

Exploring Solar Panel Efficiency

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Limits are to be pushed.

- ▶ What is the maximum possible efficiency of a solar panel?
- ▶ Costs and financial feasibility.

Theoretical Limits of Solar Efficiency

Physics sets fundamental constraints on efficiency:

- ▶ **Shockley-Queisser Limit:** Max efficiency of a single-junction silicon cell is about 33.7%.
- ▶ **Multijunction Solar Cells:** Up to 86
- ▶ **Quantum Dot Technology:** Potential for even higher efficiencies.



solar_cells.png

Cost and Financial Feasibility

High efficiency comes at a cost:

- ▶ **Multijunction Solar Cells:** Over \$100,000 per square meter.
- ▶ **Standard Silicon Panels:** \$150–\$400 per panel, 15–22% efficiency.
- ▶ **Emerging Perovskite Cells:** 30–35% efficiency at lower costs.



solar_costs.png

Balancing Efficiency, Cost, and Practicality

- ▶ Theoretical efficiency is not easily achievable.
- ▶ Must optimize cost.
- ▶ The future is in balancing efficiency and cost.