

Department of Business, Economic Development & Tourism
Biennium Budget FY 2018-2019
2017 Hawaii State Legislature
Budget Briefing

Statement of
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Before the
HOUSE COMMITTEE ON ECONOMIC DEVELOPMENT & BUSINESS

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Informational Budget Briefing

Chair Nakashima, Vice Chair Keohokalole, and Members of the Committee. Thank you for this opportunity to testify on the Department of Business, Economic Development, and Tourism's budget.

I have asked the requested Division Managers and Agency Directors to be available to introduce their programs and answer any questions you may have.

Mission Statement: DBEDT's mission is to support the development of a Hawaii economy that embraces innovation; an economy that is globally competitive, dynamic and productive; and provides opportunities for all Hawaii's citizens.

Overview: DBEDT is Hawaii's resource center for economic and statistical data, business development opportunities, energy and conservation information, and foreign trade advantages. The department oversees six divisions and has 11 attached agencies.

Objectives: DBEDT's primary objectives are to create broad policy determinations with respect to economic development in the State of Hawaii, and to stimulate opportunities that offer the most immediate promise of expanding Hawaii's economy. The department encourages initiative and creative thinking in developing objectives and activities that are in line with our overall growth strategy.

Going forward we want to capitalize on this trend within the economy and continue on an investment and growth strategy that will position Hawaii's economy to become more diversified and resilient. Our attention is focused on efforts that will build infrastructure, increase both internal and external capital, and develop and attract talent that will be our workforce of the future. The department's efforts have been targeted to stimulate economic activity in areas of competitive advantage and economic potential.

Innovation growth areas such as clean and renewable energy, global broadband, creative media, and the tech industry offer the promise of creating a knowledge-based economy that can grow and thrive in our state. In addition, advancements and recent trends in agriculture, aerospace, and foreign trade can further position the state's economy and create new jobs and opportunities for Hawaii's residents.

DBEDT's divisions and attached agencies are actively working on initiatives that support this mission of building infrastructure, attracting capital, and developing talent.

Transit-oriented development, state-sponsored and supported broadband infrastructure, Kakaako Innovation Block, the 80/80 initiative, Creative Media/Film Studio Cluster, Start-Up Paradise, Kalaeloa Microgrid, Pixar-in-a-Box, and the First Responder Tech Hub are a few examples of the efforts being undertaken by the department.

The time is now to begin developing the industries that will transform Hawaii's economy.

It's the Administration's Priority to Continue to Developing Hawaii's Innovation Economy:

Innovation is the key to Hawaii's growth strategy in today's global economy. Innovation drives economic growth, creates jobs, and is necessary to transform the state into a knowledge- and technology-based economy in order to remain competitive around the world. The state's initiatives that utilize innovation builds on sustaining existing economic momentum and ensures success in the future.

DBEDT's divisions and attached agencies have organized and aligned their programs to support an entrepreneurial ecosystem. Hawaii has made tremendous progress in support of this ecosystem, which include:

- Co-working spaces opening up around the State
- Startup Weekends and Pitch Events
- Export tradeshows (e.g. Tokyo Gift Fair)
- Industry showcases (e.g. Honolulu Fashion Week)
- Investor Summits (e.g. East Meets West conference)
- A continuum of startup capital available, from accelerator programs to Hawaii-based investment funds
- Providing pre-seed through Series A capital to Hawaii startups
- Four venture accelerator programs operating in the software, renewable energy and film/media sectors.
- FTZ and NELHA's new business incubators.
- Pixar In A Box Collaboration – Creative Industries Division, Department Of Education, and Pixar Animation/Disney partnership.
- Broadband – increasing the state's broadband capacity and speed
- Six Hawaii-based investment funds up and running

Department Priorities: DBEDT's budget priorities are based on those initiatives that best meet the following objectives:

- **Create an Innovation Economy** – Create an infrastructure that enables Hawaii's creative and entrepreneurial talent to turn ideas into products and services in a globally competitive economy. This will, in turn, increase the flow of people, products, services and ideas between Hawaii and export markets.
- **Expand Hawaii's Clean Energy Initiative** – Grow Hawaii's clean energy economy through the Hawaii Clean Energy Initiative by transforming how the state uses energy by accelerating the production of renewable and alternative energy, increasing energy efficiency and developing and adopting new technologies, thereby ensuring energy security, long-term environmental quality and benefits to residents.
- **Improve Hawaii's Business Environment** – Lead public sector efforts to bring about a business environment that is market-driven, and rewards productivity and entrepreneurship.
- **Increase Hawaii's Broadband Capacity and Speeds** – expanding the State's broadband capacity will enable rapid access of information, accelerate business development, connect first responders more efficiently, create telemedicine opportunities for the healthcare industry, enhance educational resources, improve communications networks, enhance telecommuting, and enable smart grid technology.
- **Plan Dynamic Communities** – Plan and develop live-work-play communities to attract and retain a skilled workforce. At the same time, meeting the demand for housing by supporting the creation of low- and moderate-income homes for Hawaii's residents through financing of private sector developments with long-term affordability.
- **Measure and Monitor Economic Conditions** -- Provide economic data and research analysis, and policy recommendations to government agencies and to the business community by making them accessible online.
- **Sustain the Visitor Industry** – Develop and implement Hawaii's strategic and marketing plan for tourism to sustain a healthy visitor industry through alignment of global marketing programs with Hawaii's distinctive products, natural resources, the Hawaiian host culture and multi-cultures.

Hawaii's Economic Conditions: Based on the most recent developments in the national and global economy; the performance of Hawaii's major industries; the labor market conditions in the State; and growth of gross state product (GDP), personal income, and tax revenues, DBEDT expects that Hawaii's economy will have 1.9% real GDP growth.

DBEDT DIVISIONS AND ATTACHED AGENCIES

BUSINESS DEVELOPMENT & SUPPORT DIVISION – BED 100

MISSION: The Business Development & Support Division (BDS) promotes industry development and diversification in Hawaii by supporting existing and emerging industries; attracting new investment and businesses that can create more high-skilled, quality jobs in the State; increasing exports of Hawaii products and services; expanding Hawaii's participation in global trade and commerce; and by supporting small business and community based organizations.

ECONOMIC AND FISCAL CONDITIONS: The division's non-payroll general fund restriction challenges the division's ability to undertake planned projects and activities to meet its intended goals.

NOTABLE PERFORMANCE MEASURES / ACCOMPLISHMENTS:

- **Export Program:** BDS's export program targets growth companies to increase export revenues and capital. In the fifth year of this program, it has participated in more than 25 international and domestic trade shows and retailer promotions. More than 450 Hawaii companies from various industries, including fashion, food, gifts, education, and life sciences, were featured at various DBEDT-produced Hawaii Pavilions in Japan, Taiwan, China and major U.S. Cities such as Orlando, Salt Lake City, San Francisco, San Diego, Chicago, Boston, Philadelphia and Las Vegas.
- **Hawaii State Trade Expansion Program (HiSTEP):** In 2016, HiSTEP activities helped 179 companies and resulted in \$27.3 million in export sales. Additionally, 52 companies participated in nine export readiness training sessions. As a result of the success of HiSTEP, in October 2016, DBEDT's HiSTEP was awarded \$700,000 via a competitive grant from the U.S. Small Business Administration (SBA) to increase the number of Hawaii small businesses that export as well as to increase the dollar amount of exports from small businesses already involved in global markets. Although more than 40 states received awards, Hawaii received one of the largest awards. HiSTEP is a comprehensive program involving training, trade shows, consumer shows, and direct company assistance.
- **Hawaii Education Service Centers:** Within Hawaii's overseas offices in Taiwan and Beijing, the division has established the Hawaii Education Service Centers to attract and increase international students at Hawaii's schools, colleges and universities. The Hawaii Education Service Centers work with the DBEDT-organized Study Hawaii Education Consortium of 28 public and private schools. The division and its overseas offices, in collaboration with Study Hawaii, led delegations of Hawaii schools to Tokyo, Hiroshima, Fukuoka, Hong Kong, Guangzhou, Seoul and Busan to exhibit at education

expos, conduct study in Hawaii seminars and workshops, hold school mini-fairs, and visit targeted schools. For 2016, a direct result of this effort will bring 1,400 students and teachers in school group visitations, exchanges, and short and long term study enrollment.

- **International Student Attraction:** Another of the division's main initiatives is to increase the number of international students in Hawaii. With the short-term and high school visits as the primary marketing targets, in 2016, the division was directly responsible for 1,400 students attracted to Hawaii with \$3.5 million of economic output generating \$237,000 in state taxes.
- **2016 Tokyo International Gift Show:** DBEDT organized a strong delegation of 62 Hawaii companies to promote a diverse selection of high-end Hawaii made products as part of the Hawaii Pavilion at the 2016 Autumn Tokyo International Gift Show, September 7-9, 2016. The Tokyo International Gift Show is the largest international trade show in Japan with more than 190,000 distributors, wholesalers, brokers and retailers attending the three-day trade show. Leveraging Hawaii's strong brand in Japan, 2016 marked the fifth year that DBEDT has led an export promotion mission to Japan. Hawaii exhibitors reported direct sales of more than \$15.2 million, which results in an economic impact of \$30.4 million.
- **"Buy Hawaii, Give Aloha" Consumer Fairs in Japan:** DBEDT participated in two consumer fairs in Japan: the Hawaii Expo 2016, in Tokyo with 13 vendors and the Hankyu department store in Osaka, with another 13 vendors. Total exposure for the two fairs was in excess of 275,000 consumers. Actual and projected sales as a result of participating in the fairs topped \$1.2 million.
- **Enterprise Zones (EZ):** The EZ Partnership Program is a joint state-county effort intended to stimulate -- via tax and other incentives -- certain types of business activity, job preservation, and job creation in areas where they are most appropriate or most needed. At the end of 2015, the companies eligible to receive EZ benefits reported 1,764 new or maintained jobs statewide. There were 218 companies enrolled in the EZ Program at the end of 2015.
- **Hawaii Small Business Fair:** The twice-yearly Hawaii Small Business Fair co-sponsored by DBEDT again achieved success with attendance of more than 250 entrepreneurs each at the winter and summer events.
- **International Affairs:** The division also organized two missions to promote trade and investment with the Korean Chamber of Commerce, and educational promotional missions to Tokyo, Hiroshima, Fukuoka, Guangdong, Seoul and Busan. The division produced events commemorating the 30th anniversary of sister-state relations with Jeju Province of Korea. In 2017, the division is looking to sign sister-state agreements with

Hokkaido, Japan; and Goa, India, as well as commemorate the anniversaries of sister-state relations with Fukuoka Prefecture (35 years) and Hiroshima Prefecture (20 years).

FEDERAL FUNDS: In 2017, the division must compete again for federal funding from the U.S. Small Business Administration for up to \$750,000. CFDA Number 59.061.

BED 100 BUDGET ADJUSTMENT:

- **\$75,000** to conduct activities to attract and recruit international students to study in Hawaii.
- **\$700,000** increase in the STEP federal grant ceiling in anticipation of the award.

