



introduces



Changing the way the world
cools...now in India!

Perfect Infraengineers Limited

- ❑ Established in 1996 and headquartered in Mumbai
- ❑ Listed 2016: National Stock Exchange (EMERGE) Mumbai
- ❑ Undertaking HVAC / MEP turnkey projects
- ❑ Renting of Air Conditioning systems
- ❑ Annual maintenance contracts (AMC) of air-conditioning
- ❑ ISO 9001:2008 certified
- ❑ Qualified by Central Public Works Division (CPWD) of India
- ❑ International presence with projects in Nigeria and Tanzania
- ❑ Manufacturing Factory Located in Navi Mumbai
- ❑ Full staff & manufacturing capabilities
- ❑ Capacity to manufacture 7,500+ SunTrac Systems per year

SunTrac USA, located in Tempe, Arizona USA, manufactures hybrid climate systems, featuring our patented solar thermal panel system designed for integration with commercial & industrial HVAC Systems.

Our revolutionary Solar Thermal Panel System creates affordable thermal energy combined with precise temperature controls - an industry first!



What the SunTrac System does is simple:

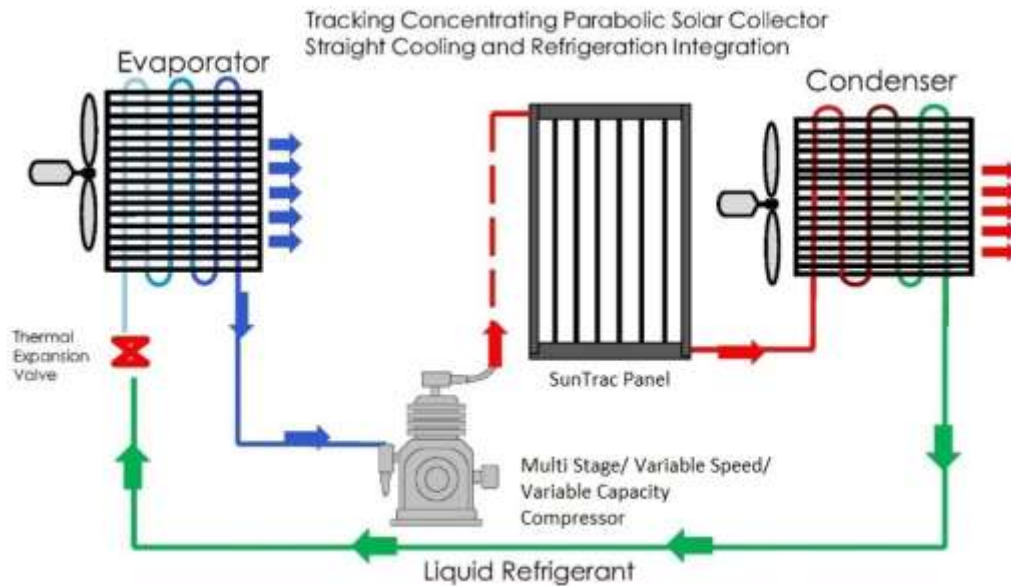
It increases cooling system efficiency and reduces operating expenses by replacing a percentage of mechanical energy required to power a compressor (saving electricity), with modulated solar thermal energy.

SunTrac comes to India - Perfect & SunTrac Team Up!

- Perfect has been appointed the exclusive manufacturer of SunTrac systems in India
- Will be marketing and distributing SunTrac products in India under the “Perfect-SunTrac” name
- Perfect will be the only manufacturing unit of SunTrac outside of the USA.
- Perfect will be positioned to fulfill SunTrac’s global order flow, including the Middle East/North Africa regions, Australia and Asia.



The Technical Description: The SunTrac Hybrid Climate System is a renewable energy method of adding pressure and heat to the refrigeration cycle which results in a decreased/displaced compressor workload, saving energy. This solar thermal system displaces a portion of the mechanical energy used by various compressor types, including single speed compressors w/VFD's, variable capacity, multi-stage, and variable speed compressors. The compressor then can operate at low stage, low range or low capacity, while delivering full and part-load cooling requirements, creating significant energy savings of 25% to 40% per year, or more.





SunTrac & Commercial HVAC Systems



**INTEGRATES WITH YOUR
NEW EQUIPMENT
INSTALLATIONS, AND
EXISTING SYSTEM UPGRADES**

Package/Split Units
Mini/Multi Split Units
Chiller Systems

**COMPATIBLE WITH MOST
HIGH EFFICIENT HVAC
EQUIPMENT**

Variable Speed
Multi-Stage
Variable Capacity



Changing The Way The World Cools!

