

# 7 Reasons to consider Roof Top Solar Thermal than Solar PV

# Power vs Energy

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## Global solar thermal market developments and status in 2016

The cumulated solar thermal capacity in operation by end of 2016 was 456 GWth (652 million square meters). Compared to the year 2000 the installed capacity grew by a factor of 7.4.

The corresponding annual solar thermal energy yield in 2016 amounted to 375 TWh, which correlates to savings of 40.3 million tons of oil and 130 million tons of CO2.

Despite these achievements, the global solar thermal market has faced challenging times in recent years. Especially in the large markets in China and Europe the traditional mass markets of small-scale solar water heating systems for detached single family houses and apartment buildings are under market pressure from heat pumps and photovoltaic systems.



- [Solar Heat Worldwide 2017](#)
- [Past Issues](#)

## 465 GWth Vs 303 GW

A tariff-induced U.S. solar industry assault notwithstanding, there's some good news in solar this week.

The International Energy Agency's Photovoltaic Power System Programme's latest report (*Snapshot of Global Photovoltaic Markets 2016*, [PDF](#)) found that 75 gigawatts of solar were installed globally in 2016 -- bringing the installed global photovoltaic capacity to at least 303 gigawatts.

That equates to producing 375 billion kilowatt-hours of solar power each year, which represents 1.8 percent of the electricity demand of the planet.

## Flexible Solutions

Meet NEC 2014 & 2017 690.12 Rapid Shutdown Requirements

- Array Level Shutdown
- 14-60kW PV Inverters
  - RSDCOM for segmented arrays

- Module Level Shutdown
- 23/28/36kW PV Inverters paired with Tigo's Flex MLPE



**YASKAWA**  
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# Solar Energy



Heat Energy



Electric Power

## SOLAR PROCESS HEAT (SOPRO INDIA)



India is consuming over 100 million tonnes of oil per annum. Of this 40 per cent is consumed in industries with roughly 15 million tonnes in thermal applications below 250 °C temperatures. Majority of oil requirement is met through imports. Combustion of oil causes release of GHG emissions leading to climate change. Utilisation of solar thermal in process heat application is seen as a viable option. Various studies have been undertaken to assess the theoretical potential of substituting solar heat in different industries. However, there are challenges for dissemination of solar heat in industrial processes (SHIP) system. These challenges are both technical and financial.

### SUMMARY

- Compare SHIP system design between Indian and European systems
- Optimise existing SHIP systems designs in India
- Improve system quality through recommending cheap,

$$\begin{aligned}
 &15000 \text{ Million Litres} \times 8000 \text{ kCal/Litre} \\
 &= 120000000 \text{ Million Kcal} / 860 \text{ kCal/kWhr} \\
 &= 139534.8837 \text{ Million KWH} / 1500 \text{ Solar Potential per year} \\
 &= 93.02325581 \text{ Million KW Solar} \\
 &= 93000 \text{ MW Solar Capacity potential}
 \end{aligned}$$

