ENERGY REPORT

CHITKARA UNIVERSITY, PUNJAB

2025-2026

OVERVIEW- ENERGY SAVING MEASURES AT CHITKARA UNIVERSITY

I. **SOLAR PANELS:** Installed Solar Panels with capacity of 1200 kWp Energy Saving = 79.01%

II. **Energy Efficient LED LIGHTS:** Replaced incandescent lights with more Energy Efficient LED light's Energy saving = 50%

III. **Automation Panel Street Light:** Automatic ON/OFF, Reduced electricity consumption, No manual switching required

IV. **Energy Efficient BLDC Ceiling Fans:** Replaced commercial Ceiling fan with the Brushless DC Ceiling Fans = 36%

V. **Energy Efficient BLDC EXHAUST FANS:** Replaced the commercial exhaust fans with the brushless DC exhaust fans Energy Saving = 72%

VI. **HEAT PUMPS:** Replaced water heater tanks with the heat pump Energy Saving = 81%

VII. **Sensor Based Fully Automatic Water Level Controller:** Water Savings: 15% to 35% saved by completely stopping tank overflows and spillage.

VIII. **Sensor Based LED Motion Sensor Light- PIR Motion Sensor:** Corridors/Staircases: 50%to 70%, Washroom: 80% Saving.

IX. **Centralized VRF AIR CONDITIONING:** Replaced the ductable air conditioners with variable refrigerant flow Energy Saving = 28%

X. **Centralized Remote Controllers (CRC):** A Centralized remote Controller as a single command hub that manages, monitors, and operates multiple connected devices like HVAC/ VRF air Conditioner**s**

XI. **Energy Management System:** It enables real-time data collection Via Sensors, allowing users to reduce energy waste, lower costs, improve efficiency, and enhance sustainability.

XII. **Building Management System (BMS):** Overall Building Energy Savings: 15% to 30%, HVAC Energy Savings: 20% to 40%, Water & Secondary Utility Savings: 10% to 20%.

- **ENERGY MANAGEMENT**

ELECTRICAL SYSTEM: Presently Chitkara University, Rajpura, Punjab plant has 11 KV Supply from Punjab State Power Corporation Ltd after that it is stepped down to 11 KV/0.440 kV. The Campus having Two electrical connections, Sub Station-1 with 3990 KVA Contract Demand and Sub Station-2 With 1700.606 KVA Contract Demand. Three transformers of 1250 KVA, 2000 KVA, 2500 KVA for Sub Station-1 and 1250 KVA Sub Station-2 are installed.

ENERGY SAVING PROJECTS IMPLEMTED BY THE UNIVERSITY:

The University has initiated several projects aimed at energy conservation. Here are some the key projects successfully implemented by the institutions management.

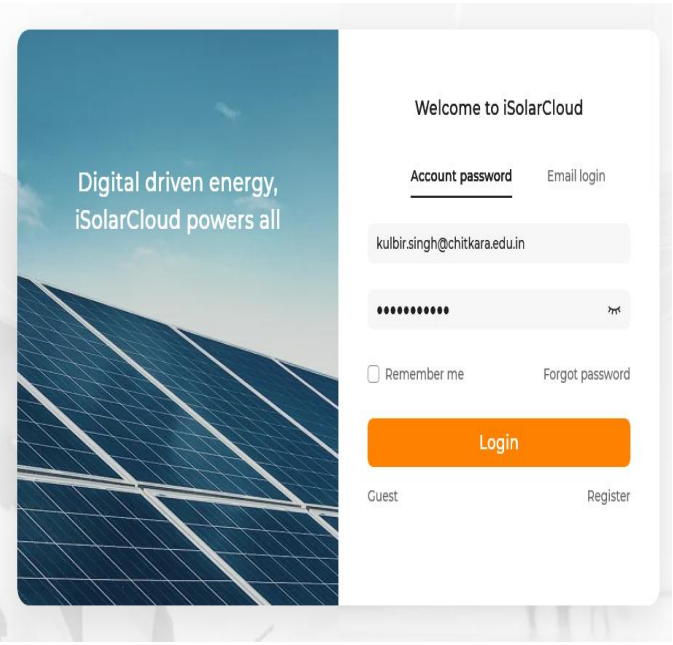
- **ENERGY SAVING PROJECT # 1**

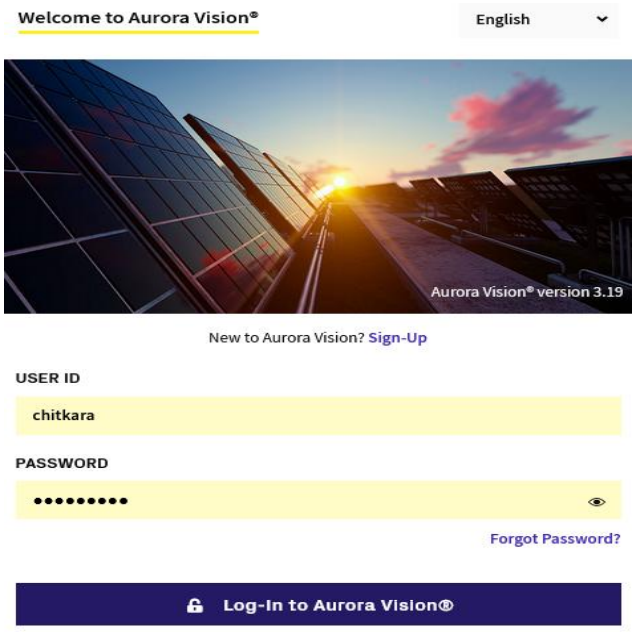
Roof top solar system of 1200 kWp:

The University executed a project to install a rooftop solar system. Solar Panels, Integral components of renewable energy setups, transform sunlight into electricity using photovoltaic cells, these cells, crafted form semiconductor materials, produce eco-friendly power devoid of emissions. Embraced across residential, commercial, and industrial sectors, solar panels play a crucial role in fostering sustainable energy practices, lessening dependence on non-renewable sources, and alleviating environmental repercussions.

