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SOLAR ENERGY TECHNOLOGIES OFFICE

SETO CSP Program Summit 2019

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SOLARRESERVE

Real-time operations optimization software

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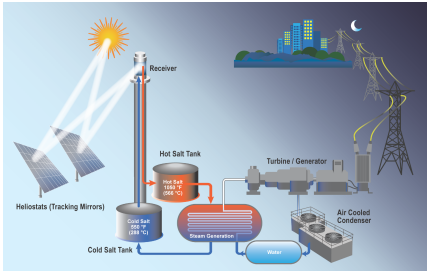
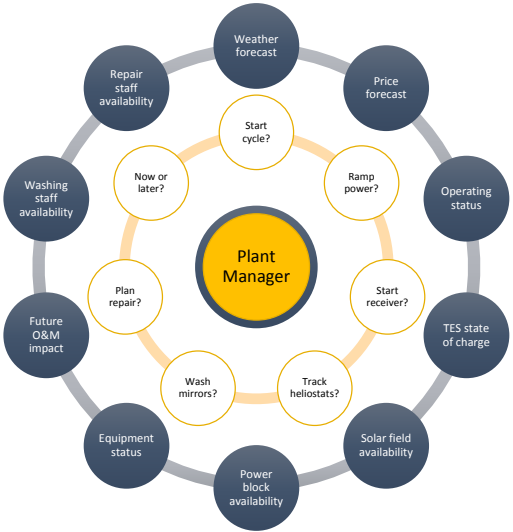
Goals of developing a real-time operations model

Apply optimization methods to determine the best schedule for operating CSP facilities over a near-term planning horizon

- Provide real-time optimized operations information over upcoming seconds to days
- Identify the operating schedule that maximizes revenue while conforming to technology requirements
- Reduce revenue loss due to maintenance and long-term component wear and tear
- Bridge the gap between research outcomes and tools that are useful to industry



The challenge of optimal plant management



Motivating observations

1. With accurate parameters, model improves dispatch outcomes
2. The nature of decision-making changes as the time horizon increases
3. Weather and price forecasts are of primary importance
4. Different profiles can have similar revenue but different O&M
5. Hourly time steps are insufficient for near-term operations

Project objectives and expected impact

Objectives

1. Optimize the trade-off between system availability, O&M costs, and operation schedules, improving long-term net revenue
2. Reduce optimization problem solve time to accommodate plant operator decision requirements
3. Deploy software at an operating facility

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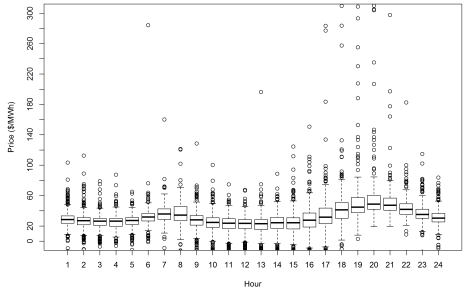
Impacts

1. Provide an accessible and flexible platform for optimizing plant operations,
2. Encourage dispatchability and responsive power generation
3. Quantify revenue impacts of possible operations decisions are likely to play out, both in design and operation
4. Advance the state of engineering and probabilistic models used for CSP

Examples of questions that can be answered

How should plant operations respond to uncertain price forecasts to both maximize profit and minimize damage from fast ramping?



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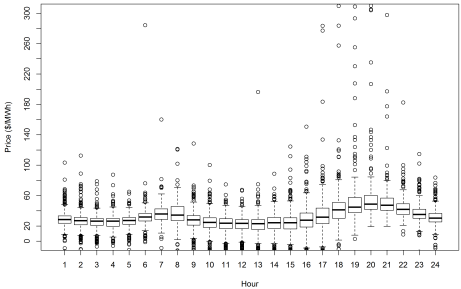
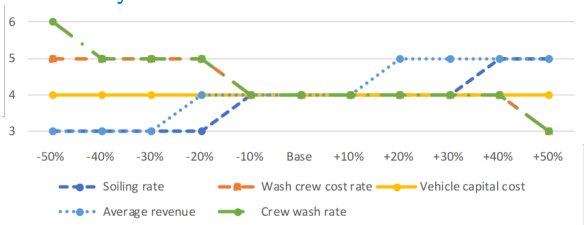


How many wash crews should be hired?



