

Solar installation in IIT Roorkee Campus completed

IIT Roorkee faculty and students have led initiatives to save significant electricity by conducting an energy audit, developing policy for reducing electricity consumption and energy conservation and using solar energy for reducing carbon footprint. It has installed following solar energy system during the year 2013 – 15.

- Solar PV (1.81 MW) for electricity generation (about 25 lacs units annual), Commissioned in April 2014 with 25 years contract of maintenance at the cost of Rs. 15.90 crores with the subsidy from MNRE of Rs. 12.84 crores.
- Water heating (4.4 Lac liters per day) covering entire campus. Commissioned in Dec 2014 with 20 years contract of maintenance at the cost of Rs. 11.93 crores with the subsidy from MNRE of Rs. 2.85 crores for 3.5 lacs lpd.
- Solar steam for cooking (students hostels 9 nos. equivalent to 5,000 cylinders of 14.2 kg LPG annually) Commissioned in Oct 2015 with 20 years contract of operation and maintenance at the cost of Rs. 2.59 crores for five years with the subsidy from MNRE of Rs. 1.05 crores.

All the systems have SCADA for monitoring and generation of data for further research. For the system technology were adopted as follows:

- A. Polycrystalline Photovoltaic Cells for Solar Electricity Generation (27 units of 1.81 MW)
- B. Evacuated Tube Thermosyphon System (3.4 lacs lpd) and flat plate bed (0.9 lac lpd) for Solar Water Heating
- C. Scheffler Concentrator (16 nos.) for Solar Steam Cooking Systems.

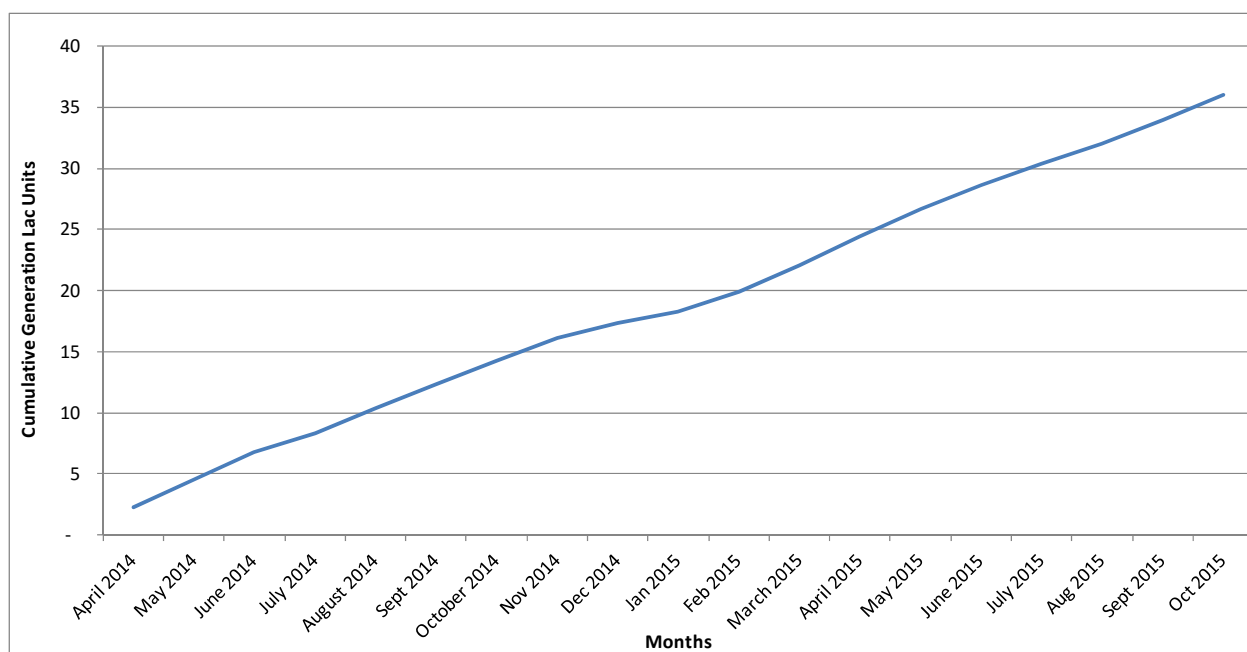
A. SOLAR PHOTOVOLTAIC SYSTEM:

In IIT Roorkee 1.812 MW capacity of solar photovoltaic system has been installed in all the 27 no. of departments/units as follows.