20 Percent load used for  
below 100°C applications  
= 20 GW (approx)

# Reason 1. Cost Effective

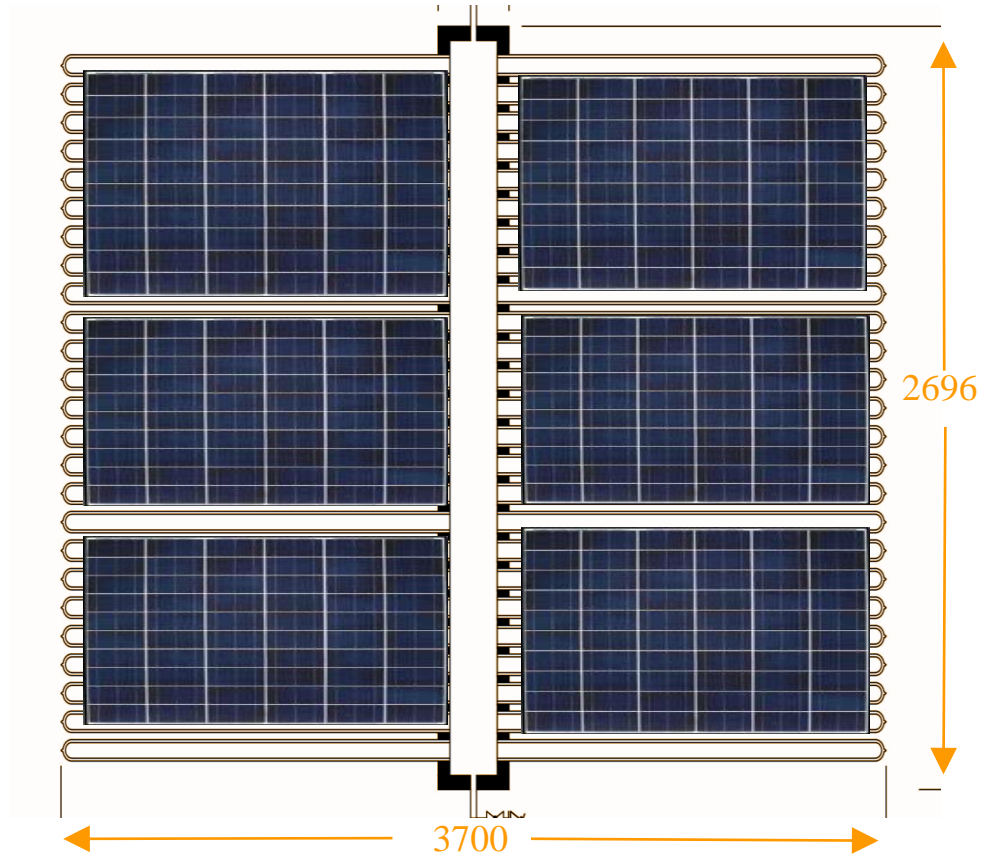
	Solar PV	Solar Thermal
Cost per MW	Rs 4.5 - 6 Crore	Rs 2.5 - 3.5 Crore
Cost per unit	Rs 5 - 6.5 per kWh	Rs 3 - 4 per kWh
Tenure	12 - 25 years PPA	7 -10 years PPA

## Reason 2. Less Space more Energy !

One 50 tubes Solar Thermal Module  
= 7 x 280 Wp PV modules

### Why ?

The overall efficiency of the solar thermal module is 17 percent  
whereas a Solar Thermal module  
has an efficiency of 65 percent



# Power generated head to head

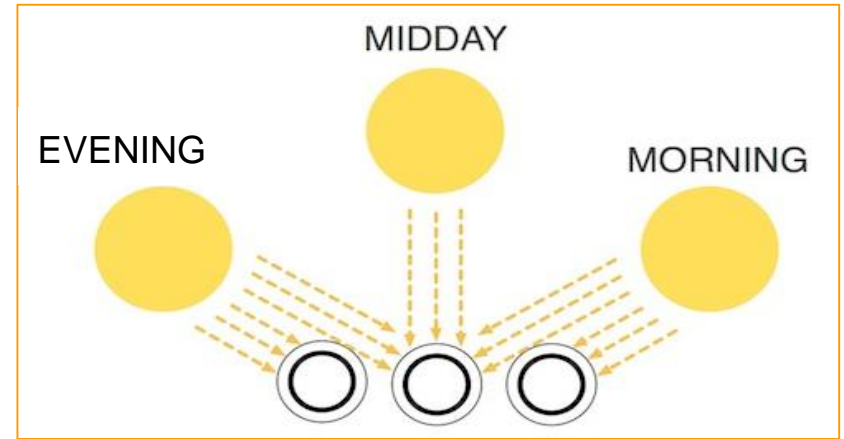
- Effective Area of the Solar Thermal Module =  $2.6 \times 3.7 = 9.62 \text{ m}^2$
- Power generated/ Module =  $7.1 \text{ kW}_{\text{Th}}$
- Annual power generated =  $7.1 \times 1500 = \mathbf{10650 \text{ kWh}_{\text{rth}}}$

