



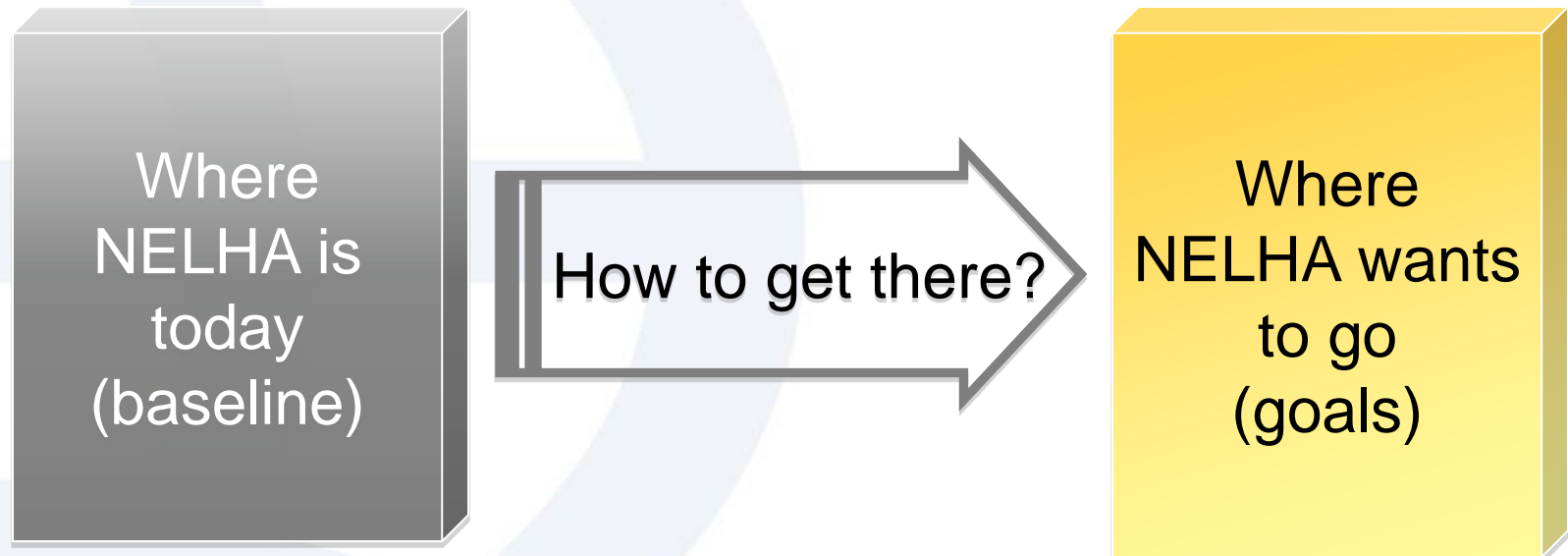
# **NELHA Distributed Energy Strategy:** **Building a Foundation for Future** **Growth**

Pacific International Center for High Technology Research (PICHTR)  
March 21, 2013

# Key Elements in the DER Strategy

- Features of the NELHA Host Park
  1. Establishing the Baseline
  2. Comparative Advantages of the Site
  3. Opportunities and Potential Comparative Advantages
  4. Constraints
- Clean Tech / Distributed Energy Resources Strategy
- Execution of Clean Tech / Distributed Energy Resources Strategy

# PICHTR's approach assesses the current state, aspirations, and pathways to move forward



# The baseline is informed by the tenant mix, current marketing strategy, and planning work done to date














*The planning done to date represents a strong body of work to build upon*



# NELHA has a reasonably strong portfolio of innovative energy technologies to build upon



	Current	In progress	Future
Electricity/Fuels	  		 
Grid/Storage			
Efficiency	 		

# Where NELHA is today: Assets

## Facility Assets

1. **Big Island** location: a living lab
2. **Land** dedicated to renewable energy through Master Plan
3. **Natural assets** (solar, cold seawater, access to transportation)
4. Good existing energy **portfolio**: solar, microalgae, OTEC, storage, grid, etc.
5. **Co-locate** R&D, commercialization
6. **Space** to convene people (Gateway), and planned incubation space
7. Commitment to **extend infrastructure** to mauka parcels

