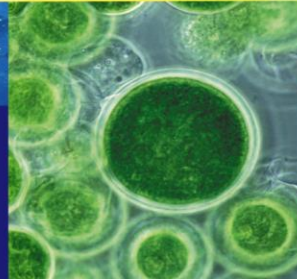
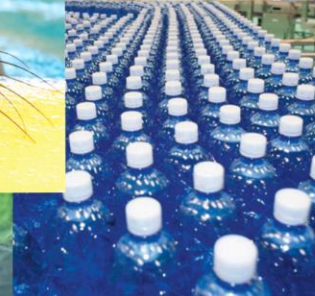


2014  
Annual  
Report



NATURAL ENERGY  
LABORATORY of HAWAII  
AUTHORITY



**MISSION  
STATEMENT**

*“To develop and diversify Hawaii’s economy by providing resources and facilities for energy and ocean related research, education, and commercial activities in an environmentally sound and culturally sensitive manner.”*

[www.nelha.org](http://www.nelha.org)



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## **NELHA FY 2014 ANNUAL REPORT**

### **1.0 Introduction**

The Natural Energy Laboratory of Hawaii Authority (NELHA) is a master-permitted ocean science and technology park whose mission is to bring economic development and diversification to the State of Hawaii and specifically West Hawaii. HOST Park is comprised of 870 acres of at Keahole Point, Kailua-Kona, on the Island of Hawaii. NELHA was created to host and support research, development, pre-commercial and commercial enterprises that make use of the unique resources at the laboratory's site at Keahole Point, particularly the clean, cold, deep ocean water accessible near to the shore as well as high solar irradiation. Its assets include a unique complement of support facilities, infrastructure, pristine natural resources and leasable land for a wide range of business research, commercial and educational applications. The NELHA story now spans 40 years and is an example of public investments by visionary State leaders that have yielded multiple returns for the benefit of all.

The original ocean science and energy concept for HOST Park was developed in 1974 as a response to the national oil crisis. The Research Corporation of the University of Hawaii and the High Technology Development Corporation originally developed two sites in Kona separately. The two projects in Kona were combined with a geothermal test site in Puna in 1990 and placed in the newly formed NELHA.

As its name implies, NELHA was formed to operate and further develop the State's geothermal experimental project in Puna and ocean thermal energy conversion (OTEC) experiments and re-use of the seawater for other projects in Kona. Over time, as geothermal matured and became commercially viable and the federal governments interest in OTEC waned, due to lower oil prices, NELHA has de-emphasized its initial involvement in geothermal development and looked to other secondary uses for its ocean science facilities and expansive seawater system in Kona.

Today, other uses for the seawater system have included projects needing to take advantage of the sites other main resource: high solar insulation. This includes aquaculture, mainly as algae production for nutraceuticals and fish/seafood hatcheries, water desalination, clean energy research and development such as solar thermal energy production, algae growth for biofuels, and seawater air conditioning.

## 2.0 Defining NELHA – Who we are.

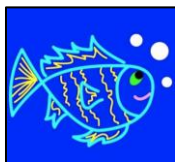
As a “first mover” into the economic development space of ocean science and energy the State, Federal and County of Hawaii investment of \$150M has appreciated considerably in value over the past 40 years. It is imperative that NELHA move towards taking advantage of this comparative advantage of the most extensive land based surface and deep seawater system in the world by focusing on maintaining the seawater system, providing the infrastructure to make development at Ocean Centerpiece possible and growing the existing microgrid by adding additional power generation and storage.

Chart 1 below illustrates three main sectors that are the current and long-term target focus areas for programs, projects, and businesses envisioned for HOST Park. The illustration generally follows the concepts and ideas presented in the NELHA 2012 Master Plan. While the master plan talked generally about growth in “applied technology” it was not sufficiently defined and too broad to be useful for implementation of the master plan. Accordingly, this illustration better defines the specific target areas for future growth.

The main areas of focus are ocean science, ocean energy and storage, and ocean cooling. The strong ocean science and energy orientation of HOST Park is due to unparalleled comparative advantage that exists in the extensive seawater system developed over the past 40 years. There is no other seawater system in the world that can compare to the one found at HOST Park. It is also interesting to note that, in general, the size of the circle corresponds with the time frame the projects will experience the most explosive rates of growth and development.

### Ocean Science

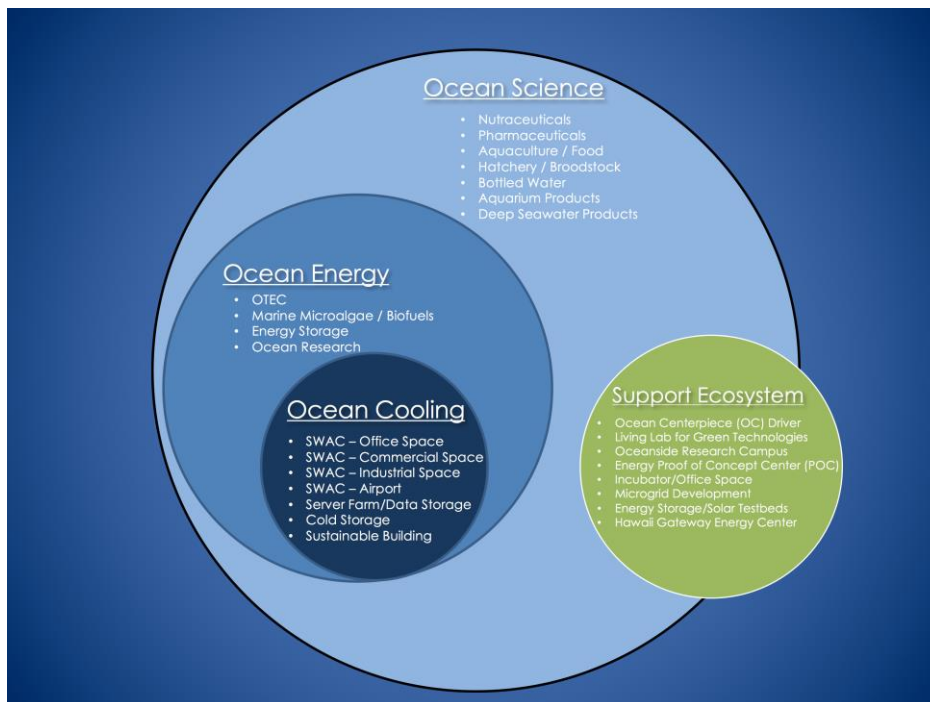
The largest circle, ocean science, includes the entire array of projects and products found in HOST Park today. Many of these non-energy related uses were



developed in the timeframe between 1990 and 2005 after the demand for OTEC waned. These projects currently make up a significant portion of the developed land at HOST Park. Growth in these types of companies is expected to continue, albeit at a slower rate. It is also important to note that one of the main ways to make a park with OTEC facilities, as the central element is to find other uses for the secondary use of the seawater. In this regard, these ocean science businesses will always play an important role at HOST Park.

New ocean science projects are continually evolving with recent interest in areas of potential high growth that include thermal aquaponics, hatcheries, and offshore activities such as habitats where traditional aquaculture would be impossible without the access to the unique seawater system. Given the availability of virtually unlimited cold and warm seawater throughout HOST Park all of the aquaculture businesses (micro-algae, macro-algae, finfish and shellfish) use what is known as recirculating aquaculture systems (RAS). These self-contained systems, both tanks and raceways, offer the flexibility to operate with increased fresh protein sources to increase productivity.

Businesses at HOST Park are demonstrating the value in RAS as a way to improve food access and gain a sustainable seafood supply. Over the years, many businesses have continued to improve technologies, filtration and energy use to decrease overall system operating expenses and increase yields. In addition, we continue to see efforts by existing businesses and startups to expand the varieties grown in these environments and continue research into optimizing the growth of specific species to open new markets and increase distribution opportunities.



The existing business base (aquaculture, nutraceutical, energy, and desalination) in ocean science also affords the opportunity to grow synergistic support service businesses. For example, the current plastic pre-form business recently located at Destiny Seawater for the desalinated water bottling businesses, aquaculture feed,

aquaculture supply chain and distribution, CO2 generation, and pipe/tank manufacturing.

### Ocean Energy

A community of like-minded entrepreneurs involved in ocean energy innovation can be created at HOST Park. Companies in this sector are beginning to emerge at HOST Park and/or will be targeted over the short-term for future growth.

HOST Park is unique in that there is a significantly high electric load (1.0 – 1.5MW) consumed for pumping seawater. In this regard, a focus on ocean energy, microgrid, and storage can more easily be developed jointly and part of a larger support ecosystem for all businesses in the park. Successful growth in this subset also has the very important benefit of lowering seawater-pumping costs for businesses in the park.

In terms of energy generation, national and international interest in OTEC research has seen resurgence in recent years due to rising oil prices and NELHA's seawater system is highly valued. Currently one R&D OTEC project (105kW) is underway and expected to begin energy production trials in 2015. NELHA continues seek a partner for a larger 1MW OTEC R&D test facility. Both of these projects are expected to provide large amounts of both cold and warm seawater for other secondary uses. In addition, there has been at least one project focusing on the creation of biofuels from marine algae.

Worldwide energy storage space is potentially one of the areas in clean energy development that will see considerable growth and technological advancement over the next ten years. Interest in this area is being driven due to the increasing number of the utility electrical circuits that have a high degree of penetration of renewable energy. There has been considerable interest in underwater compressed air storage at NELHA as well as other energy storage devices.

NELHA is well positioned as a future site for prototype and pre-commercial energy storage devices due to a combination of factors which include: unique infrastructure, high prices, strong policy framework and a high load demand for pumping seawater. Perhaps more importantly the development of a small microgrid at the park will allow entrepreneurs the opportunity to test pre-commercial storage devices in "real world" simulations connected to the demand side of the grid. The microgrid will provide additional energy efficiency information for the necessary validation of storage systems.



## Ocean Cooling

Ocean Cooling, primarily seawater air conditioning (SWAC), is a unique subset of Ocean Energy in which HOST Park has a significant comparative advantage over many other sites around the world and the State. The primary cost of a SWAC system is the initial capital cost. The energy costs for pumping the seawater are a small fraction of the total cost. While relatively new from a commercial standpoint, it is a proven technology which is extremely cost effective and an attractive “green energy” investment. SWAC also has the important advantage of providing a solid uninterrupted constant supply of cool air (24/7) vis-à-vis using more intermittent renewable clean energy technologies such as wind and solar power.

A private firm in Honolulu is currently in the process of developing a 25,000-ton SWAC district cooling system for properties in downtown Honolulu. The cost for this system, using one 63” deep seawater intake, is estimated to be approximately \$280 million.

It is to NELHA’s advantage to find ways to capitalize its ability to provide low cost cooling, as for the most part; developers or businesses at HOST Park can already take advantage of SWAC. Virtually all of the capital costs have already been incurred. The pipeline system is based on one 55”, one 40” and one 18” deep seawater intake pipelines. As such, the current deep seawater pipeline system at HOST Park already has the capacity to support a district SWAC cooling system significantly larger than the \$280 million Honolulu system. The NELHA SWAC district would be on land controlled by NELHA. A majority of the additional cost would be for heat exchangers and connections to NELHA’s seawater backbone that would most likely borne by developers or businesses.

