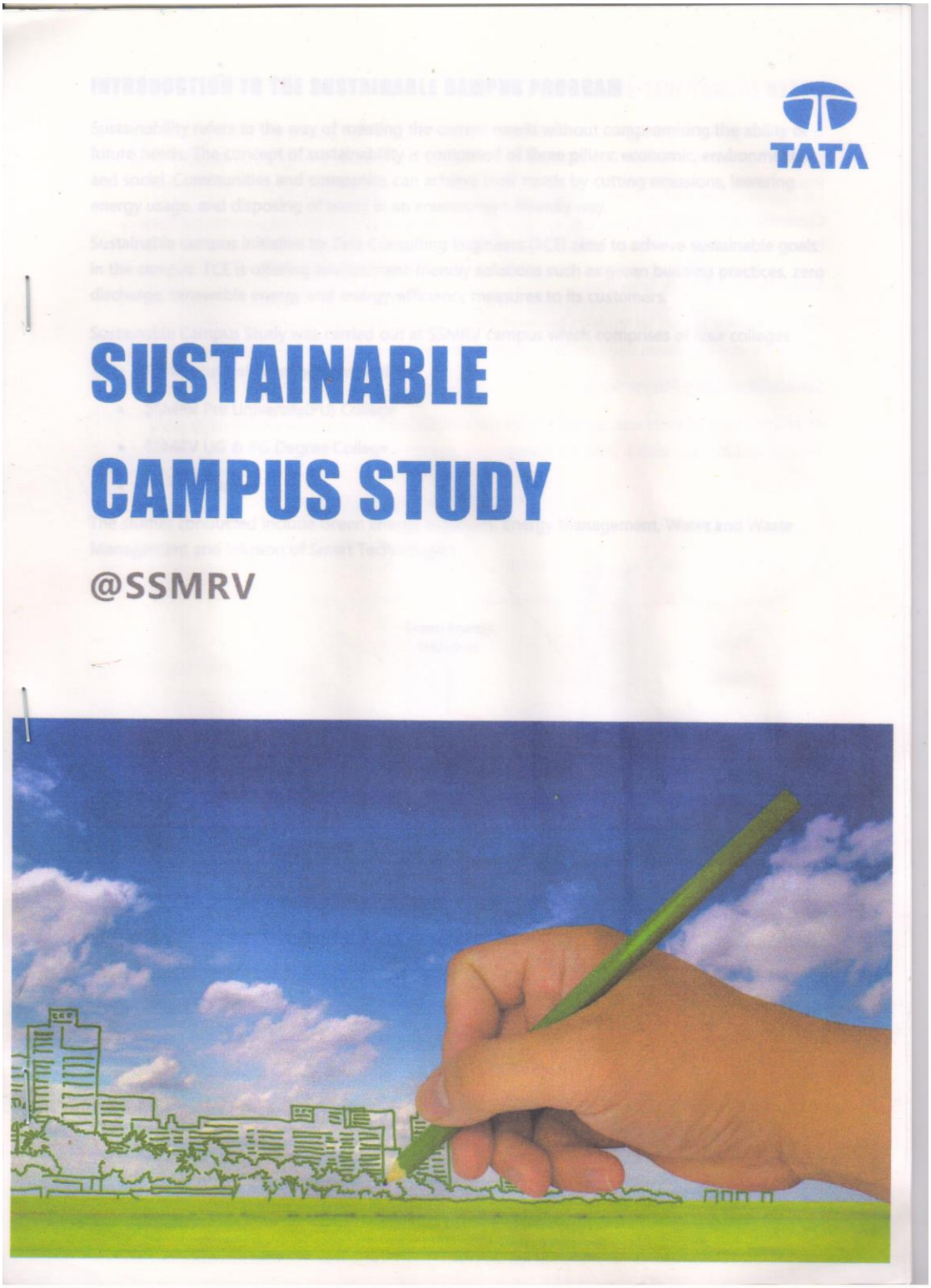
