AMITY UNIVERSITY HARYANA

NAAC 'A' GRADE ACCREDITED UNIVERSITY

AFFORDABLE AND CLEAN ENERGY

Amity University Haryana
Minutes of Meeting on Policy Review

Amity University Haryana has a huge commitment towards environment and sustainability. A lot of teaching learning research and other activities revolve around this highly significant issue to make the planet a better place. A meeting was organized on 04.02.2021 with experts to review some major policies related to these aspects. The meeting was presided over by the honorable Pro Vice Chancellor Dr. Padmakali Banerjee with following members:

1.	Member Secretary	Dr. Ravi Manuja
2.	Member	Dr. Vikas Madhukar
3.	Member	Dr. Kushagra Rajendra
4.	Member	Dr. Pallavi Sharma
5.	Member	Dr. Seema R Pathak
6.	Member	Dr. Anil Kumar

Agenda 1: To review the policy to maximise water reuse across the university

Agenda 2: To review the Environmental and Sustainability Policy

Agenda 3: To review the policy for ensuring all renovations / new builds follow the energy efficiency standards

Agenda 4: To review the policy on divesting investments from carbon-intensive energy industries especially coal and oil

Resolution: The committee recommended that at this point of time, no changes to the policy are necessary. Hence AUH may maintain the same policies for the time being.

The meeting was adjourned after Vote of thanks to the Chair.

Registrar
Amity University Haryana
Manesar Gurgaon-122413

Registrar
Amity University Haryana

AMITY UNIVERSITY HARYANA

Carbon Reduction and Emission Reduction Process

Plan for Carbon Management and Reduction of Emission

2016

NARRATIVE AND DETAILS OF MECHANICAL & LIGHTING SYSTEM

Academic Block of Amity University Haryana is air-conditioned through water cooled Centrifugal chillers, installed in the Plant room which also consists of Pumping system with constant volume of chilled water flow mechanism. The plant room is a combination of automatic controls in the pumping side and chiller controls. Manually adjusted valves and distribution system.

For Low side systems, air-conditioned areas in the building are mainly classified as academic and administration areas. Hence, the building comprises of areas including lecture halls, classrooms, tutorial rooms, office spaces, seminar halls, labs, staff rooms, lecture theater etc. All areas in Academic Block are air-conditioned through AHUs which are dedicated to the designated areas.

Space usage and Controls: Major occupancy type is students who keep shuffling into various spaces at different time of the day as per the respective lecture/activity schedule. Many of the building areas (like seminar halls, labs, lecture theaters etc.) are also occasionally occupied. The controls inside therooms are automatic through thermostat and temperature setting, hence air-conditioning of the space not-in-use gets automatically controlled during non-occupancy hours of a respective space.

Fresh Air Intake: A typical floor comprises of classrooms and/or other occupied areas that areaccessed through corridors. The HVAC design has inline fans placed at the end of corridors for fresh air intake. These fans are connected with ducts to feed each AHU for the desired requirement of freshair inside all the occupied spaces.

There is no provision of domestic hot water and space heating in this building.

Climate of Manesar where project is located has annual average RH level of 54-55 %. Moreover, air- conditioning systems have cooling coils and air passing through the fan section will have controlled RH.

Details of Mechanical system:

All air-conditioned areas in the building are occupied during the day from 9:00 a.m. to 5:00 p.m. with periodic breaks.

