## SOLAR PUMP

## METHODOLOGY



After measuring the layout of the pump, sump, building and terrace we found the following information:

Amount of water to be pumped per day: $16 \mathrm{~m}^{3}$
Total vertical length: 28 m
Total horizontal length: 32m
Height of building: 24.38 m
Depth of sump: 1.524 m
Length of day: 6 hours
Peak of insolation: $1000 \mathrm{~W} / \mathrm{m}^{2}$
Frictional losses: 5\% of total vertical height $=1.4 \mathrm{~m}$
Total dynamic head: 29.4 m

Given below are the calculations made for the power of the pump as well as the number of panels required:

Hydraulic energy required to raise the water level $=\rho \times g \times v \times T D H$

$$
\begin{aligned}
& =\frac{1000 \mathrm{~kg} / \mathrm{m}^{3} \times 16 \mathrm{~m}^{3} / \mathrm{day} \times 9.8 \mathrm{~m} / \mathrm{s}^{2} \times 29.4 \mathrm{~m}}{3600} \\
& =\mathbf{1 2 8 0 . 5 4} \mathbf{~ W} / \mathbf{h r} / \mathbf{d a y}
\end{aligned}
$$

[Note: Potential energy of the water is raised due to pumping, which must be supplied to the pump]

Solar radiation data: $6 \mathrm{hr} /$ day (peak of $1000 \mathrm{~W} / \mathrm{m}^{2}$ equivalent)

Total wattage of PV panel = Total hydraulic energy

> No. hours of peak sunshine

$$
=1280.54=\mathbf{2 1 3 . 4 3 W}
$$

```
Considering system losses = Total PV panel wattage
    Pump }\eta\times\mathrm{ MM Factor
    = 213.43 = 836.98W
    0.3\times0.85
```