## Organizational Assets

1. **Master Plan** is a good driver for direction
2. **Clear goals**: kinds of projects, sector strategies, messaging and outreach
3. **Part-time capacity in DC planned**
4. **Reputation as a energy test-bed**, both at NELHA and Hawaii Island – building on state goals to be a test bed
5. **Organizational ties** to DBEDT/SOH
6. **High energy costs** attract innovative projects/companies

# Where NELHA is today: Constraints

## Facility Constraints

1. **High cost of doing business** in Kona
2. **Limited human resources, vendors, and support contractors** located in Kona
3. **Fresh water** limitations
4. **Very high energy cost** for operations

## Organizational Constraints

1. **Regulations limit energy projects** (Lack of clarity on ability to “wheel”)
2. **Procurement rules** limit flexibility
3. **Master permitting limitations** (e.g., pre-permitted RE projects in the ocean)
4. Limited in-house energy expertise; limited marketing budget
5. Internal institutional barriers, and unclear energy strategy/messaging
6. Lack of project funding
7. Weak relationships with academia including UH



# NELHA has unique opportunities and can capitalize on potential comparative advantages



## Facility Opportunities

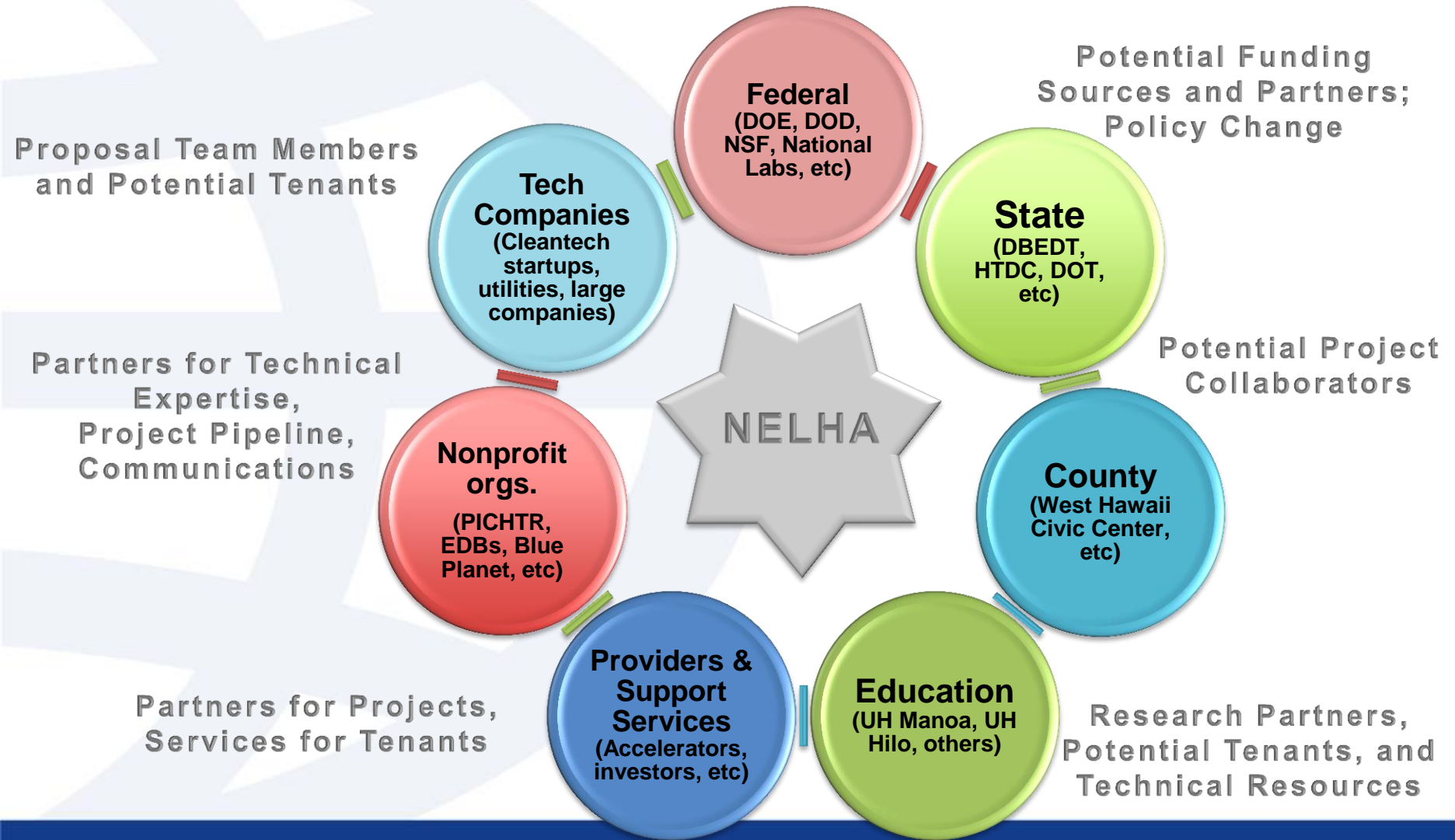
1. **Integrated energy campus** through a micro-grid
2. **On-site infrastructure** with expanded road access and cold water service
3. **Renovated office facility**

