

NREL's Cost of Renewable Energy Spreadsheet Tool (CREST)



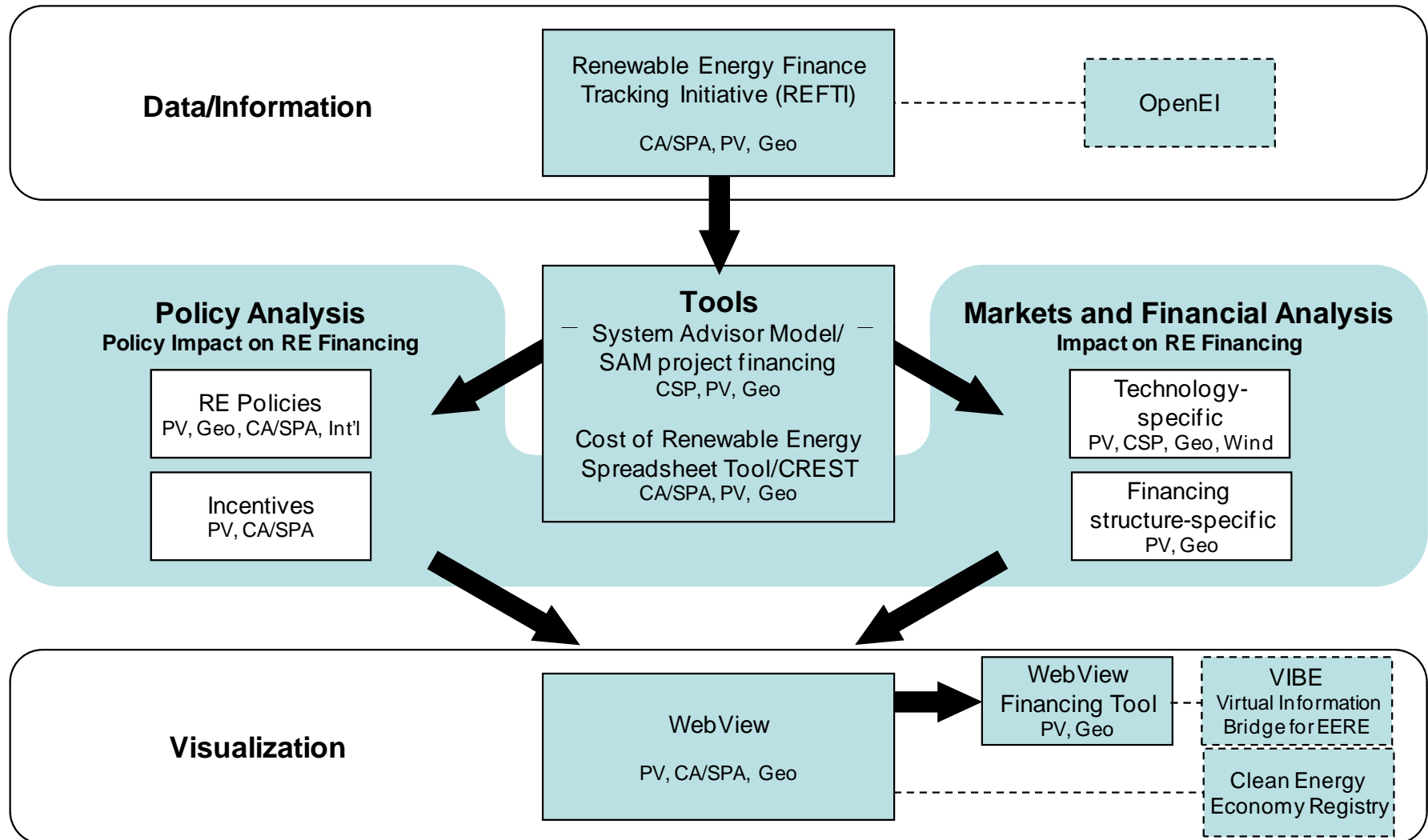
**Finance Team &
CREST Overview**

Michael Mendelsohn

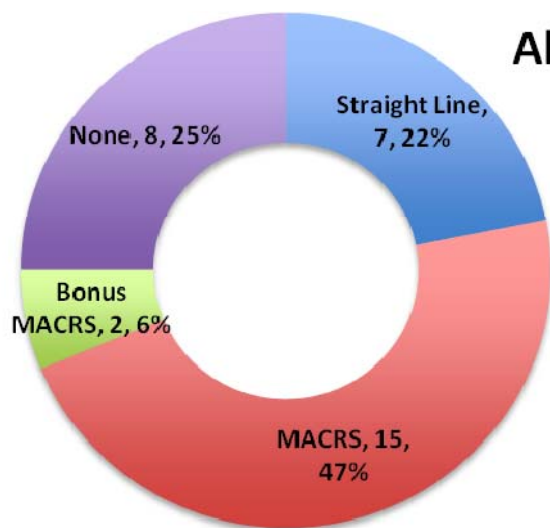
***NREL's Strategic
Energy Analysis Center***

May 16, 2011

NREL Finance Team Activities, by Activity Type



Data - RE Finance Tracking Initiative (REFTI)

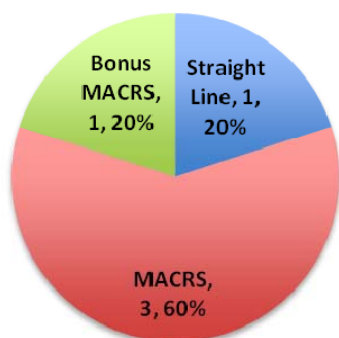


All Technologies

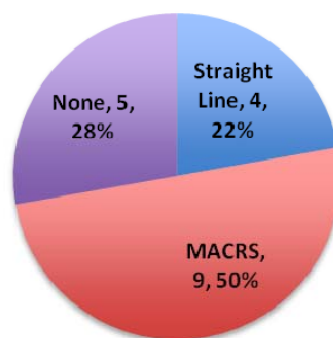
Form of Depreciation Taken

MACRS depreciation applied in roughly half of projects reported (32 participants responding)