CREATIVE INDUSTRIES DIVISION – BED 105

MISSION: The Creative Industries Division (CID) is the State’s lead agency charged with strengthening Hawaii's creative economy. CID’s mission is to accelerate Hawaii’s creative entrepreneurial capacity through strategic initiatives, investment and infrastructure development, resulting in a thriving ecosystem which supports the growth of Hawaii’s knowledge-based, creative industry sectors. Comprised of the Hawaii Film Office (HFO) and the Arts and Culture Development Branch (ACDB), the division manages statutory responsibilities for the film industry and business development for Hawaii’s creative sectors. The division designs programs which increase access to business leaders, attract investment, and increase export/distribution - all key aspects of Hawaii’s developing innovation sector.

ECONOMIC AND FISCAL CONDITIONS: While a small number of Hawaii’s creative sectors outperform their national counterparts, the majority still need professional development and infrastructure support in order to thrive. With the division’s funds of \$235,000 for the Hawaii Film Office (\$135,000 of which the Legislature identified to support R&M at the studio) and \$90,000 for the Arts and Culture Development Branch, there are very limited resources to support initiatives to empower the 50,000 individuals and small businesses in the creative and innovative sector to develop and export their products. While the division is resourceful in furthering its initiatives through partnerships, this is not an optimal scenario to grow Hawaii’s creative sector capacity and the infrastructure necessary for a thriving innovation-based economy.

The Film Industry Marketing program has been reduced to one trade show per year with only enough funding left over to conduct minimal business development activities. Additionally, funds to support professional development and export marketing programs in the arts, music, design and new media industries are limited to \$50,000 per year. As a result, the division relies on leveraging partnerships to support professional and entrepreneurial development, and is unable to mount a significant marketing campaign to attract off-shore film production, including marketing the State’s tax credit program.

With the passage of Act 88/89, the location-based film industry brings in annual production

spending of up to \$200 million per year, with an estimated economic impact of more than \$350 million. Additional funding is needed to support ongoing maintenance contracts, business development for Hawaii's film sector and to globally promote Hawaii as a film location.

To provide mentorship, entrepreneurial development programs and infrastructure to support the creative clusters, the division has partnered with sister agencies and non-profits to support DBEDT's innovation initiative, which includes the Creative Lab Hawaii (CLH) program. The Legislature provided \$100,000 in funding to expand the program, which has now been leveraged with an EDA matching grant of \$400,000. The CLH program empowers creative entrepreneurs to expand capacity and connectivity to investment, acquisition and commercial distribution markets globally.

NOTABLE PERFORMANCE MEASURES / ACCOMPLISHMENTS:

- **Creative Industries Report:** CID issued its annual report, "Hawaii's Creative Industries, Update Report," in partnership with the department's Research and Economic Analysis (READ) division. The report shows Hawaii's creative economy comprised of 49,597 entrepreneurs and small businesses, which contributed \$3.3 billion to Hawaii's GDP, representing 4.2 percent of the State's GDP.
- **Creative Lab Hawaii Program:** A total of 257 creative entrepreneurs participated in CID's innovative CLH program by participating in the following components: Immersive Programs, Ideation Weekend Programs, Public Programs and hands on coaching and mentoring by industry leaders in the areas of screenwriting, producing, broadband/new media, design/fashion, music, and interactive media. An example of a successful participant is Vilsoni "Vili" Hereniko who entered his project, "Until the Dolphin Flies," for a spot in the CLH's Producers Immersive Program, a track for producers in all genres to develop new content for films and TV. As a CLH participant, he was able to participate in the American Film Market in Los Angeles, which allowed him to network and market the script he co-authored with screenwriter Joseph Grogan. As a result, Vili and his producer wife, Jeannette Paulson Hereniko, are collaborating with Australian and New Zealand producers to bring "Until the Dolphin Flies," to the big screen. The Creative Lab Hawaii program is a feeder program for the GVS Transmedia Accelerator, funded by the Hawaii Strategic Development Corporation (HSDC).
- **Pixar in a Box Partnership:** CID developed and executed a strategic partnership between Pixar Animation/Disney studios and their educational partner Khan Academy. Pixar in a Box (PIAB) is an online STEM education program to engage middle and high school students in the application of these core areas. Working in partnership with the Women in Technology, Maui Economic Development Board, CID is attempting to bring in Tony DeRose, Senior Scientist & Co-Creator of PIXAR, to present the educational program to teachers attending the STEM Conference that is scheduled for May 2017 in Honolulu.

- **Film Production:** Film Production in 2015 reached \$184 million. Feature films included *Kong: Skull Island* (2017 release), *Mike and Dave Need Wedding Dates* (released July 2016), and the sixth season of *Hawaii 5-0*.
- **Hawaii Film Studio:** The Hawaii Film Studio is proceeding with a much needed capital improvement project to replace the original production cottages with modular units. The Department of Accounting and General Services (DAGS) is managing this project for DBEDT. DAGS has entered into a construction contract with Close Construction. Groundbreaking is anticipated for April 2017 with completion expected in December 2017. *Hawaii 5-0* is expected to film its eighth season during construction and is expected to move into the new buildings in January 2018. This will provide a more comfortable and safer working environment for tenants.

FEDERAL FUNDS: Through the U.S. Department of Commerce, Economic Development Administration, CID received a grant of \$400,000 (CFDA 11.307, Hawaii Creative Industries Innovation Ecosystem Development Project) during 2014 for Creative Lab Hawaii (CLH). Although CID is not at risk of losing these funds, they do not extend for the full duration of FY17 and end in March of that year. Federal funds support the CLH program's expansion in subject matter and geographic coverage to include the neighbor islands, to strengthen Hawaii's creative entrepreneurs' capacity for success. CID is requesting an additional \$200,000 in federal funds to support CLH for FY17-18 to continue the program. As this program runs throughout the year, any reduction to the operating budget will impact the entrepreneurial pipeline of projects initiated by creative entrepreneurs in the CLH program.

BED 105 - BUDGET ADJUSTMENT:

- **\$200,000** for Federal Grant Ceiling. This request for an increase in ceiling is in anticipation of a federal Economic Assistance Grant from the Department of Commerce.

FOREIGN TRADE ZONE – BED 107

MISSION: The mission of the Foreign-Trade Zone No. 9 (FTZ 9) is to establish, maintain, and administer general-purpose Foreign-Trade Zones and special-purpose Foreign-Trade Subzones throughout the State; provide storage and distribution services to firms engaged in import/export of merchandise; and lease office, warehouse, and manufacturing space to firms engaged in international trade. The FTZ receives no general funds. FTZ 9 has more than 300 clients, providing revenues of close to \$2 million annually, which support the program. During the last reporting year in its report to Congress, FTZ 9 had more than \$8.5 billion in cargo and merchandise transited through FTZ sites in Hawaii.

ECONOMIC AND FISCAL CONDITIONS: International trade activity has grown significantly over the past several years followed by a downward trend in activity starting in 2015 and a potential growth gain in late 2016. This reflects recent instability in the global marketplace which can be

attributed to a decrease in investment and an increase in U.S. protectionism. Hawaii's economy, however, remains stable and continues to grow at a steady rate. Although overall FTZ activity reflected a slight decrease, there were significant highlights during the past reporting period, most notably at the Pier 2 facility. The 75 FTZ offices leased to importers and exporters, or those who support the international trade community in the state, are at 100 percent occupancy. Utilization of the program's six-acre warehouse continues to maintain a very high capacity of cargo storage and distribution. Over the past year, the FTZ has worked to diversify its tenant base to include companies in the renewable energy and digital media development sectors of the economy. This allows for a wider base of clients and greater opportunities to grow and sustain international trade opportunities in diverse, emerging economic sectors for international trade.

NOTABLE PERFORMANCE MEASURES / ACCOMPLISHMENTS:

- **50th Anniversary:** FTZ 9 passed a major milestone this year as it celebrated its 50th year of serving the people of Hawaii and the international trade community.
- **Highest Number of Zone Project Users:** FTZ 9 was recognized this past year for having the highest number of Zone Project users in the nation at 441. This is the highest number of users on record and an 18% increase in clients from the previous year.
- **FTZ 9 Exports:** Exports from Hawaii's FTZs over the last year exceeded \$719 million, the 17th highest in the nation according to the Foreign-Trade Zones Board Annual Report to Congress. FTZ 9 ranked 14th highest in the nation for exports from warehouse/distribution activity.
- **FTZ 9 Activities:** Total value-added and manufacturing activities were close to \$5 billion from the Hawaii FTZ project. Capital improvement projects within FTZ's totaled \$41 million. Employment from FTZ activity statewide was 3,272.
- **FTZ 9 Representing Hawaii:** FTZ 9 was again designated as the State's representative for the EXIM Bank Regional Export Promotion program. The Export-Import Bank of the U.S. is an independent, self-sustaining agency of the federal government, which supports American exports of goods and services by filling in the gaps in export financing through its loan, guarantee, and insurance programs when the private sector is unable or unwilling to do so. The program allows smaller companies to lower their export risk.

BED 107 BUDGET ADJUSTMENT:

- **\$100,000 to increase FTZ 9 annual Operating Ceiling.** With the recent opening of the International Trade Resource Center wing of the facility, the FTZ 9 has seen an increase in overall operating expenses such as electrical, janitorial, A/C maintenance and repair, refuse collection, etc.

- **\$350,000 for bond repayment.** The bond from the renovation project to build the new wing needs to be repaid. The ceiling increase will allow FTZ 9 to properly pay for its increased expenses relating to the opening of the new wing and continued growth, and support of Hawaii’s import/export initiatives.

OFFICE OF AEROSPACE DEVELOPMENT- BED 128

MISSION: The Hawaii Office of Aerospace Development (OAD) facilitates dialogue among Hawaii’s government, private and academic sectors, and overseas organizations to promote the growth of Hawaii’s aerospace industry.

ECONOMIC AND FISCAL CONDITIONS: The current expenditure restriction has reduced funding for operations at Challenger Center Hawaii and Hawaii’s Unmanned Aerial Systems (UAS) Test Site. These programs receive operating funds through OAD.

NOTABLE PERFORMANCE MEASURES / ACCOMPLISHMENTS:

- **Commercial Spaceport:** With a \$250,000 grant (CFDA 20.110) from the Federal Aviation Administration (FAA), OAD is conducting environmental assessment studies required to obtain a commercial spaceport license from the FAA. This certification will enable “horizontal launch and land” vehicles (otherwise known as “spaceplanes”) to operate out of Hawaii. Kona International Airport (KOA) was selected as the preferred site for launch operations, and several aerospace companies have subsequently signed non-disclosure agreements with OAD to explore options for launching experimental payloads, earth-orbiting satellites, and interplanetary probes to space. Spaceplanes operating out of KOA would enable the launch of humans to sub-orbit, bringing space tourism to Hawaii.
- **Unmanned Aerial Systems (UAS) Test Range:** As one of seven sites selected by the FAA to serve as a testbed for UAS, OAD has an MOA with the University of Hawaii’s Applied Research Laboratory to manage range development and operations. The goal is to leverage the State’s diverse terrestrial and expansive over-water regions to test, validate and certify innovative UAS technologies for a range of applications, including emergency search and rescue operations, fisheries and watershed management, agricultural monitoring, motor vehicle traffic management, land use surveys, atmospheric monitoring for commercial airline turbulence avoidance, and other governmental and commercial sector applications with scientific and economic benefits for Hawaii.
- **Challenger Center Hawaii (CCH):** Since 1993, CHH has delivered an exciting space simulation experience engaging more than 5,000 students from over 200 schools to solve real-world problems as they explore the wonders of deep space. Teachers lead students in six to eight weeks of classroom preparation, culminating in hands-on

applications of knowledge and critical thinking on Mission Day. The simulated missions — involving both a return to the Moon and a rendezvous with Comet Halley — provide inspirational opportunities for students to apply vital decision-making skills and learn the value of teamwork in accomplishing their collective objectives and completing their mission. Mission tasks allow participants to experience the joy of learning and encourage the mastery of life-long skills that will prove invaluable in choosing a career.

