



MARIANO MARCOS STATE UNIVERSITY

Carbon Reduction and Emission Reduction Process

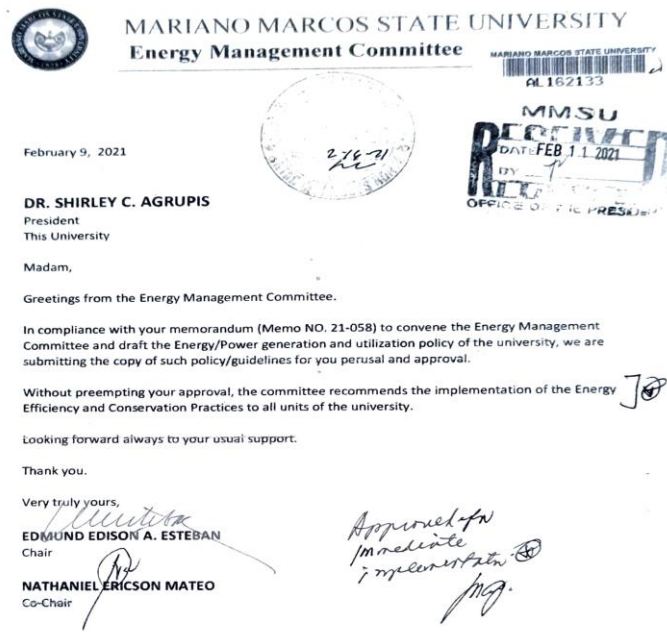
Carbon reduction programs, activities and processes has been and continue to be in place to minimize carbon emissions in support to the Sustainable Development Goals and the 7-point Agenda ACHIEVE. The list includes:

- a. University Energy Efficiency and Conservation Programs
- b. Use of MMSU hBE-20 for some of MMSU's fleet
- c. Promoting the use of Renewable Energy as a source of Power
- d. MMSU Integrated Waste and Pollution Management Program
- e. Water Conservation and Recycling Programs
- f. Commute Programs
- g. Program limiting parking area in the Campus
- h. Initiatives to Decrease private vehicles in the campus



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1. University Energy Efficiency and Conservation Program



To help reduce the energy consumption in the university an energy efficiency and conservation program is being 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 stakeholders of the university. Policies were established for new infrastructure and energy utilization.

Energy policy on new infrastructure include:

1. Designs of new buildings should integrate or incorporate the option for the construction of solar power facilities;
2. Consideration of standby generator sets to operate on renewable fuels (such as biofuels)
3. To optimize the potential of distributed generation in the university, all generation facilities (large capacity) especially on renewables (solar) should consider a net-metering scheme.

Policies on energy utilization include:

1. Consideration of the integration of green technologies but not limited to:
 - i. use of inverter technology of air conditioning units for new installations
 - ii. application of roof insulation for air conditioned areas



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- iii. use of LED lamps or high efficiency lights in buildings including street lighting
 - iv. consideration of appropriate building orientation for new buildings to optimize energy conservation; and
 - v. provision of sufficient shade (canopies) for outdoor units of split-type air conditioning units.
2. Periodic conduct of spot and detailed energy accounting and audit (electricity, water, fuel) by energy auditors within all energy centers of the university;
 3. Implementation of a university-wide energy efficiency and conservation technologies and practices.

Examples of Energy Efficiency and Conservation Practices





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2. Use of MMSU hBE-20 for some of MMSU's fleet

A biofuel developed by MMSU-NBERIC known as the MMSU hBE-20 is a mixture of 11.76% azeotropic bioethanol and 88.24% anhydrous E-10 gasoline. The fuel grade blend contains 20% hydrous ethanol that is produced from various feedstock particularly nipa sap. Performance comparison of MMSU hBE-20 and XCS E10 on a 6.5 HP engine at different loads showed no discernable differences. Furthermore, the blend was used for road testing all the way to the city of Baguio, Taguig, and Isabela from Ilocos Norte.

