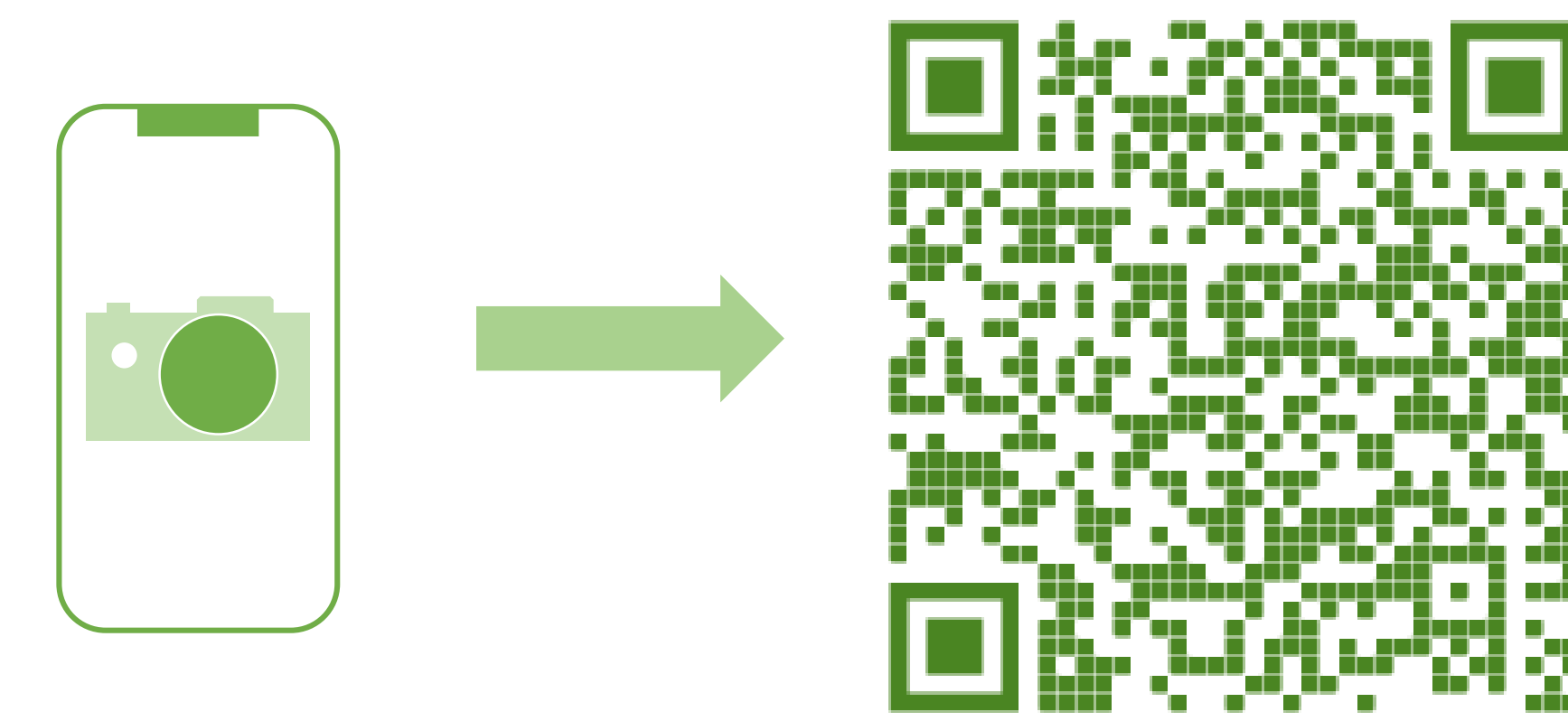


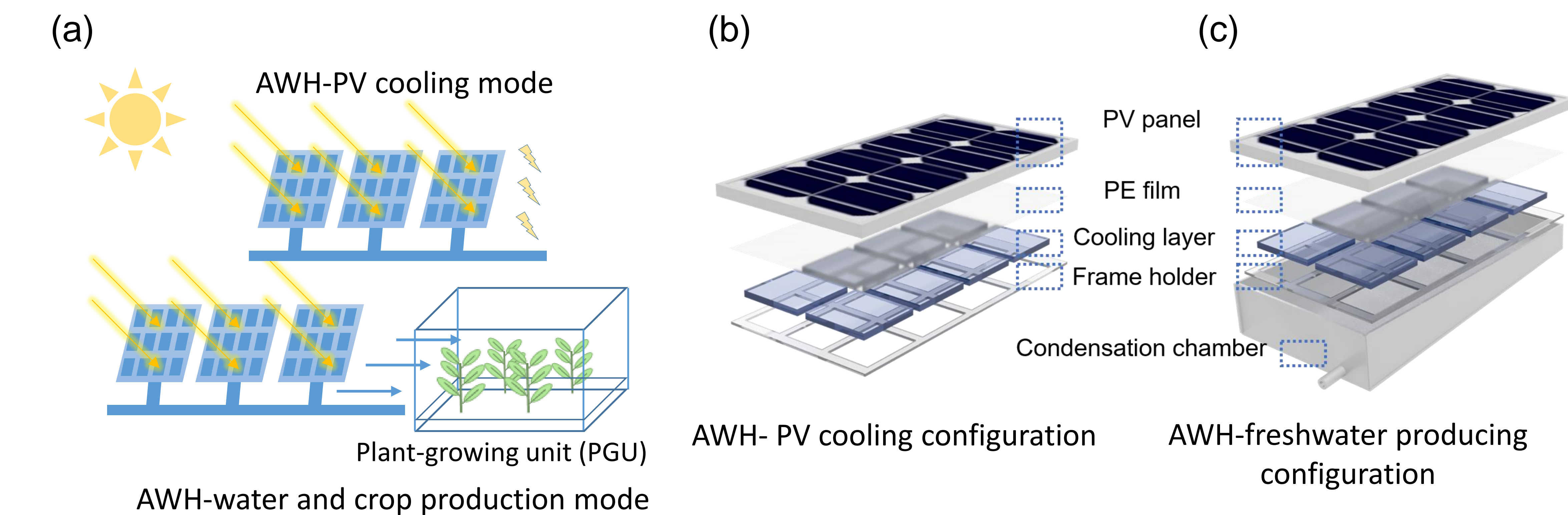
Integrated Solar-Driven System Produces Electricity with Fresh Water and Crops in Arid Regions

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MOTIVATION

Stable supplies of water, energy, and food are the most essential factors to universal achievements of the United Nation's Sustainable Developments Goals (SDGs) by 2030. However, the already over-stressed water-energy-food nexus is further complicated by the ongoing climate change, which urgently calls for holistic approaches to address the conflicts regarding allocation of resources among these sectors and, in doing so, in a minimal-carbon manner.



Innovation

This poster demonstrates a self-sustained and solar-driven, integrated water-electricity-crop co-production system (WEC2P). The design of WEC2P is based on the atmospheric water adsorption-desorption cycle:

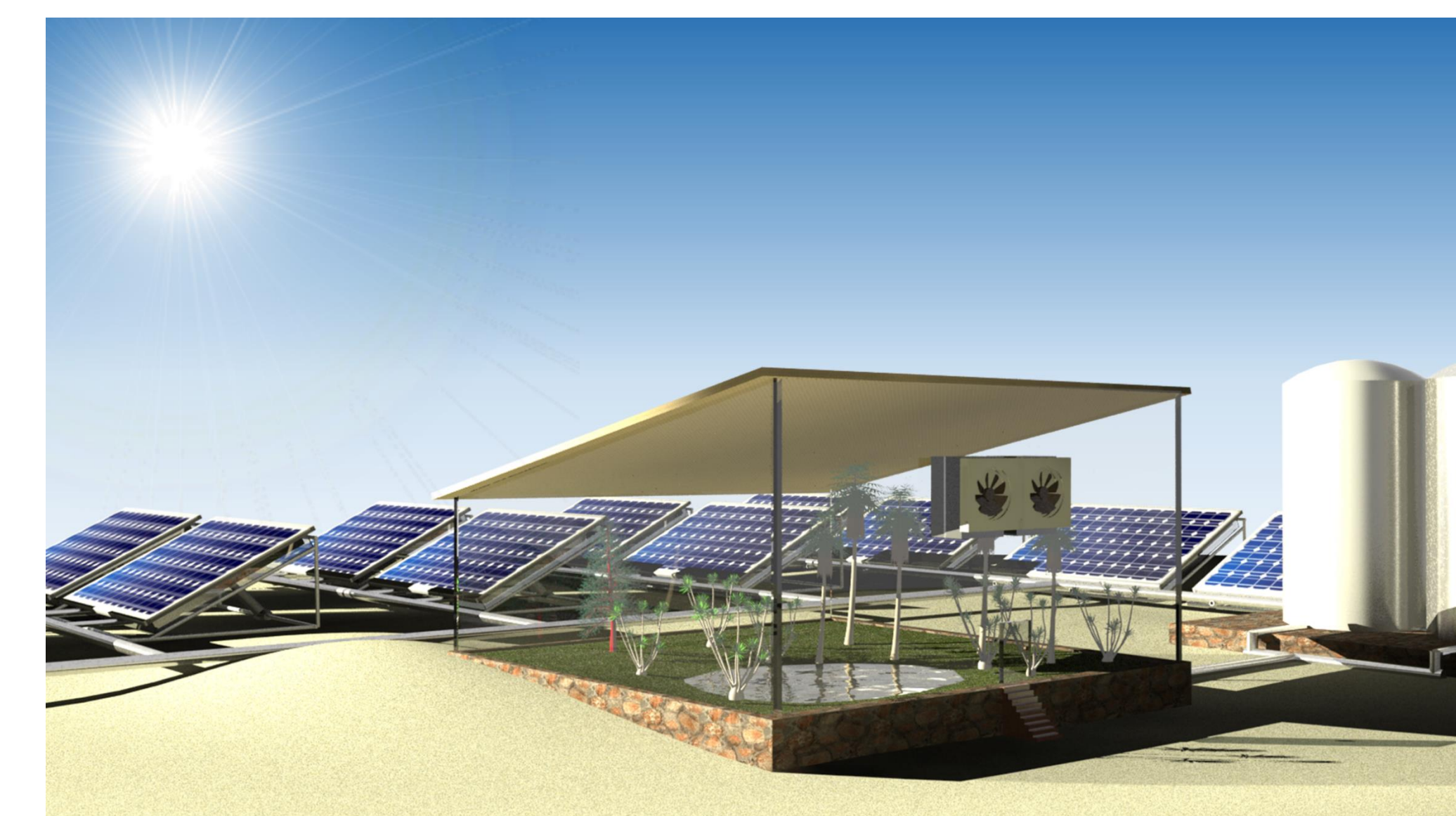
- ✓ Recycle waste heat from photovoltaic (PV) panels to produce fresh water from the atmosphere.
- ✓ Cool down PV panel and increase its electricity generation performance
- ✓ Integrated system (WEC2P) produces electricity with fresh water and crops
- ✓ Application is with minimal geological constrain.



(a) Digital photo of WEC²P. (b) Digital photo of AWH water harvesting module. (c) Produced fresh water from one 0.6×0.3 m² prototype device



The growing status of water spinach in the outdoor field test and the bench-scale plant growing unit (PGU)



Key features

- Two easily switchable options: Water-Crop Co-Production mode and AWH-PV cooling mode.
- Plant survival rate: 95% in water-Crop Co-Production mode.
- Increase 10% of PV electricity generation in AWH-PV Cooling mode.