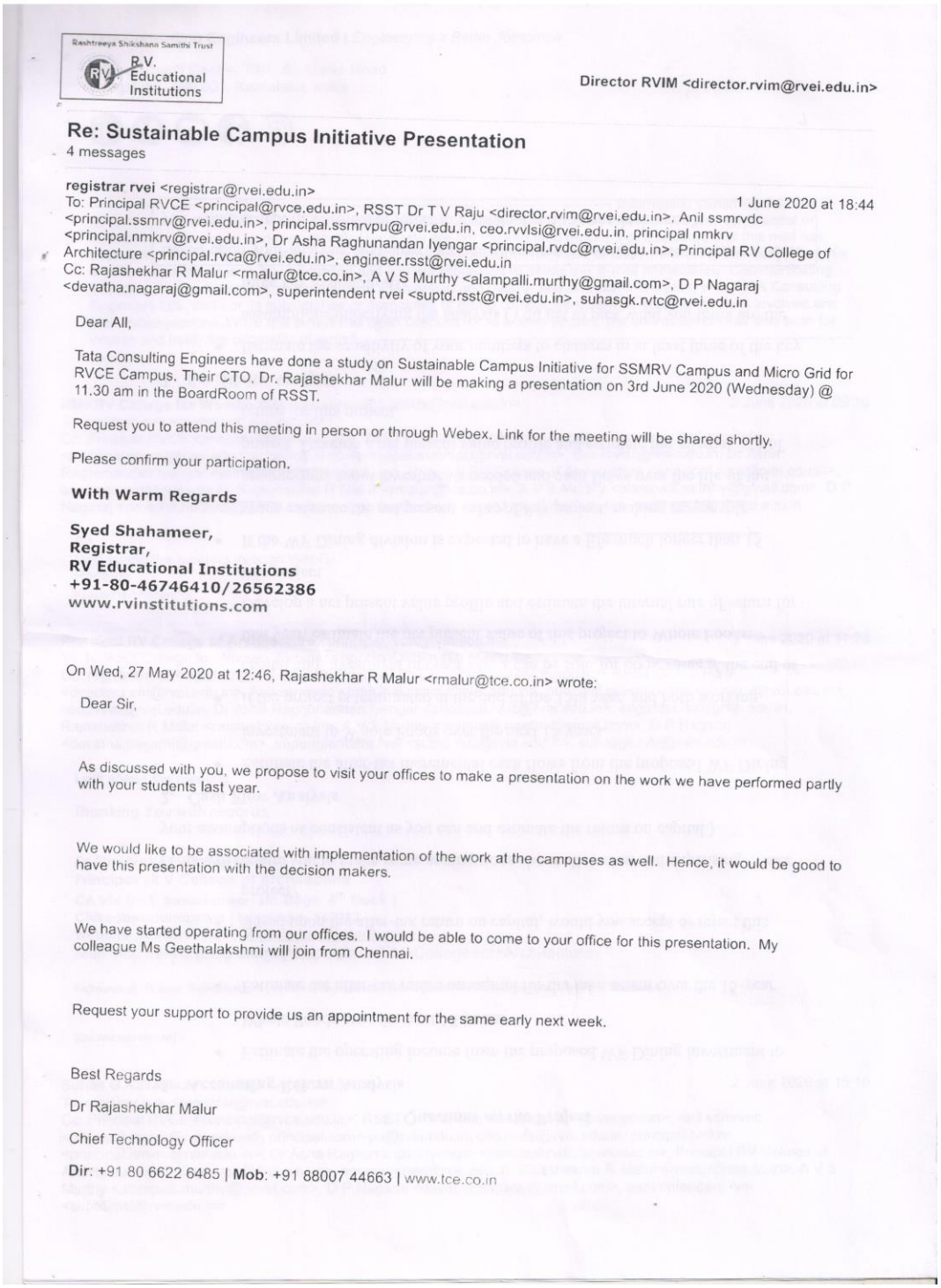


