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## A BILL FOR AN ACT

RELATING TO THE PACIFIC INTERNATIONAL SPACE CENTER FOR  
EXPLORATION SYSTEMS' PLANETARY SUSTAINABILITY TECHNOLOGIES  
INITIATIVE.

**BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:**

1           SECTION 1. The legislature finds that the Pacific  
2 international space center for exploration systems stimulates  
3 economic growth for the State, promoting the establishment and  
4 growth of new sustainable and green industries, associated jobs,  
5 workforce development, internships, and science, technology,  
6 engineering, and mathematics education programs. The Pacific  
7 international space center for exploration systems focuses on  
8 the validation and verification of planetary surface systems and  
9 technologies and works to apply these systems and technologies  
10 within the State to support economic growth and diversification.  
11 The Pacific international space center for exploration systems  
12 is an important part of the State's emerging aerospace sector.

13           The legislature further finds that the National Aeronautics  
14 and Space Administration is working to improve technologies for  
15 sustaining human exploration for increasingly greater distances  
16 and durations beyond Earth. The State can use these  
17 technologies to improve economic development opportunities and



1 develop resident expertise in self-sufficient technologies that  
2 will advance the frontiers of space exploration and the future  
3 well-being of the State, including but not limited to,  
4 applications in renewable energy, advanced water reclamation,  
5 and basaltic construction. By engaging in applied research and  
6 development to demonstrate and evaluate self-sufficient  
7 technologies, the State will not only leverage its unique  
8 geographical resources to significantly advance the frontiers of  
9 space, but also enable local developers to evaluate how these  
10 technologies could be adapted to promote near-term terrestrial  
11 applications statewide.

12 The legislature additionally finds that the Pacific  
13 international space center for exploration systems is currently  
14 researching and field testing the use of basalt material for  
15 construction, as an alternative to traditional concrete  
16 currently imported into the State from the mainland. The  
17 Pacific international space center for exploration systems is  
18 leading this research in collaboration with the National  
19 Aeronautics and Space Administration Ames Research Center,  
20 Stanford University, National Aeronautics and Space  
21 Administration Kennedy Space Center, and the University of  
22 Hawaii at Manoa. Living and operating on the moon or on another



1 planet, such as Mars, will require stabilizing the planetary  
2 surface to construct landing pads, berms, shelters, and other  
3 facilities. The State's volcanic basalt material simulating  
4 that of the moon and Mars provides an ideal location to test and  
5 validate planetary construction techniques using basalt  
6 materials. This research will not only advance future planetary  
7 exploration, but also enable the State to reduce its dependence  
8 on imported concrete in moving toward a more sustainable  
9 environment.

10 The Pacific international space center for exploration  
11 systems has initiated research and development to infuse more  
12 advanced manufacturing within the State, beginning with  
13 applications of three-dimensional laser printing technology.  
14 The Pacific international space center for exploration systems  
15 is now the lead researcher in the use of three-dimensional laser  
16 printers to sinter basalt "fines", which are small particles of  
17 basaltic powder produced by rock crushers in quarries.  
18 Application of this technology is instrumental in constructing  
19 small objects on planetary surfaces using indigenous materials.  
20 It also enables the development of construction materials from  
21 the State's stock of basalt fines, creating advanced  
22 manufacturing opportunities within the State. The Pacific



1 international space center for exploration systems is  
2 collaborating with leading advanced manufacturing organizations  
3 such as Jenoptics, Honeybee Robotics, and Made In Space to  
4 advance this research with applications across the State.

5 The legislature also finds that the Pacific international  
6 space center for exploration systems is partnering with  
7 Planetary Power, Inc., to assess high technologies in the area  
8 of renewable energy generation. Planetary Power, Inc., has made  
9 recent advances in solar concentrator energy systems that  
10 provide high efficiency, off-grid power. The Pacific  
11 international space center for exploration systems requires such  
12 power systems to support remote field tests at various lunar and  
13 Mars analog test sites on the island of Hawaii. These systems  
14 also could provide off-grid power for emergency response  
15 services during natural and man-made disasters. In addition,  
16 the Pacific international space center for exploration systems  
17 and several renewable power technology companies are  
18 investigating the use of methane-based energy systems, as  
19 methane can be produced in the State from bio-digesters  
20 currently under development at the University of Hawaii-Hilo.  
21 The Pacific international space center for exploration systems  
22 is also working with these renewable energy companies to assess



1 marketing opportunities and identify candidates for early  
2 adopters of these technologies throughout the State, including  
3 options to locate Planetary Power, Inc., manufacturing and  
4 production jobs in the State for the company's power systems.

