



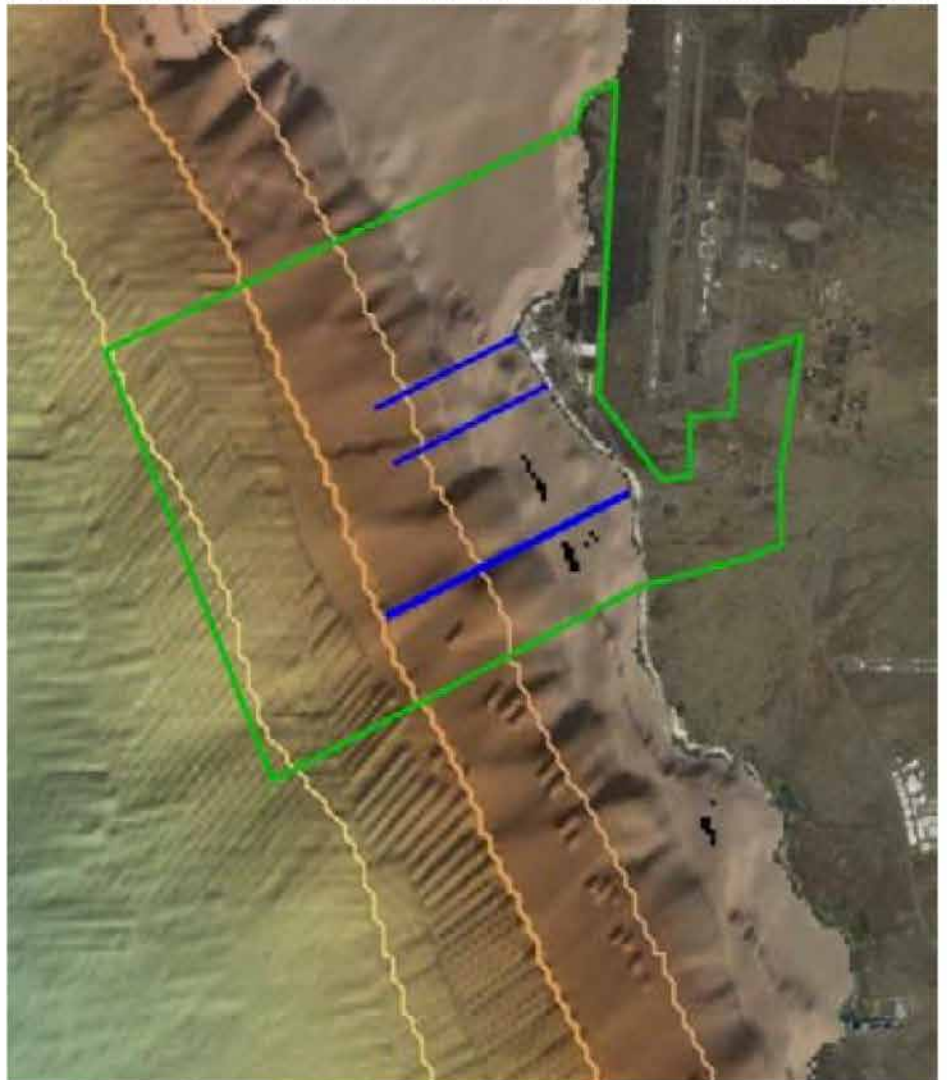
UHERO

# ECONOMIC IMPACT OF THE NATURAL ENERGY LABORATORY HAWAII AUTHORITY TENANTS ON THE STATE OF HAWAII

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# NELHA





# UHERO

THE ECONOMIC RESEARCH ORGANIZATION  
AT THE UNIVERSITY OF HAWAI'I

## ECONOMIC IMPACT OF THE NATURAL ENERGY LABORATORY HAWAII AUTHORITY TENANTS ON THE STATE OF HAWAII

Addendum to the 2012 report titled  
“Economic Impact of the Natural Energy Laboratory Hawaii Authority Tenants on the State of Hawaii”

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## EXECUTIVE SUMMARY

The Natural Energy Laboratory Hawaii Authority (NELHA) is a state agency that operates a unique and innovative ocean science and technology park in Kailua-Kona on the island of Hawaii. NELHA's assets include office and laboratory facilities, infrastructure, pristine natural resources, and leasable open land for use by tenant research, education, and commercial projects.

