



**CHITKARA UNIVERSITY**

# TOWARDS A **GREENER** TOMORROW

CONTRIBUTIONS IN 2019—A REPORT

## UNDERSTANDING THE DEVELOPMENT GOALS



The Millennium Development Goals (MDGs) were eight international development goals for the year 2015 that had been established following the Millennium Summit of the United Nations in 2000, following the adoption of the United Nations Millennium Declaration. As reported by World Vision (2015), UN secretary general Ban Ki-moon said, *“The MDGs helped to lift more than one billion people out of extreme poverty, to make inroads against hunger, to enable more girls to attend school than ever before and to protect our planet,”*.

The SDGs replaced the Millennium Development Goals (MDGs) which expired in 2015. Governments came up with the idea at the Rio+20 conference on sustainable development in Brazil in 2012. A working group with representatives from 70 countries then drafted a proposed set of goals to be achieved by the next 15 years (Rowling, 2015). A set of 17 goals and 169 targets aimed at resolving the social, economic, and environmental problems troubling the world. Hence the SDGs were born, with a target date of 2030!!



As per IISD (2017), “*Universities can support the implementation of every SDG and engaging with the SDGs can also benefit the universities.*”

**CHITKARA** University also believes that understanding and implementing the SDGs would enable growth of the university as well as the community. Being an educational institution, and entrusted upon with the responsibility of molding the future generations, there is a lot that can be done, to ensure a greener world and to mold a generation that is willing to contribute towards it. Along with contributing to the environment and society, the *unizens*\* can imbibe the principles and concept of sustainability and become ideal leaders of tomorrow. No stone has been left unturned, in the drive to a sustainable future.

Submitting the report of activities towards sustainability in 2019.

\*(coined by merging the two words—university & citizens)

## 2019 - REPORT ON INITIATIVES TOWARDS “A GREENER TOMORROW”

*Chitkara University has always prioritized its responsibility to the environment and been committed to “A GREENER TOMORROW”.*

*This report is an effort to comprehend the various events, workshops, activities, seminars, curriculum, research papers etc., that have been organized, conducted or initiated in 2019 towards a zero energy campus, reduced carbon emission, conservation of energy, reduce-reuse-recycle, waste management, sanitation, reforms, renewable initiatives, etc., It also includes any event attended by any member of the Chitkara fraternity, in the year 2019 towards the said ideology.*

*The report is being submitted in **three parts**. The **first** part would bring to fore the existing facilities and processes being followed in campus towards the mentioned ideology and up-gradations, if any. The **second** part would provide details of activities, curriculum, projects or research papers by Chitkarians on these subjects, in the year . The **third** part would be a gist of the future plans.*



*Our Honourable Vice Chancellor Dr. Madhu Chitkara, has always guided the Chitkarians to strive for the wellness of the world.... ”We should accept our responsibility to leave a better world for the future*

*generations.....We should share our resources and teach the future generation also the worthiness of sharing!”*

## PART I

<b>INDEX</b>	
<b>Topic</b>	<b>Page No.</b>
CHITKARA UNIVERSITY CAMPUS INFRASTRUCTURE	6
<i>DIVYANGJAN</i> FRIENDLY CAMPUS	7
GREEN LANDSCAPING IN CAMPUS	10
<i>EK KADAM SWACHTA KI ORE</i>	13
SDG 12	16
WASTE MANAGEMENT IN CAMPUS	17
RAINWATER HARVEST PITS	31
ELECTRICITY CONSERVATION -STEPS ADOPTED	32
AUDIT REPORTS	41
REDUCING CARBON EMISSION WITH PUBLIC TRANSPORT FACILITY	42
PHYTOREMEDIATION LAB	44
PROJECT BIOGAS PLANT	45

## CHITKARA UNIVERSITY - THE CAMPUS INFRASTRUCTURE

*“Beautiful places are almost alive! When you visit them, you can feel their breaths!”* ([Mehmet Murat Ildan](#)).



One such place is the campus of CHITKARA UNIVERSITY, Punjab, with state-of-the-art infrastructure, bejeweled

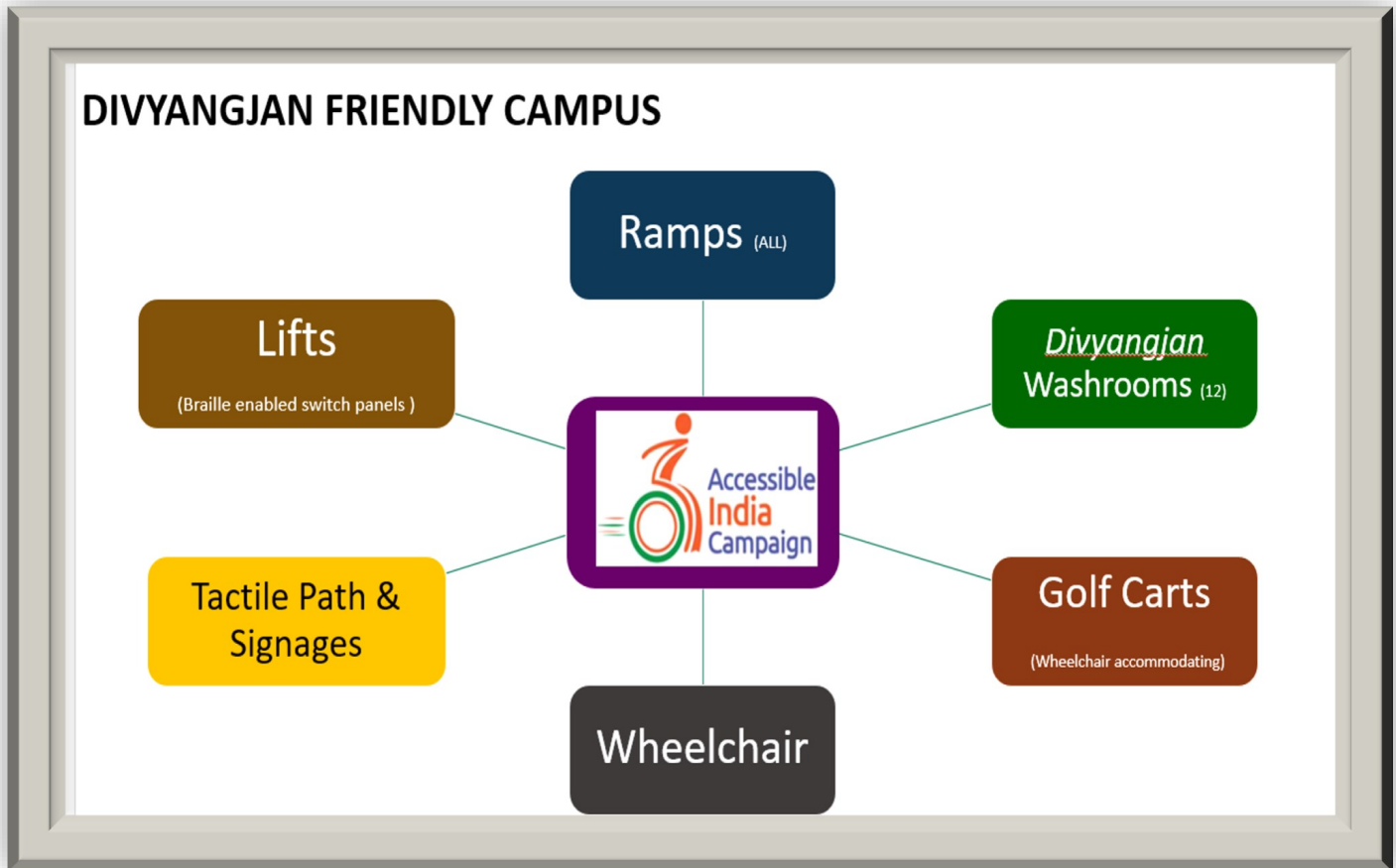
with colorful flora and greenery, very clean and well maintained, with warm hearts that focus on inclusivity and hospitality!!

Under the mentorship and able guidance of the Hon'ble Vice Chancellor, Dr. Madhu Chitkara, unceasing efforts and synergy of many teams,



filled with passion and grit, contribute in the creation of each venue at Chitkara University. While the comfort and safety of the students and staff are of prime importance, **sustainability and inclusivity** are borne in mind at all times.

Team 'Office of Architecture and Design', under the leadership of the Director, Mr. Sudarshan Pal Singh, design each and every venue of the campus. Innumerable points are taken into consideration in the creation of this aesthetically beautiful and serene campus - venues are designed as per the need of the course/school or department, labs are theme based and user friendly, landscapes are bright and colorful, the inclusivity factor is ensured with ramps for buildings, *divyangjan* friendly washrooms, lifts, tactile paths and pedestrian friendly pathways, well illuminated venues with glass panes allowing natural light into offices and classrooms, amply lighted streets and grounds which makes the campus live even in the night allowing students to participate in outdoor-activities, easily accessible water points and washrooms, waterlines for freshwater as well as treated water for double plumbing and horticulture and so much more..!



As per the infrastructure policy of the campus ( Paragraph 4.1.2 of Policy on Campus Physical Infrastructure, 2017 ) the campus is an inclusive campus . SDG states “**Leave no one behind**”. This is borne in mind while the infrastructure is designed and created in this campus,

- ◆ Tactile path, parking, and signages in reception area of campus. The tactile path was provided at Hello Future and was redone at Babbage block in 2019
- ◆ 18 lifts have been installed in the campus. The switch panel of few lifts are braille enabled.
- ◆ The campus has 10 *divyangjan* friendly washrooms, out of which two were renovated in 2019.
- ◆ A golf cart was converted as *divyangjan* friendly, where a wheel chair could also be accommodated in the golf cart. This was done by the inhouse Maintenance team.
- ◆ Pedestrian friendly pathways are provided in the campus.
- ◆ To facilitate the physically challenged stakeholders for entry to the buildings, ramps are provided in buildings. The ramps of Newton block and Babbage block were renovated in 2019.
- ◆ Wheelchairs - For any contingencies and for *divyangjan*, there are four wheelchairs in the campus.

## GLIMPSES OF INCLUSIVE INFRASTRUCTURE





# AERIAL VIEW OF THE CAMPUS .....



...FROM MAIN GATE



.....OF BOYS HOSTELS



...FROM CHITKARA WOODS

## GREEN LANDSCAPING IN CAMPUS

*“If you have a garden and a library, you have everything you need “, Marcus Tullius Cicero*

# W

hen we choose to add creative landscapes, we are helping the environment and contributing towards improved aesthetics. Landscaping plays a very important role for a healthy body and mind too. There has been consistent efforts in our campus to maintain greenery and a colorful landscape that soothes our soul and brings one closer to nature. Beautifully maintained lawns in more than seventy thousand square feet area of land, decorated with approximately eight thousand five hundred plants, of seventy varieties, speaks volumes of the efforts !!

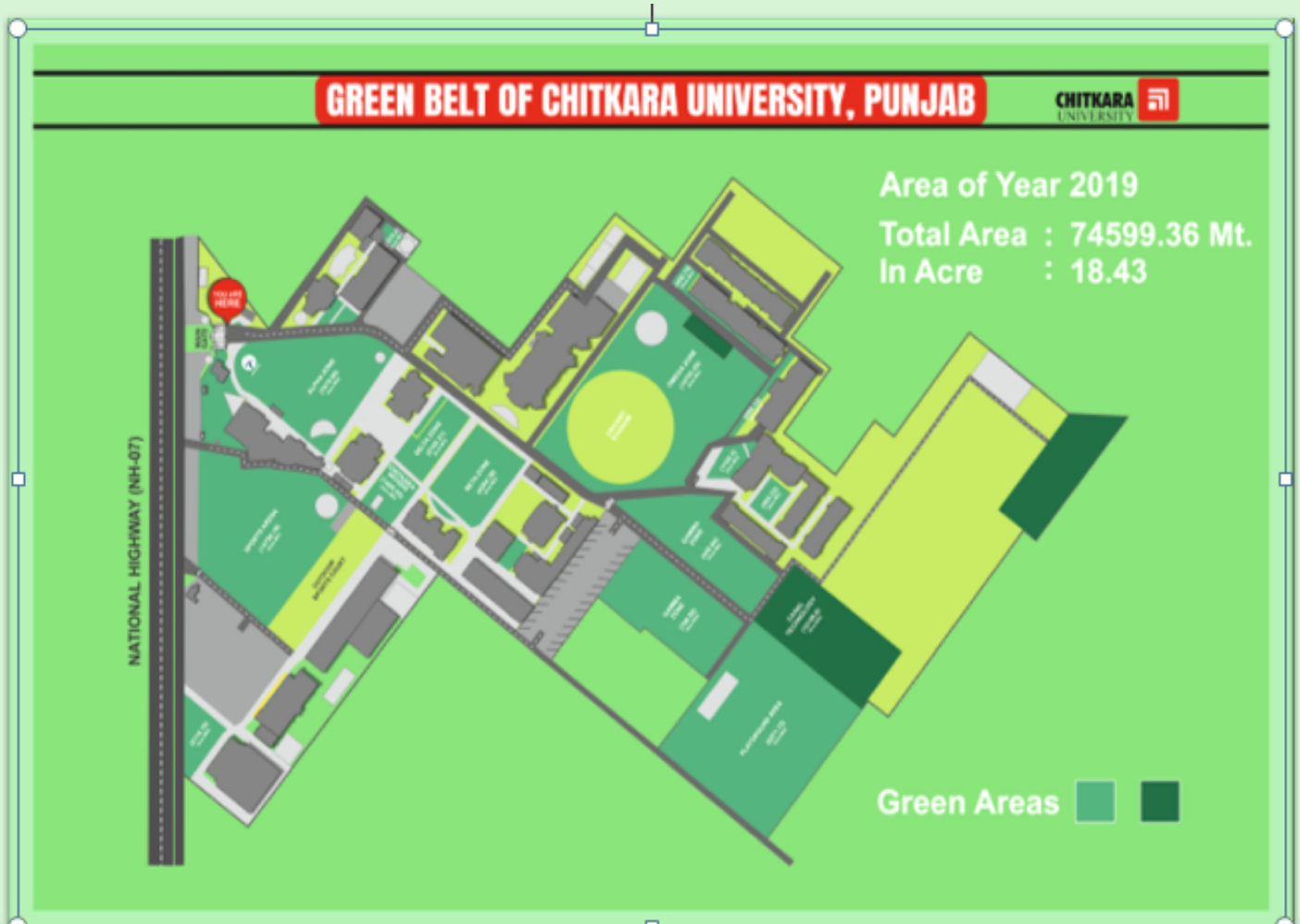
While there is an extensive use of seasonal plants, drought tolerant plants like palms, petunias, gazania, murraya, bougainvillea, geranium , lavender etc., have also been planted. Further, trees like Neem and Ashoka, have also been positioned strategically. To add to the beauty of the campus ,vertical gardening has also been adopted. Terrace gardening is also being planned for future.