Chiller:

All the chillers are Centrifugal machines with following details:

- Configuration and Sizing : 600TR X 2 Nos. + 800TR X 1 No.
- Make : Carrier
- Chilled water Entering : 50 Deg.F ~ 10 Deg.C
- Chilled water out : 45 Deg.F ~ 7.2 Deg.C

- Condenser water entering : 91 Deg.F ~ 32.78 Deg C
- Condenser water out : 98 Deg.F ~ 36.67 Deg C

Pumps:

- 3 Nos. chiller pumps : 100 DP Max
- 3 Nos. condenser pumps : 85 DP Max

Cooling Tower :

- Number of Cooling Towers : 3 Nos.
- Max. Fan motor current : 12.5 Amps
- Max. Sump water temperature : 90 Deg. F
- Average bleed off water : 1%

Piping:

The Piping arrangement is made such that the Plant room has common header for entire capacity of the air-conditioning high side equipments. Each building is equipped with valve arrangement for chilled water distribution on floors and air-conditioned areas. The valves are manually adjusted for constant flow in the scheme of distribution.

- Friction Loss : 5 Mt/ 100Rmt
- Flow velocity : 2.5 mps

Thermal Insulation:

Pipes' and ducts' insulation is with closed cell Nitrile Rubber for avoiding thermal losses during transmission. Air side and water side as well.

- Chilled water Pipe Insulation : 25 mm thick to 75 mm thick
- Pipe Size : 25 mm to 500 mm
- Duct Insulation : 9 mm to 13 mm
- Class : 'O' (CFC free with an ODP of zero)
- Density : 50kg/m3

Air Handling Units : (All ceiling suspended units)

- Make : Edge Tech/ Flaktwoods
- Face Velocity : 152 mpm
- Max face velocity across pre filters : 152 mpm
- Max water pressure drop across coil : 4.6 m
- Fan outlet velocity : 10 mps

DETAILS OF LIGHTING SYTEMS & CONTROLS

Different areas of Academic Block are installed with two types of light fixtures i.e. T5 and LED. The light fixtures installed in the building are majorly T5 along with a few LEDs that were installed as replacement to old fixtures. As per Amity Policy, any future replacement of old lighting fixture must bedone with LED fixtures only.

Lighting controls: Every space has its own local manual lighting controls which are controlled by the respective occupants.

HVAC SYSTEM OPERATION AND MAINTENANCE ACTIVITY

The HVAC system comprising of centrally located chiller system shallbe operated and maintained as per the following details:

A) Operation of Plant :

The plant comprising of chiller, pumps and cooling towers shall be operated from 09.00 AM – 05.00 PM

B) Operation of Air Handling Units :

Air Handling units shall be switched on / off by user depending on their requirement.

C) Operation of Fan Coil Units:

Fan coil units shall be switched on / off by room occupant depending ontheir requirement.

OBSERVED PARAMETERS

The below mentioned standard operating parameters shall be monitored by theplant operator during operation;

- SOP for 600 TR chiller : As per Annexure - 1
- SOP for 600 TR chiller : As per Annexure - 2
- SOP for 800 TR chiller : As per Annexure - 3
- SOP for pumps : As per Annexure - 4
- SOP for cooling tower : As per Annexure - 5

The operation of chiller system shall be monitored and documented as under:

- Plant operating parameters capturing in Log book every two hours Temperature in the block measured and recorded on each operation day onsample basis in cyclic manner.
- Cooling tower water level monitoring on hourly basisContinuous monitoring for any abnormal noise

As per attached Annexure – 6 and 7.

MAINTENANCE SCHEDULE FOR EQUIPMENT

Maintenance of chiller and other equipment shall be carried out as per following schedule:

Daily general activity

- External cleaning of all equipment
- Check drainage system of plant room for proper functioning

CHILLERS:

- **OEM SCOPE**

Maintenance service of chillers shall be carried out by OEM. In case of Trouble shooting in chiller, complaint is logged with OEM and is attended by OEM technical team.

- OPERATION TEAM SCOPE

Physical checkup of chillers is carried out by operation team on weekly basis asper defined format (refer Attached annexure 8) -

PUMPS

- Pumps are checked and maintained on weekly basis as per defined format
- Monthly checks and preventive maintenance on pumps are carried out as perdefined format
- Refer Attached Annexure- 9

AHUs

- Preventive maintenance on air handling units is carried out once in threemonths as per defined format.
- Air filters are cleaned on monthly basis.
- Yearly preventive maintenance is carried out during off season (Dec to Feb).