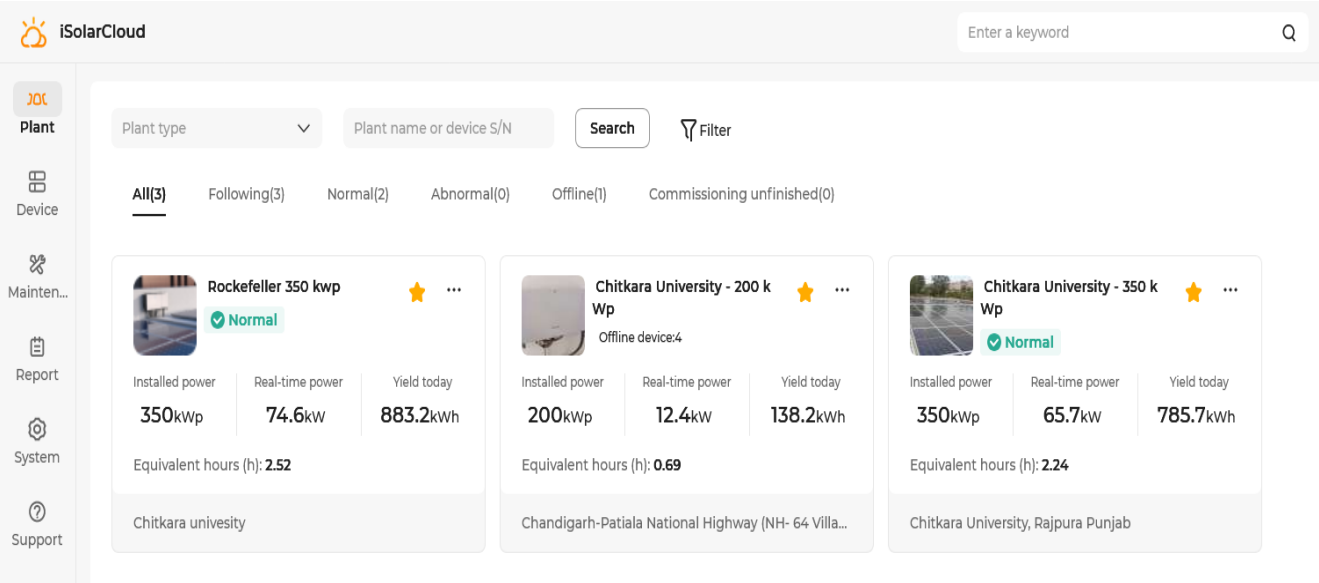
CHITKARA UNIVERSITY USES 2 SOLAR CLOUDS - BASED SERVICES

Isolarcloud by Sungrow and Aurora Vision by Fimer

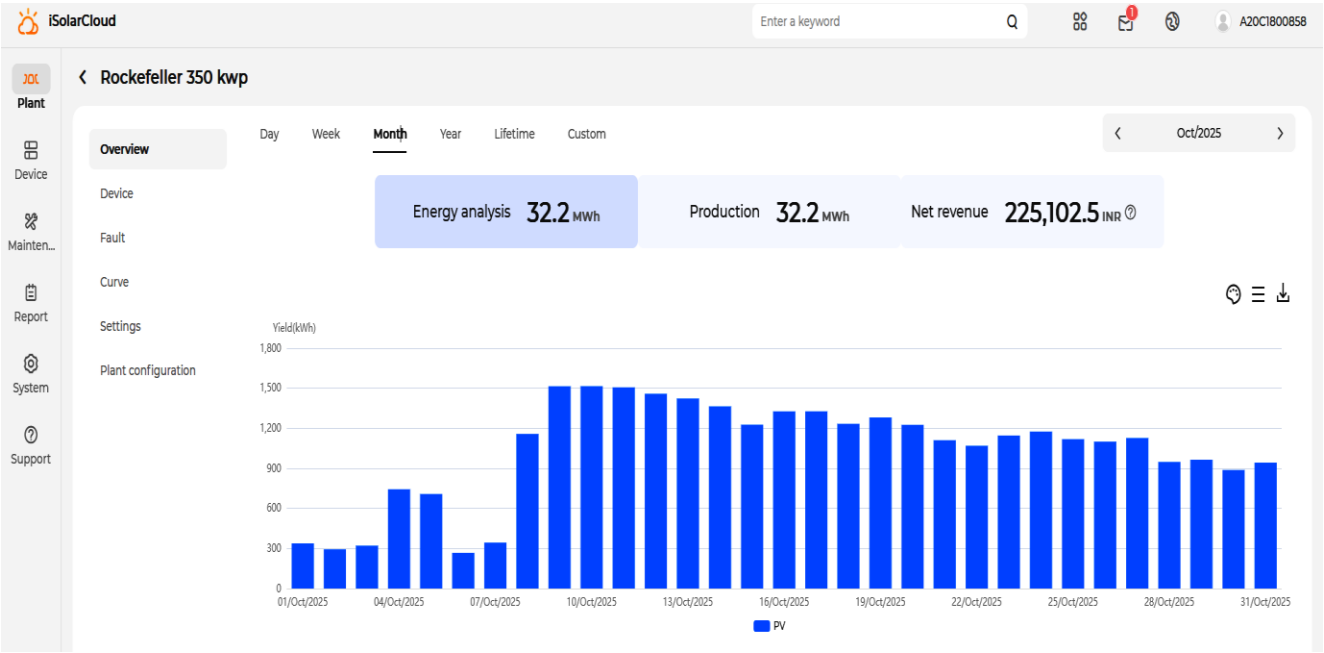




Screenshot of the Isolarcloud service which shows data tracking



Solar Power Plant Generation



Picture of Solar Power Plant Module at Chitkara University

Picture of Solar Power Plant Module at Chitakra University

Solar Power Plant Inverter

RUNNING PROJET- UNDER COMMISSIONING – 2025-26

Sr.No	Description	Location	Capacity	Qty
1	Solar Power Plant	Aristotle Hostel	50 kWp	1
2	Solar Power Plant	Pedestrian Path	80 kWp	
3	Solar Power Plant	Franklin Hostel	100 kWp	1
4	Solar Power Plant	Tesla Block	150 kWp	1
Total Capacity			**380 kWp**	