5 Furthermore, California legislators are interested in  
6 collaborating with the State to develop and promote self-  
7 sufficient technologies, with the goal of leveraging both  
8 National Aeronautics and Space Administration and private sector  
9 assets and expertise in "real-world" field operations to promote  
10 "living off the land" scenarios that will rapidly advance  
11 planetary exploration, as well as multiple terrestrial  
12 applications of sustainable technologies.

13 Matching funds, appropriated through companion legislation  
14 in California, will be used to help meet California's goals of  
15 energy efficiency, renewable energy development, water use  
16 efficiency, waste management, and sustainable construction by  
17 increasing and accelerating sustainable measures and strategies.  
18 California technology companies and the National Aeronautics and  
19 Space Administration will have the opportunity to test  
20 innovative technology solutions in Hawaii, providing new market  
21 and manufacturing areas for these groups throughout the State.



1           As such, Hawaii and California will partner to conduct  
2 joint research in planetary sustainability through planetary  
3 sustainability technology demonstrations and university  
4 competitions. University-based competitions will be based on  
5 proposals within fourteen technology areas identified by  
6 California's planetary sustainability showcase. Each  
7 competition must include at least one team from California and  
8 one from Hawaii, with each team demonstration linked to  
9 technologies that support both terrestrial as well as planetary  
10 surface applications. The goal of this project is to enable  
11 California and Hawaii to fund compelling technology  
12 demonstrations relative to planetary sustainability.  
13 Technologies will be chosen that have dual-use applications in  
14 at least one of three areas:

- 15           (1) Basaltic construction/fabrication, including three-
- 16                       dimensional printing;
- 17           (2) Off-grid, renewable energy; and
- 18           (3) Water reclamation.

19 Technologies selected from California will be tested in Hawaii,  
20 with the goal of growing these technologies and providing  
21 opportunities to expand their application in Asia-Pacific  
22 markets.



1           The purpose of this Act is to provide state funding for the  
2 Pacific international space center for exploration systems'  
3 planetary sustainability technologies initiative in partnership  
4 with California. As the National Aeronautics and Space  
5 Administration develops better technologies for sustaining human  
6 exploration for greater distances and durations beyond Earth,  
7 the State can use these technologies to diversify economic  
8 development options and develop resident expertise in self-  
9 sufficient technologies that will promote both space exploration  
10 and the future well-being of the State.

11           SECTION 2. There is appropriated out of the general  
12 revenues of the State of Hawaii the sum of \$           or so much  
13 thereof as may be necessary for fiscal year 2014-2015 for the  
14 purpose of supporting Pacific international space center for  
15 exploration systems' planetary sustainability technologies  
16 initiative with the State of California; provided that:

17           (1) No funds shall be made available under this Act unless  
18           the State of California, through companion  
19           legislation, provides a dollar-for-dollar match of  
20           funds for the purposes for which this sum is  
21           appropriated;



1           (2) Up to \$200,000 of the appropriated amount shall be  
2           targeted for planetary sustainability technology  
3           demonstrations; and

4           (3) Up to \$50,000 of the appropriated amount shall be used  
5           for university-based competitions.

6           The sum appropriated shall be expended by the Pacific  
7           international space center for exploration systems for the  
8           purposes of this Act.

9           SECTION 3. This Act shall take effect on January 20, 2050.





**Report Title:**

Pacific International Space Center for Exploration Systems'  
Planetary Sustainability Technologies initiative; Appropriation

**Description:**

Appropriates funds to support planetary sustainability  
technology demonstrations and university-based competitions.  
Effective January 20, 2050. (HB2150 HD1)

*The summary description of legislation appearing on this page is for informational purposes only and is not legislation or evidence of legislative intent.*

