



# International Framework for Establishing and Sharing Space Solar Power

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Board of Directors, NSS  
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# The National Space Society

- “The National Space Society (NSS) is an independent, nonpartisan, educational, grassroots, non-profit organization dedicated to the creation of a spacefaring civilization.”
- NSS is the preeminent citizen’s voice on space exploration, development, and settlement.
- NSS Vision is “People living and working in thriving communities beyond the Earth and the use of the vast resources of space for the dramatic betterment of humanity.”
- Learn more: <https://space.nss.org/>



# Recommendation

- Create an international consortium to promote and develop Space Solar Power (SSP) international initiatives to support clean energy & disaster relief goals.
- Directly supports SDGs 7 and 13.
- Directly supports goals of the Sendai Framework.
- In line with the Outer Space Treaty.
- In line with the Disaster Charter.
- We cannot afford to wait any longer.



# SUSTAINABLE DEVELOPMENT GOALS



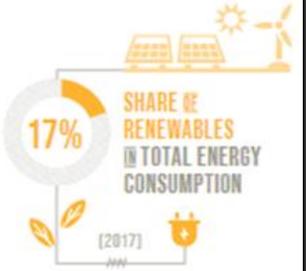
## ENSURE ACCESS TO AFFORDABLE, RELIABLE, SUSTAINABLE AND MODERN ENERGY FOR ALL

### BEFORE COVID-19

### EFFORTS NEED SCALING UP ON SUSTAINABLE ENERGY

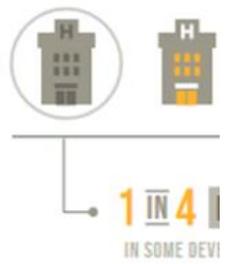
**789 MILLION** PEOPLE LACK ELECTRICITY (2018)

### STEPPED-UP EFFORTS IN RENEWABLE ENERGY ARE NEEDED



### COVID-19 IMPLICATIONS

### AFFORDABLE AND RELIABLE ENERGY IS CRITICAL FOR



FINANCIAL FLOWS TO DEV FOR RENEWABLE ENERGY



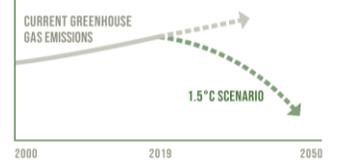
## TAKE URGENT ACTION TO COMBAT CLIMATE CHANGE AND ITS IMPACTS

### THE CLIMATE CRISIS CONTINUES, LARGELY UNABATED



2020 GLOBAL AVERAGE TEMPERATURE AT

### RISING GREENHOUSE GAS EMISSIONS REQUIRE SHIFTING ECONOMIES TOWARDS CARBON NEUTRALITY



### CLIMATE FINANCE INCREASED

BY 10% FROM 2015-2016 TO 2017-2018, REACHING AN ANNUAL AVERAGE OF \$48.7 BILLION

- PRIORITY AREAS INCLUDE
- Industrial and Transport Systems
  - Freshwater Resources
  - Human Health
  - Key Economic Sectors and Services

IRG/SDGS/REPORT/2021/



# What if we could find a new source of power...?

- that would not only leave Earth's environment unscathed, but allow our planet's atmosphere to recover?
- that was limitless, had zero carbon emissions, and was highly competitive with coal, natural gas, and nuclear power?
- that harmonize with terrestrial solar & wind power and be able beam energy directly to the most remote, impoverished regions on Earth?



# What is Space Solar Power

- “Place very large solar arrays into continuously and intensely sunlit Earth orbit (1,366 watts/m<sup>2</sup>), collect gigawatts of electrical energy, electromagnetically beam it to Earth, and receive it on the surface for use either as baseload power via direct connection to the existing electrical grid, conversion into manufactured synthetic hydrocarbon fuels, or as low-intensity broadcast power beamed directly to consumers.”