Consider the operating factor for PV panel = Total PV panel wattage after loss
Operating fraction

```
    = 836.98 =1115.97W
    0 . 7 5
Number of solar panels required of 250wp each = 1115.97 = 4.46 = 5 panels
250
Power rating of the motor \(=1115.97=1.49 \mathrm{HP}\)


\section*{;OUTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LIMITED}


Dated
26-02-2017
Fetruary 2017
Dated

HDNA 05
SUITAN UR ULOOM
EDUCATIONAL, SOCIETY
8-2-249 RD 3 BANJARANILIS
HYDERABAD 500034
\begin{tabular}{|c|c|c|c|c|c|}
\hline ESCRIPTIONS & KWH & KVAH & KVA & PF & PEAK KVAH \\
\hline eading OpEE-17 & 717089.00 & 795406.00 & 80.08 & 110858.00 & 60714.00 \\
\hline eading \(\mathrm{Og}_{\mathrm{AN}} \mathrm{N}-17\) & 702766.00 & 780666.00 & & 108346.00 & 59593.00 \\
\hline ifference 01 & 14323.00 & 14740.00 & & 2512.00 & 1121.00 \\
\hline Iultiplying Factor & 4.00 & 4.00 & 4.00 & 4.00 & 4.00 \\
\hline otal Consumption & 57292.00 & 58960.00 & 320.33 & 10048.00 & 4484.00 \\
\hline Ionthly Minimum Units & 8007.70 & & 280.00 & & \\
\hline lain Consumption & 58960.00 & Colony & 0.00 & L\&F & 0.00 \\
\hline
\end{tabular}


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SUUIHEKN YUVVEK UISIKIbUIIUN LUMPANY UF IELANGANA LIMIIED
}
H.T. C.C. Bill for the month of Dated
PAYABLE ON OR BEFORE Datedptenber 2015 26-09-2016


H.T. C.C. Bill for the month of

PAYABLE ON OR BEFORE Datedy
- 2018
\begin{tabular}{|lll|}
\hline Contracted MD (KVA/HP) & & \\
Specified Voltage (KV) & 350 \\
Actual Voltage (KV) & 11 \\
Feeder & 11 & \\
Category & CF & \\
\hline
\end{tabular}

BJH105 SUTSZAN UL ULCOM EDUCATIONAL EOCTETY. 8-2-249 RD 3 BANTARDHILIS HYDEREBAD \(500 \quad 034\)


\author{
H.T. C.C. Bill for the month of Dated
}

PAYABLE ON OR BEFORE Dated 20 26-06-2018
\(10-T M 1-18\) DISCONNECTION DATE: 25-JUI-18
\begin{tabular}{|c|c|c|c|c|c|}
\hline \begin{tabular}{ll} 
& \\
Contracted MD \((\mathrm{KVA} / \mathrm{HP})\) \\
Specified Voltage (KV) & 35 \\
Actual Voltage (KV) & 11 \\
Feeder & 11 \\
Category & CF \\
\hline
\end{tabular} & \[
\begin{aligned}
& 350 \\
& 11 \\
& 11 \\
& C F \\
& 2
\end{aligned}
\] & \multicolumn{3}{|r|}{\begin{tabular}{l}
BJH105 \\
SULTAR UL ULOOM \\
EDUCATTONAL SOCIETY \\
8-2-243 RD 3 BANJARAHILLS \\
HYDEFABED 500034
\end{tabular}} & \\
\hline OESCRIPTIONS & KWH & KVAH & KVA & PF & PEAK KVAH \\
\hline ReadingY 4 - JuN-18 & 951070.00 & 1043286.00 & 66.79 & 153483.00 & 78820.00 \\
\hline  & 940688.00 & 1032856.00 & & 151956.00 & 77238.00 \\
\hline Differengs : 01 & 10382.00 & 10430.00 & & 1527.00 & 1582.00 \\
\hline Multiplying Factor & 4.00 & 4.00 & \(4.00 \cdot\) & 4.00 & 4.00 \\
\hline fotal Consumption & 41528.00 & \$1720.00 & 267.15 & 6108.00 & 6328.00 \\
\hline Monthly Minimum Units & 7000.00 & & 280.00 & & \\
\hline Main Consumption & 41720.00 & Colony & 0.00 & L\&F & 0.00 \\
\hline
\end{tabular}


Shirteen Lakh Fourty thousand one Hundred and winteen only




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H.T. C.C. Bill for the month of

Dated
PAYABLE ON OR BEFORE Datêtgust 2018 26-08-2018
09-Sep-18 DISCONNELYIDN DETE: 24-Sep-18
\begin{tabular}{|c|c|c|c|c|c|}
\hline \multicolumn{2}{|l|}{\begin{tabular}{ll} 
Contracted MD (KVA/HP) \\
Specified Voltage (KV) & 3.50 \\
Spect \\
Actual Voltage (KV) & 11 \\
Feeder & 11 \\
Category & CFF \\
& 2 \\
\hline
\end{tabular}} & \multicolumn{4}{|c|}{\begin{tabular}{l}
B. Th105 \\
SULTAN UL ULOOM \\
EDUCATIONAL SOCIETY \\
8-2-249 RD 3 BANJARAHILLS \\
HYDERABAD 500034
\end{tabular}} \\
\hline DESCRIPTIONS & KWH & KVAH & KVA & PF & PEAK KVAH \\
\hline Reading \(\mathrm{P}^{\text {a }}\) AUG-18 & 983822.00 & 1076092.00 & 103.44 & 159409.00 & 80877.00 \\
\hline Reading \({ }^{\text {Pa JuL-18 }}\) & 966462.00 & 1058687.00 & & 156232.00 & 79812.00 \\
\hline Differerges : 01 & 17360.00 & 17405.00 & & 3177.00 & 1065.00 \\
\hline Multiplying Factor & 4.00 & 4.00 & 4.00 & 4.00 & 4.00 \\
\hline otal Consumption & 69440.00 & 69620.00 & 413.76 & 12708.00 & 4260.00 \\
\hline fonthiy Minimum Units & 10344.00 & & 280.00 & & \\