## Organizational Opportunities

1. **Ability to wheel** / sell power within host park
2. **Master permitting** and streamlined siting (e.g., pre-permitted RE projects in the ocean)
3. **New incubation offerings** in partnership with HTDC / DBEDT / others
4. **Ability to position NELHA** test-bed as part of large HCEI and Hawaii test-bed



# NELHA is part of an ecosystem of organizations that can serve as strategic partners for energy activities

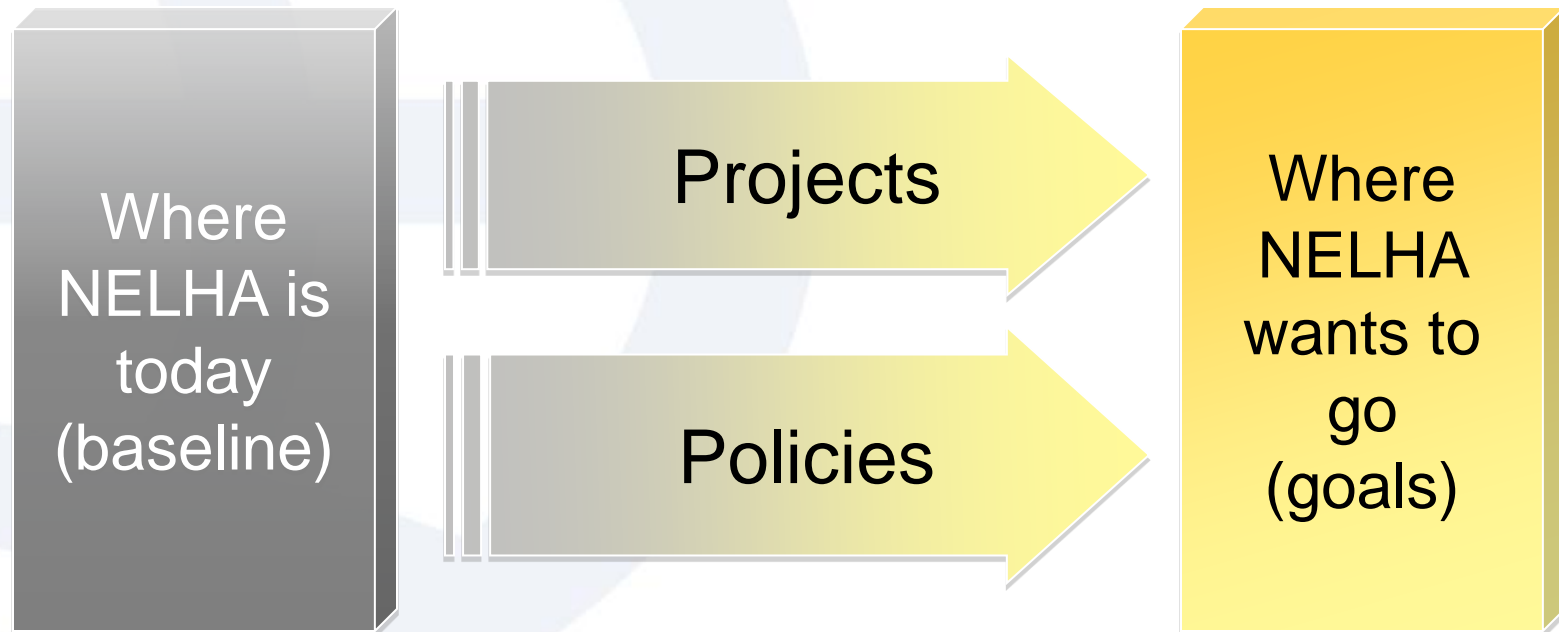


# Key Elements in the DER Strategy

- Features of the NELHA Host Park
- Clean Tech / Distributed Energy Resources Strategy
  1. Research and Development: Government/Research/Academia
  2. Industry and Commercialization
  3. Present value proposition of NELHA and approach for working with each organization
- Execution of Clean Tech / Distributed Energy Resources Strategy

# NELHA can set strategy and pursue near-term projects while addressing mid-term policy needs

How to move forward?



# Pursuing near-term projects is important to making progress, and also informs policy needs



## Projects

### Features

1. **Near term projects should fit within current constraints**
2. **Ability to streamline project siting** is a key differentiator for NELHA
3. Requires **capital** investment
4. Seek **tech expertise** to vet and execute projects (e.g, through partnerships, research comm.)
5. Provides opportunity to directly engage **labs and universities**
6. Requires engaging with **partners** (e.g., HELCO, airport, WHCC)

### Focus Areas

1. Systems **right-sized** for current conditions
2. **Microgrid** projects at a limited scale, e.g., building on SHARK capability. Full microgrid probably unrealistic at this time due to lack of in-house operational capability at NELHA. Research microgrid is much more attractive.
3. **Energy storage** projects
4. **Energy efficiency** & demand resp
5. **Ocean & solar** electric generation

# NELHA needs to continue to identify policy issues and advocate changes to enable future projects



## Policy

### Features

1. Requires political capital and time
2. Enables NELHA to host a greater range of technologies
3. Requires engaging with HELCO
4. Seek technical expertise to explore details of options, e.g, through partnerships, advisory group, or board subcommittee

