



Collecting Rainwater Falling on Solar Arrays

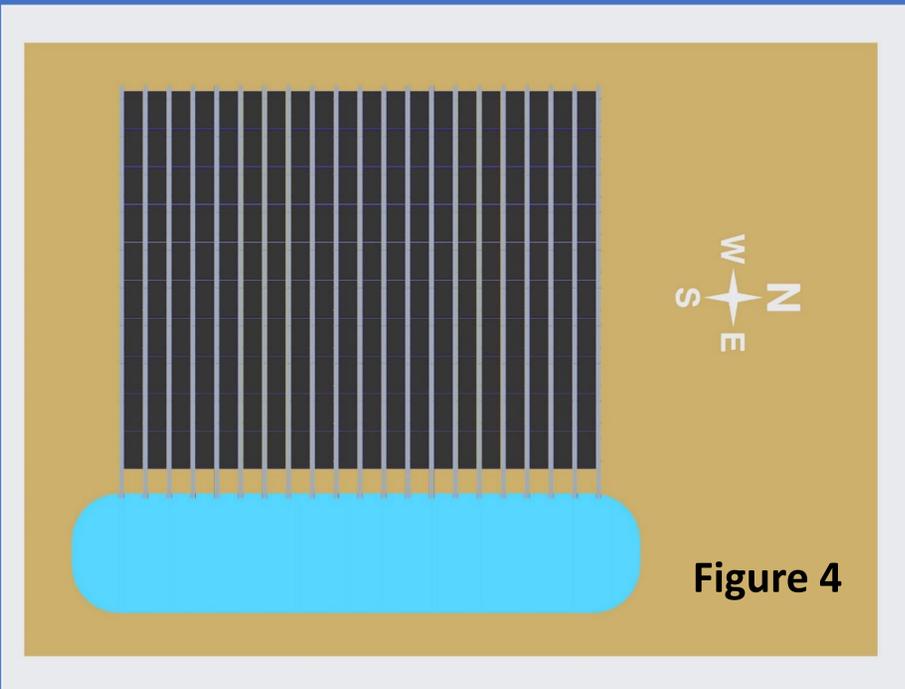
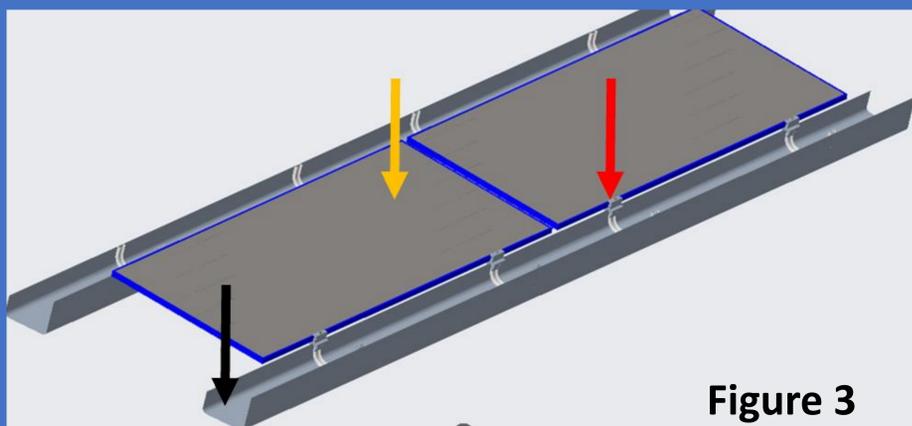
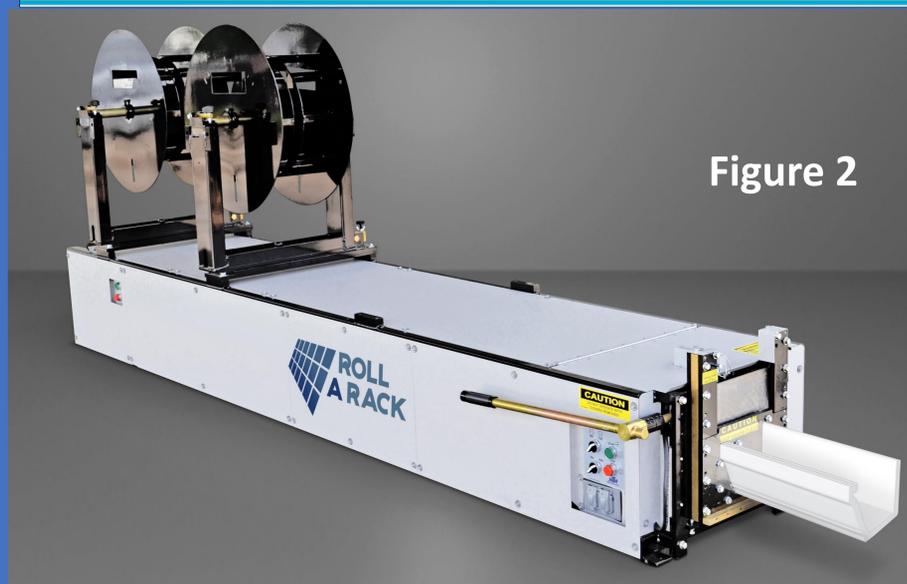
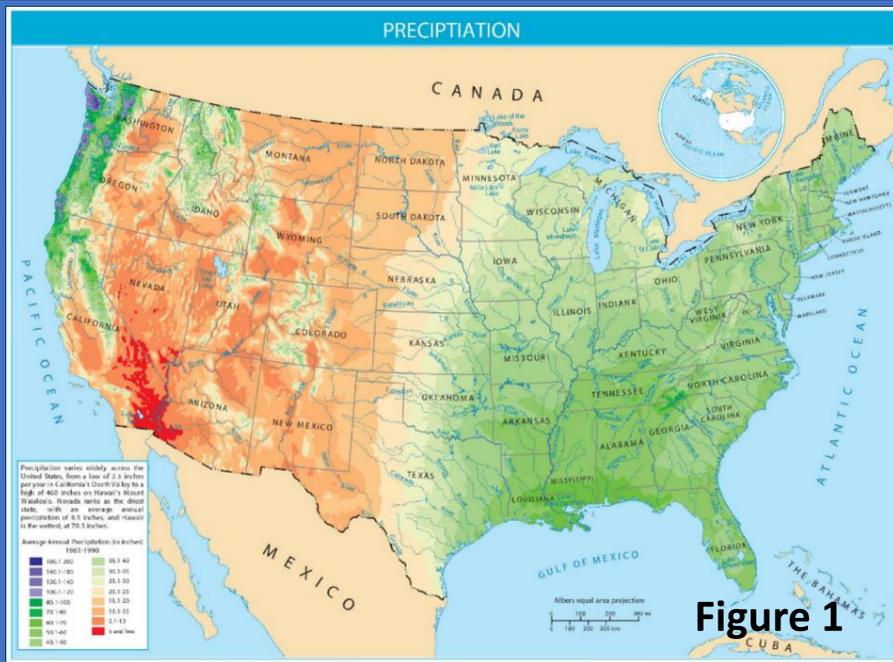
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INTRODUCTION