**SUNTRAC
SMARTPANEL
FEATURES**

RiteTemp Temperature Control
Simple Installation
12v/24v Power
Self-contained Panel
5 Year Warranty (US)
2 Year Warranty (Int'l)



This commercial unitary system upgrade program combines three technologies to create one of the most energy efficient commercial HVAC systems available today:

- The SunTrac Solar Thermal SmartPanel System
- Control Techniques Variable Frequency Drives
- The KMC Digital Controller with custom SunTrac programming & features

Available in various sizes and capacities for HVACR systems ranging from 3-Ton to 500-Ton +, this program can retrofit and upgrade existing R-22, 407C, 134A and R-410A systems while providing HVAC energy savings of up to 40%!



The features and benefits of SunTrac Hybrid Climate Systems include:

- ▶ A unique blend of superior energy efficiency with a renewable energy platform
- ▶ Upgrades for new and existing cooling systems
- ▶ Energy savings of 25% to 40%
- ▶ Works with most major commercial brands and models
- ▶ Provides the most energy efficient cooling solutions available
- ▶ Provides savings on a 24-hour basis, while boosting humidity removal

By installing just 10,000 SunTrac panels,
SunTrac India customers can save 39,000,000 kWh
of electricity ANNUALLY, which is equivalent to:

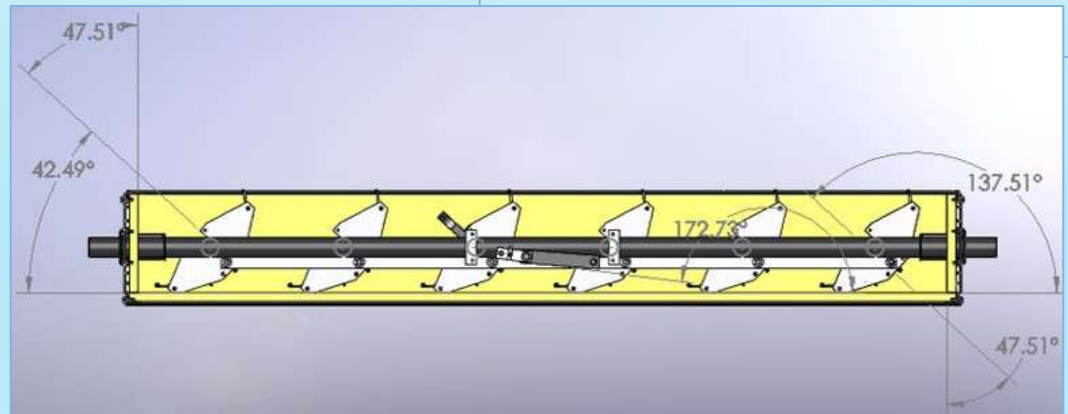
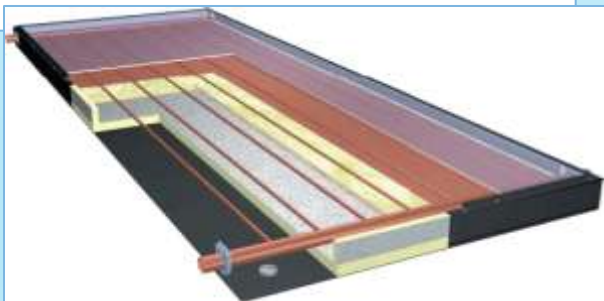
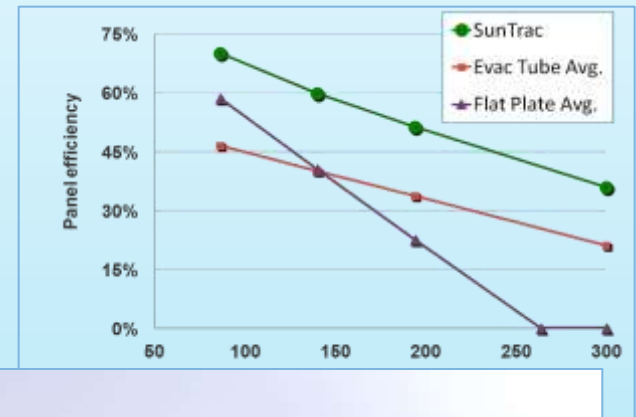
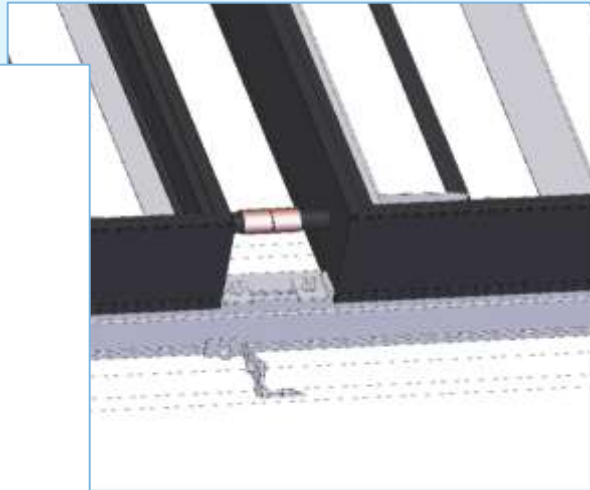
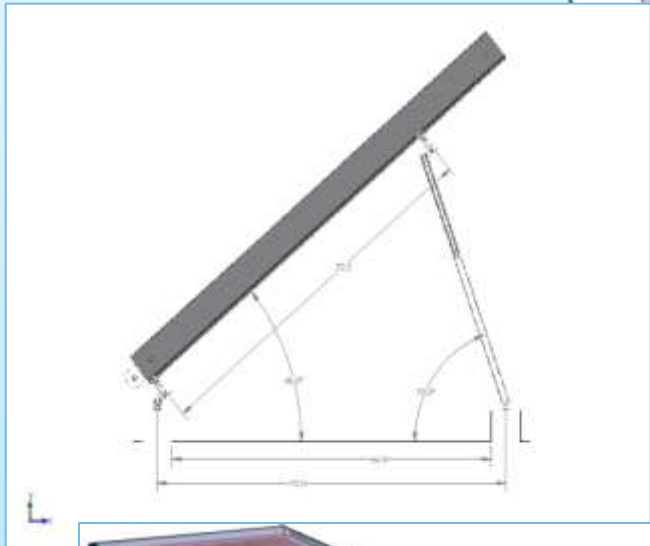


