We understand that our business activities impact on the environment, society and economy directly and indirectly;

Healthcare Global Enterprises Ltd (HCG) is committed to managing ESMS as an employer, prospective employer and professional service provider to its clients. Under this policy, Healthcare Global Enterprises Ltd (HCG) will adopt operating principles which will provide guidance on:

• Environmental Sustainability

• Social & Community Objectives

• Ethical Issues

• Our People Commitment and Business Relationships

Environmental Sustainability

Our vision is based on a fundamental belief that by embracing the sustainability agenda and by helping clients implement sustainability strategies that reduce cost and generate value, our own business will become more sustainable, grow stronger and thrive.

We recognize our responsibility to our clients and the communities within which we operate, both present and future. We are committed to help secure a better, more sustainable future for all through the advice that we provide and the example that we set. Our direction:

• We will work with our clients to pursue, promote and develop sustainable business outcomes.

• We will set a strategy and reporting procedures that will ensure continual improvement of our sustainability performance.

• We will ensure that our staff are involved in the implementation of this policy and have a comprehensive understanding of sustainability and climate change and how this affects property.

• We will be an advocate for sustainability in the wider business community by actively engaging with our suppliers and business partners to develop the values and approaches that will help to deliver a more sustainable society.

We are committed to the communities in which we live and work. We understand the impacts we create on the local community in the everyday running of our business.

Our direction:

• We will continue to encourage those employees who like to involve themselves in public and charitable service.

• We will continue to give our time and expertise for free to local community groups and voluntary organisations.

• We will aim to build long-term relationships with our suppliers and support small and local businesses.

• In our charitable giving we aim to work together with charities and create a partnership that is in tune with our business values.

• Conducting health camps, awareness programs like Diabetes, Cancer, HIV, Tuberculosis etc… across globe

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Introduction:

Why an Environmental Management System is Important for Healthcare Facilities Healthcare facilities:

Generate hazardous and non-hazardous waste, air emissions, and wastewater that can, if not properly managed, contribute to air, water, and soil pollution rank second only to manufacturing facilities in electricity usage per square foot, in the HCG must comply with a growing number of increasingly complex regulations can — with help of this manual and other tools — strive to proactively minimize pollution, while increasing the quality of care, reducing risk and saving money.

By implementing an environmental management system in healthcare facility can prevent pollution, and analyse and potentially address the life-cycle impacts of the products and services. This will allow them to more effectively comply with applicable regulations, foster good community relations, provide better healthcare services, and stay competitive within the industry

What is an Environmental Management System and How Can It Benefit Healthcare Facilities and Their Patients?

An environmental management system is a framework for continuous improvement that encompasses:

- establishing an environmental policy
- assessing the impacts of the organization on the environment
- implementing standards, programs and procedures
- raising awareness and changing behaviours
- measuring and auditing results
- reviewing progress and revising the environmental management system as needed

In essence, an environmental management system enables a facility to transform its environmental goals into reality.

The potential benefits of an environmental management system for the healthcare industry and the public are great. Waste disposal, energy consumption and wastewater are major hospital costs with significant potential for environmental impacts. Many healthcare facilities are unaware of the environmental effects they may create. They may not have an infrastructure or organization that includes environmental program management, or are not budgeted to implement efficient environmental management programs.

With an environmental management system, a healthcare facility can:

- identify and reduce environmental pollution

- reduce energy, water and waste disposal costs
- control the handling of hazardous substances
- limit air emissions
- improve the quality of patient care
- enhance its image as an ethical, responsible community business
- comply with applicable laws and regulations
- reduce operating costs

A healthcare facility should commit to improving its environmental performance by encouraging all employees to actively strive to reduce pollution, improve performance and cut costs. The sooner an environmental management system is established, the better positioned the facility will be for accessing future innovations and complying with new regulations.

HCG Hospitals as "Role Models"

HCG Hospitals can serve as environmental role models, for their staff, patients, visitors, and the general public by:

- designing and maintaining energy-efficient buildings
- implementing programs to conserve energy and water
- using non-disposable, multi-use materials
- recycling paper products and packaging
- serving non-packaged food

Hospitals as well as their staff can serve as "positive examples" by promoting understanding and acceptance of environmentally responsible behaviour.

