

Novogradac Journal of Tax Credits

News, Analysis and Commentary On Affordable Housing, Community Development and Renewable Energy Tax Credits

November 2010, Volume I, Issue XI

Published by Novogradac & Company LLP

Q&A Valuation Issues and Renewable Energy Part two of two

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Question: What are the current costs and related market trends that affect the valuation of fair market value for renewable energy assets?

Answer: Based on published industry data and the current market transactions, the cost of solar grade silicon and other materials used to produce solar panels have decreased significantly since December 2007. It is our understanding that the cost of solar panels for customers that purchase in volume is approximately \$2,000 to \$2,250 per kilowatt (kW) direct current (DC). Solar panels produced by Chinese manufacturers can be purchased for closer to \$1,750 to \$2,000 per kW DC.

Reports indicate that as of December 2009, several commercial rooftop solar installations in the 500 kW DC range closed at a cost per kW DC in the range of \$7,500 to \$8,250 per kW DC. Typically these transactions were completed among very credit worthy participants (integrator, host customer and investor). The cost of commercial solar installations when a cash customer/purchaser is involved would be lower by approximately \$1,000 per kW DC.

Numerous utility scale solar projects in the 20 megawatts (MW) to 50 MW DC range are currently in the development process. To our knowledge, none of these facilities has been completed or placed-in-service. Based on financial projections and other data, utility scale solar projects of this magnitude are pricing at approximately \$4,250 per kW DC (engineering procurement and construction (EPC) contract) with a development fee or margin of 15 to 20 percent in addition to the EPC contract. Permitting, construction interest

and other eligible costs could bring this total higher. The amounts above would indicate an overall development cost range of \$4,900 to \$5,100 per kW DC for utility scale projects.

As an example of typical data utilized in our analyses we present several tables. The following table and chart outline typical development costs of solar panel systems from a variety of sources.

The development costs include all costs associated with the solar panels and the installation of the panels. Much of this data is based on work Novogradac & Company has performed. The National Renewable Energy Laboratory (NREL) also tracks development costs for photovoltaic (PV) systems on a national basis. The following graph outlines the costs per kilowatt for the nation and California from NREL's Open PV Project database.

As indicated in this graph, installation costs have declined since 1998. According to NREL, current national average installation costs are \$8,700 per kW DC. Given the amount of California data, the state trend is similar to the national level. The data in the graph appears to slightly lag the data found in the Open PV Project database.

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Development Costs							
Source	State	Type	Site Characteristics	Size kW DC	Cost/kW DC	Effective Date	Complexity of System
Confidential	AZ	Residential	Single Site	5	\$9,330	6/2010	Roof Mount
Confidential	CO	Residential	Single Site	5	\$7,890	9/2010	Roof Mount
Confidential	CA	Residential	Single Site	5	\$7,890	8/2010	Roof Mount
Confidential	MO	Commercial	Single Site	26	\$9,271	8/2010	Roof Mount-Multiple Buildings
Confidential	MO	Commercial	Single Site	34	\$9,672	8/2010	Roof Mount-Multiple Buildings
Confidential	MO	Commercial	Single Site	39	\$9,500	8/2010	Roof Mount-Multiple Buildings
Confidential	MO	Commercial	Single Site	48	\$9,582	8/2010	Roof Mount-Multiple Buildings
Confidential	MO	Commercial	Single Site	80	\$9,136	8/2010	Roof Mount-Multiple Buildings
Confidential	MO	Commercial	Single Site	82	\$9,704	8/2010	Roof Mount-Multiple Buildings
Confidential	CA	Commercial	Single Site	85	\$9,750	4/2010	Multiple Installations
Confidential	MO	Commercial	Single Site	85	\$9,579	8/2010	Roof Mount-Multiple Buildings
Confidential	OH	Commercial	Single Site	88	\$7,002	5/2010	Typical
Confidential	MO	Commercial	Single Site	96	\$8,245	8/2010	Roof Mount-Multiple Buildings
Confidential	CO	Commercial	Single Site	102	\$5,134	6/2010	Roof Mount
Confidential	CO	Commercial	Single Site	102	\$5,134	6/2010	Roof Mount
Confidential	HI	Commercial	Single Site	106	\$8,563	8/2010	Roof Mount
Confidential	CA	Commercial	Single Site	111	\$9,556	4/2010	Multiple Installations
Confidential	CA	Commercial	Single Site	112	\$9,576	4/2010	Multiple Installations
Confidential	CA	Commercial	Single Site	118	\$5,814	3/2010	Typical
Confidential	MO	Commercial	Single Site	125	\$9,614	8/2010	Roof Mount-Multiple Buildings

