Capstone Solar Professionals

DOO Solar Webinars for Developers, Owners, and Operators:

How to Value Solar Energy Assets

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Ken Kramer has more than 30 years' experience building businesses and consulting on valuation and banking for clients on techniques that support finance, investment, insurance, taxation and financial reporting requirements. Kramer has served in industries that include manufacturing, transportation, telecommunications, power & energy, and infrastructure.

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Why do you need to know?

- If you are building a solar PV system, you don't need an appraisal to determine costs, but…
- For financing, you must document asset value (and debt service coverage) for:
  - Sec. 1603 cash grants
  - Bank & bond debt
  - Sale/leaseback financing
  - Tax equity
- If acquiring an existing facility, you are primarily concerned with its earning power. Also …
- What could possibly go wrong?

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What is Value?

Types of Value

- Scrap Value
- Auction Value
- Orderly Liquidation Value
- Fair Market Value in Exchange
- Fair Market Value in Place
- Fair Market Value in Continued Use

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What is Value?

Fair Market Value

Fair Market Value is the estimated amount at which the appraised property might be expected to exchange between a willing buyer and a willing seller, neither being under compulsion, each having reasonable knowledge of all relevant facts.

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What is Value?

Fair Market Value

When fair market value is established on the premise of **continued use**, it is assumed the buyer and the seller would be contemplating retention of the property at its present location for continuation as part of the current operations.

An estimate of Fair Market Value arrived at on the premise of continued use does not represent the amount that might be realized from piecemeal disposition in the open market or from an alternative use of the property.

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Approaches to Value

- Cost Approach
  - Depreciated Replacement Cost New (RCN)
- Income Approach
  - Net present value of projected after-tax cash flows
- Market Approach
  - Based on comparable market transactions, if available

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Approaches to Value
Reconciliation

- Must consider all approaches to value
- Must consider all facts and circumstances surrounding each asset:
  - Age
  - Operating history
  - Contracts
- Reason for weighting must be substantiated
- The market drives value more than any other approach to value.

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Residual Value

- Net present value, as of residual date, of subsequent after-tax cash flows
  - Deinstallation, transport and reinstallation of equipment
  - Extension of PPA at existing location

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Cash Flow Model Inputs

- Capacity 1,250 KW
- Capital cost $6,400,000
- Solar power production 1,482,000 KWH
- Degradation 0.5% p.a.
- PPA Pricing $0.12/KWH
- SREC pricing $0.475/KWH
- Operating Expenses $52,649
  (O&M, Insurance, Monitoring)
- Inflation 3% p.a.
- 1603 Cash Grant 30%
- Depreciation – 5-years MACRS w/ 15% basis reduction
- Tax Rate 40%
- Residual Value @ year 20 (inflated) $1,292,800
- Discount Rate (After tax) 5.75%

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Discount Rate - Weighted Average Cost of Capital

- WACC = [Kd x %D x (1-T)] + [Ke x %E]
  - Kd = cost of debt capital — 5.5%
  - %D = proportion of debt to total capital — 52%
  - T = marginal tax rate — 40%
  - Ke = cost of equity capital — 8.3%
  - %E = proportion of equity to total capital — 48%
- Ke = Rf + (ß x Rp) + Ru
  - Rf = risk-free rate of return — 3.8%
  - ß = beta — 0.9
  - Rp = common stock risk premium — 5%
  - Ru = unsystematic or additional risk premium — 0

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Sample Discounted Cash Flow Model

Discounted cash flows:	1	2	3	4	5	6	7	8
Power sales	177,853	182,273	186,802	191,444	196,201	201,077	206,074	211,195
SRECs	704,001	700,481	696,979	693,494	690,027	686,576	683,144	679,728
Total revenues	881,854	882,754	883,781	884,938	886,228	887,653	889,217	890,923
Less operating expenses	52,649	53,397	54,168	54,962	55,780	56,623	57,490	58,384
Net operating (pretax) income	829,205	829,356	829,613	829,976	830,448	831,031	831,727	832,538
Depreciation	1,088,000	1,740,800	1,044,480	626,688	626,688	312,800		
Taxable income	-258,795	-911,444	-214,867	203,288	203,760	518,231	831,727	832,538
Tax at 40%	-103,518	-364,577	-85,947	81,315	81,504	207,292	332,691	333,015
After Tax Income	-155,277	-546,866	-128,920	121,973	122,256	310,938	499,036	499,523
Add back depreciation	1,088,000	1,740,800	1,044,480	626,688	626,688	312,800		
After Tax Operating Income	932,723	1,193,934	915,560	748,661	748,944	623,738	499,036	499,523
Residual Value (after tax)								
	932,723	1,193,934	915,560	748,661	748,944	623,738	499,036	499,523
Present Value factor @ 5.75%	0.9456265	0.894209	0.845588	0.799611	0.756133	0.715019	0.676141	0.639377
	882,008	1,067,627	774,186	598,637	566,301	445,985	337,419	319,384
Energy Tax Credit (30%)	1,920,000							
Present Value of Cash flows	2,802,008	1,067,627	774,186	598,637	566,301	445,985	337,419	319,384
	8,398,101							

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Sample Discounted Cash Flow Model (cont'd.)