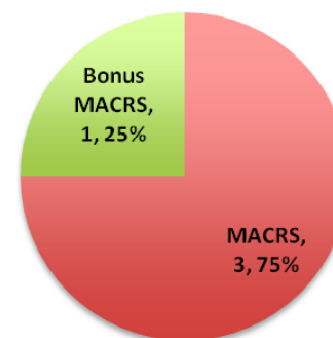
Wind



PV < 1 MW



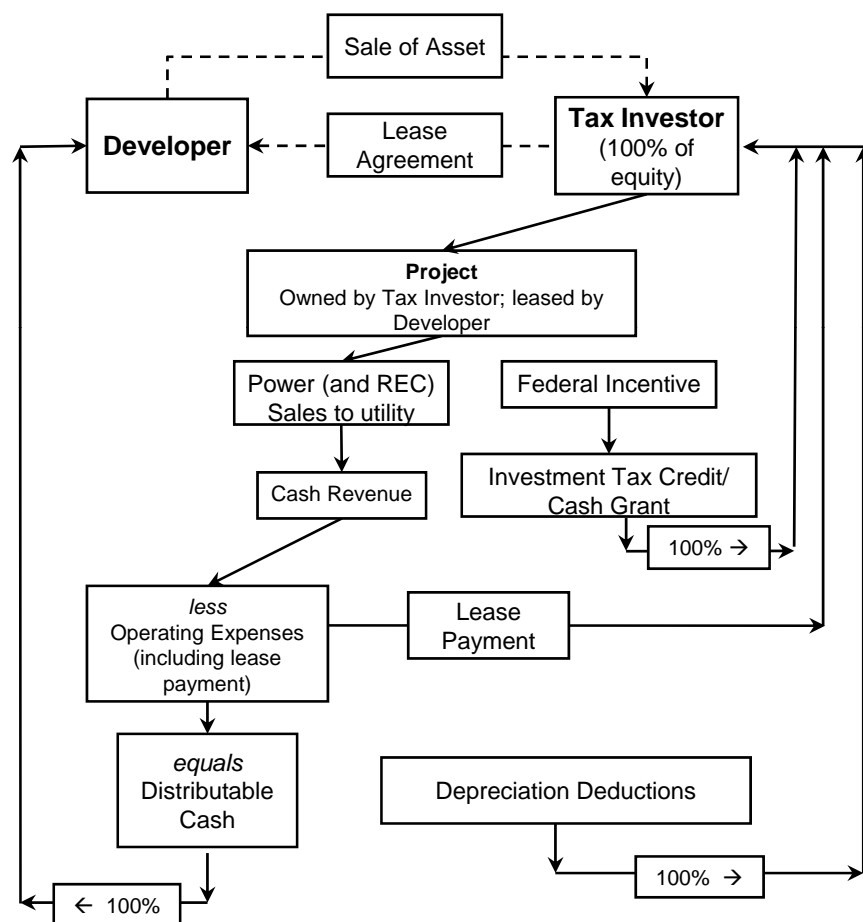
PV >= 1 MW



Q4 2010 results webinar on 5/17