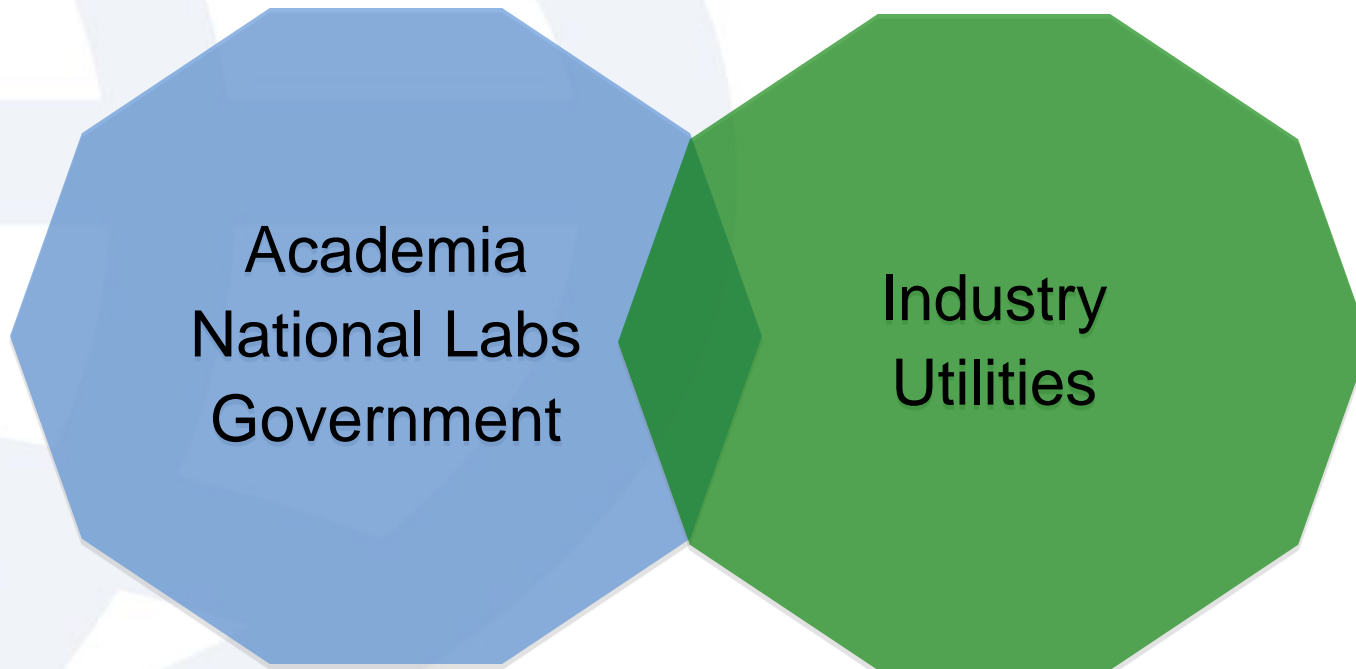
### Focus Areas

1. Address challenge of energy distribution within park
  - Enable wheeling across TMKs
  - Consolidate TMKs
  - Apply for a waiver
2. Address procurement constraints
3. Address ocean energy master permitting
4. Expand Enterprise Zone eligibility beyond just wind

# The approaches to attract partner organizations are distinct, with some important overlap

1. Research/  
Development

2. Demonstration/  
Commercialization



# Key Elements in the DER Strategy

- Features of the NELHA Host Park
- Clean Tech / Distributed Energy Resources Strategy
- Execution of Clean Tech / Distributed Energy Resources Strategy
  1. Targeted Marketing Strategy
  2. Communicating Value



# The clean tech / distributed energy resources strategy requires extensive partnering



## R&D

1. Key partners are government, labs, and academia
2. **Government:** DOE, DOD, SOH, County of Hawaii (WHCC)
3. **Labs:** NREL, Sandia, Argonne, Pacific Northwest National Lab
4. **Academia:** UH Manoa, UH Hilo, universities that have research projects at NELHA already

## Commercialization

1. Key partners are industry
2. **Clean energy technology companies** (with certain profiles, tech focus areas)
3. **Electric utilities:** HELCO, HECO, others

...This finding is consistent with the 2011 Master Plan

# BOD has already been briefed on some results of PICHTR interviews with potential R&D partners



## 1. Department of Energy HQ

- **Office of Electricity Delivery and Energy Security**
