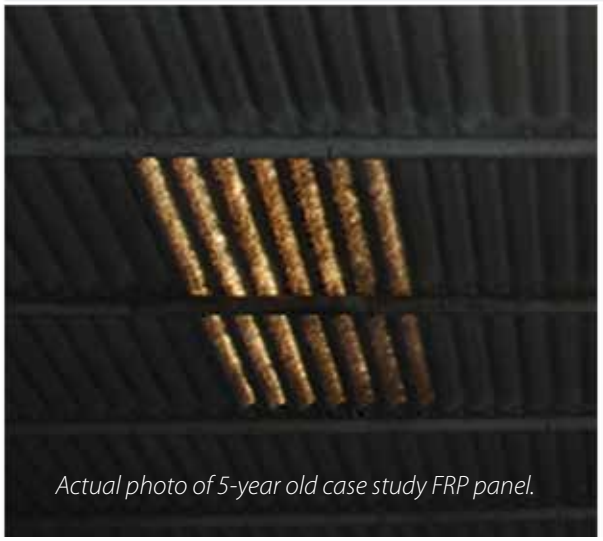
CASE STUDY

Actual photo of case study test structure.



Actual photo of 5-year old case study FRP panel.

Actual photo of 5-year old case study SUNSKY® panel.

Case Study:

Energy use & light transmission in machine shops, Sunsky vs. FRP sheets

Build On.

Energy use & light transmission in machine shops, SunSky® vs. FRP sheets

Purpose:

Evaluate lifecycle energy savings & lumen depreciation of Standard FRP (Fiberglas Reinforced Plastic) Sheets available in the market & SunSky polycarbonate sheet produced by Palram, Ltd.

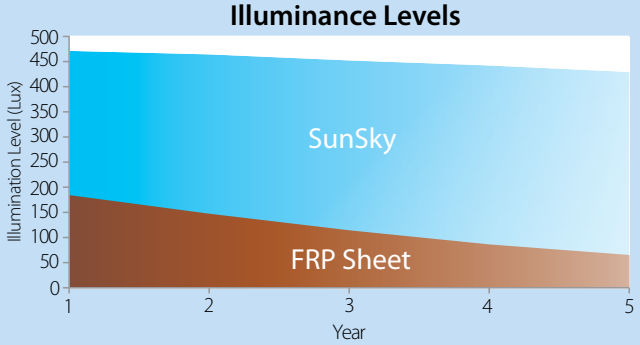
Method:

For our detailed study, we selected a pair of near identical machine shop sheds, which had an area of approximately 12,910 sq. ft.

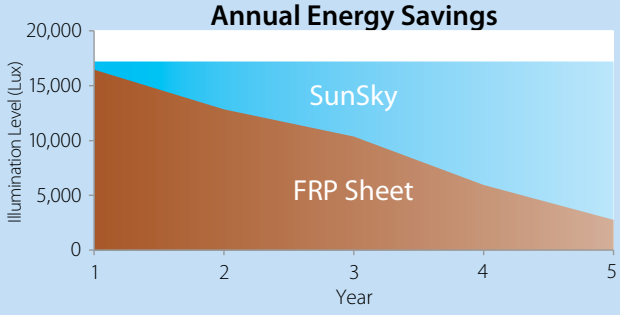
The units operated for 24 hours a day and for 300 days a year and were illuminated by 200 Watt metal halide lamps. By installing an energy meter in the Main Lighting Distribution Board of the respective units, we measured power consumption over a week before sheets were installed on the roof covering to provide daylight in the shed. We took an identical set of measurements to record the illuminance level at different times of day at various places. The SunSky sheets were installed on the roof of one of the sheds while standard FRP sheets were installed on the roof of the other shed. We installed a timer to note and monitor the period during which the lamps were actually switched off.

We monitored the energy consumption as well as off time of the lamps by noting the requisite data on a day-to-day basis. The illuminance levels were measured once per week at different times of the day in both sheds at the same time intervals; the test continued for five years. After five years there was virtually no savings in the unit with the FRP sheets due to reduced light transmission of the FRP sheets over time.