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ISSN 2152-646X

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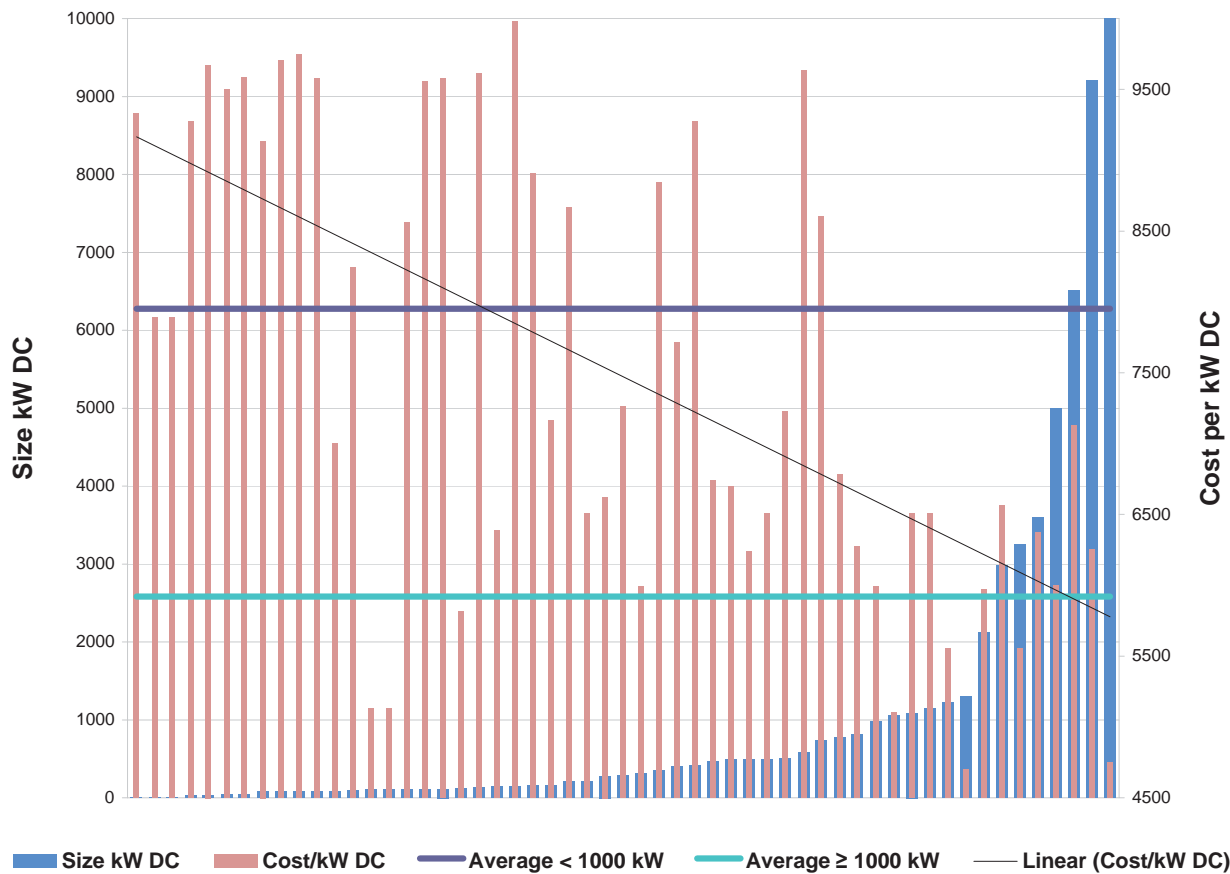
Confidential	CA	Commercial	Single Site	148	\$6,389	3/2010	Typical
Confidential	CA	Commercial	Single Site	151	\$9,981	4/2010	Multiple Installations
Confidential	CT	Commercial	Single Site	160	\$8,908	7/2010	Roof Mount
Confidential	HI	Commercial	Multiple Sites	161	\$7,165	8/2010	Roof and Ground Mount
Confidential	AZ	Commercial	Single Site	208	\$8,667	3/2010	Typical
Confidential	CA	Commercial	Single Site	212	\$6,508	9/2010	Roof Mount and Carport
Confidential	CA	Commercial	Single Site	280	\$6,624	9/2010	Roof Mount
Confidential	CA	Commercial	Single Site	290	\$7,261	9/2010	Roof Mount and Carport
Confidential	CA	Commercial	Single Site	315	\$5,991	9/2010	Roof Mount and Carport-Tracking
Confidential	AZ	Commercial	Single Site	346	\$8,842	10/2009	Roof Mount
Confidential	AZ	Commercial	Single Site	403	\$7,715	3/2010	Typical
Confidential	CA	Commercial	Single Site	415	\$9,273	4/2010	Multiple Installations
Confidential	CA	Commercial	Single Site	468	\$6,739	8/2010	Single-tracking
Confidential	MD	Commercial	Single Site	491	\$6,700	7/2008	Roof Mount
Confidential	CA	Commercial	Two Sites	492	\$6,240	7/2010	Roof Mount
Confidential	CA	Commercial	Single Site	497	\$6,508	9/2010	Roof Mount and Carport
Confidential	CA	Commercial	Single Site	499	\$7,228	3/2010	Typical
Confidential	CA	Commercial	Single Site	577	\$9,634	2/2010	Typical
Confidential	AZ	Commercial	Single Site	739	\$8,604	3/2010	Multiple Installations
Confidential	CA	Commercial	Single Site	771	\$6,782	8/2010	Roof Mount and Carport
Confidential	CA	Commercial	Single Site	816	\$6,273	3/2010	Typical
Confidential	CA	Commercial	Single Site	983	\$5,991	9/2010	Roof Mount and Carport-Tracking
Confidential	PA	Commercial	Single Site	1,060	\$5,100	3/2010	Typical
Confidential	CA	Commercial	Single Site	1,088	\$6,508	9/2010	Roof Mount
Confidential	CA	Commercial	Single Site	1,149	\$6,505	9/2010	Ground Mount-Tracking
Confidential	CA	Commercial	Single Site	1,221	\$5,554	9/2010	Ground Mount-Tracking