Environmental Impacts and Prevention

As preventive healthcare promoters, hospitals must lead the way in environmental awareness and protection — especially now that man-made pollution has been potentially associated with increases in certain types of human illnesses, such as cancer, neurological, reproductive and developmental effects and allergies. The recent growth of environmental medicine as a medical specialty reminds us to carefully address and monitor environmental conditions in hospitals.

Evaluating and Benchmarking Environmental Impact

Hospitals regularly consume more energy and water, and generate more waste, than many other industries. To control costs and environmental pollution, Hospitals should develop guidelines for conserving energy and water, and for using more environmentally friendly products.

Environmental Impacts

Hospitals must explore new and more efficient environmental management techniques to reduce pollution and cut costs. Hospitals can become more competitive by reducing the amount of natural

resources they use. In turn, they will end up with more capital to invest in new technologies and research.

Energy Consumption

Many hospital managers have reported that their environmental management plan saves primary energy costs. Implementing simple energy conservation techniques (for which no special budget should be needed) can save 10% of primary energy consumption. To identify areas of potential savings, high-cost energy categories should be targeted and monitored.

Tracker for Energy consumption for HCG hospitals to be add

S.No	Energy Consumption area	Running Hrs.	Units of consumption / Day
1	Electricity		
2	Fuels		
3	Ventilation		
4	Lighting		
5	Cooling		
6	Lifts		
7	Hot water		
8	DG		
9	Others		

Water Consumption

HCG hospitals typically use 350 – 550 liters. of water per bed per day. Water use is driven by the number of inpatients and outpatients, equipment used, facility size, number and types of services, facility age and maintenance requirements. Other contributors include steam sterilizers, autoclaves, medical processes, heating ventilation and air conditioning (HVAC), sanitary, x-ray equipment, laundries and food services. It is recommended that all these areas be evaluated to identify activities to help reduce water consumption.

S.No	Water Consumption area	Water Meter reading INITIAL	FINAL	Units of consumption / Day
1	Sanitary			
2	HVAC			
3	Medical process			
4	Laundry			
5	Cafeteria / Food service			
6	Misc / unaccounted			

Waste Management

Solid waste accounts for the majority of potential healthcare industry pollution.

S.No	Waste Generation	Kg/ Bed / Day
1	Paper	
2	Glass	
3	Metal	
4	Plastic	
5	Garden	
6	Diapers	
7	Food & Other organic	
8	Other	

While most hospital waste is similar to household waste, regulated medical waste (hazardous waste) accounts for hospital waste. I.e, infectious, pathological, and chemical waste may be categorized as hazardous waste. Solid waste accounts for the majority of hospital waste disposal costs. Regulated medical waste, more costly disposal expense, can also offer major cost savings opportunities. Effective waste management reduces costs, contributes to a healthier, cleaner world and may help protect the facility from fines or litigation.

Water Management

It is a well-known fact that every living thing is dependent on water for its very existence. Although about 70 percent of the world's surface is covered with water, most of it is too saline to drink or even use for agricultural or industrial purposes. Many parts of the world are water stressed, and the ever-increasing population intensifies the problem. Prudent use of this invaluable natural resource is essential from a resource conservation perspective.

Water Use

To identify areas to reduce water use, meters should be installed in departments that potentially utilize/consume larger amounts of water (laundry, sterilization, power plant, workshops, and technical areas).

Ask employees for ideas on how the facility could reduce water consumption. Organize a water saving competition, or offer employees incentives to reduce water consumption.

