



CASE STUDY

How Adler Realty Investments used the RST CleanTech Solution to improve solar panel production 26.2%.

Overview

Adler Realty Investments, a Woodland Hills, California based firm with over 3 million square feet under management, was looking for a way to improve solar panel production.

Adler Realty Investments has experienced a noteworthy increase in panel production after cleanings, but with their current manual cleaning methods, the production quickly reverted to pre-cleaned conditions. As such, the firm was looking for a more efficient way to keep their panels clean and optimize production.

It was decided to install the RST CleanTech Solution on one of the four solar sections on the roof. By comparing weekly production before and after installation, RST CleanTech was able to measure a significant increase in panel production on the system with the RST CleanTech solution.

The objective was to increase panel production by more than 10%. After six weeks, the average increase in production was 26.2% – significantly higher than the original goal.



26.2% Increase

in production



"Our Calabasas office building has a great location in terms of freeway access and visibility, but that also translates into heavy soiling. Washing quarterly just wasn't keeping production up where we wanted it. With RST, we've witnessed over 20% increase in production so far. I plan to include it in any future solar installations"

**- Mandana Tarr, Asset Manager,
Adler Realty Investments**

The Soiling Problem & Current solutions

Soiling Causes Production Losses

Soiling refers to debris that settle on the panels such as dust, bird droppings, falling leaves, pollution, etc. Soiling losses refer to the loss of solar production caused by soiling. Soiling is unavoidable, and in some cases, it can cause up to a 30% loss in production. The only way to regain production lost due to soiling is to keep the panels constantly clean.



The low tilt angle on sections of the solar array contributed to soiling losses.

Current Solutions & Their Challenges

For decades now, almost all commercial rooftop solar has been cleaned manually – by people on the roof scrubbing the panels. However, manual cleaning can void panel warranties by putting thermal stress on the glass (cold water on a hot day). Using pressure and chemicals can over time void panel warranties as well, making manual cleaning risky.

More importantly, it rarely makes sense to manually wash the panels if the goal is to keep them clean (that would require weekly cleanings). As a result, panels are often cleaned a few times a year and return to their pre-cleaned state in a matter of weeks – and production drops again. This was the case for Adler Realty Investments.

The case of Adler Realty Investments shows that the RST Cleantech Solution is a cost-effective way to solve soiling problems and avoid losing your panel warranty.

