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IAC 2013, PLENARY 6 – SPACE SOLAR POWER (SSP)

Plenary 6 at the 64th International Astronautical Congress (IAC) in Beijing, China, today (Thursday, 26 September 2013) brought together international leaders and proponents for SSP.

SSP has the potential to allow us to harvest solar energy from platforms in near space and wirelessly deliver the resulting power to earth.

Although past research failed to result in any major international effort to develop and demonstrate this novel technology there have been a number of accomplishments during recent years in SSP studies and technology developments.

As a result, SSP continues to be an exciting and promising - albeit sometimes controversial - vision for the future.

The Plenary included a presentation of the recently completed International Academy of Astronautics (IAA) 'First International Assessment of Space Solar Power' and reviewed the recent progress in the US, Europe, Japan and China.

John Mankins, formerly NASA lead for Space Solar Power Research & Development, opened the Plenary by saying it was appropriate to be discussing SSP at this Congress because it fitted well with the theme of IAC, 'Promoting Space Development for the Benefit of Mankind'.

Describing the essence of a SSP system, he said it involved deploying in space a large solar platform to convert almost continuous sunlight into electricity and then convert this to microwaves to send to locations on Earth.

"The reason this appealing is because such a platform can receive power almost continuously and transmit it to a wide variety of locations on Earth at different times," he explained.

"Three or four satellites could deliver power to almost 90 percent of humanity almost continuously - this is the massive vision of SSP," said Dr Makins, whose new book 'The Case for Space Solar Power' is about to be published.

He added that SSP should be seen in the context of the enormous growth of global power demands in recent years coupled with the gradual depletion of fossil fuels and resultant price increases, alongside the almost complete consensus of human induced climate change.

“All this means there will be a tremendous need in the world for new power sources,” he said. Dr Chang-Chun Ge, of the China Academy of Science, spoke on need for new energy and the opportunities being pursued in China.

“The energy programme for China is much more serious than in other countries because the consumption per capita in our country is rising very fast,” he said.

“In the year 2000, the United States was the leader in global energy consumption but China is now the global leader in energy use and energy demand is expected to continue upwards.

Dr Ge said two kinds of energy might offer a final solution to the world’s energy crisis - nuclear fusion or SSP generated energy.

“The latter is much easier to realise than nuclear fusion and from the beginning of this century I have proposed several possibilities to our government in China,” he said.

He explained a three-stage development process - 2011-2020 for design and key technology research; 2020-2025 for low Earth orbit demonstrations flights; and 2026-2040 a launch demonstration system.

“SSP is the only real sustainable green source for energy in the future - and it will lead to new technological revolution for humankind,” he predicted.

Isabelle Duvaux-Bechan, Head of the European Space Agency (ESA)’s Future Preparation & Strategic Studies Office, told delegates that the European agency was already involved in studies of solar power systems from space.

Results for ESA validation phase show that SPS is technically feasible and that energy payback would be of the order of several months to 1.5, a slightly faster time in this respect than terrestrial systems.

In terms of economic comparison to terrestrial alternatives she said that the higher the power level the more competitive the space system.

She said that initial analysis had been performed to better compare and combine space and terrestrial solar power plants.

“The concept is promising but not yet mature enough for large scale industrial development but would be suitable for international cooperation and innovative approaches.”

Mrs Duvaux-Bechan also spoke about the legal aspects of SSP in both development and operation, and said that it was also important to get the energy sector involved at the outset.

“The sooner the energy and space sectors learn to work together the better it will be for the next steps, as these sectors have few links traditionally,” she said.

Nobuyuki Kaya, Vice-President of Kobe University in Japan, told delegates that besides the cost of implementing such a system, SSP introduces several hurdles, primarily the problem of transmitting energy from orbit to Earth's surface.

“We believe the beam control system of the microwave is one of the most important and critical issues to realise the SPS,” he said. “The retro-directive antenna is a very promising technology.”

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