- In the dry West, water scarcity is adversely affecting farming on historically prime agricultural land. Traditional sources of irrigation—aquifers, lakes, and reservoirs—are severely depleted. There is also a conflict for land use between agriculture and solar power.
- In the wet East, constructing solar farms involves modifying native land which interrupts ecosystems and stormwater flow patterns, resulting in costly groundwork and repairs.
- A water harvesting solar racking system can capture rainwater and use it for irrigation (in the dry West) and channel heavy rainfall to intermediate storage; to be slowly released after the storm (in the wet East).

METHODS

- Enter Roll-A-Rack, a solar racking system that uses portable roll-forming technology to generate solar racks onsite during installation. You may be familiar with roll-forming, if you have ever seen gutters being installed on a house.
- A portable roll-forming machine “forms” the gutter from a coil of flat metal stock to custom lengths needed to fit the house dimensions. Roll-A-Rack uses the same technology to generate solar racking (Figure 2).
- The Roll-a-Rack racking system has *two-components*, a roll-formed, gutter-like channel (Figure 3, black arrow) and a support bracket (red arrow) that secures the solar panel (orange arrow) to the channel.
- The Roll-A-Rack channel shields the entire underside of the solar module to reduce *wind uplift forces*, it holds the ballast, and can gutter rainfall.
- Roll-A-Rack’s gutter-like racking covers the ground like a canopy and can capture rainwater falling on the array. The captured water can be used for crop irrigation in the dry West and rainwater management in the wet East. Roll-A-Rack mitigates problems caused by rainwater run-off water by channeling heavy rainfall to a pond or cistern.



RESULTS

Figure 4 shows a Roll-A-Rack solar array channeling rainwater to an adjacent pond.

Irrigating crops

- If a crop farm is divided equally between crops and solar, the effective rainfall is doubled because rain harvested on the solar half can be stored and used to irrigate the crop half.
- A wide variety of crops need about 30 inches of annual rainfall to grow. In areas where precipitation is only 15 inches per year, these crops require costly irrigation to make up the difference.
- The tan and light orange color areas in Figure 1 (California Central Valley and band of states from North Dakota and Wyoming down to New Mexico and Texas) get 15 inches of rainfall per year. Roll-A-Rack rain harvesting could effectively double the rainfall and reduce irrigation costs. The total harvested cropland in the US is 309 million acres. Fifteen percent of that, 46 million acres, gets between 10-20 inches of rain.

Stormwater management

- The EPA regulates utility scale solar installations. The State of Ohio requires vegetation gaps 2.5 times the width of the solar panel between rows of solar panels to prevent erosion. Consequently, a single axis tracker requires a land area 3.5 times the area of the solar arrays.
- A single axis tracker solar array produces 0.29 Mw per acre. A Roll-A-Rack array, with a 10” gutter row spacing would produce 0.67 Mw per acre, making it 130% more land-efficient than a single axis tracker array.

CONCLUSION

- Roll-A-Rack, a ballasted, low-profile, gutter-like solar racking system, is produced on site using portable roll-forming technology.
- Its gutter-like design can capture rainwater falling on the array.
- In the dry West, a Roll-A-Rack can capture water for irrigating crops;
- In the wet East, Roll-A-Rack can manage storm water run-off.

MORE INFO (LINKS)

- [Roll-form Video](#)
- [Wind Tunnel Video](#)
- [UL1703 Fire Video](#)
- [Seeking Beta Testers](#)

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