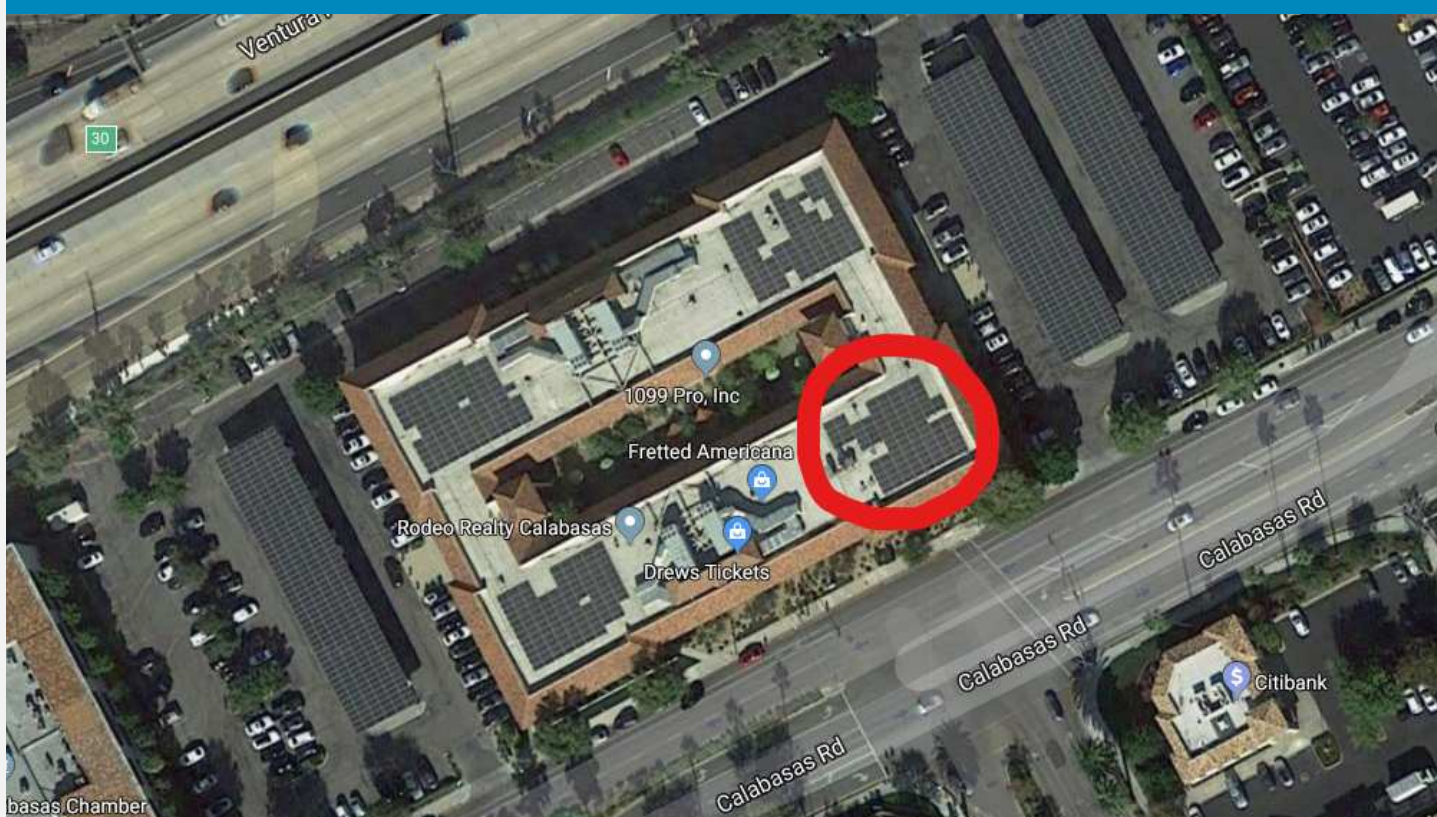
The Site & Installation

Adler Realty Investments experienced severe soiling losses for several reasons. The office building is sandwiched between a busy road and the 101 freeway. Dust is constantly being kicked into the air, soiling the panels. Another reason for higher soiling was the tilt of the panels, which varied from 3 to 7 degrees across the roof. The lower the tilt of the panel, the more dirt and soiling that will collect on the panel.

On October 6, 2019, The RST CleanTech solution was installed on one of Adler Realty Investments' four roof sections – a 98 panel section using 395W LG panel system (37.8kW).

Installation required a total of 16 man hours (two people for one full day). Minimal equipment was needed: a drill, tube cutters, and a hole puncher – with no impact on the roof.

The system automatically cleaned the panels twice a week, and after six weeks, there was an average increase in panel production of over 26.2% – while using only approximately 0.5 HCF of water and less than 24 kWh of electricity (approx. \$7 in utility costs).



Data

The rooftop site consists of four sections of solar panels. Each section has its own inverter from which to read solar production. Not all sections had the same number of panels or shading characteristics. Importantly, the section with RST (section 4) was the smallest section. As a result, it was important to establish a baseline of how the section with RST compared with the other three sections of the roof.

We reviewed the previous half year (26 weeks) of solar data and established the following baseline.

	week		Inverters Production (kWh)				comments	Inv 4/1	Inv 4/2	Inv 4/3	
	start	finish	1	2	3	4					
26	4/7/2019	4/13/2019	1822.5	1823.2	1792.7	1257.2		68.98%	68.96%	70.13%	
25	4/14/2019	4/20/2019	1647.1	1652.5	1618.3	1357.2		82.40%	82.13%	83.87%	
24	4/21/2019	4/27/2019	1805.7	1814.9	1785	1493.3		82.70%	82.28%	83.66%	
23	4/28/2019	5/4/2019	1485.4	1491.2	1459.2	1056.7		71.14%	70.86%	72.42%	
22	5/5/2019	5/11/2019	1065.2	1063.9	1046.5	908.1		85.25%	85.36%	86.77%	
21	5/12/2019	5/18/2019	1570	1551.8	1553.2	1367.9		87.13%	88.15%	88.07%	
20	5/19/2019	5/25/2019	1691.4	1694.3	1669.7	1427.6		84.40%	84.26%	85.50%	
19	5/26/2019	6/1/2019	1726.8	1731.7	1698	1424.1		82.47%	82.24%	83.87%	
18	6/2/2019	6/8/2019	1804.8	1810	1792.4	1506.8		83.49%	83.25%	84.07%	
17	6/9/2019	6/15/2019	1868.6	1873	1844.1	1550.3		82.97%	82.77%	84.07%	
16	6/16/2019	6/22/2019	1395.2	1402.3	1387.9	1173.5		84.11%	83.68%	84.55%	
15	6/23/2019	6/29/2019	1811.2	1813.4	1792.1	1509.8		83.36%	83.26%	84.25%	
14	6/30/2019	7/6/2019	1945.4	1949.1	1919.5	1621.8		83.37%	83.21%	84.49%	
13	7/7/2019	7/13/2019	1799.8	1804.5	1776.2	1504.2		83.58%	83.36%	84.69%	
12	7/14/2019	7/20/2019	1892.8	1902.1	1869.9	1589.6		83.98%	83.57%	85.01%	
11	7/21/2019	7/27/2019	1647.7	1652.2	1629.2	1380.5		83.78%	83.56%	84.73%	
10	7/28/2019	8/3/2019	1814.1	1817.7	1793	1513.1		83.41%	83.24%	84.39%	
9	8/4/2019	8/10/2019	1747.6	1753.8	1726.2	1456.2		83.33%	83.03%	84.36%	
8	8/11/2019	8/17/2019	1710.3	1717.4	1694.8	1427.7		83.48%	83.13%	84.24%	
7	8/18/2019	8/24/2019	1579.6	1584.5	1568.6	1320.9		83.62%	83.36%	84.21%	
6	8/25/2019	8/31/2019	1508.2	1512.7	1492.7	1256.1		83.28%	83.04%	84.15%	
5	9/1/2019	9/7/2019	1417.2	1421.6	1402.8	1178.3		83.14%	82.89%	84.00%	
4	9/8/2019	9/14/2019	1333.4	1333.1	1327.3	1105.9		82.94%	82.96%	83.32%	
3	9/15/2019	9/21/2019	1280.1	1279.6	1273.3	1058		82.65%	82.68%	83.09%	
2	9/22/2019	9/28/2019	881.3	861.9	873.9	725.5		82.32%	84.17%	83.02%	
1	9/29/2019	10/5/2019	1583.9	1459	1540.4	1257.6		79.40%	86.20%	81.64%	
	10/6/2019	10/12/2019					installation week	82.33%	82.52%	83.33%	BASELINE