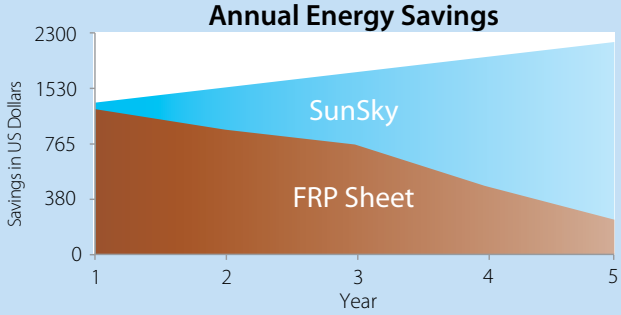
Observations & Findings:



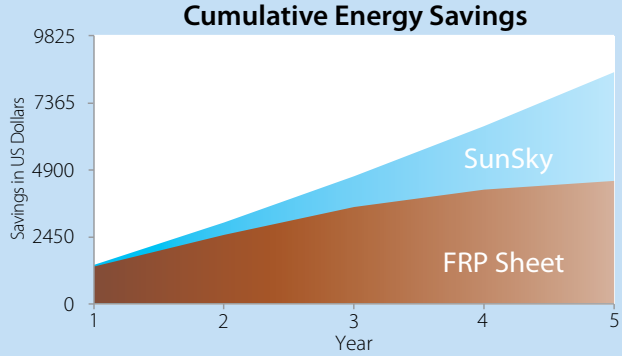
Illuminance Levels		
Year	SunSky	FRP Sheet
1	472	185
2	465	148
3	453	115
4	443	87
5	430	66



Annual Energy Saving (kWh)		
Year	SunSky	FRP Sheet
1	17,250	16,500
2	17,250	12,880
3	17,250	10,400
4	17,250	5,980
5	17,250	2,800

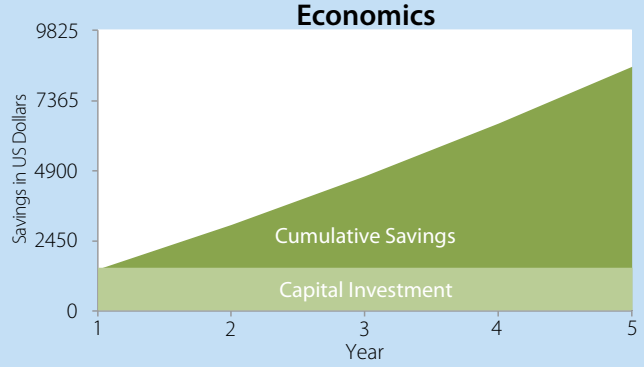


Annual Energy Saving in USD		
Year	SunSky	FRP Sheet
1	$1,427.15	$1,365.10
2	$1,569.87	$1,172.17
3	$1,712.58	$1,032.51
4	$1,855.30	$643.17
5	$1,998.01	$324.32



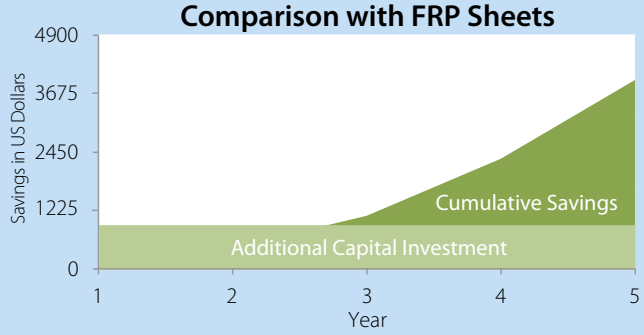
Cumulative Savings in USD		
Year	SunSky	FRP Sheet
1	$1,427.15	$1,365.10
2	$2,997.02	$2,537.27
3	$4,709.61	$3,569.79
4	$6,564.90	$4,212.96
5	$8,562.92	$4,537.27

Economics



Cumulative Savings	
Year	Savings
1	$1,427.15
2	$2,997.02
3	$4,709.61
4	$6,564.90
5	$8,562.92

Comparison with FRP Sheets



Additional Savings	
Year	Savings
1	$62.05
2	$459.75
3	$1,139.82
4	$2,351.95
5	$4,025.65

Installation Details

Description	Units	Unit – I FRP Sheets	Unit – II SunSky
Width of the premises	ft.	98.4	98.4
Length of the premises	ft.	131.2	131.2
Area of the premises	ft^2	12910	12910
Height of fitting from working level	ft	14.8	14.8
Operation	Hr/day Day/year	24 300	24 300
Type of lamp	Metal Halide	Metal Halide	Metal Halide
Rating of the lamp	W	250	250
Number of fittings	—	20	20
Average Illuminance	Lux	200	200
Duration of the measurement	hr	24	24
Annual power consumption	kWh	36000	36000
Cost of Translucent sheets	USD	$496.40	$1,489.20

