THE GATEWAY PROJECT

Hawaii Center for Distributed Energy Resources at NELHA

Project Partners:

- U.S. Department of Energy
- Natural Energy Laboratory of Hawaii
- Hawaii Department of Business, Economic Development & Tourism
- Hawaii Natural Energy Institute, University of Hawaii
- New Mexico Tech
- County of Hawaii
- Utilities
- Energy Companies

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The Gateway Project

- A signature project to be located at the entrance to the Hawaii Ocean Science & Technology (HOST) Park of the Natural Energy Laboratory of Hawaii.
- A campus setting for research, development, education and outreach.
- Initial construction funding of $3 million has been provided via a grant from the U.S. Department of Energy.
- Three primary thrust areas:
  - Distributed Energy Resources (Phase I)
  - Ocean Sciences and Marine Bioproducts
  - Education, Outreach, and Tourism

Phase I:
Center for Distributed Energy Resources

The Gateway Project provides the foundation for a premier national institute dedicated to the development, testing, and deployment of distributed energy generation technologies.

- Construction grant to be used to design and build a state-of-the-art facility and infrastructure.
- Center will serve as incubator for companies focused on renewable/distributed energy generation and hydrogen.
- Development of industry partnerships through co-sponsored R, D & D is a key program element.
- National partners will advance market penetration overseas (to bridge U.S. technology with Asia-Pacific needs)