- **ENERGY SAVING PROJECT #2**

Energy Efficient Led Lights:

The University initiated a project to install energy efficient lights in various areas such as classrooms, the sports room, and streetlights. These advanced LED Lights mark a significant shift in lighting technology, saving 50% of energy as compared to commercial lights in 2025-2026 with a prolonged lifespan, they minimize both waste and maintenance expenses, while providing instant illumination and emitting low heat for enhanced safety. The adoption of LED lights aligns with environmental sustainability goals, making them a conscientious choice for contemporary lighting solutions that contribute to eco –friendly practices.

Picture of the Energy Efficient Lighting Fixture

Picture of the Energy Efficient Lighting Fixture

Picture of the Energy Efficient Lighting Fixture

- **ENERGY SAVING PROJECT # 3**

Automation Control of Street Lighting System:

The **Automatic Street Lighting Control System** is used to operate street lights automatically without requiring manual switching.

At **CHITKARA UNIVERSITY**, the outdoor street lights are controlled through an automated lighting system. The system detects the surrounding light level using a light sensor (LDR) or a timer-based controller.
During the daytime, when sufficient sunlight is available, the light sensor sends a signal to the control panel to switch the street lights OFF, thereby reducing unnecessary electricity consumption. In the evening or whenever the ambient light level decreases, the sensor detects the low light intensity and automatically switches the street lights ON.

This automated system offers several benefits, including reduced electricity consumption, improved energy efficiency, lower maintenance costs, and reliable operation without human intervention. It also enhances campus safety by ensuring that all outdoor areas remain properly illuminated during the night while minimizing energy wastage.

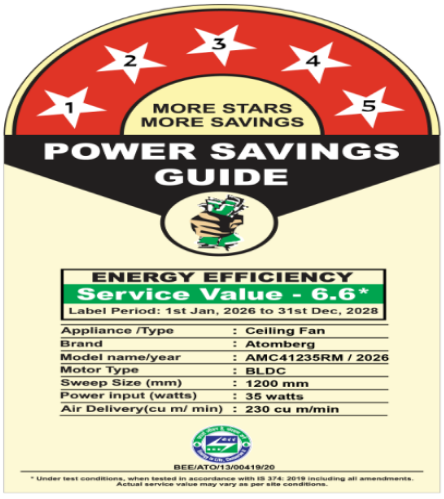
- # ENERGY SAVING PROJECT # 4

Energy Efficeinet BLDC Ceiling Fan

The University executed a project to replace old, high-power consumption fans with BLDC ceiling fans, representing a notable advancement in energy efficiency and performance. Diverging from traditional fans, BLDC ceiling fans utilize brushless motors, minimizing friction and energy loss. This results in a substantial reduction in power consumption, translating to lower energy bills. Renowned for their silent operation, durability, and extended lifespan, these fans come equipped with advanced features such as remote control and variable speed settings, providing enhanced customization and convenience. Embracing Sustainability, BLDC ceiling fans contribute to eco-friendly living by optimizing energy usage, seamlessly blending modern comfort with environmental consciousness in contemporary spaces.

Save upto ₹1500* per year

Parameters & Criteria	Unrated Fans	Atomberg BLDC Fans
Wattage	75 W	35 W
Annual Cost of Electricity (16hrs/day x 300days/year x wattage x ₹ 8/-per unit)	₹ 2880	₹ 1344
Savings/year	0	*₹ 1536



- # ENERGY SAVING PROJECT # 5

Energy Efficeinet BLDC Exhasut Fan

The University successfully executed a project to upgrade outdated high-power consumption exhaust fans (approximately 80 watts) with new energy-efficient BLDC exhaust fans, significantly reducing power consumption to around 20 watts. These advanced exhaust fans optimize ventilation through cutting-edge technology, effectively removing stale air and moisture with minimal electricity usage.
Incorporating intelligent features like motion sensors and timers, they operate efficiently to conserve energy. Beyond cost savings, these fans improve indoor air quality and contribute to eco- friendly, sustainable living environments. This initiative reflects the University's commitment to embracing energy-efficient solutions for a more environmentally conscious and resource -efficient campus

- **ENERGY SAVING PROJECT # 6**

Heat Pump

The University successfully executed a project involving the installation of almost 26 Heat Pump with various capacities. 81.25% energy is being saved using heat pump instead of water heater tanks. These versatile technologies excel in transferring heat efficiently between locations, catering to both heating and cooling needs. Functioning on the principle of extracting warmth from the air, ground, or water, Heat Pumps deliver energy-efficient climate control for both residential and commercial settings. By reversing their operation, these pump effectively cool indoor spaces during warmer seasons, showcasing an eco- friendly approach with reduced energy consumption compared to traditional heating or cooling systems. Widely recognized for their Sustainability and cost-effectiveness, Heat Pump actively Contribute to minimizing carbon footprints and endorsing environmentally conscious temperature regulation solutions.

Picture of Heat Pump Installed at Chitkara University

Heat Pump:

I. **Energy Efficiency:**
Heat Pumps are more energy-efficient for water heating compared to traditional electrical resistance heaters. They move heat rather than generation it, making them more efficient in converting energy into heat.

