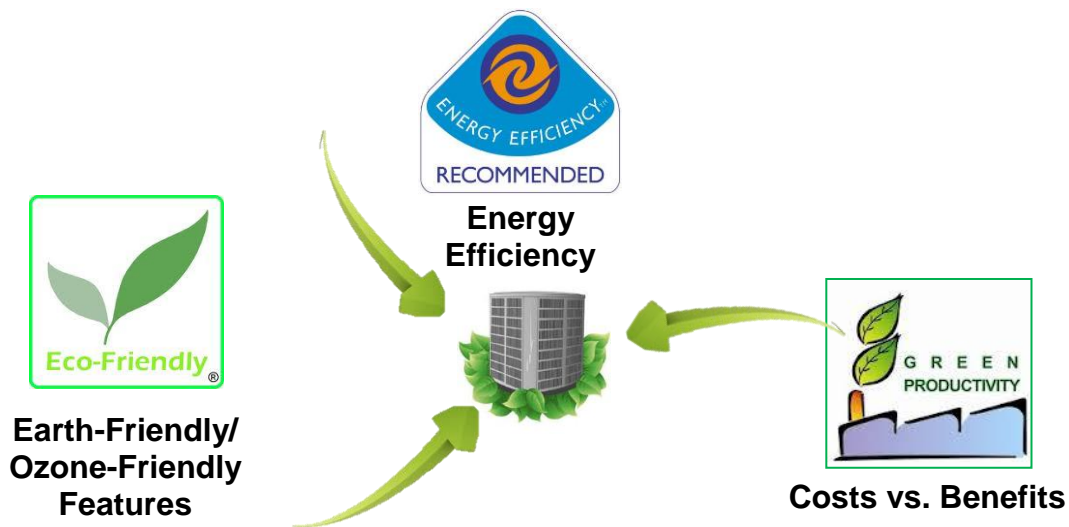




**Appendix A: Guidelines for the Management of Air Conditioning Units**

A major source of high energy costs may be attributed to the use of aircons. In order to manage the high costs attributed to aircons, constant monitoring, maintenance and upgrading of aircon systems may be necessary in order to enjoy maximum energy efficiency. Most aircon units have a life span of 8 – 10 years and tend to become more inefficient once they have gone beyond 10 years of constant use. A simple aircon database management system can help monitor the energy efficiency, ozone friendliness as well as the cost-effectiveness of current aircon systems in place. This can also further help reduce the energy costs attributed to aircon use by providing information on units that needs repairs or even decommissioning. The following key areas may be taken in consideration in the purchase, maintenance and eventual replacement of aircon systems.





**A. Factors related to Aircon Selection, Maintenance/Repair and Decommissioning**

1. **Energy Efficiency.** Purchase of new units should meet the *Minimum Energy Performance Standards (MEPS)* set by the DOE. It should also take in consideration the cooling requirements of the room where these will be installed. **DOE: Minimum Energy Performance Standards (MEPS) for Air Conditioning Units** The MEPS covering window-type and split-type (wall or floor mounted) air conditioning units make use of a labelling system wherein products are given the DOE Energy Label which indicates a product's **energy efficiency ratio (EER)**. (The EER is the ratio of the cooling capacity to the power consumption on an aircon unit -- the *higher EER rating = higher energy efficiency*).