In further contribution to the environment, water used for horticulture is treated water from the two STPs in campus. Treated water has been used for horticulture in 2019 as well as for Karnal Technology. Sprinklers have been provided in some lawns.

Land For Greenery	18.43 Acres
Plants Procured	Amounting to Rs 2,05,396/-
Plants from Nursery (Numbers)	Over 20000 seasonal plants and 4000 hedges
Manure Used (Inhouse/ Procured)	2000 kgs of which 778 kgs was made available inhouse—200 kgs from the sludge of the STPs, 60 kgs from the biogas plant and 518 kgs from vermicomposting.
Maintenance Expenditure	Rs. 1,50,611/-
Vertical Gardens (Numbers)	Ten Vertical Gardens with 2080 flower pots
Gardens in Campus (Numbers)	28 (including Chitkara Woods)
Grounds in Campus (Numbers)	7 ( Alpha , Beta, Delta, Omega, SportsArena, PG 1 and PG 2)

As brought out by Warnert (2016) lawns need extensive care, as gardens that are not taken care of can do more harm than good. A dedicated team of gardeners under the able guidance of the Sr. Horticulturist, Mr. Hamid Raza, handle the task!

## LAYOUT OF GREEN BELT AREA IN CAMPUS



## GLIMPSES OF GREEN LANDSCAPING IN CAMPUS





EXPECTED SOON—TREE HOUSE AT CAMPUS !!

EXPECTED SOON—ORGANIC FARM IN CAMPUS !!



“EK KADAM SWACHHTA KI ORE”

C

leanliness is an integral part of a comfortable learning environment. The importance of a clean environment need not be reemphasized. The environment has a huge potential to increase the risk of cross infection. Therefore, a clean and safe environment is essential so we can live healthy lives and leave our future generations, a healthy Earth. Cleaning is the method used to achieve a clean environment and can best be viewed as a fundamental environmental management process of segregating the unwanted matter away from the clean and good matter and disposing the unwanted matter in a proper manner. This ensures an environment that is sustainable and functioning. Cleaning is a systematic, science-based process. Setting a standard

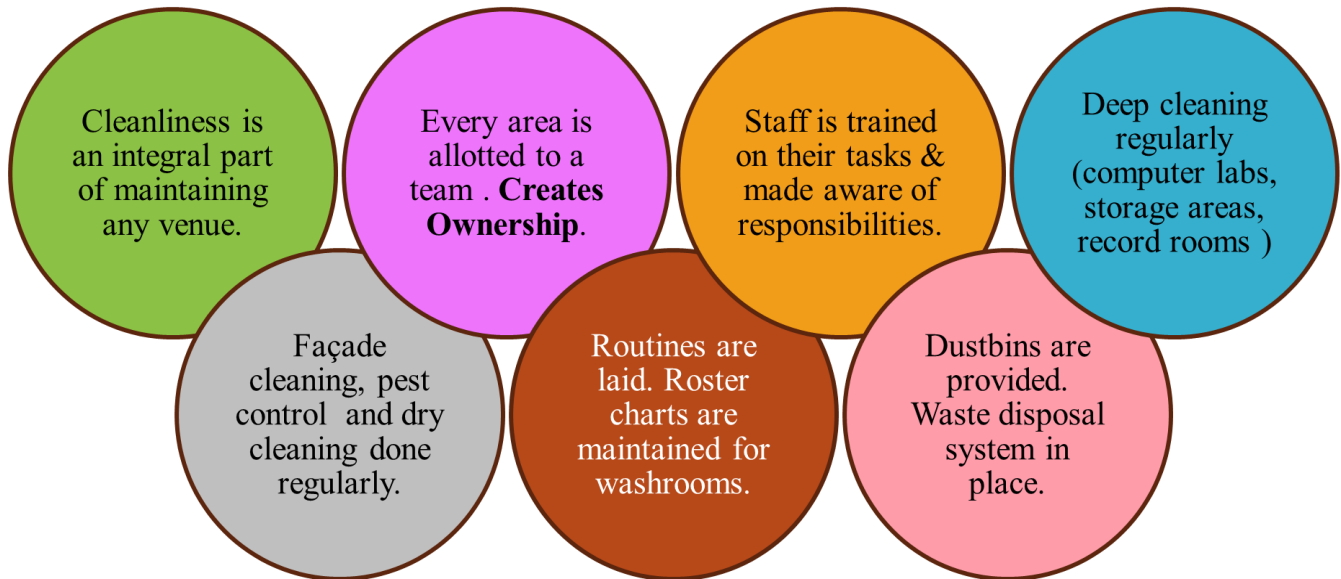


for environmental cleanliness, effective cleaning is our first line of defense against viruses and infectious diseases. In healthcare environments the practical value of cleaning is widely accepted and hence “*Swachh se Swasth*”.

Much before the *Swachhta Abhyaan* was introduced in India as a step towards progress, Chitkara University had already adopted cleanliness as an integral part of routine. Chitkara believes that just as state-of-the-art infrastructure and ambience is a must in the campus for the overall growth of a student and for the comfortable work environment of staff, cleanliness of the buildings and surroundings, timely maintenance and hygiene are also equally important.

Dedicated teams contribute to the cleanliness of the campus. Every area of the campus is allotted to a specific team that would be responsible to ensure the cleanliness and maintenance. This brings in them the sense of belongingness /ownership, which reflects in the dedication to their work. The areas so allocated include the fountains, the grounds, the parking areas, roads, the hostels, the messes, kitchens and the manholes on the roads too!! Schedules for cleanliness are laid down and meticulously followed. The cleanliness schedules for various areas have been well thought of, planned and laid down. These could be daily, weekly, monthly or bi-annual. The cleanliness schedules also depend on the type of cleaning which could be routine cleaning or “deep” cleaning. Further, to increase the life span of computers and ensure better performance, care is also taken to ensure that all computers placed in labs and libraries are vacuum cleaned regularly. Records destroyed by termites and/or rodents can cause huge losses of important records. Hence attention is given to clean the storerooms of all schools and departments at regular intervals to clean the area and check for any pest infestation. Pest control measures are in place.

## CLEANLINESS - PROCESSES



A clean campus with broken and unfit furniture or poorly painted walls would hamper the appearance and ambience. Also a well maintained infrastructure adds to sustainability . Hence utmost care is taken to ensure timely maintenance of the campus infrastructure. There is continuous monitoring of the maintenance (general and electrical) requirements of the infrastructure of the campus. Committed teams monitor these requirements which are conveyed to them by users, online. Systems are in place to ensure that solutions are provided within laid intervals.

## MAINTENANCE REQUIREMENTS

### ELECTRICAL & GENERAL

Complaints are raised Online (Admin Supervisors / School or College Representatives) or on F(29)

#### At Maintenance

- Work is allotted to tradesmen based on nature of complaint
- To be done by maintenance team
- To be done by a contractor (depends on the work)

#### Requisition process (Online) / Indent process (Online)

Once work completed, details of materials used is noted and complaint noted for closure

If user is not satisfied, respond to the closure mail , and the complaint shall be held pending. Work shall be monitored till closure

FAÇADE CLEANING IN PROGRESS



FIXTURES CLEANING IN PROGRESS



FOUNTAIN CLEANING IN PROGRESS



MANHOLE CLEANING IN PROGRESS



AIRFRAME AREA CLEANING IN PROGRESS



FOUNTAIN CLEANING IN PROGRESS



TERMITE TREATMENT IN PROGRESS



DEEP CLEANING IN PROGRESS



COMPUTERS CLEANING



CLEANING OF GROUNDS

INTERIOR CLEANING



It is natural to create waste. One should always endeavor to reduce waste, and wherever possible to recycle the generated waste. The problem arises when the waste produced, is not disposed off appropriately. An important need for the collection and disposal of waste is to ensure protection of the environment and the health of the population. Poorly handled waste can cause air and water pollution. Rotting garbage is also known to produce harmful gases that mix with the air and can cause breathing problems in people. When waste is disposed appropriately, it helps improve sanitation, it protects water supplies, encourages reuse of the waste, helps maintain clean campsites, prevents habituation of pests and parasites that can affect hygiene adversely.

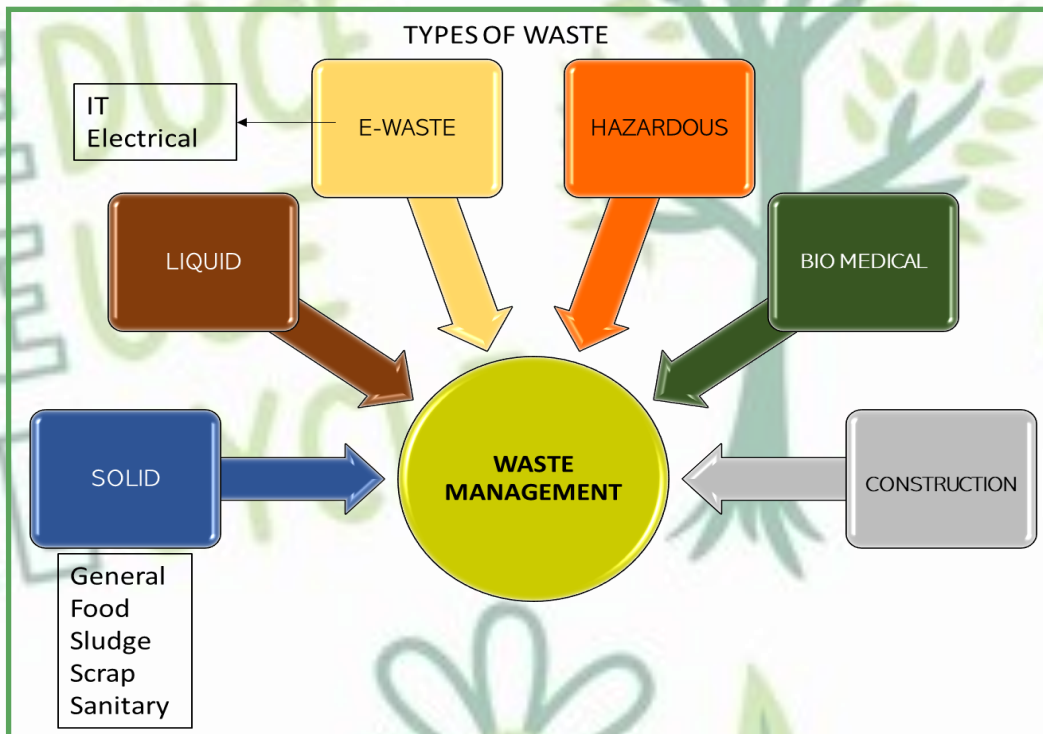
Various SDGs focus on the need to reduce, reuse and recycle different types of waste starting from routine home waste to hazardous and chemical waste.

<p><b>TARGET 12-5</b></p> <p><b>SUBSTANTIALLY REDUCE WASTE GENERATION</b></p>	<p><b>TARGET 11-6</b></p> <p><b>REDUCE THE ENVIRONMENTAL IMPACT OF CITIES</b></p>	<p><b>TARGET 12-4</b></p> <p><b>RESPONSIBLE MANAGEMENT OF CHEMICALS AND WASTE</b></p>	<p><b>TARGET 12-3</b></p> <p><b>HALVE GLOBAL PER CAPITA FOOD WASTE</b></p>
-------------------------------------------------------------------------------	-----------------------------------------------------------------------------------	---------------------------------------------------------------------------------------	----------------------------------------------------------------------------



## WASTE MANAGEMENT IN CAMPUS

Let's first have a look at the types of waste that arises in the campus.



TYPE OF WASTE	WHAT IS INCLUDED
SOLID	<b>General</b> - Juice cans, stationery, used paper plates etc. <b>Food</b> - Food waste from Mess kitchens, Pantries in Academic Areas, Food Waste from Hostels. The food waste is further distributed to Biogas plant which further produces biogas and compost waste. <b>Sludge</b> - Sludge form STPs <b>Scrap</b> – Metal/ Plastic/ Glass /Wood/Paper <b>Sanitary Waste</b> - Sanitary waste from Girls hostels and academic areas
LIQUID	Waste water from toilets and mess kitchens
E-WASTE	Generated from the IT and electrical equipment/appliances that are no further useable.
HAZARDOUS	The only hazardous waste in campus is the used oil from the Diesel Generators
BIOMEDICAL	The waste generated in the campus dispensary and the biolabs at CSHS and CCP
CONSTRUCTION	The waste arising out of the various construction /renovation sites.

Chitkara University adopts the philosophy of **REDUCE, REUSE AND RECYCLE** for waste management. For waste that cannot be further reused or recycled, processes are in place for the final disposal.



TYPE OF WASTE	REDUCE	REUSE	RECYCLE	DISPOSE
SOLID / SCRAP	✓	✓	✓	✓
FOOD WASTE	✓	✓	✓	
SLUDGE			✓	
BIO MEDICAL WASTE / SANITARY WASTE				✓
LIQUID WASTE	✓		✓	
E WASTE / HAZARDOUS WASTE				✓

**Solid Waste** – Efforts are made by the University to guide staff and students to **reduce** waste, be it stationary or prudent consumption of any raw material like at maintenance workshops or at construction sites. At Chitkara, to **reuse** solid waste various measures are adopted, like usage of old tyres and cans in horticulture or staff being encouraged to use one side printed paper, or by sharing old furniture and old sports material with schools and offices of the adopted villages, or used waste from maintenance workshops being used for various project works, or repairing of old doors and using at various locations etc. Further solid waste is **recycled** when used paper is further processed for making file covers, notepads etc. The general waste disposal process and the scrap disposal process mentioned ahead would also give an idea of how the solid waste is handled in campus.

**General Waste** - Dustbins are provided in classrooms, offices, hostel rooms, pantries, corridors, grounds, washrooms. All waste is first deposited into the dustbins. The waste accumulated is deposited at the Main Waste Yard. At the Main Waste Yard, there are partitions for - Biodegradable Waste / Non-Biodegradable Waste. Further there is a Waste Food Pit also in the area. The waste is segregated at the Main Waste Yard as biodegradable and non-biodegradable. A contract is in place with a vendor for daily collection of the plastic / non- biodegradable waste that is generated. The pickup is generally twice a day. Records are maintained. Sanitary waste is incinerated at hostels and at the Main Waste Yard.