And this saves our customers over \$4,000,000 USD per year in electricity costs!



Commercial & Residential Installations





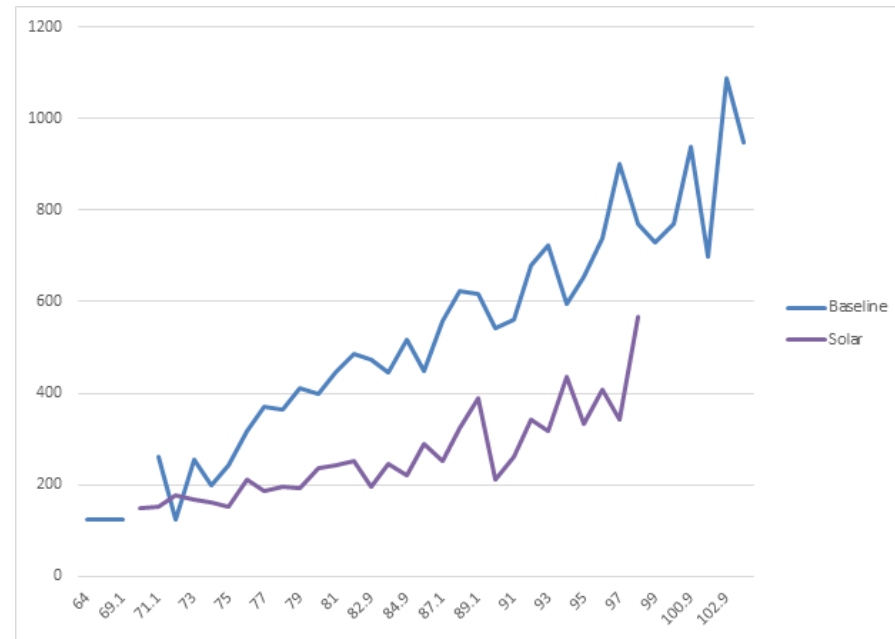
Commercial Install, Daikin Inverter Mini-Split (Variable Speed) Tempe, Arizona USA

Daikin Mini Split

- 2-Ton
- 18 SEER
- As-Is Install
- No new controls

Evaluation

- October 2016
- 14-Day Period
- Same Ambient
- Monitored 24/7
- 47% Savings
- Tempe, AZ
- 6' SunTrac Panel



Equipment, data analysis and test results provided by Goodman Manufacturing Co.

