

Space sails for space and terrestrial sustainability Onur Çelik, Delft University of Technology

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Space sailing

ADEO Drag Sail, Credits: ESA



IKAROS, Credits: JAXA



ACS3, Credits: NASA

- Lightweight planar membrane technologies including drag sails, solar sails, magnetic sails, light sails, orbiting reflectors, etc.
- Sustainable by many definitions exploiting natural environment, scalable, more accessible in certain cases
- Synergies between technologies are critical, but often overlooked



"Multiplicity" as a mission driver (or desire)

Multiplicity is where space sails make an impact in space sustainability





Space sailing and space sustainability





Space sails and terrestrial sustainability

Space-based solar energy



Global mean yearly solar insolation (1990-2004) and SPF under construction





Znamya-2, Credits: RSC Energia (CC BY-SA)

Orbiting reflectors could enhance solar power generation beyond daylight hours.





Bhadla Solar Power Farm, India (Credits: CC-BY-SA)



Rjukan, Norway

An *overarching approach* to space sailing technologies could revolutionise our path towards sustainability in space and on Earth.

The synergistic development of technologies enables new business opportunities in near-Earth space and open new frontiers in deep-space exploration





Thank you

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