ENERGY/POWER GENERATION AND UTILIZATION IN MMSU

INTRODUCTION

The Mariano Marcos State University is a comprehensive institution of higher learning in the Ilocos Region which was established in January 6, 1978 by Presidential Decree (PS) 1279 which merged two state colleges in the Province of Ilocos Norte, the Mariano Marcos Memorial Colleges of Science and Technology (MMCST) with campuses in Batac, Currimao, Paoay and Dingras, and the Northern Luzon State College (NLSC) in Laoag City.

The University has eleven academic units : Graduate School (GS), College of Medicine (COM), College of Law (COL), College of Health Sciences (CHS), College of Business Economics and Accountancy (CBEA), College of Agriculture, Fisheries and Sustainable Development (CAFSD), College of Arts and Sciences (CAS), College of Engineering (COE), College of Teacher Education (CTE), College of Industrial Technology (CIT), College of Aquatic Sciences and Applied Technology (CASAT).

The main campus is located in Batac City with a land area of about 300 hectares. It houses the University Administration Building , seven academic units (COM, COL, CHS, CBEA, CAFSD, CAS, COE), MMSU Hostel, University Library, Student Center, Crop Research Laboratory, Teatro Ilocandia. There are two other campuses in Laoag City housing the two academic units respectively, Campus 1 –CTE and GS, Campus 2-CIT. The Campus in Currimao houses the academic unit CASAT and the Campuses in Dingras and Paoay are satellite campuses of the CAF and CIT respectively.

The university envisions to be a premiere Philippine university by the year 2028 and has a mission to develop virtuous human capital and sustainable innovations in a knowledge-driven global economy.

POWER INSFRASTRUCTURE

The university receives its power from the local utility – the Ilocos Norte Electric Cooperative (INEC) via a single service entrance located inside the main campus. The power distribution system inside the main campus which includes the primary and secondary lines, line supports (poles/towers), all transformers in buildings including all accessories are owned and managed by the university (pls see attached layout).

The power distribution system is a 13.2 KV, 60 hz, three phase line extending to all the buildings and facilities in the main campus that require electric power. Distribution transformers to step down the primary voltage of 13.2 kV into 220V utility voltage are provided in each load center (buildings).

The following is the list of transformers of various sizes and ratings that are installed in the main campus of the university:

EMERGENCY POWER SOURCE

The university has four large backup power sources (50kVA and higher) from diesel generator sets that operates as emergency power units. These generator sets are stationed at the following sites :

1. Administration Building – 250 kVA Diesel Generator set
2. Science and Technology Park - 250 kVA Diesel Generator set
3. Communication Arts Building – 250 kVA Diesel Generator set
4. Main Library Building - 50 kVA Diesel Generator set

In addition to these generator sets, small units with ratings less than 5 kVA are used by some or the units of the university as emergency power to run critical electrical loads such as computers, printers, laboratory apparatus and the like during power outages.

IN-HOUSE POWER GENERATION

In-house power generation is the production of local power using the resources of the university which are not classified under the emergency power sources above. These facilities can be produced from renewables or fossil based plants.

Presently there are two 10 kW hybrid solar (renewable) power installation in the university. One 10 kW hybrid unit was installed at the CRL lab building and another 10 kW hybrid unit at the NBERIC building. These units are capable of producing electric power for the buildings consumption and excess can be sold out to the grid (utility) via net-metering.