Example of Gasoline blended with MMSU Hydrous Ethanol for use of university vehicles



3. Promoting the use of Renewable Energy as a source of Power

Currently, Mariano Marcos State University is harnessing 3 sources of renewable energy - bioethanol, solar and biomass. Solar power has been utilized for a variety of applications (i.e. solar powered irrigation pumps, solar-powered lights, solar PV generators). This is to further reduce the use of diesel and gasoline fueled motors, thus reducing carbon emissions.





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4. MMSU Integrated Waste and Pollution Management Program

The MMSU Integrated Waste & Pollution Management Program (MMSU – IWPMP) is formed by the University Waste and Pollution Management Committee under the General Services Directorate (GSD). With the Chairperson (PCU chief), the Pollution Control Officers, and two other designated members, the Committee is further composed of deans/directors/heads, unit/college coordinators, and support services.

The MMSU IWPMP has promulgated, implemented and enforced the basic policies provided by the Republic Act 9003 or the Ecological Solid Waste Management Act and other environmental laws such as RA 6969, PD 1586, PD 984, PD 1152, RA 8749 and RA 9275. Institutional or internal policies consistent to the policies of the acts were identified, promulgated and institutionalized to further amplify the implementation of the University waste management program.

The following policies were institutionalized:

1. All development projects (existing and proposed) with known or probable environmental impacts shall be subjected to the Philippine Environmental Impact Statement System (PEISS, PD 1586) wherein Environmental Impact Assessment (EIA) shall be conducted in order to secure Environmental Compliance Certificate (ECC)
2. Establishment of Material Recovery Facility (MRF) to all campuses, units and colleges
3. Establishment of centralized separate storage facilities for Polychlorinated Biphenyls (PCBs) (or transformers containing PCBs), and Hazardous or toxic wastes
4. Registration as Hazardous waste generator
5. Waste segregation at source
6. Guidelines on waste management
7. No burning policy of waste materials of the university
8. No burning
9. Waste segregation
10. No styrofoam/limited use of plastics
11. Classroom cleanliness and orderliness
12. No astray/tethering of animals
13. Permit revocation
14. Implementation of the policy on the elimination of styrofoam and plastic as secondary packaging materials

The following Good Management Practices were also observed during the implementation of the program:

1. Waste Minimization Strategies
2. Practice of 5Rs (Recycle, Reuse, Reduce, Refuse, Recover)
3. Substitution
4. Cleaner Production (CP) Practices

5. Water Conservation and Recycling Programs

Because of its geographical location and climatic conditions, MMSU generally utilizes groundwater for its operations and activities. As such, the University strives to be a responsible steward of this valuable and finite resource. Small farm reservoirs (SFRs) and cascading pond systems were maintained to impound rainwater. These rainwater harvesting structures were purposely unlined to allow recharging of aquifers. Moreover, during the rainy season (May to October), some of these SFRs are used for aquaculture activities. During the dry season (November to April), the impounded water is used to irrigate the croplands or experimental farms



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of the University. MMSU is thus able to both harness the benefits of excess water and mitigate the effects of water scarcity.

6. Commute Programs

The goal of the MMSU Commute Programs is to reduce the number of vehicles inside the campus by encouraging employees, students and guests to explore and use alternate means of transportation to commute to and from the university. Fewer vehicles on the road means less burning of fuels, an improvement in air quality and less traffic congestion.



MEMORANDUM NO. 19-196

TO : All Personnel
THRU : Deans and Directors
FROM : DR. SHIRLEY G. AGRUPIS
University President
DATE : 06 August 2019
SUBJECT : Eco-Friendly Transportation Options

To minimize our carbon footprint in support of the Sustainable Development Goals and the 7-Point Agenda to ACHIEVE, you are hereby encouraged to explore eco-friendly transportation options within, and to and from the campus:

- 1. Shuttle Bus**
The Northbound bus can accommodate 40 passengers, and the Southbound bus can accommodate 30 passengers.
- 2. Car Sharing**
To minimize the number of cars on campus, you are encouraged to observe a car-sharing scheme. Those who are willing to support this activity are requested to accomplish the attached form which will be shared to possible passengers. Please submit your form to your immediate supervisors for consolidation and submission to the PPGSD.
- 3. Bike / E-bike**
Please use the bike lanes. A minimal fee will be charged for e-bikes.
- 4. Walking**
Use our covered walkways and enjoy the benefits of walking as an exercise.