It is also important to note that the current system has the capacity to include the airport and the University of Hawaii’s new Palamanui Campus, which is across from the airport, into NELHA’s SWAC district. The concept of using SWAC at the new proposed \$36 million international terminal at Kona International Airport and Palamanui has been considered for many years. Selling deep seawater to the operators of their individual systems is another source of new revenue for NELHA.

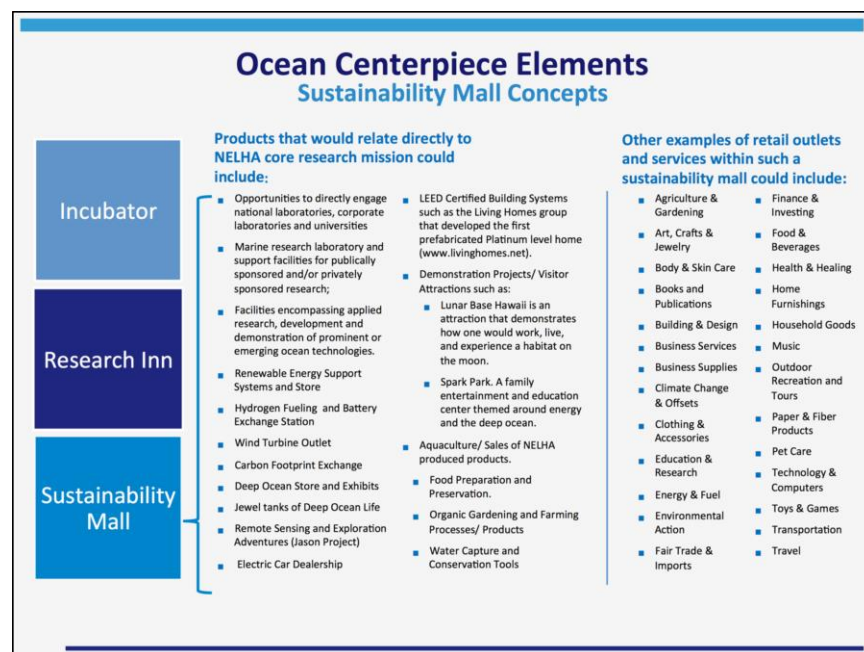
While the original seawater air conditioning (SWAC) prototypes were originally developed at NELHA about 30 years ago, other than the NELHA buildings in the research campus, there is currently relatively little use of this technology at HOST Park today. It is anticipated that growth in this area will be significant when the

infrastructure is in place to allow development of the Ocean Centerpiece driver (also referred to as the “economic driver” in the recent 2012 master plan).

The development of the Ocean Centerpiece has always been key to the long-term viability of the park. NELHA will need to seek a strategic partner to develop this 80A parcel of prime real estate in a manner that demonstrates strong revenue generation opportunities for both the developer and for NELHA. The key to successfully developing this parcel will be finding a strategic partner with a long-term vision, adequate financial resources, and a strong desire to complete a unique one-of-a-kind development entirely focused on sustainable living.

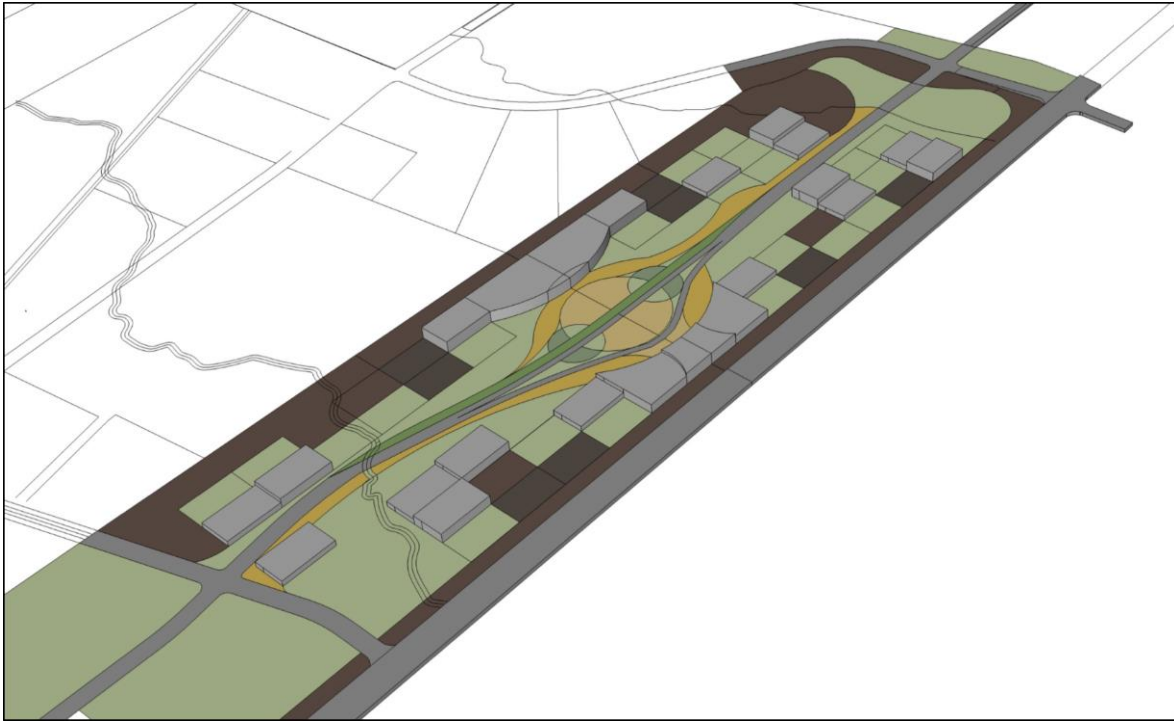
It is envisioned that this site will eventually become a world-renowned living laboratory and showpiece for green technologies that builds upon the natural assets at HOST Park such as deep-sea water, access to transportation, ocean research corridor and high solar insulation. In this regard, future development should emphasize the use of new and existing resources and clean technologies to reduce fossil fuel dependence, conserve potable water, green technologies that are environmentally friendly and provide community enhancement.

While the development must specifically emphasize and take advantage of the use of the large volumes of deep-sea water for cooling and air-conditioning that are currently available to the site, other concepts include those shown below:



## OCEAN CENTERPIECE

Living Laboratory and Showcase for Sustainable and Green Technologies



## Development Lifecycle

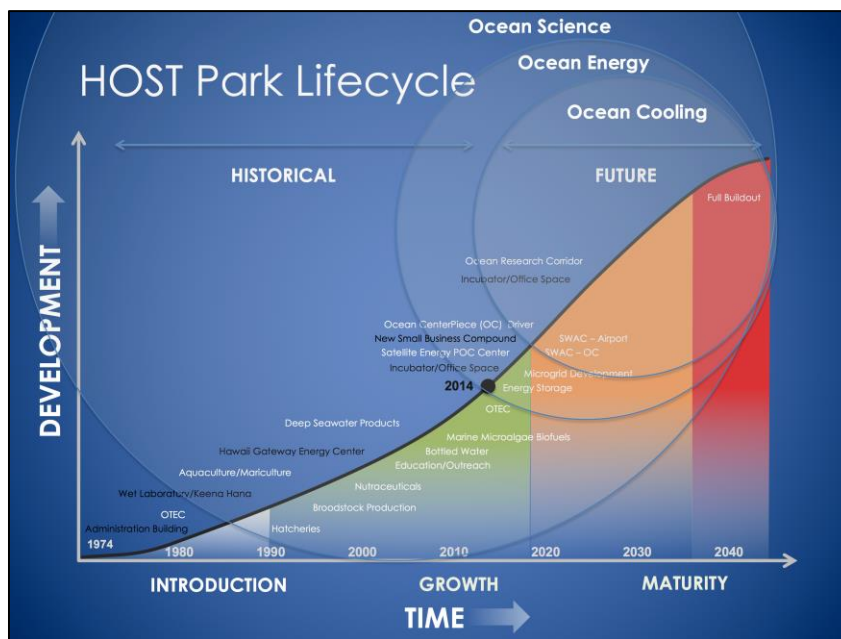
In terms of looking forward to the next 30 years or so, it is important to review development of HOST Park from a historical perspective. Accordingly, following illustration shows the projects over the past 40 years and those focus areas and projects listed above from a product lifecycle perspective. The long-term vision and target growth areas as shown in the chart on page 3 are also shown on this chart for reference.

It is important to note that the illustration below is showing the Ocean Energy, as a subset of Ocean Science and likewise, Ocean Cooling is a subset of Ocean Energy. It can also be inferred from the illustration that all infrastructure is currently in place to begin focusing on Ocean Energy projects. However, additional infrastructure is necessary before significant growth can be realized in the Ocean Cooling subset.

With regard to the horizontal or time axis; the illustration below shows a 70-year development timeline. This is generally in line with the 2012 Master Plan. This timeline is fairly realistic in terms of past land absorption rates for development at HOST Park but could be accelerated if desired via policy decisions by the NELHA Board of Directors.

In terms of the vertical or development axis, the illustration represents a general combination of acres leased and revenue although the curve is only being shown for illustrative purposes. No data was assembled to draw the curve, however; there is general consensus by NELHA staff that the curve is a fairly accurate representation.

The products shown are generally placed at the beginning of when development began. Items in white lettering are products and those items in black letter are buildings constructed at HOST Park over the years.



## Looking Forward

HOST Park can open the door for researchers to take their new ideas beyond research and demonstration to full commercialization, all at one location. HOST Park has also a unique combination of other natural resources, subtropical environment and community infrastructure that makes it a highly desirable location for new business enterprises. Accordingly, HOST Park is the premiere choice for the location of a variety of leading edge research, education, and commercial enterprises capitalizing on innovation in the combined use of seawater and high solar irradiation.

Proximity to an international airport, five minutes away, plays a vital role in helping the HOST Park clients get valuable products to the mainland as well as to Asian and other Pacific-rim markets fast. The prospects for the future are even greater with new and existing business expansions and recently completed facilities to support cutting edge R&D in renewable energy and ocean sciences. The vision for HOST Park has long been to serve as a demonstration site for many of the US National Energy Laboratories as well as many private sector companies.

## NELHA As a State Agency - Current Services

As shown in the table below, NELHA provides many services, resources, and expertise to the 40 plus business clients in HOST Park.