FEDERAL FUNDS: None projected for FY18-19.

BED 128 BUDGET ADJUSTMENT:

- **\$100,000** to add a Director position to oversee OAD. Act 149 - Relating to Aerospace Development, SLH 2007, created a Director to oversee, supervise, and direct the planning, evaluation, and coordination of space-related activities and identify and promote opportunities for expanding and diversifying aerospace-related industries in the State, initiate discussions for private and international involvement in space-related activities in the State, establish partnerships with various entities that can promote and enhance the State's aerospace industry, and do all other things necessary to carry out the purpose of Act 149. Funding is being requested in DBEDT's biennium budget to hire an OAD director to assume these responsibilities.

PACIFIC INTERNATIONAL SPACE CENTER FOR EXPLORATION SYSTEMS (PISCES)

MISSION: The Pacific International Space Center for Exploration Systems (PISCES) serves as a Hilo-based research and education/training center enabling aerospace agencies from around the planet to develop, test, and validate, in Hawaii, pioneering technologies that can advance robotic and human missions to space.

ECONOMIC AND FISCAL CONDITIONS: For Pacific International Space Center for Exploration Systems (PISCES) there was a \$400,000 base budget, making the available funds for PISCES for FY17 \$380,000. It was necessary to make staffing reductions (from 5.18 FTE to 2.85 FTE) and adjustments to other current expenses.

NOTABLE PERFORMANCE MEASURES / ACCOMPLISHMENTS:

- For applied research, PISCES completed or participated in four major projects: Landing Pad Construction, NASA Ames-PISCES Collaborative Rover Test, Lunar Base Site Survey, BASALT Field Work with NASA.
- PISCES continues its workforce development/outreach with a number of successful programs with students in 2016.
- Long-term economic development activities for 2016 included Non-Disclosure Agreement's (NDA) with three different organizations to evaluate possibility of

establishing a basalt industry in Hawaii. In addition, PISCES Established an MOU with a company interested in working with a local energy storage company.

FEDERAL FUNDS: None.

BUDGET ADJUSTMENT: None.

RESEARCH & ECONOMIC ANALYSIS DIVISION – BED 130

MISSION: The Research & Economic Analysis Division (READ) works to enhance and contribute to the economic development of Hawaii by providing data, analyses and policy recommendations on economic issues. READ provides economic forecasts that contribute to long-term statewide planning and infrastructure needs assessment, and also conducts and reports on basic research on Hawaii's economy.

ECONOMIC AND FISCAL CONDITIONS: There has been increasing demand for economic studies, by the legislature, other government agencies, and the general public. Some of the economic studies are funded by appropriation and READ hires research firms to complete part of the work. In FY 2015, two studies were completed with the help of research firms with a total spending of \$193,000. READ is funded by general funds entirely.

NOTABLE PERFORMANCE MEASURES / ACCOMPLISHMENTS:

- **Reports:** Produced an average of 50 economic and statistical reports covering all aspects related to Hawaii's economy and the population.
- **Website Information:** READ's website receives an average of 30,000 page views a month.
- **Economic Studies:** READ completed a series of economic studies on housing, construction, and real estate; completed a study on the Economic Impact of Real Estate Investment Trust; completed a study on the Economic Impact of Exempting GET from Sales to the Federal government; completed an interim study on the Analysis of Real Property Tax in Hawaii.
- **Support for Government and Business:** READ provided economic data and analysis for government agencies and the business community. These include the monthly passenger count for the Hawaii Tourism Authority to estimate the visitor numbers; and preparing economic documents for the Department of Accounting and General Services, Department of Transportation, and Department of Budget and Finance.
- **State Financial Activities:** READ participated in the activities of the State revenue bond and general obligation bond credit rating and sales.

- **Education and Outreach:** READ delivered an estimated 20 presentations to the local business communities in the State on economic conditions and other issues.

FEDERAL FUNDS: READ does not receive any federal funding.

BED 130 BUDGET ADJUSTMENT:

- **\$57,168** to restore an Economist VI position that was abolished in FY 14 due to revenue shortfall. With the Economist position, some of the economic studies can be done within the division instead of contracting out to outside research firms. This will save the state \$40,000 annually and the Economist will produce an average of two economic studies or analysis a year on current economic issues.

GENERAL SUPPORT FOR ECONOMIC DEVELOPMENT – BED 142

MISSION:

The Office of the Director provides overall direction and coordination of statewide economic development and energy programs. It formulates and executes economic development policies of the Governor and the executive branch and economic development initiatives proposed and approved by the Legislature.

The Administrative Services Office provides internal management, fiscal, budgetary, contract, personnel, information technology and other administrative services in support of DBEDT's six core programs and 11 attached agencies.

The Small Business Regulatory Review Board (SBRRB) is attached to the Director's office, and is responsible for providing recommendations to State and County agencies on new and amended administrative rules that impact small business. The SBRRB is also charged with reviewing existing rules upon requests from small business owners or at the Board's initiative.

ECONOMIC AND FISCAL CONDITIONS: With limited staff and operational funds, the SBRRB continues to be challenged in reaching small business owners in order to optimize the Regulatory Flexibility Act (Chapter 201M, HRS), and continues to have a low profile and does not receive high visibility attention from the Hawaii small business community.

NOTABLE PERFORMANCE MEASURES / ACCOMPLISHMENTS:

- **Broadband:** In September 2016, DBEDT retained JP Morgan to advise the State on a public-private partnership to deliver a secure, open access, carrier neutral, multi-tenant cable landing station that will enable Hawaii to serve as a regional and International interexchange platform for broadband communications in the Pacific Basin. The partnership is expected to provide a foundation for the development of future terrestrial broadband initiatives in Hawaii. By enhancing Hawaii's capacity to serve as a

strategically located marketplace for the exchange of communications traffic, data and content, the partnership will facilitate an increase in broadband availability at competitive prices. As more broadband is available, there will be a meaningful increase in productivity of the State's current industries and workforce as well as new employment opportunities thereby increasing overall aggregate economic growth in the State.

- **SBRRB Outreach:** SBRRB increased its outreach efforts through business associations (such as the chambers, trade associations, etc.), and expanding its communication with state agencies, counties and the legislature. In 2016, SBRRB reviewed 37 new and amended rules, both pre- and post-public hearing, and received a request for review of two administrative rules from a small business owner. SBRRB also distributed monthly e-Newsletters and sent out weekly/bi-weekly communications on Facebook and Twitter to business organizations, chambers, and legislators.
- **Regulatory Review Card:** SBRRB created and launched the Regulatory Review Card, which allows small business owners to alert the SBRRB via the SBRRB's website and seek assistance with burdensome rules.

FEDERAL FUNDS: None

BED 142 BUDGET ADJUSTMENT: None

HIGH TECHNOLOGY DEVELOPMENT CORPORATION – BED 143

MISSION: The High Technology Development Corporation (HTDC) is leading the State of Hawaii's effort to grow the technology industry sector with the objectives of diversifying the economy and creating high-wage job opportunities for the people of Hawaii. HTDC works closely with all of the DBEDT divisions and hosts two federal programs supporting manufacturing and alternative energy solutions for transportation.

ECONOMIC AND FISCAL CONDITIONS: HTDC operates under a highly leveraged model providing \$8 of service to the State for every \$1 of general funds received. The additional funding comes from revenue from the incubation centers, federal contracts (HCATT and INNOVATE Hawaii), consulting contracts, and private sector sponsors for events.

HTDC continues to operate without a long-term lease at the Manoa Innovation Center (MIC). The lease expired in April 2015 and a long-term extension with UH has not come to fruition. Rental income from the innovation center is the primary source of income for the agency's special fund. The special fund is used to fund program initiatives, any required match for federal grants, as well as staff wages. If the month-to-month lease were to be terminated and funding for a new facility is not provided, HTDC will lose its income source and ability to

continue on in its present form. HTDC has made progress on the Entrepreneur’s Sandbox in Kakaako and intends to construct an adjacent innovation center to replace MIC once funding becomes available.

NOTABLE PERFORMANCE MEASURES / ACCOMPLISHMENTS:

- **FY2015 HTDC Economic Impact Survey**

Number of companies surveyed	109 companies
Est. 2015 Total Revenue	\$140.4 million
Total Economic Impact	\$263.7 million
Income Generated	\$99.3 million
State Taxes Generated	\$15.6 million
Number of jobs	906 jobs
Number of jobs in Hawaii	673 jobs

- **Innovate Hawaii program**

Number of companies served	53 manufacturers
Internal Investment	\$6 million
Revenue	\$27.6 million
New Employees	34 employees
Jobs Saved	138 jobs

- **Hawaii Small Business Innovation Research (HSBIR) program:**

Number of companies surveyed	33 companies
Est. 2015 Total Revenue	\$69.2 million
Total Economic Impact	\$135.2 million
Income Generated	\$53.9 million
State Taxes Generated	\$8.3 million
Number of jobs	519 jobs
Number of jobs in Hawaii	403 jobs

HSBIR PHASE 1 AWARDS, STATEWIDE (FY2016)

Total federal SBIR funding	\$1.755 million
HSBIR matching funds	\$0.520 million
Number of companies	12 companies
Number of new companies	5 companies

HSBIR PHASE 2 AWARDS, STATEWIDE (FY 2016)

Total federal SBIR funding	\$7.9 million
HSBIR matching funds	\$2 million
Number of companies	7 companies
Investment ratio	3.95

- **Manufacturing Assistance Program (MAP) matching grant:**

MAP AWARDS (FY2016)

Total applications received	69
Total applications funded	51
Total company investment	\$31,377,504
Total grants requested	\$3,401,169
Total matching grant awarded	\$1,903,634
Projected economic impact*	
New employees	363
New jobs earning > \$80K/year	70
Jobs saved	266

* These projections were reported by the applicants.

- **Hawaii state matching funds for U.S. Office of Naval Research Energy Projects (HONR)**

Total ONR funding	\$11.3 million
HONR matching funds	\$1 million
Number of companies	3 companies

- **NI3 Initiative:** HTDC launched the Neighbor Island Innovation Initiative (NI3) to make the agency truly statewide. This new business mentorship program on Kauai and Hawaii Island provided assistance to 35 companies with the mentors meeting 97 companies in less than a year.
- **Incubators:** Manoa Innovation Center and Maui Research and Technology Center incubated 72 companies with 3 companies graduating.
- **Outreach Events:** HTDC sponsored 23 events that attracted more than 65,000 participants. Wetware Wednesday hosted 11 monthly networking events attended by more than 900 people. HTDC hosted 12 workshops and grant info sessions on Oahu, Kauai, Maui and Hawaii.