Tools – Adding Adv. Financial Structures to SAM

Sale Leaseback



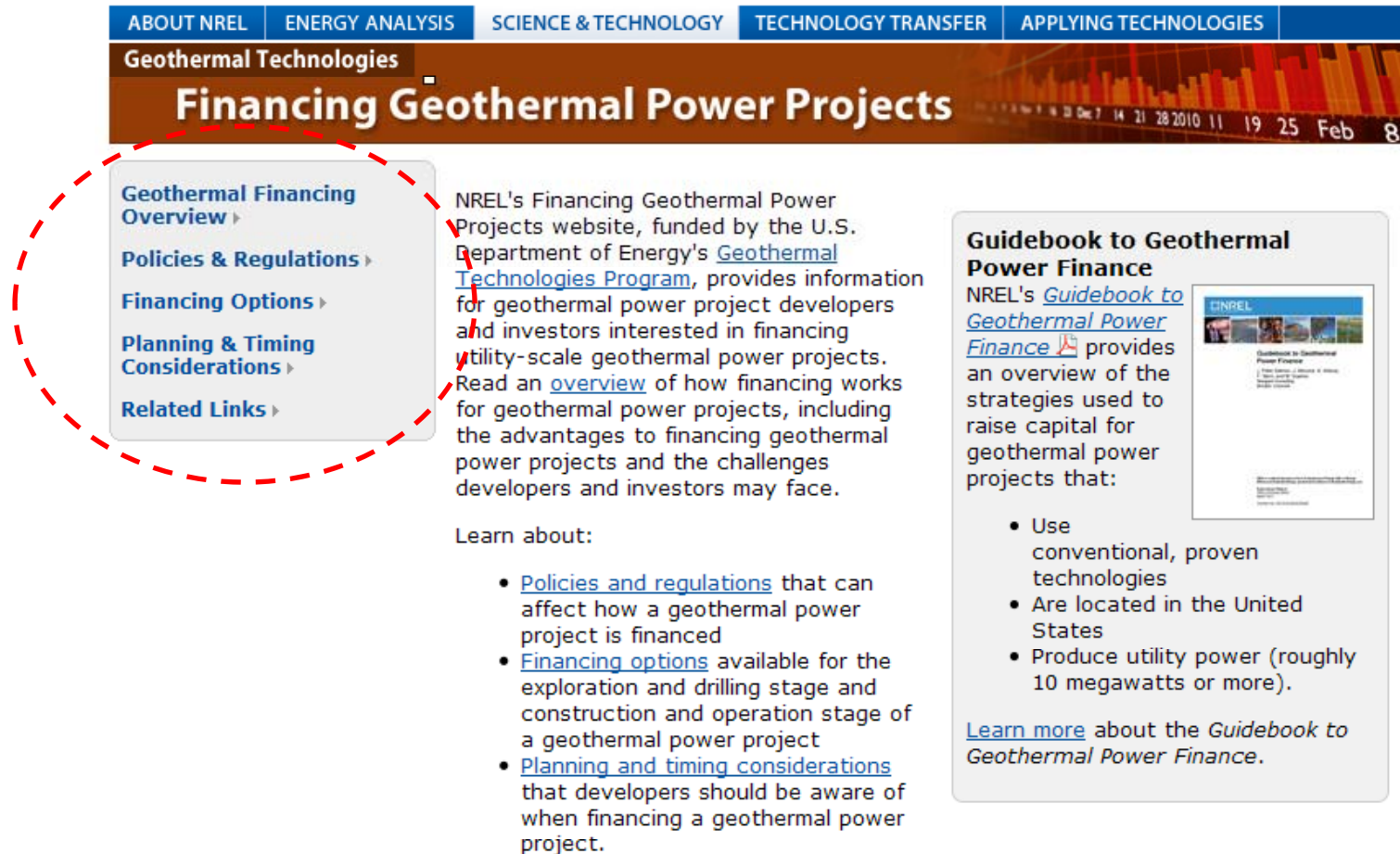
Structure Details:

- Developer constructs project and sells 100% to Tax Investor.
- Developer (Lessee) leases the project back from Tax Investor (Lessor).
- Lessee operates the project and pays Lessor an annual lease payment. Lease payment sized to provide Lessor with target return.
- Lessee retains free cash flow after lease payments and operating costs.
- Lessor receives annual lease payment from Lessee, and tax incentives and depreciation from ownership of project assets.
- Each party to the transaction has a separate taxable income (project taxable income is not shared as in the Partnership Flip Structures).

SAM beta testing to begin in April, new version by April / May

Content - Guide to Geothermal Power Finance

www.nrel.gov/geothermal/financing



ABOUT NREL **ENERGY ANALYSIS** **SCIENCE & TECHNOLOGY** **TECHNOLOGY TRANSFER** **APPLYING TECHNOLOGIES**

Geothermal Technologies

Financing Geothermal Power Projects

Geothermal Financing Overview ▶

Policies & Regulations ▶

Financing Options ▶

Planning & Timing Considerations ▶

Related Links ▶

NREL's Financing Geothermal Power Projects website, funded by the U.S. Department of Energy's [Geothermal Technologies Program](#), provides information for geothermal power project developers and investors interested in financing utility-scale geothermal power projects. Read an [overview](#) of how financing works for geothermal power projects, including the advantages to financing geothermal power projects and the challenges developers and investors may face.

Learn about:

- [Policies and regulations](#) that can affect how a geothermal power project is financed
- [Financing options](#) available for the exploration and drilling stage and construction and operation stage of a geothermal power project
- [Planning and timing considerations](#) that developers should be aware of when financing a geothermal power project.

Guidebook to Geothermal Power Finance

NREL's [Guidebook to Geothermal Power Finance](#) provides an overview of the strategies used to raise capital for geothermal power projects that:

- Use conventional, proven technologies
- Are located in the United States
- Produce utility power (roughly 10 megawatts or more).

[Learn more](#) about the *Guidebook to Geothermal Power Finance*.

Content, cont'd.

<http://financeRE.nrel.gov>

Weekly Blog Articles

- *Do New Dodd-Frank Regulations Impact REC and Allowance Markets?*
- *Drilling Down Into the Cost of Geothermal Energy (upcoming)*
- *A Chicken in Every Pot? Is there Enough Tax Equity to Sustain the RE Market?*
- *Wanna Improve Financing of RE Projects? Include a Charitable Organization*
- *Five Steps to Crafting Geothermal Policy*
- *Staying (Cash Flow) Positive: Investor Requirements for RE Project Financing*
- *Grazing in the Grass? Making Sense of the New BLM Rate Structure for Solar Projects*

Regular Feature Analyses

- *Power Purchase Agreement Checklist for State & Local Governments*
- *DOE's Loan Guarantee Program: A Primer*
- *First Known Use of QECBs will Save Yolo County at least \$8.7 Million over the Next 25 Years*
- *NREL's Renewable Energy Project Finance Tracking Initiative (REFTI)*

