



Decentralized Energy Systems

VERTICAL SOLAR GENERATOR (VSG)

Revolutionizing Urban & Remote Solar Energy
Generation

Presented by
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Project Overview:

VSG is a groundbreaking solar technology developed by Kunfirm Technologies. It provides scalable, high-efficiency power generation through its innovative vertical design, maximizing sunlight capture in limited spaces, such as urban rooftops, military bases, and remote industrial locations.



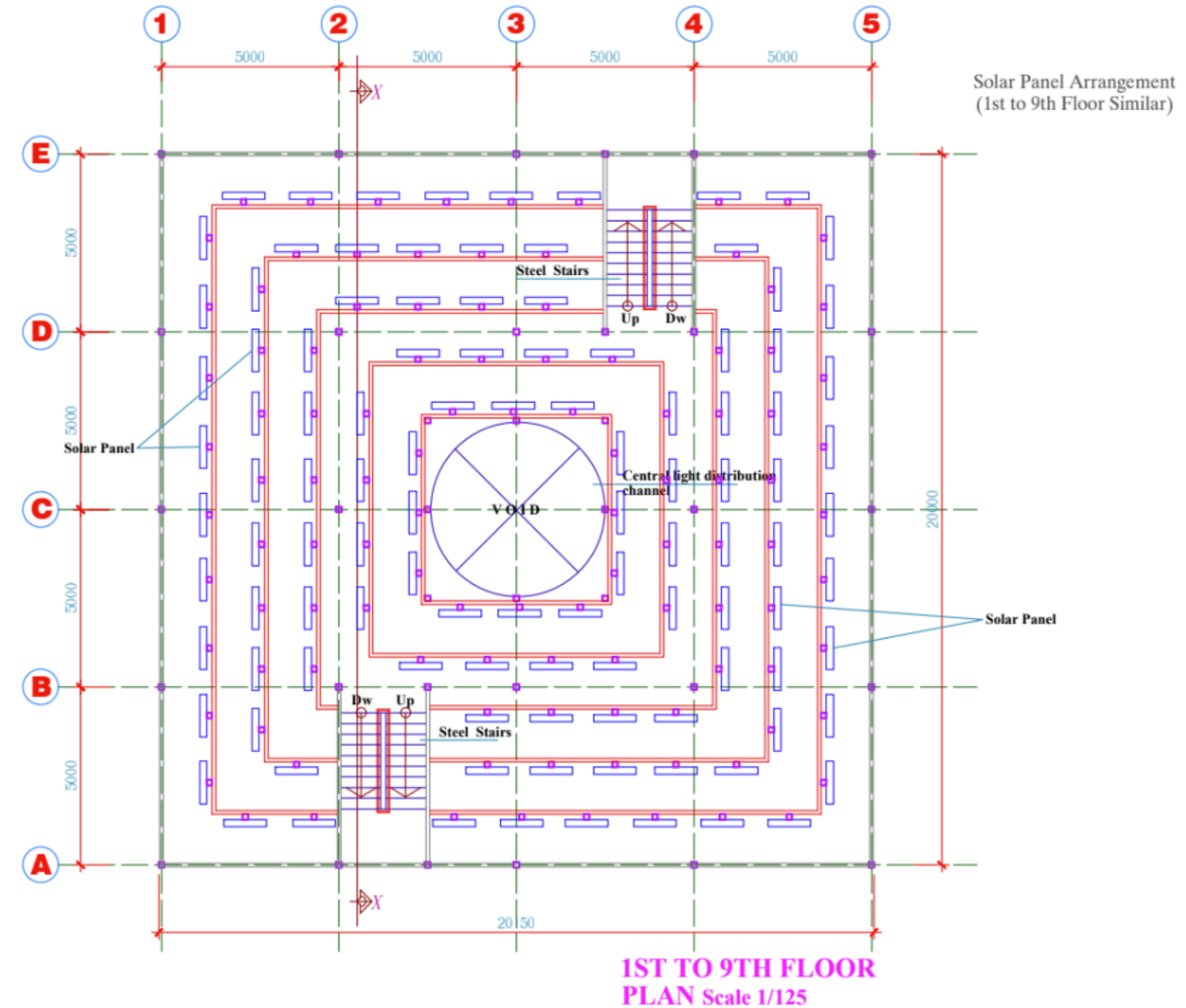
Key Technical Innovations:

1. **Vertical Stacking:** Maximizes power generation per square foot, fitting more solar panels in a smaller footprint compared to traditional solar farms.
2. **Central Light Distribution:** Reflective mirrors and magnifying optics channel sunlight to all panels, optimizing energy capture and efficiency even in areas with limited direct sunlight.
3. **Integrated Energy Storage:** Built-in battery systems store excess energy for use during non-peak sunlight hours, ensuring a continuous and reliable power supply.
4. **Decentralized Power Production:** Offers on-site generation with minimal transmission losses, contributing to energy independence and resilience in off-grid locations.



Performance Metrics:

- Land Efficiency: 1 acre generates up to 20 MW, 600% more efficient than traditional solar installations.
- Energy Efficiency: Panel efficiency increased by 25% using advanced magnifiers and reflectors.
- Cost Reduction: Offers a 50% lower cost compared to traditional solar solutions.





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Target Applications:

- **Urban Settings:** Ideal for rooftops in space-constrained areas.
- **Off-Grid Power:** Perfect for remote areas, including military bases and industrial projects, where grid access is limited.
- **Military and Disaster Relief:** Provides energy resilience and fast deployment options for critical infrastructure.





Team



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The University of Texas at Austin
Center for Electromechanics
Cockrell School of Engineering



Harvard
innovation labs



Partnerships:

- Developed in collaboration with the University of Texas Center for Electromechanics (UT CEM), leveraging cutting-edge research to ensure optimal performance.



The University of Texas at Austin

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Why VSG?

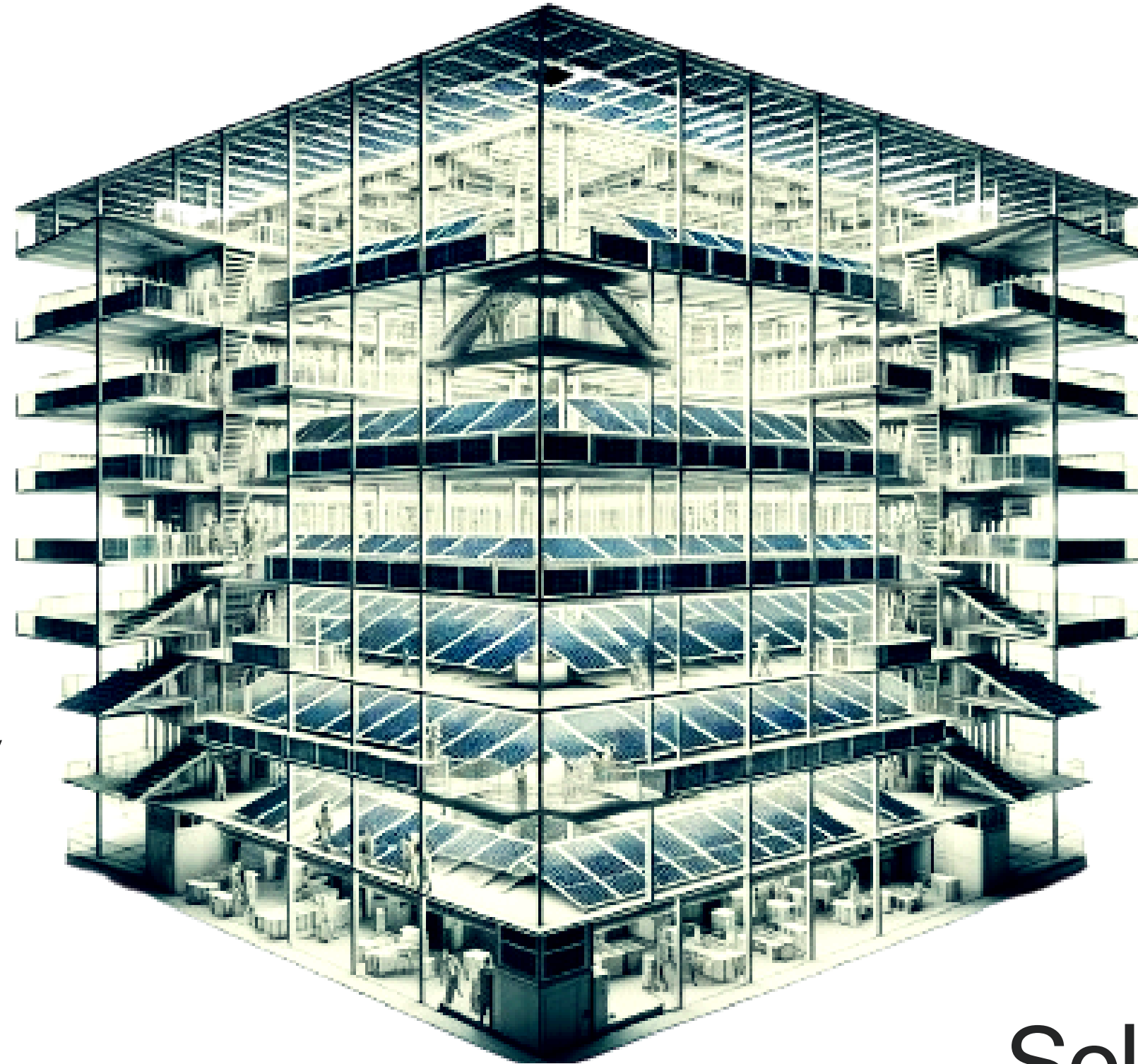
- **Sustainable:** Supports decarbonization efforts by optimizing solar generation in previously inaccessible areas.
- **Scalable:** Customizable from 3-floor to 20-floor designs based on energy demand and location.
- **Innovative:** Breaks the boundaries of traditional solar design with its compact, high-output vertical stacking.