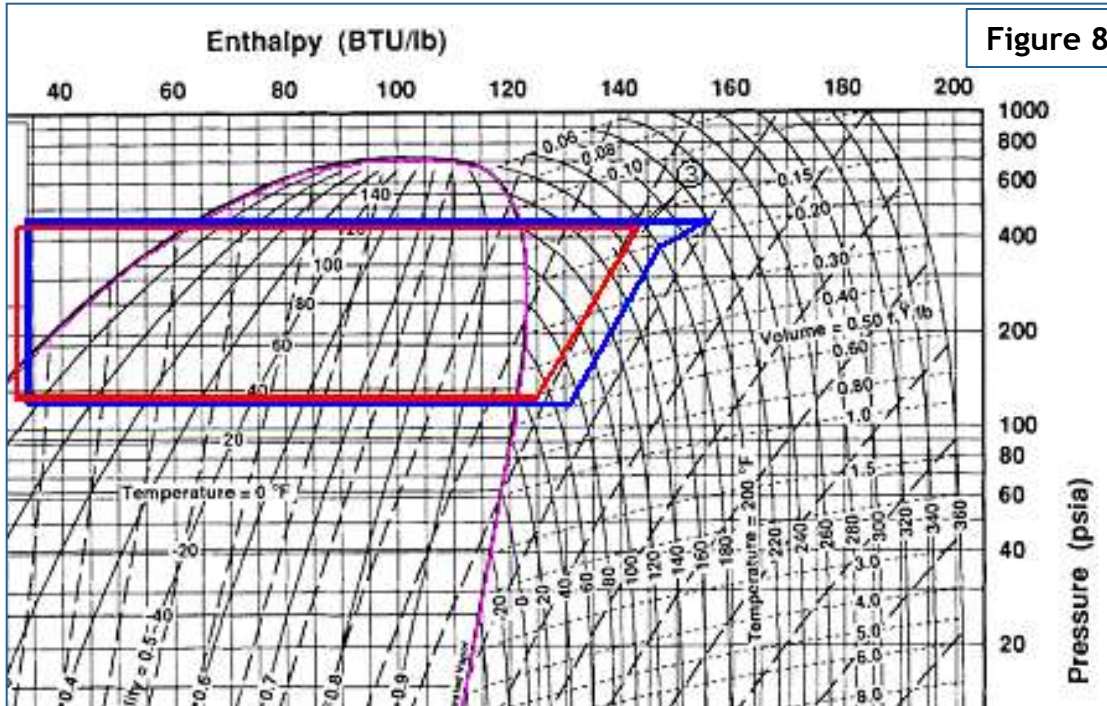


4-Ton HP-A/C Package Unit w/ Copeland 2-Stage Compressor & SunTrac System Phoenix, AZ, Oct. 2014

First Stage Operation (67%) with Panel (*Blue*)

vs.

Second Stage Operation (100%) without Panel (*Red*)



Comparison of the analysis in Figure 8 shows that:

Cooling by System w/Solar Panel (Compressor Stage 1 - *BLUE*)

is approximately equal to

Cooling by System No Solar Panel (Compressor Stage 2 - *RED*)

First Stage Operation with Panel vs. Second Stage without Panel

(4-Ton HP-A/C w/ Copeland 2-Stage Compressor, Phoenix, AZ, Oct. 2014)

“It is evident that the energy introduced into the system by the sun through the solar panel enables the system to produce higher total heat of rejection with less energy expended by the compressor. This becomes orders of magnitude more significant as the system reaches higher required discharge pressures (i.e. second stage). Thus any added energy into the system via the solar panel is significant.

The power difference required to provide approximately equal cooling by the system measured at the compressor for each case follows. Referring back to Fig. 8:

$P = (V \cdot I \cdot 1.732) \cdot \text{Power Factor} \cdot \text{Efficiency}$ where efficiency = 0.8 and Power Factor = 0.70

Case 2: No Panel-Stage 2: $P = (246.8 \cdot 10.0 \cdot 1.732 \cdot 0.70 / 0.8) = 3837 \text{ W}$

Case 3: W/Panel-Stage 1: $P = (248.6 \cdot 7.1 \cdot 1.732 \cdot 0.70 / 0.8) = 2675 \text{ W}$

Difference = 1162 W

% Power Savings Case 2 vs. Case 3 = 30% Less Power Consumed

The energy added to the refrigerant by the compressor in Stage 1 plus energy added by the panel was approximately equal to energy added by the compressor in Stage 2. In all cases analyzed, it is clear that the panel is providing added energy to the system thus allowing the compressor and other components (not measured here) to operate at lower loads while providing equal or better cooling.”

James “Jim” Bordenave, P.E.

Senior Engineer

SunTrac Solar Manufacturing LLC



SunTrac & Toshiba Field Test Results



Full Operation Test Report: VRF System with Panel vs. without Panel

(Toshiba 10-Ton HP-A/C w/DC Inverted Compressors, Saigon, Vietnam, March 2015)

Result #1 - The SunTrac Panel adds substantial thermodynamic heat to the “hot gas” of the VRF system

The typical results are displayed on the graphic shown in the report photos. When the refrigerant was passed through the SunTrac panel, the temperature rise was typically measured at between 8 - 10C.

Result #2 - The addition of solar thermal energy to the refrigerant system causes the VRF compressor to unload and create substantial, measurable savings