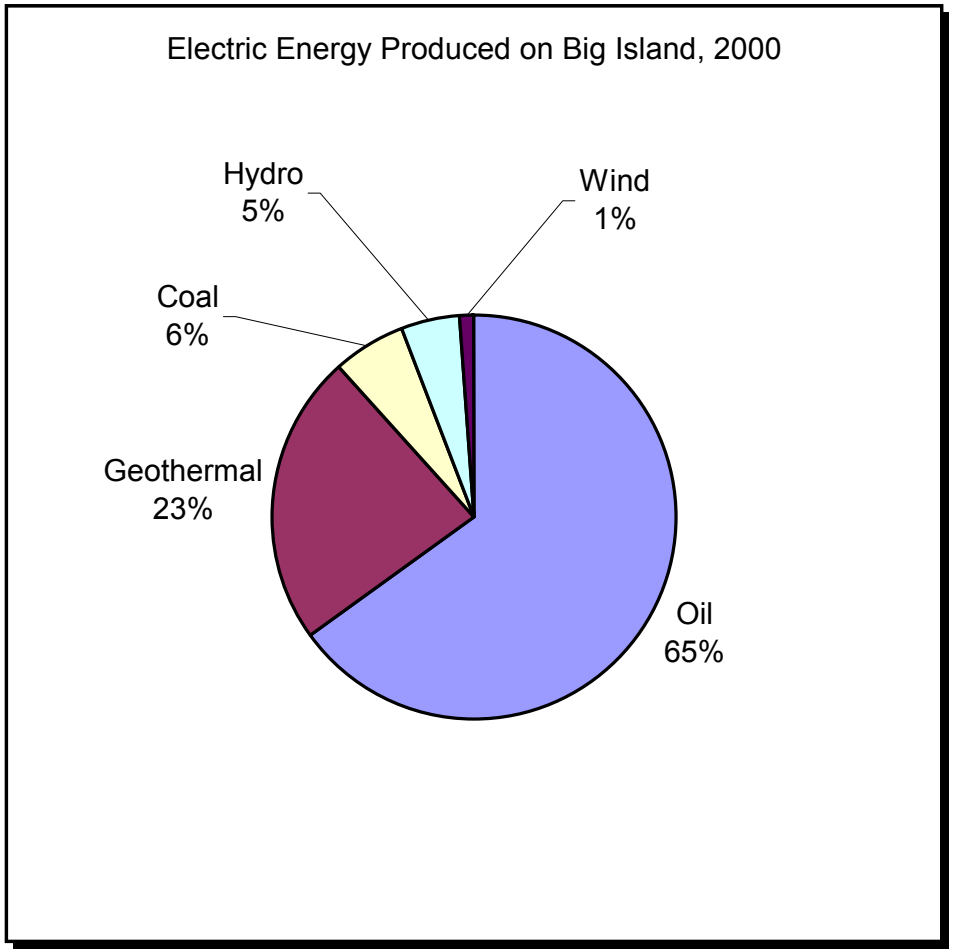
Location: The Big Island of Hawaii

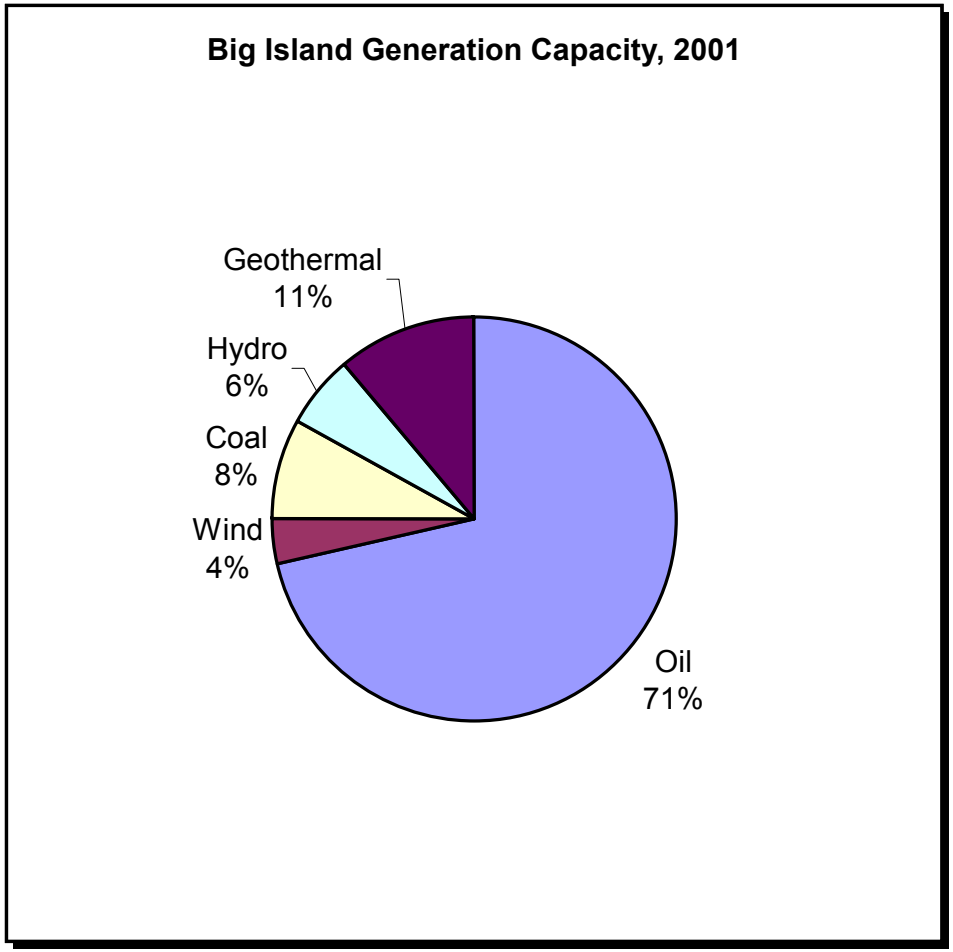
- **Big Island of Hawaii is an ideal location.**
  - Urgent need for distributed energy resources (DER).
  - A model demonstration site to less developed energy economies without difficulty of working outside the U.S.
  - Proximity of potential markets in Asia-Pacific region
- **Why locate at NELHA?**
  - Gateway Project opportunity
  - Significant existing investment in support infrastructure
  - Successful track record in incubating technology companies
  - Broad support for distributed energy resource technology development and demonstration

