its pipeline parallel to the outside right-of-way line rather than parallel to the corridor centerline to avoid costly irregularities in the pipeline. In such cases, subsequent users may establish their slots parallel to this user rather than parallel to the corridor centerline. The slot boundary of the outside slot in such a case is determined by the minimum slot boundary offsets. Future users are advised to refer to "as-built" drawings of previously laid lines that are on file with the Harbors Division of the state department of transportation. Users are expected to keep their pipelines along the centerline of their

[illegible]

MAUKA #1   MAUKA #2   CENTER SLOT   MAKAI #2   MAKAI #1

SLOT   SLOT   SLOT   SLOT   SLOT

S   S   S   S   S

W   W   W   W   W

VARIABLE   VARIABLE

EASEMENT OR RIGHT-OF-WAY LINE  
(W VARIES WITH WIDTH OF EASEMENT)

FACING IN AN EASTERLY DIRECTION  
NOT TO SCALE

assigned slots. However, in cases where lines are required to be moved off the slot centerline, minimum distances must be maintained between outside pipe walls and slot boundaries.

The current energy-corridor easements are pipeline easements only. No special provisions have been made for auxiliary facilities such as heating stations, pumping stations, cathodic-protection facilities, valves, or scraper stations. In cases where these features must extend above the ground surface or outside the user's designated slot, the user is required to make the necessary arrangements with the appropriate property owners and other affected parties.

The assignment of slots to users is on a first-come, first-served basis. The potential user may request any unoccupied slot according to preference and subject to the approval of the state of Hawaii. However, the user must occupy the same slot for the full length of the corridor and may not switch from one slot to another except in extenuating circumstances and as approved by the director of the Hawaii Department of Transportation.

The user is required to design and construct its pipeline and appurtenant structures to be compatible with the requirements of future users. However, any structures thus designed are not required to support more than the builder's facilities. In addition, the design and construction of the facilities must be compatible with the aesthetics of the surrounding area. This condition is particularly significant in the area of the Waiau Power Plant where the corridor exists as an overhead easement.

#### FUNDING, COST SHARING, AND AMORTIZATION

The total funds appropriated were \$1,400,000 of which \$1,000,000 was designated for the land-acquisition program and \$400,000 was designated for engineering services. The source of funds would be from the sale of state of Hawaii, reimbursable, general-obligation bonds. Except as later described herein, the state's intent is that no costs, claims, or fees shall be assessed, charged against, or borne by the state for the establishment or the operation of the energy corridor.

By an agreement executed on December 31, 1970, by the state of Hawaii, acting by and through the Hawaii Department of Transportation, the Hawaiian Independent Refinery, Inc. (HIRI), was established as the initial user. In the agreement, HIRI declared a need for such a corridor and agreed to underwrite all necessary reasonable costs for it. Until there was a subsequent user, all costs would be borne by the initial user, and the sharing of costs (to be defined) was not applicable. GASCO, Inc., became a second user in 1974 with the installation of a 16-in.-diameter (40.6-cm-diameter), high-pressure gas line.

A method was adopted to provide for a system of fair sharing of all costs of the corridor. When new, bona fide suppliers are accommodated, all prior users will receive adequate and fair reimbursement for a share of their outlays made up to the time of admission. Future interested parties are permitted to install facilities in and use the corridor and enjoy the same services and privileges as the other participants by paying their share of the costs of the corridor. All authority given under chapter 277, H.R.S., is to be administered by the director of the Hawaii Department of Transportation through its Harbors Division. Included in this authority is the administration of this cost sharing.

An energy-corridor advisory board was established to review costs, cost estimates, and equity of cost sharing, and make recommendations to the director of transportation on all matters pertaining to the responsibilities given to the department in chapter 277, H.R.S. This advisory board is made up of 1 member who is appointed by each authorized corridor user plus members appointed by the governor of Hawaii. The state-appointed members include the chairperson of this Board and others the number of whom always must equal the total of the user members plus 1. Members serve for 4-year periods in staggered terms.

A separate account was established for handling all money and transactions for this energy corridor. This account is separate from all other accounts of the state of Hawaii.

Any subsequent corridors that are established in the state will have their own separate accounts for record keeping. The state added a standard administrative overhead burden calculated by the Department of Accounting and General Services that currently is 5 percent on all revenue paid out of the energy-corridor account. Repayments to prior users are exempt from this additional burden. Direct and indirect costs incurred by the state for both personnel time and out-of-pocket costs are also included. Several exceptions are to be noted. If any parcels of land are acquired in fee simple for the corridor and the director of the transportation department determines that such parcels have value to the state for other purposes, then a credit will be given to the energy-corridor account. In such a case, users are required to pay only for the easement of land that is required for installation of energy transmission systems. The difference between the easement value and the cost of the parcel in fee simple is credited to the account. The advisory board selected an appraiser to establish the easement value. Another exception is when a user is required to make substantial improvements in the corridor that are of direct benefit to all users (current and future). An example of such an action is the relocation of a building off the corridor right-of-way to accommodate construction of a pipeline. In such a case, the user must make application to the director of the transportation department in advance and receive approval for a qualified exception. If the director rules that such an expenditure on the user's part is of value to the corridor as a whole, then the total amount or appropriate portion may be credited to the energy-corridor account for fair sharing of these costs by other users in the same manner that other costs are shared.