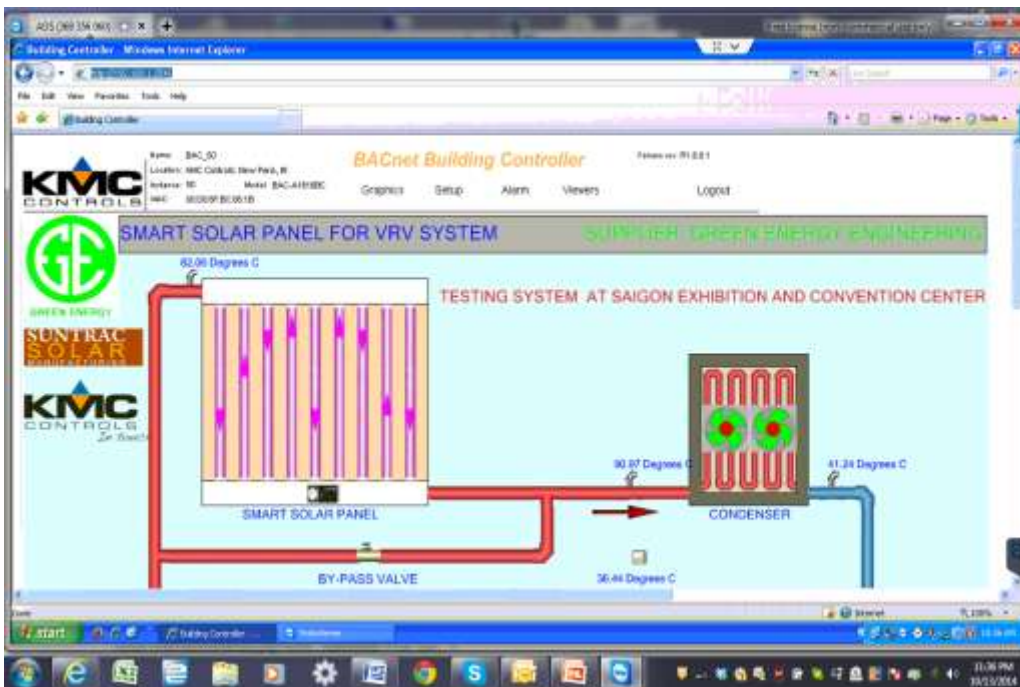
From repeated cycles of measurement, the “average” measured power was approximately 2.6 - 2.65KW, or a ***measured power reduction of 50%***. These results were measured over a total of 5 testing cycles during the day.

Result #3 - NO modifications were necessary to the Toshiba Control System

It was determined that the Toshiba unit’s inherent control system modulated the compressor from near full load to a substantially reduced load using the existing, internal control system.



Full Operation Test Report: VRF System with Panel vs. without Panel Toshiba 10-Ton HP-A/C w/DC Inverted Compressors, Saigon, Vietnam March 2015



This test was conducted by:

Tien Nguyen, Managing Director - Green Energy Engineering & Trading Co. (GEE), Saigon, Vietnam

Mr. Nguyen is a graduate of Van Lang University in Ho Chi Minh City with a Bachelor's Degree in Applied HVAC Technologies with a sub-specialty in Heat Transfer applications. He spent seven years with Johnson Controls Vietnam in successive roles as field engineer, applications engineer, project manager and sales engineer before leaving Johnson Controls to found his own company.

Note: The complete white paper is available upon request.

SunTrac upgrade w/ Fujitsu 40kW VRF System, Istanbul, Turkey

Commercial Building: Tanrıöver Engineering
Oct. 2016

- Fujitsu 40kW VRF System (Inverter, Variable Speed), Model # AJY126LBTF + 6 indoor units with capacity of 49.7kW
- Test showed a decrease in amperage used from 13.37A in standard operation to 8.85A while operating with SunTrac, a power reduction of 33.8%
- Test results: 33.8% power saved



SunTrac upgrade w/ Daikin 10 HP VRF System Perfect/SunTrac Facility, Navi Mumbai, India

- Daikin VRV IV, 10HP System (Inverter, Variable Speed)
- November, 2017
- Test showed a decrease in amperage used from standard operation to operating with SunTrac, and an average power reduction and savings of 27.4%