COOLING TOWERS

- Cooling Towers are checked and maintained on weekly basis as per definedformat (Refer Attached Annexure 10)
- Sump water is drained and cleaned once in 15 days.
- Fresh water is filled after this cleaning.

COMPLAINT MANAGEMENT

The complaints received in relation to cooling with central plant shall be recorded and resolved by operation team.

STEPS TO REDUCE CO_2 EMISSION

Usage of Environment friendly Refrigerant

The project uses Centrifugal chillers with R-134a refrigerant which minimize or eliminate emission of compounds contributing to ozone depletion and climate change. Refrigerant (R-134a) used in the chillers has minimal emission of compounds that contribute to ozone depletion and climate change. The building HVAC equipment's combined contributions to ozone depletion and global warming potential calculations is shown below:

REFRIGERANT CALCULATIONS	
Project name	Amity University Haryana
Project location	Manesar
Unit Manufacturer	Carrier
Refrigerant type	R-134a
Equipment type	Centrifugal chiller
Capacity, Ton (Q unit)	2000
Refrigerant charge, Kgs	550
Refrigerant charge, Kgs/KW (Rc)	0.27
Leak rate, % of charge per year (Lr)	2.0%
Equipment life (Life)	25
End-of-life refrigerant loss, % of charge (Mr)	10.0%
Global warming potential of refrigerant (GWPr)	1320
Ozone depletion potential of refrigerant (ODPr)	0
Life-cycle direct global warming potential (LCGWP)	8.7
Life-cycle ozone depletion potential (LCODP)	0
OPD & GWP Factor (per kW)	8.7
OPD & GWP Factor × capacity	17424

Alternative Commuting -Transportation

Amity Group incorporates comprehensive transportation management for all their campuses across the nation in order to reduce commuting through single occupancy vehicles and also to provide hassle-free commuting facility to the regular commuters. As a regular practice, this plan has been implemented for Amity University Haryana as well. Theplan includes having private buses for carrying Students and Faculty Members coming to the project.

The campus is designed such that 60% of the campus population lives in the campus and walk to reach academic buildings. The campus buses have been provided to reduce single occupancy vehicles and catering approx. 11%. The balance population coming to the campus use their own vehicles.

Indoor Air Quality Auditing

An indoor air quality (IAQ) audit is performed annually at the Amity University Haryana at Manesar to identify and remedy any potential indoor air quality problems.

The project team assigned one of their team members, Mr. Saini, as the IAQ manager to conduct the audit and to be responsible for communicating IAQ-related issues with building occupants. IAQ MANAGER reviews the "Indoor Air Quality Building Education and Assessment Model (I-BEAM)", including:

- Fundamentals of IAQ in Buildings
- Diagnosing and Solving Problems
- Renovation and New Construction
- Managing for Indoor Air Quality
- Training Supervisors and Staff
- Establishing Written Plans and Protocols
- Establishing a Communications Program.

IAQ Audit is performed for the following:

1. **Building Exterior**

The building exterior portion of the audit focused on:

- identifying flaws in the building shell
- problems with outdoor air intake and dampers in air handling units (AHU)
- general odors' or pollutants emitted from outdoor sources

2. **HVAC Systems**

The HVAC component of the audit assessed:

- the mixing plenum and dampers in HU
- cooling coils and condensate pansin AHU
- mechanical room
- air ducts and air plenums
- diffusers, grilles, and registers
- fans and fan chambers
- exhaust fans
- chiller

3. **Building Interiors**

The indoor space portion highlighted general conditions, such as:

- air flow and temperature
- acoustics
- floor and ceiling quality
- furnishings

IAQ management inspects the building exterior, HVAC systems, and indoor spaces on an annual basis to monitor the status of documented problems and evaluate new IAQ issues.