Discounted cash flows:	9	10	11	12	13	14	15	16
Power sales	216,443	221,822	227,334	232,983	238,773	244,706	250,787	257,019
SRECs	676,329	672,948						
Total revenues	892,772	894,769	227,334	232,983	238,773	244,706	250,787	257,019
Less operating expenses	59,305	60,253	61,229	62,235	63,271	64,338	65,438	66,570
Net operating (pretax) income	833,468	834,516	166,105	170,748	175,501	180,368	185,350	190,450
Depreciation								
Taxable income	833,468	834,516	166,105	170,748	175,501	180,368	185,350	190,450
Tax at 40%	333,387	333,807	66,442	68,299	70,201	72,147	74,140	76,180
After Tax Income	500,081	500,710	99,663	102,449	105,301	108,221	111,210	114,270
Add back depreciation								
After Tax Operating Income	500,081	500,710	99,663	102,449	105,301	108,221	111,210	114,270
Residual Value (after tax)								
	500,081	500,710	99,663	102,449	105,301	108,221	111,210	114,270
Present Value factor @ 5.75%	0.604612	0.571737	0.54065	0.511253	0.483454	0.457167	0.432309	0.408803
	302,355	286,274	53,883	52,377	50,908	49,475	48,077	46,714
Energy Tax Credit (30%)								
Present Value of Cash flows	302,355	286,274	53,883	52,377	50,908	49,475	48,077	46,714

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Sample Discounted Cash Flow Model (cont'd.)

Discounted cash flows:	17	18	19	20
Power sales	263,406	269,952	276,660	283,535
SRECs				
Total revenues	263,406	269,952	276,660	283,535
Less operating expenses	67,736	68,937	70,174	71,448
Net operating (pretax) income	195,670	201,015	206,486	212,087
Depreciation				
Taxable income	195,670	201,015	206,486	212,087
Tax at 40%	78,268	80,406	82,594	84,835
After Tax Income	117,402	120,609	123,892	127,252
Add back depreciation				
After Tax Operating Income	117,402	120,609	123,892	127,252
Residual Value (after tax)				1292800
	117,402	120,609	123,892	1,420,052
Present Value factor @ 5.75%	0.386575	0.365555	0.345679	0.32688311
	45,385	44,089	42,827	464,191
Energy Tax Credit (30%)				
Present Value of Cash flows	45,385	44,089	42,827	464,191

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Sensitivities - “what if?...”

- Loss of residual
- Change in PPA rate
- Change in SREC revenue
- Less creditworthy offtaker – higher discount rate
- Bonus vs. standard MACRS depreciation
- NOL carryforward
- Maintenance / Reserve / Insurance

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NPV Impact of Pricing Changes

Base Case	Without residual	Reduced PPA Rate	Reduced SREC Revenue	Higher Discount Rate	Bonus Deprec-iation	Tax Loss Carry-forward
	Cost to move is not economic	PPA reduction from $0.12 to $0.11/kwh	Years 6-10 reduced by 50%	Weaker off-taker WACC =10%	All deprec-iation claimed in first year	Project must absorb its own tax losses
$8.398	$7.975	$8.271	$7.744	$7.120	$8.555	$8.301
	(5%)	(2%)	(8%)	(15%)	2%	(1%)

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Questions and Discussion

Please enter your questions into the Chat window

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Questions

John: Discuss valuations for 3 types of solar players

1. Equipment manufacturers like GT Solar
2. Panel manufacturers
3. Installers like principal solar

Ken Kramer:

- **I would not analogize a big public company to a solar PV installation, but a factory making panels or inverters would be analyzed similarly to what was done here. A solar system is an "electron factory", with capital costs, operating costs, and revenue streams – no different conceptually from a widget factory in terms of setting up a cash flow model.**

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Questions

Scott: Renewable vs. Renewable, I read this morning about the Bonneville Power Authority in Washington state issued a new set of rules governing when they would buy hydropower preferentially over wind – thus re-writing the contracts and revenue estimations that many wind generators were relying on. How can you account for something of this nature when valuing an asset with a 2-decade + life span?

KK: The Bonneville situation shows that "stuff happens," and there may be greater (and less predictable) risks in selling power under a "binding" PPA than market participants currently realize. Not having seen this PPA, I would expect legal challenges due to what appear to be unilateral contract changes by Bonneville, but in general you need a cushion to handle the unknown, and there is apparently more unknown out there than we thought. If the world is a more complicated place, the discount rates used to analyze these transactions should be higher to reflect a higher levels of risk.

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Questions

- Michael: How expensive is an official appraisal like you discuss here, who is typically paying that fee in the PV solar industry, and how often do you need a new appraisal?

- **KK: Appraisals are typically done to support financings and acquisitions, generally upfront, but in some cases for periodic portfolio reviews as well. Price is typically a flat fee based on scope of work, calculated from man-hour estimates. The American Society of Appraisers does not allow fees as a percentage of appraised value, because of the obvious potential conflict of interest.**

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Questions

- Ken: Typically, what size of systems need appraisals? In kW or $

- **KK: We are not involved in the residential market, more in inside-the-fence commercial/industrial installations, starting in the hundreds of KW, up to utility-scale plants. Really depends on who is paying for the appraisal and what kind of financing is being used.**

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Questions

- Ken: What impact on valuation does the risk of losing the SREC income carry. This market is unstable and relies on local politics?

- **KK: The finance world prefers to see the long-term contracts in SRECs, similar to long-term PPAs. Even if spot SREC markets are higher than long-term markets, it is difficult to base long-term project finance on the assumption those relationships will continue.**

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