A number of opportunities are available for reducing water use, including:

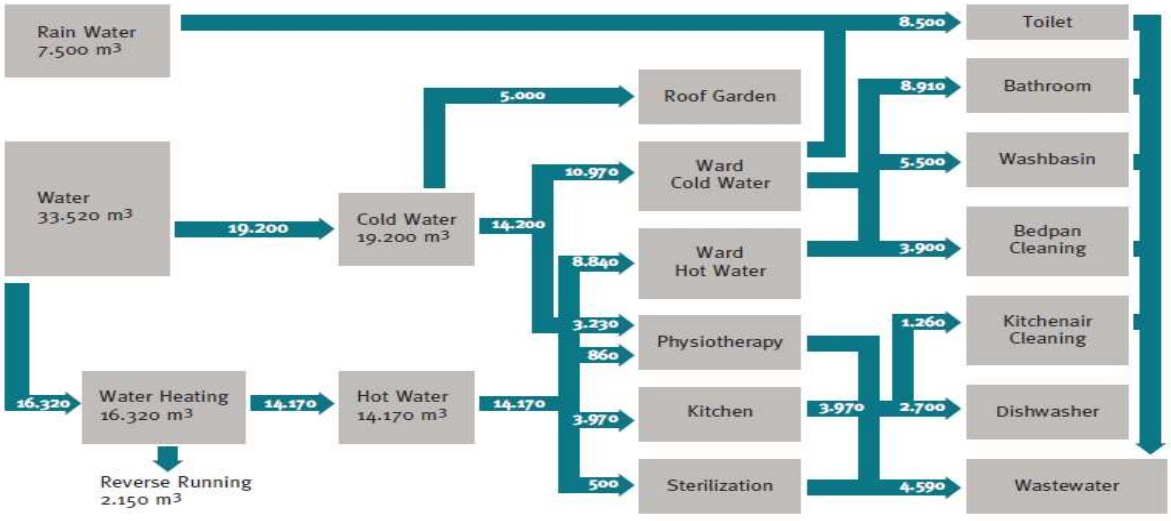
- autoclavable bubble fittings that inject air into the water stream
- electronically controlled valves that open only when a person washes his/her hands, and close as soon as the hands are withdrawn
- automatic water volume controls that operate independently of the water pressure to control the amount of water
- shorter hand-wash cycles (reducing the time the water runs from three minutes to one minute results in savings of about 16 liters of water per hand-wash)
- reduced-flow showerheads, thermostats, and single-lever fittings or self-closing mixing taps, saves as much as 50 liters per shower
- waterless urinals
- water containing cisterns, normally set for a capacity of 10 liters, may be reduced to 6. (Short-flush buttons allow the flush water volume to be controlled individually depending on the need. As a rule, these kinds of investments are amortized within the first couple of years after installation.)
- less unnecessary cleaning
- cisterns to collect rainwater for irrigation

Wastewater

Hospital staff should understand that pharmaceuticals such as antibiotics, cleaning agents, and other environmental pollutants, could potentially affect the ability of microorganisms to break down and detoxify waste in sewage-treatment plants.

Pathogenic microorganisms, such as salmonella bacteria and hepatitis viruses may be found in typical city wastewater and are, therefore, not regulated in most areas. Some wastewater streams may carry extraordinary types or amounts of pathogenic microorganisms and, therefore, may need to be segregated and isolated. Effluent should be examined to determine if additional precautions need to be put in place (e.g., isolation wards).

Sample



- are likely to impair the condition of the water in the long term (e.g., disinfectants)
- are likely to form poisonous, malo
-
- dorous, or explosive vapors (e.g., methanol or formaldehyde concentrates) in large quantities
- may have any other environmentally harmful effects

In principle, it should always be assumed that waste materials, until properly evaluated, should not be disposed of in the wastewater system.

Water and Wastewater Management

HCG strives to:

- use water resources carefully
- reduce wastewater pollutants
- monitor and control water cycles

To reduce volume and improve quality of wastewater, hospitals should assess and monitor:

- water consumption
- wastewater quantities and quality
- wastewater sources
- partial flows
- ecological improvement

Wastewater sources should be determined, and potentially harmful substances identified that may contaminate the water (for example, disinfectants, cleaning agents, cytostatic and antibiotic agents) (see 5.1 Hazardous Substances). In hospitals with large radiological departments, at least 60 to 70 percent of organic halogen compounds in wastewater originate from X-ray contrast media containing iodine.

Potential chemical users should review material safety data sheets to identify hazardous substances prior to their purchase and delivery to the hospital.

A hospital's main wastewater discharge flow may not warrant pre-treatment (except neutralization or radioactive decontamination). However, partial flows from hospital functional areas (e.g., laboratories, oncology, and pathology) should be carefully evaluated for opportunities to reduce discharge and improve quality.

