Carbon Emissions (in tCO_2e)

at IIT (BHU) Varanasi

Greenhouse Gas Protocol (GHG Protocol)

Solar Power Generation &

Recycle of Old Batteries

Estimation of saving of CO_2 emissions using solar power for the time period August-23 to July-24

The CO2 emissions associated with electricity consumption in India can vary based on the energy mix and the carbon intensity of electricity generation in different regions. As ref [1], the average carbon intensity for electricity generation in India was around 0.82 kilograms of CO2 per kilowatt hour (kgCO2/kWh).

Total Electricity Consumption	**13367610.5 KWh**
Total Electricity Generated using solar panels	**14,95,286 kWh**
Net Electricity Consumption	**1,18,72,324.5 kWh**

To calculate the CO_2 emissions from electricity consumption in India, we have used the formula mentioned earlier:

CO_2 emissions (kg) = Electricity consumption (kWh) x Carbon intensity ($kgCO_2/kWh$)

As shown in Table 1 illustrates the generated solar power in kWh for the time period August-23 to July-24 at IIT (BHU Varanasi, is **1,18,72,324.5 kWh**.

The CO_2 emissions (kg) is therefore = **1,18,72,324.5 kWh** x 0.82 $kgCO_2/kWh$ CO_2 emissions (kg) = **97,35,306.09 kg** for the time period August-23 to July-24.

Average CO_2 emissions (in tCO_2e) for the time period August-23 to July-24= **9,735 tCO_2e**

Ref [1]: CO_2 Baseline Database for the Indian Power Sector, https://cea.nic.in/wp content/uploads/baseline/2023/01/Approved_report_emission__2021_22.pdf

Estimation of saving of CO_2 emissions using recycle of old Batteries 2024

Estimating the exact saving of CO_2 emissions through the recycling of old batteries requires specific data on the recycling process, the type and quantity of batteries recycled, and the carbon footprint associated with both recycling and manufacturing new batteries.

To calculate the saving of CO_2 emissions using recycle of old batteries 2024 at IIT (BHU) Varanasi, using the following

● The carbon footprint of batteries: According to Ref. [1], each kWh of batteries produced would generate the equivalent of 150 to 200 kilograms of CO_2.

● According to Ref. [2], recycling can save 50% to 98% of CO_2 emission.

Based on [1] and [2], the saving of CO_2 emissions using recycle of old batteries 2024 as follows:

= No. of batteries x carbon footprint generated by new batteries x reduces the CO_2 emission by recycle

=600 (Table 2 and ref [3]) x 175 (average of 150 and 200) x .75 (average of 50% to 98%)

=78,75,000 kilograms CO_2 **= 7,875 tCO_2e**

References

[1] https://greenly.earth/en-us/blog/industries/carbon-footprint-battery

[2] https://8billiontrees.com/carbon-offsets-credits/carbon-footprintrecycling/#:~:text=How%20Much%20Does%20Recycling%20Reduce,61%20kg%20of%20emissions%20monthly

Table 1: illustrates the generated solar power in KW

Clean Max Enviro Energy Solutions Pvt. Ltd.

CleanMax™

Payer Name	Indian Institute of Technology Hindu University
Payer Address	Indian Institute of Technology Banaras Hindu University, IWD, IIT - Banaras Hindu University, Varnasi Uttar Pradesh 221005
Solar plant total capacity	1518.3 kWp
Bill date	25 May 2024
Bill Supplies Upto	30-Apr-24

Location/Building	Capacity(kWp)	Reading Type	Current reading (A)	Previous reading kWh (B)	Billable units (C= A-B)	Billable units (C= A-B) including Deemed & Inverter	Rate per kWh (D)	Comment
IIT BHU Electrical New Bldg	88.20	Energy Meter	122557.66	109746.98	12,810.68	12,810.68	6.15	
IIT BHU Electrical Old Bldg	126.00	Energy Meter	999190.25	985075.94	14,114.31	14,114.31	6.15	
IIT BHU Civil Old Bldg	81.90	Energy Meter	211930.63	203938.27	7,992.36	7,992.36	6.15	
IIT BHU Civil New Bldg	63.00	Energy Meter	221592.13	214406.88	7,185.25	7,185.25	6.15	
IIT BHU Electronic Bldg	119.70	Energy Meter	918540.06	904217.63	14,322.43	14,322.43	6.15	
IIT BHU Chemistry Building	37.80	Energy Meter	26929.84	21976.72	4,953.12	4,953.12	6.15	
IIT BHU Mechanical Building	113.40	Energy Meter	832487.56	821899.31	10,588.25	10,588.25	6.15	
IIT BHU PHARMACY Bldg	151.20	Energy Meter	1083256.5	1072231.13	11,025.37	11,025.37	6.15	
IIT BHU Ceramic	88.20	Energy Meter	756081.75	748202.75	7,879.00	7,879.00	6.15	
IIT BHU Mining Bldg	214.20	Energy Meter	820365.79	819503.25	862.54	862.54	6.15	
		Energy Meter	615699.2	597567.69	18,131.51	18,131.51		
IIT BHU Aryabhatta Hostel	220.50	Energy Meter	975697.63	963527.25	12,170.38	12,170.38	6.15	
		Energy Meter	820761	805096	15,665.00	15,665.00		
IIT BHU Visvesaraya Hostel	88.20	Energy Meter	505042.41	495305.63	9,736.78	9,736.78	6.15	
IIT BHU S N BOSE Hostel	63.00	Energy Meter	204220.63	199294.55	4,926.08	4,926.08	6.15	
IIT BHU Library and Director Bldg	63.00	Energy Meter	130471.15	126154.93	4,316.22	4,316.22	6.15	
Total	1,518.30		9244824.19	90,88,144.91	1,56,679.28	1,56,679.28		

For any billing related queries/clarifications, please send an email to billing@cleanmax.com

Disclaimer: This is an electronically generated document, hence does not require a signature.

Table 2: Batteries for recycle

Technical Specifications

Requirement Units:

1. Each of the 20 KVA UPS(Model: Luminous) has bank of 20 No. 100 AH batteries. So in total for the 2 UPS units **40 units of 12V, 100 AH SMF VRLA** batteries are required.
2. Each of the 3 KVA UPS(Model: Luminous) has bank of 12 No. 26 AH batteries. So in total for the 12 UPS units **312 units of 12V, 26 AH SMF VRLA** batteries are required.