- Power generated/ Solar Photovoltaic module =  $280 \times 7 = 1960 \text{ Watts} = 1.96 \text{ KW}$
- Annual power generated =  $1.96 \text{ kW} \times 1500 = \mathbf{2940 \text{ kWhr}}$

## Reason 3. Self Tracking



Vs



Mechanical Tracker tracking maximum solar radiation

No mechanical trackers required

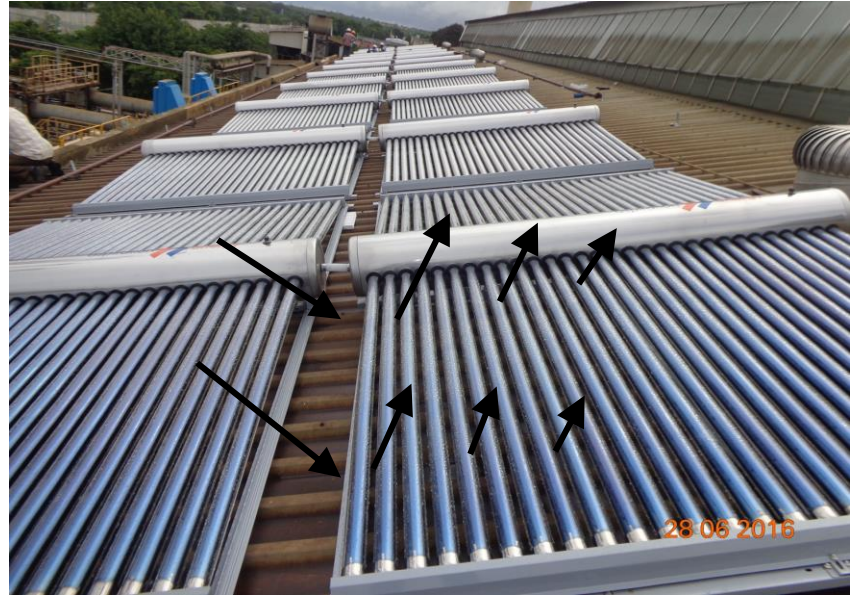


# Reason 4. Wind Roof Load



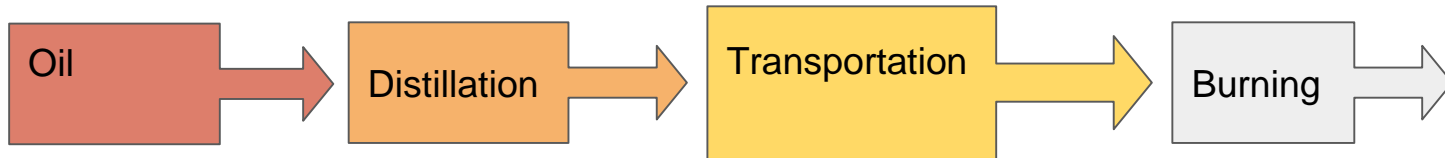
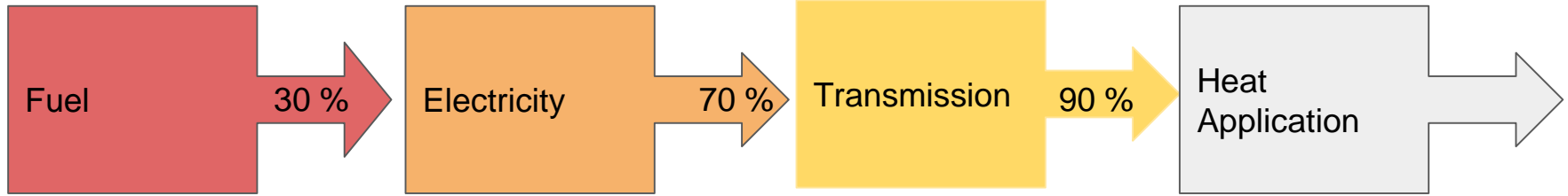
Total load on Roof = Static Load + Dynamic Wind Load