SSMRV Campus comprises of 4 colleges and RVIM is independent standalone Institute there .The energy audit was conducted by TATA Consulting Engineers team and Student Volunteers of RVIM Centre for Social Responsibility. The report was submitted to The Director, RVIM and the entire campus report was

submitted to the RV Group of Institutions in the presence of Hon.Secretary, and other members on June 3,2020(E Mail Copy next)



Rashtreeya Shikshana Samithi Trust
R.V. Educational Institutions

Director RVIM <director.rvim@rvei.edu.in>

Re: Sustainable Campus Initiative Presentation
4 messages

registrar rvei <registrar@rvei.edu.in> 1 June 2020 at 18:44
To: Principal RVCE <principal@rvce.edu.in>, RSST Dr T V Raju <director.rvim@rvei.edu.in>, Anil ssmrvdc <principal.ssmrv@rvei.edu.in>, principal.ssmrvpu@rvei.edu.in, ceo.rvvlsi@rvei.edu.in, principal nmkrv <principal.nmkrv@rvei.edu.in>, Dr Asha Raghunandan Iyengar <principal.rvdc@rvei.edu.in>, Principal RV College of Architecture <principal.rvca@rvei.edu.in>, engineer.rsst@rvei.edu.in
Cc: Rajashekhar R Malur <rmalur@tce.co.in>, A V S Murthy <alampalli.murthy@gmail.com>, D P Nagaraj <devatha.nagaraj@gmail.com>, superintendent rvei <suptd.rsst@rvei.edu.in>, suhasgk.rvtc@rvei.edu.in

Dear All,

Tata Consulting Engineers have done a study on Sustainable Campus Initiative for SSMRV Campus and Micro Grid for RVCE Campus. Their CTO, Dr. Rajashekhar Malur will be making a presentation on 3rd June 2020 (Wednesday) @ 11.30 am in the BoardRoom of RSST.

Request you to attend this meeting in person or through Webex. Link for the meeting will be shared shortly.

Please confirm your participation.

With Warm Regards

Syed Shahameer,
Registrar,
RV Educational Institutions
+91-80-46746410/26562386
www.rvinstitutions.com

On Wed, 27 May 2020 at 12:46, Rajashekhar R Malur <rmalur@tce.co.in> wrote:

Dear Sir,

As discussed with you, we propose to visit your offices to make a presentation on the work we have performed partly with your students last year.

We would like to be associated with implementation of the work at the campuses as well. Hence, it would be good to have this presentation with the decision makers.

We have started operating from our offices. I would be able to come to your office for this presentation. My colleague Ms Geethalakshmi will join from Chennai.

Request your support to provide us an appointment for the same early next week.

Best Regards

Dr Rajashekhar Malur

Chief Technology Officer

Dir: +91 80 6622 6485 | **Mob**: +91 88007 44663 | www.tce.co.in

Presentation to ALL STAKE HOLDERS

INTRODUCTION TO THE SUSTAINABLE CAMPUS PROGRAM

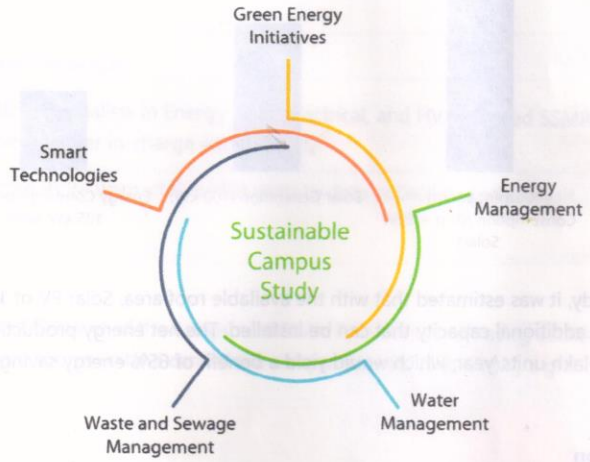
Sustainability refers to the way of meeting the current needs without compromising the ability of future needs. The concept of sustainability is composed of three pillars: economic, environmental and social. Communities and companies can achieve their needs by cutting emissions, lowering energy usage, and disposing of waste in an environment-friendly way.

Sustainable campus initiative by Tata Consulting Engineers (TCE) aims to achieve sustainable goals in the campus. TCE is offering environment-friendly solutions such as green building practices, zero discharge, renewable energy and energy-efficiency measures to its customers.