Visualization - RE Project Finance Website

http://financeRE.nrel.gov

The screenshot shows the website's layout. At the top is the NREL logo and a navigation bar with links: HOME, FIND CONTENT, FEATURED ANALYSIS, BLOGS, EVENTS, GLOSSARY, LINKS, and CONTACT US. The main content area is divided into several sections. On the left, a 'Welcome' message is followed by a list of site features: a comprehensive Resource Database, featured case studies and analysis, a weekly blog, and an upcoming events listing. Below this is a 'User Log-in' section with a search bar and a 'Filter by Sector' dropdown menu. The right side features a 'PPA Checklist for State and Local Governments' with a photo of a city skyline and solar panels, and a 'Market Insights Blog' with several article titles and dates. Callout boxes with arrows point to specific elements: 'User Login: registered users can comment, rate content' points to the login section; 'Flexible Search: by keyword, or by filters (single/multi-) by sector, tech, size, policy, financing structure, and/or content type' points to the search and filter options; 'Feature Analyses: Unique NREL analysis about policies, innovations and market conditions that impact RE project financing' points to the PPA Checklist; and 'Blog Analyses: Credible, objective policy and market observations from NREL analysts' points to the Market Insights Blog.

Renewable Energy Project Finance

HOME FIND CONTENT FEATURED ANALYSIS BLOGS EVENTS GLOSSARY LINKS CONTACT US

Welcome

The Renewable Energy Project Finance community is your guide to project financing, market issues, and policies.

This site features:

- A comprehensive [Resource Database](#) filled with reports, presentations, and tools on financing topics
- Featured [case studies and analysis](#) on the current state of the market
- A [weekly blog](#) highlighting analysis from NREL
- An [upcoming events](#) listing from a variety of conference and Webcast organizers.

Directly below this text, you will find the portal to our Resource Database, which is navigated by selecting the filters or typing keywords that interest you.

User Log-in

Login | Register

Search

Filter by Sector

Business
Federal agency
Homeowner

PPA Checklist for State and Local Governments

This fact sheet provides information and guidance on the solar photovoltaic (PV) power purchase agreement (PPA), which is a financing mechanism that state and local government entities can use to acquire renewable energy.

[Previous](#) [Pause](#) [Next](#)

Market Insights Blog

Staying (Cash Flow) Positive: Investor Requirements for RE Project Financing
Karllynn Cory - November 8, 2010

Developers and Investors Doing "Flips" for Government Tax Incentives: A Discussion of Partnership Flips
Paul Scharfenberger - November 1, 2010

Peeling the Onion: The Layers of Capital Structures
Paul Schwabe - October 25, 2010

Coordinate, Collaborate, Innovate: the Case of California's Renewable Energy Funds

User Login:
registered users can comment, rate content

Flexible Search: by keyword, or by filters (single/multi-) by sector, tech, size, policy, financing structure, and/or content type

Blog Analyses: Credible, objective policy and market observations from NREL analysts

Feature Analyses:
Unique NREL analysis about policies, innovations and market conditions that impact RE project financing

CREST - Development

- Borne from DOE – NARUC Partnership: Saw need for simple yet robust tool. DOE sponsors include:
 - *Geothermal*
 - *Solar*
 - *EERE Corporate Analysis*
- Exeter Associates hired to assess current publicly-available tools & design/build new model. Team incl:
 - *Sustainable Energy Advantage* *
 - *Meister Consulting Group*
- Worked with several PUCs in development:
 - *Colorado*
 - *Hawaii*
 - *Michigan*
 - *Washington*

CREST – Project Objectives

Create a toolkit for cost-based rate-setting in the US

- Report, Models, User Manual

CREST models:

- *Cherry-pick best features of other public models*
- *Balance ease-of-use and rich feature set*
- *No macros*
- *Provide immediate feedback on inputs of concern*

<u>Inputs</u>	<u>Constraints</u>	<u>Outputs</u>
Size & Performance Capital Costs O&M Costs Financing Ownership/Tax Incentives Reserves Depreciation	Debt Service Coverage Ratios <ul style="list-style-type: none">– Minimum– Average	<ul style="list-style-type: none">• Cost of Energy• Levelized Cost of Energy (LCOE)

CREST Models Available

- At following link:
 - <http://financere.nrel.gov/finance/content/CREST-model>
- Or Google “CREST Model”
- Models are protected outside of primary inputs
- Caveat: some technical issues with Mac version of MS Excel (NREL still working on a solution)
- User manual available at same site
- Analytic report to come shortly

Model intro & walk-through...