**Disposal of Scrap** - Scrap is generated when various products can no further serve the purpose they were created for and is the leftover of the initially finished product. They can be defined as the recyclable materials left over from product manufacturing and consumption, such as old and unwanted furniture or fixture, old newspaper, building supplies, etc. Unlike waste, scrap has monetary value. Some scrap can even be used for teaching purpose or experiments, and various projects. For e.g., a refrigerator that is outdated or the body parts of which are not economically replaceable, can be utilized while teaching the functioning of a refrigerator for students of Engineering. Hence scrap material should be disposed to those who may use it prudently. The scrap that is generated in our campus includes old projects, old and unwanted furniture, cans of various liquids and HK material, oil tins, construction waste, old and unwanted infrastructure etc. In our campus solid waste has been used for various projects by students, to create decoration props for events, the biogas plant has been made using old water tanks, the solar lounge prepared by students is made of scrap maintenance material etc.

A point to be noted is that the scrap is not disposed daily and needs to be stored for a while till the same can be disposed in a bulk. Hence this needs storage facility. Further, the waste needs to be stored as per the type of material as they are disposed separately. The Junk Yard in the campus has various bins which allows the scrap material to be stored separately and hence ensuring better sorting, storage, and disposal.

The existing process of storage and disposal of scrap is in vogue in the campus since 2012 which was formulated by the Scrap Disposal Committee. Departments/ schools raise a No Objection certificate (NOC) for the scrap that has accumulated and submit to the Central Stores. The material is deposited at the Scrap Yard and is stored in the concerned bin. The scrap is disposed at regular intervals by the Central Scrap Disposal Committee to authorized vendors based on the best bid. The total disposal of scrap in the year 2019 amounted to Rs. 10,34,595/-.

NOC - FORM									
Department/ School:							Date:		
NOC No: CU/PB/									
Sr.No.	Name Of Item	Description	Approx. Quantity (Units/ weight/ Litres)	User Department	Estimate Date of Purchase	Approximate Cost Price	Last highest price of resale of similar items (if any)	Present Status of Item (Obsolete/ No further use / Not repairable/Not Economically Repairable)	Is any part of the asset removed for further use? if yes, provide details.
1									
It is certified that the above-mentioned items cannot be repaired or put to economic use. ( Description, if any, may be provided)									
We have no objection in the item being disposed as scrap.									
Signature of Dean / Director									
(Name)									

Scrap Disposal Committee	
Sqn Ldr Rina Angel	Presiding Officer
Mr. Anchal Rana	Member
Mr. Vinay Rishiraj	Member
JE Kulbir Singh	Member
Mr. Beant Singh	Member
Mr. Kartik Sharma	Member, Secretary
Mr. Gurupal Singh	Member

## DIAGRAMMATIC REPRESENTATION OF THE SCRAP DISPOSAL PROCESS IN CAMPUS



## DIAGRAMMATIC REPRESENTATION OF WASTE MOVEMENT TO WASTE YARD & SCRAP YARD





OLD TYRES USED IN THE GARDEN @ CHITKARA WOODS

**REUSE OF SOLID WASTE IN CAMPUS IN LANDSCAPING**



OLD TABLES CONVERTED AS SEATING SOLAR LOUNGES



OLD BOTTLES USED FOR VERTICAL GARDEN AT LECORBUSIER BLOCK

## Food Waste

*“There is food for everyone on this planet, but not everyone eats” - Carlo Petrini.*

The question is – are we also culprits for this situation? Sustainable Development Goal (SDG) Target 12.3 aims to halve global food waste at the retail and consumer levels and reduce food losses, including postharvest losses, along supply chains by 2030. One kitchen in the campus caters to the food requirements for the hostels and refreshment areas. In 2019, the amount of food prepared amounted to approximately 32,40,000 kgs. The total food waste generated in the campus from was 1,01,701 kgs. That would mean 3.13 %. Steps shall be initiated to reduce this figure further.



The best way to reduce wastage is to **plan ahead, procure accordingly and store appropriately.**

Team Office of Student Services, in liaison with the Residential Services team, *forecast the demand and strength of diners for all meals based on attendance.*

*This way they strive to reduce extra food preparation.* A system to forecast the food requirement well in advance based on the menu, and liaison with the local vendors, enables proper storage of food material.



For the food that is prepared and served, efforts are made to reduce waste by **sensitizing students and displaying posters** about the hunger deaths in the world and the value of food etc. Further, wardens strictly monitor the food wastage, by their physical presence in the students' messes during meal hours. The **food waste generated is displayed on a board** on a daily basis, to keep students aware and to encourage them to reduce the figure. The

Office of Student Services (OSS) team is lead by Mr.

Vishal Sharma and Mr. Ranbir Singh and the Residential Services are lead by Col AK Chauhan and Col Satyavir Singh.

**Recycling Food Waste** – Though there are efforts made to reduce food wastage, some amount of food gets wasted. Extra food, if any, is collected by a piggery farm. The university has a contract in place for the same and renews it annually. A small amount of food waste is used for the guinea pigs and rabbits at the animal house ( Chitkara College of Pharmacy), the biogas plant and some for vermicomposting too. Food waste, which could be in paper plates and cups etc., that is collected from the refreshment areas, is deposited in the Waste Food Pit (Big). Food Waste collected from pantries of the academic buildings is very less in amount. This is deposited at the food waste pit (small) near the vermicomposting area.



<b>Kitchen</b> —1 in Vaso Da Gama Hostel
<b>Messes</b> —7 ( Nightingale /Teresa/Pi B/Pi C/ Vasco Da Gama/ Marco Polo and Magellan)
<b>Food prepared for students and staff in 2019</b> —(Approx) 32,40,000kgs
<b>Food Wastage</b> — 3.13% of food prepared

	To Piggery	Vermicompost	Bio Gas Plant	Animal House
Food Waste	94814.70 kgs	2075 kgs	3414 kgs	1398 kgs
Output for Horti-culture	NIL	518 kgs	60 kgs	NIL
Savings (Costing)	Rs 3,60,000/-	Rs. 3,112/-	Rs. 120/-	NIL

**Sludge** – There are two STPs in the campus and the sludge that is produced is collected and recycled as manure. In 2019, approximately one thousand kgs of sludge has been collected and has been converted as manure and used by the Horticulture team, thus reducing the need to procure as much manure .



**Bio Medical Waste** - Bio medical waste arises in the campus dispensary and in the labs of Chitkara School of Health Sciences and Chitkara College of Pharmacy (Animal House) . At these venues, waste is collected into the dustbins placed as per the color code laid for bio-medical waste. The waste from these dustbins is further disposed as per the laid environmental norms, through a contract with Neelam Hospital.

## **BIOMEDICAL RULES 1998**

- The Government of India as contemplated under Section 6,8 and 25 of the Environment (Protection) Act,1986, has made the Biomedical Wastes (Management & Handling) Rules, 1998.
- The rules are applicable to every institution generating biomedical waste which includes hospitals, nursing homes, clinic, dispensary, veterinary institutions, animal houses, laboratory, blood bank.
- The rules are applicable to all persons who generate, collect, receive, store, transport, treat, dispose, or handle bio medical waste in any form.





**Handling e-waste**

Which are the SDGs that deal with E-waste ? As per ITU-D (2017), better understanding and management of e-waste is closely linked to **Goal 3** (Good health and Well-being), **Goal 6** (Clean water and Sanitation), **Goal 11** (Sustainable Cities and Communities), **Goal 12** (Responsible Consumption and Production), **Goal 14** (Life Below Water), and **Goal 8** (Decent Work and Economic Growth). Have a look at the highlighted SDGS in the image below.



Target of SDG	WHAT IT DENOTES
Target 3.9	Reduction of the number of deaths and illnesses caused by hazardous chemicals and air, water, and soil pollution and contamination
Target 6.1	Universal and equitable access to safe and affordable drinking water for all
Target 6.3	Reduce pollution, eliminate dumping, and minimize release of hazardous chemicals and materials. Most e-waste will be generated in cities
Target 8.8	Protection of labour rights and promotes safe and secure working environments for all workers, including migrant workers, particularly women migrants, and those in precarious employment. Necessary for countries to formalize the environmentally sound management of e-waste and to take advantage of the business opportunities it offers.
Target 11.6	Reduce the adverse per capita environmental impact of cities, by paying special attention to air quality and to municipal and other waste management
Target 12.4	Achieve the environmentally sound management of chemicals and all waste throughout the life cycle, in accordance with agreed international frameworks, and to significantly reduce their release into air, water, and soil in order to minimize their adverse impacts on human health and the environment.
Target 12.5	Reduce waste generation through prevention, reduction, repair, recycling, and reuse. An increasing number of people on the planet are consuming growing amounts of goods, specifically in the area of electrical and electronic equipment.
Targets 14.1 and 14.2	Marine pollution and the protection of the marine ecosystem

**E-waste** can be explained as electronic products that have reached at the end of their “useful life” and are not of further use and hence treated as waste. E-waste has negative effects on human health, animal life and the environment. To humans, it has the potential to cause respiratory diseases, affect the brain, kidneys, heart, liver and even the nervous and reproductive systems. Hence they need to be treated with care, as per laid norms.



At Chitkara, Punjab, the e-waste is stored near the Scrap Yard, absolutely secluded and located away from the academic or residential areas. Access to this area is restricted. The e-waste generated is accounted for, by the concerned departments. As per the process laid down, the e-waste is stored by the electrical and IT teams, in the respective storage areas near the scrap yard, which is a restricted area. Once the final check of inventory is done, the NOC is prepared and the authorized recyclers approached. The application is then sub-



Form-6  
[See rule 19]

**E-WASTE MANIFEST**

1.	Sender's name and mailing address (including Phone No.)	Chitkara University, Rajpura.
2.	Sender's authorisation No, if applicable.	NA.
3.	Manifest Document No.	SR/2019/11-231
4.	Transporter's name and address (including Phone No.)	Speco Recycling, Ludhiana.
5.	Type of vehicle (Truck or Tanker or Special Vehicle) Commercial Vehicle.	
6.	Transporter/s registration No.	NA.
7.	Vehicle registration No.	PD 11A/ 9883.
8.	Receiver's name & address	Speco Recycling, Ludhiana.
9.	Receiver's authorisation No, if applicable.	018LDH474082.
10.	Description of E-Waste (Item, Weight/ Numbers):	mixed waste as per list (280 kg)
11.	Name and stamp of Sender* (Manufacturer or Producer or Bulk Consumer or Collection Centre or Refurbisher or Dismantler): Signature: Month Day	Chitkara University [Signature] 07/10/2019
12.	Transporter acknowledgement of receipt of E-Wastes Name and stamp: Signature: Month Day	Speco Recycling, Ludhiana. [Signature] 07/10/2019
13.	Receiver* (Collection Centre or Refurbisher or Dismantler or Recycler) certification of receipt of E-waste Name and stamp: Signature: Month Day	Speco Recycling, Ludhiana. [Signature] 07/10/2019

\* As applicable

Note:-

Copy number with colour code (1)	Purpose (2)
Copy 1 (Yellow)	To be retained by the sender after taking signature on it from the transporter and other three copies will be carried by transporter.
Copy 2 (Pink)	To be retained by the receiver after signature of the transporter.
Copy 3 (Orange)	To be retained by the transporter after taking signature of the receiver.
Copy 4 (Green)	To be returned by the receiver with his/her signature to the sender

mitted to the Pollution Board for the final clearance and then the said e-waste is disposed off to the approved recycler. The e-waste is disposed off at regular intervals by the joint efforts of the **Scrap Disposal Committee in liaison with IT ( Director IT, Mr. Pawan Mehta) and Electrical (SE Kulbir Singh )** teams, as per laid statutory norms. A huge role is played by Mr. Kartik Sharma, who is the member of the Scrap Committee responsible for liaison with the authorized recyclers. The records are maintained by the Secretary of the Scrap Disposal Committee Mr. Gurupal Singh. **Overall it's a team effort which is done meticulously.** The sale of e-waste in the year 2019 amounted to Rs. 1,26,500/-.

**Hazardous waste** means any waste which by reason of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances. The only hazardous waste generated is from the five DG sets of the campus in



the form of lube oil. **Used lube oil** is disposed off to recyclers authorized by the PPCB (Punjab Pollution Control Board) every year. **This year, with the improved electricity load in campus** and reduced usage of the generator drastically, we could achieve a reduced usage of generators and hence used oil wastage. Only the minimum waste oil i.e. 150 liters per year. This is the minimum required for annual servicing of the generators in campus.

FORM-4  
[See rules 5(6) and 22(2)]  
FORM FOR FILING ANNUAL RETURNS BY THE OCCUPIER OR OPERATOR OF FACILITY  
[To be submitted by occupier / operator of disposal facility to State Pollution Control Board / Pollution Control Committee by 30th June every year for the preceding period April to March]  
01/01/2019 TO 31/12/2019

1	Name and address of the Generator/operator of the facility	Chitkara University Chandigarh Patala National Highway Tahsil Rupnagar, Distt. Patiala, Punjab - 140401 - INDIA	
2	Name of the authorized person and full address with telephone and Fax number	Dr. S.C. Sharma Registrar Chitkara University Chandigarh Patala National Highway Tahsil Rupnagar, Distt. Patiala, Punjab - 140401 - INDIA Telephone No. 01762-507925, FAX No. 01762-507805	
3	Description of hazardous waste	Physical form with descriptions	Chemical form
4	Quantity of hazardous wastes (in MTA)	Type of hazardous waste	Quantity in Tones
a.	Used Oil 5.1	Oil	NA
4	Quantity of hazardous wastes (in MTA)	Type of hazardous waste	Quantity in Tones
a.	Used Oil 5.1	Oil	150 Litres
5	Description of storage	Used oil stored in M.S. Drum in the Waste Room	
6	Description of treatment Manifest copy attached 10249	Manifest Document No. 10249 Used Oil Sale 150 Litres (Balance Year 2018 From 15.05.2018 to 31.12.2018 = 110 Litres, Year 01.01.2019 to 31.12.2019 = 40 Litres) Balance Used Oil - Nil In BRS Lubricants D-57, Focal Point Mandi Gobindgarh, Contact No. 9041320006	
7	Details of transportation	Name & address of consignee	Mode of Packing Mode of Transportation Date of Transportations
a	Mahindra Pickup PB 23 M 2354	BRS Lubricants D-57, Focal Point Mandi Gobindgarh, Contact No. 9041320006	M.S. DRUM Mahindra Pickup PB 23 M 2354 24.12.2019
8	Details of disposal of HW	Name & address of consignee	Mode of Packing Mode of Transportation Date of Transportations
a	Total Used Oil 150 Litres Sale 150 Litres Balance - Nil	BRS Lubricants D-57, Focal Point Mandi Gobindgarh, Contact No. 9041320006	M.S. DRUM Mahindra Pickup PB 23 M 2354 24.12.2019
9	Quantity of useful material sent back to the manufacturers	Name and type of material sent back to manufacturers	Quantity in tones /KL
		Not Applicable	

Date: 21.01.2020  
Place: Patala

Signature: *Ch Sharma*  
CHITKARA UNIVERSITY, PUNJAB  
Chandigarh Patala National Highway  
Tahsil Rupnagar, Distt. Patiala  
Punjab - 140401 - INDIA

FORM-10  
[See Rule 19 (1)]  
Hazardous Waste Manifest  
(Information of Hazardous Waste for Disposal)

1. Sender's Name & Mailing Address (Including Phone No.) PUNJAB COMPS CHITKARA UNIVERSITY	2. Sender's Registration No.	3. Manifest Document No. 10249	4. Type of Vehicle Truck Truck Special Vehicle	5. Transporter's Registration No.
BRS LUBRICANTS D-57, Focal Point, MANDI GOBINDGARH M. : 70096-54703				6. Facility's Registration No. BPCB/2018/23F-140
7. Designated Facility Name & Site Address BRS LUBRICANTS D-57, Focal Point, MANDI GOBINDGARH M. : 70096-54703 E-mail : brs.lubricants@gmail.com vikas.garg29@gmail.com	8. Facility's Registration No. BPCB/2018/23F-140	9. Facility's Phone No. 70096-54703	10. Total Quantity of Waste	11. Waste Description
			150 Ltr.	Used waste oil (waste)
12. Consistency	13. City	14. State	15. Country	
Solid Semi-Solid Sludge	Terrary Slurry			
16. Transport Description of Waste	17. Containers	18. Total Quantity	19. Unit	20. Waste Category No.
Used waste oil 5.1	21. No. 01 22. Type Drum	150	Ltr.	5.1
19. Special Handling Instruction & Additional Information				
20. Occupier's Certificate: I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are categorized, packed, marked, and labeled, and are in all respects in proper condition for transport by road according to applicable national government regulations.				
Typed Name & Stamp Signature: <i>Ch Sharma</i>		Signature Day Month Year 24 12 19		
21. Transporter's Acknowledgment of Receipt of Materials		Signature Day Month Year 24 12 19		
22. Discrepancy Note Space		Prop.		
23. Facility owner or Operator's Certification of Receipt of Hazardous Waste		Signature Day Month Year 24 12 19		

Retained Signed Copy for Operator of Hazardous Waste Facility

Copy 1st Retained - To be forwarded by the sender to the State Pollution Control Board after signing all the seven copies.