FEDERAL FUNDS: INNOVATE Hawaii submitted a proposal to renew its \$500,000 annual contract with the US Department of Commerce National Institute of Standards and Technology to support the Manufacturing Extension Partnership program (CFDA 11.611, Contract # 70NANB13H129) for FY17 through FY21. The program provides direct consulting assistance to manufacturers and administers the MAP and SBIR matching grant programs. The economic impact is detailed above and includes 4 full time staff. We anticipate the contract to be renewed. If the federal funds were lost, HTDC would require \$500,000 annual state funding to continue the program. The program operates on federal funding and in-kind match from HTDC.

HCATT's \$22 million contract with the US Air Force Research Lab (CFDA 12.800), Contract # FA8650-11-2-5605 originally set to expire 3/31/2017 has been extended to 9/30/17. HCATT continues to solicit Federal funding from a variety of sources to diversify its income stream. HCATT does not currently receive any State funding. HCATT operates the only operational renewable hydrogen production and dispensing station on Oahu and over the years has brought more than \$40 million in federal funds into the State, matched by another \$23 million from private partners. HCATT was a leader in making Hawaii the first electric vehicle ready State in the late 1990s and is currently leading discussions on renewable hydrogen vehicle infrastructure. The program includes 5 full time staff.

BED 143 BUDGET ADJUSTMENT:

- **\$23,750** in FY 18 and **\$47,500** in FY 19 (MOF:B) for COO/Industry Info Specialist Position #102460, converts the 50% special funded positions into 100% special funded positions. These positions are critical to the growing programs and partnerships with other state agencies for HTDC services. HTDC is working with 7 agencies to create needed infrastructure that will increase the number of high wage jobs in Hawaii. These positions would allow HTDC to hire experienced staff to move these projects to a successful outcome. Without additional staff HTDC will not have the capacity to support the partnerships.
- **\$16,250** in FY 18 and **\$32,500** in FY 19 (MOF:B) for Special Projects Coordinator Position #102275 fund the positions 100% through HTDC's special fund. These positions are needed to attain HTDC's 80|80 directive as well as continuing to support economic development and innovation in the tech sector.

HAWAII STRATEGIC DEVELOPMENT CORPORATION– BED 145

MISSION: Hawaii Strategic Development Corporation's (HSDC) core activities are to manage and grow its fund of funds investment program that supports economic development and diversification in Hawaii. The focus of this economic development program, called the HI Growth Initiative, will be to: 1) support the establishment of an entrepreneurial ecosystem that will provide mentoring, collaboration, and funding opportunities for Hawaii entrepreneurs to establish and scale their business ventures; 2) actively partner with the private sector to establish accelerator programs in target industry sectors; and 3) network Hawaii's high-growth businesses into the broader universe of mainland and international investment funds through its fund of funds investments.

ECONOMIC AND FISCAL CONDITIONS: HSDC has not received any new funding since 2013. Existing funds have been encumbered to specific investment initiatives. HSDC's investment activities typically require up to a year of planning and working with private investors to establish a Hawaii investment fund. Given the lack of funding, HSDC has not been able to develop any new investment initiatives. Furthermore, HSDC will be unable to support the continued activities of the accelerator programs that have been the foundation of Hawaii's growing entrepreneurial ecosystem.

NOTABLE PERFORMANCE MEASURES / ACCOMPLISHMENTS:

- **HI Growth Supported Accelerators are National Winners:** Three Hawaii accelerators have been awarded \$50,000 and recognized as leading innovators by the U.S. Small Business Administration for their work supporting small-business job creation and growth. This was the third such award in three years for Kona-based GVS Transmedia Accelerator, which cultivates locally produced film and creative media projects. Two-time winner Maui Food Industry X-celerator in Kahului focuses on value-added agricultural products, while the University of Hawaii's XLR8UH program on Oahu also won for the second time. From an initial pool of more than 400 applicants, judges selected a total of 68 winners across 32 states. These accolades for Hawaii's local accelerators come on top of last year's rating of tech accelerator Blue Startups as No. 17 in the U.S. by TechCrunch and the Energy Excelerator's recognition as one of the leading clean-tech accelerators in the country. HSDC through the HI Growth Initiative supports GVS, Maui Food X-celerator, Blue Startups and Energy Excelerator operationally as well as through follow-on investment funds targeted at accelerator graduates.
- **UHERO Report Concludes 12X leverage on State's investment:** The HI Growth Initiative, in just four years, has shown Hawaii is a viable place build competitive startups. A 2016 study by the University of Hawaii's Economic Research Organization found 65 companies have been funded as a result of the HI Growth Initiative. The average capital investment from the HI Growth Initiative is \$160,000 per company, representing a cumulative investment at the end of 2015 of \$10.5 million. Companies on average have gone on to attract an additional \$2 million in private funding for a total of \$136 million: over 12X leverage on the state's investment.
- **HI Growth has mobilized support and capital participation from diverse entities:** HI Growth programs have engaged participation from private investors, Hawaii corporate investors, Hawaii institutional investors and County Governments. There is strong corporate commitment to the Energy Excelerator and corporate investment in follow-on fund EEX Fund One. The University of Hawaii's innovation strategy has been strongly supported by the Hawaii Business Roundtable and corporates are active investors alongside HI Growth's UPSIDE Fund II in UH spinout companies. The County of Hawaii is a strong partner in the GVS Transmedia Accelerator. Several small and large corporates have also participated as sponsors of pitch competitions, demo days, hackathons and reverse pitch events.
- **Vibrant startup ecosystem launched:** Entrepreneur-focused events are an important component of an entrepreneurial ecosystem, enabling serendipitous collaboration and networking. The HI Growth Connect and Network (CAN) program has been a key facilitator of these types of events, which include Startup Weekends and pitch competitions. Additionally, HI Growth supports three major venture capital summits focused on three different industries: East Meets West, brings together Asian and

Western investors and startups; MaiTai Maui Tech Night, brings Silicon Valley executives and investors to Hawaii; and GVS All Access, brings Hollywood executives to network with Hawaii's film and creative media entrepreneurs. The objective is to create opportunities for Hawaii entrepreneurs to grow their businesses by exposing them to potential customers, partners and investors on a regular basis. In FY 2016, more than 1,500 people participated in HI Growth-sponsored events. These activities are important to increasing the pipeline of entrepreneurs establishing new businesses.

FEDERAL FUNDS: In 2011, HSDC received a \$13 million grant under the US Treasury's Small Business Credit Initiative (2011SSBCIHI-A) to fund its venture capital investment program. These funds have been fully encumbered. This was a one-time grant program and there currently are no other Federal programs that provide funds for venture capital investment programs.

BED 145 BUDGET ADJUSTMENT:

- **\$10,000,000 General Fund infusion into HSDC's Revolving Fund.** These funds will be used to continue a state economic development effort called the HI Growth Initiative. The HI Growth Initiative will invest, in partnership with the private sector in three key areas: 1) entrepreneur ecosystem development; 2) accelerators; and 3) access to startup capital to grow and scale businesses. A portion of the funds will be used for program management, e.g. legal work, industry networking events, and studies to measure program effectiveness.
- **\$188,056 General Fund appropriation** for two existing positions at HSDC. These positions have been historically funded out of the HSDC Revolving Fund.
- **\$286,895 Reduction of HSDC Revolving Fund appropriation** for two existing positions at HSDC as funding will be thru General Fund.

NATURAL ENERGY LABORATORY OF HAWAII AUTHORITY (NELHA) – BED 146

MISSION: The mission of Natural Energy Laboratory of Hawaii Authority (NELHA) is to support the development and diversification of the economy of Hawaii by providing resources and facilities for energy and ocean-related research, education, and commercial activities in an environmentally sound and culturally sensitive manner.

ECONOMIC AND FISCAL CONDITIONS: The current worldwide trend towards sustainability technologies has had a positive impact on the demand for sites at the Hawaii Ocean Science and Technology Park (HOST Park) located next to the Kona International Airport. In particular, worldwide focus on clean energy has increased the interest in OTEC technology and other forms of alternative energy, which will assist NELHA in attracting new businesses and research projects. The University of Hawaii Economic Research Organization (UHERO) recently completed an update of the 2010 NELHA Economic Impact Study. The report shows that total annual economic impact surged by 40 percent from 2010 to 2013 (\$88 million to \$122 million)

and generated State tax revenue of \$5 million annually. A total of 617 jobs were generated statewide and 25% in key areas of research, science and technology.

NOTABLE PERFORMANCE MEASURES / ACCOMPLISHMENTS:

- **Key NELHA initiatives are:**
 - Maintain operational self-sufficiency.
 - Maintain and complete build out of Deep and Surface Seawater System.
 - Make mission-critical Research Campus improvements including Blue Tech Incubator.
 - Add OTEC and solar energy production and storage to the development of the Integrated Energy District.
 - Provide infrastructure for Ocean Centerpiece – an 80-acre development focused on providing a Living Laboratory and Showpiece for Sustainable and Green Technologies.

- **Public- and Private-funded Projects:** More than \$70 million in new public and private funded projects at NELHA’s Hawaii Ocean Science and Technology Park have been completed in the past several years to encourage economic and job growth. These projects provide a foundation for a stronger entrepreneurial ecosystem to grow Hawaii’s innovation sector, particularly in the areas of blue technology and clean energy. Of note is the completion of West Hawaii’s first business 15,000 sq. ft. incubator in October 2016. The incubator serves as the focal point for providing services to new businesses in West Hawaii for the innovation sector. Much of the private sector growth at NELHA has led to statewide aquaculture production surging by more than 150% in past several years (\$30 million to \$78 million). Export focus is critical to support future economic growth in Hawaii and the two of the State’s leading exports come from businesses at NELHA (water bottling and shrimp). In renewable energy, the world’s largest grid-connected OTEC facility came online at NELHA in 2015. OTEC is important for the State’s energy future and needs to be part of the equation when the State achieves 100% renewable energy by 2045. In addition, the first publically accessible hydrogen production, storage and fueling facility is currently nearing completion at NELHA.

FEDERAL FUNDS: During FY 2016, NELHA did not lose any Federal Funds. NELHA recently received \$3 million in Federal Funds from the U.S. Economic Development Agency (Investments in Public Works, CFDA No. 11.300) and \$420,000 from the U.S. Department of Energy via the National Renewable Energy Laboratory. This funding is not at risk. NELHA is in the process of applying for additional federal grants.

BED 146 BUDGET ADJUSTMENT:

- **\$5,200,000** in General Obligation Reimbursable Bonds, Improvements and Upgrades to Seawater System, Hawaii. NELHA is requesting an amendment to Section 48.2 of Act 119, SLH 2015, as amended by Act 124, SLH 2016, to correct the conflicting language between the proviso and the appropriation for the Capital Improvement Program project Item A11.01.

