U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

SOLAR ENERGY TECHNOLOGIES OFFICE

SETO CSP Program Summit 2019

SkyTrough Vacuum Membrane

A Low Cost Solar Thermal Collector for Desalination

Project led by SkyFuel, Inc. with support from NREL and cooperative research funding from DOE (DE-EE0008393)

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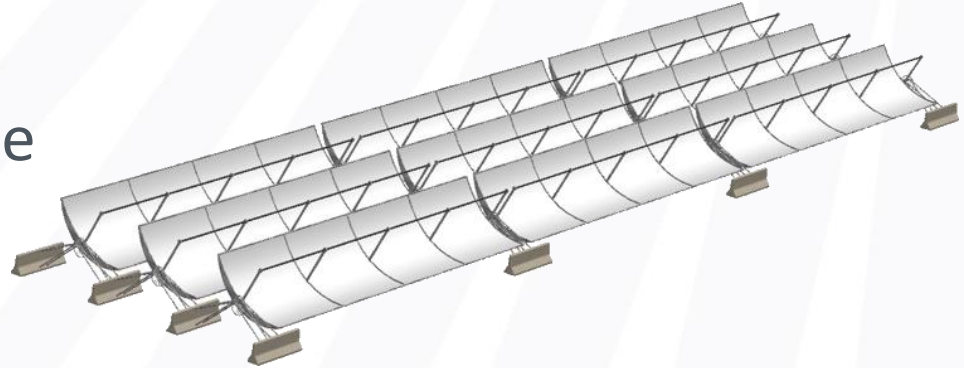
Project Overview

- October 2017 - October 2019
- ~$2M total project cost, $1.6M federal contribution
- Develop an extremely low cost parabolic trough for desalination and industrial process heat
- Levelized cost of heat (LCOH) < $0.01/$kW_{ht}$

Philosophy

- Eliminate entire cost category and minimize others
  - Torque structure, reflectors, receivers, balance, assembly
- Reduce components and optimize for manufacturing
- Plan for smaller, flexible installations
- Take advantage of reflective film's inherent benefits
  - Flexibility, conformance
- Use other industries' scale

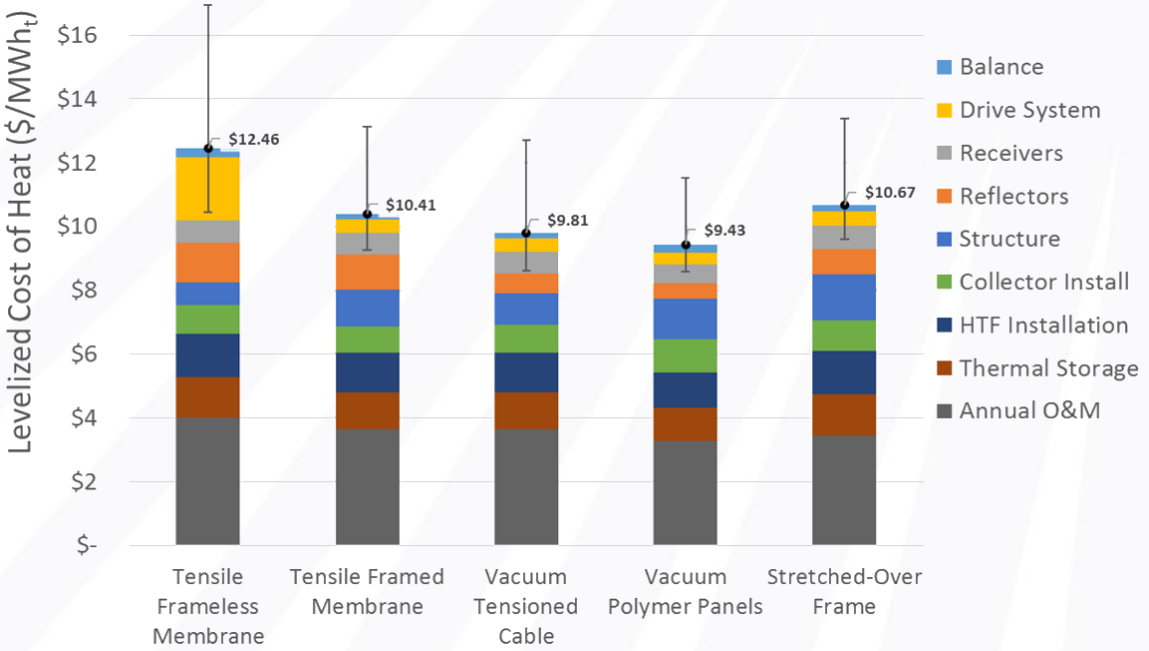


Major Milestones

- Down select from conceptual designs
- Load report and detailed design of collector
- Develop lower cost, more durable reflective film
- Complete techno-economic analysis
- Prototype and test a full-scale module
- Establish commercial partner for pilot-scale demo