NELHA contracted the University of Hawaii Economic Research Organization (UHERO) to update the 2012 "Economic Impact of the NELHA Tenants on the State of Hawaii".<sup>1</sup> Specifically, this research determines NELHA's contribution to local business sales, employee earnings, tax revenues, and number of jobs in Hawaii from the expenditures of NELHA and its tenants in calendar year 2013.

To estimate expenditures made by NELHA and its tenants in 2013, UHERO researchers prepared an online survey where expenditures were broken down into 17 named categories and respondents were asked to provide total expenditures in 2013 and the share of these expenditures that were paid to Hawaii vendors. UHERO received responses from 20 NELHA tenants (out of 37). Expenditure levels for the survey non-respondents were estimated using techniques similar to the 2012 study. Estimated expenditures for NELHA and its tenants totaled \$98.8 million dollars, of which approximately \$72.0 million (or 73%) were paid to Hawaii entities.

Following a standard approach, UHERO defined economic impact as the direct, indirect, and induced economic activities generated by tenant spending in the Hawaii economy. The 2007 20-sector State Input-Output (I-O) model of the State of Hawaii prepared by the Hawaii Department of Business, Economic Development and Tourism was used to evaluate these impacts.<sup>2</sup> The impact of NELHA's in-state expenditures in 2013 on the State's output (sales), earnings, and tax revenues was estimated to be \$122.8, \$28.9, and \$5.0 million dollars, respectively. Furthermore, not only do NELHA tenants employ hundreds of people but their expenditures also contribute to hundreds of other jobs in the larger Hawaii economy (617 total, including NELHA).

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<sup>1</sup> UHERO, "Economic Impact of the Natural Energy Laboratory Hawaii Authority Tenants on the State of Hawaii", May 18, 2012 (<http://www.uhero.hawaii.edu/assets/UHERONELHAimpactstudy-final.pdf>).

<sup>2</sup> "The Hawaii State Input-Output Study: 2007 Benchmark report," Department of Business, Economic Development, and Tourism, July 2011.

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## INTRODUCTION

The Natural Energy Laboratory Hawaii Authority (NELHA) contracted the University of Hawaii Economic Research Organization (UHERO) to estimate its economic impact on the State of Hawaii. NELHA currently accommodates 37 tenants ranging from companies bottling deep sea water to solar and biofuel companies. These tenants pay close to \$2 million in rent, royalties and pass through expense directly to NELHA. In addition, they employ hundreds of people, purchase goods and services from local businesses, and invest in capital improvements at NELHA.

This research determines NELHA's contribution to local business sales, employee earnings, tax revenues, and number of jobs in Hawaii from the expenditures of its tenants in 2013. NELHA provides additional benefits to the state of Hawaii that this study does not capture but are important to consider when evaluating NELHA's overall footprint on the economy.<sup>3</sup>

## METHODOLOGY

This study uses standard empirical research methods to assess the economic impact of NELHA. The essential steps conducted include survey design, data collection from the survey, survey data aggregation, and input-output analysis.

The survey design used for this study is nearly identical to the survey conducted by UHERO researchers in 2012. To facilitate data collection, expenditures were broken down into 17 named categories and respondents were asked to provide the total expenditures in 2013 rounded to the nearest thousand dollars and the share of these expenditures that went to Hawaii vendors. A copy of the expenditure survey distributed to NELHA tenants is reported in the Appendix.

The survey was administered online, resulting in a total of 20 responses out of 37. For five tenants who did not complete the survey, NELHA had income statements. Nine of the remaining 12 non-respondents were deemed relatively small by NELHA, and, therefore, not included in the analysis.<sup>4</sup> NELHA estimated income for the final three non-respondents. In the expenditure estimation process, we closely follow the methodology of the UHERO 2012 report.<sup>5</sup> Table 1 reports the final survey results in terms of number of surveys and total expenditures by tenants who completed and did not complete the survey.

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<sup>3</sup> These benefits are described in UHERO, "Economic Impact of the Natural Energy Laboratory Hawaii Authority Tenants on the State of Hawaii", May 18, 2012.

<sup>4</sup> We do include their rent payments to NELHA.

<sup>5</sup> For the description see: UHERO, "Economic Impact of the Natural Energy Laboratory Hawaii Authority Tenants on the State of Hawaii", May 18, 2012.