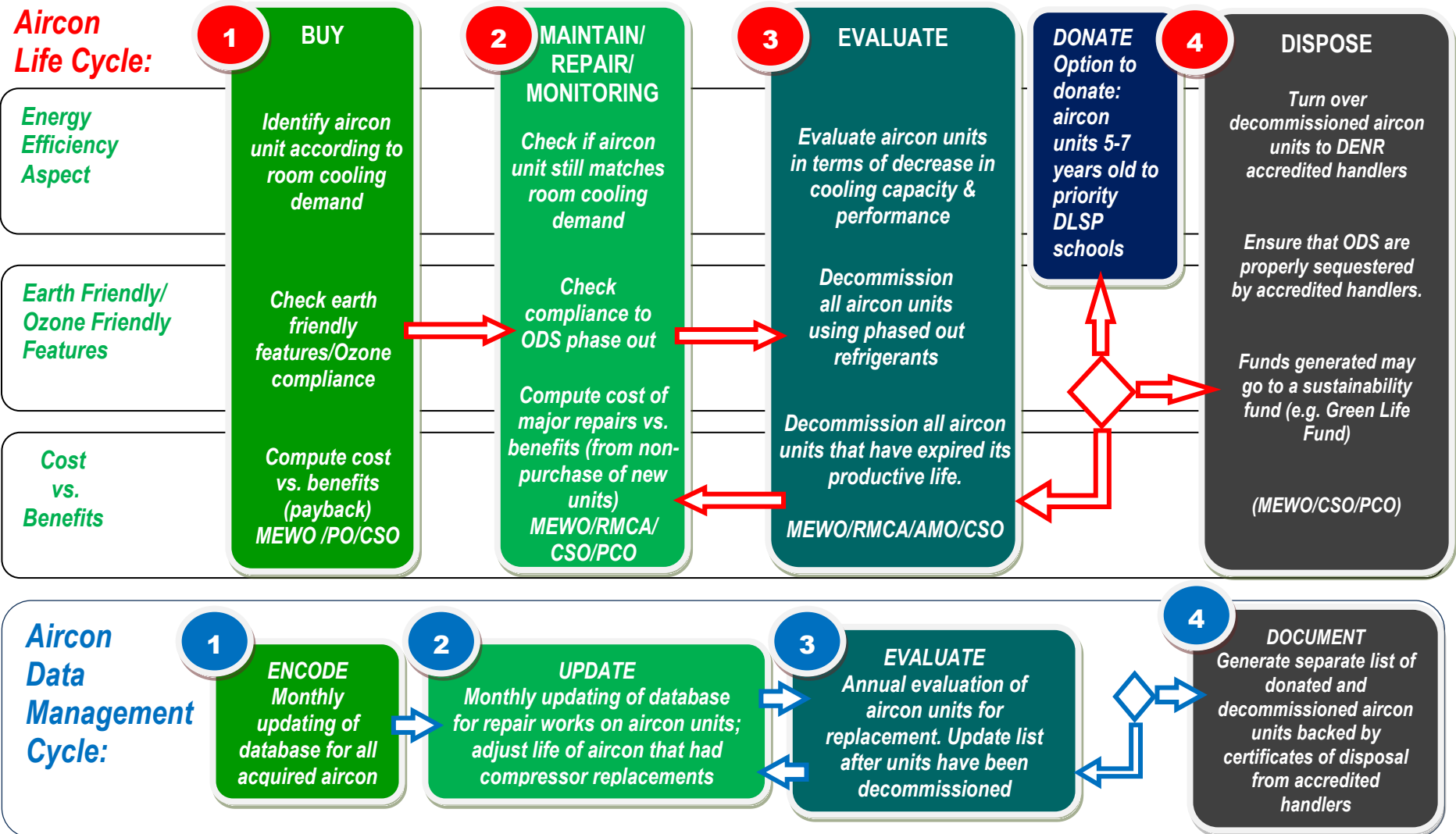
**Phil. Department of Energy MEPS (2011): EER not less than 9.1 (<12,000 kJ/h cooling capacity)  
EER not less than 8.6 (>=12,000 kJ/h cooling capacity)**

References: <http://energy.gov/energysaver/articles/room-air-conditioners>,  
<http://www.doe.gov.ph/services/energy-research-testing-laboratory-services/lighting-appliances-testing-laboratory/308-appliance-testing>

- 2. **Earth-Friendly/Ozone-Friendly Features.** *Ozone Depleting Substances (ODS)* are strictly being monitored by government and are gradually being phased out. Refrigerants being used by aircon units should be regularly monitored to ensure compliance to government regulations. Other features that may be reviewed and considered are earth friendly features particularly those related to improving indoor air quality.
- 3. **Cost vs. Benefits.** Decisions on whether to replace old aircon units may also take in consideration the increasing costs that arise from old systems due to expenses on repairs as well as the higher energy consumption resulting from reduction in efficiency. Foregone opportunity costs (in keeping the old and not buying a new one) may also be factored in to provide insights that may help in decision making. In buying new ones, cost-benefit analysis may also be done since new products tend to be very expensive. Generally, in making a cost-benefit analysis, take in consideration the frequency of the intended use. Energy-efficient products tend to be more cost beneficial if these products are used more often since the savings kick in with the frequency of use.



Process Flow Chart: Aircon Data Management





Data Management vis-à-vis the Aircon Life Cycle

<b>Process:</b>	<b>BUY:</b> <i>Purchase of New Aircon Units</i>	<b>MAINTAIN/REPAIR:</b> <i>Preventive Maintenance and Repairs of Aircon Units</i>	<b>EVALUATE:</b> <i>Decommissioning of Aircon units</i>	<b>DONATE/DISPOSE:</b> Disposal
<b>Factors:</b>				
<b>Energy Efficiency</b>	Determine the cooling load/demand of an office or room needing an aircon unit. Include data on Energy Efficiency Ratio (EER) of aircon products in information requested from suppliers	Evaluate energy efficiency of aircon unit in terms of cooling capacity vs. power consumption and performance.	Annually evaluate aircon units that have significantly decreased in cooling capacity and performance.	<i>Disposal c/o DENR- accredited handlers</i>
<b>ODS/Green Features</b>	Request data on refrigerant used from suppliers; screen out products not compliant with CCO list of DENR. Include information on other earth-friendly features of the product (e.g. improved indoor air quality, humidity controls etc.)	Monitor compliance to DENR regulations re: ODS phase-out and substitutes.	Screen aircon units that use ODS that have already been banned/ phased out.	<i>ODS Sequestration c/o accredited handlers</i>
<b>Cost vs. Benefits</b>	Conduct cost-benefit analysis based on: cost of new product vs. expected savings (include in the computation, the frequency of use)	Monitor incurred expenses vs. original cost of the aircon unit as well as opportunity cost if new aircon were purchased instead of doing major repairs.	Recommend for donation/decommissioning units that are already 5 years old or have already undergone 1 major repair (e.g. change of compressors)	<i>Explore option of donating aircon units 5 years or older before they start to break down. Funds generated deposited in Green Life Fund</i>