Big Island Energy Picture

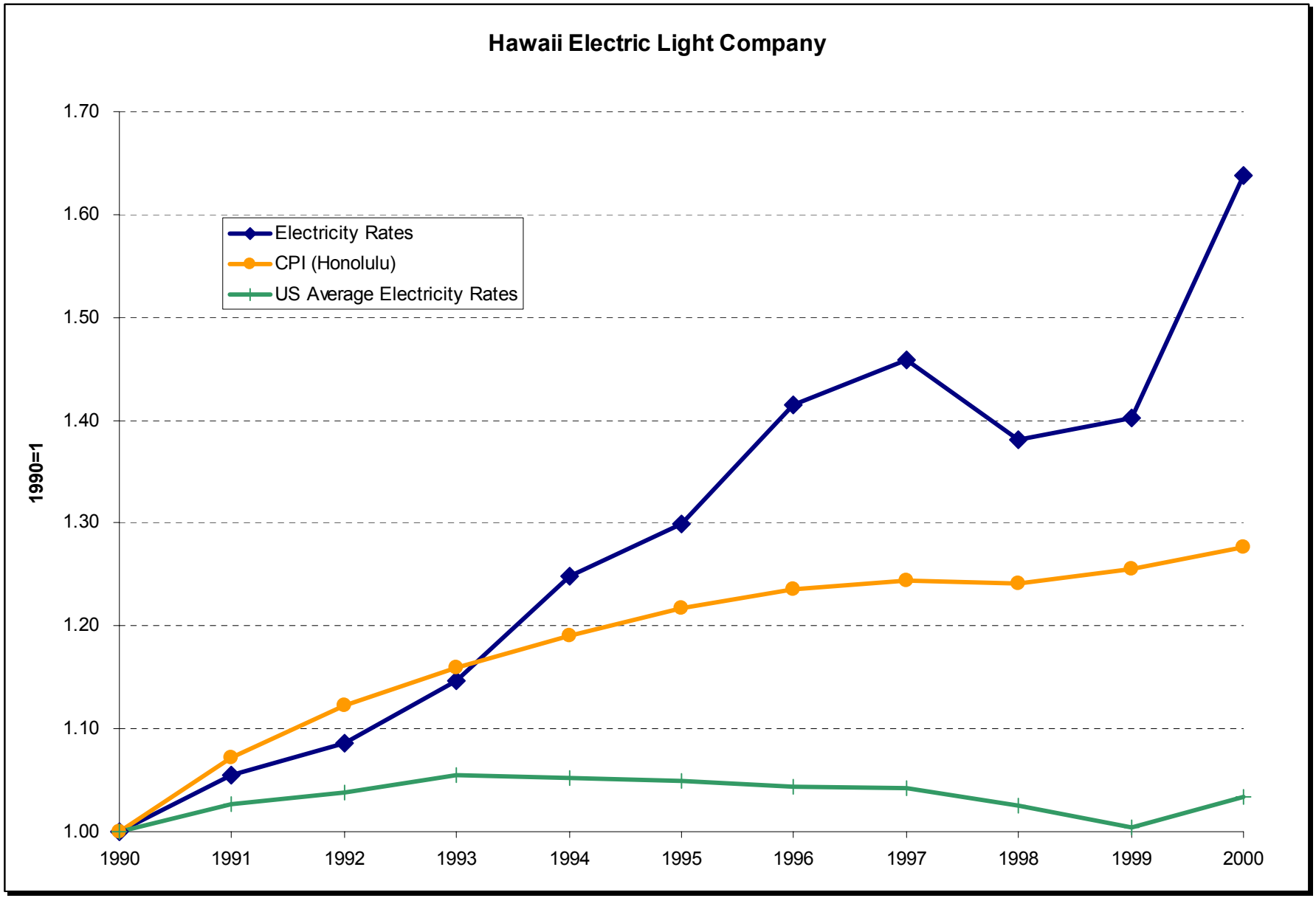
- **Small isolated grid (171 MW Peak Demand in 2000)**
- **Wide array of existing renewable technologies and resources**
  - 70^{+} MW developed or permitted
  - Existing solar, wind, hydroelectric and geothermal generation
  - Significant biomass and ocean thermal resources
- **High average energy cost ($0.20/kWh, $2.10 per gallon gasoline)**
- **Unique transmission and demand characteristics**
  - Early evening peak strains transmission system
  - Lower night demand requires curtailment of RE sources
  - Off-peak cost-effective RE is available for conversion into hydrogen and application in DG systems
- **Major energy users have installed DER systems**

Electricity Generation Mix, Big Island





Electricity Cost History -- Hawaii



Examples of DER Installed

- **Orchid at Mauna Lani -- Propane cogen with heat recovery and absorption chillers**