DAVID Y. IGE
GOVERNOR OF
HAWAII



SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

KEKOA KALUHIWA
FIRST DEPUTY

JEFFREY T. PEARSON, P.E.
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

**STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES**

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

**Testimony of
SUZANNE D. CASE
Chairperson**

**Before the House Committee on
ECONOMIC DEVELOPMENT & BUSINESS**

**Friday, January 27, 2017
9:00 AM
State Capitol, Conference Room 309**

**In consideration of
INFORMATION BRIEFING ON LNR 172 FORESTRY RESOURCE
MANAGEMENT AND DEVELOPMENT**

The purpose of the Department of Land and Natural Resources' (Department) LNR 172 Forestry Resource Management and Development is to strengthen the State's economy through forest resource management and promote the sustainable production of forest products and services from Forest Reserves and other public and private lands, and to promote resource restoration and conservation through outreach and education. The Department has requested budget allocations for the Fiscal Year (FY) 2018 and 2019 to support the purpose and objectives of LNR 172.

The Department's number one priority for the biennium budget request is the re-authorization of **Act 84, Session Laws of Hawaii (SLH) 2015**, as a formalized general budget allocation in the LNR 172. Act 84, SLH 2015 is the minimum funding needed for the positions and operating expenditures for supporting the State's existing forest land management program, including approximately \$680,000 acres of public Forest Reserve System and 66% of Hawaii's forests in private ownership. Prior to FY2015, LNR 172 was supported by transfer from the Natural Area Reserve Special Fund to the Forest Stewardship Special Fund, which received a portion of the conveyance tax. Act 084, SLH 2015 eliminated the transfers to the Forest Stewardship Special Fund, and provided \$2,832,996 in general funds as a replacement for the conveyance tax revenue in each year of the biennium. This funding, however, expires after fiscal year 2017. Providing these general funds to the base budget for LNR 172 will allow the Department to continue serving the public and avoid elimination of key programs and positions of this core governmental program.

The LNR 172 base budget request provides support for both public and private forest land engaged in developing the State's economic base through establishment and management of

forest resources. Forests provide a full suite of goods and services that are vital to human health and livelihood, including those related to environmental, economic, and social benefits. Our forests are critically important to the State's economy, its people, and its culture. Hawaii's forests provide aesthetic value, recreational enjoyment, specialty non-timber forest products, water conservation, improved air quality, wood and fiber products, and many other amenities. It is important that future directions of the forest industry consider forest management that sustains the health and growth of Hawaii's forests over the long term. Sustainable forest management is a multi-generational undertaking and with a continued dedicated effort, the endeavors of the past will help ensure healthy and productive forests in the future.

Forest's environmental services or benefits include maintenance of water cycles in our watersheds; preventing soil erosion; buffering weather events; mitigating climate change; providing wildlife habitat and diversity; storing a vast amount of genetic information; developing forest products for subsistence use; and providing numerous recreational opportunities.

The economic and social benefits of forest management, include harvesting and processing operations that provide employment opportunities in rural island communities, including jobs for foresters, woodworkers, sawyers, nursery growers, truck drivers, millers, tree planters, researchers, and manufacturers, just to name a few. More than 900 workers were employed in the Hawai'i forest and woodworking industry with a corresponding payroll of \$30.7 million. Hawaii's woodworking industry is one of the best value-added industries in the State, particularly when viewed from the price of raw lumber to finished tables and chairs. Local wood artisans draw from the diverse pallet of locally grown woods including koa, mango, milo, monkeypod, various eucalypts, Sugi pine, and among many others. Hawaii's wood products are sought after and cherished for their uniqueness, beauty, and cultural value.

Specific Department priority economic development projects in LNR 172, include establishment and management of:

- (1) Timber resources for energy production, construction materials, and finished products.
- (2) Agroforestry systems that support diversified agricultural production.
- (3) Non-timber forest products, such as materials for lei making, medicinal treatments from plant material, and game animals for subsistence use.
- (4) Eco-tourism opportunities that highlight Hawaii's unique and beautiful forests, waterfalls, coastal resources, and recreational trails.
- (5) Carbon dioxide sequestration project development that support native forest restoration and mitigates climate change.

Additionally, forests collect and provide water for agricultural producers downstream, and recharge our groundwater for residential uses that supports the economic base for those industries and users.

The Department's LNR 172 – **Forest Restoration for Forestry Resources Management and Development** budget requests are necessary to recover key forest ecosystems, endangered species, and ecosystem functions within the Forest Reserve System such as water replenishment, soil protection, carbon dioxide sequestration using native species, and investment in forest resources. These restoration projects have been identified as high priority in significant

watersheds in the State (projects listed below) and help to meet the State's sustainability goals including natural resources, community self-sufficiency, and economic priorities.

- Koke'e Reforestation – Area subject to a series of wildfires in 2012; project goals include fencing for out-planting of native hardwoods to re-establish the forest and economic values of this forested watershed (the only Timber Management Area on Kaua'i).
- Carbon sequestration project – Establish carbon sequestration projects statewide that are eligible to participate in carbon off-set markets (voluntary or compliance markets as appropriate).
- Kipahulu Forest Restoration – Forest restoration in this priority watershed on Maui, including actions related to out-planting and invasive species control.
- Koa and sandalwood seed orchards – Establish seed orchards of native hardwoods that are ecologically and economically important for Hawaii's forests and landowners. Plantings would provide economically value seeds for public and private restoration projects.
- Kapapala Koa Canoe inventory and restoration – Next step in moving this important project forward, including forest restoration and eventual harvest of koa for cultural and community use as canoes.
- Moloa'a and Na Pali-Kona Forest Reserve endangered species recovery – Protect, manage, and out-plant endangered species known to these areas of Kauai's watersheds
- Kahikinui Forest Reserve - Koa forest restoration (already fenced area) on Maui (leeward Haleakala), including planting and invasive species management. Project also has potential as carbon sequestration project.
- Statewide natural resource inventory and forest monitoring – Necessary forest inventory and monitoring of the public forest reserves for significant natural resources (rare species, climate change impacts, among others).

Thank you for the opportunity to provide this information.



HAWAII'S AEROSPACE INDUSTRY



DEVELOPING A STRATEGIC ROADMAP FOR EXPANSION AND DIVERSIFICATION

REPORT TO THE
GOVERNOR AND THE LEGISLATURE
OF THE
STATE OF HAWAII

Pursuant to
HR 26, 2016 Legislative Session

PREPARED BY

THE OFFICE OF AEROSPACE DEVELOPMENT
DEPT. OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
STATE OF HAWAII

EXECUTIVE SUMMARY

This report has been prepared by DBEDT's Office of Aerospace Development (OAD) to provide an overview of the nature and status of Hawaii's Aerospace Industry, along with recommendations for developing a strategic roadmap to help expand and diversify this industry statewide during FY 2018-22.

For the purpose of this study, "aerospace" is defined as "the branch of technology and industry concerned with both aviation and space flight"¹, and is subdivided into the following major subsectors for analysis: astronomy, civil aviation, commercial space launch, defense systems, robotics, information technology, and unmanned aerial systems.

Hawaii's strategic mid-Pacific/near-equatorial location, Moon/Mars-like terrain, resident expertise covering multiple aerospace-related technologies, and long-standing ties with space-faring nations throughout Asia and the Pacific, clearly afford strategic assets and capabilities that can be leveraged to realize humankind's full potential in space, and in so doing enable our State to engage as both a major contributor to and beneficiary of the global space enterprise.

This study highlights the key assets and capabilities that make aerospace a strategic growth sector for Hawaii's economy, as well as ongoing programs to promote development and diversification of this industry statewide. It then provides an overview of current priorities and projected trends for aerospace in global markets, followed by an analysis of this industry in key subsectors. It then explores creative pathways toward enhancing Hawaii's leadership role in and benefits from the global aerospace economy, focusing on key near-term programs with substantial promise for expansion and diversification.

The study concludes with recommendations for developing a sustainable aerospace roadmap for Hawaii that can enable our State to realize its full potential in this industry. Emphasis is placed on collaboration with Hawaii's Aerospace Advisory Committee to explore opportunities for enhancing aerospace sub-sectors statewide – identifying principal players (commercial and governmental), strategies and key milestones for development, as well as resources (both financial and manpower) essential for sustainable implementation.

¹ Oxford English Dictionary (<https://en.oxforddictionaries.com/definition/aerospace>)

For example, the University of Hawaii is applying its resident expertise in adaptive optics and remote sensing toward the development of advanced sensor technologies for spaced-based observations of our planet. Local companies such as Oceanit, Raytheon Solipsys, NovaSol and Trex Enterprises are also leading national efforts to develop new sensors for atmospheric monitoring, land and coastal resource assessment, and both optical communications and electro-optical tracking.

In addition, major aerospace corporations such as Boeing, Lockheed Martin, Northrop Grumman, Raytheon and BAE Systems, already established in Hawaii, will have opportunities to expand their operations in the islands as a bridge to Asian and Pacific markets – especially in the development and delivery of advanced systems for aviation maintenance and training, air traffic control, satellite communications, and deep space tracking and reconnaissance.

Finally, Hawaii’s unique geography and technological assets are ideally suited to support the commercial launch of next-generation aircraft, including spaceplanes, to carry small satellites, experimental payloads and tourists to space; the monitoring, management and mitigation of both man-made and natural disasters Pacific-wide; and the development of space-based power systems to capture sunlight as a renewable energy source for both interplanetary spacecraft and earth-based applications.

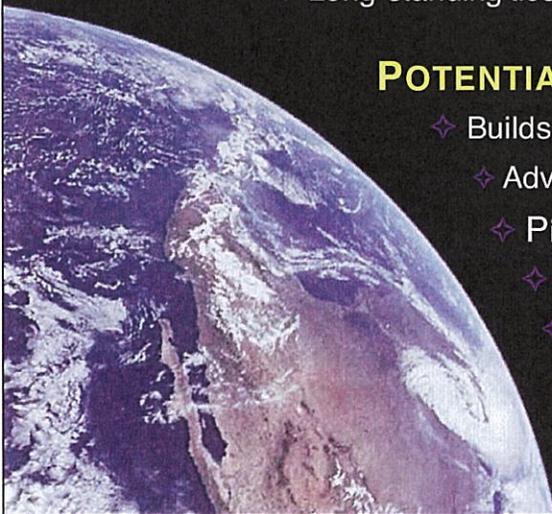
Aerospace in Hawaii

OUR STRATEGIC ADVANTAGES

- ◆ Mid-Pacific location
- ◆ Unique geographical resources
 - ◆ Resident scientific/engineering expertise
 - ◆ Long-standing ties with the Asia-Pacific Community

POTENTIAL AS A “GROWTH INDUSTRY”

- ◆ Builds on existing infrastructure
- ◆ Advances scientific research
- ◆ Pioneers STEM education & training
- ◆ Catalyzes technology innovation
- ◆ Huge returns for modest investments
- ◆ Will not be exported as it matures
- ◆ Will expand Hawaii’s A-P leadership