Sustainable Campus Study was carried out at SSMRV campus which comprises of four colleges

- RV Institute of Management(RVIM)
- SSMRV Pre University(PU) College
- SSMRV UG & PG Degree College
- RV-VLSI Centre

The studies conducted include Green Energy Initiatives, Energy Management, Water and Waste Management and infusion of Smart Technologies.



Energy Audit Report Copy Page 1

GREEN ENERGY INITIATIVES

Green energy is the energy produced through means that do not pollute the atmosphere. The primary source of green energy considered for the campus is solar energy using Rooftop Solar Power.

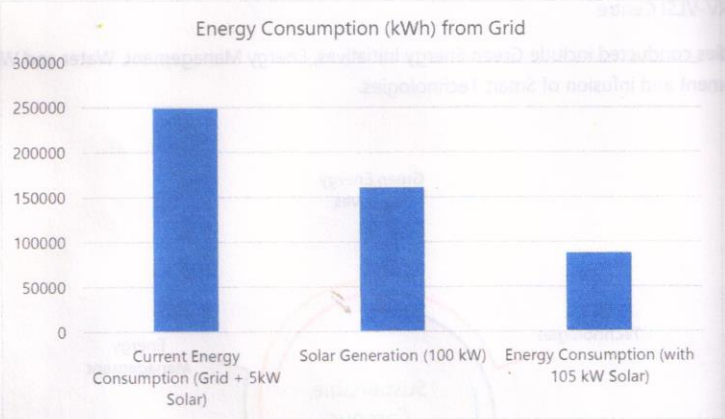
Currently, 5kW Solar PV is installed and used at the campus. The additional potential of Solar Energy was assessed through simulations using PVsyst software.

Solar PV Technology Selection

Poly Crystalline Silicon technology has been chosen considering higher efficiency, relatively cheaper and well-proven large installations in both rooftop and ground-mounted applications.

Simulations using PVsyst Software

An energy yield analysis was carried out for the campus for a typical case of poly-crystalline module and inverter with a fixed-tilt system.



Based on the study, it was estimated that with the available roof area, Solar PV of 100kWp wou be the maximum additional capacity that can be installed. The net energy production is expect to be around 1.6 lakh units/year, which would yield a benefit of 65% energy savings.

Recommendation

- **Solar PV of 100kWp shall be installed.**
- **Net meter shall be installed, and the net metering facility shall be obtained.**
- **Overall cost estimate for the proposed Solar PV is around 50 lakhs with a payback period of 4.5 years.**

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ENERGY MANAGEMENT

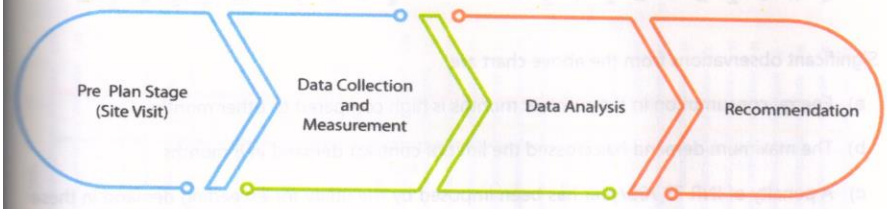
Energy management focuses on optimum usage of energy through a process of monitoring, controlling, and conserving energy.

The objective of the Energy audit and Energy management study carried out at SSMRV campus is

- To study the energy consumption and energy usage patterns at the campus
- To identify the areas of energy wastage and estimate the energy-saving potential
- To suggest cost-effective measures to improve the efficiency of energy use

Energy Audit Methodology

A systematic approach with the four-stage process was adopted



Site Visit and Data Collection

TCE team comprising specialists in Energy audit, Electrical, and HVAC visited SSMRV campus and interacted with the Engineer in-charge and RV staff.

Student groups from RVIM were vital contributors to data collection and analysis.

Data Analysis

The current contract demand of the campus is 90kVA. Two DG sets of rating 82.5kVA and 62.5kVA act as an emergency source to take care of the campus power loads during a grid outage.