- **Office of Energy Efficiency and Renewable Energy**
- **Office of Fossil Energy**



## 2. Selected National Laboratories

- **Argonne National Lab** – lead lab for DOE Energy Storage Hub
- **Lawrence Berkeley National Lab** – energy efficiency and demand response
- **National Renewable Energy Lab** – DOE/EERE lead lab, DOE lead for HCEI
- **Pacific Northwest National Lab** – lead for DOE/OE smart grid
- **Sandia National Lab** – solar energy and smart grid technologies

# ... But there are others as well. NELHA strategy for R&D should focus on developing relationships



Research & Development

Commercialization

Key Partner	Approach
<p><b>Government:</b> DOE, DOD, State of Hawaii, County of Hawaii</p>	<ul style="list-style-type: none"> <li>• Relationship building to understand emerging areas of interest / funding</li> <li>• Collaboration with airport</li> </ul>
<p><b>Labs:</b> NREL, Sandia, Argonne, Pacific Northwest National Lab</p>	<ul style="list-style-type: none"> <li>• Relationship building toward teaming on proposals</li> <li>• Use existing facilities to conduct applied research (e.g., DR at Gateway)</li> </ul>
<p><b>Academia:</b> UH Manoa, UH Hilo, universities that have science projects at NELHA already</p>	<ul style="list-style-type: none"> <li>• Relationship building toward teaming on proposals</li> <li>• <b>Pitch ability to bridge R&amp;D, commercialization in one location</b> (Develop Center of Excellence: “Center for Renewable Energy and Sustainable Technology Transition – CRESTT” - <i>described in backup slides</i>)</li> </ul>