II. **Cost Savings:**
Heat Pump can result in cost savings over time due to their higher energy efficiency. While the initial investment may be higher, the lower operating costs can lead to significant savings in the long run.

III. **Environmental Impact:**
Heat pump produces fewer greenhouse gas emissions compared to electrical resistance heaters. They utilize ambient air or ground temperature to heat water. Reducing the overall environmental impact

IV. **Renewable Energy Compatibility:**
Heat pumps can be easily integrated with renewable energy sources, such as solar or wind power, further reducing their carbon footprint and dependence on non – renewable energy

V. **Consistent Performance in Cold Weather**:
Unlike some Traditional Electric heaters that my struggle in cold climates, heat pumps can maintain relatively high efficiency even in colder temperatures, making them suitable for various climates

VI. **Longer Lifespan:**
Heat pumps generally have a longer lifespan compared to traditional electric water heaters. Properly maintained heat pump systems can last for 15 Years or more

VII. **Quick Payback Period:**
While the initial cost of a heat pump may be higher, the energy savings CAN LEAD to a quicker payback period compared to traditional electrical heaters, especially in regions with high electricity costs.

VIII. **Reduced Peak Demand:**
Heat Pump can help reduce peak electricity demand since they operate more efficiently than electrical resistance heaters. This can be beneficial for overall gird stability.

HEAT PUMP INSTALLATION INSIDE THE CAMPUS
JULY 2025 – JUNE 2026

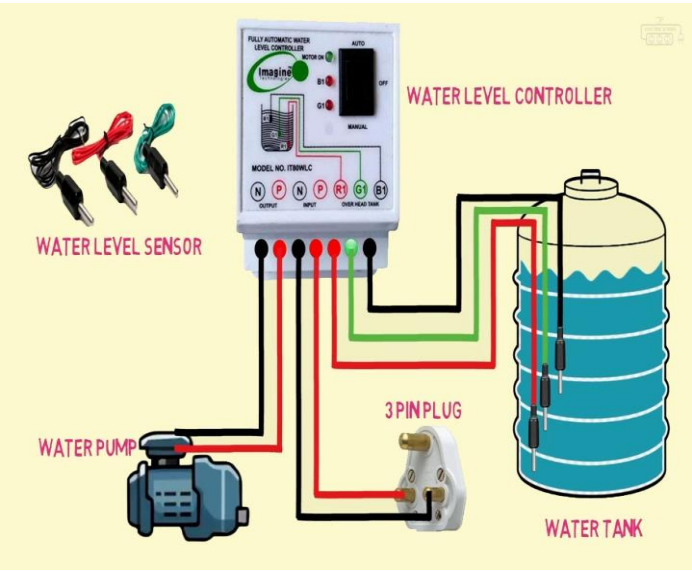
Sr.no	Location	Capacity	Qty
1	Franklin Hostel	18 KW	6
2	Alfred Noble Hostel	18 KW	5
3	Square One	10 KW	1
4	IBN Hostel	18 KW	3
5	Magellan Hostel	18 KW	1
6	Vasco Da Gama Hostel	18 KW	2
7	Babbage Block	10 KW	1
Total Heat Pump			**19**

- **ENERGY SAVING PROJECT #7**

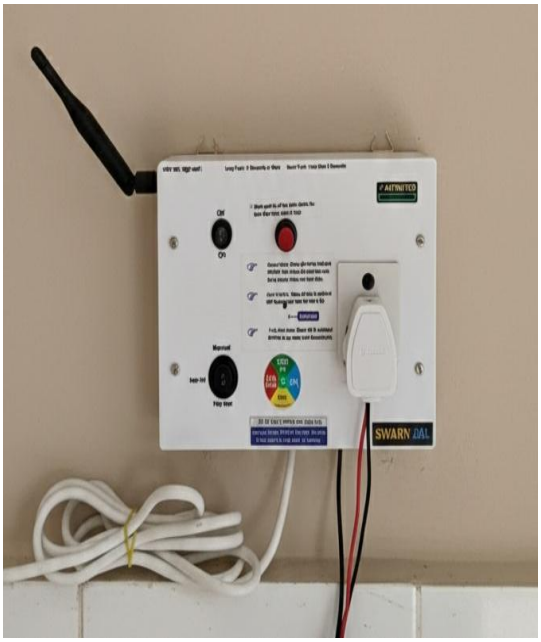
SENSORS – BASED Fully Automatic Water Level Controller :

Water Level Controller Sensors are being installed in tanks of hostels and buildings in Chitkara University. They are also installed on submersible pumps, motors and fountains. They are known for their ability to reduce electricity and water wastage as well as low labor costs. This suggests a step towards automation and resource efficiency.

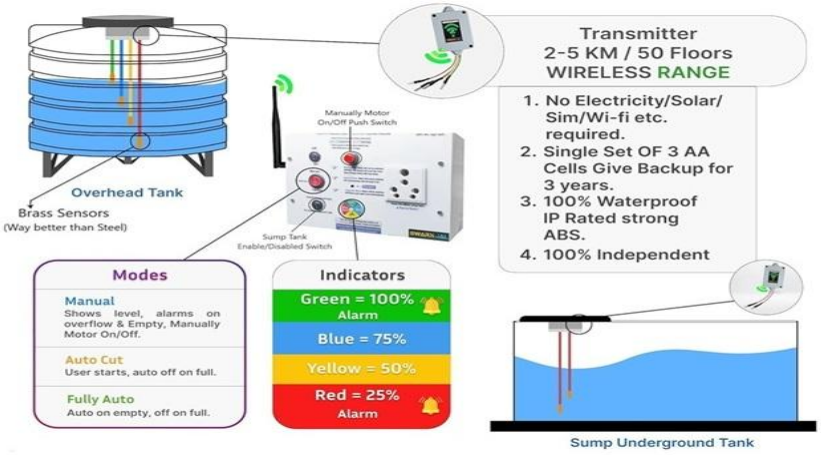
An automatic water level controller is an electronic system that monitors the water level in a storage tank. It automatically starts the motor when the tank is low and stops it once it is full. This automation saves water, reduces energy consumption, and protects your motor from damage caused