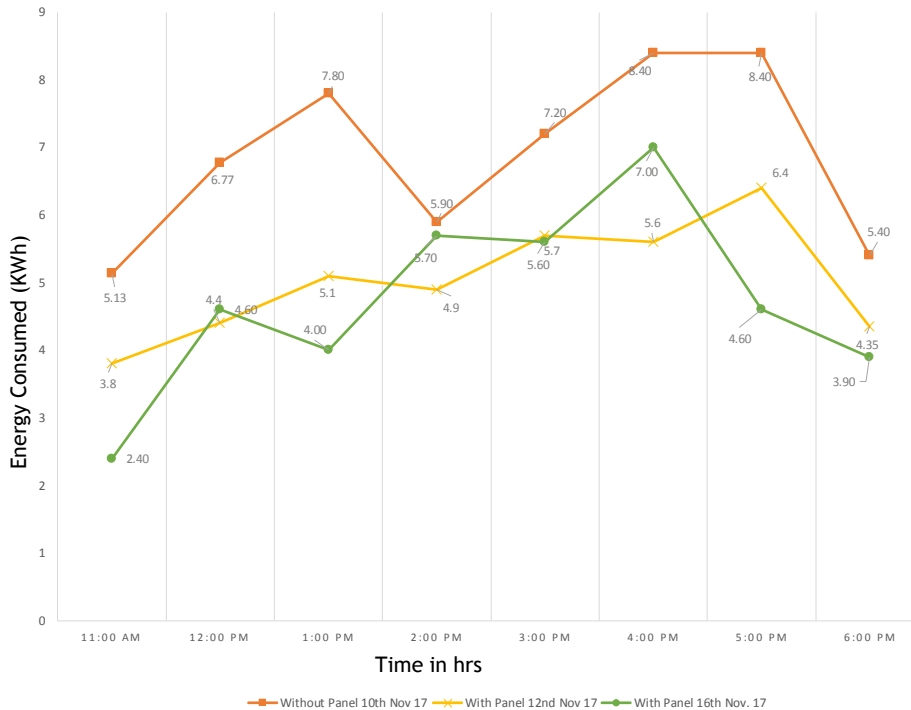


SunTrac & India Installations, cont'd



SunTrac upgrade w/ Daikin 10 HP VRF System, (Model No.RXYQ10TRY6) Perfect/SunTrac Facility, Navi Mumbai, India: **Avg. Savings is 28%**

ENERGY CONSUMPTION WITH V/S WITHOUT SOLAR PANEL



**Daikin VRV IV 10 HP Out Door Unit (Model No.RXYQ10TRY6)
 Connected to 4 Indoor Unit of 2 Tr. Each**

**Avg. Ambient Temp. 34°CDB, 18°CWB
 TC= 26.2, PI=6.04**

Table No.02

| Till Time | Energy Consumed in K Watt per Hour | | |
|---|------------------------------------|----------------------------|----------------------------|
| | Friday | Sunday | Thursday |
| | Without Panel 10th Nov. 17 | With Panel 12nd Nov. 17 | With Panel 16th Nov. 17 |
| 11:00 AM | 5.13 | 3.8 | 2.40 |
| 12:00 PM | 6.77 | 4.4 | 4.60 |
| 1:00 PM | 7.80 | 5.1 | 4.00 |
| 2:00 PM | 5.90 | 4.9 | 5.70 |
| 3:00 PM | 7.20 | 5.7 | 5.60 |
| 4:00 PM | 8.40 | 5.6 | 7.00 |
| 5:00 PM | 8.40 | 6.4 | 4.60 |
| 6:00 PM | 5.40 | 4.35 | 3.90 |
| Total Energy Unit Consumed in 8 Hrs. (KWH) | 55 | 40.25 | 37.8 |
| Total Energy Saved with Panel in Percentage% | | 26.8% | 31.3% |

So, The average of all percentage is 29.0%

Place of Field Testing: Perfect Infraengineers Ltd., Rabale, Navi Mumbai

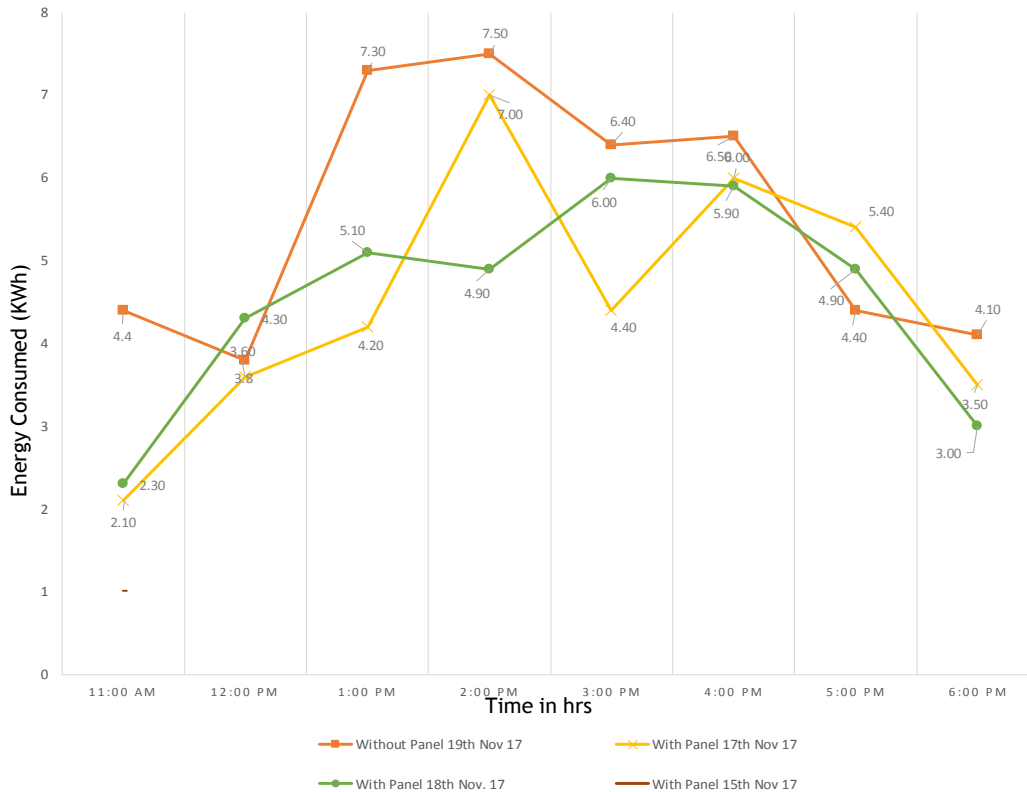


SunTrac & India Installations, cont'd



SunTrac upgrade w/ Daikin 10 HP VRF System, (Model No.RXYQ10TRY6) Perfect/SunTrac Facility, Navi Mumbai, India: **Avg. Savings is 18%**