SERVICES	RESOURCES	EXPERTISE
NELHA services are tailored to fit each business in HOST Park.	NELHA is uniquely suited as a test bed for clean energy and ocean science opportunities	NELHA provides a wide variety of support to business in HOST Park.
<b>Research Campus:</b> Located near the shoreline on Keahole Point the six-acre Research Campus consists of over 4,000 square feet of laboratory space, outdoor wet laboratory, conference rooms, restrooms and both covered and open industrial storage space.	<b>Site Conditions:</b> Planned master permitted subdivision includes a full range of infrastructure: access roads, potable water, underground telecommunication/electric lines, ocean water, intake and distribution pipes, pumping stations, disposal systems, and groundwater quality monitoring wells.	<b>Water Quality Laboratory:</b> The Lab is staffed with a professional chemist and provides a commitment to excellence combined with a wide array of analytical instruments to generate data of maximum quality. The lab has become a benchmark for environmental water quality analysis for ocean water.
<b>Ocean Water Systems:</b> NELHA is a seawater utility and is master-permitted to pump over 100,000 gallons per minute of pristine surface and deep ocean water within HOST Park.	<b>Ocean Environment:</b> The steep ocean bottom gradient makes possible the tapping of deep, cold waters at depths ranging from 50 to 3,000 feet. This ocean water is of significant purity and has a high nutrient content.	<b>Scientific and Cultural Support</b> is provided in the fields of biosecurity, ocean sciences and ocean energy applications. In addition, there are established cultural and business links to Asia and other Pacific countries.
<b>Office Space:</b> Several buildings within the Research Campus and the Hawaii Gateway Energy Center along Queen Kaahumanu Highway provide office space for businesses located in Host Park.	<b>High Solar Insulation:</b> In the lee of three major mountains, NELHA receives approximately 10 inches of rainfall annually and offers the highest solar insulation of any coastal site in the United States.	<b>Technical Support</b> is provided by engineers, electricians and mechanics. In addition, NELHA works closely with the Friends of NELHA to offer educational tours and information on clean energy projects.



From an agency lifecycle standpoint, NELHA is in transition and now entering a more mature phase. Much of the seawater infrastructure “backbone” has been completed with the distribution lines for the third deep seawater, potable water lines, underground electrical and telecommunication utilities, major roads and several buildings. In the 80s and 90s, much of the focus was on basic infrastructure development, environmental studies and build-out. The Federal government, State Legislature and Administration, and the County of Hawaii government have provided the policy and financial support the NELHA concept during this time with the investment of over \$120 million.

Over the past 10 years self-sufficiency was the focus. Revenue growth and cost containment for operations were critical to achieving self-sufficiency. NELHA has successfully restructured its operations to become self-sufficient from an operating standpoint and looks forward to live up to its promise and expectation as an economic development engine.

This success has not happened on its own and NELHA acknowledges the strong support in the past that has helped it achieve success. The State administration, Legislature, small and large businesses, Hawaii residents and consumers and particularly NELHA’s Board of Directors and excellent staff who have taken bold actions over the years to meet the demands and challenges of developing the world’s premier ocean science and technology park

### **3.0 Year in Review**

FY 2014 was another year of strong growth for NELHA. Our efforts to date are yielding results and we are poised to grow and fulfill our potential as a site to advance research, stimulate scale-up models and nurture market acceptance of green and clean energy technologies.

As summary of major events and achievements in FY 2014 is listed below. These achievements illustrate NELHA’s desire to move from functioning as a landlord for an ocean science and technology park towards developing an environment or ecosystem where private sector businesses can grow.



- Complete Design and Select Contractor for Alternate Energy and Biotechnology Incubator in Research Campus
- Concept design for Ocean CenterPiece
- Independent Economic Impact Study Update
- Energy Strategy Implementation
- Build and grow relationships with key Federal, State, County and University institutions and initiate new marketing efforts.
- Web site update
- New Pipeline Design and Maintenance
- Road design
- Completion of Solar Energy Test-Bed in the Research Campus

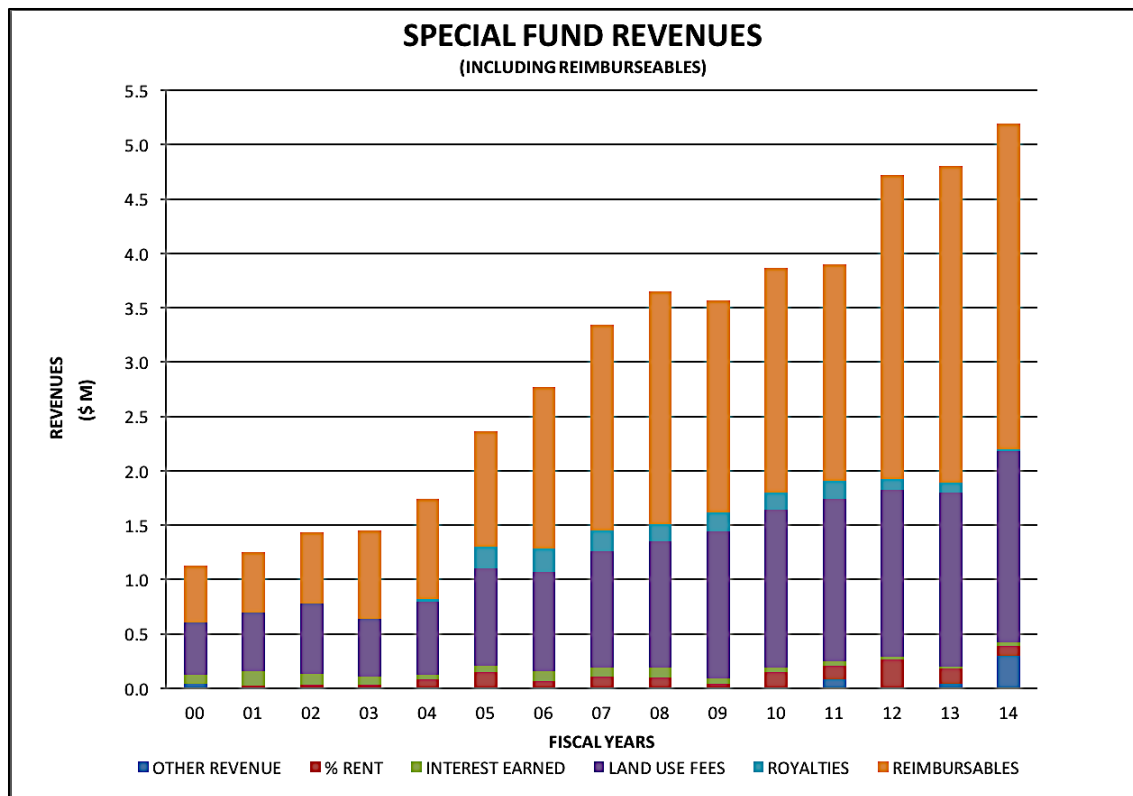
#### Who's Who at NELHA – Notable Visitors to HOST Park in 2014

- Arizona State University – Global Institute of Sustainability
- EnerSys Inc.
- Aquion Energy
- BYD Energy Inc.
- US Environmental Protection Agency
- GoogleX – Rapid Evaluation Team
- US National Park Service
- US National Marine Fisheries Service
- Blue Planet Foundation
- National Taiwan Ocean University
- Beijing BORE Energy Technology Company
- Solar Hydrogen Trends Inc.
- Lockheed Martin
- Hawaii Business Roundtable
- Hawaii Congress of Planning Officials

## Financials

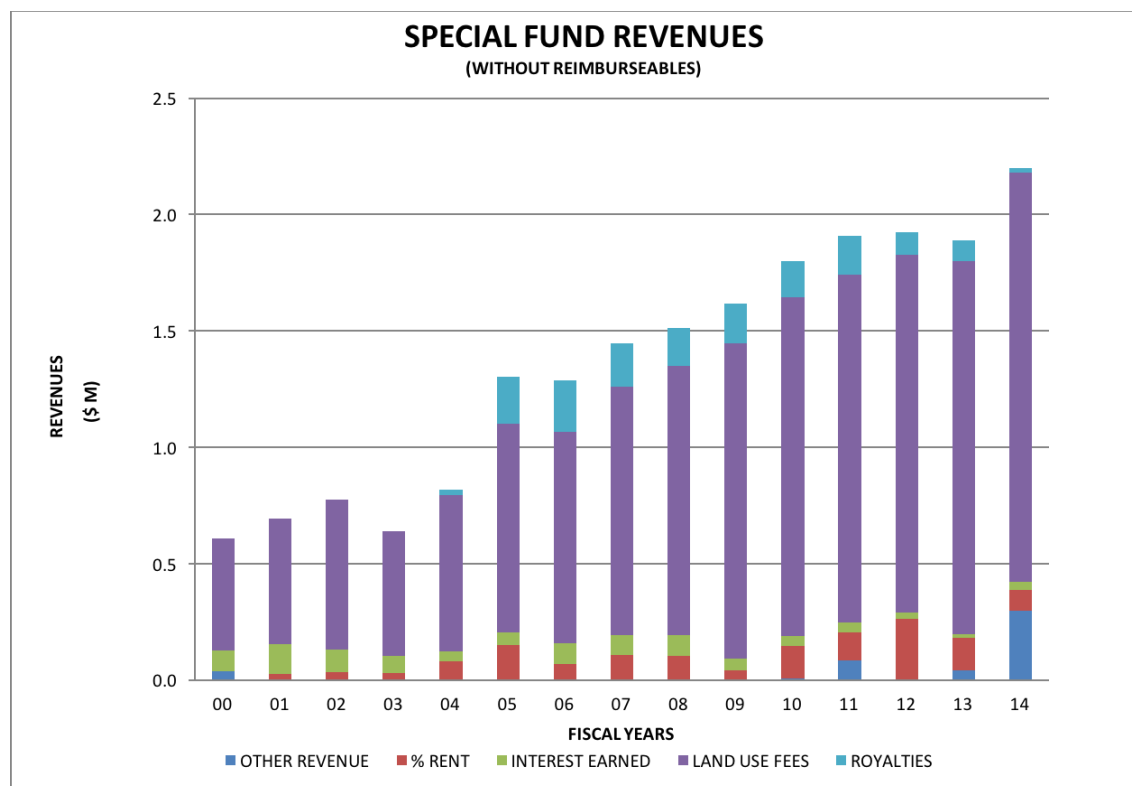
In terms of financial review, four charts are shown below. These charts illustrate the strong growth that NELHA has seen in revenue and its ability to become self-sufficient over the years.

The chart below illustrates the growth of total revenues over the past 14 years. It shows growth from approximately \$1 million in 2000 to over \$5 million last year. Much of this growth is due to increasing costs for seawater delivered to businesses in HOST Park. This system operates on a break-even basis. In addition, revenue from electrical and freshwater sub-meters is included in the reimbursable category. The increase in other revenue is due to successfully obtaining federal grants.



