

Development of the Renewable Dispatchable Generation Model

Overview of SEPA & ScottMadden Engagement



Speakers

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About SEPA



SEPA is an educational non-profit (501c3)

585+ Utility Members

495+ Non-Utility Members

Core Functions

Education

Research

Advisory Services

SEPA Mission & Focus

- Our mission is to facilitate the utility industry's smart transition to a clean energy future through education, research, and collaboration
- Our focus centers on solar, storage, demand response, and other enabling technologies



COMMUNITY

Members, Events, USC, Fact Finding Missions, Partnership Opportunities, Power Player Awards



DATA

USD, Solar Calculators, Mapping Tools, Research Reports, Project and RFP News, Custom Research Solutions



INSIGHTS

Advisory Services, Webinars, Workshops, Case Studies, SEPA Publications, Blog, Expert Commentary

About ScottMadden



ScottMadden is a management consulting firm with more than 30 years of deep, hands-on experience.

We deliver a broad array of consulting services—from strategic planning through implementation—across the energy utility ecosystem.

W E D O
**WHAT IT TAKES
TO GET IT DONE
RIGHT**

ENERGY

Our Energy practice has been serving the industry since 1983 by solving the right problem, the right way, and delivering real results.

We provide guidance on how to solve the right problem with industry-leading practices and management insights.

CLEAN TECH & SUSTAINABILITY

Our Clean Tech & Sustainability practice helps you develop innovative solutions based on a unique understanding of what works in the energy industry through a perspective built from 30 years of energy experience.

We provide guidance on navigating clean and renewable sources of energy, smart energy management, and sustainability.

GRID TRANSFORMATION

Our Grid Transformation practice helps you transform the way you operate, plan, and maintain the grid and interact with your customers.

We provide guidance on how to proactively engage with regulators through this transformation.

RATES, REGULATION, & PLANNING

Our Rates, Regulation, & Planning practice helps you develop your regulatory strategy, prepare your filing, and manage your rate case process.

We provide expert testimony on a wide range of issues and can help you with regulatory policy, best practices, regulatory process improvement, preparation for compliance audits, and more.

State of the State: Curtailment Risk in Hawai'i

- Increasing penetration of distributed PV has created a surplus of daytime, non-dispatchable generation on all of the Hawaiian Islands
- This generation, which is not directly controlled by the utilities, is effectively “must take”; that is, the utilities must manage other conventional and renewable generation resources around the output of these systems
- Each island must balance load and generation on its own – **no interconnected system between the islands exists**
- Because of distributed solar penetration, some islands are projecting curtailment as high as 20% to 50% in the near future