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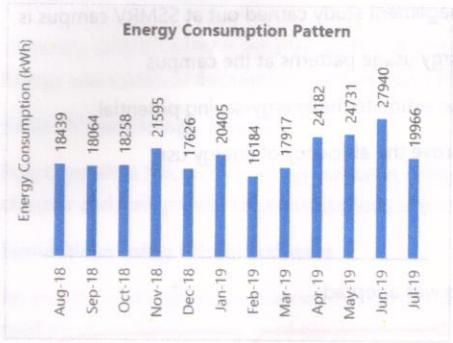
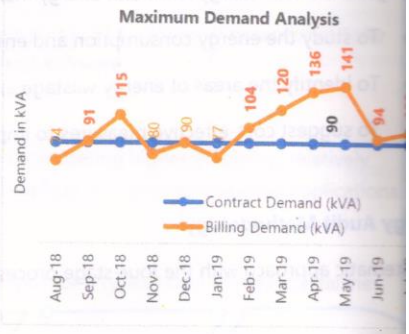
Energy Consumption Analysis





Significant observations from the above chart are:

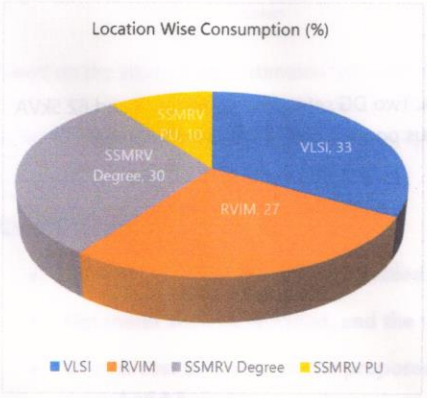
a) Energy consumption in the summer months is high compared to other months.

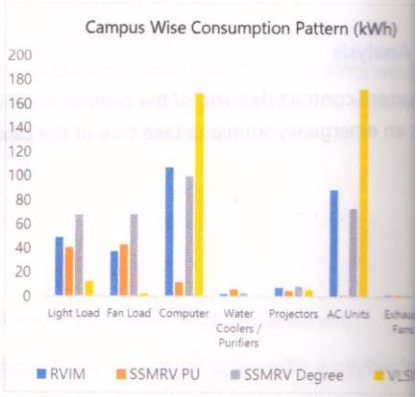
b) The maximum demand has crossed the limit of contract demand in 8 months.

c) A penalty of INR 73,700/year has been imposed by the utility for exceeding demand in th eight months.

Power Consumption Analysis

The various sources of energy utilised in the campus are Utility Grid, Renewable energy – PV Sc and Diesel Generator Set. The significant loads in the university are Lighting & Fans, IT (Compu printers), and AC Units (Split ACs). Following graphs indicate consumption pattern on a typical averaged over a peak consumption month.





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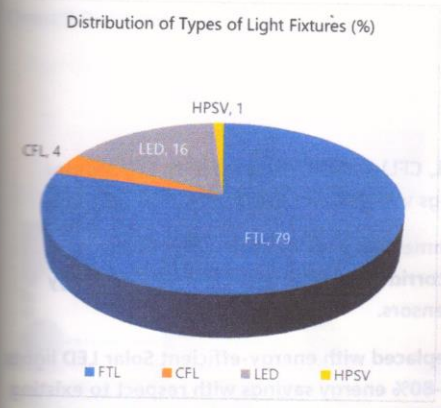