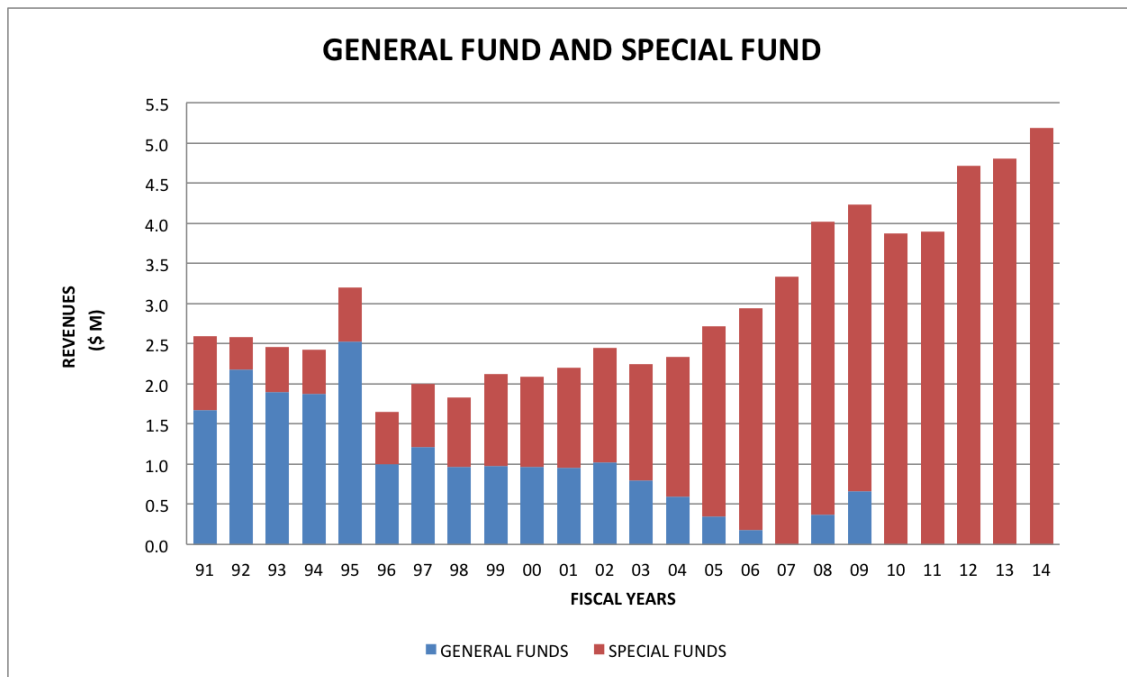


The following chart illustrates the growth of total revenues without reimbursables over the past 14 years. The majority of revenue shown in purple and is from land use fees or base rent from businesses in HOST Park. These businesses also pay a percentage of gross receipts and are shown in red. Royalties are shown in light blue and received from the businesses that began to desalinate and bottle deep-sea water for sale mainly to foreign markets in Asia. These businesses began to operate in HOST Park in 2004. Other revenue was received from the Federal government in FY 2011 to repair earthquake damage and federal grant funding in FY 2014.



The chart below speaks for itself in illustrating the success that NELHA has achieved in attaining self-sufficiency over the past 25 years. Around 2000, the State of Hawaii made a major policy decision in that those State agencies with large assets, and therefore the ability generate additional revenue, should begin to become self-sufficient. The chart shows an annual subsidy, shown as general funds in light blue, of approximately \$1 million annually being replaced by revenue from the seawater and land use fees being placed in NELHA's special fund. The basic concept was that general funds were subsidizing those individual businesses in the park. The State still continues to provide funds for capital improvement

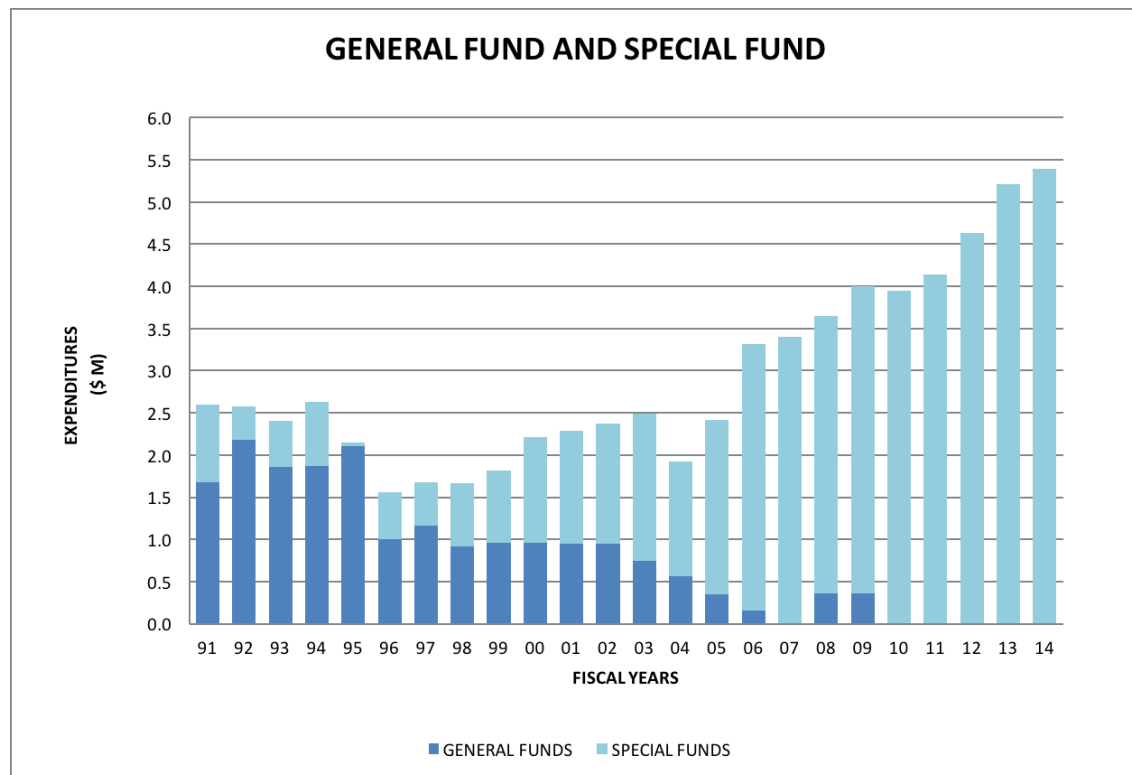
projects which are considered a “public good” and available to all business in the park as well as residents throughout the State.



The State and Federal governments continue to help support NELHA’s infrastructure such as improvements to the seawater system as well as roads. In the past three years, NELHA has received over \$21 million in State and Federal support for capital improvement projects (CIP). A listing of CIP projects that were beginning, in-progress, or completed during FY 2014 is listed below.

PROJECT DESCRIPTION	AMOUNT	CONTRACTOR
Seawater system improvements including 28" surface seawater connector pipeline	\$2,323,000	Procurement process underway
Design of 40" deep sea water pipeline system repairs	\$300,000	Makai Ocean Engineering
Plans and design for additional seawater pipeline distribution system	\$538,440	RM Towill
Plans and design for access roads and utilities in HOST Park (Note: \$500,000 is federal funds)	\$929,023	Parsons Brinkerhoff Inc.
Construction of Kahilihili connector road	\$9,694,000	Awaiting completion of environmental studies and design completion
Construction upgrades for 40" deep sea water pipeline system	\$5,300,000	Healy Tibbitts Builders Inc.
Main building renovation design and construction management services in conjunction with EDA \$3.0M federal grant	\$453,484	INK Arch LLC
Main building renovation construction in conjunction with EDA \$3.0M federal grant	\$3,460,120	F&H Construction

In terms of expenditures, the following chart shows similar pattern regarding growth in expenditures and the proportion between general and special funds.

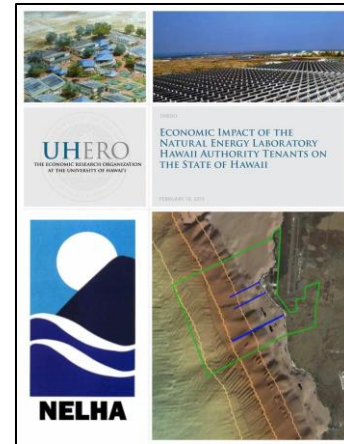


#### 4.0 Economic Impact

NELHA hired the Economic Research Organization at the University of Hawaii (UHERO) to conduct an analysis of the economic impact of HOST Park using 2013 data. This study updated the previous economic impact study that was completed several years ago using 2010 data.

The study found that total economic impact of the park has surged by 40 percent between 2010 and 2013. Total expenditures from the businesses at NELHA were \$99 million dollars, of which about \$72 million were paid to Hawaii entities in 2013. UHERO completed a similar study several years ago using 2010 data. The 2013 data represents an increase in total expenditures of \$18 million or 22% and an increase of in-state expenditures by \$22 million or 45 percent.

On a broader level, using type II multipliers from the State's input-output model, UHERO estimated the total economic output to the greater Hawaii economy was \$123 million dollars. That represents an increase of 40% between 2010 and 2013. State tax revenue generated by NELHA sales also grew to \$5.0 million dollars in 2013. The analysis also found that not only do NELHA businesses employ hundreds of people but also that their expenditures contribute to the total of 617 jobs in the larger Hawaii economy in 2013.



This data reflects pent-up demand from the great recession and a strong focus on investor relations that is leading to more confidence by private sector in making improvements or expansion to existing projects as well as new ventures. Based on the increase in construction in 2012 and 2013 it was obvious that there was a significant amount of new investment at HOST Park.

The growth of in-state expenditures is partially driven by substantial increases in expenditures on equipment and to a lesser degree on utilities and transportation. The overall increase in the local (in-state) expenditures has led to the significant increase in the estimated impacts. This makes sense given recent reports of over \$60 million in new investments in the past two years. These new investments into Hawaii's economy are much needed. NELHA's tenants are engaged in research activities that encourage investment in both physical and human capital and help generate knowledge spillovers so important in Hawaii's budding technology and innovation community."

The report shows that the growth was across the board in terms of several indicators. For example, the impact on the State's output (sales) increased by \$35.1 million (or 40%). The increase in earnings, tax revenues, and jobs was 17%, 11%, and 6%, respectively. As these new investments mature, it is anticipated that there will be a corresponding growth in employment over the next several years. This is especially rewarding as the growth provides quality jobs in marine science and sustainable engineering.

#### Construction fuels growth

As reported last year, there is a significant amount of construction activity at NELHA. State economist Eugene Tian estimated the construction work will create

over 500 jobs and generate over \$5.7 million in state tax revenue. Not only is the construction activity creating temporary jobs, but a water bottle preform manufacturer is opening a factory that will create eight permanent jobs.