- **SENSOR – BASED Wirless Water Level Controller :**



WIRELESS WATER CONTROLLER: We have installed wireless water level controller sensors. With a strong wireless range of up to 5 km or 50 floors, this device automatically manages the water motor in “automatic mode”, turning it off when the overhead water tank is full and turning it on when it is empty. Its dry run protection feature protects your motor by ensuring that it does not start if there is no water in the underground tank. In addition, the motor will shut off if the underground tank runs out of water. The system operates wirelessly without the need for internet, Wi-Fi, Bluetooth, SIM cards, subscriptions, or any external network it has its own dedicated wireless network. The device can communicate between the overhead tank and sump tank wirelessly, covering up to 2-5 km combined distance



- **ENERGY SAVING PROJECT # 8**

Sensor – Based Led Motion Sensor Light- (PIR Motion Sensor):

Sensor-Based LED Motion Sensor Light is an energy-efficient lighting system that automatically turns **ON** when it detects human movement and turns **OFF** after a preset time when no motion is detected. It uses a **Passive Infrared (PIR) sensor** to sense the infrared radiation emitted by the human body.

This sensor lights are highly effective at saving energy because they prevent lights from being on unnecessarily. Instead of requiring a person to remember to flip a switch, the sensor acts as an automated switch. This is especially useful in areas with intermittent use, such as by only activating when needed, PIR sensors can significantly reduce the total operational hours of a light fixture. For instance, a light that might be left on for 12 hours a day could be reduced to just a few hours of actual use. This can lead to energy savings of 30% to over 90% depending on the application and how often lights would otherwise be left on.

SENSOR – BASED PIR MOTION SENSOR:

At CHITKARA, we use motion sensors in building washrooms to enhance safety and convenience. These sensors typically utilize PIR (Passive Infrared) technology to automatically control lighting and toilet flushes. Since students often forget to turn off the lights when leaving, these sensors detect when the washroom is unoccupied and automatically switch the lights off, resulting in significant daily electricity savings.

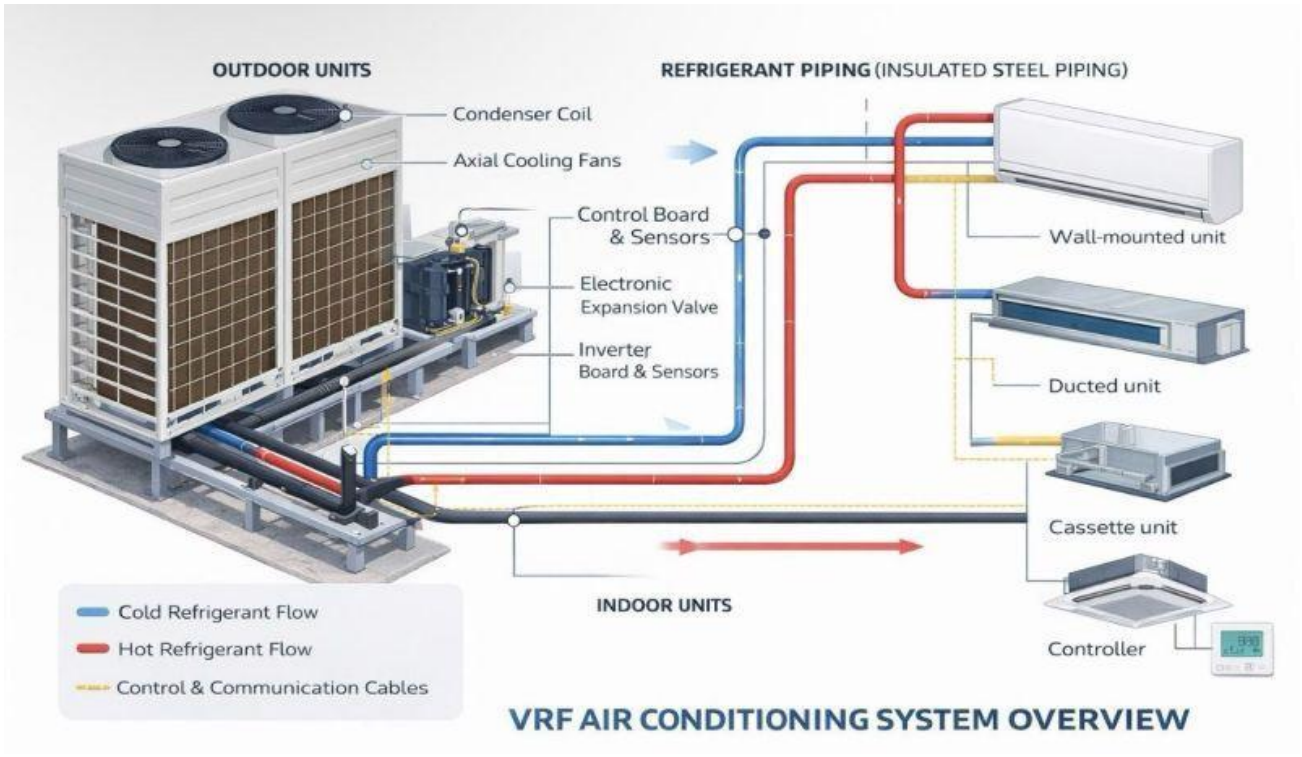
He working principle of a PIR motion sensor is simple. All objects, humans, and animals having a temperature of above zero naturally release infrared radiation into their surroundings. Imagine a room with motion-sensing light. When there is no one in the room, the PIR motion detector picks up a constant pattern of infrared radiation. The moment someone enters the room, the PIR motion detector senses a rapid change in the Infrared radiation pattern. However, a PIR movement sensor does not detect the shape of the object. It measures its calculations only on the variations in the infrared radiation released