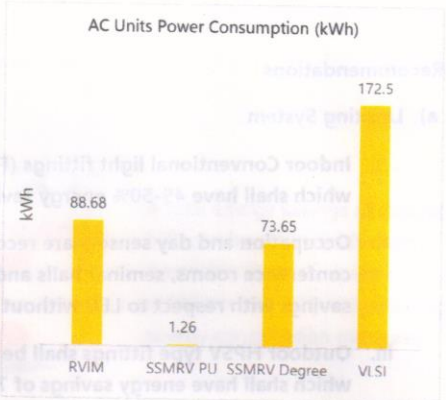

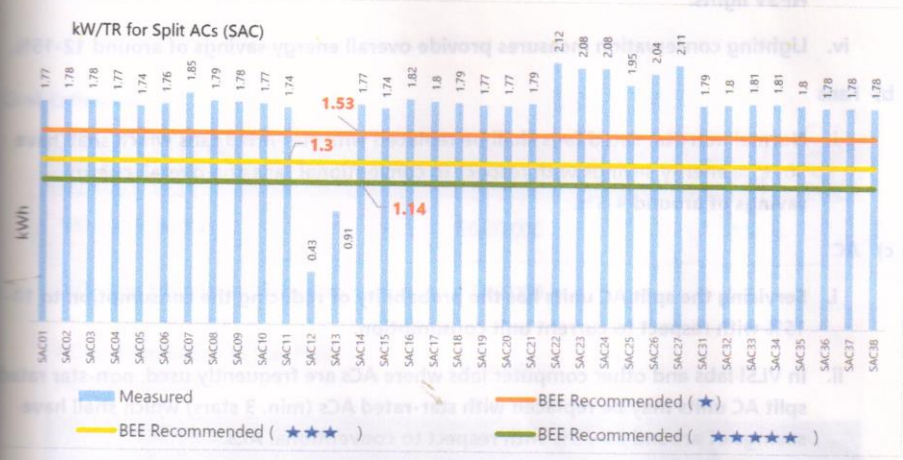

Observations

a) SSMRV PU College consumes **10%** of the total campus power. All other colleges have an almost equal share of **30%**.

b) Major consumers on the campus are Computers (**36%**), AC units (**31%**), Lighting (**16%**) and Fans (**14%**).

c) In Lighting, share of Non-LEDs (FTL/CFL/HPSV) is very high (**79%**). LEDs share in the entire campus is only **16%**.

d) **95%** of the split AC units do not meet the Bureau of Energy Efficiency (BEE) standards.

e) AC units and Computers consume **94%** of the power in VLSI college.

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Recommendations

a) Lighting System

i. **Indoor Conventional light fittings (FTL, CFL) shall be replaced with LED lamps which shall have 45-50% energy savings with respect to conventional lighting.**

ii. **Occupation and day sensors are recommended in classrooms, restrooms, conference rooms, seminar halls and corridors. This shall have 15-25% energy savings with respect to LED without sensors.**

iii. **Outdoor HPSV type fittings shall be replaced with energy-efficient Solar LED lights which shall have energy savings of 75-80% energy savings with respect to existing HPSV lights.**

iv. **Lighting conservation measures provide overall energy savings of around 12-15%.**

b) Fans

i. **Normal non-star rated fans shall be replaced with star rated fans which shall have 30-35% energy savings with respect to conventional fans and overall energy savings of around 4-5%.**

c) AC

i. **Servicing the split AC units has the probability of reducing the consumption to 10-15% with respect to current unit consumption.**

ii. **In VLSI labs and other computer labs where ACs are frequently used, non-star rated split AC units may be replaced with star-rated ACs (min. 3 stars) which shall have savings of around 20-25% with respect to conventional ACs.**

d) IT loads

Awareness may be created among students and staff in following good habits for energy conservation.

i. **Use sleep mode for computers.**

ii. **Adjust the monitor brightness. Brightest setting on the monitor uses about twice as much energy as the dimmest setting.**

iii. **Turn off computers & their monitors, printer and photocopy machines when not in use.**

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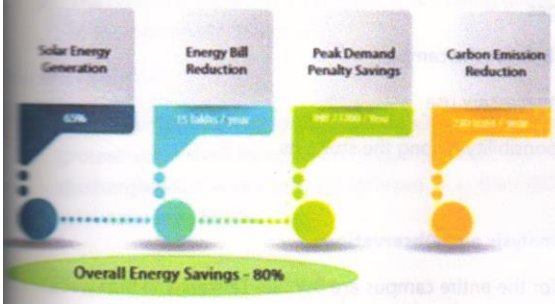
Overall Outcome



A total energy savings of around 80% can be achieved through expansion of solar capacity (additional 100kW) and adopting energy conservation measures.

Cost Estimates

System Description	Capital Cost (Rs)	Payback (Yrs.)
100 kW Solar PV	50,00,000	4.5
LED Light Fittings and Sensors	17,00,000	5.6
AC and ventilation (5 Star Fans, AC Maintenance)	8,00,000	6
Total Capital Cost	**75,00,000**	**4.7**

The total amount of investment can be recovered within 5 years.