Organic halogen compounds:

Hospital wastewater, with respect to chemical oxygen demand (COD), biological oxygen demand (BOD), pH, and conductivity, resembles the household variety. However, it can differ greatly from domestic effluents with respect to organic halogen compounds, which have very low chemical and biological degradability, and often have high toxic and ecotoxic potential.

Organic halogen compounds in wastewater can originate from elementary chlorine ("active chlorine") or reagents that split off elementary chlorine (such as sodium hypochlorite). Opportunities for using less laundry chlorine bleach should be sought — perhaps by changing the wash cycles or by dosing at certain points in the cycle. It may also be feasible to use oxygen based products, such as hydrogen peroxide ("perhydrol"), percarbonate or peracetic acid, that do not contribute to organic halogens.

Drugs containing halogens (fluorine, chlorine, bromide and iodine) usually have an insignificant environmental impact because they are not disposed of in wastewater. In contrast, organic iodine X-ray contrast media can be found in high concentrations in hospital effluents. Halogenated solvents (chloroform, methylene chloride, frigene), or reagents containing halogen from laboratories can raise organic halogen concentrations in wastewater as a result of creating a vacuum over the solvents using a water jet pump. A downstream cooling trap can help to lessen this effect. To completely eliminate solvent releases, a vacuum pump should be installed in place of a jet pump. Cooling traps also help to reduce emissions.

Heavy metals

- Copper, chromium, lead, nickel and zinc are toxic, do not degrade, and can be a significant issue in wastewater treatment systems.
- Zinc ointments can be replaced with zinc-free ones.
- Mercury-containing drugs, diagnostic agents (e.g., Thiomersal®), disinfectants (Merbromin®, Mercurochrome® and Nitromersol®), and diuretic agents (mercurophyllin) should be avoided. At a university in Germany, the skin disinfectant Mercurochrome, reportedly accounts for 1-1.5% of the slurry pollution in the local treatment plant. Mercury thermometers should be replaced with digital ones. Dental treatment units should be equipped with amalgam separators.
- Hospitals are one of the few known sources of the heavy metal gadolinium (from nuclear magnetic resonance imaging) in wastewater. Little is known about gadolinium's environmental impact.

Disinfectants:

Discharging concentrates of disinfecting and cleaning agents should be avoided — particularly chlorine, phenols, quaternary ammonium compounds, and products containing nonylphenol (potentially estrogenic effect) and strong cleaning ingredients. When possible, non-polluting, cost-saving, thermal disinfection should be used instead.

Air Emissions

Hospitals contribute to air pollution indirectly by using electricity from fossil-fuel generating plants, and directly, by burning fuel for space heating and hot water.

Emissions from Power Generation and Consumption

Carbon dioxide (CO2) emissions from power plants cause significant air pollution and are associated with global climate change. Table 5.5 shows CO2 emissions in grams per kilowatt hour (g/kWh) generated by different energy sources.

CO2 Emissions per kWh Energy Consumption

Energy Type	CO2 in g/kWh
Natural Gas	200
Fuel oil – light	260
Fuel oil – heavy	280
External supply of electricity	492

for example, hospitals release nearly four million tons of CO2 annually from heat generation alone. They consume an average 26,000 kWh per/bed of thermal power each year — totalling an estimated 17 million megawatt hours (MWh) of energy for all hospitals.

Emissions Caused by Sterilizers for Thermally Unstable Materials

The use of toxic and mutagenic ethylene oxide gas as a “cold” sterilant should be minimized or eliminated. sterilization using ethylene oxide gas, and formaldehyde gas is effective but environmentally hazardous, and a health risk for employees. Less hazardous alternatives, such as hydrogen peroxide or low-temperature plasma sterilization, are available and should be considered for use.

If ethylene oxide gas is used, precautions should be taken to protect employees from exposure. Several chemical engineering methods “detoxify” ethylene oxide gas emitted from sterilization processes. The most widely used is a catalytic reaction that converts ethylene oxide into CO2 and H2O. Another method, involving exhaust-gas scrubbing, uses sulfuric acid to convert ethylene oxide into the less harmful ethylene glycol, emitting only CO2, H2O, and low concentrations of H2O2 (max. 0.056 mg/m3).