# Execution strategy for commercialization should focus on communicating the value proposition

Research & Development

Commercialization

Key Partner	Approach
<b>Industry:</b> Clean energy technology companies (with certain profiles, tech focus areas)	<ul style="list-style-type: none"><li>• <b>Set optimal tenant mix</b> given constraints, opportunities</li><li>• <b>Pitch ability to bridge R&amp;D and commercialization in one location</b> (Develop Center of Excellence: Center for Renewable Energy and Sustainable Technology Transition – CRESTT - <i>described in backup slides</i>)</li><li>• <b>Conferences</b> (e.g., APCESE, industry specific) to present on value proposition</li><li>• <b>Workshops</b> around specific NELHA opps</li><li>• <b>RFPs</b> offering space etc. for industry demos</li></ul>
<b>Electric utilities:</b> HELCO, others	<ul style="list-style-type: none"><li>• Opportunity to test grid solutions</li><li>• <b>Leverage smart grid projects</b> to provide value to utility</li></ul>

# Three key relationship-building activities would raise NELHA profile with target partners





# Workshops on site with key players enable sharing the vision, soliciting ideas, developing work plans



## Ex 1: Microgrid

1. **Key participants:** DOE, NREL, Argonne, Sandia, DBEDT, UH Manoa, HNEI, UH Hilo, Hitachi, Silver Spring, HELCO, Saft, Altairnano, Referentia, HNu
2. **Content:** tour current microgrid assets, share host park unique value proposition and vision for future, solicit ideas for infrastructure rollout
3. **Outcomes:** measurable goals for adding microgrid capabilities; work plan for adding to microgrid, to include outlines of RFP for, e.g., energy storage (industry); teaming on funding proposals (govt/academia)

## Ex 2: Renewables for Pumping

1. **Key participants:** County Department of Water Supply, DBEDT, HNEI, UH Manoa, UH Hilo, HELCO, Gen-X
2. **Content:** tour current pumping setup, share host park unique value proposition, solicit ideas for pumping configurations and financing
3. **Outcomes:** outlines of an RFP (industry), teaming on funding proposals (govt/academia)
4. **Follow up:** hold “lessons learned” workshop at project completion

*Note: Examples were pulled from conversations with NELHA, reflecting areas of interest in the near term*

# Conference participation and presentations raise NELHA profile among target partners



**Conferences:** Target areas of interest and attend 1-2 key conferences a year; contact conference organizers to see if NELHA can present on new opportunities

## Ex 1: Microgrid

1. **Possible Conferences:** [IEEE Innovative Smart Grid Technologies](#) (DC) or [Microgrid World Forum](#) (CA) or Sandia [Electrical Energy Storage Applications and Technologies](#) (CA)
2. **Content:** present host park activities, unique value proposition, and microgrid plans for the future
3. **Outcomes:** partners from national labs, industry, and industry organizations aware of NELHA opportunity; teaming on funding proposals; ideas for new technical approaches and projects

## Ex 2: Asia Pacific Clean Energy

1. **2013: organize sideline workshop to present how to engage** with NELHA and broad energy goals; many innovative clean energy companies and national labs attend. A repositioning of NELHA for this audience would send a clear message to local stakeholders and people interested in doing projects in Hawaii
2. **2014: present specific NELHA opportunities** (eg., microgrid project, RFP) in a sideline workshop



# Outreach should be designed to keep partners informed and get new stakeholders engaged



**Existing partners:** Develop marketing database/list of contracts. Send newsletter 2-4x /yr to share new energy projects coming online, opportunities, updates

**Website:** Feature existing energy projects and new energy initiatives. Potential partners need to be able to understand the value proposition at a glance, and to see NELHA's current energy assets