## Reducing Water Wastage

**“A** drop of water, if it could write out its own history, would explain the universe to us.” –  
Lucy Larcom

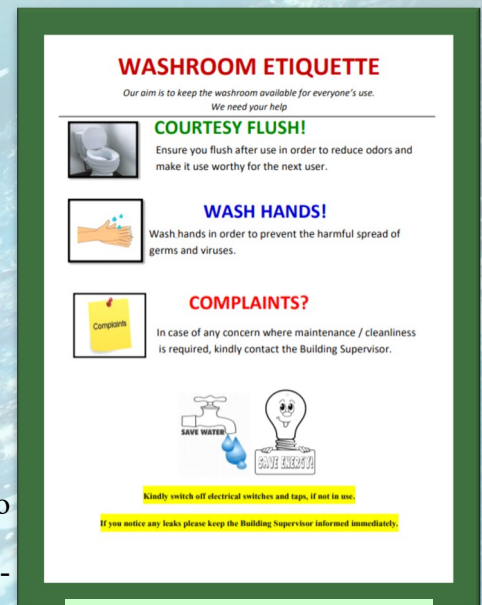
Every drop of water is precious and all out efforts are made to reduce any water wastage and to encourage prudent usage. The campus is well equipped with a Main overhead water tank with a capacity of four and a half lakh litres . Water drawn from 2 bore wells are routed to this tank at regular intervals to cater to the requirement of the 6 lakhs litres of water in campus. The process is **auto-mated using sensors, hence saving manpower efforts of manual monitoring, and reducing chances of overflow.** Every building is provided with sufficient number of water tanks , based on the footfall of the building. *These tanks get automatically filled (sensor based)* from the Main Overhead Tank. Further there are 2 dual purpose underground water tanks of four lakh and one lakh litres each also in campus.

**Posters** have been placed at the rear of washroom doors. Aim is to remind staff and students to switch off taps when they leave. Building supervisors are advised to raise complaints in case they notice any water leakage. Complaints related to water leaks are given top most priority.

Cleaning of water tanks and fountains are planned and scheduled to ensure least wastage of water. The water of the fountains is emptied to the grounds and this helps watering of the lawn area. Water supply to the tanks are switched off well in advance to ensure that there is least water wastage.

**Aerators** are provided for the taps to reduce the flow and thus wastage.

**Sensor based taps** are being provided at certain areas. The plan is to provide more sensor based taps.



**POSTER DISPLAYED IN WASHROOMS**

**TARGET**

**6-3**

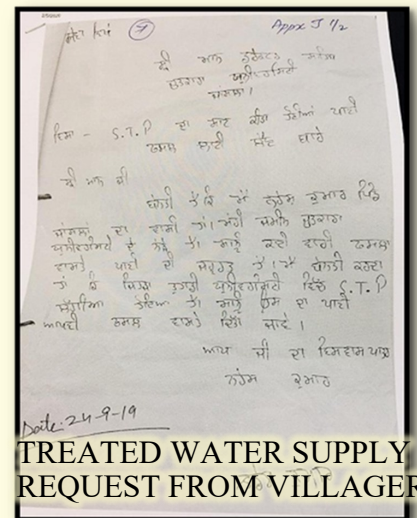


**IMPROVE WATER QUALITY, WASTEWATER TREATMENT AND SAFE REUSE**

**Recycling Liquid Waste** - The campus has 2 STPs; one with capacity of 250 KLD and one of 1000 KLD. The water consumed on a daily basis is approximately six lakhs litres of water. Hence Approximately four and a half lakh litres of water is treated by these two STPs. Most of this water is used for horticulture in campus, Karnal technology, double plumbing as well as shared with neighboring villagers who have requested for the same.



STP 1



STP 2



## Construction Waste

A huge number of construction activities are undertaken in the campus. The construction work in the campus is handled by a dedicated team of engineers under the mentoring of Mr. Sanjeev Kumar Bhardwaj. Kudos to the team that works relentlessly to create /renovate venues in the campus. What is further appreciable is that utmost importance is given to ensure least pollution at construction sites, be it air, water or noise pollution. The measures adopted include (and are not restricted to) :



- Ensuring that the temporary and unsurfaced roads are regularly graded and watered to control dust .
- Ensuring proper storage and proper disposal of all waste at sites including wood waste/ mortar /organic waste/domestic waste etc. Innumerable efforts are made to ensure that the mortar and old construction material of every site is used in the best possible manner
- Ensuring no wastage of electricity and water at construction sites.
- Ensuring sites are maintained clean and hazard free
- Reducing noise pollution by best utilization of equipment and scheduling work as per office/class hours. Further, the details of reuse of materials from site is explained below.

The demolition waste in Chitkara university was generated during the upgradation of Picasso block in 2019. It included the debris, concrete, cement sand, metals and bricks. The metal scrap was recycled and reused in the premise. About 150 cum. of concrete, debris, bricks were generated. This unusable waste was managed by using them for landfilling purposes. All the generated waste was stockpiled first . An approximate of one hundred fifty cubic meters of mortar and waste was used for backfilling of land in the year.

### **AREA FOR LABOR HUTS CREATED WITH LAND FILLING**



**Rain** rain go away ....., so begins a nursery rhyme most of us must have learnt...!  
 But that not the attitude of this campus !!! Here rains are more than welcome !

The rain water is collected through the eight **Rain Water Harvest** pits. These help in the water table of the ground to improve. There are more rainwater harvest pits planned for the campus. These are being handled and monitored under the able guidance of the Project Manager, Mr. Sanjeev Bhardwaj.

**PICTURES OF RAIN WATER HARVEST PITS IN CAMPUS**



Rainwater Harvesting Pits	
Venue	Nos
Omega Zone	3
Beta Zone	1
Nightingale Hostel Ground	1
Columbus Hostel Ground	1
Sports Arena	1
Alpha Zone	1
<b>Total</b>	<b>8</b>



ELECTRICITY CONSERVATION—STEPS ADOPTED

SDG 7—*Ensure access to affordable, reliable, sustainable and modern energy for all*

**M**ost of us may have the luxury of electricity supply at our homes and in our campus. But there are about 789 million people who lack the facility (UN Report, 2018). So the important question is, “are we using electricity in a responsible manner ?” The goal of SDG 7 can be achieved only when each of us contribute in prudent utilization of energy. Chitkara University has also taken various initiatives for reduction in wastage of energy and reduction in consumption of energy. First a look at the electricity load of the campus.

PSPCL -Punjab State Power Corporation Limited Power Supply – 11 KV HT Line
Sub Station's - 02 Nos
Present Connected Load / Contract Demand
Sub Station - 01 - <b>6807.74 KW / 2600 KVA</b> (Jhansla)
Sub Station 2 = 474.2 KW / 400 KVA (Fatehpurgarhi)

**Electricity Load Extension**

For a comfortable study environment, there is a plan to provide air-conditioning in additional campus buildings and hence there would be a need for more electricity load in the year 2019 for smooth working of the Sub Station. Hence with necessary liaison with the State Authorities (PSPCL) a load extension was sanctioned.

Connected - 2813.85 Kw

Demand - 800 KVA

Sanctioned Date - 20.04.2019

Along with growth and development of the campus, the demand for electricity load also increased. But simultaneously all steps are initiated for use of clean and renewable energy to reduce the carbon foot prints, to save energy, to reduce the wastage of electricity as well as to ensure prudent usage.

Next few pages provide details of the initiatives towards conservation of energy, and in ensuring clean and renewable energy in the campus. SE Kulbir Singh, under the guidance of the Director Projects, Mr. Kamal Kishore , with a dedicated team , handles the electrical matters of the campus. Kudos to their efforts !!!



**11 KV Sub Station**

**Sub Station-** A substation is a part of an electrical generation, transmission, and distribution system. Substations transform voltage from high to low, or the reverse, or perform any of several other important functions. As tabulated in the previous page, campus has two substations

**PICTURES OF SUB STATION –1**



## PICTURES OF SUB STATION –2



Central individual Sub Station with technology upgrades like VCB, OLTC transformer's, ACB Panels etc. have improved the power supply system in campus.

**VCB** - A VCB panel is a type of circuit breaker where the arc quenching occurs in vacuum environment. VCB or Vacuum Circuit Breaker is renowned technology today and is also known as the most reliable current interruption technology for medium voltage switchgears.

**LT Panel** is an electrical distribution board that receives power from generator or transformer and distributes the same to various electronic devices and distribution boards. Our LT panels are designed to work with low electricity consumption that makes them cost effective.

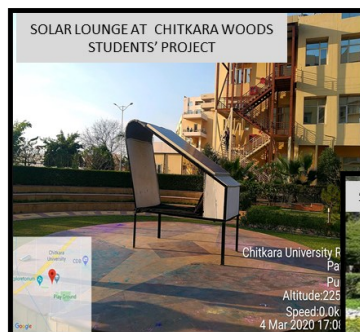
**Transformer** -On-load tap changer (OLTC), also known as On-circuit tap changer (OCTC), is a tap changer in applications where a supply interruption during a tap change is unacceptable, the transformer is often fitted with a more expensive and complex on load tap changing mechanism.

**LED Lights** – To improve efficiency and reduce energy consumption, LEDs are replacing the incandescent *light bulbs*. Quality LED light bulbs last longer, are more durable, and offer comparable or better light quality than other types of lighting. In this year we installed a total of 3553 LED with a capacity of 53789 Watts. Have a look at the energy consumption as tabulated below.

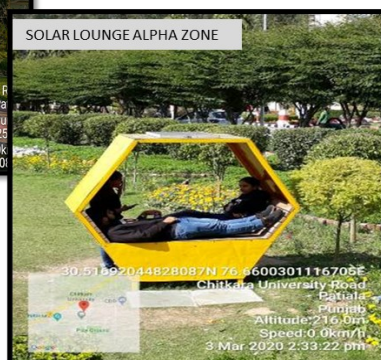
Calculation of expense towards energy consumed by LEDs	
Total Units Consumption in one hour by LEDs	53.789 Units
Electrical Supply Per Unit Price	@8.50/- Approx
Unit Consumption for one hour (in Rupees)	Rs. 457.20
Unit Consumption for seven hours (in Rupees)	Rs. 3200.40
Hence Monthly Expense	Rs. 96,012
Annual Expense	<b>Rs. 11,52,144</b>



In case commercial lights were used instead of LEDs, the wattage would have been approximately **107578 watts leading to a costing of Rs. 23,04,288/-**. Hence, a saving of 50% energy. Though costlier, the LEDs are more efficient and lead to reduced energy consumption, thus leading to a win-win situation for the environment and for the organisation and users!!



**Solar lounges** have been placed in the gardens where students can have the luxury of charging their phones, while enjoying the nature outdoors. The solar lounge at the Alpha zone is an example of old furniture reused to create lounges. This was done in 2019.



The solar lounge at the Chitkara Woods is a project of students, which was also created using waste material.

## Solar Geysers

Students and staff residing in campus would require hot water during winters for their daily needs. We Solar geysers have been installed in all hostels and hence there is no electricity consumed for providing the facility of hot water. The table provided below provides the calculation of the half yearly saving of approximately 14.2 lakhs.