TABLE 1: SURVEY RESULTS

<b>Tenant Category</b>	<b>Tenants (#)</b>	<b>Expenditures (Millions of 2013\$s)</b>
Tenants who completed a survey (includes NELHA)	21	\$96.13
Tenants who did not complete a survey	17	\$2.70
Tenants for whom NELHA had an income statement	5	
Tenants whose income was estimated by NELHA	3	
Tenants whose income was deemed to be relatively small	9	
<b>Total (includes NELHA)</b>	<b>38</b>	<b>\$98.8</b>

## RESULTS

The total expenditures of NELHA tenants were computed by summing expenditures across tenants within each category. A tenant's expenditures to Hawaii vendors equal its total expenditures in a given category multiplied by the indicated share of expenditures in that category that went to Hawaii vendors. Then we summed local expenditures for each category across all tenants to arrive at total expenditures by all tenants for each category. The analysis was performed on these aggregate data so that no individual tenant could be identified, therefore maintaining anonymity.

The expenditure data that we collected can be thought of as reflecting values at the retail level since all purchases were presumably made at the retail level. Table 2 reports the aggregated retail level expenditure data for all NELHA tenants. The expenditures are reported by the categories provided in the survey.

NELHA tenants cumulatively spent about \$98.8 million dollars. Of these expenditures 73% went to in-state entities. The three largest expenditure categories were equipment, labor, and utilities.

TABLE 2: ESTIMATED TOTAL AND IN-STATE EXPENDITURES BY NELHA AND NELHA TENANTS  
(MILLIONS OF 2013\$S)

Expenditure category	Total	In-State
	(Millions of 2013\$S)	
Rent	\$4.27	\$4.12
Equipment	\$43.09	\$26.04
Supplies	\$5.62	\$3.85
Information	\$0.31	\$0.24
Utilities	\$7.51	\$7.42
Professional services	\$5.34	\$2.82
Financial & Insurance services	\$2.93	\$1.09
Business services	\$0.35	\$0.35
Transportation	\$5.75	\$4.97
Repair & Maintenance	\$1.36	\$1.06
Taxes	\$1.58	\$1.56
Travel (Lodging)	\$0.39	\$0.21
Travel (Transportation)	\$0.50	\$0.30
Education services	\$0.08	\$0.04
Food processing	\$0.01	\$0.01
Labor	\$19.76	\$17.89
<b>Total</b>	<b>\$98.83</b>	<b>\$71.96</b>

To compute the economic impacts of NELHA tenants' expenditures, one must convert the in-state retail level expenditure data collected from the surveys into producer level expenditures by industry categories identified in DBEDT's 2007 condensed I-O transactions table. This conversion must be done since all transactions in the DBEDT I-O model are valued at producer prices. Therefore, the economic multipliers that are used to estimate economic impacts are based on producer level rather than retail level data.

In the conversion of NELHA tenants' expenditures into producer level expenditures, we closely follow the methodology used and described in the 2012 NELHA Impact study.<sup>6</sup> Table 3 reports producer level expenditures for each category, as well as retail and wholesale sector expenditures.

<sup>6</sup> Ibid 1.

**TABLE 3: PRODUCER LEVEL EXPENDITURES FOR EACH CATEGORY AS WELL AS RETAIL AND WHOLESALE SECTOR EXPENDITURES (MILLIONS OF 2013\$S)**

<b>Expenditure category</b>	<b>In-State (millions of 2013\$S)</b>
Equipment	\$18.56
Utilities	\$7.42
Wholesale	\$6.86
Transportation	\$4.40
Rent	\$4.12
Retail	\$3.14
Professional services	\$2.82
Supplies	\$2.22
Taxes	\$1.56
Financial & Insurance services	\$1.09
Repair & Maintenance	\$1.06
Business Services	\$0.35
Information	\$0.24
Travel (Lodging)	\$0.20
Education services	\$0.04
Food processing	\$0.01
Personal consumption expenditures (PCEs)	\$15.28
<b>Total expenditures including labor</b>	<b>\$69.35</b>

A substantial portion of labor earnings (\$17.9 million reported in Table 2) will be injected back into the economy in the form of household purchases of goods and services. We convert tenants' expenditures on labor into local employee spending using the personal consumption expenditures (PCEs) conversion factor. PCEs may be treated as an additional producing sector. The conversion ratio between labor earnings and PCEs is calculated using the 2007 Condensed Input-Output Transaction Table for Hawaii and equals 85.4%, indicating that about 85% of employees' earnings are spent in the local economy. This suggests that \$17.9 million of labor earnings will create approximately \$15.3 million of additional spending in the economy. (The latter reported as a separate entry in Table 3).