**Reach out to key stakeholders and potential partners:** Follow up with national labs and DOE representatives contacted through this process (*see mini pitch decks*); invite representatives to NELHA for site visits, tours of existing facilities, and discussions of future plans and potential collaborations; demonstrate ways that NELHA supports DBEDT philosophy of “creating an environment so that companies can do things on their own”

**Spread the word:** Submit article to industry news sites & publications on new NELHA microgrid investments once they come online *Examples: Greentech Media (gridtech channel); E&E publishing (greenwire)*

**greentechgrid:**



# Mini pitch deck: NREL Example











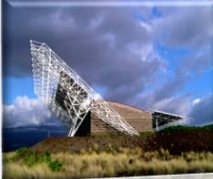

## NELHA represents a unique value proposition for NREL

1. **Technology demonstration:** Ability to demonstrate NREL Energy Systems Integration Facility (ESIF) tests at real world site
2. **At excellent site:** Site is master permitted, the land is available for renewable energy projects, and infrastructure is in place
3. **With resources:** Energy resource availability
4. **In context:** Supporting the U.S.DOE / State of Hawaii partnership: *Hawaii Clean Energy Initiative*
5. **Economically:** High energy prices on Big Island
6. **With partners:** Including motivated leadership at NELHA
7. **To solve problems:** Energy infrastructure issues on Big Island grid



# Mini pitch deck: NREL Example

## NELHA aims to leverage existing energy assets to achieve new goals

	Current	In progress	Future	New goals
Electricity/Fuels	  		 	<p>Add <b>electric generation</b> to serve local demand without creating grid problems; explore containerized tech</p> <p>Expand <b>microgrid &amp; storage infrastructure</b></p> <p>Engage <b>energy loads</b> to support grid, e.g., demand response</p>
Grid/Storage	 			
Efficiency	 			

## NREL can play an important role in achieving these goals...

### Project Idea 1

- New collaborations on efficiency and micro-grids with **Kona International Airport**
- Capitalize on opportunity to effect change with a broader set of buildings

### Project Idea 2

- Collaborations on sustainable building technologies, demand response, and distributed generation
- At new LEED Silver West Hawaii Civic Ctr
- Utilizing Gateway facility

### Project Idea 3

- Smart grid at scale
- Deploy smart grid tech developed or tested at NREL / ESIF on real grid system
- Support integration of solar, wind, and other renewable resources

**... by using NELHA to demonstrate integrated clean energy systems in a real world environment**



# Mini pitch deck: UH Manoa Example

## NELHA represents a unique value proposition for UH Manoa

1. **Applied research:** Ability to test and compare renewable energy, energy efficiency, and energy storage technologies in an applied setting
2. **At excellent site:** Site is master permitted, the land is available for RE, and infrastructure is in place
3. **With resources:** Energy resource availability
4. **In context:** Supporting UH energy research goals, e.g., CRESTT, and Hawaii Clean Energy Initiative
5. **Economically:** High energy prices on Big Island
6. **With partners:** Building on existing track record and relationship with NELHA
7. **To solve problems:** Energy infrastructure issues on Big Island grid, with lessons applicable across the state and region



# Mini pitch deck: UH Manoa Example



## Partnering to realize UH Innovation Council Recommendations

**Recommendation #1 – Identify research as an industry in Hawaii**

**Recommendation #2 – Establish Hawaii Innovation Technology Exchange Institute**

**Recommendation #3 – Identify key areas for commercialization opportunities**

**Recommendation #4 – Integrate entrepreneurship into the curriculum**

**NELHA alignment**










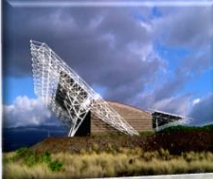

**Security and Sustainability: Energy & Agriculture**

**Smart Software**

**Asian-Pacific Health**

# Mini pitch deck: UH Manoa Example

## NELHA aims to leverage existing energy assets to achieve new goals

	Current	In progress	Future	New goals
Electricity/Fuels	  		 	<p>Add <b>electric generation</b> to serve local demand without creating grid problems; explore containerized tech</p>
Grid/Storage				<p>Expand <b>microgrid &amp; storage infrastructure</b></p>
Efficiency	 			<p>Engage <b>energy loads</b> to support grid, e.g., demand response</p>