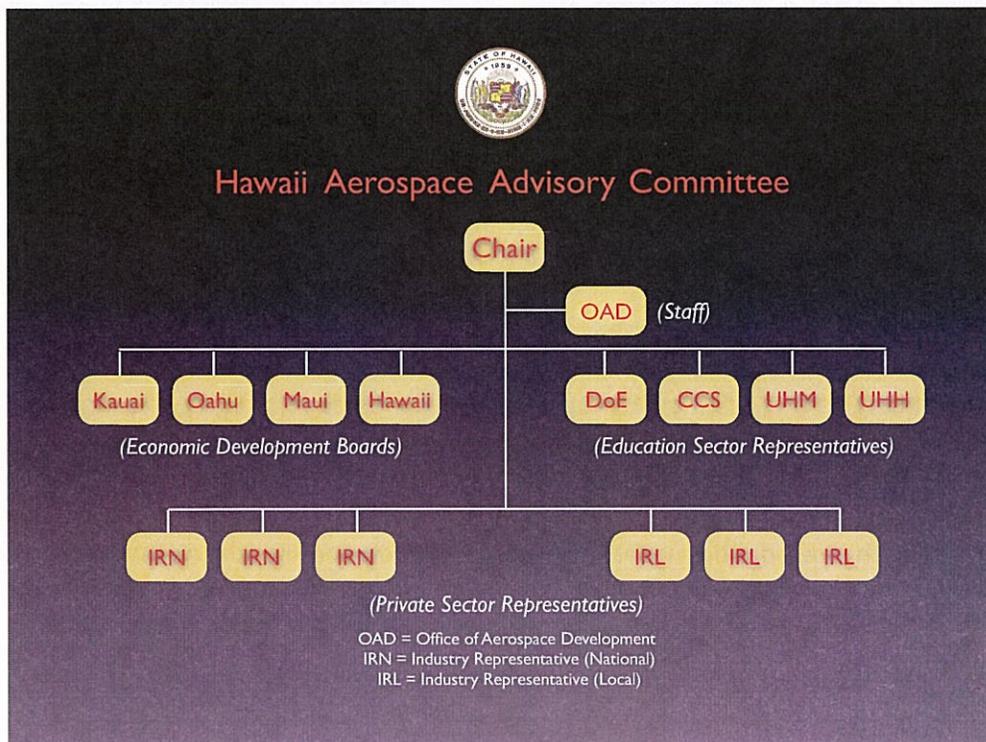


Office of Aerospace Development

PRIMARY GOALS

- ☆ Help expand/diversify aerospace-related enterprise statewide
- ☆ Leverage local assets and capabilities for development
- ☆ Seed public-private and multinational partnerships
- ☆ Promote education and workforce development
- ☆ Monitor trends and recommend State-based policies
- ☆ Serve as an information “clearing house” for this industry

To assist with this effort, the Hawaii State Legislature (through Act 52, Session Laws of 2009) established the Hawaii Aerospace Advisory Committee (HAAC) to advise and assist OAD, the Legislature, and State agencies in monitoring, assessing and promoting aerospace development statewide. The Committee is comprised of leading aerospace industry executives, distinguished academicians from across the state, and economic development board representatives from Oahu, Kauai, Maui and Hawaii – all united with a common purpose to help the State diversify its economy and promote innovative education and employment opportunities for residents statewide.

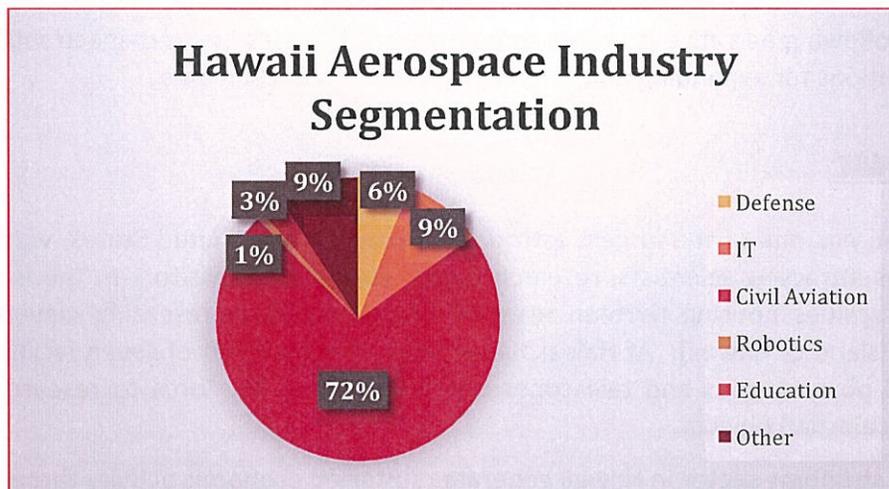


Defense budgets in the US, United Kingdom, France, Japan, several Middle Eastern countries, and other nations are increasing at a time when national security threats are being heightened. Global revenues in the defense subsector are expected to return to growth in 2016, as governments equip their armed forces with modern defense weapons platforms and next-generation technologies, including cyber, intelligence gathering, defense electronics, and precision strike capabilities.

The commercial aerospace subsector is expected to continue its decade-long trend of above-average growth rates, driven by growth in passenger travel demand and an accelerated equipment replacement cycle. Strong increases year over year of global revenue passenger kilometers are leading to an unprecedented level of aircraft production rates, which in 2015 were about twice the levels experienced 10 years ago.

HAWAII'S AEROSPACE SECTOR: REVIEW OF INDUSTRY DEVELOPMENT STATEWIDE

The aerospace sector of Hawaii's economy represented ~5.5% of State GDP, or approximately \$4 Billion in 2014, with a projected growth rate of ~5% through 2017.⁴ The largest segment of Hawaii's aerospace industry (72%) comes from civil aviation, including flights in and out of Hawaii, helicopter tours, and ancillary support services such as refueling and maintenance. Information Technology (IT) also plays a significant role, accounting for 9% of the entire industry, followed by defense-related applications and robotics.



Projected through 2017, these aerospace segments are anticipated to remain fairly intact proportionately, with the highest growth rate occurring in robotics and information technology at 9.5% and 8.8% respectively, and the lowest projected to be defense at 0.6%. This industry is projected to grow at an approximate rate of 5.2% through 2017. The graph below indicates by the year 2017, the size of the aerospace industry within Hawaii is expected to be approximately \$4.5 billion.⁵

⁴ *Hawaii Aerospace Market Study 2013-2017*, Kogod School of Business, American University (Dec. 2014), p. 8.

⁵ *Ibid.*, p. 9.

Including indirect and induced benefits, and adjusting for inter-county feedback and spillover effects, the astronomy sector had a total impact of \$167.86 million statewide. The largest impact was found to be in Hawaii County (\$91.48 million), followed by Honolulu County (\$68.43 million), with relatively small impacts in Maui County (\$5.34 million) and Kauai County (\$2.61 million). In addition, astronomy activities generated \$52.26 million in earnings, 8.15 million in state taxes and 1,394 jobs statewide.⁸

Technical and administrative staff comprise most of an observatory's workforce. Technicians are mainly mechanical, electrical, and optical engineers. Per a Hawaii Island astronomy workforce survey undertaken in 2010 by the Hawaii County Workforce Investment Board (in collaboration with the Mauna Kea observatories), projections indicate that some 482 observatory jobs will open from 2010 through 2023. That averages more than 34 jobs a year over 14 years. Of these new jobs, over 330 openings in technology and nearly 150 openings in administration are anticipated. Most of these jobs will require a two-year associates degree or a four-year bachelor's degree. Other observatory staff include scientists (primarily researchers with doctoral degrees) and scientific support staff, such as telescope operators.

Looking to the future, astronomy in Hawaii can be a trailblazer for space exploration, charting unknown regions of the universe and searching for potentially habitable planets around nearby stars, as well as signs of life elsewhere in the universe. But this field also has more tangible cross sections with space exploration. For example, astronomical research in Hawaii has continually discovered new solar system bodies with potential impacts for our home planet, such as near-earth asteroids that could be used for mining (or that could potentially strike our planet and therefore require deflection).⁹

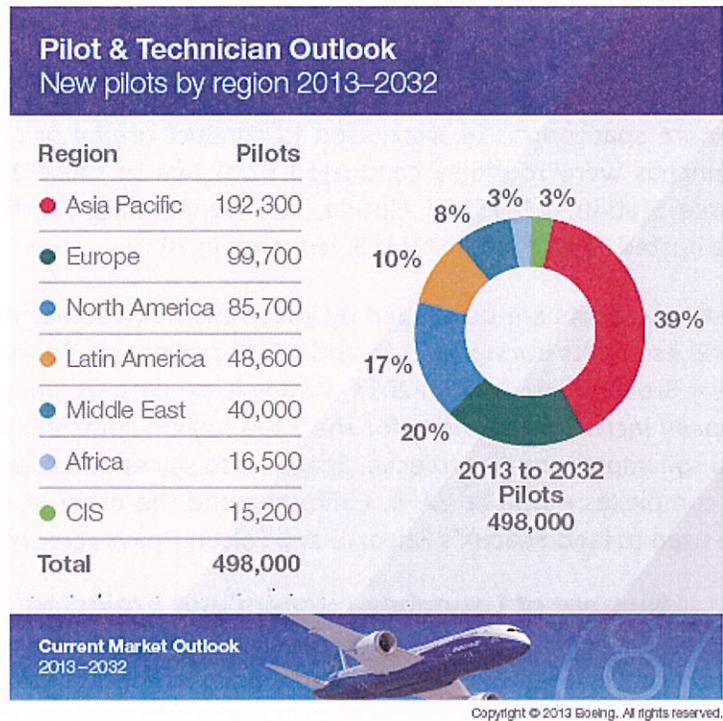
Both the Mauna Kea and Haleakala Observatories are studying the distribution and growth of "space debris" (a growing concern for launching payloads into both near-earth and geostationary orbits), and data from this research can be used by NASA and other space agencies in determining appropriate launch trajectories.

Technology development in conjunction with astronomical instrumentation will also provide opportunities for economic growth and diversification. The Institute for Astronomy at Hilo has a long history of developing and characterizing the largest near-infrared detectors, and those employed in NASA's James Webb Space Telescope were characterized and developed in Hawaii in collaboration with Teledyne Technologies.

The substantial astronomical infrastructure atop Hawaii's volcanoes places our State in a unique position to lead international studies in a variety of fields. However, as Günther Hasinger of the Institute for Astronomy has noted, "we are not data-limited – we are brain limited." As such, appropriation of funds to hire researchers at the graduate student, postdoctoral; or junior faculty level would make a substantial contribution toward enabling Hawaii to achieve its full potential in astronomical research and technology development.

⁸ See <http://uhero.hawaii.edu/products/view/472>.

⁹ The world's most powerful "Near Earth Object" (NEO) hunter telescope (Pan-STARRS1 on Haleakala) recently discovered a "quasi-moon" (asteroid) orbiting Earth that could well become a priority target for future space enterprise, including both mining and technology R&D.



Data summarizing current and projected demand for aviation-related services in Hawaii from 2013-2021 is presented in the closing Appendix. Combining scheduled passenger and freight air transportation, our State’s aviation sub-sector includes 8,164 jobs, with a projected growth rate of 8.1%.

Hawaii provides an airport system that connects Hawaii with the world and reflects our unique spirit of Aloha. Maintaining and improving the capabilities of the airports system to meet future demands of air commerce by modernizing and expanding facilities and infrastructure are well underway. Hawaii’s unique location makes it especially attractive as a focus for all aspects of aeronautics for the pacific basin, including an unrealized potential for regional aviation maintenance and repair, as well as flight training. This substantial potential can be realized by promoting and facilitating widespread aeronautical industry participation in Hawaii to meet current and projected demands and opportunities.