Emissions Caused by Anesthetic Gases

The most commonly used inhalative anesthetic agents are nitrous oxide, halothane, enflurane, sevoflurane and isoflurane.

Nitrous oxide (N2O), a breakdown-stable compound, reacts in the stratosphere with atomic oxygen to form NOx which, in turn, breaks down ozone.

Halothane, isoflurane and enflurane are partially halogenated inhalation anesthetics with ozone breakdown potential, and atmospheric "life spans" of 0.7 years, 2.0 years, and 2.4 years, respectively. However, the life spans of these gases are much shorter than those of gases like chlorofluronated hydrocarbons (CFC) which may range from 76 years for CFC 11 to 140 years for CFC 12. A shorter atmospheric life span coupled with a chemical structure that results in substantial breakdown before reaching the stratosphere, means that halothane, enflurane, and isoflurane have a much lower ozone breakdown potential than CFC (e.g., CFC: 100 %, halothane: 36 %, enflurane: 2 %, isoflurane: 1 %).

Some practical measures for reducing anesthetic gas emissions include:

- using vacuum (local exhaust) systems
- using no-mask anesthesia; if masks are required, use double masks
- checking appliances and connections regularly for leaks
- checking the tightness of the anesthesia appliances after each cleaning and after changing of hoses
- measuring room concentrations regularly for excessive emissions
- monitoring technical air units regularly to make sure they are working properly

It is also very important that the potential for employee occupational exposures be thoroughly assessed by qualified EHS personnel.

Emissions Caused by Traffic

Employees, patients, and visitors should be encouraged to use public transportation, perhaps by offering various incentives. Fewer parking lots will be needed, and there will be a healthier environment with less auto emissions into the hospital ventilation system.

Other Atmospheric Emissions

Powder-based inhalers should be used instead of dosed aerosol dispensers with halogenated hydrocarbons. (Halogenated hydrocarbons are still used as propellants mainly in dispensers for broncholytic / antiasthmatic agents.)

Emissions Caused by Hospital Incinerators

Incineration may produce toxic air emissions by: 1) releasing the pollutants contained in the waste stream, such as mercury and other hazardous materials, and 2) creating new toxic compounds, such as dioxins, from the burning process itself. These toxic air emissions may potentially affect the local environment and, in some cases, the global environment. Incineration may also produce toxic ash

residue as a by-product. The ash residue is often sent to landfills for disposal, where the pollutants can leach into groundwater. Waste treated by other methods and then landfilled may also produce potentially harmful leachate. Many, if not most, on-site medical waste incinerators not only burn infectious waste, but also readily recyclable items such as office paper and cardboard which could be profitably recycled. Incineration plants should be designed according to local regulations, employ current technology, and be built by a competent contractor.

Environmentally Preferable Purchasing

Purchasing departments should be educated and trained on the procurement of environmentally "friendly" products. A procedure should be available that gives purchasing agents clear advice and requirements on preferred products and services. It is recommended that the life cycle of all products be evaluated to determine their impacts on the environment. Hospitals should strive to purchase products that do not contain persistent (never degrade),bio accumulative (are not excreted or metabolized) toxins, or PBTs. Some healthcare products contain PBTs, or can generate or release PBTs into the environment when they are manufactured, used, discarded, incinerated, or recycled. See below table for PB T-free alternatives.

Product	PBT's	PBT-free Alternative
Batteries	Antimony, Cadmium, Lead, Mercury, Nickel	PBT-free batteries and other power sources (such as fuel cells) are available for some equipment. Set up a program in your facility. For more information about recycling or rechargeable batteries.
Blood-pressure equipment	Mercury	Mercury-free aneroid and electronic blood pressure units (sphygmomanometers) are accurate, available, and widely used.
Diesel fuel used to power generators, vehicles (non-emergency) And other equipment	Antimony, Arsenic, Beryllium, Cadmium, Cyanide, Dibutyl phthalate, Di(2-ethylhexyl)- phthalate (DEHP), Dioxins, Lead, Mercury, Naphthalene, Nickel, Phenol, Polychlorinated dibenzofurons (PCDFs), Poly- cyclic aromatic	Institutions that buy or lease shuttle buses and other vehicles should specify that they run on compressed natural gas (CNG) whenever feasible. For more information on the advantages of CNG, see INFORM's Bus Futures report (2000). For existing diesel-powered vehicles and equipment, consider adding biodiesel fuel. Some generators and other equipment may be able to be powered with hydrogen fuel cells or other energy source(s).