## UH can play an important role in achieving these goals...

### Project Idea 1

- Conduct applied research of clean energy technologies
- Provide real world testing for UH-developed alternative energy technologies, such as power electronics

### Project Idea 2

- Test and evaluate multiple clean energy technologies pre-deployment at one pre-permitted site
- For example, collect comparative data from several energy storage technologies

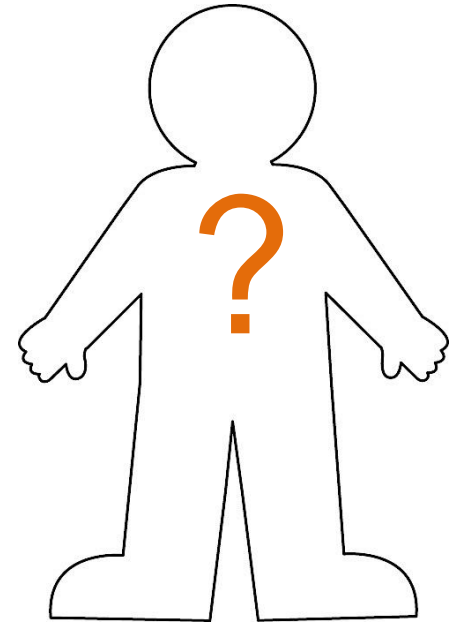
### Project Idea 3

- Engineering student exchange
- Training UH Manoa engineering students on real world systems and problems

**... by using NELHA to demonstrate integrated clean energy systems in a real world environment**

# The ideal NELHA tenant has a number of attributes, such as deriving value from host park assets

1. **Novel clean energy technologies that fit NELHA resource base** (solar, ocean thermal energy conversion (OTEC), wave, energy storage, grid and systems integration)
2. **Ability to benefit from NELHA assets** (e.g., cold water, sunshine, infrastructure, existing tenants)
3. **Outstanding reputation** and reach into emerging cleantech markets
4. Profile that **piques interest of partners**, especially DOE and the national labs
5. **Track record** with investor commitments and project management
6. **Solid management**
7. (**Future**: Need for incubation space / services)



**What is the profile of an ideal tenant?**

# What's the bottom line? Key highlights for NELHA to take away from this effort

## Internal resources are required

1. Executing the DER strategy will take internal resources, especially time
2. Marketing is important (website, stakeholder meetings, site visits)
3. Raising the profile of NELHA within target groups will help attract tenants and partners (conferences, media)

## External partnering is key to success

1. Engaging technical experts (e.g., subcommittees of Research Advisory Committee) to set goals, work plans, and technical specs of RFPs
2. Finding projects that provide strong value to NELHA and others
3. Pursuing funding sources
4. Releasing RFPs to give energy technology providers the opportunity to solve near-term problems
5. Removing barriers to high-value near-term energy project proposals

# What's the bottom line? Specific recommendations for NELHA next steps

- **Position NELHA internally to set and achieve energy goals**
  1. Adopt DER strategy and utilize consistent message
  2. Identify person to serve as chief marketing officer responsible for execution
- **Formalize partnerships to execute energy plans**
  1. **DBEDT:** Technical assistance to identify/solve energy problems, potential cost share funding thru barrel tax, assistance with addressing policy questions
  2. **UH (Manoa and UH Hilo):** Applied research, engineering training
  3. **County of Hawaii R&D:** West Hawaii Civic Center
  4. **DOE Office of Electricity:** Grid-related funding opportunities
  5. **DOT Airports Division:** Efficiency and distributed generation projects
  6. Consider developing project development account from NELHA special fund reserves
  7. Reach out in person to DOE, NREL and Sandia for briefings on NELHA and talk about project development that supports HCEI

# A timeline can help NELHA track progress toward strategy execution through projects and other work