- **ENERGY SAVING PROJECT # 9**

Centralized VRF Air - Conditioning

University implemented a project of installing Centralized VRF Air-Conditioning. University install 2760 HP of VRF Air – Conditioning system which reduces the electricity consumption by 28% Centralized Variable Refrigerant Flow (VRF) air conditioning systems represent a cutting-edge solution for efficient climate control in large buildings. This innovative HVAC technology allows for the centralized management of heating and cooling by varying the refrigerant flow to individual indoor units. With precise temperature control in different zones, centralized VRF systems enhance energy efficiency, ensuring optimal comfort while minimizing energy consumption. These systems offer flexibility, adaptability, and ease of maintenance, making them ideal for commercial and multi-zone applications. The ability to simultaneously cool and heat different areas contributes to a comfortable and energy-efficient indoor environment, aligning with modern sustainability goals.

CENTRALIZED VRF AIR – CONDITIONING



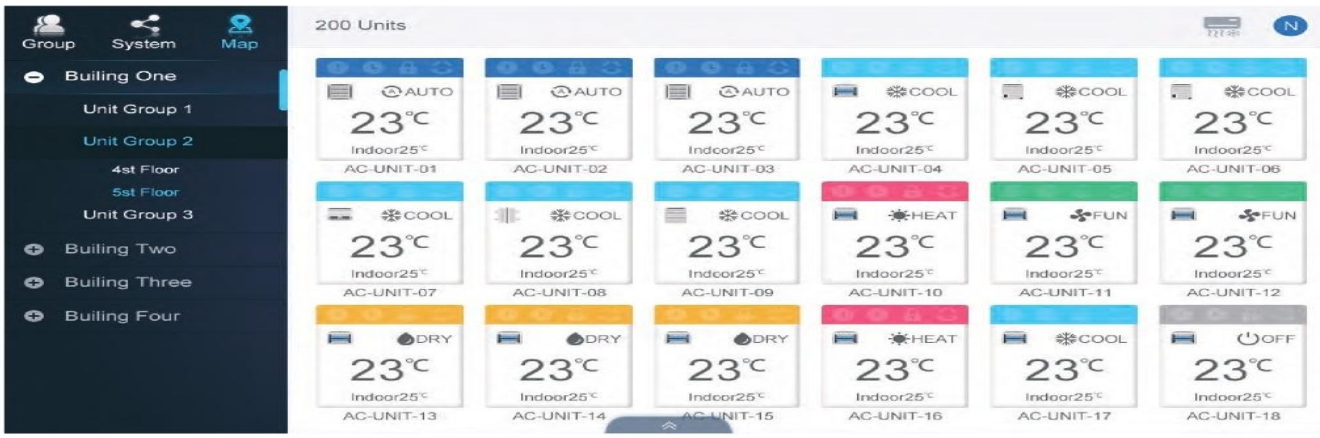
Advantages:

- 30–50% energy savings compared with many conventional systems under typical conditions.
- Independent temperature control for each room.
- Low operating noise.
- One outdoor unit serves many indoor units.
- Lower maintenance than installing many separate split AC

- **ENERGY SAVING PROJECT #10**

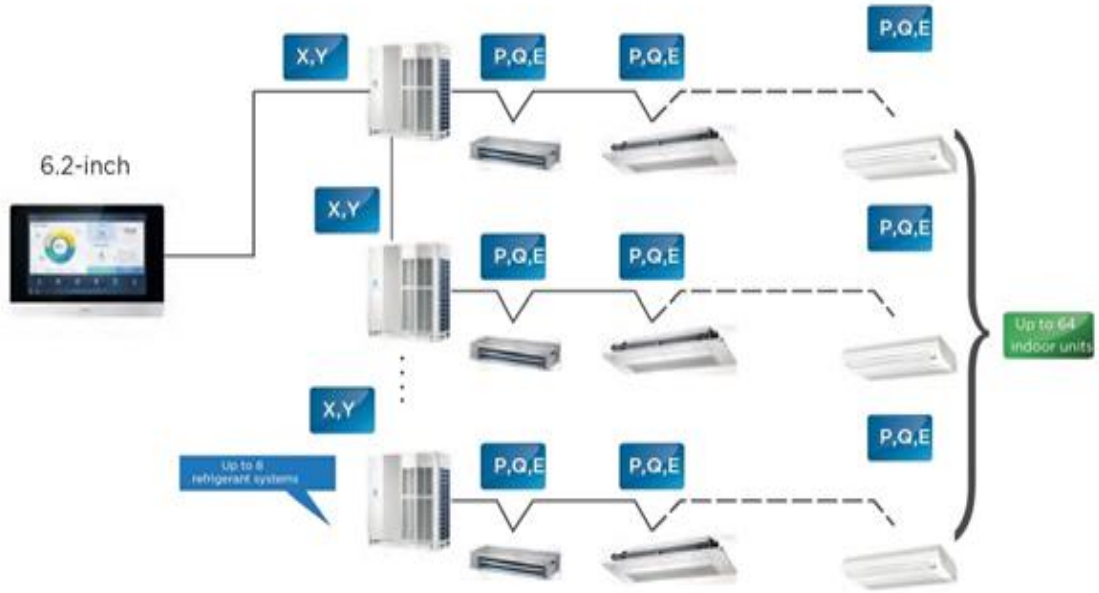
  Centralized Remote Controllers (CRC)

  A centralized remote control system allows you to control many air conditioners from one central controller. It works by connecting all indoor AC units to a master controller through a wired or wireless communication network. Unlike normal air conditioners, which need a separate remote for each unit, this system can control all indoor units from one place. It helps save energy by setting temperature limits, turning off unused AC units, and managing their operation automatically. With this system, you can monitor and control the temperature and operation of all indoor air conditioners from a single screen, even if there are **262 indoor units** installed.