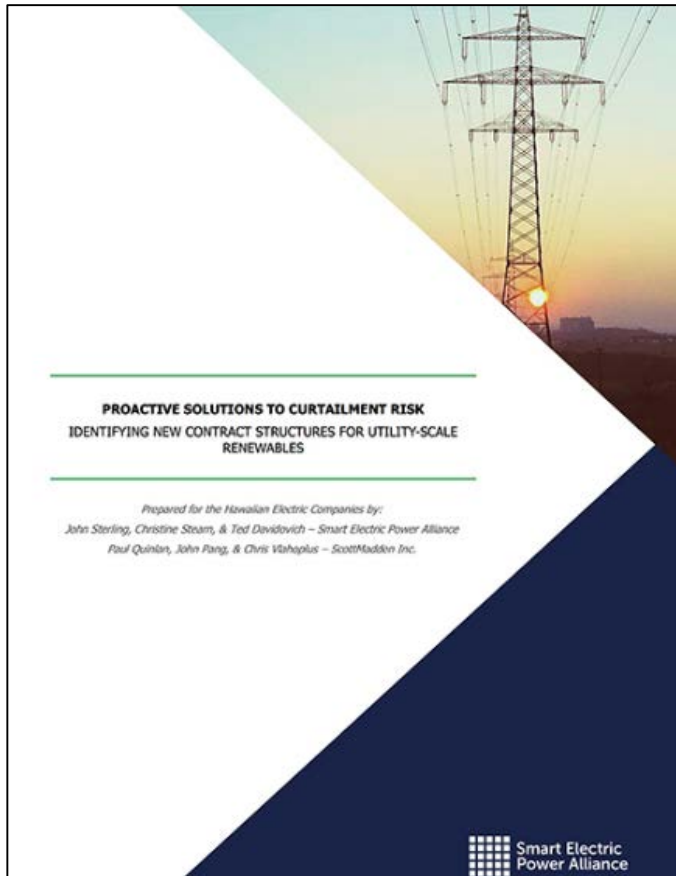
Changing How We Think



- 100% RPS requires a mindset shift
 - Over-procurement of intermittent generation
 - Resources may see increased curtailment
- New contracting approaches can address these issues
 - Resource assessment
 - Facility availability
 - Operational flexibility
 - Risk allocation
- Need to move beyond the mindset and language of “curtailment” in favor of “dispatchability”
- Need for robust modeling to support new contracting structures

As Hawai'i moves towards a 100% renewable future, contracting for firm capacity and ancillary services from renewable resources becomes extremely important

Project Overview



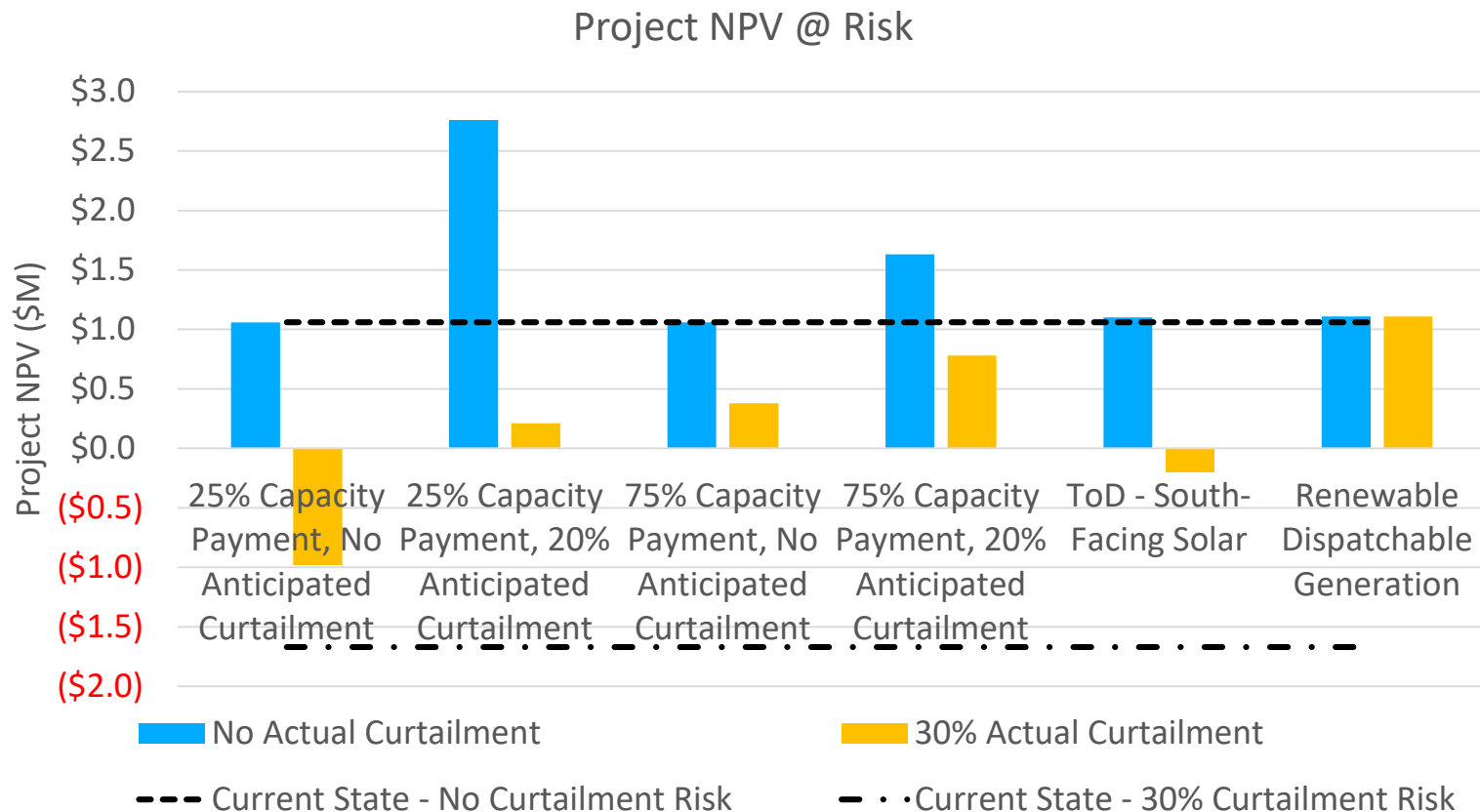
- SEPA and ScottMadden brought in to help identify innovative solutions to better allocate the risk of curtailment between all parties (developers, utility, consumers)
- Considered over a dozen new procurement and contracting models that could help address curtailment risk
- Deep dived on three specific approaches:
 - Capacity and Energy PPAs
 - Time-of-Day Pricing
 - **Renewable Dispatchable Generation (RDG) Model**
- Report is publicly available at www.sepapower.org
www.scottmadden.com