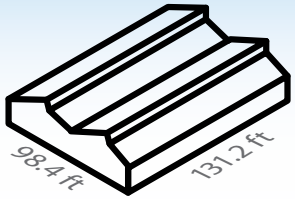
Actual Measurements

Duration of the test: April 2007 through September 2012

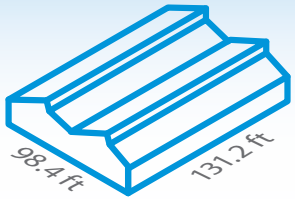
		Year 1		Year 2		Year 3		Year 4		Year 5	
Description	Units	FRP Sht.	SunSky	FRP Sht.	SunSky	FRP Sht.	SunSky	FRP Sht.	SunSky	FRP Sht.	SunSky
Illuminance	Lux	185	472	148	465	115	461	87	457	66	448
Time - Lamp Off	Hr./day	11	11.5	9.2	11.5	7.6	11.5	7.6	11.5	6.9	11.5
Days - Lamp Off	Days	300	300	280	300	257	300	225	300	203	300
Lamp On All Day	Days	0	0	0	0	0	0	5	0	10	0
Energy Savings	kWh	16500	17250	12880	17250	10400	17250	5980	17250	2800	17250
	USD	1,365.10	1,427.15	1,172.17	1,569.87	1,032.51	1,712.58	643.17	1,855.30	324.32	1,998.01

Quick Reference for Installation Details

Unit 1: 12,910 sq. ft.



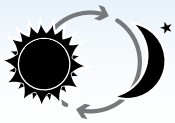
Unit 2: 12,910 sq. ft.



Lighting Specs

Bulb: Metal Halide
Wattage: 250
Avg. Illum.: 200 Lux

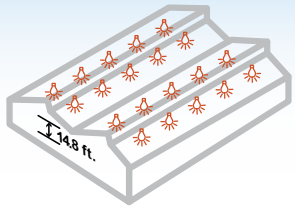
Operating Time and Duration of Measurement



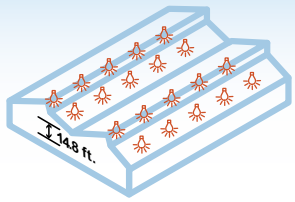
24 Hours/Day

300 Days/Year

Unit 1: 20 Lights @ 14 ft. Height



Unit 2: 20 Lights @ 14 ft. Height



Findings							
		FRP Sheet			SunSky		
Description	Units	First Year	Fifth Year	Drop	First Year	Fifth Year	Drop
Illuminance	Lux	185.0	66.0	64%	472	448	5%
Time - Lamp Off	Hr./day	11.0	6.9	37%	11.5	11.5	0%
Days - Lamp Off	Days	300	203	32%	300	300	0%
Lamp On All Day	Days	0.0	10.0	50%	0	0	0%
Energy Savings	kWh	16500	2800	83%	17250	17250	0%
	USD	1,365.10	324.32	76%	1427.15	1998.01	30% Gain

Observation & Conclusion:

- SunSky provided a higher and more uniform illuminance level than standard FRP sheets over the entire period of five years. The illuminance level of SunSky averaged at 450 Lux whereas FRP sheets averaged approximately 125 Lux during the same period.
- The unit with FRP Sheets observed lumen depreciation of 66% as against approximately 5% for the unit with SunSky during the period of five years.
- The unit with FRP sheets was forced to switch on the artificial light during daytime on rainy/cloudy days right from day one; switching on the artificial light kept increasing over the test period. The unit with SunSky never switched on the artificial light during day time during entire period of five years.
- The unit with FRP sheets required switching to artificial lighting in twilight zones - evening as well as morning; but no such concern was felt by the unit with SunSky. The "Lamp on Period" kept on increasing during twilight period as the days passed by.
- At the end of third year/beginning of fourth year, the unit with FRP sheets switched on lamps throughout the day to illuminate critical areas; requirement of artificial illuminance increased as the days passed. The unit with SunSky required no artificial illumination to supplement the lighting.
- At the end of fifth year the unit with FRP sheets had to switch on all the lamps since the sheets became practically opaque whereas the unit with SunSky could easily rely on natural daylight.

About PALRAM

With 50 years of expertise in the industry, PALRAM has established manufacturing, distribution and sales operations across seven continents and 120 countries around the world. Palram markets its products to the sign and graphics market, as well as to the commercial, industrial, residential, marine, and do-it-yourself construction markets.

Palram corrugated polycarbonate products are sold under the trade name Suntuf® (and SunSky in North America). Palram also offers the MetalMatch™ technology, allowing the use of SUN-TUF polycarbonate panels for daylighting options with virtually any metal profile available. Suntuf is offered in a range of colors, including a soft white to eliminate glare. Palram also offers Sunlite®, a multi-wall polycarbonate sheet for skylights, roof lights, or side-lighting applications.

About SENERGY Consultants

Senergy Consultants' mission is to "Provide total solutions to optimize resource utilization for perpetual benefits of our customers, the nation and the society at large."

As the name emphasizes, it's the synergy between Senergy and YOU that alone can facilitate optimum utilization of energy. Senergy was founded with this concept in early 1990 and has grown up with the same.

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Senergy has Accredited and Certified Energy Auditors by Bureau of Energy Efficiency.

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