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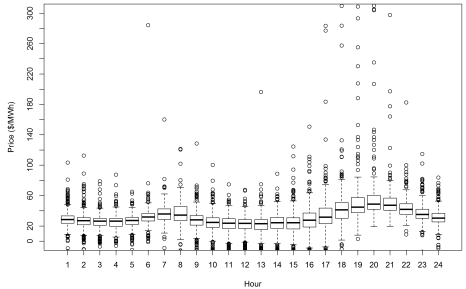

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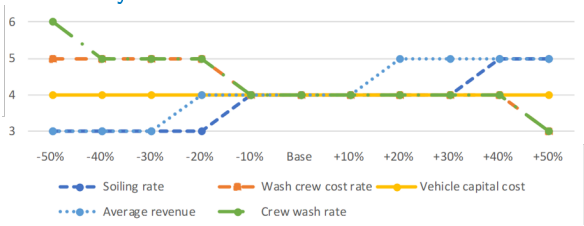
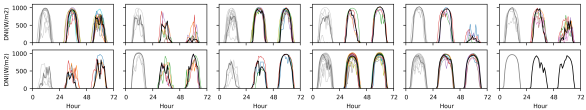
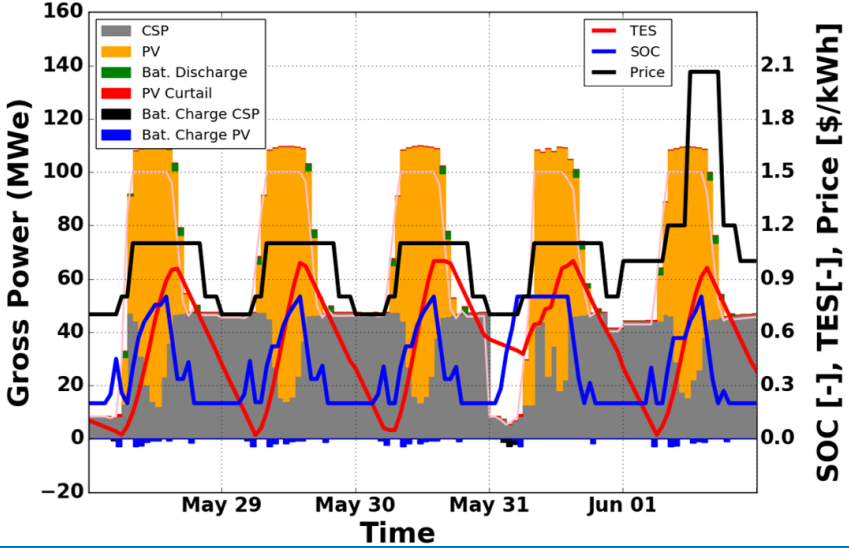


How can machine learning techniques improve plant performance over time and relieve operator inconsistency?

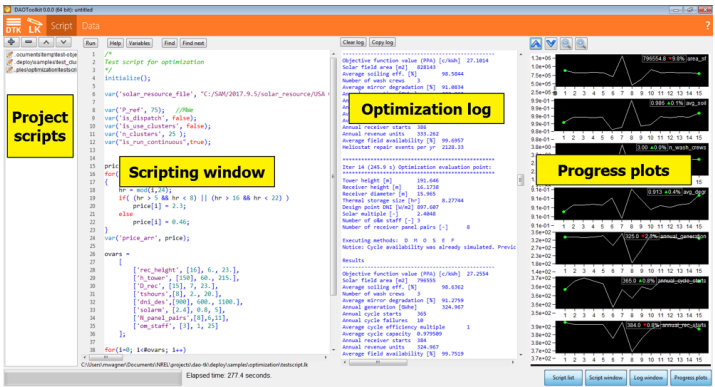


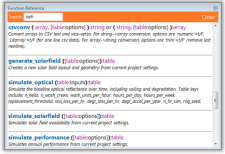
Improving our understanding of complex operating relationships

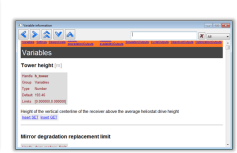


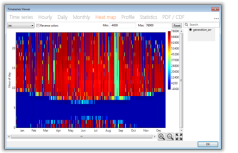
Software interface

Design Analysis Operations Toolkit (DAO-Tk) Is a flexible software package derived from SAM that incorporates recent advances in dispatch optimization, failure simulation, and forecast uncertainty to provide holistic power tower system characterization.









Thank you!