Project Overview: Quantitative Review

- Assumed a 10 MW solar installation with an LCOE of \$100/MWh as a baseline project
- Considered risk from multiple vantage points (both IPP and customers) via quantitative metrics
 - Project NPV
 - Debt Service Coverage Ratio
 - Effective PPA Price (\$/MWh delivered)
- Reviewed two scenarios for how projects may be priced
 - No anticipated curtailment
 - 20% anticipated curtailment
- Reviewed four scenarios for how actual curtailment impacts economics
 - 0% / 10% / 20% / 30% actual curtailment

Impact of New Structures on Project NPV

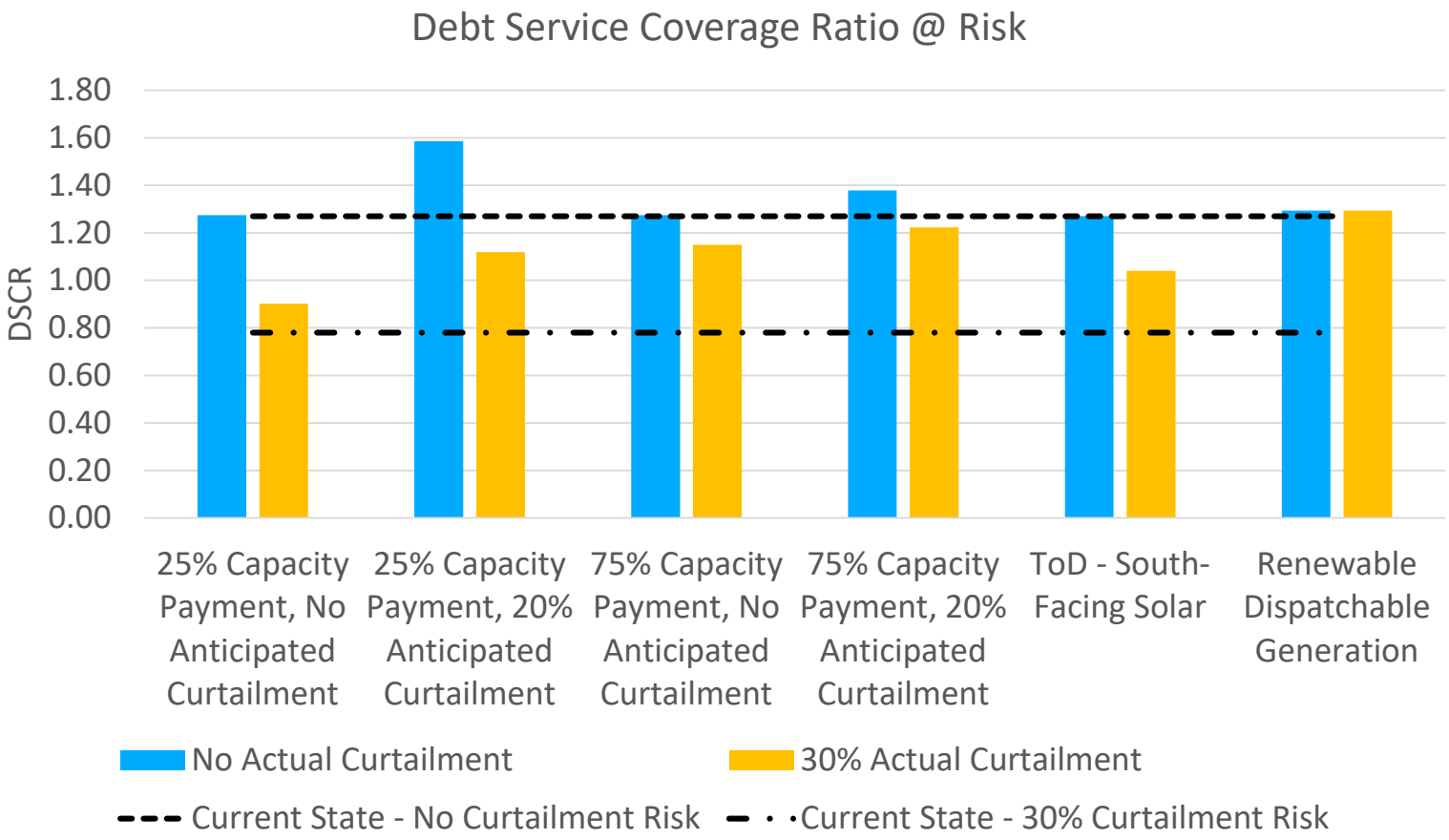
All models considered reduced the downside risk for developers on project NPV