The expenditures in Table 3 correspond to a direct effect of NELHA tenants on the Hawaii economy. For example, NELHA tenants spent a total of \$2.8 million directly on professional services. The professional services sector in turn spent some of those \$2.8 million on Hawaii goods and services. This indirect action leads to a multiplier effect. In addition, there is an induced effect that refers to the changes in household spending that result from changes in earnings through direct and indirect effects.

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In other words, for every dollar spent, the direct effect is the original dollar, the indirect effect is the additional spending by industries created by that dollar, and the induced effect is the additional spending by households in the economy from increased income as a result of that original dollar spent.

To evaluate the short-term impact of tenant expenditures in 2013 on the state of Hawaii, we used Type II multipliers from the 2007 20-sector input-output model of the State of Hawaii.<sup>7</sup> The Type II multipliers are widely used in real-world applications, as they capture the direct, indirect, and induced effects per dollar of spending in each sector of the economy. The impacts were computed by multiplying the expenditures by their respective “type II multipliers” to arrive at total sales, employment, earnings impacts, and jobs impacts.

Table 4 reports impacts of NELHA and NELHA tenants’ in-state expenditures on state output, earnings, taxes, and employment by industry. These estimates can be interpreted for the state as a whole or industry-by-industry. For example, take the transportation industry. NELHA tenants collectively spent \$4.9 million in this one sector. The impact on Hawaii’s larger economy from NELHA’s spending on the transportation industry was \$9.7 million in output (sales), \$2.5 million in employee earnings, \$390,000 in additional state taxes, and 55 additional jobs. The total state impact from all of NELHA’s spending was an increase of \$122.8 million in output (sales), \$28.9 million in earnings, \$5.0 million in increased state taxes, and 617 additional jobs.

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<sup>7</sup> Ibid 2.



TABLE 4: INITIAL EXPENDITURES AND TOTAL ECONOMIC IMPACTS (MILLIONS OF 2013\$S AND JOBS)

Industry	Initial in-state expenditures (MMs of 2013\$s)	Impact on			
		Output	Earnings	State Tax	Jobs
		(Millions of 2013\$s)			(#)
Food processing	\$0.13	\$0.30	\$0.07	\$0.01	2
Other manufacturing	\$21.37	\$31.82	\$4.21	\$0.67	86
Transportation	\$4.88	\$9.74	\$2.50	\$0.39	55
Information	\$0.70	\$1.22	\$0.31	\$0.06	6
Utilities	\$7.77	\$13.38	\$1.83	\$0.52	30
Wholesale	\$7.38	\$14.08	\$4.49	\$0.54	83
Retail	\$5.27	\$9.99	\$2.93	\$0.60	79
Financial & Insurance serv.	\$1.91	\$4.15	\$1.08	\$0.19	22
Rent	\$7.66	\$11.89	\$1.55	\$0.50	42
Professional services	\$3.04	\$6.53	\$2.62	\$0.42	48
Business services	\$0.45	\$0.98	\$0.39	\$0.06	9
Education services	\$0.30	\$0.67	\$0.27	\$0.04	7
Accommodation	\$0.77	\$1.58	\$0.51	\$0.13	9
Repair & Maintenance	\$1.82	\$4.14	\$1.47	\$0.21	37
Government	\$2.18	\$4.15	\$1.83	\$0.19	31
Other industries <sup>8</sup>	\$3.72	\$8.17	\$2.85	\$0.49	69
<b>Total</b>	<b>\$69.35</b>	<b>\$122.78</b>	<b>\$28.91</b>	<b>\$5.02</b>	<b>617</b>

NELHA's impact on the State of Hawaii in 2013 was substantially larger than in 2010, which is consistent with about a 45% increase in the total in-state expenditures (i.e., from \$47.3 million to \$69.4 million). The growth in 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 an increase in the estimated impacts.<sup>9</sup> 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%, 12%, and 6%, respectively.

