VARUNA ENERGY AUDITS

SUMMARY REPORT

FOR THE TIME PERIOD

SEPTEMBER 2014 - MARCH 2015

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Prepared by:

24th April 2015
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1. INTRODUCTION

This report summarizes the findings and recommendation of the energy audit reports generated for 23 buildings of Auroville. Varuna Auroville currently monitors energy consumption of buildings and conducts on site data collection of buildings whose bi-monthly energy consumption show an increase of 30% as compared to the precious bi-monthly reading. Additionally data collection on electricity consumption of buildings is being undertaken on request of building stewards. The data collected is then shared and analysed by Auroville Consulting and an energy audit report that lists recommended Energy Efficiency interventions is shared with Varuna and the respective building stewards.

The data in this document includes only baseline and recommended cases for electric fixture and appliances for which energy efficiency interventions were recommended, hence the data does not reflect the electrical energy baseline of the entire buildings audited. For the time period from September 2014 to March 2015 a total number of 29 buildings where audited. 23 energy efficiency reports where completed. 6 energy efficiency reports could not be completed yet due to lack and inconsistency in data.
2. SUMMARY OF FINDINGS

We identified three main reasons for the increase in electricity consumption in the buildings by more than 30%. Those are:

- Seasonal spikes that include change in weather patterns and occupancy (more need for fans, and air conditioning in hotter periods of the year, visiting guest etc.),
- Old dysfunctional appliances that increase electricity consumption (e.g. dysfunctional thermostat)
- Purchase of a new/additional appliance

Additionally energy audits where conducted on request of building stewards.

Figure 1 Reason for Energy Audits

The total energy consumption in percentage of fixtures/appliance per type considered is reflected in Figure 1. Air conditioners account for more than half (57%) of the electricity consumption of the audited fixtures; Refrigerators follow this with about 29%.

Figure 2 Baseline consumption by audited type of fixture
Figure 2 compares the annual electric consumption by type of fixture for the baseline and for the case if recommended energy efficiency interventions were implemented. Air conditioners and refrigerators show the highest saving potential followed by fans and lights (see Figure 3 and Figure 4).

Figure 3 Electricity consumption before intervention and after intervention.

Figure 4 Potential energy Savings per type of fixture in kWh

Figure 5 Potential Energy Savings per type of fixture in % on total savings identified
Table 1 summarizes the findings for the audited appliances indicating the baseline consumption and saving potential in kWh, INR and percentage.

Table 1 Summary of Baseline Consumption by type of fixtures

<table>
<thead>
<tr>
<th>Type of Appliance/Fixture</th>
<th>Baseline Consumption</th>
<th>Estimated Consumption after proposed EE.Intervention</th>
<th>Saving in kWh</th>
<th>Savings in % on total Savings</th>
<th>Estimated Investment required (Rs)</th>
<th>One time capital Investment required per kWh savings over on year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Conditioner</td>
<td>18,719.00</td>
<td>11,737.00</td>
<td>6,982.00</td>
<td>44%</td>
<td>3,43,054.00</td>
<td>49.13</td>
</tr>
<tr>
<td>Fans</td>
<td>2,207.30</td>
<td>509.10</td>
<td>1,698.20</td>
<td>11%</td>
<td>71,900.00</td>
<td>42.34</td>
</tr>
<tr>
<td>Refrigerators</td>
<td>9,620.00</td>
<td>4,151.00</td>
<td>5,469.00</td>
<td>35%</td>
<td>61,616.00</td>
<td>11.27</td>
</tr>
<tr>
<td>Washing Machine</td>
<td>611.00</td>
<td>330.00</td>
<td>281.00</td>
<td>2%</td>
<td>4,59,211.00</td>
<td>1,634.20</td>
</tr>
<tr>
<td>Lights</td>
<td>1,791.30</td>
<td>449.90</td>
<td>1,341.40</td>
<td>9%</td>
<td>19,800.00</td>
<td>14.76</td>
</tr>
<tr>
<td>Total</td>
<td>32,948.60</td>
<td>17,177.00</td>
<td>15,771.60</td>
<td>100%</td>
<td>9,55,581.00</td>
<td>60.59</td>
</tr>
</tbody>
</table>

Figure 6 attempts to highlight the most cost efficient areas for energy efficiency interventions using a key which is the estimated one time capital investment for the purchase of a more efficient appliance divided by the financial savings due to reduction in electric energy consumption. This indicates that the most attractive interventions in terms of finance are for Lights and refrigerators followed by fans and air conditioners.

Figure 6 Investment required per kWh saved
2. RECOMMENDATIONS

- In order to complete energy efficiency audit reporting, complete and accurate data from the building energy required. It is recommended to upload data on Podio only after all data for the each building has been collected and checked for accuracy. (Especially in case of data extracted from the data logger)
- Contacting the respective building steward before the audit and using a check-list with basic questions may help to avoid audits of building that are spiking due to seasonal variations (visiting guests etc.)
- Creating two categories on Podio one for buildings that spiked and another category for buildings that voluntarily requested an energy audit.
- Consider a pro-active approach by using the electricity consumption per square meter or per person for selecting building to be audited
- Share Information about the implemented energy efficiency interventions of the buildings audited with the community to create a momentum
- Celebrate electrical energy saving through energy efficiency interventions in Auroville internal media channels (News and notes, AV Today. Auronet).
- Request Auroville Varuna team members to lead by example to get their buildings audited and some energy efficiency recommendations implemented. The achieved electricity savings may be published in Auroville media channels to inspire the community.
3. ANNEXURES

List of Completed Energy Audits by Building Steward

1. Booma
2. Ribhu
3. Marlenga
4. Uma
5. Mita
6. Moorthy
7. Meenakshi
8. Julian
9. Sundaravinayagam
10. Narayanan
11. Rakhal
12. Benito
13. Pushkar
14. Soham
15. Vikas
16. Taj
17. Rajesh
18. Joy
19. Patha
20. Anjalakshi
21. Louis
22. Banumathi
23. Grace

List of Pending Audits

1. Sumithra- audit data incomplete
2. Shakti- audit data incomplete
3. Francois- audit data incomplete
4. Arka Staff quarters audit data incomplete or wrong
5. Sylas- audit data incomplete
6. Toby – audit data incomplete