Sr. No.	HOSTEL Block	Water Tank Capacity	Capacity in Litres	Capacity of Heating Element in Kilowatt	Working Hours/ Units	Unit Consumption
1	Columbus	2 X3000 Litres 1 X 2500 Litres	8500	81	6 Hours	162
2	Vasco da Gama	4 X 2000 Litre	8000	72	6 Hours	144
3	PI A	2 X 3000 Litres	6000	54	5 Hours	90
4	PI B	2 X 3000 Litres	6000	54	5 Hours	90
5	Marco Polo	4 X 2000 Litre	8000	72	6 Hours	144
6	Armstrong	2 X 2000 Litre	4000	36	6 Hours	72
7	Teresa	2 X 2000 Litres	4000	45	5 Hours	75
8	Bloom	1 x 1000 Litres	1000	9	3 Hours	9
9	Nightingale	1 X 3000 Litres 1 X 2000 Litres	5000	36	4 Hours	48
10	PI C	2 X 3000 Litres	6000	54	5 Hours	90
11	Escoffier	1 x 1000 Litres	1000	9	3 Hours	9
<b>Total</b>		<b>25 Tanks</b>	<b>57,500 Itrs</b>	<b>522 Kilowatt</b>		<b>933</b>

**Total Units Consumption - 933 Units**

**Electricity Per Unit- Price = @8.50/- Approx.**

**Total Amount per day= 933 X 8.50 = 7930.50 per day**

**Half yearly Savings -14,27,490/- ( Solar Geysers are usually used only during winters)**

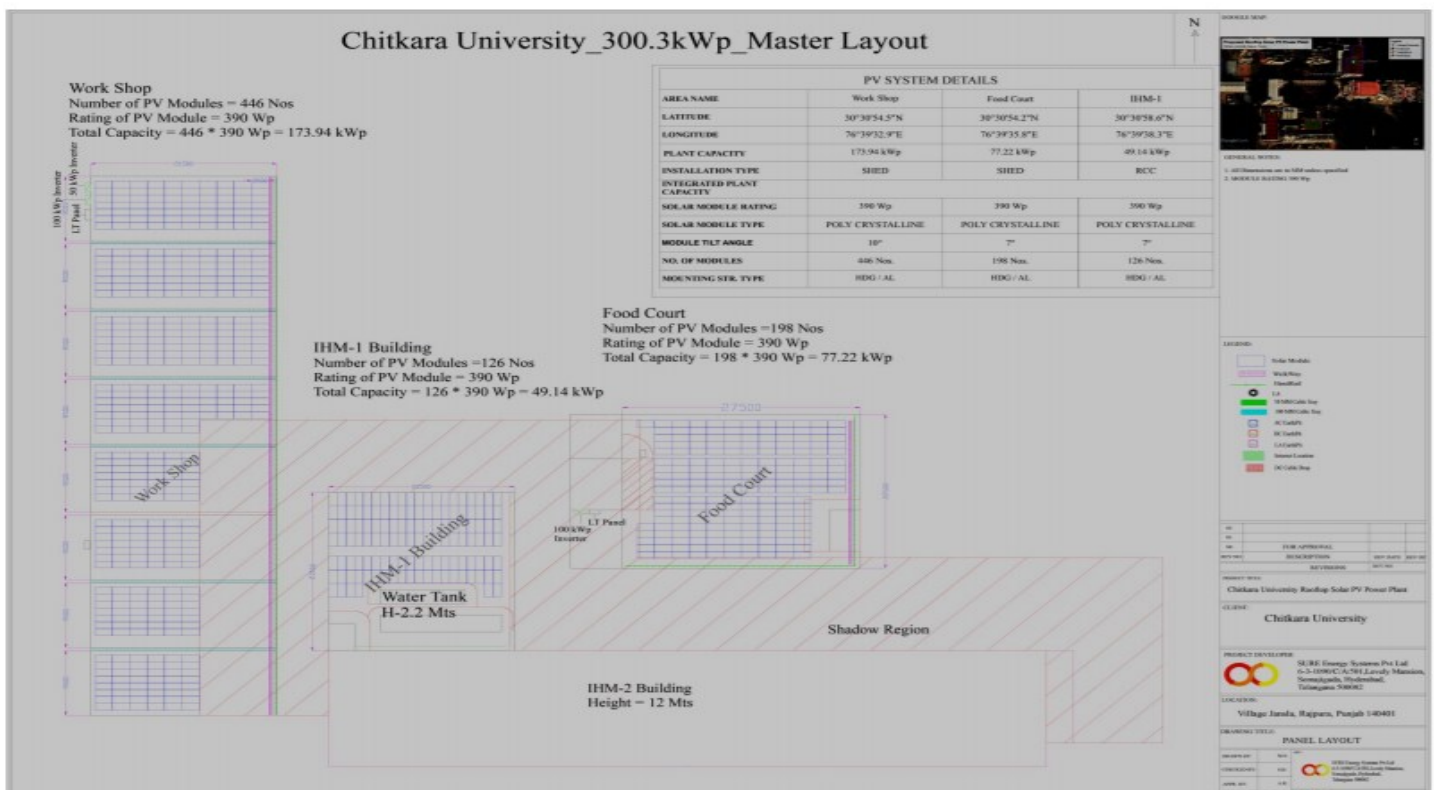


## Solar Power Plant

Solar energy is **any type of energy generated by the sun**. We receive sufficient sunlight which can be tapped and used for generation of electricity. The Solar Geysers being used do provide us the option of reduced consumption of electricity, but this energy cannot be used for any other purpose other than heating water.

Hence the concept of Solar Power Plant was studied. **Solar power plant** is the source of converting the natural energy into electricity which not only saves money but also saves the environment as it creates no pollution and is budget friendly with low maintenance cost. In the presence of Sunlight, PV modules will generate DC electricity using the photovoltaic effect, which is converted to AC electricity and synchronized with the electricity. Power quality is same as that of the grid power and can be used for any application along with the grid supply. This option was considered and finalised. The required actions were initiated for the approvals.

The complete project is planned in three phases. Work is in progress to install a 300 kWp Solar plant in our campus to cater to the existing load, with green energy concept. The planning is to achieve 1.5 Mega Watt (in phased manner of 300/400 kwp each phase). This Solar Plant would also be on grid. First phase for 300 kWp shall be completed by 2020.



Solar Power Plant



PICTURES OF PHASE I OF THE SOLAR POWER PLANT IN CAMPUS



**Prudent Usage of Electrical Appliances** - It was noticed in the campus that, in most cases, refrigerators and watercoolers are hardly utilised, but stay 'ON' on weekends from Friday evening to Monday morning. Hence it was decided that these appliances should be switched off on Friday Evenings (when Saturdays are not working days) and on Saturday evenings when Saturdays are working days). In offices that are open / operational for 24 hours like dispensary the refrigerator is not switched off. The watercoolers placed at Edison block ground floor or rear of Fleming block or the watercooler near Sportorium, where staff and students may use these even on holidays and after working hours, , are also not switched off.

<b>SAVING ELECTRICITY WASTAGE BY SWITCHING OFF WATERCOOLERS &amp; REFRIGERATORS</b>						
	<b>Wattage</b>	<b>Refrigerator Quantity</b>	<b>Per Hour Units Consumption</b>	<b>Total Wattage</b>	<b>Unit Rate</b>	<b>Per Hour Bill Amount</b>
Unit Calculation	65	1	0.065	0.065	8.50/-	0.55
Final Calculation	65	64	4.16	4.16	8.50/-	35.2
<b>From Friday 5.30 to Monday 8 AM = 62.30 Hours</b>						
<b>Total Wattage in Units <math>62.30 \times 4.16 = 259.16</math> Units</b>						
<b>Total Bill Amount <math>259.16 \times 8.50/- = \text{Rs. } 2,202.86</math> per weekend</b>						
	<b>Wattage</b>	<b>Water Cooler Quantity</b>	<b>Per Hour Units Consumption</b>	<b>Total Wattage</b>	<b>Unit Rate</b>	<b>Per Hour Bill Amount</b>
Unit Calculation	775	1	0.77	0.77	8.50/-	6.54
Final Calculation	775	56	43.4	43.4	8.50/-	368.90
<b>From Friday 5.30 to Monday 8 AM = 62.30 Hours</b>						
<b>Total Wattage in Units <math>62.30 \times 43.4 = 2703.82</math> Units</b>						
<b>Total Bill Amount <math>2703.82 \times 8.50 = \text{Rs. } 22,982.47/-</math> per weekend</b>						

**Diesel Generator** - The campus has 5 Diesel Generators (DGs) . While four of them are of 500 KVA, one is of 600 KVA. These DG sets have been provided separate canopies and also adequate stack height of 8.0 m above roof level separately. Further these are silent generators. Silent generator operates inside a sound proof container or generator enclosure which muffles the sound that is generated which the workers, employees, customers and other members of the public hear. By installing silent generators, providing canopies, and stack height, the campus ensures there is no pollution to the sound in campus, due to the operation of generators.

**Building Wise Panel Switch off** - A main switch is a central cut-off switch that controls the smaller cut-off switches and machines of a building. The main switch, also referred to as a distribution board, divides the feed of electrical power to a building into subsidiary circuits and provides a protective fuse for each circuit. For safety we switch off the electrical main switch of buildings for double check to ensure that all the appliances & general lights is off. The building have only emergency lights of corridor, essential requirement & fire fighting equipment.

**Automation** - Water level indicators work by using sensor probes to indicate water levels in a storage tank. These probes send information back to the control panel to trigger an alarm or indicator. As explained above, the control panel can be programmed to automatically turn on your pump to refill the water again. This helps in reducing any water wastage and in the additional electricity that would be wasted for the motors. In our campus, 14 water motors (supply to overhead tanks of buildings, 10 fountains in campus, and Main overhead tank are all automated. The street lighting system, high mast, etc., are being controlled through DPET (Digital Programmable Electronic Timer) Technology. This automations helps in reduction of the labour cost. Further, offensive use of the energy in the campus would help save the campus economy.

2019					
Sl No.	Bill No.	Dated	Description	Qty	Amount
1	4418	19.01.2019	Water Level Controller (WLC)	3	750
2	DEL5-10246780	31.01.2019	Fully Automatic Sensor	3	3597
3	404-2367085-2159544	30.07.2019	Fully Automatic Sensor	5	5995
4	404-6158513-5335564	03.08.2019	Fully Automatic Sensor	1	799
5	DEL5-13630250	26.11.2019	Water Level Controller (WLC)	3	1199
				<b>15</b>	<b>12340</b>

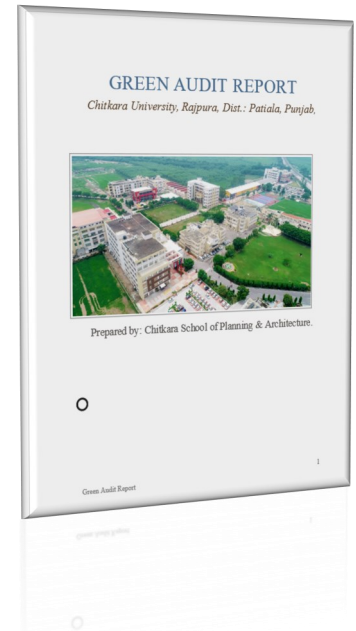
**Energy Efficient Electrical Appliances** - To reduce energy consumption, energy star-labelled appliances are being used in offices & residential areas and energy-savings settings have been done for other appliances, including IT equipment. In February 2019 a detailed Energy Audit from external auditor suggested installation of BLDC ceiling fans. This is planned for implementation.



## GREEN AUDIT REPORT OF CAMPUS

Green Audit was conducted in the year and the gist of the suggestions are as below:

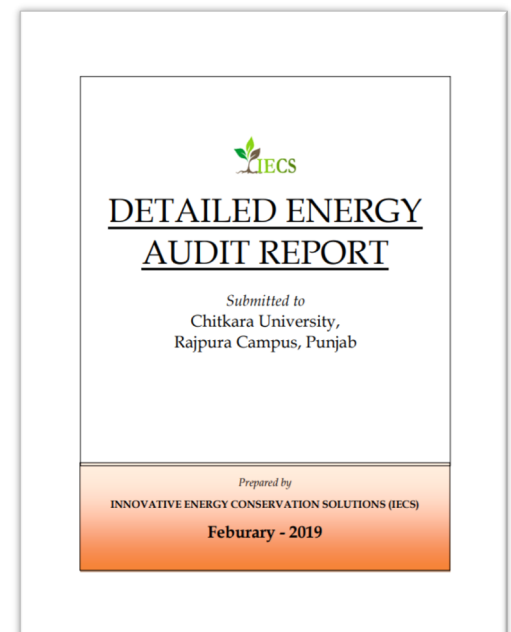
- Water monitoring would help regulate the consumption of water and treated wastewater. Consider water meter at the inlet of every building.
- The stack emission and noise pollution testing to be ensured periodically
- Sprinkling of treated water at the construction site will prevent the release of PM 10 and PM 2.5 into the atmosphere.
- Additional source of renewable energy may be considered. Also LED bulbs, BLDC fans and other electric appliance consuming less energy may be used. Regular energy audits to be ensured.
- More emphasis may be laid on reuse of treated water for flushing purposes.
- More rainwater harvesting pits or recharge well can be planned.
- All vehicles entering the vehicles must have Pollution under Control Certificate.
- The solid waste generated is to be segregated at the source only.
- More plantations can be planned.
- Creating awareness regarding environment and safety among employees. Training for students & staff on the matter may also be conducted periodically.



## DETAILED ENERGY AUDIT REPORT OF CAMPUS

Energy Audit of the campus was conducted and the suggestion received are listed below:

Sr. No.	Energy Saving Proposals
1	Optimise Sanctioned Contract Demand from 1800 to 2200 kVA For Packet -1
2	Improve Power Factor for 1800 kVA Connection
3	Improve Power Factor For 400 kVA Connection
4	Replace Existing Wall Mounting/Ceiling Fans with BLDC Fans
5	Replace Conventional Lighting Lamp with New LED Lamp
6	Replace Existing Non-Star Air Conditioner With 5 Star Air Conditioner on Failure Replacement Basis
7	Install Solar PV Plant to Reduce Energy Consumption



## REDUCING CARBON EMISSION WITH PUBLIC TRANSPORT FACILITY

The campus provides free transport service to all faculty. This leads to “combined travelling”, and hence re-



ductions of personal cars plying on roads. The average distance an employee would commute to reach campus may be calculated as 45 kilometers one way. A light vehicle would use an average of 1 litre for 15

kilometers. Hence when six hundred staff avail bus facility (which is at no cost to them), there is a reduction in carbon emission. The table provided gives details of how much carbon emission can be reduced by the staff and faculty utilizing the public transport system. There is also a reduction in the area required for parking of vehicles. Hence while providing the comfort of travel, there is a contribution towards reduced carbon emission also.

Further, restricted number of vehicles are provided parking permits in campus to encourage utilization of public transport. Facility of carpooling is provided to senior staff. These vehicles need to adhere to all the pollution norms as laid from time to time. Further, for internal movement within campus, there are restricted paths and only zero emission golf carts are permitted to ply. All these are efforts towards a greener tomorrow!

67 Routes	Average Kms
Chandigarh	45 kms one way
Mohali	
Panchkula	
Derabassi	
Pinjore	
Khanna	
Shahbad	

Staff Availing Bus Facility	600 (708 have registered)
15 km = 1 liter	
(90 km = 6 liters) * 24 days * 600 = 86400 liters saved	
1 liter of gasoline = 2.3 kg of CO <sub>2</sub>	



For the internal movement of staff, students and guests (within campus), battery operated golf carts are used. These are efforts towards reducing carbon emission. As on date, there are 5 golf carts. Out of these three are student projects and two golf carts were procured. One of these golf carts has been made *diyangan* friendly this year. There is a plan to procure more golf carts.

**HANDOVER OF PROJECTS TO TRANSPORT DEPARTMENT**

**CHITKARA UNIVERSITY** DEPARTMENT OF MECHANICAL ENGINEERING

Ref. No. CUIET/MED/2017/065 Date: 11/04/2017

**Handover of Electric Golf Cart**

To: Central Store, Chitkara University, Punjab

The 3<sup>rd</sup> year students of Department of Mechanical Engineering fabricated the Electric Golf Cart with faculty coordinator Mr. Suraj Bagla, Assistant Professor, DME under patronage of Dr. Anoop Kumar Singh, Dy. Dean, DME.