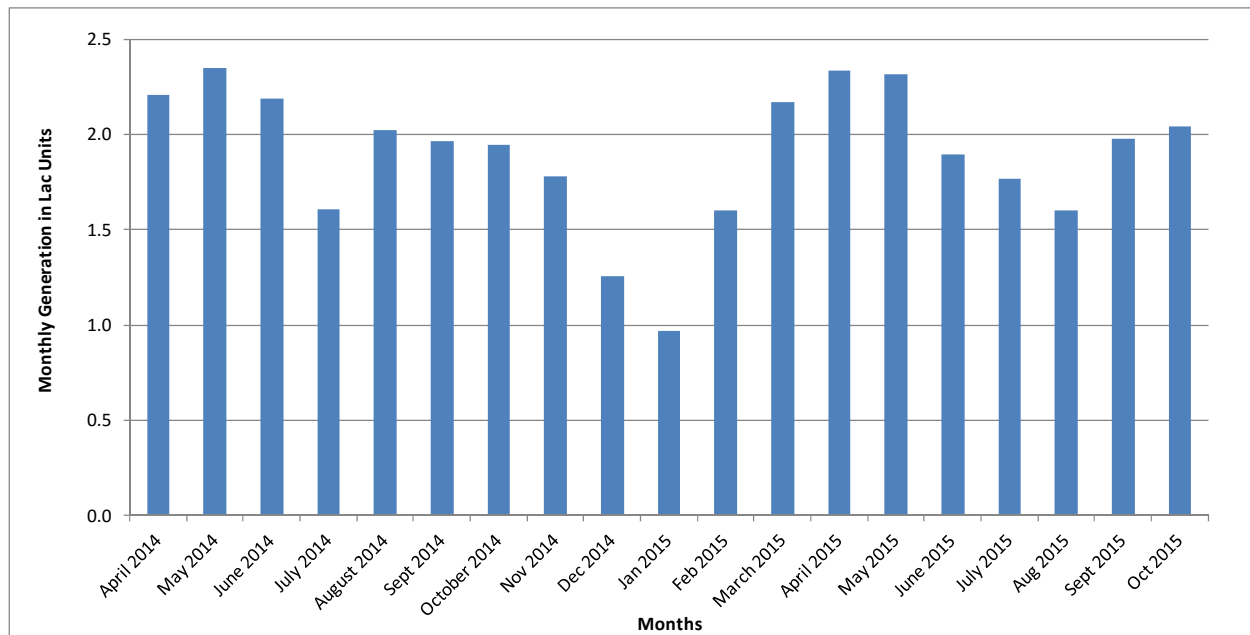
| S. No. | Site (Departments / Centers) | Roof Area (sq.m.) | Peak Power Output (kWp) |
|--------|---------------------------------------|-------------------|-------------------------|
| 1. | Alternate Hydro Energy Center | 658.6 | 42 |
| 2. | Dept of Architecture & Planning | 1050.6 | 66 |
| 3. | Geomatics engg | 767.6 | 60 |
| 4. | Dept of Civil Engineering | 2734.7 | 200 |
| 5. | Department of Chemistry | 1263.9 | 61 |
| 6. | Dept of Chemical Engg | 2069.5 | 119 |
| 7. | Dept of Management Studies | 1166.2 | 40 |
| 8. | Dept of Earthquake Engg | 1540.7 | 66 |
| 9. | Dept of Earth Science | 535.1 | 50 |
| 10. | Institute Computer Center | 615.6 | 32 |
| 11. | Water Resource Development &Mgnt | 786.3 | 43 |
| 12. | Dept of Electronics and Computer Engg | 2180.3 | 114 |
| 13. | Dept of Electrical Engg | 3273.1 | 170 |
| 14. | Dept of Humanities and Sciences | 659.3 | 35 |
| 15. | Dept of Hydrology | 577.2 | 26 |

| S. No. | Site (Departments / Centers) | Roof Area (sq.m.) | Peak Power Output (kWp) |
|---|----------------------------------|-------------------|-------------------------|
| 16. | Dept of Maths& Physics | 1372 | 60 |
| 17. | Dept of Metallurgy | 3237.7 | 159 |
| 18. | MCA block | 1050.6 | 15 |
| 19. | Institute Instrumentation Center | 317.4 | 22 |
| 20. | Dept of Mechanical Engineering | 1596.6 | 100 |
| 21. | Mahatma Gandhi Central Library | 941 | 42 |
| 22. | Lecture Hall-1,-2 | 134.9 | 30 |
| 23. | Lecture Hall Complex | 1575.6 | 84 |
| 24. | Hafiz Mohd Ibrahim Building | 999 | 61 |
| 25. | Industrial Block | 932.5 | 48 |
| 26. | OP Jain Auditorium | 454.8 | 21 |
| 27. | RS wing | 787.1 | 46 |
| Total | | 33277.9 | 1812 |
| Cumulative Generation from April 2014 – Aug 2015 | | | 3,197,163 units |