Vs



Total Load = Static Load Only

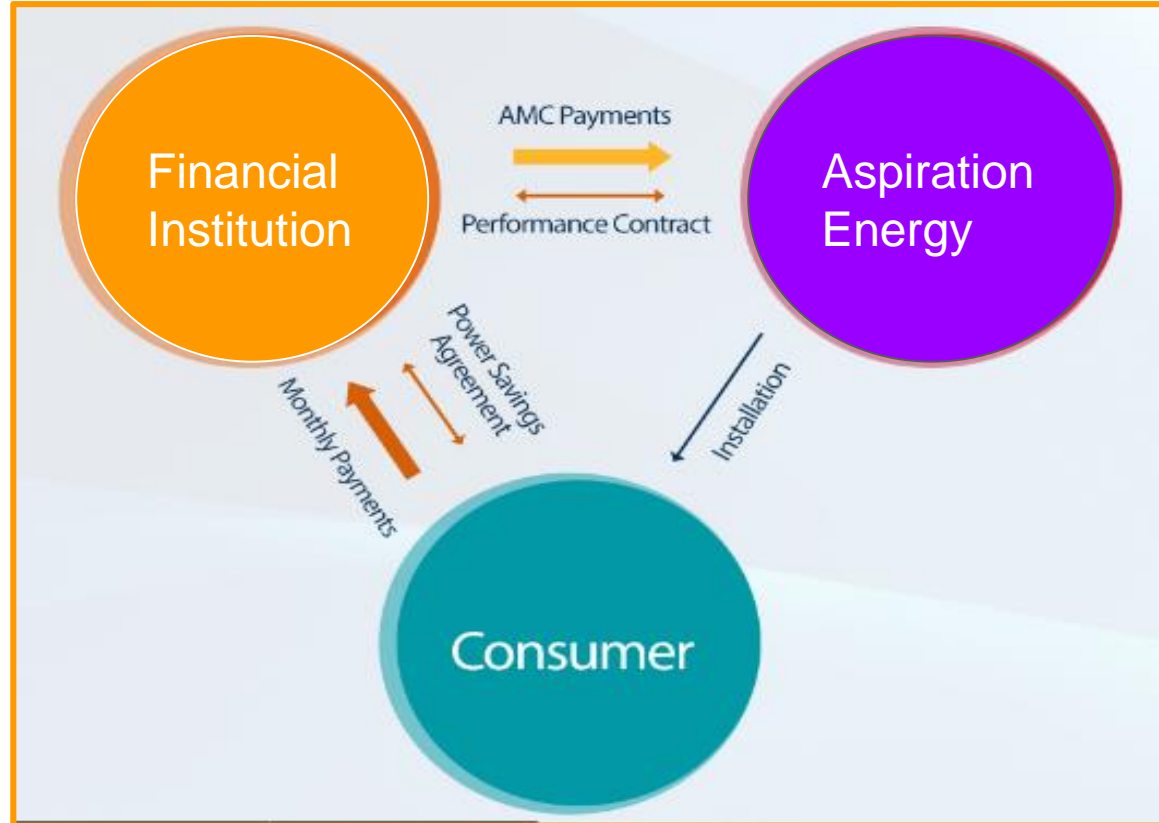
# Reason 5. No Double Conversions



# Reason 6. Replace more expensive fuels

Unit cost Rs/1000 kCal Vs Various Loads	LPG	Diesel	Electricity	Furnace Oil
100 percent	6.2	8.0	5 To 10	5.2
90 percent	6.4	8.3	5 To 10	5.4
70 percent	6.7	8.6	5 To 10	5.6
50 percent	7.0	9.1	5 To 10	5.9
30 percent	8.0	10.3	5 To 10	6.7
10 percent	11.5	14.8	5 To 10	9.6

# Reason 7. Pay as you save





*Be the proud  
pioneer and  
save the  
future...*

>> **Fast Forward to the  
Solar Future!!** >>

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