IV. Results

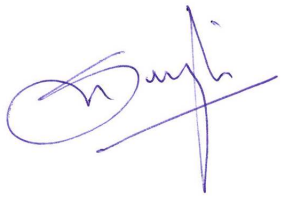
Aside from a few minor and easily-remedied issues (like leakage from a few ducts which was sealed properly), the IAQ systems were in very good shape and there were no abnormal noisesor odours found. The equipment and indoor and exterior spaces were free of algae, mold and other pollutants.

Sqd. Ldr. S K Singh
Director Administration
Amity University Haryana

Sqn Ldr SK Singh
Director Admin
AUH Manesar

Annexure - 1

Chiller Capacity	**600TR**	
Chilled Water IN - Min	50	F
Chilled Water IN - Max	65	F
Chilled Water Out - Min	45	F
Chilled Water OUT - Max	60	F
Condensor Water IN - Min	70	F
Condensor Water IN - Max	91	F
Condensor Water Out - Min	75	F
Condensor Water OUT - Max	98	F
Condensor Approach temp - Max	10	F
Compressor Amps	530	Amps
Voltage Range	380-420	Volts



Annexure - 2

Chiller Capacity **600TR**

Chilled Water IN - Min	50	F
Chilled Water IN - Max	65	F
Chilled Water Out - Min	45	F
Chilled Water OUT - Max	60	F
Condensor Water IN - Min	70	F
Condensor Water IN - Max	91	F
Condensor Water Out - Min	75	F
Condensor Water OUT - Max	98	F
Condensor Approach temp - Max	10	F
Compressor Amps	530	Amps
Voltage Range	380-420	Volts

Annexure - 3

Chiller Capacity	**800 TR**	
Chilled Water IN - Min	50	F
Chilled Water IN - Max	65	F
Chilled Water Out - Min	45	F
Chilled Water OUT - Max	60	F
Condensor Water IN - Min	70	F
Condensor Water IN - Max	91	F
Condensor Water Out - Min	75	F
Condensor Water OUT - Max	98	F
Condensor Approach temp - Max	10	F
Compressor Amps	710	Amps
Voltage Range	380-420	Volts