Impact of New Structures on DSCR*



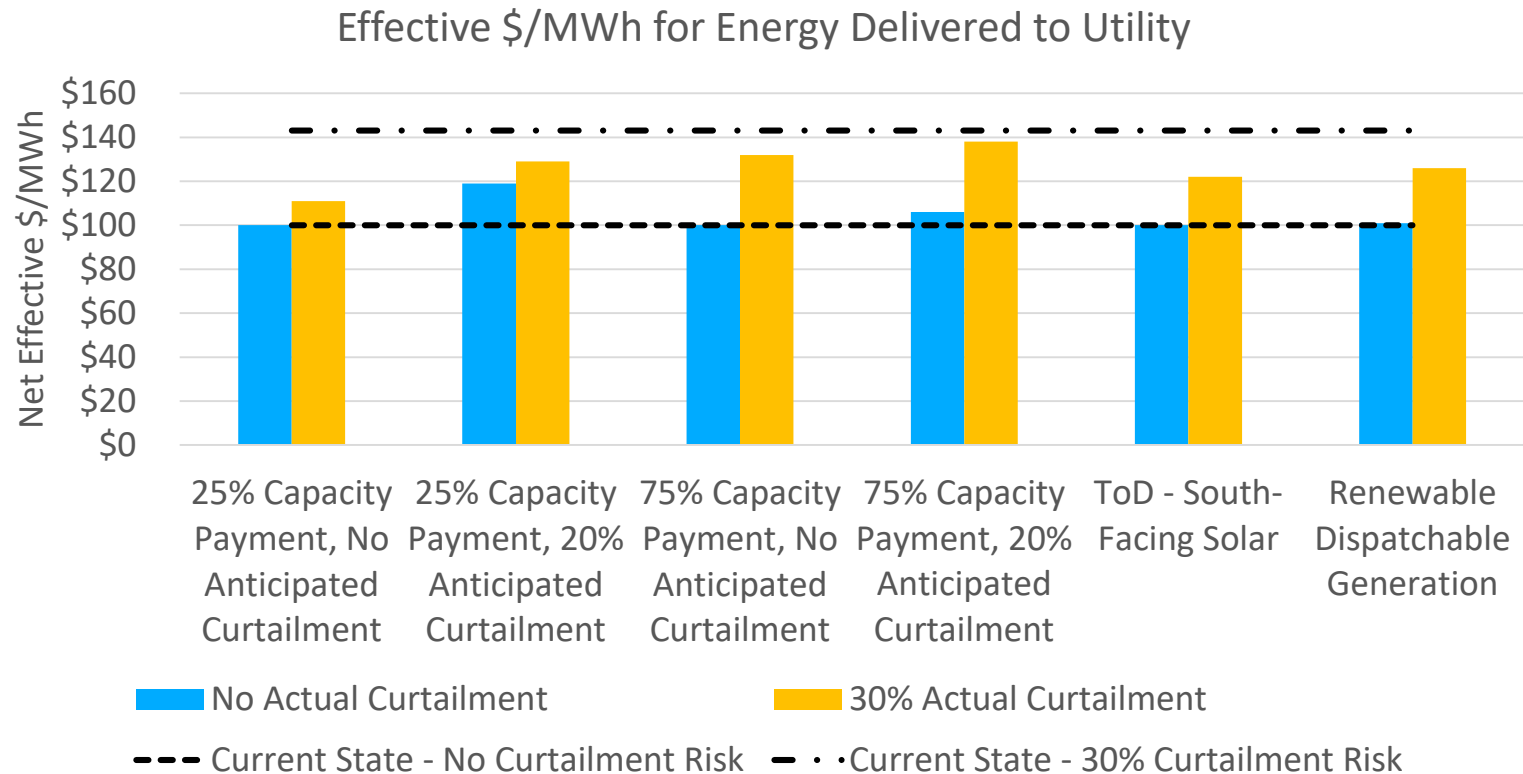
All models considered reduced the downside risk for developers on project DSCR