Introducing the Vertical Solar Generator (VSG)

A modular, scalable, and space-efficient solar solution.

Optimizes solar energy capture in limited spaces, ideal for urban settings.



Integrates advanced magnifying optics and reflective technologies.

Solution Overview



Technology

➔ **Magnifying Optics:**
Concentrates sunlight to enhance energy capture.

➔ **Vertical Stacking:**
Allows high-density panel installation, increasing output per square meter.

➔ **Reflective Technologies:**
Evenly distributes light across panels, maximizing efficiency.

➔ **Heat Capture System:**
Utilizes thermal energy to generate additional power.



Market Opportunity

The global renewable energy market was valued at approximately **\$881.7 billion** in 2020 and is projected to reach around **\$1,977.6 billion by 2030**, growing at a compound annual growth rate (CAGR) of **8.4% from 2021 to 2030**. This strong growth trend underscores the significant opportunity for innovative technologies like the VSG in the expanding renewable energy sector.

01

Surplus Demand

Growing demand for renewable energy, particularly in urban areas.

02

Superior Solution

Opportunity to replace or supplement traditional solar farms.

03

Applications

Urban power generation, commercial buildings, parking lots roof tops, highway rest areas, and industrial facilities, defence.



VSG Competitive Advantage

| Aspect | Vertical Solar Generator (VSG) | Traditional Solar Farm |
|--------------------------|---|--|
| Land Use | 1 acre for up to 19 MW (with vertical stacking) | 5-10 acres per MW |
| Energy Density | High (due to vertical stacking and reflective technologies) | Low (horizontal layout limits density) |
| Installation Cost per MW | \$0.25M - \$0.5M | \$1M - \$3M |
| Annual Maintenance Costs | Moderate to High (due to complex systems) | Low to Moderate |
| Environmental Impact | Lower footprint, reduced land usage, high efficiency | Higher land use, potential habitat disruption |
| Grid Integration | Decentralized, can be placed near demand centers | Centralized, requires long-distance transmission |