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Confidential	NC	Utility	Single Site	1,300	\$4,700	5/2010	Ground Mount
Confidential	AZ	Utility	Single Site	2,117	\$5,974	10/2009	Ground Mount
Confidential	CA	Commercial	Single Site	2,980	\$6,564	3/2010	Multiple Installations
Confidential	AZ	Commercial	Single Site	3,247	\$5,555	8/2010	Ground Mount
Confidential	CA	Commercial	Single Site	3,600	\$6,372	10/2010	Typical
Confidential	PA	Commercial	Multiple Sites	5,000	\$6,000	4/2010	Typical
Confidential	AZ	Commercial	Single Site	6,512	\$7,124	3/2010	Multiple Installations
Confidential	VA	Utility	Single Site	9,200	\$6,250	6/2010	Ground Mount
Confidential	CA	Residential	Multiple Sites	10,000	\$4,750	6/2010	Multiple Systems (3kW to 6kW)

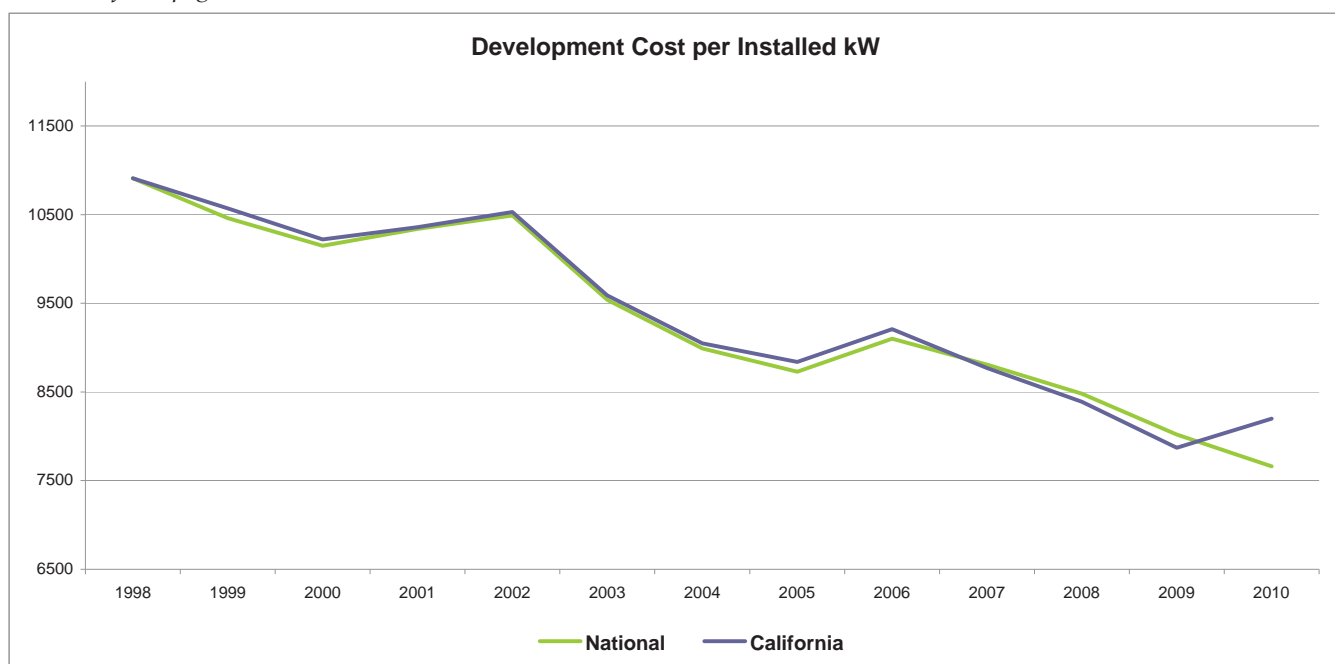
(Source: Novogradac & Company LLP, 9/2010)



(Source: Novogradac & Company LLP, 8/2010)

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(Source: Novogradac & Company LLP and NREL Open PV Project, 9/2010)



This article first appeared in the November 2010 issue of the Novogradac Journal of Tax Credits.

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