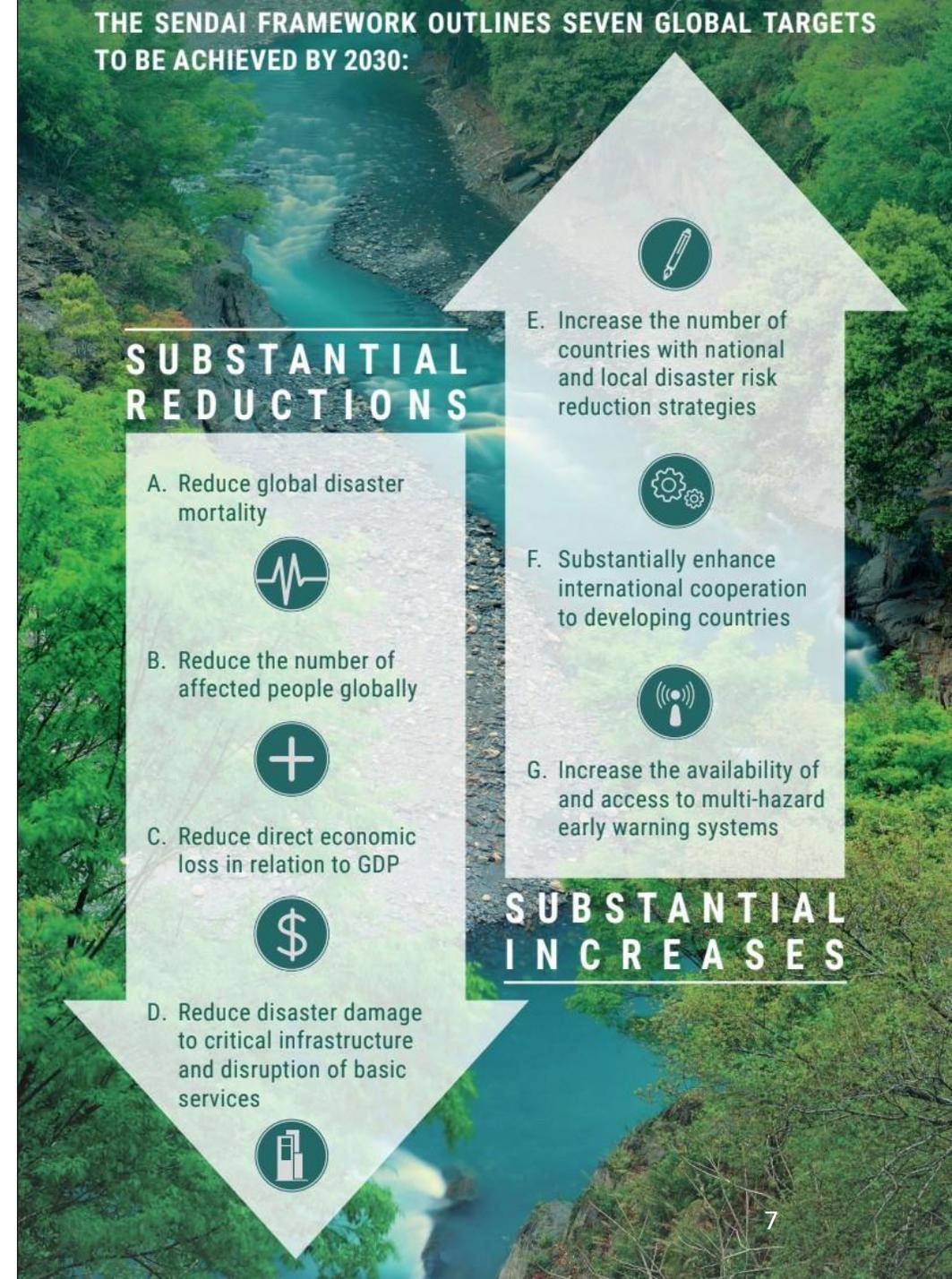
-- Peter Glaser, 1968

- Enabling factor: Enhancement of international Space Traffic Management mechanisms and procedures.