Each user is required to maintain its own facilities to the point that maintenance of the corridor by the state is minimal. If any maintenance costs are incurred by the state, they are charged to the account. A reserve fund is established to cover such extraordinary expenditures and initial operating and administration costs. The amount allocated to the reserve fund is \$20,000/year for the first 5 years and thereafter as required to maintain a reserve fund of approximately \$100,000. The amounts of the reserve fund may be changed as recommended by the advisory board and approved by the director of the Hawaii Department of Transportation.

The users of the energy corridor make payments into the account by estimating the revenues and expenditures of the forthcoming year. On advice by the advisory board, the state prepares an estimate at the beginning of each calendar year of the expected expenditures that will be incurred in the energy-corridor account for the coming fiscal year. This estimate includes an amount to maintain the reserve fund at the required level. Payments into the account by the users are made quarterly, in advance, at the place and in the manner delineated in the lease agreement between the state and the user. If there is only 1 user of the energy corridor, then that user makes all payments into the account that are required by the state. Each subsequent user must make an initial payment into the account for bearing its proportional share of the costs of the establishment of the energy corridor. When there is more than 1 user, then the costs of the corridor for each year will be shared among them in accordance with detailed rules established by the advisory board. Each user enters into a lease agreement with the state of Hawaii to occupy a portion of the corridor for each transmission element. The period of the lease to accommodate the initial user will be as stated in the lease agreement, and the lease for each subsequent user is coterminous with the first lease.

#### ROLE OF THE STATE AND HAWAII ARCHITECTS AND ENGINEERS, INC.

In January 1971, the state of Hawaii selected Hawaii Architects and Engineers, Inc. (HA&E), a consortium of professional firms, to assist in implementing Act 33. HA&E was to review the alternative corridor routings and refine the most promising routing into specific, finite locations along a 23-mile (36.8-km) pathway.

Accomplishing the establishment of the corridor within a short time required close coordination of 2 project teams. The first was that of the state of Hawaii. The second, the HA&E project team, consisted of 3 groups: The first covered field surveys and

cadastral work; the second was in charge of refining corridor location, setting design standards, master planning, hydrographic surveying, and forming guidelines for shared use of the corridor; and the third handled the acquisition and appraisals of rights-of-way.

Aerial photographs covered the total area of the proposed route; these were scanned and analyzed, and changes were made in the routing. Teams then went into the field to tie down specific locations. The teams produced 2 types of maps: (a) alignment maps that detailed the route and principal topographic features affecting the route, and (b) parcel maps that showed property lines and areas affected by the corridor.

Five months after retaining HA&E, the governor of Hawaii (responding to mounting public environmental concern) issued an executive order requiring state-funded projects to have detailed environmental impact statements showing how the projects would affect land, air, streams, and ocean. The energy-corridor project technically did not have to comply with the executive order because it had started before the order became effective. However, the state specified that it would be necessary for HA&E to draft a statement. On the basis of evaluation by the engineering, scientific, and social disciplines, the statement concluded that the proposed energy-corridor alignment could be constructed along the preferred route with minimal damage to the environment. The statement also concluded that the construction of pipelines within the energy corridor according to carefully planned construction practices also would have a minimal impact on the environment. Furthermore, a continuing safe operation could be expected because of the satisfactory operating performance of recently constructed pipelines elsewhere. The routing selected for the energy corridor generally (a) followed existing pipelines, roads and railroad rights-of-way; (b) avoided hazardous geological areas; (c) minimized potentially damaging hydrologic effects; (d) avoided ecologically sensitive areas; (e) reduced but did not eliminate overall expected sociological reaction and impact; and (f) was the most environmentally acceptable alternative available for both alignment and mode of transport. It was recognized that some of the information in the impact statement essentially would be unaltered over time. However, other data, such as those related to sociological aspects and, to some extent, to ecology, are fairly unstable and could change, depending on events that cannot be foreseen. Therefore, all conclusions were based on judgment and assessments of information available at the time.

An appraisal report for the fair market value of more than 100 easement parcels for the corridor based on the right-of-way maps was prepared and submitted, and any required reappraisals were made.

## ACCOMPLISHMENT AND SITUATION TODAY

With the exception of a few parcels that are still being negotiated in which major highway construction is under way, acquisition of the energy corridor and all of its preceding work, including layout, location, surveys, and mapping, are essentially complete. One petroleum-products line has been in operation in a portion of the corridor for approximately 2 years. Construction of a 16-in. (40.6-cm) gas line by GASCO, Inc., is complete, and the line is ready for use. Room still exists for 3 more pipeline users in the energy corridor. Negotiations have taken place from time to time with Conoco-Dillingham Oil Company for 2 slots in conjunction with their planned \$100 million refinery at Barbers Point. At this time, the future of this refinery remains unsettled. The initial planning of the energy corridor was to satisfy transshipment needs for Oahu through the year 2020. It appears that this initial plan will be fulfilled.

## ACKNOWLEDGMENTS

All parties that have been involved with the energy corridor agree that it is a success and has met the intent and purposes of Act 33. That any pipelines could have been installed in Honolulu without the enabling legislation that produced the energy corridor

is unlikely. The corridor, furthermore, demonstrates rather dramatically what can be accomplished when government and private enterprise work together to solve a problem. The state of Hawaii; the Hawaiian Independent Refinery, Inc.; GASCO, Inc.; and Hawaii Architects and Engineers, Inc., have worked together smoothly and closely throughout the entire project. The Hawaii project, in fact, might well prove to be a working prototype for future energy corridors throughout the United States and other parts of the world particularly in fast-growing industrial communities whose leaders can be convinced of the value of planning for future needs rather than merely allowing events to happen.