Thus a saving of CO₂ 2622 ton has been achieved till Oct 2015.



Cumulative Generation





Monthly Generation

PV systems have been connected to micro grid power of the campus and are without any battery.

Further at IITR extension centre at Greater Noida in 10 acre area, a 47 kW solar photovoltaic system is being installed for which MNRE sanction has been received in July 2015.



IIT Roorkee Solar Systems

| | |
|---|--|
| View From Electronics Department Tower | MGCL |
|  |  |
| Civil Department | Mechanical Department |

B. SOLAR WATER HEATING SYSTEM:

In IIT Roorkee campus, solar water heaters systems with various capacities (100 LPD, 200 LPD, 300 LPD, 500 LPD, 750 LPD, 1000 LPD, 1500 LPD, 2000 LPD, 2500 LPD, 3000 LPD) has been installed for all possible installations in Bhawans (hostels), faculty residences and guest houses. There are 12 hostels, 2 guest houses and 14 residential areas covering all staff, students. A total of 4.35 lacs litre per day of installed capacity systems have been installed.

Existing geysers have also connected to the solar water heating systems for use during periods of low and poor heating/sunshine due to fog or clouds. Further an additional capacity of 25000 liter per day is being planned for the balance/recently built hostels.

| | |
|---|--|
|  |  |
| 100 LPD | 200 LPD |

| | |
|---|--|
|  |  |
| 300 LPD | 750 LPD |
|  |  |
| 1000 LPD | 2000 LPD |

Installations: Following installations has been done in the Campus

| LPD of units | No. of system | Total LPD |
|--|---------------|----------------|
| During 2011-12 (Flat plate system) | | |
| at 6 places of different capacities | | 96000 |
| During 2014-15 (Evacuated vacuum tubes) | | |
| 100 | 20 | 2,000 |
| 200 | 1058 | 211,600 |
| 300 | 12 | 3,600 |
| 500 | 12 | 6,000 |
| 600 | 25 | 15,000 |
| 750 | 8 | 6,000 |
| 1,000 | 19 | 19,000 |
| 1,500 | 29 | 43,500 |
| 2,000 | 11 | 22,000 |
| 2,500 | 2 | 5,000 |
| 3,000 | 2 | 6,000 |
| Sub Total | 1,198 | 339,700 |
| | | 435,700 |

Considering full capacity use of SWS for about only 150 days in a year, 4 kWh per day saving is expected for a 100 lpd system, thus a total annual saving of electricity is estimated as 26 lacs units which has saved 2132 ton of CO₂.

C. SOLAR STEAM COOKING SYSTEM

61 collectors providing an area of 976 sq. m using Dish type parabolic solar concentrator have been installed in 9 students messes. These messes are as follows:

| S. No. | Student Messes | No. of Students | Approximate No. of Concentrators (16m ² Dishes with single axis tracking) |
|--------------|----------------------|-----------------|---|
| 1 | Ganga Bhawan Mess | 567 | 7 |
| 2 | Cautley Bhawan Mess | 907 | 9 |
| 3 | Rajendra Bhawan Mess | 800 | 8 |
| 4 | Azad Bhawan Mess | 499 | 6 |
| 5 | Ravindra Bhawan Mess | 509 | 6 |
| 6 | Govind Bhawan Mess | 606 | 7 |
| 7 | Jawahar Bhawan Mess | 642 | 7 |
| 8 | Sarojini Bhawan Mess | 251 | 3 |
| 9 | Radhakrishnan Mess | 624 | 8 |
| Total | | 5,405 | 61 |



Azad Bhawan Mess



Ganga Bhawan Mess



Rajendra Bhawan Mess



Govind Bhawan Mess



Sarojini Bhawan Mess



Jawahar Bhawan Mess

For details

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