*Debt Service Coverage Ratio (DSCR) represents the likelihood that a project's future revenue streams can cover its debt obligations; frequently used by lenders to set rates when financing a project

Impact of New Structures on Effective \$/MWh for Delivered Energy*

All models considered reduced the Effective \$/MWh for customers in high curtailment situations



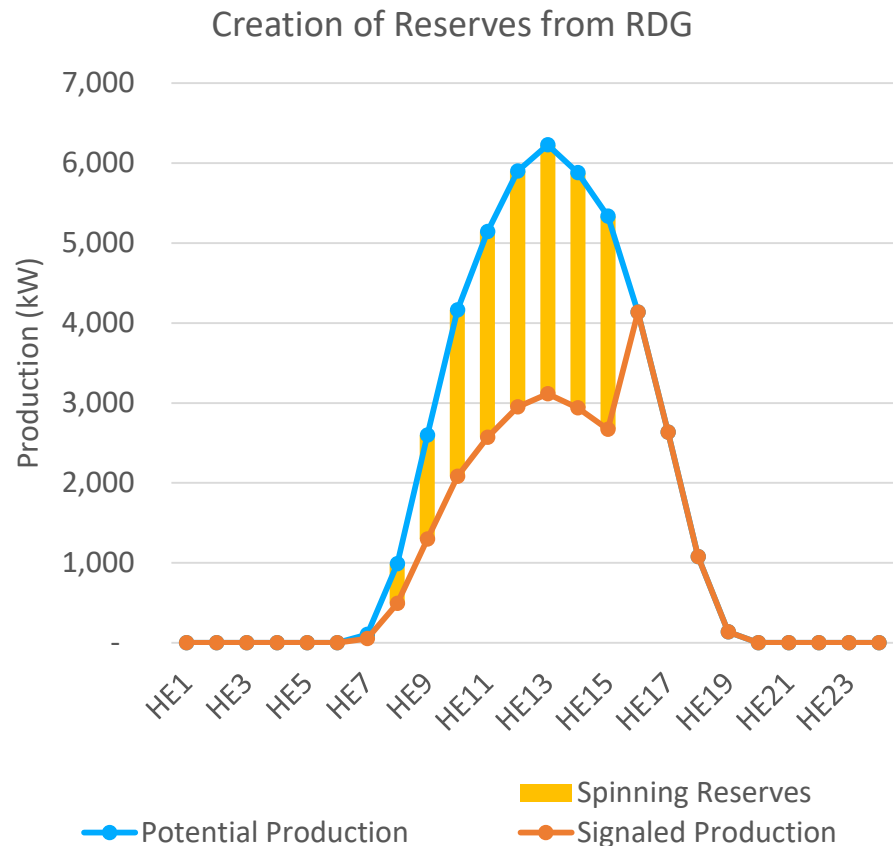
*Effective \$/MWh = The all-in price that customers pay for energy delivered, after considerations for fixed and variable costs, and payments for undelivered energy

RDG Model: Key Concepts



Intent: To maximize value from future variable generation resources by increasing the operational flexibility necessary to optimize dispatch of the HECO system

- As Hawai'i moves towards 100% RPS, procuring ancillary services through renewable resources becomes of increasing value to the system
- RDG Model converts curtailment into dispatch, and creates the potential for measurable and valuable grid support services (frequency response, spinning reserves, etc.)



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