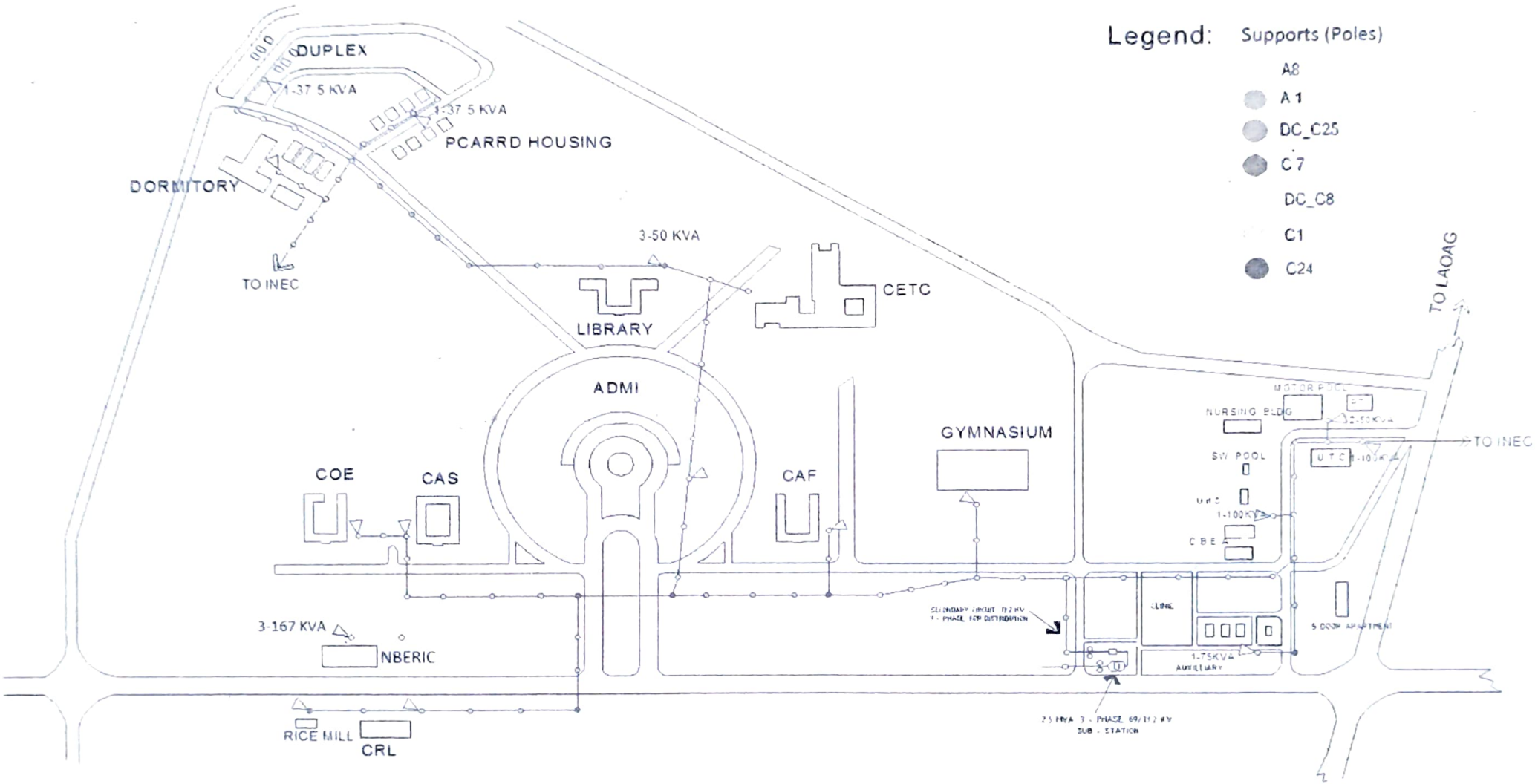
There is also a proposed (MOA signed with DOE-PNOC) 200 kW grid-tied solar (renewable) rooftop installation for some buildings in the main campus of the university. One 100 kW installation for the Admin Building, 60 kW for the COE and another 40 kW for the Main Library building. When completed, the facility will save some electricity bills of the university.

ELECTRICAL CONSUMPTION

The university consumes an average of more than 100,000 kW-hr of electrical energy every month. The following is the average demand in each load center. This energy is mainly supplied and paid to the local utility – the Ilocos Norte Electric Coop (INEC).

Local or in-house power generation such as renewable sources can reduce the university's dependence from the grid.

To help reduce the energy consumption in the university an energy efficiency and conservation program shall be implemented in all units of the university. It is the least cost (or no cost) way of reducing energy consumption, however it involves the participation and commitment of all the constituents.



ELECTRICAL POWER DISTRIBUTION OF MMSU, BATAC CITY

LIST OF POWER TRANSFORMERS INSTALLED IN THE VARIOUS ENERGY CENTERS IN MMSU

MAIN CAMPUS

	ENERGY CENTER	QTY	RATING (KVA)
1	MANSION	1	75 (1Ø)
2	UTC	3	75
3	NACIDA OLD	3	167
4	NACIDA NEW	3	75
5	COM	3	50
6	CHS	3	100
7	SWIMMING POOL	3	25
8	COL	1	50 (1Ø)
9	INFIRMARY, HS	1	100 (1Ø)
10	CBEA1	1	100 (1Ø)
11	CBEA2	3	75
12	STUD CTR	1	150 (3Ø)
13	TEATRO	3	100
14	GYMNATORIUM	3	333
15	CAFSD	3	100
16	ADMIN	3	167
17	CIMEA	3	100
18	LIBRARY	3	50
19	COE	3	100
20	CAS	3	167
21	CAB	3	167
22	NBERIC	3	167
23	CRL	3	167
24	DORMITORIES	3	25
25	HOUSING	1	100 (1Ø)

CTE CAMPUS

	ENERGY CENTER	QTY	RATING (KVA)
1	CTE Admin	3	50
2	CTE H.S.	3	25
3	CTE Elem.	3	37.5

CIT CAMPUS

1	CIT	3	50
2	CIT New	3	75

CASAT CAMPUS

	CASAT	2	50 (Open V)

PAOAY CAMPUS

	Paoay	1	50 (3Ø)

DINGRAS CAMPUS

	Dingras	3	25

ENERGY GENERATION/UTILIZATION POLICIES

ENERGY POLICY ON NEW INFRASTRUCTURE

The following are recommended guidelines (policies) on the construction of new infrastructures (buildings and facilities)

SOLAR ENERGY GENERATION

- Readiness (Adaptability) .
    - Designs of new buildings should integrate/incorporate the option for the construction of solar power facility (solar panels and accessories).
    - Roof deck (roof integrity) must be considered in the designs.
    - Consideration of south facing roof (around 18°) are recommended.
    - Provision for the integration of interconnectivity with the grid/utility with net-metering.