Brgy. 16 Quiling Sur, City of Batac, 2906 Ilocos Norte, Philippines
email address: mmsuop@yahoo.com

Telefax: (077) 600-0459
Website: www.mmsu.edu.ph

a. Shuttle Services

There are two shuttle services provided by MMSU to its faculty, staff, and students – the HINO bus and County (Rosa). The HINO bus has 49 seats and travels up north of Batac City (where MMSU is located) only (Batac, San Nicolas, and Laoag) while the County Rosa can accommodate 32 and travels down south of MMSU (Batac, Currimao, Pinili, and Badoc). The shuttle vehicles



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minimize the need for private transportation; in addition, it also gives a more affordable transportation option. The fare is only Php 20.00 (\$ 0.34) per trip, which is way lower than the fare collected by public utility buses and jeepneys which averages from Php 80 (\$ 1.37) per trip.



Example of Shuttle Service: Hino Bus
Rk1JST with deluxe air conditioned



Example of Shuttle Bus Service: 2019
Hyundai County (mini Bus)29
seats/Euro 4 air conditioned

b. Zero Emission Vehicle (ZEV)

Zero Emission Vehicles are available, provided by the university for free (Exhibits A and C). These are used by MMSU personnel who travel from one building to the other. Usually, they are used to transport documents, cover events, and site visits within the campus. Likewise, all MMSU personnel and students are encouraged to use e-bikes and bicycles





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The zero emission vehicles of the university are for faculty and staff who travel from one building to the other. Usually, they are used to transport documents, cover events, and site visits within the campus.



Students are encouraged to use e-bikes as well in the University. In return, MMSU allows them to charge their ebikes for free.



University personnel and even students are encouraged to use bicycles inside the campus

c. Walking inside the Campus

Pedestrian transportation is facilitated by covered pathways between the buildings and leading to transportation hubs. This protects the MMSU stakeholders from heat and rain. 2. Pedestrian lane in the road (Exhibit B). In order to ensure the safety of the students, the university has pedestrian lanes usually in front of main buildings. In Exhibit B, this helps pedestrians to cross from the covered



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pathway to the other side of the road. 3. Exhibit C. MMSU has streetlamps for pedestrians at night. The university has 55 solar street lamps and censored lights, which automatically control the solar street lights, depending on the intensity of light. 4. Exhibit D. All the buildings of MMSU have ramps for PWDs. These ensure their safety as well in getting in and out of the buildings.



Covered Catwalk.



Pedestrian lane (Mariano Marcos State University)

Solar lights in pedestrian path (Mariano Marcos State University)



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7. Program limiting parking area in the campus

Parking areas in the University are gradually being diminished by controlling the number of vehicles entering the University.

1. **Gate Pass System** - The gate pass requirement is a mechanism in place to control and monitor vehicles entering the premises, control traffic within the campus, and allocate available parking spaces.
2. **Parking Spaces Management** - For an organized parking mechanism, areas are labelled for bicycle areas, motorcycle areas, and four-wheeled vehicles. For organized loading and unloading, signages are available to guide the University community.
3. **Shuttle Services** - Shuttle services from centralized Motorpool also cater to employees traveling to and from Laoag and Badoc to encourage commuting and minimizing vehicle count.
4. **Car Sharing** - Car sharing is also a practice of employees from different units to minimize fuel use as well as to lessen parking space requirements.
5. **Other Uses for Parking Spaces** - Decreasing the number of vehicles in the campus allows other areas to be utilized for other purposes. For instance, at CAFSD, part of the parking lot is now occupied by sheds that can be used for group study and other purposes. At CAS, part of the parking area for tricycles has been converted into a park / garden.



Limiting parking areas by designating the type and for whom the areas are allotted to in the College of Medicine (COM) of MMSU



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Enforcement of traffic signages to ensure limited vehicles on loading terminals

8. Initiatives to decrease private vehicles on campus

Car Sharing. MMSU personnel who have vehicles are encouraged to 'share a car' with their colleagues. Through a memorandum order, the faculty, who are willing to 'share a car', identify specific times of the week where they pick up their colleagues or even students who are willing to join them as they report to work.





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