Annexure - 4

Pumps

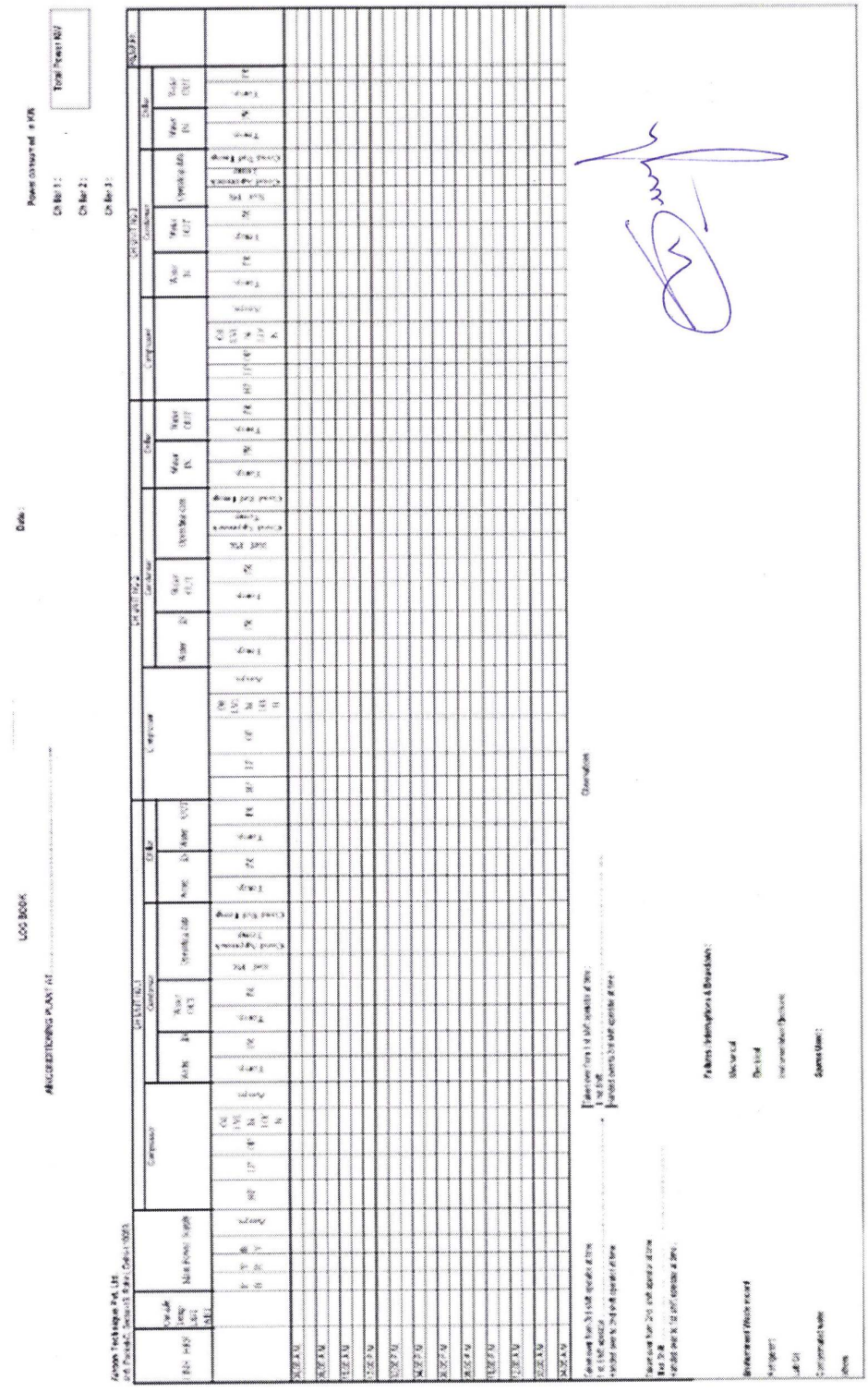
	DP Max	Amps Max
Chiller pump - 1	100	76.5
Chiller pump - 2	100	76.5
Chiller pump - 3	100	76.5
Condenser Pump -1	85	76.5
Condenser Pump -2	85	76.5
Condenser Pump -3	85	76.5

Annexure – 5

COOLING TOWER

Fan motor current	max	12.5 amps
Sump water temperature	max	90F
Bleed off water	average	1%

Annexure - 6



Annexure - 7

AIRCONDITIONING PLANT AT.....

LOG BOOK

Aircon Technique Pvt. Ltd.
418, Pocket - C, Sector-19, Rohini, Delhi - 110089.

TIME HRS	Condenser Water Pumps												Chiller Water Pumps												C.T. Fan Colling Tower Motor											
	Amps.				Water Pr Inlet				Water Pr Outlet				Amps				Water Pr Inlet				Water Pr Outlet				Amps											
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	6	7	8	9	10	11	12
06.00 A.M.																																				
08.00 A.M.																																				
10.00 A.M.																																				
12.00 P.M.																																				
02.00 P.M.																																				
04.00 P.M.																																				
06.00 P.M.																																				
08.00 P.M.																																				
10.00 P.M.																																				
12.00 A.M.																																				
02.00 A.M.																																				
04.00 A.M.																																				
Power consumed KW																																				

Total Power Consumed :

Supervisor / Operator : .....