Centralized Remote Controllers (CRC)

The controllers can be connected to the master outdoor unit directly.

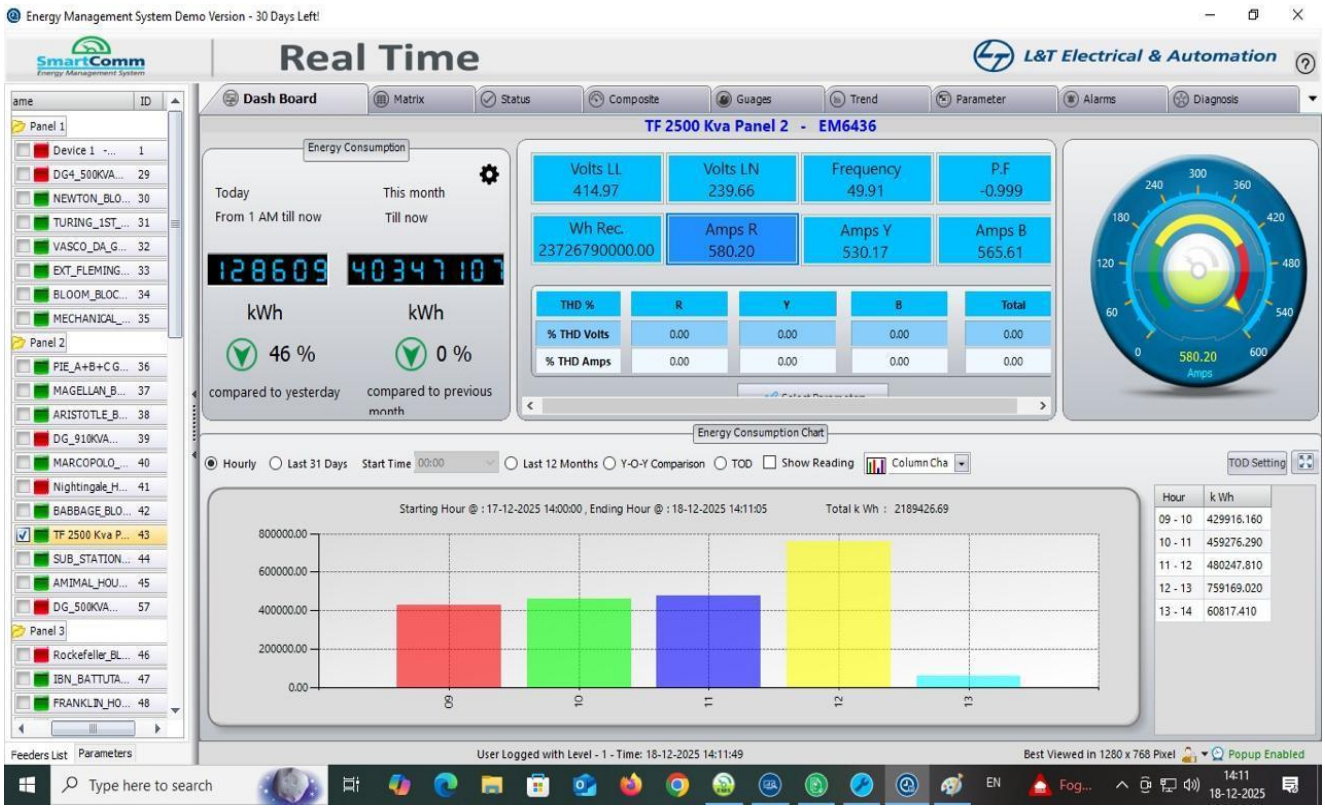


- # ENERGY SAVING PROJECT #11

Energy Management System:

An **Energy Management System (EMS)** is a comprehensive combination of software and hardware tools designed to monitor, analyze, and optimize energy consumption in industries, commercial buildings, and power grids. It enables real-time data collection through sensors and smart metering devices, allowing users to identify energy inefficiencies, reduce energy waste, lower operating costs, improve overall efficiency, and support sustainability initiatives. An EMS also provides valuable insights through data analysis, helping organizations make informed decisions for effective energy management and continuous performance improvement.

Screenshot of the EMS system showing data tracking



- # ENERGY SAVING PROJECT #12:
  ## Building Manegement Sysem (BMS)

A Building Management System (BMS) is a centralized computer-based system used to monitor, control, and optimize the operation of various building services from a single platform. It helps improve energy efficiency, reduce operating costs, enhance occupant comfort, and ensure the safe and reliable operation of building equipment.

BMS integrates multiple building systems and provides real-time monitoring and control of critical utilities. The system collects data from sensors, meters, and controllers installed across the campus and displays the information on a central dashboard for easy monitoring and analysis.