\hline Main Consumption & 69620.00 & Colony & 0.00 & L\&F & 0.00 \\
\hline
\end{tabular}
\begin{tabular}{l|lc}
\hline PESCRIPTIONS & RATE & KVA/ UNITS \\
Demand Charges Normal & Rs99 & 350 \\
Demand Charges Penal & Rs80 & 63.76 \\
Energy Charges & Ps 780 & 69620
\end{tabular}
ncentive TODI
ncentive TOD2
OD Charges
Electrical Duty
Colony Charges
\&F Charges
SA Charges
(FR:105114 IR:103923)
(FR: 36810 IR:36379)
Ps \begin{tabular}{ll}
100 & 16968 \\
& \\
\(\mathrm{P}_{5}\) & 69620 \\
\(\mathrm{Ps}^{6330}\) & 0 \\
\(\mathrm{Ps}^{780}\) & 0
\end{tabular}
upplier Name

Net KWH KVA TOD Customer Charges
Low Powar bactur हnatrage RKVAH Surcharge HYDEL RKVAH Surcharge WIND Late Payment Charges Interest on ED Penal Interest Difference Voltage Surcharge Wheeling / Transmission Charges other Gribergergasil

Gross Total

AMOUNT Rs.
136500.00 49732.80 543036.00 \(-4764.00\) \(-1724.00\) 16968.00 4177.20
0.00
0.00

Total Amount Payable hirteen Lalch Seventy Two Thousand Six Hundred and Eighty one only

\section*{SOUTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LIMITED}
H.T. C.C. Bill for the month of

Dated
PAYABLE ON OR BEFORE Datept ember 2018 26-09-2018
10-0ct-18 DISCONNECTION DATE: 25 -0ct-18
\begin{tabular}{|c|c|c|c|c|c|}
\hline \multicolumn{2}{|l|}{\begin{tabular}{lc} 
\\
Contracted MD (KVA/HP \\
Specified Voltage \\
(KV) & 11 \\
Actual Voltage (KV) & 11 \\
Feeder & 11 \\
Category & 3 \\
\hline
\end{tabular}} & \multicolumn{4}{|c|}{\begin{tabular}{l}
BTHLOE \\
SUITAN UL UTHOM \\
EDUCETIONAL SOCIETY \\
8-2-243 RD 3 BANJARAHILLS \\
HYDERABAD 500034
\end{tabular}} \\
\hline DESCRIPTIONS & KWH & KVAH & KVA & PF & PEAK KVAH \\
\hline ReadingTon-ser - 18 & 998298.00 & 1090607.00 & 122.01 & 162158.00 & 81733.00 \\
\hline ReadingX0-AUG-18 & 983822.00 & 1076092.00 & & 159409.00 & 80877.00 \\
\hline Differencer :01 & 14476.00 & 14515.00 & & 2749.00 & 856.00 \\
\hline Multiplying Factor & 4.00 & 4.00 & 4.00 & 4.00 & 4.00 \\
\hline Total Consumption & 57904.00 & 58060.00 & 488.04 & 10995.00 & 3424.00 \\
\hline Monthly Minimum Units & 12201.00 & & 280.00 & & \\
\hline Main Consumption & 58060.00 & Colony & 0.00 & L\&F & 0.00 \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|c|}
\hline DESCRIPTIONS & & RATE & KVA / UNITS \\
\hline Demand Charges Normal & & Rs 390 & 350 \\
\hline Demand Charges Penal & & Rs 780 & 138.04 \\
\hline \begin{tabular}{l}
Energy Charges \\
Finentive ToD1
\end{tabular} & (FR: &  & 58060 \\
\hline Incentive ToDz & (ER: & 37175 18:36810) & \\
\hline Don Charges & P. & 1.15 & 14420 \\
\hline Electrical Duty & & Ps 6 & 58060 \\
\hline Colony Charges & & Ps \({ }^{725}\) & \\
\hline L\&F Charges & & \(\mathrm{Ps}^{8.37}\) & 0 \\
\hline
\end{tabular}

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SOUTHERN POWER DISTRIBUTIOA COMPANY OF TELANGANA LIMTTED \\ Dated
}
H.T. C.C. Bill for the month of

PAYABLE ON OR BEFORE Dated ctober 2018 26-10-2018


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\section*{SOUTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LIMITED}
H.T. C.C. Bill for the month of

Dated
PAYABLE ON OR BEFORE Dated December 2018 26-12-2018
09-Jan-19 DISCONWECTICN DATE = 24-Jan-19


\section*{SOUTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LIMITED}
H.T. C.C. Bill for the month of

Dated
PAYABLE ON OR BEFORE Dated

Feb- 15
TNDG: TON DATE: \(\quad 24-\mathrm{Feb}-19\)


\section*{UTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LIMITED}
H.T. C.C. Bill for the month of

Dated
3019
26-02-2019
PAYABLE ON OR BEFORE Dated

\author{
February \\ -Mar-19
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ISCONNECMION DATE: 27-MaK-19


\section*{SOUTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LIMITED \\ \author{
H.T. C.C. Bill for the month of
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PAYABLE ON OR BEFORE Dated:



\title{
OUTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LIMITED
}
H.T. C.C. Bill for the month of

PAYABLE ON OR BEFORE Dated

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