	hydrocarbons (PAHs), Selenium. Diesel exhaust contains all of the PBTs listed plus other cancer-causing substances.	
Fever and laboratory thermometers	Mercury	Electronic, gallium-tin, and other types of thermome ters are available for most medical and laboratory uses. Avoid replacing mercury thermometers with instruments that contain mercury batteries or have PVC (vinyl) casing.
Gastrointestinal and feeding tubes	Mercury	Tubes weighted with tungsten or water are used in many hospitals today.
Laboratory chemicals	Mercury	Many laboratory reagents use mercury-based preservatives for calorimetric assays and tissue fixing. Mercuryfree alternatives are available for almost all of these applications. Mercury can also be a contaminant in many reagents. Massachusetts has created a database listing the mercury content of chemicals used in hospitals
Vinyl IV and feeding bags	Di(2-ethylhexyl) phthalate (DEHP), Dioxins plasticizers, which may potentially leach into bag contents.	When incinerated, vinyl (PVC plastic) may create dioxins that are released into the air. Vinyls also typically contain DEHP or other phthalate. Polyolefin plastic or other alternatives to PVC are available for many medical applications.

Hazardous Substances

The definition and classification of a hazardous substance varies throughout the world. However, the management of these substances is an essential part of a hospital's day-to-day activities. Proper registration, handling, and training are necessary to guarantee a safe work-place and to prevent potential risks to employees, patients and the environment.

Hazardous Substances and Risks

Potentially hazardous substances used in hospitals may include halogenated and non-halogenated organic compounds (e.g., solvents), inorganic compounds, caustic materials (acids/bases), prescription pharmaceuticals, disinfectants or other compounds that may be car-cinogenic, mutagenic, or reproductive toxins.

Some examples of potentially hazardous substances handled in hospital environments that should be assessed, monitored, and controlled include:

- fixer and developer baths from X-ray departments
- heavy-metal-based compounds containing silver, lead, copper, cadmium, chromium, mercury, or manganese
- reactive/explosive substances such as azides and peroxide compounds such as hydrogen peroxide, perchloric acid, peracetic acid, and perborates
- hazardous microbiological cultures, dyes and solvents (gentian violet, etc.)
- tissue fixing chemicals (osmium tetroxide, aldehydes or ethidium bromide used in genetic analysis)
- substances from nuclear medicine/radiology (including radioactive substances and iodo-organic contrast media)
- used oil, thinners, varnish, and paint residues
- concentrates of disinfectants and cleaning agents, bleaches and detaching agents
- solvent mixtures (including turpentine and nitro thinners)
- sterilization gases (for example, ethylene oxide)
- anesthesia gases
- formaldehyde (formalin), ethanol, and xylene from pathology operations

Managing Hazardous Substances

A critical part of any environmental management system includes strict standards that must be set and followed for hazardous substance management. Written procedures should be developed for receiving, handling, storage and disposal. To make the process complete, the purchasing department should also be integrated into the system. All potentially hazardous sub-stances should be evaluated and approved before being used. Information on potential hazards is available from material safety data sheets (MSDS) provided by manufacturers or vendors.

A written procedure for safely managing a hazardous material in a healthcare facility includes:

- work area and place of work/activity
- environmental and human risks
- emergency instructions and first aid
- substance description (chemical and synonym)
- protective measures and handling instructions
- proper disposal information

A registry of environmentally hazardous substances and materials used by a healthcare organization should be created to include:

- name of compound
- hazardous classification

- usage (process, amount per year)
- safety and environmental precautions required
- waste disposal requirements
- medical surveillance required

All hospital departments and functional areas should be examined for the presence and use of hazardous substances.