- **Mauna Lani Hotel PV -- 3 projects, 0.5 MW**

Examples of DER Installed (continued)

- Parker Ranch – wind / PV hybrid for water pumping
- Kahua Ranch -- village power system installed with funds from the Government of Japan

- Ho'owaiwai farms – run-of-river hydro

HELCO Integrated Resource Plan, 2001-2020--All Fossil, No Renewables

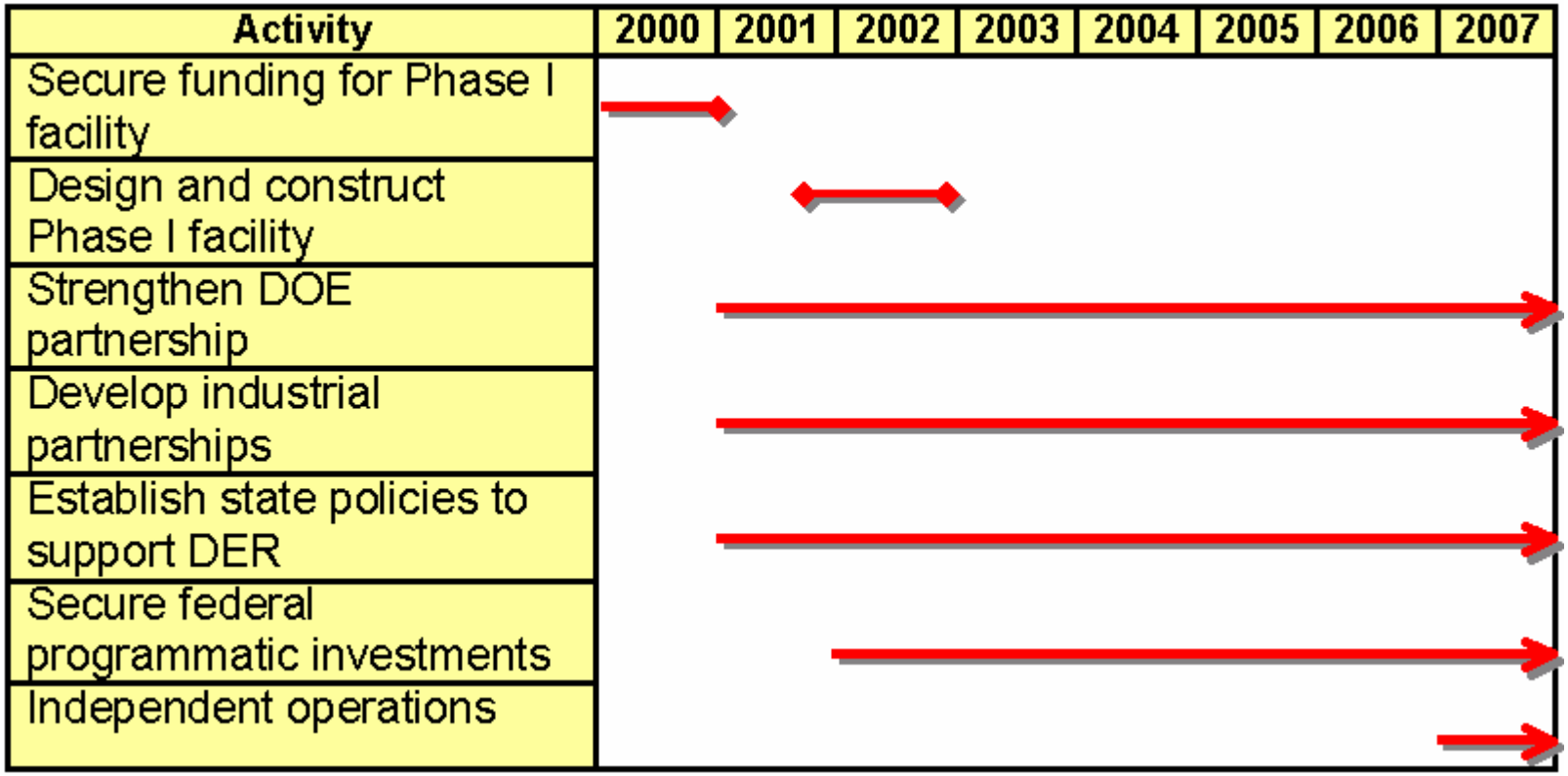
2001	Hamakua Energy Partners 62 MW Naphtha DTCC fully operational *Retire 3.1 MW Oil Fired Steam (OFS)* *Retire 3 MW Internal Combustion Diesels (IC Diesels)* *Place 14.4 MW OFS on standby*
2002 - 2003	Install 2x 20 MW Combustion Turbines (CT) *Retire 11.5 MW CT* *Retire 29.5 MW IC Diesel*
2004	*Retire 9.5 MW IC Diesel*
2005	*Retire 7.1 MW OFS*
2006	Install 20 MW Steam Recovery Generator (SRG) to 2x20 MW CTs added in 2002 to form 58 MW Dual Train Combined Cycle (DTCC)
2008	*Retire 20.8 OFS (including 14.4 MW on Standby)*
2009	Install 21 MW CT
2013	Install 21 MW CT
2016	Install 18 MW SRG to 21 MW CTs added in 2009 and 2013 to form 60 MW Dual Train Combined Cycle (DTCC) unit
2017	Install 21 MW CT
2019	*Retire 13 MW CT*
2020	Install 21 MW CT