ENERGY CONSUMPTION WITH V/S WITHOUT SOLAR PANEL



Daikin VRV IV 10 HP Out Door Unit (Model No.RXYQ10TRY6)
Connected to 4 Indoor Unit of 2 Tr. Each

Avg. Ambient Temp. 31°CDB, 18°CWB
TC= 26.2, PI=5.63

Table No.02

| Till Time | Energy Consumed in K Watt per Hour | | |
|---|------------------------------------|----------------------------|----------------------------|
| | Sunday | Friday | Saturday |
| | Without Panel 19th Nov. 17 | With Panel 17th Nov. 17 | With Panel 18th Nov. 17 |
| 11:00 AM | 4.4 | 2.10 | 2.30 |
| 12:00 PM | 3.8 | 3.60 | 4.30 |
| 1:00 PM | 7.30 | 4.20 | 5.10 |
| 2:00 PM | 7.50 | 7.00 | 4.90 |
| 3:00 PM | 6.40 | 4.40 | 6.00 |
| 4:00 PM | 6.50 | 6.00 | 5.90 |
| 5:00 PM | 4.40 | 5.40 | 4.90 |
| 6:00 PM | 4.10 | 3.50 | 3.00 |
| Total Energy Unit Consumed in 8 Hrs. (KWH) | 44.4 | 36.2 | 36.4 |
| Total Energy Saved with Panel in Percentage% | | 18.5% | 18.0% |

So, The average of all percentage is **18.2%**

Place of Field Testing: Perfect Infraengineers Ltd., Rabale, Navi Mumbai



**WEIGHT - 276kg
SPACE -384 sq. ft.
PHOTOVOLATIC SYSTEM**



**WEIGHT - 82kg
SPACE - 32 sq. ft.
EQUIVALENT SUNTRAC SYSTEM**

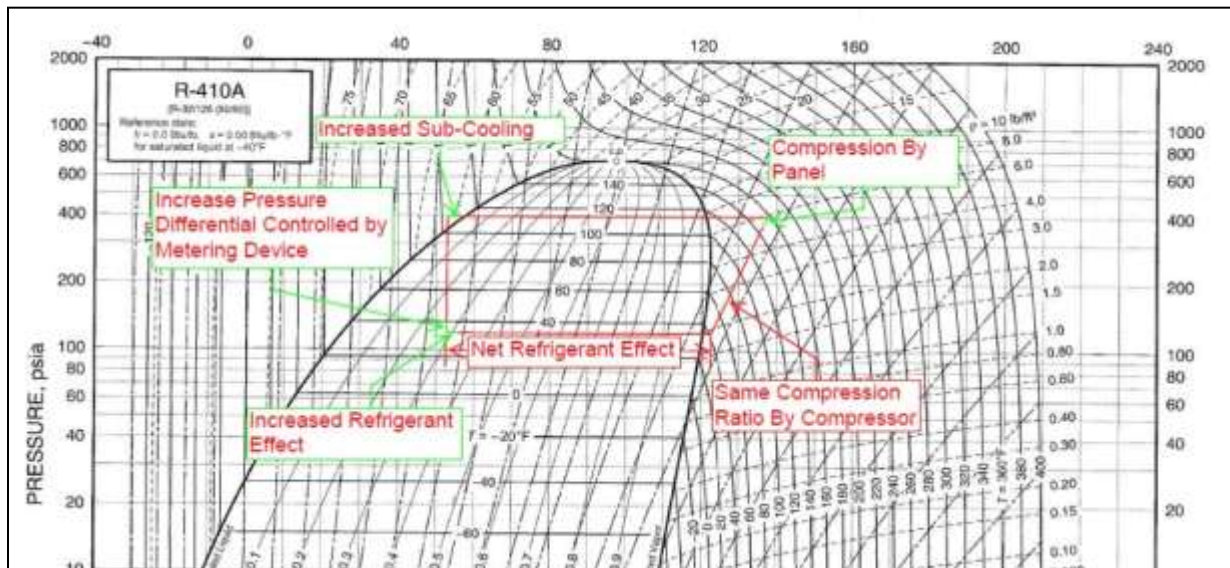
**WE ARE NOT A PHOTOVOLTAIC
(ELECTRIC) PANEL SYSTEM**

**We do not generate electricity.
We convert the sun's energy to
heat, the ultimate renewable
energy source.**

About this picture; this is
approximately the number of PV
panels it would take to do the
work of just ONE (1) SunTrac Solar
Thermal SmartPanel™