Minimizing the Use of Hazardous Substances

Highly hazardous substances — e.g., benzene, chromosulphuric acid, mercury, chrome VI compounds, and hydrazine — should be replaced with less hazardous ones whenever feasible. Benzene, for instance, can often be replaced with less hazardous toluene or xylene. Since many pesticides are considered hazardous substances, an integrated pest management plan may be utilized to reduce/eliminate the use. Hazardous substances in hospitals may be mutagenic, carcinogenic, or reproductive-toxic. Staff should be trained on how to safely use potentially hazardous substances.

Waste Management

The shortage of landfill space, and waste incineration facilities, and the increasing environmental awareness of the general population is causing waste disposal to become ever more controversial and expensive.

Therefore, in priority order, prime waste-management criteria include:

Avoidance	Reuse	Recycling	Proper disposal

Developing an action plan is a key element to waste management and should include:

- avoiding waste by modifying a process/procedure (for example, emphasize electronic rather than paper record-keeping systems)
- buying environmentally friendly products
- managing waste (separation of different kinds of waste; recycling)
- examining materials to see if they pose a potential risk for the environment before purchasing or using them
- reducing the amount of polyvinyl chloride (PVC) containing products or equipment
- identifying toxic substances, including lab chemicals and reducing the amount used; not using persistent bio-cumulative toxins (PBT)
- evaluating waste and waste sources regularly and looking for opportunities to sell waste

Waste Avoidance

All products used should be evaluated for environmental friendliness. It may be found that some of them are not needed or can be replaced with less wasteful ones. Again, it is critical that the purchasing department is integrated at a very early stage.

Examples:

- reduce or eliminate the use of disposable overshoes since many hygiene experts agree they are not needed to maintain good hygiene. Please note, however, that in areas where chemotherapy is being administered, overshoes may be recommended as a strategy to control surface contamination.
- consider using empty cleaner or disinfectant containers as syringe disposal bins, provided they are puncture resistant, properly labeled, and sealed before disposal
- avoid unnecessary packaging
- consider changing infusion systems and dressings in the nursing sector less often, i.e., every 72 hours24, since studies suggest this can be done without risk of infection
- help avoid expired chemical laboratory waste by buying limited quantities to meet immediate needs
- establish a chemical exchange program whereby surplus chemicals that are still usable are passed on to other users

The following Table provides some examples of disposable medical products and possible alternatives

Disposable Product	Alternative
Suction hoses and appliances,	Reusable
Respiration hoses	
Respiratory trainer	Reusable
Body bags	Use PVC free bags, made of polylefin film
Office supplies	Look for supplies that do not contain PVC
Blood bags	Utilize non-PVC bags
Abdominal sheets	Reusable
Bed cover cowlings	None, or bed covers
Disposable razors	Reusable razors, electric razor
Disposable scissors, disposable pincers	Reusable
Disposable slips	String slips, or none
Disposable draw-sheets (Moltex)	Reusable (no PVC), or none

Infusion bottle holders	Reusable
Catheter sets	(Own) assembly
Forceps unit, remover	Reusable
Medicine cups	Reusable
Knives, scalpels	Reusable (metal)
Oral hygiene beakers	Reusable
Kidney bowls	Reusable (metal), recycled carton depending on use and preparation
Redon bottles	Reusable
Oxygen masks	Reusable
Infant feeding bottles	Reusable
Dummies	Reusable
Spatula, mouth spatula, non-sterile	Reusable (metal, plastic)
Thermometers	Mercury-free thermometers, electric thermometers
Thermometer sleeves	Only rectal use, wipe thermometer with isopropylene alcohol
Thorax drainage	Reusable
Face flannels, gloves	Reusable
Laundry bags	Textile bags
Diapers	Reusable (cotton)

To eliminate cross contamination, any articles being r eused must be cleaned, disinfected and, if necessary, sterilized, which may cost more, and/or be less environmentally friendly, than using a disposable product. This needs to be investigated on a case-by-case basis.

Investigations in Germany showed that by re-using redon bottles, thorax bottles, and suction systems, healthcare facilities can save about 50% or more when compared to the costs for using the same disposable items.