COMMERCIAL SPACE LAUNCH

Nineteen countries have, are developing, or are planning to host, spaceports. The term “spaceport” encompasses a wide variety of facilities. Some spaceports are used to launch multiple-staged rockets into Earth orbit or further into space, carrying probes, cargo, and/or astronauts. Others might be used for launching jet-like spacecraft from runways for a short suborbital hop to another location on the Earth’s surface, much like regular aircraft. Still other spaceports are simply economical places to conduct short experiments with small rockets. All the activities from each of these differing use cases of spaceports rely on healthy and growing space support infrastructure across the globe. And all spaceports share a common purpose to provide facilities to lift an object into space, even if only for periods of time.

In 2015, OAD conducted a site selection study that identified Kona International Airport (KOA) as the best site in Hawaii to establish a commercial spaceport that will support launch and landing of "spaceplanes" (horizontal launch and land vehicles) carrying satellites, experimental payloads, and tourists to space. An Environmental Assessment (supported through a matching grant from the Federal Aviation Administration) is now being completed that will enable our State to apply for a commercial spaceport license and initiate space launch operations from KOA by 2018. Several companies have also indicated interest in operating out of the Kona spaceport, and have initiated non-disclosure agreements with DBEDT to pursue their ongoing interest in space launch options from Hawaii.

Commercial interest has also been expressed in vertical launches from East Hawaii to support the rapidly growing small satellite market. The Alaska Aerospace Corporation has agreed to manage a Hawaii facility dedicated to orbital launch by training Hawaii citizens to conduct launch operations, providing \$250K as matching funds to conduct an environmental assessment for the proposed operations. Both X-Bow Launch Systems and Rocket Lab USA are writing letters of commitment to use the proposed East Hawaii launch site, with the goal of building a Hawaii workforce dedicated to smallsat operations and vehicle production/assembly.

Small Satellite Market

We are on the cusp of a major revolution for the space, as more than 3,600 smallsats are expected to be launched over the next ten years – a significant increase from the previous decade.¹⁶ The total market value of these satellites is anticipated to be more than \$22 billion (manufacture and launch), a 76% increase over that of 2006-2015. This rate of growth is unprecedented for the space sector, and will bring about fundamental changes as both new and established industry players attempt to increase their capabilities to gain market share.

Including all third-party and in-house manufacturers, around 200 organizations built a smallsat between 2006 and 2015, and the coming decade predicts a similar pattern. Smallsat suppliers are entering the industry to capitalize on demand with flexible COTS equipment, reducing costs and development times. Larger integrators focusing on larger missions do not necessarily have the capacity to create these smaller, nominally lower-cost solutions at a profit, or have the platforms available to support small mission development.

In the next decade, launch services are expected to generate \$5.3 billion, a 76% increase over the previous decade. Small-lift vehicles under development will add further specialized supply. Prices from Firefly, Rocket Lab and Virgin Galactic are not expected to undercut existing supply prices. However, with smallsat operators impacted by the launch bottleneck and affected by delays in ridesharing (despite higher prices per kilogram), the benefits of faster, dedicated access to space could become quite attractive to operators.

SmallSat Missions from Hawaii

Hawaii attempted its first rail launch of a University of Hawaii satellite (HawaiiSat-1) on a new three-stage solid rocket into polar orbit from the Pacific Missile Range on Kauai in October,

¹⁶ Euroconsult, *Prospects for the Small Satellite Market* (July 2016).

2. The development of pre-staged, modular spacecraft ready to launch rapidly/on demand (72 – 96 hour turnaround from initial flight decision).
3. Private or Federal agencies interested in the development of redundancy, within a constellation of small satellites.
4. Flight-testing of instruments/software for the private sector, DoD, or NASA for the low-cost on-orbit testing of innovative technologies.

Skill sets that need to be developed within the Hawaii community include:

1. Mission design/proposal preparation – scientists with numerous skill sets, including solar astronomy, oceanography, Earth science, and communications.
2. Small satellite design – optical, electrical and mechanical engineers.
3. Integration and test of satellites – electrical and mechanical engineers.
4. Mission planners and mission operators, including the expansion of tracking and data down-link capabilities.

Potential next steps to help grow the small satellite market opportunities in Hawaii include:

1. Develop routine (~twice per year) launch opportunities from PMRF and/or other site(s) within the State.
2. Transfer knowledge and personnel to the private sector via the development of small high-tech companies that build, operate, and control specific satellites.
3. Provision to the private sector of greater access to existing integration and test facilities in Hawaii, so that many of the support functions are conducted in-State.
4. Develop U.H. academic programs on aerospace technology, including electrical mechanical engineering and applications-focused instrument/mission design.

DEFENSE SYSTEMS

For the purposes of this report, we will adopt the definition of the Defense sub-sector of the aerospace industry as presented in Hawaii's Aerospace Market Study (2013-2017) by Kogod Business School at American University: "Defense within aerospace consists of missile systems, aircraft, drones, and all the repairs and technology that support these systems, including the design of aerospace and defense plans."

According to that study (and the Deloitte financial and economic impact analysis referenced therein)¹⁹, there are 2,580 employees in the aerospace defense segment in Hawaii who generate approximately \$590M of revenue annually. While the study notes that missile systems are one of the significant contributors to the Hawaii aerospace defense market, there are no further details on what the other impactful contributors are, or whether they are more service-based or manufacturing-based. Also not referenced in this study is the software and sensor work currently being conducted by both private industry and the University of Hawaii.

¹⁹ See: <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Manufacturing/gx-manufacturing-2016-global-ad-sector-outlook.pdf>

Examples include:

- Payload flight certification with the FAA (IA, DER, DAR).
- Warehousing and security.
- Depots for training, operations, servicing, and repair (cranes, hoists, fuel storage, battery charging, test equipment, and hazardous waste management).

Even mainland companies might elect to conduct testing activities in Hawaii if this support infrastructure were cost-competitive and provided added visibility with the nearby PACOM and Component Commands. A tertiary revenue source would be the money that these contractors would spend during their stay in Hawaii.

Potential next steps to support Hawaii's aerospace defense sub-sector in Hawaii:

1. Determine quantitatively what we're currently doing in this sub-sector (who's doing what, and how much this contributes to Hawaii's \$590M aerospace defense total).
2. Establish contacts with the major players in this sub-sector to develop a better understanding of their current challenges and future vision/goals.
3. Determine what we can be done at the State level to promote optimal opportunities for growth in this sub-sector.
4. Work with military test ranges (e.g., the Pacific Missile Range Facility, the Pohakuloa Training Area, Marine Corps Training Area Bellows, Makua Military Reservation, Marine Corps Base Hawaii, Hickam Air Force Base) to both market what they do and determine what they could do to support Hawaii's aerospace defense community.

ROBOTICS

The branch of technology that deals with the design, construction, operation, and application of robots or automated machines, robotics has impacted industries from auto manufacturing and semi-conductors to life sciences and consumer goods. The robotics industry in North America is rapidly expanding, primarily fueled by strong demands from manufacturing companies in all sectors. A record 14,135 robots (valued at \$788 million) were ordered from North American robotics companies in the first half of 2014. This marks an industry record for sales in the first half of a year.

The robotics industry has grown annually at a steady 26% rate nationally since 2010. The automotive industry has had the broadest application of robotics to revolutionize auto manufacturing, but other industries such as semiconductors, life sciences, food and consumer goods are also being transformed through robotic operations. It is now estimated that 230,000 robots are being utilized within the United States, placing the U.S. second only to Japan in applications of robotic technologies.²¹

²¹ *North American Robotics Market Posts its Best Quarter Ever, Sets New Record for First Half of 2014:*
http://www.robotics.org/content-detail.cfm/Industrial-Robotics-News/North-American-Robotics-Market-Posts-its-Best-Quarter-Ever-Sets-New-Record-for-First-Half-of-2014/content_id/4934



The average IT company revenue growth rate within the United States is 8.8%. This includes breaking down Information Technology into various growth segments, such as communications equipment, computer hardware, computer networks, software and programming, etc. Based on this estimated rate, the above graphic indicates that by the year 2017, companies operating in Hawaii that specialize in Information Technology services that relate to Aerospace will have annual revenues in excess of \$447 Million.²⁴ Additionally, in 2013 there were approximately 1,924 employees within these IT companies. Exhibit 20 also displays projections regarding the number of employees working in IT companies that relate to Aerospace through the year 2017.

UNMANNED AERIAL SYSTEMS

In March 2012, the Federal Aviation Administration announced that it was planning to establish six national ranges to serve as test and certification sites for Unmanned Aerial Systems (UAS). Hawaii, in partnership with the States of Alaska and Oregon, submitted an application to serve in this capacity, and the tri-state team was selected by the FAA (in December, 2013) as one of these sites.

Although Alaska and Oregon appropriated state funding to initiate their UAS test range operations (in the spring of 2014), legislation was not approved in Hawaii to support this program. However, a bill subsequently introduced during the 2015 session did appropriate funds to hire a chief operating officer to manage this program for the State. Although this funding was allocated to the Office of Aerospace Development within DBEDT, a memorandum of agreement with the University of Hawaii's Applied Research Laboratory (UH-ARL) was established that transferred funding (and operation) of this program to the University.

A major question now facing the State is how best to leverage UAS technologies and capabilities to enable substantial economic returns. Outside of government sponsored research and development, today there is very little economic impact from the handful of hobbyists and researchers currently operating UAS in Hawaii. This will likely remain the case until UAS are integrated with the national airspace.

²³ *Kogod Report* (ibid.), p. 32.

²⁴ Technology Sector Growth. (n.d.). Retrieved from CSI Market website: http://csimarket.com/Industry/Industry_Growth.php?s=1000

The robust STEM and robotics programs in our local schools (both public and private) are preparing Hawaii's future workforce for this emerging technology. The State can best promote growth in this sector by:

1. Funding the establishment of PPUTRC testing in Hawaii.
2. Encouraging the use of UAS into resource management, law enforcement, and disaster response with the state to reap economic benefits through efficiencies.
3. Advocating for the study of related technologies as part of the curricula at the University of Hawaii.
4. Encouraging local investment in research and development of UAS technologies (platforms, sensors, links, artificial intelligence, and control).
5. Integrating UAS into local STEM and robotics programs.

We need to give thought to how the Hawaii FAA Test Site can support the research with meaningful test and evaluation. We know we have all the natural resources here (weather, diverse topography, airspace), but what about other resources such as range instrumentation and a secure network/data repository, and how can Hawaii assemble this on a limited or nonexistent budget? Part of the answer will be to leverage existing infrastructure operated by state and federal agencies, including the national guard, the armed services (particularly the Navy through the UARC), and our local FAA contingent. Partnering with broad industry contacts (not just traditional aerospace companies) will be critical in building a sustainable program.

Future of UAS in Hawaii

The targets we must aim for should address "levels of benefit" to the State of Hawaii. Several measures to ascertain progress might include:

1. Durable business development, both in the Supply and User side of our business community, embracing public safety and environmental quality control, but also extended to entertainment, tourism, and creative media sectors.
2. Positive socialization of UAS into Hawaii's daily infrastructure operations through community involvement and support.
3. Active workforce development thru K-12 STEM education.
4. Clear recognition and support from both the Legislative and Administration.

Standards and best practices for UAS use are emerging in the FAA, the Dept. of Human Services, and the Pan Pacific UAS Test Range Complex (PPUTRC). Incorporating these (modified for Hawaii's uniqueness) into a Drone Standard Operating Procedure (SOP) will be an important task that has already been requested by our State Senate.

