Capital solar thermal energy

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This summary of the Concentrating Solar-Thermal Power (CSP) portion of the 2022 Solar Energy Technologies Office (SETO) Peer Review covers discussions between reviewers and their discussions with SETO"s awardees. See descriptions of all CSP projects that were analyzed as part of this review.

There is room for improvement in this specific area with one option being to require that all PIs explicitly address these two considerations for their project showing traceability back to SETO CSP goals.

Given SETO"s higher-level program mission and given the CSP-specific goals and strategy, it appears that the scope of the CSP portfolio of projects effectively matches the defined mission. The portfolio has a good mix (as previously discussed) and appears to be largely focused on the right technology advancements to further stimulate CSP market interest and to accelerate deployment.

A final observation is that perhaps more attention should be given to leveraging cross-cutting technologies where feasible for advancing CSP technologies. An obvious area of potential overlap would be with the nuclear industry (e.g., high-temperature components and material needs, molten salt and liquid sodium expertise and data bases, etc.). It is suggested that the SETO CSP staff explore options for sharing data and for potential collaboration with other segments of DOE and with other industries.

The SETO has stated CSP goals as: Low cost solar-thermal electricity by using a greater than 50% thermal to power efficiency cycle, reliable electricity using thermal energy storage, and energy beyond electricity using solar thermal (heat) in process industries. Specifically, the goal is to reduce the life cycle cost of electricity (LCOE) from the current 9.8 cents/kWh to 5 cents/kWh by 2030.

For the collector subsystem topic, which accounts for over 40% of the capital expenditure (CAPEX) in the CSP plant, the goal is to reduce over 40% of the 4.8 cents/kWh reduction in LCOE (2.1cents/kWh) is expected from reducing the CAPEX and operating expenditure (OPEX) cost of collector subsystem.

The strategy is to form a consortium of national labs, universities, developers and gather the existing knowledge base and fund research, design and demonstration projects in this topic area with an aim to reduce both capital expenditure (CAPEX) and operating expenditure (OPEX). Specifically,

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