<sup>8</sup> Agriculture, Health services, Arts and entertainment, Eating and drinking. These industries are affected via personal consumption expenditures.

<sup>9</sup> The estimated impacts are partially affected by implementation of a more detailed survey questionnaire (i.e., 17 expenditure categories instead of 11), which improved the accuracy of reporting by industry.

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## SUMMARY

Using an online survey, we obtained expenditures data for 20 NELHA tenants (out of 37). The expenditure levels for the survey non-respondents were estimated using various techniques. Total NELHA tenant expenditures were estimated at \$98.8 million, of which about \$72.0 million (or 73%) were paid to Hawaii entities. In comparison to NELHA expenditures in 2010, the total in-state expenditures have increased by about \$20 million.

The in-state expenditures provided many economic benefits to the state of Hawaii. Using the DBEDT multipliers, we estimated the impact of NELHA in-state expenditures on the State's output (sales), earnings, and tax revenues to be \$122.8, \$28.9, and \$5.0 million, respectively. Furthermore, not only do NELHA tenants employ hundreds of people but also their expenditures contribute to over 617 jobs in the larger Hawaii economy. In other words, every million dollars spent by NELHA created 9 jobs in 2013 in Hawaii.

## APPENDIX: NELHA TENANT SURVEY

Category	Description and examples	Total CY2013 expenditures (to the nearest thousand \$)	% of total CY2013 expenditures to Hawai'i business*
Salaries and wages	Salaries and wages paid to employees or contractors. Do not include fringe.		
Employee benefits	Fringe benefit payments, expenditures for business and employee insurance coverage, employee benefit programs and services. Do not include FICA.		
FICA taxes	Federal Insurance Contributions Act		
Rent	Rental expenses paid to NELHA, rental of facilities, equipment, vessels, cars, etc.		
Equipment	Expenditures for capital purchases - durable goods, equipment, motor vehicles, furniture, construction materials, metals and minerals (except petroleum), laboratory equipment, scientific instruments, etc.; include raw and intermediate materials and supplies used in production		
Supplies	Office supplies, consumables, minor equipment		
Information	Internet, Telecommunications, Broadcasting		
Utilities	Electricity, gas, water (if paid separately from rent)		
Professional services	Expenditures for services such as accounting and payroll; computer support; consulting; research; advertising, engineering, architectural, etc.		
Financial & Insurance services	Investment management services, expenditures for interest on loans or leasing arrangements		
Business services	Waste management and remediation services; security and surveillance services, cleaning		
Transportation	Expenditures to transport materials and equipment via air, water, truck, rail, etc.; include warehousing and storage en route		
Repair & Maintenance	Equipment and machinery repairs and maintenance		
Taxes	Payroll taxes other than FICA, real property taxes, income taxes, import taxes		

		<b>COLUMN A</b>	<b>COLUMN B</b>
<b>Category</b>	<b>Description and examples</b>	Total calendar year 2013 expenditures (to the nearest thousand \$)	% of total calendar year 2013 expenditures to <b>Hawai'i business*</b>
Travel	Expenditures for airfare, lodging, meals & incidentals paid on behalf of employees and others such as event participants, invited guests, etc. Please provide total and a breakdown of lodging costs and airfare/ground transportation as % of the total travel expenditures. <b>Total travel</b>		
	Lodging (%)	(% of the total travel)	(% of column A to HI vendors)
	Airfare/gr transportation (%)	(% of the total travel)	(% of column A to HI vendors)
Other**	(Please describe)		

\*If you do not know the exact split between expenditures to Hawaii and non-Hawaii entities, then please report your best estimate of the share of the total expenditures made to Hawaii businesses. Hawaii business refers to any business doing business in Hawaii.

\*\*"Other" expenditure category is a catch-all to account for all institution expenditures in calendar year 2013. Use this category for expenditures that were not captured in the above specified categories and provide as best as possible a brief description of the expenditure. Use this category if you are not sure whether a particular expenditure belongs to any other above specified categories. Please note that you can make more than one entry in this category. For each entry, please provide a description/explanation along with each expenditure amount e.g., tuition payments for employees - \$XXX", x%; publication costs - \$YY, y%. We encourage you to make multiple entries in situations where there is more than one expenditure type that cannot be included in one of the specified categories.