# Space Solar Power Initiative Established by Northrop Grumman and Caltech

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PASADENA, Calif., April 20, 2015 /PRNewswire/ -- Northrop Grumman Corporation (NYSE: NOC) has signed a sponsored research agreement with the California Institute of Technology (Caltech) for the development of the Space Solar Power Initiative (SSPI). Under the terms of the agreement, Northrop Grumman will provide up to $17.5 million to the initiative over three years.

A photo accompanying this release is available at: http://media.globenewswire.com/noc/mediagallery.html?pkgid=32231.

Working together, the team will develop the scientific and technological innovations necessary to enable a space-based solar power system capable of generating electric power at cost parity with grid-connected fossil fuel power plants. SSPI responds to the engineering challenge of providing a cost-competitive source of sustainable energy. SSPI will develop technologies in three areas: high-efficiency ultralight photovoltaics; ultralight deployable space structures; and phased array and power transmission.

SSPI was conceived by three principal investigators from Caltech's Division of Engineering and Applied Science (EAS) who jointly lead the initiative:

- Harry A. Atwater, Jr., Howard Hughes Professor of Applied Physics and Materials Science, Director of the Resnick Sustainability Institute;
- Ali Hajimiri, Thomas G. Myers Professor of Electrical Engineering and Medical Engineering; and
- Sergio Pellegrino, Joyce and Kent Kresa Professor of Aeronautics, Professor of Civil Engineering and Jet Propulsion Laboratory Senior Research Scientist.

Atwater, Hajimiri and Pellegrino have assembled a team of students, postdoctoral scholars, and senior researchers that will eventually exceed 50 members. EAS is building specialized laboratory facilities to support this team. Northrop Grumman engineers and scientists will collaborate with the team at Caltech to develop solutions, build prototypes and obtain experimental and numerical validation of concepts that could allow development to proceed toward eventual implementation.

"By working together with Caltech, Northrop Grumman extends its long heritage of innovation in space-based technologies and mission solutions," said Joseph Ensor, vice president and general manager, Space Intelligence, Surveillance and Reconnaissance (ISR) Systems, Northrop Grumman. "The potential breakthroughs from this research could have extensive applications across a number of related power use challenges."

"This initiative is a great example of how Caltech engineers are working at the leading edges of fundamental science to invent the technologies of the future," said Ares Rosakis, Otis Booth Leadership Chair of the Caltech Division of Engineering and Applied Science and the Theodore von Kármán Professor of Aeronautics and Professor of Mechanical Engineering. "The Space Solar Power Initiative brings together electrical engineers, applied physicists, and aerospace engineers in the type of profound interdisciplinary collaboration that is seamlessly enhanced at a small place like Caltech. I believe it also demonstrates the value of industry and academic partnerships. We are working on extremely difficult problems that could eventually provide the foundations for new industries."

Caltech and Northrop Grumman have a long history of collaboration, dating back decades to joint work between Professor Theodore von Kármán and Jack Northrop. Von Karman was a scientist and engineer who directed Caltech's Guggenheim Aeronautical Laboratory during the 1930s and later co-founded the Jet Propulsion Laboratory. Northrop was an aviation pioneer who in 1939 founded the Northrop Corporation, one of the legacy companies that united to become Northrop Grumman. This unique $17.5 million initiative is one of the largest corporate sponsored research projects Caltech has undertaken in recent years.

Caltech (www.caltech.edu) is a world-renowned research and education institution focused on science and engineering, where faculty and students pursue new knowledge about our world and search for the kinds of bold and innovative advances that will transform our future. The scientific, engineering, and technological contributions of Caltech's faculty and alumni have earned national and international recognition. Caltech's 124-acre campus is located in Pasadena, California. The Institute manages the Jet Propulsion Laboratory (JPL) (www.jpl.nasa.gov) for NASA, and owns and operates several large-scale research facilities. The Caltech Division of Engineering and Applied Science (www.eas.caltech.edu) consists of seven departments and supports teaching and research faculty who work with internationally diverse and extremely talented students, postdoctoral scholars, and colleagues.

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