The Department wants to handover Electric Golf Cart to Central Store of Chitkara University, Punjab. Such that it can be utilized in University Campus. The Golf Cart consist four batteries, one 1.5 kW motor, four wheels, etc.

Dr. Anoop Kumar Singh  
Dy. Dean  
Department of Mechanical Engineering

11/4/17

5-283  
Mr. Harpal

- Pl take on your Store ledger change & further issue to Transport Deptt.

Received Golf Cart in  
Tfor Deptt  
open file & give name "Golf Cart 2023"  
Handover to Sec. Gate  
11/4/17

## PHYTOREMEDIATION LAB

Centre for Water Sciences Lab (CURIN)

Team leader: Prof (Dr) Jyotsna Kaushal

Team members: Dr Pooja Kashyap, Navjeet Kaur, Lata Rani, Pooja kashyap, Shalini

In this world of science and technology, along with the tasks aimed at global development, arose various new challenges of environment protection and conservation. For sustainable development of a country, soil and water resources are the most valuable; but sadly, exploited and polluted in the race for development. There is an urgent need of technology that would enable environment protection parallel to global development.

Phytoremediation is an emerging green technology that uses various plants to degrade, extract, contain, or immobilize contaminants from soil and water.

To carry phytoremediation research Chitkara University took an initiative in Aug 2015 and set up a phytoremediation lab (rear of Fleming Block). Objectives of the Phytoremediation lab:

- Screening studies to find suitable aquatic as well as terrestrial plants for remediation of different types of contaminants present in water.
- To investigate the various modes of phytoremediation process to make this process more efficient.
- To study and investigate the mechanism behind phytoremediation
- Bench- and pilot-scale testing of promising plant species
- Limited and full-scale field trials.



## PROJECT— BIO GAS PLANT

### GENERATION OF BIO GAS FROM FOOD WASTE OF KITCHEN MESS

The concept of the ‘four R’s’, which is a useful principle and which stands for Reduce, Reuse, Recycle, and Renewable energy, has generally been accepted at Chitkara University Campus. To enable students understand the concept of a biogas plant and for demonstration purpose a biogas plant was installed in Chitkara University. Initially it was located at the rear of Fleming block and has later on been shifted near the nursery in campus. It is a kitchen waste based Floating Drum biogas plant (KWBP). This plant works on similar principles of traditional *gobar* gas plants with the exception of type of feed with the above modifications. Some amount of food waste from kitchens is used in the plant.

This project is handled by a team under the guidance of Dr. Charu Khosla.

It is handled as a sustainability venture and is fully functional for teaching, training and demonstration purpose. The gardeners enjoy their cup of tea during their refreshment break, from the biogas that is generated from this plant !!!



## PART II

### ACTIVITIES, WORKSHOPS, CURRICULUM & RESEARCH PAPERS

Tutorials and curriculum being enriched with topics of Sustainable Development (SD) can help students to appreciate the subject and gain hands on experience . Subjects could range from converting food a manure, use of recycled material in ceramics or for recycling of paper, generating solar energy, operating a biogas plant etc.

Many a times, departments implement various measures towards sustainability technology like double plumbing, or rain water harvesting, or methods for recycling or reducing waste, or the process of waste management etc.. But these are not discussed with or known to the academicians, and is seldom referred to by the faculty to the students. Poor utilization of these ideas and practical facilities which are available at the door step is a classic missed opportunity in Higher Education. Universities should strive to encash on these opportunities by involving students and providing them visits to these facilities and encouraging them to involve in these activities as part of project work etc.

The sustainability issues of the world may be reflected in our communities too. By involving students and faculty in community activity universities can encourage and instill in them the ability to understand the concerns and provide solutions thus encouraging them as leaders of the future, to take actions towards sustainability They can help bring rich and interesting learning opportunities on sustainability issues. These could be by way of sensitizing the community people or holding radio talks, or undertaking various activities in the community etc. Chitkara University has adopted five villages, there are various activities that are undertaken in these villages by the various colleges and departments of the campus.

This section of the report deals with the various activities where staff and students have participated to help a greener tomorrow, the curriculum where these subjects were dealt with, and the research articles published by Chitkarians, in the year 2019, on these subjects.

**PART-II**  
**ACTIVITIES, WORKSHOPS, CURRICULUM & RESEARCH PAPERS**

<b>INDEX</b>	
<b>Topic</b>	<b>Page No.</b>
CAMPUS TOUR FOR PROJECT ON VERTICAL GARDENS	48
GARDENERS' VISIT TO THE ROSE GARDEN	49
TREE PLANTATION DRIVE ON REPUBLIC DAY	50
SUSTAINABLE ENERGY CONCLAVE BY FICCI	51
WATER - THROUGH THE EYES OF ARTIST	52
WATER AWARENESS CAMPAIGN AT ADOPTED VILLAGES	53
REDUCE-REUSE-RECYCLE-SUSTAINABILITY - COMBINED EFFORTS OF VARIOUS TEAMS	55
SUSTAINABLE LIVING - TALK ON 107.8 FM RADIO CHITKARA	57
WORLD ENVIRONMENT DAY 2019	59
THREE DAYS INDO-UK WORKSHOP	60
PLANT A TREE SO THAT NEXT GENERATION GET AIR FOR FREE	61
RADIO TALK- HEALTH AND ENVIRONMENT	62
SWATCH BHARAT SUMMER INTERNSHIP PROGRAM	63
TREE PLANTATION ON INDEPENDENCE DAY	66
ONE STUDENT ONE TREE	67
AWARENESS SESSION ON SUSTAINABLE WATER AND ENVI- RONMENT DEVELOPMENT	68
CURRICULUM	69
RESEARCH PAPER	71

## CAMPUS TOUR FOR PROJECT ON VERTICAL GARDEN

Event : Awareness Tour on Vertical Gardens

Organised by : Dr Pooja Mahajan

Recourse Person : Mr. Hamid Raza, Sr. Horticulturist, Chitkara University

Date:16 Jan 2019

***"No water, no life. No blue, no green." - Sylvia Earle***

With the increase in population and need for development, infrastructure is a must. But this leads to a reduction in the space for greenery. To compensate for the same, plantation on the facades of buildings is an alternate. These practices are called vertical gardens/ living walls/ green facades. Vertical gardens, which allow growth of various species of plants in the complicated city life, help to balance the urban ecology and enhance the quality of urban life. In urban lifestyle, vertical gardens play an important role to reduce the carbon footprint of a building by filtering pollutants and carbon dioxide out of the air, which also benefits those living nearby as the quality of the air is improved. Thus, vertical gardens help reduce the negative impacts of urbanization and to create a sustainable city model.

It is necessary that we teach the importance of “green” to the future leaders of the society. What could be better than using our own resources and facilities in campus, to teach the students! As per Fang (2013), one of the best places, where the theory studied in classrooms can be put to practical implementation, is the university campus.

Dr. Pooja Mahajan, Department of Applied Sciences, CUIET, organized a campus tour for the students of Team no. 1, 2, 3 of CSE-G and CSE-I on 16 January 2019. Students were working on a project regarding “Automation of Vertical Garden”. The tour was organised to enable them to understand the practical working of vertical gardens. Issues such as utilization of natural resources, environmental problems, and global climate change, were discussed to increase the awareness on “green-design” in the built environment and give direction to the attempts of creating cities with natural environment. Students visited the vertical gardens of the campus and interacted with Mr. Hamid Raza, Senior Horticulturist, Chitkara University, and the gardeners working in different grounds and gained knowledge regarding the concept of vertical gardening and its importance.

Cont'd



Mr. Raza shared valuable points regarding designing and structure of vertical garden. Students could understand different types of plantation, material and cost of the project and got to know various problems that could arise in the project. This interaction would surely enable students to develop an efficient design for automated vertical garden.



Students interacting with Mr. Hamid Raza at Alpha Zone, Chitkara University, Punjab.

### GARDENERS’ VISIT TO THE ROSE FESTIVAL

The University believes in training staff by all methods possible. One such method followed is visit of the gardeners to the annual Rose Festival organized at Zakir Hussain Rose Garden of sector 16,



Chandigarh. Such fun trips refresh the staff, enables them to enjoy and learn how the gardens can be maintained, and gives them an understanding of how they can add beauty to the already gorgeous campus !!

## TREE PLANTATION DRIVE ON REPUBLIC DAY

*“He who plants a tree, plants a hope” Lucy Larcom*

Event :Tree Plantation Drive  
 Date : 26 January 2019  
 Organised by: NSS Department  
 Supported by : Horticulture Department

The 70th Republic Day was celebrated, this year also, with great enthusiasm and patriotic spirit by the faculty and students, creating an atmosphere of national pride on the premises of Chitkara University, Punjab. A tree plantation drive was also held at the university campus by NSS Department in which more than 50 saplings were planted. Mr. Mohan Singh, Group Head-Human Resources, Sterling & Wilson and his wife Ms. Mona Singh were the chief guests for the day who graced the occasion along with Hon’ble Dr. Madhu Chitkara, Vice-Chancellor, Chitkara University, Punjab and Dr. S.C Sharma, Registrar, Chitkara University, Punjab. The event was supported by the Horticulture team of the campus too !

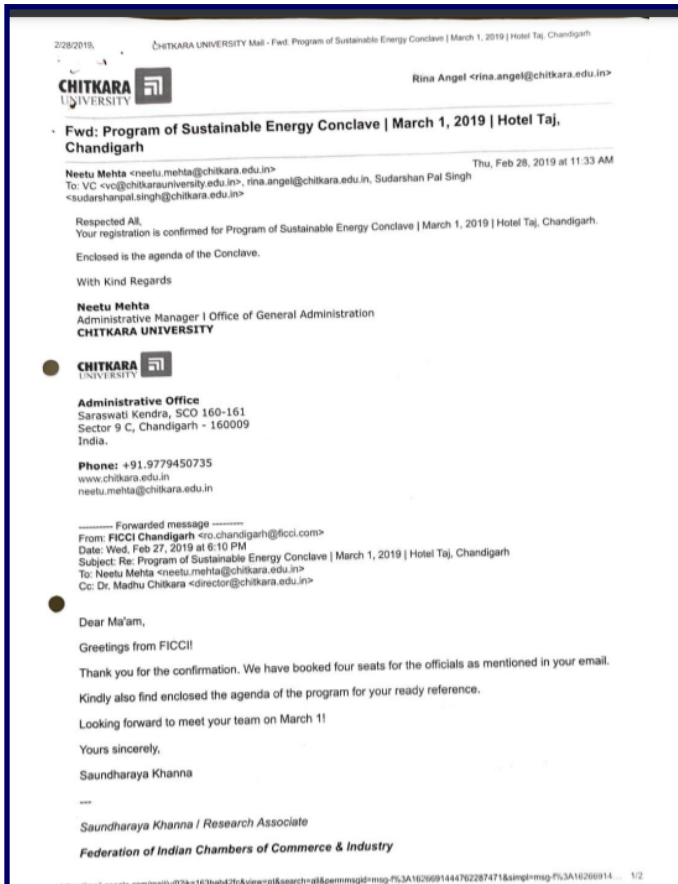


Hon’ble Dr. Madhu Chitkara, Vice Chancellor, Chitkara University at the Tree Plantation Drive

Hon’ble Dr. Madhu Chitkara, Vice Chancellor, Chitkara University with Guests Mr. Mohan Singh and Ms. Mona Singh at the Tree Plantation Drive



## SUSTAINABLE ENERGY CONCLAVE BY FICCI



A good discussion increases the dimensions of everyone who takes part.

Randolph Bourne

A team of five led by the Honorable Vice Chancellor, Dr. Madhu Chitkara attended a Sustainable Energy Conclave organized by FICCI on 01Mar 2019. The session was very informative and eminent officials addressed the audience. Dr. Madhu Chitkara was also requested to share her ideas and the initiatives towards the said cause by the University. The other staff who attended the session are Dr. Varinder Kanwar, Mr. Kamal Kishore, Mr. Sudarshan Pal Singh and Sqn Ldr Rina Angel.

GLIMPSES OF THE CONCLAVE & Dr. MADHU CHITKARA ADDRESSING THE AUDIENCE



## “WATER - THROUGH THE EYES OF ARTISTS”

Event : Poster Creating Competition for Students  
Theme : ‘Water Through The Eyes of Artists’  
Date: 09 March 2019  
Organised By : Dr. Pooja Mahajan  
Event Adjudged By : Dr. Ranjan Mallik , Dept. of Fine Arts

### ***“A picture is worth a thousand words...!!”***

There are various ways to make students appreciate the necessity to ‘save water resource’. One such method is to encourage them to express the subject through their artistic skills. It awakens their creative minds and gets them thinking on the subject.

Dr. Pooja Mahajan, Department of Applied Sciences, under the aegis of the Water Literacy Club, Chitkara University organised a university level poster making competition ‘Water –Through the Eyes of Artists’, on March 9<sup>th</sup>, 2019. The theme of the competition was ‘save water to promote water conservation’. For the competition, the students had to create posters with ‘save water’ slogans. About 100 students from different schools of Chitkara University participated in the competition.

Dr. Rajan Kumar Mallik (Dean, Department of Fine Arts) judged the event and felicitated the prize winners as well as the participants.



## WATER AWARENESS CAMPAIGN AT ADOPTED VILLAGES

Event : Awareness Campaign on Clean Water

Venue: Adopted Villages

Date: 17 to 19 March 2019

Resource Persons : Dr. Pooja Mahajan, Dr. Jyotsna Kaushal, Mr. Ajay Singh

SDG 6 –aims at availability and sustainable management of water and sanitation for all.

Living organisms, including humans need water to survive. But sadly only 2.5% of the water available on earth is fresh. Even worse is the fact that humans are inefficient users of water. It is necessary and especially important now that we all understand the scarcity of the resource and use it prudently and take necessary precautions to keep water, clean and hygienic.

Being an educational institution, Chitkara takes it as its responsibility to spread awareness among the villagers of the adopted villages, regarding the importance of ensuring least wastage and to keep the water resource clean. When faculty and students participate in such activities, they first learn and then further educate, leading to a win-win situation.

Dr. Pooja Mahajan, Department of Applied Sciences, Chitkara University, organised a "Water Awareness Campaign" in three of the adopted villages of the university - Rampura, Fatehpur Garhi and Kalo Majra on 17<sup>th</sup>, 18<sup>th</sup>, and 19<sup>th</sup> March 2019, respectively, under the aegis of the Water Literacy Club of the university. The focus of this awareness campaign, was on proper usage of drinking water, waste management near safe water source, importance of water testing laboratory, necessity of hand washing, proper usage of sanitation, cleaning of environment, quality of drinking water etc. The risks of consuming unsafe water and the various steps and precautions, one can take to practice better sanitation / hygiene and avoid contaminating drinking water etc. were conveyed to the villagers.