# Space Solar Power & Disaster Relief

- The 3 largest cost factors associated with disasters are lack of:
  - 1) energy,
  - 2) communications, and
  - 3) nighttime illumination (for around-the-clock relief and recovery efforts).

Solar power satellites could provide affordable power to enable these *crucial* relief elements!



# Sendai Framework Priorities

- Understanding disaster risk in all its dimensions -- for risk assessment, prevention, mitigation, preparedness & response.
- Strengthening disaster risk governance to better manage disaster risk at national, regional, & global levels -- for prevention, mitigation, preparedness, response, recovery, & rehabilitation.
- Investing in disaster risk prevention & reduction thru structural & nonstructural measures -- to enhance the resilience of persons, communities, and countries.
- Enhancing disaster preparedness for effective response and to “build back better” -- in recovery, rehabilitation, and reconstruction.

# Legal Considerations

- Outer Space Treaty
- Article I: Exploration and use of space carried out for the benefit ... of all countries. Facilitate and encourage international cooperation in scientific investigation.
- Article II: No national appropriation.
- Article III: Promote international cooperation and understanding.
- Article VI: State Parties have international responsibility for national (governmental & non-governmental) activities.

# Legal Considerations, cont.

- Article VII: Launching States internationally liable for damages to other State Parties.
- Article VIII: State Parties maintain jurisdiction and control over space objects.
- Article IX: Exploration and use to be guided by the principle of cooperation.
- Articles X and XI: Promote international cooperation by being transparent and sharing information.

# The Intelsat Model

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- INTELSAT started as an intergovernmental partnership. Participants joined to establish & collectively operate satellite facilities, which each partner intended to use for telecommunications within its own defined service area.
- The partnership consisted of governments and telecommunications entities, public and private.
- Within the spectrum of international organizations, INTELSAT is the most like our proposed consortium on space solar power because it was an international organization providing extensive global services, in coordination with private entities.



# UNGA Resolution 1721

- UNGA Resolution 1721, which passed unanimously in 1961, expressed the belief that “communication by means of satellites should be made available to the nations of the world as soon as practicable on a global and non-discriminatory basis.”
- Thereafter, negotiations regarding the INTELSAT system commenced.

# International Collaborative Partnership

NSS proposes the introduction of a resolution which would express the belief that solar energy gathered by on-orbit satellites and delivered to Earth should be made available to the nations of the world as soon as practicable and on a global and non-discriminatory basis.

# The Disaster Charter

- Consists of 17 charter members and 130 State parties and allows for a collective of space agencies and data providers to make satellite data readily available for disaster relief efforts.
- The Disaster Charter itself does not have funding but depends solely on voluntary humanitarian use of satellite technology.
- In the event of a disaster in a particular State, the Charter is “activated” by an authorized user which then mobilizes associated satellites to provide around-the-clock information and mapping data to the authorized user.
- This information can then be used to inform relief efforts in affected areas.



# Challenges

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- Export control laws and regulations: enabling technology sharing.
- Spectrum allocation management.
- Integrated and coordinated research and development investment.
- Health and safety considerations: identify how standards will be established.

# Challenges, continued

- Enabling public-private partnerships.
- Development of terrestrial multilateral Space Solar Power Test Ranges and Proving Grounds.
- Establishing a *greatly enhanced* Space Traffic Management System to deal with orbital debris and satellite crowding!

# The Space 2030 Agenda

- **Objective 2.4:** Advance the role of space technologies in...addressing climate change and facilitating the transition to low-emission societies, and promote international collaboration in that regard, in line with...international mechanisms and organizations.
- **Objective 2.5:** Promote the use of space-based technologies in all phases of the disaster management cycle, applicable to both natural and man-made disasters . . . response, recovery, reconstruction and rehabilitation....

# Thank You.

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