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<b>Process:</b>	<b>BUY:</b> <i>Purchase of New Aircon Units</i>	<b>MAINTAIN/REPAIR:</b> <i>Preventive Maintenance and Repairs of Aircon Units</i>	<b>EVALUATE:</b> <i>Decommissioning of Aircon units</i>	<b>DONATE/DISPOSE:</b> Disposal
<b>Factors:</b>				
<b>Data Management Activity</b>	<b>Update aircon database upon purchase of new aircon unit.</b>	<b>Update major repairs done on aircon unit upon completion of repairs.</b>  <b>For repairs involving the replacement of compressors (only once), adjust life of aircon unit by an additional 3 - 5years.</b>	<b>Every 2<sup>nd</sup> term of each school year, short list all items due for replacement by the following school year, aircon units for donation/decommissioning based on served number of years, actual condition and unit performance as well as conflict with legal compliance concerns.</b>	<b>Separate List of all donated and decommissioned aircon units accompanied by Certificates of Disposal from DENR-Accredited handlers</b>

Roles and Functions of Responsible Units vis-à-vis the Aircon Life Cycle

<b>Process:</b>	<b>BUY:</b> <i>Purchase of New Aircon Units</i>	<b>MAINTAIN/REPAIR:</b> <i>Preventive Maintenance and Repairs of Aircon Units</i>	<b>EVALUATE:</b> <i>decommissioning of Aircon units</i>	<b>DONATE/DISPOSE:</b> Disposal
<b>Responsible Units</b>				
<b>Mechanical and Electrical Works Office (MEWO)</b>	Identifies demand for aircon. Measures Cooling Demand of offices/classrooms. Provides technical evaluation of aircon products. Maintains and updates Aircon database (shared document with AMO).	Conducts regular preventive maintenance checks and repairs of aircon units. Maintains and updates aircon database to include repairs done on units e.g. change of compressors and parts, etc. (shared document with AMO)	Evaluate products due for donation and /or decommissioning. Recommend to administration, aircon units for donation (5-7 years old) and/or due decommissioning (8-10 years old; + 3 years if compressors have been replaced)	Cleans and prepares aircon units for donation. Dismantles aircon units for decommissioning. Maintains and updates Aircon database (shared document with AMO). Maintain separate lists of donated and decommissioned aircon database and secure certificate from handlers. (shared documents with PCO and CSO)



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<b>Process:</b>	<b>BUY:</b> Purchase of New Aircon Units	<b>MAINTAIN/REPAIR:</b> Preventive Maintenance and Repairs of Aircon Units	<b>EVALUATE:</b> decommissioning of Aircon units	<b>DONATE/DISPOSE:</b> Disposal
<b>Responsible Units</b>				
<b>Procurement Office (PO)</b>	Provides product information e.g. ODS used, energy efficiency features and other earth-friendly features on available products.	Provide financial advice on cost vs. benefits of major repairs vs. purchase of new products in the market.	Provides information e.g. ODS used, energy efficiency features and other earth-friendly features on new products in the market	Assists CSO in identifying DENR-accredited handlers of hazardous waste materials.
<b>Asset Management Office (AMO)</b>	Maintains and updates Aircon database (shared document with MEWO)	Maintains and updates aircon database to include repairs done on units e.g. change of compressors and parts, etc. (shared document with AMO)	Prompts MEWO regarding requests for aircon unit donations as well as units due for decommissioning (based on shared database document).	Disposes old aircon units after being cleared by CSO for removal of ODS.
<b>Risk Management and Compliance Audit (RMCA)</b>	Monitors compliance with the Clean Air Act based on reports and inspections conducted by CSO and PCO.	Updates MEWO on ODS phase-out and relevant DENR Administrative Orders	Updates MEWO on ODS phase-outs and relevant DENR Administrative Orders	Monitors compliance to proper disposal of hazardous waste materials and sequestration of ODS by accredited handlers.
<b>Campus Sustainability Office (CSO)</b>	Provides technical evaluation of aircon products.			Maintain separate lists of donated and decommissioned aircon database and secure certificate from handlers. (shared documents with PCO and CSO)
<b>Pollution Control Officer (PCO)</b>	Ensures all new products are compliant with the Clean Air Act.			



Campus Sustainability Office

Proposed Database Information/Format:

Location : St. La Salle Building  
 Total Number of Units : \_\_\_\_\_  
 Last Update : \_\_\_\_\_

Item #	Room No.	Cooling Demand of Room	Aircon Cooling Capacity HP/TR	EE R	Serial No.	Type	Brand	ODS/ Refrigerant	Price at Purchase	Date Installed	Replaced Compressor ? (date)	Recommended for Donation by (year)	Recommended Decommissioning By (year)
1	107-R		2 HP	8.9	12345	WT-VRF	Carrier	HFC 134A	22K	27-Aug-02	Yes/2008	2007	2010 + 2013