Dr. Jyotsna Kaushal, Dr. Pooja Mahajan and Mr. Ajay Singh interacted with about two hundred villagers in small groups of 15-20 people. Keeping in mind that art can reach out to more people, a *Nukkar Natak* (street plays, usually performed in open areas to convey some important messages to large groups, in the form of skits with many slogans and dialogues) was performed. The act covered points on water conservation and safe and clean, drinking water.

## GLIMPSES - WATER AWARENESS CAMPAIGN AT ADOPTED VILLAGES

“ do believe that clean water is the most efficient way to change the world”.

Chris Long

### A FEW GLIMPSES FROM THE CAMPAIGN



## REDUCE-REUSE-RECYCLE- SUSTAINABILITY—

### COMBINED EFFORTS OF VARIOUS TEAMS

*“Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it is the only thing that ever has.” Margaret Mead.*

Certain activities are already in practice in the campus with a motive to reduce pollution and to contribute in preserving nature. It was felt that if all the members of the meeting could first understand these practices, they could then help in the audit as well as in providing solutions for the concerns or further help in introducing systems that could be more effective. Hence a meeting was planned to discuss the numerous practices and activities in vogue and to have a platform where future activities and responsibilities could be decided.



#### *The mail invite*

Each of us need to be part of the team that will spearhead CHITKARA campus in best utilization of resources, in its USR for paying back to the SOCIETY and NATURE. Charity begins at home! We should start from ensuring our campus contributes in reducing carbon footprint. We request you to attend a meeting tomorrow (20 Mar 2019) at 2:55 pm sharp.

The meeting was presided over by the *Hon'ble Vice Chancellor Dr. Madhu Chitkara.*

The Registrar Dr. SC Sharma was also present

The attendees :

Sudarshan Pal Singh <sdarshanpal.singh@chitkara.edu.in>, kamal kishore <kamal.kishore@chitkara.edu.in>, Shivani Malhotra <shivani.malhotra@chitkara.edu.in>, Sanjeev Kumar Bhardwaj <sanjeev.bhardwaj@chitkara.edu.in>, Pawan Kumar <pawan.kumar@chitkara.edu.in>, Dhana Sekaran <dhanasekaran@chitkara.edu.in>, Arrik Khanna <arrik.khanna@chitkara.edu.in>, Ambuj Kumar <ambuj.kumar@chitkara.edu.in>, jyotsna kaushal <jyotsna.kaushal@chitkara.edu.in>, Kulbir Singh <kulbir.singh@chitkara.edu.in>, charu khosla <charu.khosla@chitkara.edu.in>, Archana Mantri <archana.mantri@chitkara.edu.in>, "Dr. S.N Panda" <snpanda@chitkara.edu.in>, Kartik Sharma <kartik.sharma@chitkara.edu.in>, Gurupal Singh <gurupal.singh@chitkara.edu.in>, Rina Angel <rina.angel@chitkara.edu.in>, kanika bansal <kanika.bansal@chitkara.edu.in>, Atul Dutta <atul.dutta@chitkara.edu.in>, Gautam Malik <gautam.malik@chitkara.edu.in>, "Dr. K K Mishra" <krishna.mishra@chitkara.edu.in>, Hamid Raza <hamid.raza@chitkara.edu.in>, Harbans Singh <harbans.singh@chitkara.edu.in>, Jyotsna P <jyotsna.p@chitkara.edu.in>, Raminder Sharma <raminder.sharma@chitkara.edu.in>

**MINUTES OF MEETING ON REDUCE- REUSE-RECYCLE-SUSTAINABILITY on 20 March 2019**

<b>POINT DISCUSSED</b>	<b>GIST OF THE DISCUSSION</b>	<b>ACTION REQUESTED BY</b>
Electrical Practices	Mr. Kulbir brought out the various activities being undertaken to reduce the consumption of power.	
	Hon'ble VC suggested that the savings made also be noted. It was suggested that all departments analyse the past and strive for improvements.	Electrical Team to kindly do the needful. (Mr.Kulbir Singh)
E Waste	Mr. Pawan Mehta brought out that though vendors are listed for collection of e-waste, the action that they take further may not necessarily be ethical. Many a time child labour is seen deployed at their sites.	It was confirmed that the processes of e-waste disposal and formats are being submitted as laid down by Pollution Board. The matter of child labour would be checked
Usage of power by IT equipment	Mr. Pawan Mehta brought out that in case a PC is left switched on but there is no activity of the PC, electrical power would continue to be consumed. As a solution to this problem, CISCO energy management system is being used which enables an auto switch off after a specified time, if there is no activity in a PC.	<a href="https://www.cisco.com/c/dam/global/en_uk/.../energy/.../white_paper_c11-514539.pdf">https://www.cisco.com/c/dam/global/en_uk/.../energy/.../white_paper_c11-514539.pdf</a> .
	Hon'ble VC desired that this be introduced.	IT team requested to confirm (Mr Pawan Mehta)
Vermicompost	Waste food for vermicompost usage was discussed. It was also brought out that the sludge waste from STP is also used as manure for the greenery in campus.	
	Hon'ble VC raised a query - How much manure is required in campus at present. How much do we procure? Can we reduce the same by increasing the vermicompost in campus?	Horticulture team requested to provide an input on the same ( Mr. Hamid Raza)
Vertical Gardens	A mention of the vertical gardens was also made in the meeting. Hon'ble VC suggested that we should have vertical gardens.	OAD (Mr. Sudarshan Pal Singh) & Horticulture (Mr. Hamid Raza) are already working towards the same.
Solid Waste Management	The process of solid waste management in campus was explained by Ms Rina Angel. The food waste pit, the scrap yard, the process of disposal of scrap material etc. was explained	
	Hon'ble VC brought out that whenever any machine/ equipment is being disposed as scrap, the same should be brought to the notice of CURIN, CCAE, CSPA, Design Schools and Engineering. These could be further utilized as part of training.	Ms. Rina Angel, Scrap Disposal Committee to ensure.
STPs	The STPs and usage of the treated water was explained by Ms. Rina Angel	
	Mr.Dhanasekharan, Mr. Arrik and Mr. Gautam Mallik brought out a process of how the STP treated water can be further treated and made clear enough as drinking water. A demonstration of the same also was provided.	The results appeared to be good. This needs to be done in the open to avoid effect of ozone in a closed room. The practicality, feasibility and economics would need to be analysed and confirmed. Mr. Dhana-sekharan to do the needful
	Hon'ble VC brought out that washrooms should place placards that explain the reason for discolored water in flush.	Ms. Rina Angel to ensure
Automatic Sensors	Dr Nitin mentioned a system where sensors could help in controlling temperature of the AC.	
	Hon'ble VC brought out that we should have Light and water sensors in new buildings and in existing buildings where feasible and light sensors for CCTV Cameras also	Works /OAD / Purchase teams to ensure
Waterless Urinals	Using water less urinals was an idea by Mr. Sanjeev.	This is already in use at CIS. Feasibility in campus could be checked. (Purchase Team to liaise with vendor and check).
Creating Energy	While it was brought out in the meeting that discussions are already on for creating solar energy, Mr. Atul and Ms. Kanika brought that creating power from walking pavers could also be considered	
Egg Tray as Germination Bed	Dr Panda brought out that he could help in having egg trays used as germination beds. This could be done in liaison with the Horticulture team.	
Awards	An idea by Pro VC that awards be given to the departments bring out maximum saving was appreciated by all members.	



## SUSTAINABLE LIVING – TALK ON 107.8 FM RADIO CHITKARA

Event : Talk on Radio on Sustainable Living

Venue : Studio—Radio Chitkara, 107.8 FM

Date : 22 April 2019

Resource Persons : Dr. Charu Khosla, Ms. Meenakshi Dhiman , Dr. Ashutosh Mishra

107.8 FM, Radio Chitkara aired a talk on sustainable living on the eve of **Earth Day**, on 22<sup>nd</sup> April 2019. The panelist discussion was on sustainable biodiversity. The panelists Dr. Charu Khosla, Ms Meenakshi Dhiman and Dr. Ashutosh Mishra focused their discussion on how our environment could be protected and what actions could help save the flora and fauna that was at the verge of extinction. The speakers highlighted that the pace of extinction of certain species was high and actions were required to be initiated at the earliest to help them to grow and flourish

and curb them getting extinct.

They also mentioned that each specie had an important role to play for the ecological balance and food chain; and that we as humans, should understand our responsibility and initiate all actions and practices that we can, to protect nature.

The languages used for the talk was Hindi and Punjabi, with an aim to reach out to the local vil-

lagers also.

Range of 107.8 FM Radio Chitkara, spans over a radius of 12 to 15 kilometers around the university, and thus includes the five adopted villages of Chitkara University , among other villages. Such messages on sustainable living reaches out to not only to the students and staff of Chitakara, but also to the villagers in the near vicinity.



## WORLD ENVIRONMENT DAY

5<sup>th</sup> June is celebrated as World Environment Day across about 100 with a mission to spread awareness about the impact of nature pollution and motivate the global community to protect mother Earth. A United Nations initiated global campaign since 1974, has become widespread through the years. In 2019, the theme of World Environment Day was “Air Pollution”.



### **DID YOU KNOW ?**

#### **Air Pollution: The Silent Killer That Claims 7 Million Lives Each Year**

UN, GENEVA (4 March 2019) – Air pollution, both outside and inside homes, is a silent, sometimes invisible, prolific killer that is responsible for the premature death of 7 million people each year, including 600,000 children.

“Yet, this pandemic receives inadequate attention as these deaths are not as dramatic as those caused by other disasters or epidemics,” the Special Rapporteur told the Human Rights Council in Geneva. “Every hour, 800 people are dying, many after years of suffering, from cancer, respiratory illnesses or heart disease directly caused by breathing polluted air.” *Boyd (2019)*

WORLD ENVIRONMENT DAY-2019  
Celebration in Collaboration with PPCB

Event—Interactive Session & Tree Plantation

Date - 04 June 2019

Venue – Sun Hall

Industry-academia collaboration has always worked wonders for the university as it leads to creating an awareness of the trends of the industry and inspires application derived discussions. For sustainability, which other industry could be better than the officials from the Punjab Pollution Control Board, Patiala!!!

Ahead of World Environment Day, Chitkara University in collaboration with Punjab Pollution Control Board (PPCB), Patiala, joined hands to mark the occasion and pledge to save the environment on 4<sup>th</sup> June 2019. The theme was “air pollution”. In a session to all the faculty and students that were present, the speakers threw light on the innumerable ways each one of us could contribute towards a sustainable environment and the importance of clean, green, and sustainable environment, clean air. They also shared concerns regarding saving water, deforestation, food wastage and water and global warming. While they appreciated the initiatives of the university, they also mentioned the importance of ensuring that each one continues to contribute to the cause of a sustainable environment.

In a plantation activity which was planned after the talk, Hon'ble Pro Chancellor Dr. Madhu Chitkara, along with Chief Guest Er. Karunesh Garg, Member Secretary, PPCB, and special guests Er. Lavneet Kumar, Environmental Engineer, PPCB, Er. Devraj Goyal, Sr. Environmental Engineer, PPCB, planted trees in

**Hon'ble Dr. Madhu Chitkara, Vice Chancellor and Er. Karunesh Garg planting saplings at the Plantation drive.**

**A Group Photograph of all delegates with Hon'ble Vice Chancellor Dr. Madhu Chitkara,**



THREE DAYS INDO-UK WORKSHOP ON  
“WASTEWATER TREATMENT: APPROACHES,  
MANAGEMENT, AND CAPACITY BUILDING”

**Workshop** - “Wastewater Treatment: Approaches, Management, and Capacity building”.  
**Venue** - Sophisticated Analytical Instrumentation Facility, Panjab University, Chandigarh, India.  
**Date** - (July 03 - 05, 2019)

Dr. Pooja Mahajan, Department of Applied Sciences, Chitkara University (Punjab) was selected to participate in the workshop. The workshop was jointly organized by the British Council, by Dr. Alex O Ibhadon, University of Hull and Prof. S K Mehta, Panjab University, Chandigarh, India, under the Researcher Links Scheme offered within Newton fund, in partnership with the Royal Society of Chemistry. This joint event provided a platform for substantive interaction and discussion between scientists and researchers from academia and industry with expertise, research, and interest in Water and Wastewater Treatment Science and Technology as well as Water Management.

The workshop focused on water and sanitation specific themes in the three-day workshop and different sessions were covered by eminent speakers. Sessions of the first day focused on water quality and environment stability. The different approaches such as physical, chemical, and biological, for treating wastewater were part of discussion of this session. The monitoring and management of drinking water as well as wastewater quality were part of discussion of sessions of the second day. The water quality standards and guidelines & the sustainable goals of development were also discussed in last session on the second day. Day 3 focused on capacity building for water quality monitoring and on new approaches in field of wastewater treatment.



Dr. Pooja Mahajan was felicitated by the organizers for her oral presentation on “Phytoremediation Potential of Ornamental Plants for wastewater treatment”.

“PLANT A TREE SO THAT NEXT GENERATION CAN GET AIR FOR FREE”

**Event** : Tree Plantation Drive

**Theme** : “Plant a tree so that next generation can get air for free”

**Venue** : Chitkara Woods

**Organisers** : Chitkara School of Health Sciences Dr. Preethi John & Dr. Meenkashi Sood

**Date** : 24 July 2019

A Tree Plantation drive was organized by Chitkara School of Health Sciences on 24 July 2019, in Chitkara Woods. The main aim behind this campaign was to educate the students and spread the message of the necessity of greenery to secure fresh and clean air for the future generation . The students were encouraged to play his/her role to protect the existing trees and also to plant more trees not only in campus or near-by villages , but at home too. The students and faculty then went on to prepare some posters conveying the message of “need for more plantation” and displayed them . All faculty and 70 students of CSHS participated with full zeal and enthusiasm in the drive. Mr. Dharam Singh, Clinical Instructor, CSHS , was the in-charge of the event.



All faculty members and CSHS Students with their posters after planting tree/ samplings  
(24<sup>th</sup> July 2019)

## “RADIO TALK - HEALTH AND ENVIRONMENT ”

**Event** : Radio Talk

**Theme** : “Health & Environment”

**Venue** : Studio of 107.8 FM, Radio Chitkara at CSMC

**Organisers** : Chitkara School of Health Sciences

**Date** : 24 July 2019

A Radio Talk on 107.8 FM Radio Chitkara, was aired on 24 July 2019 on Health and Environment. The participants of the talk were students of B.Sc. AHS MIT 3rd Semester (Ms. Shaina, Mr. Manjot, Ms. Kangan, Ms. Preksha and Ms. Sakshi).