Key Systems Monitored and Managed by the BMS:

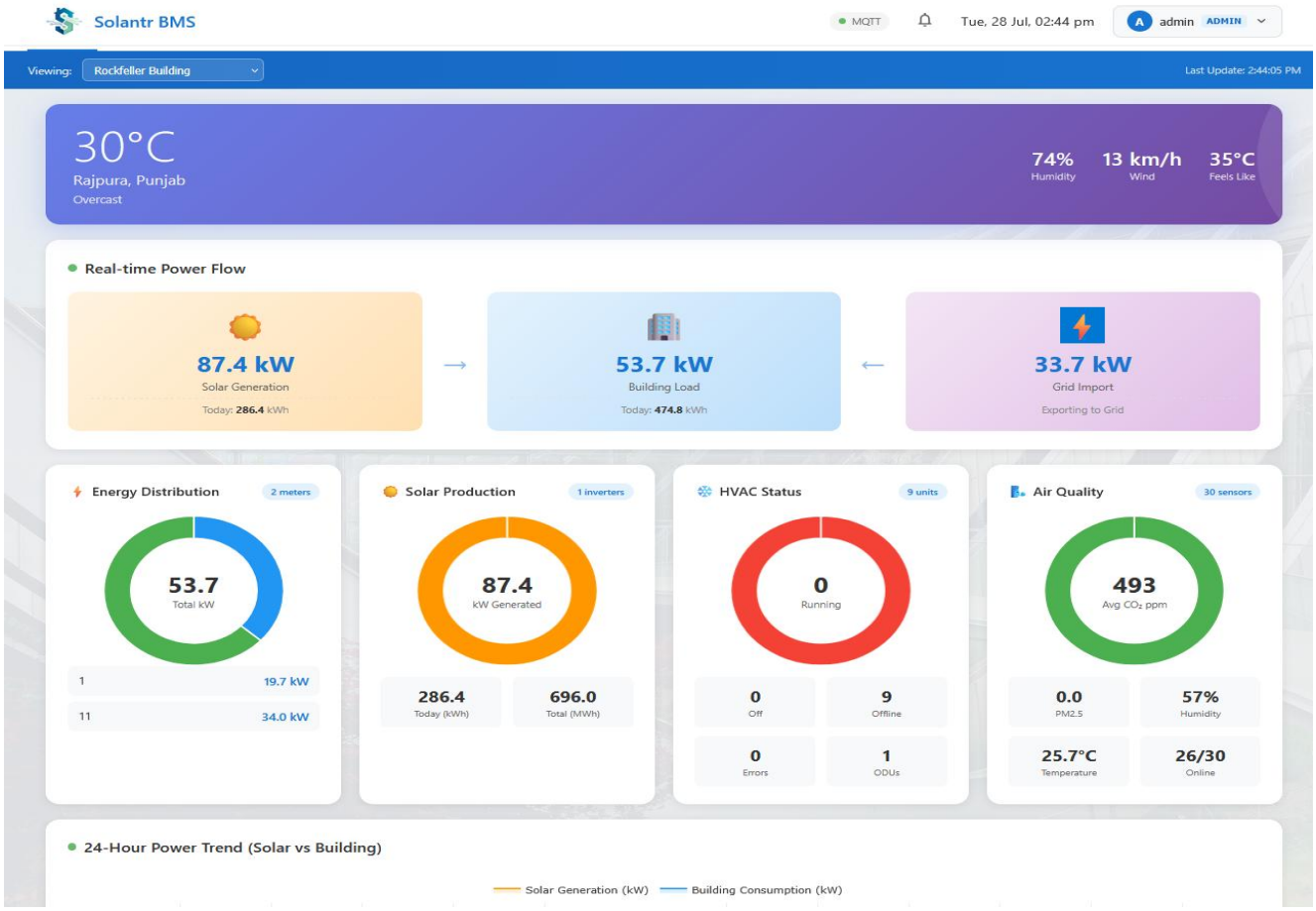
- **Solar Power System** – Tracks solar energy generation, power output, and overall system performance.
- **Energy Monitoring** – Displays real-time electricity consumption, energy trends, and helps identify opportunities for energy savings.
- **HVAC System** – Monitors and controls Air Handling Units (AHUs), chillers, VRF systems, ventilation equipment, and temperature settings to maintain indoor comfort while reducing energy consumption.
- **Indoor Air Quality (IAQ)** – Continuously monitors environmental parameters such as CO2 concentration, temperature, humidity, and air quality to ensure a healthy indoor environment.
- **Electrical System** – Monitors power distribution, electrical panels, meters, voltage, current, and energy usage across the campus.
- **Lighting Control** – Manages lighting schedules and automated operation to reduce unnecessary power consumption.
- **Water Management** – Monitors water tanks, pumps, water levels, and water consumption to improve operational efficiency.

- **Alarm and Fault Management** – Provides instant alerts and notifications for equipment faults, abnormal conditions, or system failures, enabling quick corrective action.

- **Historical Data and Reports** – Stores operational data and generates reports for performance analysis, maintenance planning, and energy management.

The Building Management System (BMS) installed at Chitkara University plays a vital role in creating a smart, energy-efficient, and sustainable campus. By integrating solar energy monitoring, HVAC control, indoor air quality monitoring, electrical systems, lighting, water management, and alarm monitoring into a single platform, the BMS enables efficient building operation, reduces energy waste, improves occupant comfort, and supports effective facility management.

Screenshot of the BMS system showing data tracking



MONTHLY ENERGY TABLE

Energy Consumption (in KWh) during 2025-2026

Month	Year	Total Energy (KWh)	Solar Energy (kWh)	Grid Energy (kWh)
July	2025	1754177.28	92957.28	1661220
August	2025	1964564.99	97604.99	1866960
September	2025	2017006.27	93946.27	1923060
October	2025	1883379.12	108369.12	1775010
November	2025	588390.77	84570.77	503820
December	2025	982255.79	52525.79	929730
January	2026	724865.39	52375.39	672490
February	2026	1283993.15	84043.15	1199950
March	2026	957908.5	103668.5	854240
April	2026	1549038.43	138588.43	1410450
May	2026	1465740.56	133450.56	1332290
June	2026	1592062.98	119272.98	1472790
Total		**16763383.2**	**1161373.23**	**15602010**

CHITKARA UNIVERISTY, PUNJAB

ELECTRICAL DEPARTMENT TEAM