HOST PARK CONSTRUCTION PROJECTS			
NAME	AMOUNT	COMMENT	FUNDING
<u>Projects Under Construction</u>			
1 Marine Mammal Center	3,200,000	Monk Seal Hosptial (Phase I)	Private
2 Cyanotech	4,500,000	Office Bldg & Extraction Facilities	Private
3 Shrimp Improvement Systems	6,000,000	Move World HQ from Key West FL (Phase I)	Private
4 Taylor Shellfish	1,000,000	Expansion Building and Ponds	Private
5 West Hawaii Explorations Academy	8,500,000	New Charter School (USDA loan)	Federal
6 NELHA Pipeline Repairs	5,300,000	Deep Sea 40" Pipeline	State
7 Destiny Deep Seawater/Encon Inc	2,000,000	New Preform Manufacturing Equipment	Private
8 NELHA SCADA System and PV Testbed	412,000	Ntl. Renewable Energy Laboratory - Grant	Federal
Sub-Total Projects Under Construction	30,912,000		
<u>Planned Projects</u>			
1 Shrimp Improvement Systems	4,000,000	Phase II	Private
2 Makai Ocean Engineering	4,000,000	OTEC Turbine (DOD Research Grant)	Federal
3 NELHA Kahilihili Road Construction	9,690,000	CIP funding	State
4 Marine Mammal Center	600,000	Monk Seal Hosptial (Phase II)	Private
5 NELHA SSW Connector Pipe	2,323,000	CIP funding	State
6 NELHA Main Building Renovation	3,000,000	US Department of Commerce (EDA) Grant	Federal
7 NELHA Main Building Renovation	1,000,000	CIP funding (Reimbursible GO Bonds)	State
Sub-Total Planned Projects	20,613,000		
GRAND TOTAL	51,525,000		

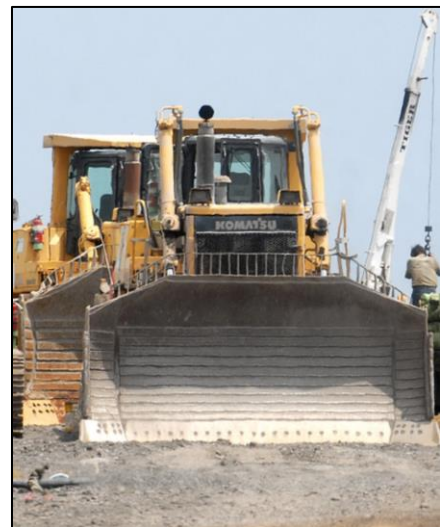




NELHA Board members (L-R Dr. Don Thomas, Karl Fooks, William Rolston, Todd Low and Michael Buchel) tour the ongoing construction at the new Shrimp Improvement Systems site.

The surge in construction activity was very noticeable in FY2014 driving into HOST Park as many of the active construction sites line Makako Bay Drive that is the facility's access road. In addition to private sector, NELHA has also been successful in securing State funding for public infrastructure to grow the park.

Most likely, many of the projects are being fueled by the economic expansion in the national economy since end of the great recession. However, NELHA continues to receive application for new projects is a good indication which shows that the private sector still sees a lot of potential and is willing to invest in HOST Park.





### DBEDT 2014 Team of the Award

NELHA snagged the Department of Business, Economic Development and Tourism (DBEDT) Team of the Year Award in 2014. The **“NELHA Deep Seawater Pipe Repair Team”** completed repairs to secure deep-sea pipeline to ocean floor at a depth of 500 feet and extend life of pipeline by adding additional buoyancy. The team completed the work ahead of schedule and under budget.

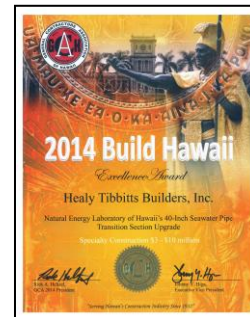
The project was completed to upgrade the existing mooring bridles and transition anchors of NELHA’s 40” deep seawater pipeline system off shore. The mooring bridles and transition anchors were in place for 24 years and based on previous surveys have deteriorated. The pipeline was in jeopardy of breaking loose from the bottom and floating to the surface where it would be a health and safety threat in the offshore corridor on the western side of the Island of Hawaii and the surrounding environment. Upon, completion, earlier this year, the pipeline has been secured and the upgrades extended the life of the system for another 15-20 years. The total budget available for this project was \$5.3M.



A good analogy for this project would be conducting an orchestra on the bottom of the ocean. Due to the deep ocean depths at which this project was completed work was extremely complex and required a great deal of advanced planning and choreography. In addition, all of the work had to complete in a relatively short period of time: over a two-week period.

Weather and changing surface and deep-sea conditions is something that was out of our control and required that once all equipment is

mobilized and in place the work be completed as soon as possible to avoid increase in costs and potential human safety issues. Accordingly, the project took a significant amount of planning, procurement and scheduling. The main contractor for this project was Healy Tibbitts and they had several sub-contractors involved including Sea Engineering, American Marine and Global Divers. NELHA also hired Makai Ocean Engineering for construction management. The main contractor Healy Tibbitts Builders Inc. also won an award from the General Contractor’s Association of Hawaii.



## 5.0 Research Campus Improvements

In 2012, NELHA completed a pre-feasibility engineering study of renovating the Administration building into an office space incubator facility that is located in the six-acre research campus on Keahole Point. Based on the study, completed by Ferraro Choi and

Associates, the overall condition of the building is good and higher levels of utilization could be achieved if this building is renovated as an incubator to support HOST Park ventures. The concept is to relocate storage and maintenance to alternative facilities in the research campus.



NELHA applied for and received a grant of \$3.0 million from the US Department of Commerce Economic Development Administration for this project. In addition, NELHA received \$1.0 million in State funding. The proposed project

is mission critical for HOST Park's future and will provide a focal point to facilitate a "pipeline" for pre-commercial and commercial tenants for the HOST Park, especially in the fields of alternative energy, biotechnology and ocean science.

INK Arch LLC was hired to design the new clean energy and ocean science technology innovation/accelerator center in the Research Campus. The project is intended to provide a focal point for the rejuvenation of the Research Campus by adding much needed office and collaboration space. INK Arch completed design in early 2014 and the project was put out to bid for construction in the Spring 2014.



The project will not require any changes to the existing super-structure of the facility and the existing foundation is adequate to support the proposed facility. A new two-story structure will be added inside occupying the entire



footprint of the shell structure and the existing two-story light wood frame structure will be demolished. The proposed design will allow for an additional 10,000 SF of net leasable office space. In addition, common amenities will include a conference room and lounge/break room. When fully complete the center will have office and meeting space on two levels and a large collaboration space in the middle of the building.

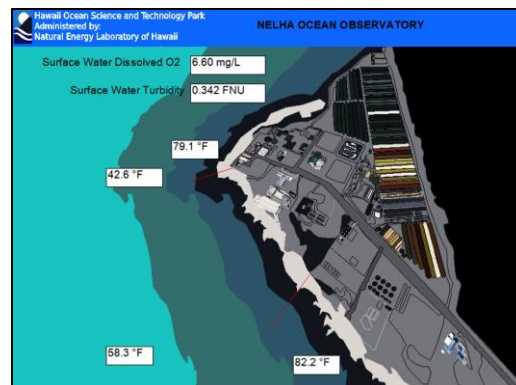
NELHA signed a contract with F&H Construction in June 2014 and the project is planned to be complete in late 2015. When fully complete the center will have offices for 17 different businesses with office space totaling approximately 10,000 sf. In addition, the center will include over 4,000 s.f. of collaboration and meeting space.



With the renovation of the old administration building due to begin soon, NELHA moved its administrative office into the Keena Hana building next to the Water Quality Laboratory. The picture at the left shows the new lobby for the NELHA.

## 6.0 Clean Energy Initiatives

NELHA applied for and received a \$412,000 grant from the U.S. Department of Energy in FY 2012 to fund the development and deployment of distributed energy systems at HOST Park. The funds will be used to analyze how advanced energy technologies could improve energy performance at HOST Park with the development of a small micro-grid and provide related updates to the State of Hawaii's renewable energy and distributed energy resources strategy. DOE's National Renewable Energy Laboratory (NREL) served as a project manager for this grant.





Dr. Bill Kramer, from NREL visited NELHA in FY 2014 to assess progress on the project. He is shown in the picture on the left with Dr. Xuemei Bai, Senior Director of Research and Development for Cellana discussing the marine microalgae pond trials at their Kona Demonstration Facility.

Major components of the project included: 1) the development of a solar energy test bed at the HOST Park Research Campus; 2) an industrial control system for seawater system equipment combined with a system to monitor, collect, and report data about electricity use at NELHA; 3) the collection of system and solar resource data “industrial level weather station” at the NELHA site; and, 4) the updating of the Renewable Energy and Distributed Electric Resources Strategy to increase the utilization of the Hawaii Gateway Energy Center. The weather station and the DER strategy were completed in FY 2013.



The solar test bed was completed in FY 2014 and provides approximately 35KW of power. The installation was completed by Island Pacific Energy.

The control and data acquisition system will provide a backbone that NELHA can build out further in the coming years and greatly assist in making the seawater system more cost efficient. NELHA made significant progress on the control system in FY2014. The server room was completed and increased connectivity for the system was completed with a new fiber link to the State’s next generation network.

Two of the key conclusions of the DER strategy report were to increase strategic partnerships and focus on becoming a test-bed for energy storage systems. NELHA made significant progress in both areas in FY2014 and is further detailed below.

### Developing Strategic Partnerships with National Laboratories.

NELHA developed a contract with the University of Hawaii in order to utilize the university's contacts with the Department of Energy (DOE) National Laboratory System. As a result of an earlier contract with PICHTR, it was decided to have the NELHA management visit four national laboratories where there was the greatest potential for collaborations leading to funding for NELHA.

In early March 2014, the NELHA team visited Sandia National Laboratory (Albuquerque, NM) and Lawrence Berkeley National Laboratory (Berkeley, CA). In early May, the NELHA team visited Pacific Northwest National Laboratory (Richland, WA) and the National Renewable Energy Laboratory (Golden, CO).

A significant number of senior management contacts were made as part of these visits. The number of senior management discussions reflects the strength of the interest in the national laboratories in possible collaboration with NELHA.

All of the laboratory visits were characterized as a set of substantive discussions. We were able to present NELHA capabilities and attributes. For the laboratories, we were able to hear what they were doing that may have the potential for collaborations in the near future. For all of the laboratories, with the exception of LBNL, we were able to visit a number of their facilities.



There were clear opportunities that were presented to the NELHA team.

### Sandia National Laboratory

As one of the two DOE lead laboratories for energy storage, Sandia is in a position to support energy storage testing, validation, and demonstration at NELHA. In addition, Sandia expressed interest in solar thermal energy demonstrations at NELHA. Sandia provided a protocol for energy storage testing. A similar protocol was provided by PNNL

### Lawrence Berkeley National Laboratory (LBNL)

The focus of the visit to LBNL was on demand response technology demonstrations. In this case, the use and upgrading of the Gateway facility is of

interest to LBNL. Due to their international reputation in the area of demand response technology, it may be possible to work with them on projects funding by groups other than the federal government.

#### Pacific Northwest National Laboratory (PNNL)

Of all of the laboratories visited, this group probably exhibited the most interest in working with NELHA. As a DOE lead laboratory for energy storage, they would be able to work with NELHA on testing, validation, and demonstration of energy storage technologies. As a winner of a very large project on Smart Grid systems, they would have the expertise to work with NELHA on microgrid systems as well as working with the utility and county on system upgrades. PNNL's leadership in trans active energy systems and analyses could help NELHA with their seawater management and utility systems. There was also interest in better utilizing the Gateway facility for energy efficiency demonstrations. Lastly, PNNL raised the idea of establishing a PNNL "node" in the new NELHA building upon its completion.

#### National Renewable Energy Laboratory (NREL)

There was considerable interest on the part of NREL in working more closely with groups in Hawaii for a variety of reasons. There was interest in complementing the work being done in their ESIF facility with additional demonstrations. They expressed interest in utilizing the Gateway Center and the abandoned solar thermal demonstration for the development of new demonstrations in energy efficiency and solar thermal systems. There is also interest in providing data for the virtual "cave" that NREL has. As with PNNL, they expressed interest in establishing an office in the new NELHA building upon its completion. NREL agreed to provide additional funding to NELHA as part of an existing agreement between the two agencies.

