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

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



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

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



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

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



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

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



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

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

14 Matching funds, appropriated through companion legislation
15 in California, will be used to help meet California's goals of
16 energy efficiency, renewable energy development, water use
17 efficiency, waste management, and sustainable construction by
18 increasing and accelerating sustainable measures and strategies.
19 California technology companies and the National Aeronautics and
20 Space Administration will have the opportunity to test
21 innovative technology solutions in Hawaii, providing new market
22 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 developing 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 and the National Aeronautics and Space
5 Administration Ames Research Center. As the National
6 Aeronautics and Space Administration develops better
7 technologies for sustaining human exploration for greater
8 distances and durations beyond Earth, the State can use these
9 technologies to diversify economic development options and
10 develop resident expertise in self-sufficient technologies that
11 will promote both space exploration and the future well-being of
12 the State.

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

- 19 (1) No funds shall be made available under this Act unless
20 the State of California, through companion
21 legislation, provides a dollar-for-dollar match of



1 funds for the purposes for which this sum is
2 appropriated;

3 (2) Up to \$ of the appropriated amount shall be
4 targeted for planetary sustainability technology
5 demonstrations; and

6 (3) Up to \$ of the appropriated amount shall be
7 used for university-based competitions.

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

11 SECTION 3. This Act shall take effect on July 1, 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 7/1/2050. (SD1)

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