Failures / Interruptions & Breakdown :

Mechanical :

Electrical

Instrumentation/Electronic

Spares Used :

Enviornment Waste record

Refrigerent

Lub Oil

Contaminated water

others

Annexure - 8

PREVENTIVE MAINTENANCE OF WATERCOOLED CHILLERS

INSTALLATION LOCATION :

PLANT CAPACITY :

PLANT MAKE :

S NO.	Work Description	W-1	W-2	W-3	W-4	
1	Clean the equipments externally					
2	Check foundation status					
3	Check oil level					
4	Check pressure gauges					
5	Check ref. piping for vibrations					
6	Check ref. piping for signs of oil leaks					
7	Ensure tightness of all connections and fittings					
8	Check starter connections					
9	Check starter contactors					
10	Check starter operation					
11	Check for proper water flow in the evaporator					
12	Leak test for refrigerent					
	Signature of operator					

	OPERATING PARAMETERS					
1	Evaporator Suction Temperature					
2	Evaporator Refrigerent Pressure					
3	Evaporator Approach					
4	Condensor Refrigerent Temperature					
5	Condensor Refrigerent Pressure					
6	Condensor Approach					
7	Chiller Water in Temp					
8	Chiller Water out Temp					
9	Chiller Water in Pressure					
10	Chiller Water out Pressure					
11	Condensor Water in Temp					
12	Condensor Water out Temp					
13	Condensor Water in Pressure					
14	Condensor Water out Pressure					
15	Lubrication Oil Tank Pressure					
16	Oil Tank Temperature					
17	Running Ampers					
	Signature of Operator					

Annexure - 9

Preventive Maintennce Checklist for Pumps

Job Name: Type: Weekly

Pump Model: Sr. No.:

Location: Moter HP :

Application : Condensor Water / chilled water Month :

Dateof PPM:						Remarks
Sr.No.	Description of Work	W-1	W-2	W-3	W-4	(If Any)
1	CLEAN THE MOTOR & PUMP IN GENERAL					
2	CHECK THE MOTOR COUPLINGS AND ALIGNMENT					
3	CHECK & TIGHTEN ALL THE FOUNDATION BOLTS					
4	ENSURE MOTOR AND PUMP BEARINGS ARE GREASED PROPERLY					
5	CHECK/TIGHTEN ALL THE ELECTRICAL CONTACT POINTS					
6	CHECK COUPLING CONDITION					
7	CHECK THE GLAND PLATE FOR LEAKAGE					
8	CHECK CLEAN BUTTERFLY VALVES					
9	CHECK AND CLEAN NON RETURN VALVE					
10	ENSURE DRAIN IS NOT CLOGGED					
11	CHECK THE PRESSURE GAUGES					
12	CURRENT PER PHASE IN AMP.					
a	R-PHASE					
b	Y-PHASE					
c	B-PHASE					
13	CHECK PUMP DISCHARGE PRESSURE					

Observations:

Sign. Of Technician Sign of supervisor

Annexure - 10

Preventive Maintennce Checklist Cooling Tower						
Job Name		Type				
Tower Model		Sr. No.				
Location		Capacity				
Date						Remarks
Sr.No.	Description of Work	W-1	W-2	W-3	W-4	(If Any)
1	CHECK COOLING TOWER FOR UNUSUAL NOISE / VIBRATION					
2	CHECK CONDITION OF MOTOR AND FAN ASSEMBLY					
3	CHECK TOWER SUMP FOR ANY DAMAGE					
4	CHECK SUCTION SCREENS PROPERLY FIXED					
5	CHECK FAN OPERATION					
6	CHECK THE ELECTRICAL CONTACT POINT AND TIGHTEN THE LOOSE POINTS					
7	CHECK FAN COUPLING BOLT AND ALIGNMENT					
8	CHECK AND CORRECT LOOSE CABLE					
9	ENSURE DRAIN IS NOT CLOGGED					
10						
Sr.No.	Observation	W-1	W-2	W-3	W-4	Remark
1	Current in Amps 1					
	2					
	3					
	4					
2	Sump Water Tempreture					
3	Ambient Air WB / DB Temp					
4	Water Inlet Temperture					
5	Water out Temperture					
	Sign of Supervisor:	Sign of Supervisor				