Two of the laboratories have contacted us to say that they are actively working on approaches for teaming with NELHA. These are Pacific Northwest Energy Laboratory and Lawrence Berkeley Energy Laboratory. The immediate next steps are to respond to the laboratories promptly and to re-contact specific individuals soon. On a specific note, we will work with the laboratories to obtain their attendance at the Energy Storage Workshop in Kona.

#### Developing and Energy Storage Systems Test-Bed in the Research Campus.

NELHA, County of Hawaii, and Hawaii Electric Light Company entered into a strategic partnership in February 2014 to share resources and attract companies

interested in testing and evaluating pre-commercial energy storage units at HOST Park. The strategic partnership highlights NELHA's value as a test-bed for new technologies and driver of innovation and economic development. With the significant cost reduction in clean energy generation over the years, some consider lower cost energy storage to be the 'missing link' and one of the most challenging elements in the design and function of a clean energy microgrid.

Energy storage is a rapidly evolving market and offers significant potential for future growth, as microgrids require higher degrees of reliability and power quality, sophisticated generation-load balancing. According to some reports, the worldwide market for energy storage systems for wind and solar will grow from less than \$150 million annually in 2013 to \$10.3 billion by 2023 and an installed capacity of projected to total 21.8 GW.

NELHA developed much of the necessary infrastructure to allow for the 'real-world' grid connected standardized testing and validation of energy storage devices at HOST Park with funds received from the National Renewable Energy Laboratory the previous two years. The concept is to offer low-cost outdoor and indoor sites for testing, up to 30kW of power, power sensors, and real-time monitoring data of energy storage devices.

Efforts like these are providing a backbone that NELHA can build out further in the coming years and greatly assist stabilizing the costs for the critical seawater system for businesses at HOST Park.

## NELHA: 1974 to 2014 – Our 40th year

The mid-70s were an exciting time. The first Saturday Night Live television program appeared. University of Hawaii at Hilo was founded and opened its doors. And, the Natural Energy Laboratory of Hawaii was founded. One year later, Steve Wozniak would demonstrate his first computer running basic, the Apple 1, to the Homebrew Computer Club in Menlo Park California.

As shown on the original hearing notice, House Bill No. 3097-74 Relating to the State Natural Energy Laboratory was first heard on Friday March 15, 1974. According to handwritten notes from the hearing file found at the Hawaii State Archives, and most likely from the Committee Chairman Richard A. Kawakami, there were three people who testified: Dr. John T. Craven from Governor Burns office, John W. Shupe from the University of Hawaii and Lloyd Sadamoto from the County of Hawaii. On June 14, 1974, State legislators approved Act 236 that established an independent non-profit corporation, the Natural Energy Laboratory of Hawaii at Keahole Point.

The site was chosen after careful review of the criteria necessary for successful development of ocean thermal energy conversion (OTEC) and related technologies. The most important considerations were: nearby availability of cold, deep ocean water, a warm ocean surface layer not subject to strong seasonal cooling; high year-round solar radiation; accessibility to logistical support, including airports, harbors, and highways; and adequate quantities of neighboring undeveloped land suitable for aquaculture and related projects.

HOUSE OF REPRESENTATIVES  
THE SEVENTH LEGISLATURE  
REGULAR SESSION - 1974

COMMITTEE ON WATER, LAND USE  
AND DEVELOPMENT  
RICHARD A. KAWAKAMI, CHAIRMAN

NOTICE OF  
PUBLIC HEARING

DATE: FRIDAY, MARCH 15, 1974  
TIME: 9:00 A.M.  
PLACE: HOUSE CONFERENCE ROOM 332, STATE CAPITOL

AGENDA

H.B. No. 58 RELATING TO HISTORICAL OBJECTS AND SITES.  
H.B. No. 3005-74 RELATING TO FISH AND GAME LICENSES FOR SENIOR CITIZENS.  
H.B. No. 2784-74 RELATING TO FISHING.  
H.B. No. 2978-74 MAKING AN APPROPRIATION TO CONDUCT A CONFERENCE ON COASTAL ENGINEERING.  
H.B. No. 2993-74 MAKING AN APPROPRIATION FOR THE ESTABLISHMENT OF A STATE PARK.  
**H.B. No. 3097-74 Relating to a State Natural Energy Laboratory**

PERSONS WISHING TO TESTIFY SHOULD SUBMIT 30 COPIES OF THEIR TESTIMONY TO THE COMMITTEE CLERK NO LATER THAN 24 HOURS PRIOR TO THE HEARING. FOR FURTHER INFORMATION, PLEASE CALL THE COMMITTEE CLERK AT: 548-5982.

TESTIFIERS:

H. B. No. 58 ✓ Sunao Kido, DLNR  
✓ Agnes Conrad, Hawaii Foundation of History and Humanities  
✓ Francis Jackson, Task Force  
✓ Jackie Erickson, Coalition of Hawaiian People  
✓ Aaron Levine, Citizen's Advisory Com. to the Honolulu Civic Center Master Plan  
✓ Carl Klunder, Downtown Improvement Assn.  
✓ John T. Craven, Marine Affairs Coordinator

H. B. No. 3005-74 Morimasa Kaneshiro, Commission on Aging  
Dept. of Land & Natural Resources

H. B. No. 2784-74 Dept. of Land & Natural Resources

H. B. No. 2978-74 ✓ Alden Reeves - HUB  
✓ Frans Gerison, UN Dept. of Ocean Engineering  
✓ John T. O'Brien, UN Dept. of Ocean Engineering  
✓ John T. Craven, Marine Affairs Coordinator  
Dept. of Transportation, written comments only

H. B. No. 2993-74 ✓ Howard A. Schimma, ASCE  
Dept. of Land & Natural Resources

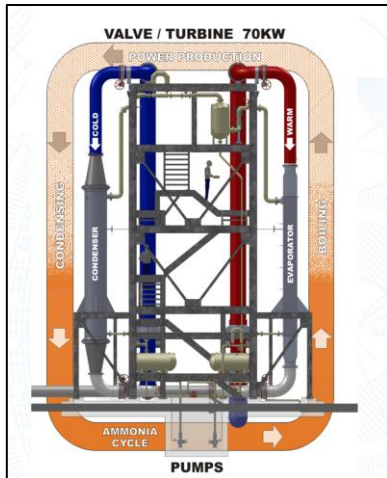
H. B. No. 3097-74 ✓ John T. Craven, Marine Affairs Coordinator  
John W. Shupe  
Lloyd Sadamoto - Hawaii County  
Agnes Conrad

The initial funds consisted of \$50,000 from the State and \$50,000 from the County of Hawaii. The Research Corporation of the University of Hawaii (RCUH) was chosen to provide immediate corporate structure and financial and management functions. The initial staff consisted of three individuals appointed by the Board of Directors. They worked on planning and development of the Keahole Point site. This planning developed recommendations that were submitted to the 1975 legislature. In April 1976, the legislature appropriated \$750,000 for capital improvements at the site. The land was rezoned for urban use, and NELH was underway.



## 7.0 Ocean Thermal Energy Conversion (OTEC) Update

There continued to be significant activity regarding OTEC at HOST Park in FY 2014. HOST Park continues to be seen as the world's preeminent OTEC research and demonstration site. Projects currently underway or planned will reinforce HOST Park's leadership as a test bed for this technology.



Makai Ocean Engineering continued development of their OTEC heat exchanger test facility at the in the Research Campus. The test facility is a 40-foot tall tower that supports evaporators, condensers, seawater piping, and an accurately instrumented ammonia working fluid piping system. NAVFAC and ONR sponsored the facility as a cost-effective means to test the performance of heat exchangers on land using NELHA's existing seawater pipe infrastructure.

In addition to the Makai Ocean Engineering test tower, NELHA worked closely with the County of Hawaii regarding their initiative to host the 4<sup>th</sup> annual Hawaii – Okinawa Ocean Energy Workshop. The mission of the OTEC workshop is to facilitate implementation and advancement of effective OTEC systems. An operational demonstration plant with scalable components has been identified as a key driver for the promotion and realization of larger OTEC projects worldwide. A 100kW OTEC demonstration project in Kumejima became operational in June 2013 and MOE's project as described above is expected to become operation in 2015. The workshop attracted leading professionals in OTEC from around the world and Dr. Ikegami from SAGA University is pictured below addressing the workshop.





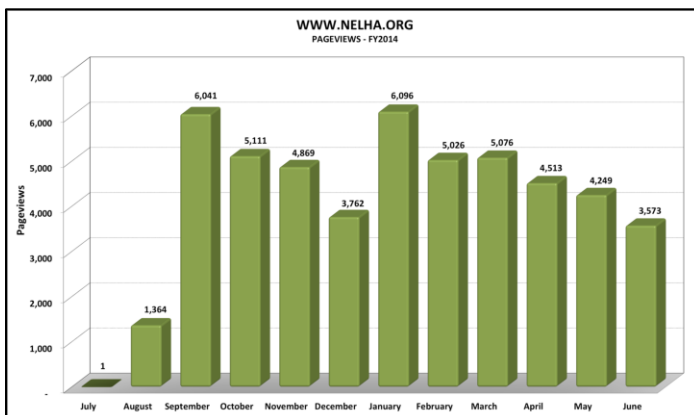
Another key OTEC event was the September 2013 Asia Pacific Clean Energy Conference in Honolulu included a special track devoted to OTEC. Participants were invited to NELHA for a one-day workshop. The picture

below shows many of the participants at the Gateway Center workshop.

## 8.0 Marketing, Public and Community Relations

NELHA's marketing efforts support the facility with television, magazines, literature, promotion, press familiarization tours, and exhibits at trade shows. In addition, NELHA provided almost \$50,000 of in-kind support and works closely with the Friends of NELHA; approximately 5,000 visitors were hosted at the Hawaii Gateway Energy Center in FY2014 and were given educational tours of the facility.

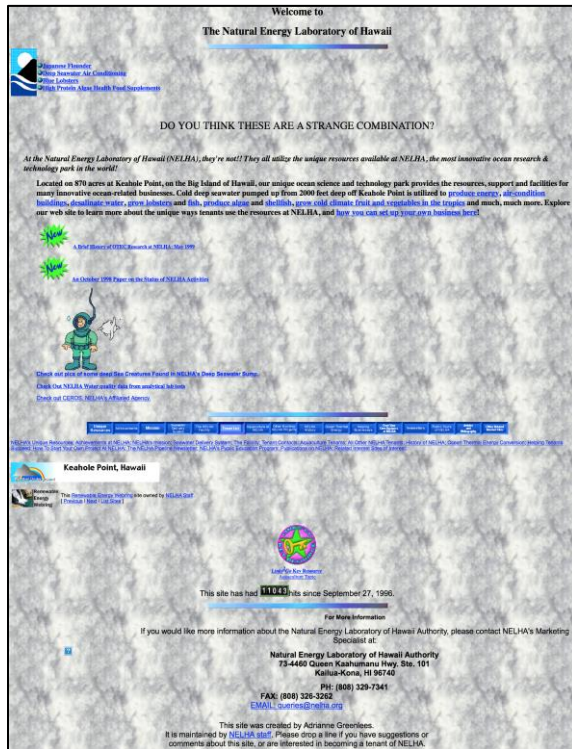
NELHA continues to nurture connections with high schools, community organizations, colleges, universities and research institutions to promote a culture of fresh ideas and new thinking. We offer internships and volunteer student projects that provide an opportunity for students to enhance their academic programs with field experience, related to their career interest, in a real world setting. We also facilitate internships at other businesses within HOST Park client organizations.