90% SPACE SAVING

“Since the refrigerant cycle is at part load of refrigerant mass flow rate we can take advantage of the heat exchanger heat transfer capability of the condenser coil to subcool the liquid before it goes into the metering device. This subcooling gained in the system gives an increase in net refrigerant effect. When the panel is activated, the pressure differential of the refrigerant cycle is higher. This means there is a higher pressure drop across the metering device. The pressure increase produced by the positive displacement compressor is the same (same compression ratio) with the additional pressure increase provided by the solar panel. The metering device is controlled by the superheat of the refrigerant coming off the coil. Because the refrigerant is subcooled, less refrigerant is needed for a given load of the coil, closing the metering device down, increasing the pressure drop across the device and lowering the compressor suction discharge which also provides an increased efficiency of the compressor due to lower pressure of the suction gas.”



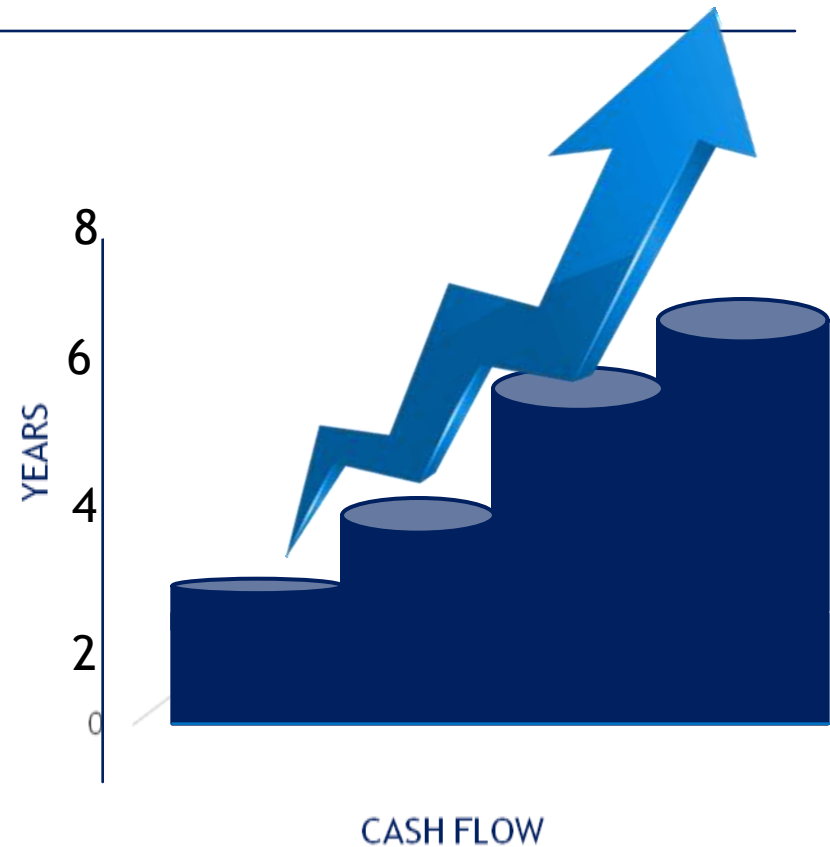
Aaron Bartek, P.E., LEED® AP
November, 2015
HTS Texas | texas.htseng.com



- ❑ For a 10 ton A/C which is equivalent to 12HP VRV, consuming 11 kWh electricity, for 25 working days, operating 10 hrs /day with 60% load.
- ❑ Total monthly electricity charge =
- ❑ ₹ $11 * 25 * 10 * 12 * 0.6 = ₹ 19800$
- ❑ This Hybrid Thermal System saves up to 40% of energy consumption lowering monthly charge by ₹7900
- ❑ Total Panel installed cost is about ₹2 lakhs which will thus be recovered in 30 months (₹2 lakhs / ₹7900 ≈ 26 months)



| | |
|--|-------------------|
| SAVING/MONTH/PANEL | ₹ 7900 |
| ELECTRICITY SAVING (10 YEARS) | ₹ 9,48,000 |
| INSTALLATION COST | ₹ 2,00,000 |
| PAYBACK PERIOD | 2.2 YEARS |
| AVERAGE PANEL LIFE | 10 YEARS |
| NET POSITIVE CASH FLOW | ₹ 7,48,000 |
| RATE OF RETURN | 37.4% |





SunTrac OEM Warranty Program



SunTrac Standard Warranty

Commercial Panel System: 2-Year Parts

SunTrac's Extended Warranty Program for New A/C & HVAC Systems w/SunTrac Panels and SunTrac/Emerson HVAC Upgrade Installs:

- **Commercial:** 2-Year System Parts Warranty for both System Upgrades and new HVAC System Installs
- Supplements or replaces existing OEM Warranties on Entire System

See current Warranty Terms and Conditions for details.

All SunTrac OEM Warranties and extended warranty products are provided and administered by:

Trinity Warranty
www.trinitywarranty.com





Contact Us



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THANK YOU