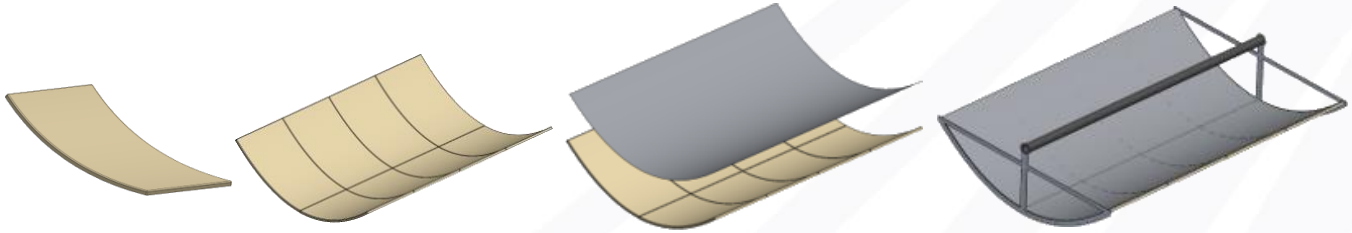
Current Status

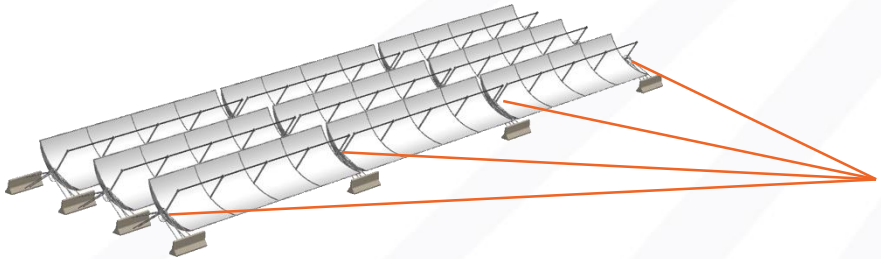
- Conceptual designs complete, detailed design underway
- Reflective film development has begun

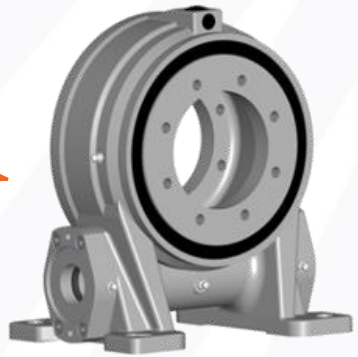


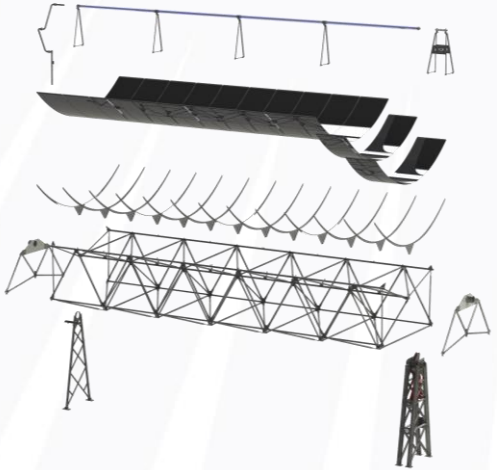
Conceptual Design - Collector

- Polymer panels used as mirror and module structure
- Modules do not carry torque, multiple drives along string









Typical Construction

Conceptual Design – Receiver & Balance

- Rapid installation, driven piles double as pylons
- Carbon steel receivers, ambient glass envelope

NREL Partnership

- Design-phase optical modeling
- Validation during reflective film development
- Third-party validation of prototype performance results
- Validation of cost model & techno-economic analysis

Contact

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