NELHA completed a “revamp” of its website in FY2013. FY2014 was the first year it as been fully operational in the new format. Interestingly, NELHA's website had 49,681 page views for FY2014. Averaging a little over 4,500 per month.



## 1996 to 2002



## NELHA WEBSITES OVER THE YEARS

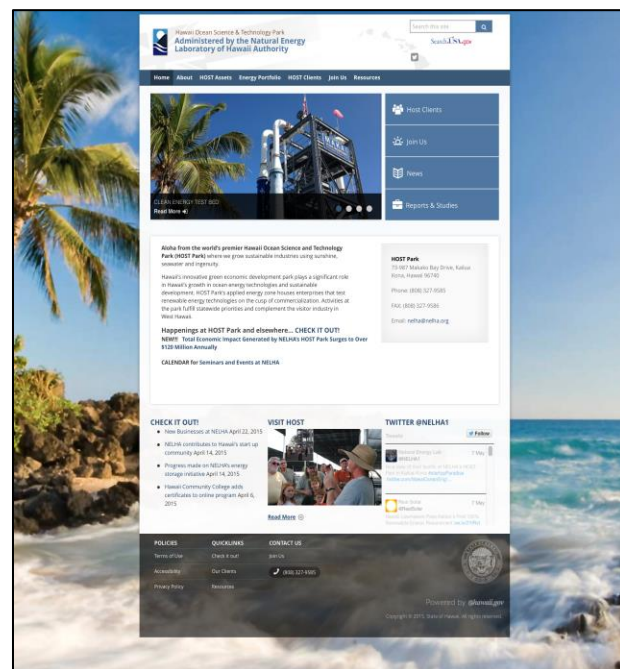
## 2002 to 2012



## 2012 to 2013



## 2013 to Current



JW

## IRONMAN 2013

In addition, to education and outreach regarding clean energy and marine science as discussed earlier, NELHA supports many West Hawaii community events. Among the most significant events

is the Ironman World Championships held in Kona every year. Several miles of the marathon segment of the Ironman are run inside HOST Park. In addition, four aid stations are in the Park; the largest being at the entrance to HOST Park at the junction of Queen Kaahumanu Highway and Makako Bay Drive.

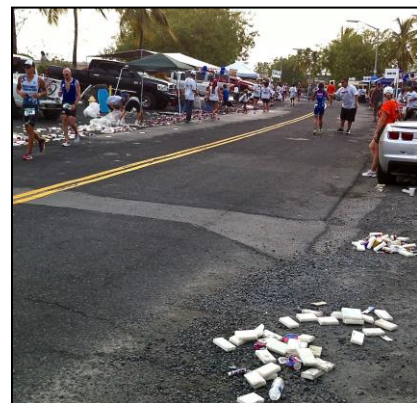


HOST Park has the privileged distinction of being called the “Dante’s Inferno”. Participants in the Ironman’s third and final leg, the marathon, come down HOST Park on Makako Bay Drive for the 17-19<sup>th</sup> miles of the marathon. As many marathoners know, this is typically where runners “hit the wall” and this segment of the marathon is very difficult.



According to urban legend, the HOST Park segment is one of the hottest parts of the marathon due to high sunshine and “black lava” along the road. In addition, at the 18<sup>th</sup> mile of the race, runner’s turn around and head back to Kona town for the finish. The turnaround area, shown below, is along the ocean and runners must climb the 100 feet in elevation on their way back to Queen Kaahumanu Highway and the final 6 mile leg back to the finish line in Kona town.

Many NELHA staff participate in race organization, such as Jan War, who has been Swim Director for over 20 years. Keith Olsen is integrally involved in the cycling portion of the race and many staff assist race aid stations.



## 9.0 Pipeline Infrastructure

NELHA operates the world's largest seawater utility and provides both pristine surface and deep seawater throughout HOST Park. A listing of major pipelines is shown below. In addition, NELHA operates and maintains three major pump stations, four major (three fixed and one mobile) backup generators and an extensive seawater pipeline distribution system throughout the park.

PIPELINE DESCRIPTION	DEPTH (ft)	SURFACE SEA WATER	DEEP SEA WATER
40-inch diameter	2,210		13,400 GPM
28-inch diameter	69	9,700 GPM	
18-inch diameter	2,060		3,000 GPM
24-inch diameter	33	5,400 GPM	
55-inch diameter	3,000		27,000 GPM
55-inch diameter	79	40,500 GPM	

In addition, to routine maintenance on the system, one major project was completed in early July 2013. This included the design of upgrades to the main 40-inch deep seawater pipeline. This pipeline is one of the oldest at NELHA and was installed in 1986. Work to repair bridles, which secure the pipeline to the ocean floor at a depth of 500 feet and extended the life of the pipeline for another 15 years. NELHA also continued work regarding the design of new distribution pipelines distribution for the upper elevations of the park to open up some of the last remaining land available for development in the park. This work also included the design of upgrades to the 55-inch pump station to allow for higher capacity vertical turbine pumps and associated electrical and mechanical upgrades. Work also included the design of a 28" surface seawater connector pipe to connect the north and south seawater systems.

Finally, NELHA has initiated efforts to provide additional remote data collection for energy consumption, seawater flows and water quality. Instrumentation being installed with funds from the NREL grant will be "double purposed" for this initiative. This project will provide the backbone necessary to provide detailed information for future upgrades to increase efficiencies.

## 10.0 Analytical Laboratory

NELHA's Analytical Laboratory specializes in environmental sampling and marine water chemistry sample analysis. The NELHA Analytical Laboratory again received its certified acceptable proficiency rating in FY 2014 from the US Environmental Protection Agency's Discharge Monitoring Report-Quality Assurance Program on



routinely performed water chemistry analytes. The NELHA Analytical Laboratory collects, process, and disseminates analytical and biota study information needed to protect NELHA's valuable seawater and groundwater resources.

The environmental monitoring activities the NELHA Analytical Laboratory performs include sample collection, analysis, and data recording of environmental samples from NELHA's seawater pipeline distribution system, groundwater wells, anchialine pond water, and the near shore seawater environment fronting NELHA's shoreline.

Yearly reports are issued in compliance with regulatory requirements of the Hawaii County Planning Department and State of Hawaii government agencies including the Department of Land and Natural Resources, the Office of Environmental Quality Control, and the Department of Health. NELHA has established a forward-looking, multi-disciplinary environmental monitoring program and has maintained and operated an analytical laboratory to meet all of its environmental monitoring permitting requirements.

Much of the environmental monitoring work involved the implementation of NELHA's Comprehensive Environmental Monitoring Program (CEMP), collecting and analyzing samples from more than 120 sites located both onshore and offshore. The CEMP allows NELHA to monitor its pristine environment and serves as an early detection system should any irregularities in onshore effluent disposal occur, and observing the pristine offshore environmental water quality.

The objective of the CEMP is to safeguard the unique environmental resources at HOST Park. This program, in combination with an independent biota monitoring survey, determines if any negative impact has occurred to the class AA marine water chemistry, and if there are observable changes in the diversity and abundance of the coral cover and marine biota populations.



This water quality-monitoring program began in March 1989 and as such the 2014 CEMP provides data in the context of a 25-year historical perspective. Prior to March 1989, NELHA provided marine water quality data with its weekly pipeline

water quality-monitoring program. This report will address the HDOH rules for class AA marine water and discuss general trends with respect to NELHA's groundwater, anchialine ponds, and terrestrial seawater disposal monitoring programs.

The 2014 CEMP report shows no extraordinary groundwater water quality issues were noted. In addition, NELHA's ocean transect sampling results were within the historical range of NELHA pipeline and ocean transect data set. The results are also similar to other West Hawaii marine water quality monitoring programs.

It is important to note that since July 2010, a seawater disposal-monitoring program was gradually phased in and fully executed by January 2011. No unusual seawater disposal observations have been noted since its inception. The seawater disposal-monitoring program involves quarterly sampling of terrestrial seawater disposal sites at the NELHA facility. NELHA measures total suspended solids, biological oxygen demand, total nitrogen, and total phosphorous as guided by HAR Title 11 Chapter 62 with further recommendations from the HDOH Wastewater Branch.

As summary of the benthic, biota and water chemistry data shown in the 2014 report is listed below:

- Coral cover has gradually increased from the early 1990's storm events;
- Fish communities have been constant over the past twenty-two years;
- Chlorophyll-a, a measure of phytoplankton biomass, has never exceeded the HDOH limit;
- Near shore ocean water chemistry has been historically consistent; and,
- Groundwater has been comparatively stable over the past twenty-five years with intermittent nutrient spikes and associated recoveries.

Recently, NELHA has successfully implemented numerous enhancements to its CEMP program to further improve its ability to find and identify the causes of episodic events and institute timely corrective actions. These enhancements include:

- Implementing a seawater disposal monitoring program;
- Funding additional laboratory equipment to enhance the NELHA Water Quality;
- Laboratory analytical abilities;
- 62% increase in groundwater monitoring wells, totaling 34 wells;
- Aligning sampling techniques with EPA and HDOH protocols;
- Participation in the EPA's Discharge Monitoring Report-Quality Assurance Study Program; and,

- Documenting events with the use of NELHA Environmental Incident Report Form.

## 11.0 Land and Leasing

NELHA operates on the 870-acre HOST Park via a General Lease from the State of Hawaii Department of Land and Natural Resources (DLNR). This 45-year lease was initially received in 2001. As such, as of 2012 only 34 years was remaining on the lease. To allow for long-term leases to new businesses, NELHA sought and received from the DLNR a lease extension to extend the term of the master lease to 65 years or 2066.

NELHA saw a significant amount of lease activity in FY 2014. As shown in the table below, activity included renewing existing agreements, new leases, negotiation of existing leases during rent re-opening periods, merger of existing leases and review of a multitude of new projects.

Number new agreements including subleases	9
Number new tenants	4
Number new subleases	0
Potential projects (some NELHA staff time investment)	7
Potential projects (significant NELHA staff time investment)	7
Total potential projects	14
Number of promising long term projects	6

## 12.0 HOST Park Infrastructure

### Additional Funding for Fresh Water

One of the biggest constraints preventing the use of vacant land and the subdivision of land to provide additional parcels for lease is the fresh water system at NELHA. In this regard, NELHA requested funds in 2014 for the exploratory phase of a new potable water well. In line with the strong support we have received over the past several years from the DBEDT Director Richard Lim and Governor Abercrombie our request was included in the Administration budget request that was transmitted to the Legislature this past December. With very strong support from the businesses in HOST Park, we were successful in obtaining \$2.5 million from the 2014 Legislature.