DIESEL/GASOLINE GENERATOR SETS FOR POWER GENERATION (for 50 kVA and larger)

- Consideration of generator sets as standby units for power generation (not only during emergencies)
- Consideration of standby generator sets to operate on renewable fuels (such as biofuels – hybrid with fossil fuel)
- Maintenance program for generator sets should be in place and to be strictly observed.

NET-METERING

- To optimize the potentials of distributed generation in the university, all generation facilities (large capacity) especially on renewables (solar) should consider net-metering scheme.

POLICIES (GUIDELINES) ON ENERGY UTILIZATION

The following are recommended for new and existing buildings and facilities :

- Consideration of the integration of *green technologies* but not limited to :
    - The use of Inverter types of air conditioning units for new installations
    - Application of roof insulation for air conditioned areas.
        - Use CERAMIC FIBER (and the like)
    - Use of LED lamps or high efficiency lights in buildings/facilities including street lighting
    - Consideration of Appropriate Building Orientation for new buildings to optimize energy conservation.
    - Provision of sufficient shade (canopies) for outdoor units of split-type air conditioning units.
- Periodic conduct of spot and detailed energy accounting and audit (electricity, water, fuel) by energy auditors within all energy centers of the university.
    - Spot energy audit – as often as possible (can be done by coordinators)
    - Detailed energy audit – at least one every three years (to be done by energy auditors)
- Implementation of a university wide Energy Efficiency and Conservation Technologies and Practices. (Pls see attached)

ENERGY EFFICIENCY AND CONSERVATION PRACTICES

A. AIRCONDITIONING UNITS (ACU load accounts to more than half of the total energy consumed by the building)

1. Air conditioners are switched on at 9:00 AM and switched off at 4:00 PM except for computer and laboratory classes.
2. Aircon units are switched off or set at fan mode during lunch break (12:00 – 1:00 PM)
3. Check that the thermostat is working and set to not lower than 25°C (room temperature). For every degree higher translates to around 10% savings
4. Air conditioned offices (areas) are well insulated from direct sunlight or heat (like curtains, blinds, indoor plants). Automatic door closer maybe installed.
5. Air conditioning units should be cleaned and maintained periodically.

B. ELECTRIC FANS (AND OTHER FANS)

1. Electric fans are switched off when not in use. Electric fans in classrooms are switched off after every class
2. If cooling is desired in one direction only, the oscillator is locked where the fan is needed except for ceiling fan
3. If comfortable enough the fan is set to "low"
4. Exhaust fans are switched off while the ACUs are in operation (where applicable).
5. Agricultural and other pumps (electric) should be properly maintained and accounted.

C. LIGHTING (ILLUMINATION)

1. Incandescent lamps should be replaced with compact fluorescent lamps (CFL) or LED lamps (or high efficiency lamps)
2. Lighting fixtures (reflectors, luminaires) are cleaned regularly.
3. Busted fluorescent lamps are replaced or removed.
4. Light are to be switched off or reduced where there is natural light.

D. OFFICE EQUIPMENT/APPLIANCES COMPUTERS/PRINTERS

1. Computers should be strictly for official use only.
2. Computers are switched off when not in use (both CPU and monitor) or set to energy-saving mode.
3. Playing computer games or playing music in PC should be prohibited.
4. Laserjet printers are advisable not to be turned-off if it will be used again later on.

E. OTHER APPLIANCES

1. Refrigerators are switched off during weekends/holidays and long vacations (except when necessary).
2. Ovens and electric stoves in offices are prohibited except for laboratory activities.
3. Watching TV is not allowed during office hours except for instructional purposes.
4. Check water system (plumbing) against leaks. (leaks are energy lost)
5. Unplug all water dispensers (and the like) before leaving the office.
6. For new procurement of IT equipment laptops maybe considered in lieu of desktops (laptops consume less energy -around more than 50%).

F. MOTOR VEHICLES/MACHINERIES

1. Motor vehicles should undergo regular preventive maintenance.
2. Only certified road worthy vehicles are allowed to travel.
3. Prolonged idling in vehicles should be avoided.
4. Dispose vehicles that are very old. They become less roadworthy and they become fuel inefficient.
5. Agricultural and other pumps (using fuel) should be properly maintained and accounted.