Gateway Project Site:
Natural Energy Laboratory of Hawaii Authority

- Created by the Hawaii State Legislature in 1990 to administer the 322 acre Natural Energy Laboratory of Hawaii (NELH) and 548-acre Hawaii Ocean Science & Technology (HOST) Park properties located at Keahole Point on the Island of Hawaii.

- A unique complement of natural and logistical resources gives NELHA an advantage over other locations for development and deployment of renewable energy resources.
  - Warm surface seawater
  - Cold deep seawater
  - High solar insolation
  - Adjacent to international airport

Proposed Timetable



Center Supports the DER Strategic Plan

The Center will support USDOE's Distributed Energy Resources Strategic Plan goal of 20% new distributed energy generation capacity by 2010.

- Provide centralized site and infrastructure to test DER technologies in a real-world environment.
- Develop outreach activities to accelerate public acceptance of DER technologies.
- Promote industrial partnerships and sponsorship of R&D and testing programs.
- Provide model utility for real-world demonstration of DER technologies (local pool of potential commercial users).
- Contribution of state assets including including those from NELHA and the University of Hawaii.

Hawaii's Energy Policy Facilitates DER

2001 legislation led to enactment of milestones and measures designed to promote the use of distributed energy resources.

- **Act 272**
  - Requires electric utilities to set a renewable portfolio standard goal of 7% of net electricity sales by 12/31/03, 8% by 12/31/05, and 9% by 12/31/10.
  - Provides "net energy metering" for eligible customer-generators up to 0.5% of the electric utility's system peak demand.
- **Act 283**
  - Establishes a public/private partnership to support & promote hydrogen use in Hawaii.
  - Appropriates $200,000 to the Dept. of Business, Economic Development & Tourism for a workshop, policy study and assessments, and projects.
- **Act 221**
  - Provides a 4% tax credit for technology infrastructure renovation costs including backup and emergency power systems.
  - Expands the definition of a "qualified high technology business" (QHTB) to include "non-fossil fuel energy related technology."

Partnership Strengthens the Center

Active collaboration of government, research, and industry will enable:

- Appropriate programmatic guidance
- Mechanisms for sustained funding
- Best available technical assistance
- Community, government, and industry outreach
- Opportunities for collateral joint projects
- Achievement of partners' objectives

Summary

- The Gateway Project at NELHA provides the foundation for a premier national institute dedicated to the development, testing, and deployment of distributed energy generation technologies.
- The Big Island of Hawaii is an ideal location for Phase I of the Gateway Project, the Center for Distributed Energy Resources.
- The Natural Energy Laboratory site has unique attributes and access to a variety of renewable energy resources not found elsewhere.
- The Center will support USDOE's Distributed Energy Resources Strategic Plan goal of 20% new distributed energy generation capacity by 2010.
- The project is further strengthened by Hawaii's supportive state energy policies and the collaborative partnerships involved.