These funds will be used to complete the exploration phase for a new well. This phase includes: well siting studies, such as hydrology and geophysical to locate a possible source; field investigations; environmental assessment; permitting; plans/specifications for the exploratory well; and, drilling, casing and testing of the exploratory well.

Upon completion of the exploration phase, NELHA will begin the development phase. This phase includes: planning and design of production well for 1.5 million gallons per day; storage; access road; and, transmission lines if necessary.

### Roads

NELHA continued work on the design new roads in the upper elevations of the park in conjunction with the pipeline design effort listed above. This design is being aided with \$500,000 in Federal Highway Administration funds. It is anticipated that the design will be complete next year and construction will begin shortly thereafter. The new roads, when constructed will open up much of the remaining land at the upper elevations of the Park.

## **13.0 Staff Movements and Awards**

NELHA hired two new members to our team in 2014. They are familiar faces to many as they both have a history at HOST Park.

Dr. Alex Leonard joined our team as the new Administrative and Projects Manager. Alex will work on new initiatives and some of the almost \$20 million in new infrastructure projects at NELHA that we will be completing over the next several years. Alex was the General Manager of Nan Construction's Big Island Operations in Kona and was formerly with Aquasearch.

Dean Towle also joined the team in 2014 as the new Operations Engineer and Supervisor. Dean was recently with Keahole Solar Power and had a strong background in operations and maintenance of a large systems and SCADA controls.

Karin Haleamau "Uncle Karin" retired from NELHA in 2014 after a long and distinguished career.



**FINANCIAL STATEMENT**  
(For the period July 1, 2013 to June 30, 2014)

**REVENUES**

Land Use Fees	\$1,761,476.38
Royalties	16,800.00
Reimbursable	2,991,699.89
Interest Received	32,487.63
Other	298,770.58
Percentage Rent	88,523.85
Subtotal	<b>5,189,758.33</b>

**EXPENDITURES**

Salaries	1,373,942.01
Operations (including OHA transfers)	3,658,592.06
Subtotal	<b>5,394,055.97</b>

**FINANCIAL POSITION**  
(as of June 30, 2014)

Special Fund Cash Balance July 1, 2014	1,246,522.41
Prior Year Unrequired claims	0
Prior Year Transfers	184,573.71
Special Fund Revenues	5,189,758.33
Subtotal	6,620,854.45
Special Fund Expenditures	5,032,534.07
Transfers to OHA-Ceded land	361,521.90
<b>Special Fund Cash Balance</b>	<b>\$1,226,798.48</b>

## **Board of Directors**

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**John DeLong, Chair**

President, Hawaiian Cement

At Large Member appointed by Governor

**Harvey Kim, Vice-Chair**

Director, Vitus Group

At Large Member appointed by Governor

**Michael Buchal**

At Large Member appointed by Governor

Owner, Aquaculture Consulting Hawaii, LLC

**William Rolston**

Energy Analyst

Ex-Officio – Mayor, County of Hawaii

**Dr. Vassilis Syrmos Ph.D.**

Vice-President for Research and Innovation, University of Hawaii

Ex-Officio – President, University of Hawaii

**Dr. Gerry Cysewski, Ph.D.**

Chief Science Officer/Executive Vice-President, Cyanotech Corporation

Ex-Officio – Tenant Representative

**Richard C. Lim**

Director, Department of Business, Economic Development and Tourism

Ex-Officio – Director, Department of Business, Economic Development and Tourism

**Todd Low**

Manager, Aquaculture & Livestock Support Services Branch

Hawaii Department of Agriculture

Ex-Officio - Vice-Chair, Research Advisory Committee

## **Board of Directors**

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**H. Brian Moore**

Senior Vice-President, Pacific Guardian Life Insurance Co, LTD  
Ex-Officio – Hawaii Strategic Development Corporation

**Race Randle**

Senior Director of Development, Howard Hughes Corporation  
Ex-Officio – Hawaii Technology Development Corporation

**Dr. Donald Thomas Ph.D.**

Geochemist and Director of Center for the  
Study of Active Volcanoes  
University of Hawaii at Hilo  
Ex-Officio - Chair, Research Advisory Committee

**Russell Y. Tsuji**

Administrator, DLNR Land Division  
Ex-Officio – Director, Department of Land and Natural Resources

**Larry Visocky**

Plant Manager, KOYO USA Corporation  
Ex-Officio – Tenant Representative

## NELHA Employees in 2014

POSITION TITLE	INCUMBENT
NELHA Executive Director	Barbour, Gregory
NELHA Senior Secretary	Appleby, Karen
NELHA General Laborer II	Debina, Chad
NELHA Secretary III	Espinueva, Georgette
NELHA Maintenance Mechanic I	Gibo Jr., Celestino
NELHA Groundskeeper II	Haleamau, Karin
NELHA Fiscal Officer	Kaniho, Sheryll
NELHA Administrative and Projects Manager	Leonard, Alex
NELHA Accounting Clerk III	Miranda, Jerrae
NELHA Maintenance Mechanic I	Mitchell, Anthony
NELHA Engineering Project Coordinator	Nichols, Jeffrey
NELHA Chief Science Officer	Olson, Keith
NELHA Utility Electrician	Pierce, Thomas
NELHA Vehicle Construction Equip Mechanic	Robinson, Richard
NELHA Chief Marketing Officer	Sombardier, Laurence
NELHA Operations Engineer	Towle, Dean
NELHA Operations Manager II	War, Jan
NELHA Laboratory Intern	Aucoin, Megan
NELHA Laboratory Intern	Chu, Michelle
NELHA Laboratory Intern	Gregg, Daniel
NELHA Laboratory Intern	Jackson, Keli
NELHA Laboratory Intern	Martin-Schatz, Jin
NELHA Laboratory Intern	Richno, Camie
NELHA Laboratory Intern	Ross, Delany
NELHA Laboratory Intern	Seto Denzer, Brittany
NELHA Laboratory Intern	Van der Spool, Luke
NELHA Laboratory Intern	Van Pernis, Kristiana

## Appendix 1 – Timeline of Major Events

1974	Natural Energy Laboratory of Hawaii, operated by the University of Hawaii, was established as a response to the first oil crisis.
1979	Mini-OTEC was anchored offshore of Keahole Point, demonstrating the world's first production of net electrical power via closed-cycle OTEC.
1980	Laboratory facilities and its first pipeline to draw deep seawater from 2,000 feet and surface seawater from 45 foot depths were completed.
1981	Shore-based OTEC research began with a project testing biofouling and corrosion countermeasures for the closed cycle OTEC process.
1984	Legislation authorized commercial activities, allowing the Laboratory to host new business ventures.
1985	Legislature authorizes NELH to assume the management responsibility of the Puna Geothermal Facility to NELHA. Facility consists of a 3 mW electric power plant and the Noi'i O Puna Research Center
1986	Hawaii Ocean Science and Technology (HOST) Park was created on an adjacent 500+ acres and operated by the Hawaii Technology Development Corporation (HTDC). US DOE and HOST Park combine resources to install 40" deep seawater and 28" surface seawater system at Keahole Point. Laboratory building air conditioning system converted to deep seawater cooling. Legislature appropriates funds for 18" deep seawater pipeline.
1987	Heat and Mass Transfer Scoping Test Apparatus (HMTSTA) open cycle OTEC test tower constructed and operated by Pacific International Center for High Technology Research (PICHTR).
1989	Puna Geothermal Facility and HGP-A well shut down. The Aluminum Company of Canada (ALCAN) develops program at the Laboratory for testing "roll bonded" aluminum heat exchangers.
1990	NELH, operated by UH, and HOST Park, operated by HTDC, merge to become the Natural Energy Laboratory of Hawaii Authority (NELHA).
1992	210 kW open-cycle OTEC Net Power Producing Experiment (NPPE) constructed at NELHA and operated by PICHTR.
1994	Micro-tunneling begins to construct two 66" diameter tunnels under the shoreline and offshore reef as a pipeline protection crossing in preparation for NELHA's new 55" warm and cold seawater pipelines.
1995	CEROS transferred from HTDC to NELHA
1998	NPPE Open-cycle OTEC power plant decommissioned.

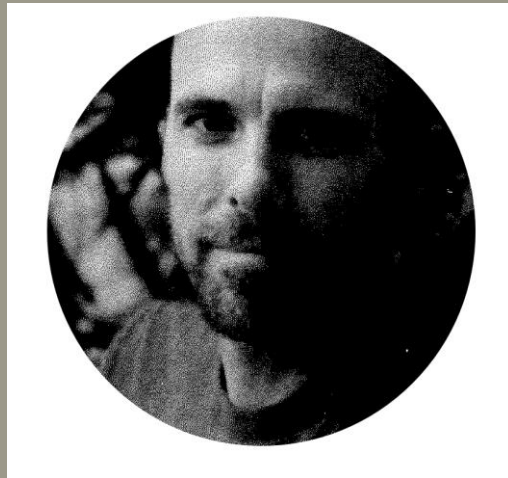


2000	Construction begins for NELHA's new 55" offshore intake pipelines and pump station. Planning and design process started for new Hawaii Gateway Distributed Energy Center.
2002	Successful deployment of 55" deep seawater pipeline offshore and construction of initial phase of onshore pump station using specially designed fiberglass reinforced (FRP) intake canisters. First deep seawater desalinization project begins experimentation to develop bottled drinking water.
2003	NELHA tenant count reaches 34. Non-profit "Friends of NELHA" (FON) formed to assume basic public relations and outreach functions for NELHA.
2004	Construction of Hawaii Gateway Distributed Energy Center completed.
2005	55" warm and cold seawater pump station and distribution pipelines completed.
2006	NELHA Foreign Trade Zone status granted by US Department of Commerce. Keahole Solar Power LLC begins construction of solar thermal research and demonstration facility. Five leases to desalinize deep seawater to produce boutique drinking water.
2007	Cellana in partnership with Royal Dutch Shell begins construction of a 6-acre micro algae to biofuels research center.
2011	Makai Ocean Engineering completes construction of corrosion lab and heat exchanger test tower to investigate the use of aluminum alloys for OTEC.
2012	UH Economic Research Organization (UHERO) completes first economic impact study regarding HOST Park. Results indicate economic impact and job creation is much higher than anticipated and is almost \$90 million annually and 600 jobs. Master Plan and Strategic Plans updated. Federal grants totaling almost \$3.5 million received for renovation of Main Administration building and micro-grid infrastructure for the Research Campus.
2013	HOST Park economic impact surges by 40 percent since 2010. Repairs offshore pipeline (\$5M) completed to extend life of pipeline by 15 years.
2014	NELHA receives almost \$12 million in CIP funding for new pipelines and road construction. Incubator construction initiated. National Lab relationships strengthened.

Photo Credits: Monk seal picture on cover page – Photo by Julie Steelman © The Marine Mammal Center / NMFS Permit 932-1905-01MA-009526-1. Construction pictures on bottom of page 17 and bottom of page 18 courtesy of West Hawaii Today.



## In Memoriam



**Joseph “Joz” Darius Bybee**

**1974 - 2014**

Mr. Bybee was an employee of Bybee Consulting and passed away during dive operations in the near shore waters of Keahole Point while collecting data for the NELHA annual biota survey.



*2014  
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