From time to time these requirements will change, as the circumstances for the Ranges change. In fact currently FAA has asked the Test Ranges to help determine the path for the Ranges for next 5 years, now that Federal Aviation Regulation (FAR) 107 has been made law. This FAA initiative could introduce new project and range management, preparation, and security requirements, especially as the Ranges take on more challenging use cases and new technology for UAS.

★ FOOTSTEPS TO THE FUTURE ★

KEY NEAR-TERM PROGRAMS FOR EXPANSION AND DIVERSIFICATION

Several programs supported by DBEDT's Office of Aerospace Development are currently underway, with the potential of significantly impacting our State economy. These programs are summarized below, followed by recommendations for developing a sustainable aerospace roadmap for Hawaii.

Kona International Air and Space Port

As the commercial space market continues to develop and mature, the State of Hawaii (by virtue of its near-equatorial, mid-Pacific location) is uniquely positioned to be an active participant in this industry. In March of 2013, DBEDT executed a contract with RS&H, Inc. to complete a technical analysis of potential spaceport infrastructure, a spaceport site selection study, and a National Environmental Policy Act (NEPA) environmental assessment report, or EA (including flight corridor development, risk analysis, and site plans to mitigate safety hazards related to launch operations - e.g., propellant storage and handling), development of launch site operation procedures, and other studies required for an application to the Federal Aviation Administration, Office of Commercial Space Transportation (FAA-AST), for a commercial Launch Site Operator's License (spaceport license) for the State of Hawaii.

This license will enable "spaceplanes" (horizontal launch and land vehicles) to operate out of Kona International Airport (KOA) at Keahole, carrying both people and experimental payloads/satellites to space, and bringing "space tourism" to our islands. Several aerospace companies have signed "non-disclosure" agreements with DBEDT to explore options for both satellite launch and space tourism operations out of Hawaii. Long-range plans include "point-to-point" flights carrying both people and cargo from Hawaii to Asia and Europe, as well as to space vehicles stationed in low-Earth and geosynchronous orbits. It is anticipated the EA will be completed in 2017, after which the State will officially apply for its commercial spaceport license from the FAA. Spaceplane companies will also have to obtain individual licenses to operate their spacecraft out of KOA.



Several measures associated with outcomes would apply here. For example:

1. Durable business opportunities (in both the Supply and User sides of our economic community) spanning the complete range of potential UAS service – i.e., public safety, environmental management, infrastructure development, commercial and military applications, STEM education, sports and entertainment, tourism, creative media, and agriculture.
2. Positive socialization of UAS into Hawaii's daily infrastructure operations through community involvement and support, including K-12 Education and community participation.
3. Workforce development through STEM education and training (as measured through both public and private school UAS programs).
4. Clear recognition and support at both Legislative and Administration levels, measured by both Legislative business investments and CODEL support of positive UAS Congressional efforts (including partnerships with other CODEL).

Hawaii-based UAS would fit into two separate business categories:

1. Broad efforts involving producers, users, consumers, educators, researchers, regulators, and lawmakers.
2. Narrower efforts defined through the Pan Pacific UAS Test Range Complex (PPUTRC), specifically addressing testing and evaluation under the Public Aircraft Operations federal doctrine.

Although Hawaii's UAS program will be managed under UH-ARL, it will be implemented within the terms and SOP of the University of Alaska's FAA OTA Test Range contract (which recently has added the State of Mississippi to the team). As such, a three-part strategy will need to be developed that applies to Hawaii's commercial and industrial certified UAS business in general; to educational and workforce development efforts; and to uncertified T&E under the PPUTRC structure. The last part was addressed through Act 208 (2015 Session). However, this element must rest upon a foundation of public acceptance and enable measurable benefits to Hawaii (looping back to the other two elements of the strategy).

The PPUTRC overall strategy will be established by action of the PPUTRC Board of Advisors starting in January 2017. This strategy will include business practices allowable under the University of Alaska FAA Contract, SOP for the four states comprising the PPUTRC, and work placement process, reporting, outreach, and advocacy.

In developing Hawaii's component of the PPUTRC, it will be important to focus on those elements of testing which would be of value to future business in Hawaii (coffee agriculture, for example), as well as to our educational system. Equally critical will be UAS manufacturers who find it expedient to run tests in Hawaii, landowners who look forward to participating in land use for UAS testing, and legislative action that removes barriers to success for Hawaii.

Technologies developed in PISCES and elsewhere will be tested, matured and integrated as appropriate into the operating outpost, in collaboration with governmental space agencies, as well as partnering universities and industry.

The PISCES 'business operating plan was designed to follow the model of an industry-university-government partnership center, which is predicated on leadership by faculty members of the host institution and partnering universities, coupled with involvement of companies from the United States, Japan, and other spacefaring nations, particularly those around the Pacific Rim, and assisted by a business development office. Major sources of potential non-State operational funding include the National Aeronautics and Space Agency (NASA), the Japan Advanced Exploration Agency (JAXA), and other space agencies, particularly those along the Pacific Rim of nations, augmented by investments from private industry based in participating countries. Primary customers of PISCES include the State of Hawai'i, its citizens and the residents of Hilo and the Big Island; the research and technology development program managers in NASA and other space agencies; researchers and program managers in the space-related industry; and the taxpayers of the U.S. and other spacefaring nations.

PISCES priorities during FY18-22 as envisioned by the PISCES staff and approved by the PISCES Board of Directors will focus on:

- Raising supplemental funds through various grant opportunities to support the PISCES Intern Program and R&D activities.
- Helping develop a basalt-based industry in Hawaii that can include (but not be limited to): basalt rebar manufacturing, basalt fiber manufacturing, basalt fiber products, and high performance/ultra-high performance concrete.
- Continuing to promote and participate in planetary robotic program development and analog site testing with various collaborators (public and private) to include but not be limited to NASA and aerospace-related agencies/institutions located in Canada, Korea, and Japan.
- Continuing to support, as appropriate, NASA's Laser Communications Ground Station Initiative.
- Participating in the initial planning stages, and as a potential partner involved with operations, of the proposed Multipurpose Processing Facility and Small Satellite Launch Initiative on the Big Island.
- Continuing to develop close collaboration with state-based academic institutions at the University of Hawaii at Hilo, Honolulu Community College, U.H. Manoa (including the Hawaii Space Flight Laboratory), and other programs as appropriate.
- Collaborating with the HI-SEAS (Hawaii Space Exploration Analog and Simulation) Program in the upgrade and fidelity improvement of their Mars Habitat.
- Supporting the development and implementation of the Lunar Base Vision established by Henk Rogers, PISCES Board Chairman.²⁷

²⁷ PISCES programs and activities may be found online at: <http://www.pacificspacecenter.com>

The concept of a Moon base has also been under discussion with a multinational team, formed during OAD's Next Giant Leap conference on the Big Island in November, 2014, that is now working to launch an International Lunar Decade, supported by various space agencies worldwide, that will provide a framework within to coordinate future lunar missions.

In addition, a Multinational Lunar Outpost scenario has been developed through the national Aerospace States Association, and a second "Giant Leap Conference", tentatively scheduled on the Big Island in October, 2017, will engage key players from NASA, the European Space Agency (ESA), the Japan Aerospace Development Agency (JAXA), other international space organizations, aerospace corporations, development agencies and universities worldwide in developing strategic options for a lunar return.

DEVELOPING A SUSTAINABLE AEROSPACE ROADMAP FOR HAWAII (FY18-22)

To pioneer a successful and sustainable pathway toward Hawaii's future in aerospace, several key factors need to be addressed which, collectively, will help secure the most beneficial and widespread returns on investment – a key factor which both legislators and administration officials agree should be the "bottom line" driving economic development.

1. Gaining community consensus on both Hawaii's aerospace vision and strategic goals for development.

As outlined at the beginning of this report, Hawaii's strategic mid-Pacific location, Moon/Mars-like terrain, and international connectivity with space-faring nations throughout the Asia-Pacific region well position our State to play a leadership role in a variety of aerospace-related initiatives. The key to successfully leveraging these strategic advantages will be to coordinate and pool resources among leading R&D and business development institutions and organizations statewide (e.g., county offices, economic development boards, statewide educational programs, industry associations) to present a united and welcoming front to potential investors who may wish to partner with Hawaii in programs of mutual interest.

As such, our State should work toward developing a baseline vision and set of related goals for development that can be broadcast to the global aerospace community, which in turn could help catalyze public-private partnerships to enable the sharing of complementary resources and capabilities to help reduce the costs, enhance the benefits, and (hopefully) accelerate timetables for future aerospace enterprise. Hawaii's Aerospace Advisory Committee (HAAC) and the multiple institutions and organizations represented therein could (and should) play a leadership role in this effort in coordination with DBEDT's Aerospace Office.

2. Defining primary capabilities and strategies required to succeed.

In concert with the recommendations cited above, the HAAC (considering the broad aerospace community representation on this Committee) should form a working group to identify an optimal path forward, with specific reference to key assets and procedures that could be applied/followed to expand/diversify priority components of Hawaii's aerospace sector as well as to attract external investments in Hawaii-based

APPENDIX

Aviation Sector Analysis

8,164
Jobs (2014)
299% above National average

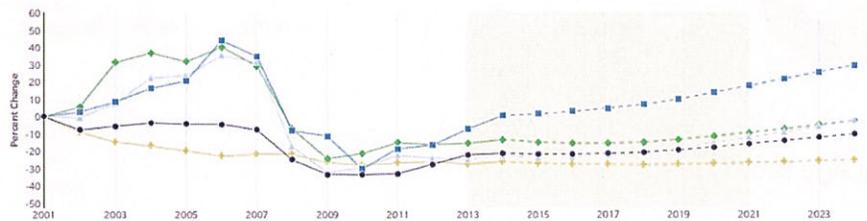
+8.1%
% Change (2013-2021)
Nation: +0.9%

\$78,015
Avg. Earnings Per Job (2014)
Nation: \$93,216

Industry Detail

Establishments (2014)	56
Jobs Multiplier	Only Available for 6-Digit
Unemployed (11/2014)	Only Available for 2-Digit

Regional Trends



Region	2013 Jobs	2021 Jobs	% Change
● Region	8,081	8,733	8.1%
■ Hilo, HI	451	573	26.9%
▲ Kahului-Wailuku-Lahaina, HI	545	633	16.3%
◆ Kapaa, HI	217	233	7.4%
+ United States	419,136	422,826	0.9%

Top Regional Businesses

Business Name	Industry	Local Employees
Hawaiian Airlines, Inc.	Scheduled Passenger Air Transportation (481111)	451
Aloha Air Cargo	Scheduled Freight Air Transportation (481112)	309
Island Air	Scheduled Passenger Air Transportation (481111)	157
Courier Corporation Of Hawaii	Scheduled Freight Air Transportation (481112)	130
Japan Airlines Co. Ltd.	Scheduled Passenger Air Transportation (481111)	100

Source: Equifax Business-Level Data
DISCLAIMER: Business Data by Equifax is third-party data provided by EMSI to its customers as a convenience, and EMSI does not endorse or warrant its accuracy or consistency with other published EMSI data.