In other words over the previous 26 weeks, section 4 produced on average 82.33% of section 1, 82.52% of section 2, and 83.33% of section 3.

Data

Once RST was installed, the results were as follows:

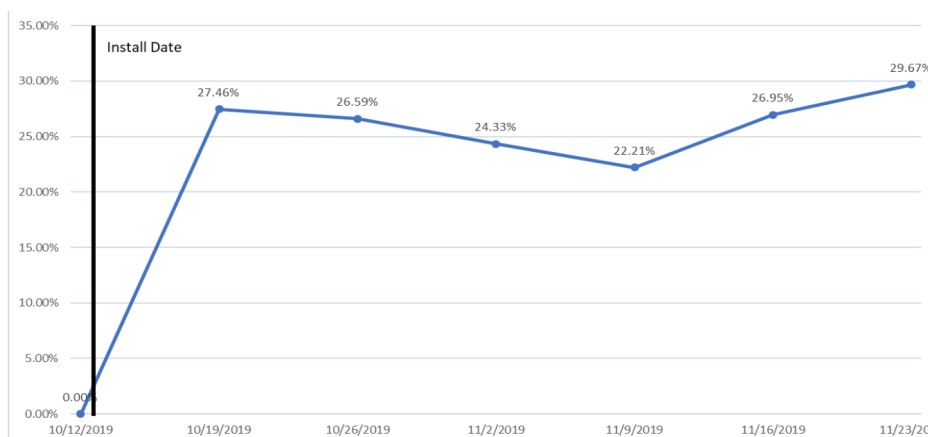
	week		Inverters Production (kWh)						
	start	finish	1	2	3	4			
1	10/13/2019	10/19/2019	1712	1595.1	1727.4	1767.1	103.22%	110.78%	102.30%
2	10/20/2019	10/26/2019	1030.5	954.8	1037.1	1053.5	102.23%	110.34%	101.58%
3	10/27/2019	11/2/2019	909.8	840.1	910.4	910.7	100.10%	108.40%	100.03%
4	11/3/2019	11/9/2019	913	844.7	905.6	896.4	98.18%	106.12%	98.98%
5	11/10/2019	11/16/2019	785.3	740.8	779.6	806.6	102.71%	108.88%	103.46%
6	11/17/2019	11/23/2019	645.3	608.6	646.3	678.9	105.21%	111.55%	105.04%

In the six weeks after installation, one can see that section 4 with RST produced on average between 100% to 111% of the other three sections.

In terms of percentage increase, we compared the baseline number to the new production data. As an example, for section 1 compared to section 4, the baseline was established at 82.33%. In week one, the difference in production was 103.22%. This increase in production is 25%. The following results show percentage increase of section 4 compared to the other 3 sections:

Week	Production Increase Compared to Inverter #:				Production Increase Compared to Inverter #:		
	1	2	3		1	2	3
1	25%	34%	23%	AVERAGE PRODUCTION INCREASE	23.82%	32.50%	22.29%
2	24%	34%	22%				
3	22%	31%	20%				
4	19%	29%	19%	AVERAGE BETWEEN ALL 3 INVERTERS	26.20%		
5	25%	32%	24%				
6	28%	35%	26%				

Over six weeks, the RST section saw an average of 23.82% increase over section 1, 32.50% increase over section 2, and 22.29% increase over section 3. The aggregate average was 26.2%.



CONCLUSION

- 💧 **Additional energy generated in kWh:**
 - 1 year: 15,484 (\$2,787)
 - 25 years: 364,740 (\$95,018)
- 💧 **Number of panels cleaned:**
 - Per wash: 98
 - 1 year: 10,192
 - 25 years: 254,800
- 💧 **Additional savings in manual labor / cleaning**
 - 1 year: \$ 618
 - 25 years: \$ 17,443
- 💧 **Cleaning Adler Realty Investments' panels 2 times a week improved productivity by over 25%**
- 💧 **Solar panel warranty remained valid** due to RST CleanTech's gentle rinsing with filtered water. No detergents, high pressure or abrasive material were used during the cleaning.
- 💧 **Additional resources**
No need to hire a solar cleaning company, schedule appointments, and having people on the roof.