Environmental health is the origin of public health. Even in ancient times, people understood the importance of providing safe water and food, adequate shelter, and clean air for ensuring prosperity and growth. Later on, in the nineteenth century and applying modern epidemiological methods, John Snow demonstrated the essential need to address the risks in our environment if we are to protect and promote people’s health.

The aim was to encourage the students to understand the concept and speak about it, spread the message to the staff and students and to educate the nearby villagers too, through the radio talk. Dr. Navita Gupta, Asst Professor, CSHS, was in-charge of the event.



The team that participated in the Radio Talk highlighting Health & Environment (24<sup>th</sup> July 2019)

## SWACHH BHARAT SUMMER INTERNSHIP PROGRAM

(01 to 15 August, 2019)

Swachh” means clean. A clean body leads to clean mind and clean surroundings would lead to a comfortable and healthier environment. Cleanliness has always been given due importance at Chitkara University. The volunteers and officials of National Service Scheme (NSS), of the campus, carried out the *Swachh Bharat Summer Internship Program* with much enthusiasm and zeal at the different adopted villages by our university.

The theme of the program was to spread awareness on the significance of cleanliness and its effect on the environment. Chitkara University has adopted five villages namely Ramnagar, Thuha, Kalomajra, Jhansla and Fatehpur Garhi.

The drive began with action of the NSS volunteers in cleaning the government school and its surroundings and making the students of the school and other village members, aware of the importance of keeping our environment clean. It was heartening to watch the energy of the NSS Volunteers who could be seen with brooms, cleaning of Government school grounds, classrooms, offices etc. They further went on to paint the blackboards and walls. Yes, the volunteers had a message - only a well painted clean board can help you write and learn more...and only a clean campus can help you stay healthy and comfortable!

Cont'd...





Spreading awareness on the importance of *swachh swasth* environment was also an essential part of the program which was ensured for the students and the villagers through interactive sessions, discussions, video presentations, poster presentation and *nukkad naatak*.

Cont'd...





As part of this program, tree plantation drive was carried in the village of Ramnagar, by the NSS volunteers. It indeed was a fulfilling sight as they committed themselves to make Earth a better place to live. The students were excited when they got to share their experiences and learnings on 107.8 FM, Radio Chitkara, at the Chitkara School of Mass Communication!!



The students of the villages at the Radio Studio of 107.8 FM, Radio Chitkara, Chitkara School of Mass Communication



Plantation Drive at the adopted villages as part of the program

The initiative does not come to an end once the mission is over, it will be an ongoing process at the University and NSS department of Chitkara University, Punjab will continue to contribute in every possible way to keep the environment clean and healthy.

## TREE PLANTATION ON INDEPENDENCE DAY

A special plantation drive was also carried out to mark India's 73rd Independence Day with gaiety and patriotic fervor at the campus. Dr. Madhu Chitkara, Vice Chancellor, Chitkara University Punjab, Dr. SC Sharma, Registrar, Chitkara University, Punjab and Deans and Directors of various schools and departments participated in the drive. On the occasion, the Vice Chancellor emphasized that the key to a greener planet is in the hands of each one of us and that planting trees is an investment for the future generations.



## ONE STUDENT- ONE TREE

“O

*ne Student, One Tree*”, is a concept that was conceived by our esteemed Vice Chancel-

lor Dr. Madhu Chitkara. It is a special plantation drive where one student shall plant one tree and take the responsibility of nurturing that tree during his or her stay in university campus. Dr. Neelam Verma, Deputy Dean, Office of Student Affairs in collaboration with National Service Scheme, was the program coordinator for this program.

Students from all departments/schools of Chitkara University have been directed to plant one tree in the university campus and in adopted villages for the period September 02-17, 2019.



## AWARENESS SESSION ON SUSTAINABLE WATER AND ENVIRONMENT DEVELOPMENT

**Event** – Awareness Session

**Venue** - Government Primary School of Pehar Khurd and Pehar Kalan Village

**Date** - 05 Dec 2019

**SDG 6**

Dr. Jyotsna Kaushal and Dr. Pooja Mahajan organized an awareness session on “Sustainable Water and Environment Development” under the aegis of Centre for Water Sciences, CURIN, Chitkara University. The two environmentalists addressed the topics of water and tree plantation. Dr. Jyotsna Kaushal made students aware about quality of drinking water, various ways to conserve water, methods of water purification at home and the need for analysis of water quality. Dr. Pooja Mahajan highlighted the importance of planting trees to restore native forests around the village and to protect water supplies. First year students of B. tech Applied Engineering along with horticulture team of Chitkara University planted different varieties of 100 trees in the vicinity of the schools to spread the message of “**going green**” to maintain clear eco-friendly environment, reduce pollution and improve the natural ambience of the village.





# CURRICULUM on sustainable environment

## **COST-EFFECTIVE BUILDINGS (AT CSPA)**

Cost-effective buildings is an elective course taught to 7<sup>th</sup> semester students of B.Arch. Program. The course revolves around the need for cost-effective buildings in both rural & urban sectors, strategies and methods for reducing cost, case examples supporting theory and principles learnt, and study of works of eminent architects in India and abroad as well as innovative works of various organisations associated with promotion and actualisation of cost-effective buildings. Cost-effective buildings not only deal with cost reduction, but also with sustainability, climate responsiveness and vernacular through the use of locally available building materials and innovative construction techniques. The students are taught about the practical implementation of the concept through case studies of cost-effective architects like Laurie Baker, Hassan Fathy, Simon Velez, Nari Gandhi, Anna Heringer, etc. and organisations like CBRI-Roorkee, Auroville Earth Institute-Puducherry, etc.

## **CLIMATOLOGY ( AT CSPA)**

With an objective to familiarize B.Arch students with the meaning and relevance of terms like ‘sustainable’, ‘environment friendly’, ‘energy-conscious’, ‘climate-responsive’ and ‘green buildings’ the subject "Climatology" has been incorporated in the Course curriculum of 4th semester. In this subject students are being taught about the key concepts of Energy and other non-renewable sources, their use in the construction industry and implications for the natural environment. Students are made aware of the use of passive design methods for creating bioclimatic comfort in traditional, vernacular and contemporary built environments.

## **SUSTAINABLE DESIGN (AT CSPA)**

In the course curriculum of 3rd semester of M.Des the course of "Sustainable Design" has been incorporated to make students aware of the meaning of sustainability and environment issues. In this subject students are being taught about the key concepts of principles of sustainable design, their meaning and relevance to the environment. The environmental issues are well taken and discussed considering historic examples with the approach of providing solutions with practices of renewable and nonrenewable sources, their application in building interior environment of spaces.

## **ELEMENTS OF LANDSCAPE DESIGN (AT CSPA)**

This been incorporated in the course curriculum of B.Arch students with an objective to create awareness amongst students of the role of various elements of Landscape in design of groups of buildings and settlements and also to introduce the characteristics of various elements of landscape design and their application in design of the built environment.

Landscape architecture involves shaping and managing the physical world and the natural systems that we inhabit. A landscape architect is the one who restores environmental aspects of a place via designing and also maintains the characteristics of that site, so that the site is more comfortable for the users and helps in conserving the environment. It includes the plants selection which should be according to the climate of the area and also includes the water management, specially the storm water management which helps to save gallons of water of the earth. Different garden styles like Persian, Chinese, Japanese, Italian, French use elements wisely according to the climate, location and the site terrain. They evolved various irrigation methods as well, where Qanat could be the best example during Mughal garden style.

## **ECOLOGY AND LANDSCAPE ELEMENTS (AT CSPA)**

This subject has been incorporated in the course curriculum of 6th sem B.Des students with an objective to create awareness amongst students of the role of various elements of Landscape in interior design, the concepts of interior landscaping and their application in the design of interior spaces. Also, developing an understanding about the design of interior landscape with special emphasis on the choice and care of plant materials used in the interior spaces. Course also cover the history of landscape design. Students understands the ecology and its principles leading towards a better understanding of the environment.

## **ENVIRONMENTAL STUDIES (AT CSPA)**

It is a course taught in 5th semester of B.Des. programme. The aim and objective of this course is to develop awareness amongst students regarding the nature of environmental resources as well as the role and importance of these in improving the quality of human habitat. To acquaint students with various factors causing environmental deterioration and degradation and the available preventive and remedial to safeguard the environmental resources. The students were able to understand the importance of environment, about environmental problems and issues leading to preventive measures.

## INDOOR ENVIRONMENT CONTROL (AT CSPA)

It is taught to the B. Des. students in the 3rd and 4th semesters with the objective to make students understand the importance of human comfort in built form and environment and at the same time to understand the impact of climate on human comfort. The students are taught seasonal changes and climatic changes throughout the year with climatic zones in India and its impact in interior spaces. Also students are benefited by giving Climate-wise Case examples of Vernacular and traditional Interior Concepts.

## **R** RESEARCH PAPERS published in the year on the various topics towards Sustainability

SI No.	Author	Topic	Link
1	Pooja Mahajan and Jyotsna Kaushal	Phytoremediation of carcinogenic diazo Congo Red dye by using <i>Pistia stratiotes</i> (Water lettuce)	Jan 2019 ,
2	Pooja Mahajan, Jyotsna Kaushal, Arun Upmanyu, and Jasdev Bhatti	Assessment of Phytoremediation Potential of Chara vulgaris to Treat Toxic Pollutants of Textile Effluent	Feb 2019, <a href="https://doi.org/10.1155/2019/8351272">https://doi.org/10.1155/2019/8351272</a>
3	Shivam Modi and Pooja Mahajan	Prototype of a Biogas Anaerobic Digester from the Hostel Mess Kitchen Wastes	Journal of Chemistry, Environmental Sciences and Its Applications 5 (2), 35-39 , 2019
4	Manmohit Singh	Morphological Continuity in the Development of Urban Fringe with respect to Patiala, Punjab	International Conference of Future Cities, IIT Roorkee, Roorkee, India, 2019
5	Ambuj Kumar, Jasleen Kathpal	Volarizing the cultural heritage in Urban Planning: A study of an Ancient town - Ethiopia - "Axum"	International Conference of Future Cities, IIT Roorkee, Roorkee, India, 2019
6	Sachin Harry, Yamini Gupta	Can existing buildings be adapted to the present day needs for addressing the sustainability issues and efficient use of resources? Case example of Corbusier block, Chitkara University, Punjab.	International Conference of Future Cities, IIT Roorkee, Roorkee, India, 2019
7	Yamini Gupta, Deepmala Singh	Reviving water structures of Narnaul: A sustainable Approach	International Conference of Future Cities, IIT Roorkee, Roorkee, India, 2019

## PART III

### FUTURE PLANS

Completion of the Tree House (it is almost complete)
More LEDs and Energy Efficient Appliances. BLDC Fans are also being considered
Solar Power Plant—1.5 Megawatt/ 1500-Kilowatt Installation in Phased Manner (Phase I nearing completion).300+350+350+500
Progress on Organic Farming ( To get operational by Feb 2020)
Encourage schools for more Project Works on Solar Energy
More Research Papers and more subjects in curriculum
More Activities from staff and students in campus and adopted villages
New Paper Recycling Plant for campus

## *References*

Clara Changxin Fang (2013). Ten Ways to Integrate Sustainability into the Curriculum. Retrieved from <https://www.aashe.org/ten-ways-integrate-sustainability-curriculum/#:~:text=Here%20are%20some%20ways%20that%20sustainability%20can%20be,students%20should%20practice%20doing%20as%20well%20as%20reading.> Accessed in Feb 2020.

David R. Boyd (2019). Air pollution: The silent killer that claims 7 million lives each year . Retrieved from <https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=24248&LangID=E>. Accessed on Mar 2020

ITU-D (2017). Chapter 2 E-waste and Its Relation to the Sustainable Development Goals. Retrieved from <https://www.itu.int/en/ITU-D/Climate-Change/Documents/GEM%202017/Global-E-waste%20Monitor%202017%20-%20Chapter%202.pdf>. Accessed in Mar 2020.

J E Warnett (2016). A home garden can help reduce greenhouse gas emissions . Retrieved from <https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=22155#:~:text=A%20UC%20Santa%20Barbara%20study%20concluded%20that%20planting,that%20impacted%20greenhouse%20gas%20emissions%20in%20home%20gardens%3A>. Accessed in Jan 2020.

UN Report. SDG 7. Ensure access to affordable, reliable, sustainable and modern energy for all. Retrieved from <https://sdgs.un.org/goals/goal7>. Accessed in Mar 2020.



# LET'S CONTRIBUTE TO "A GREENER TOMORROW"

<p>SWITCH OFF LIGHTS WHEN NOT IN USE</p>	<p>TURN OFF TAPS WHEN NOT IN USE</p>	<p>USE LEDs</p>	<p>WATER LEAK? INFORM IMMEDIATELY</p>	<p>USE LESSER WATER – LESSER PUMPING OF WATER – LESSER ELECTRICITY</p>
<p>TAKE SHORTER SHOWERS</p>	<p>TURN OFF RUNNING TAPS WHILE BRUSHING</p>	<p>KEEP DOORS &amp; WINDOWS SHUT WHEN AC IS SWITCHED ON</p>	<p>MAINTAIN TEMPERATURE AT 26 DEGREE CELCIUS</p>	<p>DAY TIME LIGHT - KEEP BLINDS UP AND LIGHTS OFF</p>
<p>UNPLUG ELECTRONICS NOT IN USE</p>	<p>POWER DOWN LAPTOPS &amp; PCs</p>	<p>USE ENERGY EFFICIENT APPLIANCES</p>	<p>SHARE APPLIANCES</p>	<p>LAUNDRY- USE FULL LOADS</p>
<p>CARPPOOL OR AVAIL BUS FACILITY</p>	<p>AVOID LIFT USE STAIRS STAY HEALTHY</p>	<p>PLANT A TREE &amp; NURTURE IT</p>	<p>DO NOT WASTE FOOD</p>	<p>DO NOT LITTER</p>
<p>DO NOT USE PLASTIC BOTTLES</p>	<p>DONATE OLD CLOTHES /BEDSHEETS/ UTENSILS</p>	<p>DO NOT OVER PROCURE</p>	<p>CARRY A CLOTH BAG WHEN YOU GO SHOPPING. AVOID PLASTIC BAGS</p>	<p>WASTE – REDUCE /REUSE /RECYCLE</p>
<p>PRINT ONLY IF NECESSARY . USE ONE SIDE PRINTED PAPER</p>	<p>IF YOU DONOT NEED AN EQUIPMENT - RAISE 'NOC' TO SCRAP DISPOSAL COMMITTEE</p>	<p>DISPOSE OFF E-WASTE PRUDENTLY</p>	<p>USE SENSOR BASED TAPS &amp; SWITCHES</p>	<p>HAVE IDEAS TO SUSTAINABILITY? SHARE IT WITH US ....!!</p>

*Meet you again next year, same time, same place.....  
Till then do all it takes to paint the world **GREENER !!!***