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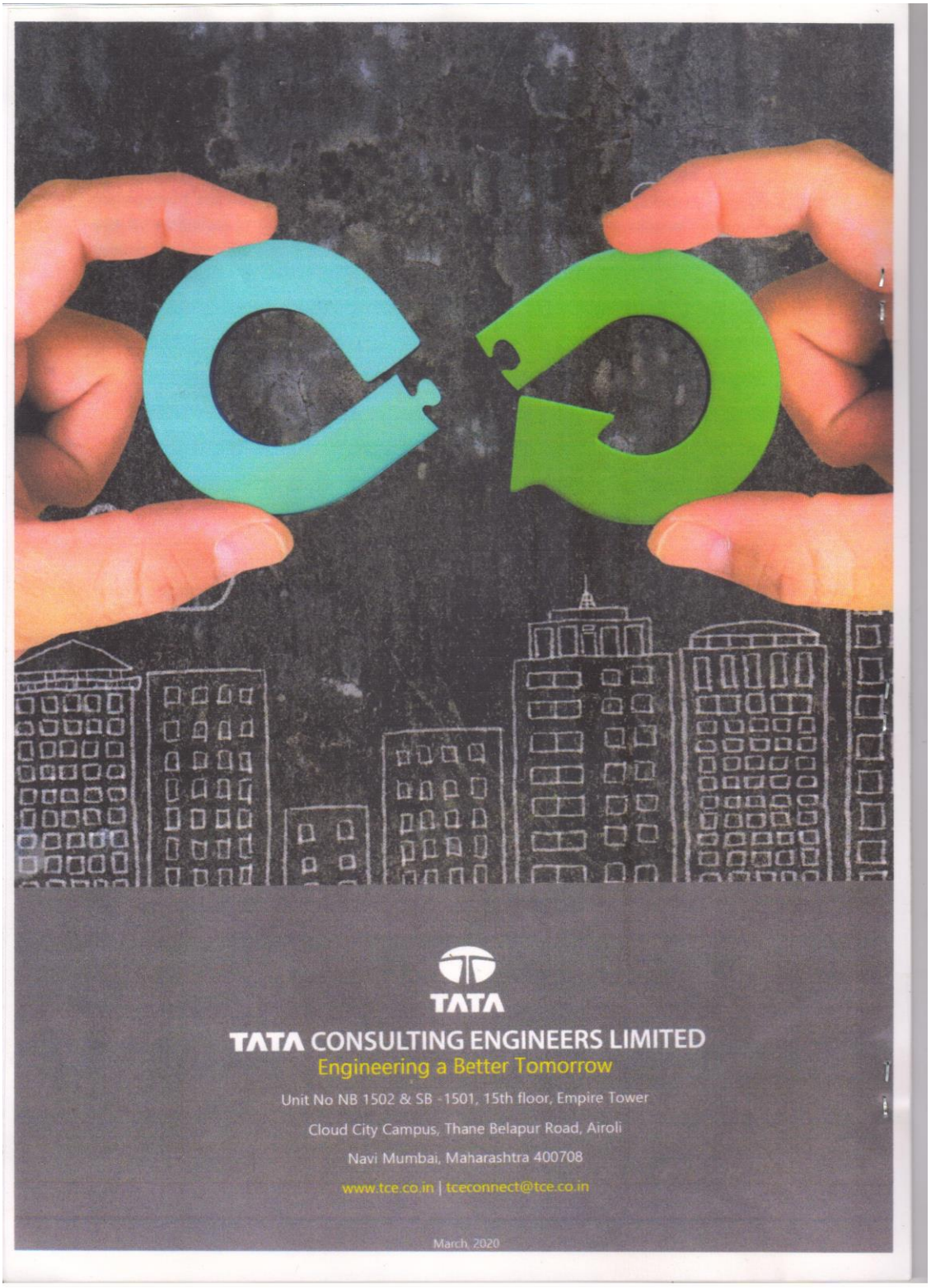

Back Cover Energy Audit Report Copy