# HVPE Lower Cost III-V Photovoltaics (23SF-P-100)

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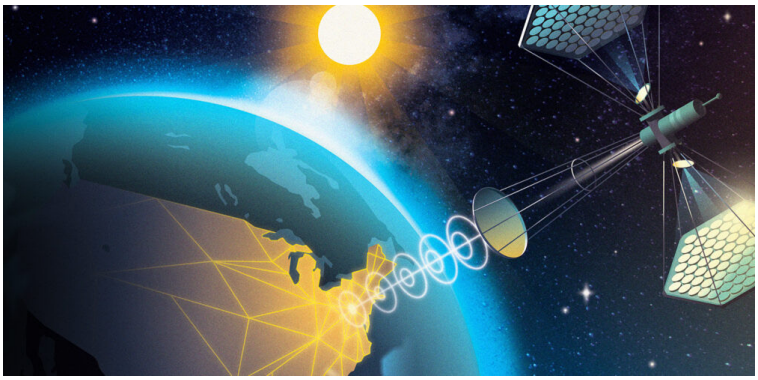
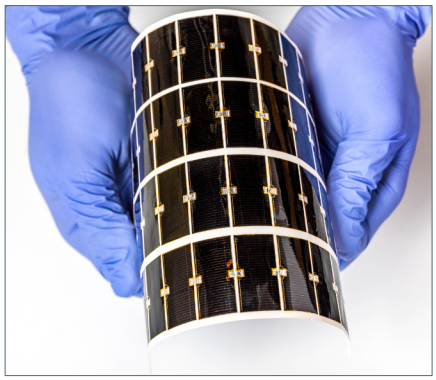


Source: https://innovationfrontier.org/space-solar-power-an-extraterrestrial-energy-resource-for-the-u-s/

***Space Solar Power Enabled by Low-Cost, High-Efficiency Photovoltaics to Satisfy Power Requirements for Challenging DOD Missions***



*Flexible, lightweight, high-efficiency solar panel*

## The What

**Product Description:** Develop and transition high-efficiency (>30%), low-cost photovoltaic (PV) devices via dynamic halide vapor phase epitaxy (D-HVPE)

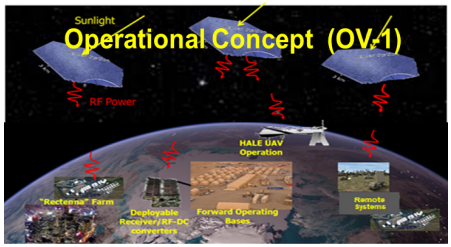
**The So What:** Reduction of PV cost from ~$150/W to <$30/W, with pathway to <$1/W. Reduction enables widespread use of PV for DOD missions. >$180M in savings for each 1.5MW solar power satellite, 2.9MKg/yr $CO_2$ savings for each FOB.

*D-HVPE tool installed at NREL*

- Pilot D-HVPE tool (installed Summer 2023) enables 300kW/yr production capacity, with expansion to multi-megawatt level
- D-HVPE demo'd SOA quality PV at 100x faster deposition rate using 10x lower cost materials
- D-HVPE demo'd substrate repair from spalling, very low defect lattice mismatched materials, *in-situ* photon crystal

## The Why

- Lower-cost, high-efficiency solar cells for challenging DOD missions (space solar power, proliferated Space Force architecture, deployed soldier power, UAV, etc.)
- Provides cost, environmental and operational resilience/flexibility benefits (Agile Combat Employment [ACE])
- High-efficiency photovoltaics (PV) provides solutions, but current costs are prohibitive
- Use of PV offers operational flexibility and resilience, with reduced logistics tail
- Opportunity to leverage and build on US lead in high-efficiency photovoltaic science, technology and industrial capacity



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