Waste Re-use and Recycling

The following wastes should be collected for recycling:

- paper, cardboard, cartons

- glass (white, brown, green)
- certain plastics, including expanded polystyrene (Styropor®)
- metal
- office equipment
- organic waste (e.g., flowers)
- food leftovers
- textiles
- electronic scrap
- scrap metal
- fluorescent tubes
- used solvents
- fixing and developer chemicals
- radioactive chemicals

Recyclable materials should be collected in areas where they accumulate (for example, store, kitchen, laundry, pharmacy, and workshops) and then delivered to central storage areas to be prepared for transportation.

If a facility stores any hazardous substances for recycling or re-use, the storage area should be evaluated to determine if special requirements are necessary (for example, special storage containers).

Waste Disposal

Non-hazardous hospital waste

can be disposed of with normal domestic waste

Infectious waste

Possible disposal methods for infectious waste include:

- pre-treatment (disinfection) prior to disposal together with normal domestic hospital waste; thermal disinfection using steam is the most cost-effective
- incineration

Chemical Waste

Certain groups of chemicals require special disposal procedures.

Group	Examples:
Solvent, halogen-free, water soluble	Methanol, Ethanol, n-Propanol, Isopropanol, Acetone, Acetonitrile, Tetrahydrofuran, Acetone, Ether

Solvents, halogen-free, non-water soluble	Ethyl acetate, Xylene, Toluene, Rotihistol
Halogenated solvents	Chloroform, Dichloromethane, Carbon tetrachloride. Trichloracetic acid, Trifluoracetic acid, Chloronaphtol
Rinses and washes	Saline solutions, Buffers, Formaldehyde solutions, Aqueous dye solutions
Rinses containing cyanide	
Acids	Hydrochloric acid, Nitric acid, Sulfuric acid, Perchloric acid, Acetic acid, Formic acid, Propionic acid
Alkalines	Caustic soda, Potash solutions, Ammonia solutions
Ethidium bromide wastes	
Old and/or expired disinfectants	
Old and/or expired cleaning agents	

It is recommended that you check with pharmaceutical companies for specific information on

proper disposal of expired product. Pharmaceutical waste should be disposed of properly according to local regulations and requirements.

Other waste

- Other types of waste may also require special disposal, including batteries (wet and dry), mercury, and residues and products containing mercury (e.g., mercury thermometers, vapour lamps, and fluorescent tubes).

Radioactive waste

- Healthcare facilities have the potential to use a variety of products and devices that contain varying types of radioactive materials. Eventually, these products and devices become radioactive waste as shown in the following table.

Type of Waste	Radionuclides
Radiopharmaceutical product and vials	Thallous-201 Chloride (Tl-201), Gallium-67 Citrate (Ga-67), Xenon-133 Gas (Xe-133), Technetium-99m (Tc-99m) in eluate and lyophilized vials
Mo99/Tc99m Generators	Molybdenum-99/Technetium-99m (Mo-99/Tc-99m)

Contaminated trash (e.g., gloves, lab coats, wipes, papers, etc.)	Same as above
Contaminated syringes and other sharps	Same as above
Contaminated body fluids (e.g., blood, urine, feces, etc.)	Same as above
Wastewater (from Nuclear Medicine department sinks)	Same as above
Instrument calibration sources	Cobalt-57 (Co-57), Cesium-137 (Cs-137)

Waste Disposal

Products:

- Used radiopharmaceutical products and vials
- Tc-99m eluate vials
- Lyophilized drug product vials (containing Tc-99m)

Disposal:

Used vials should be stored in their original lead-shielded containers, using additional lead shielding if necessary, for at least ten half-lives; then monitored with a suitable radiological survey instrument (see following Table 5.4 for a partial list of radionuclide half-lives).

Radionuclide	Half-life (rounded to nearest whole hour)
Tl-201	73 hours
Ga-67	78 hours
Xe-133	126 hours
Mo-99/Tc-99m (generators)	66 hours
Tc-99m (in vials)	6 hours

If no radioactive material is detected:

- Vials should be removed from their lead containers
- Labels should be defaced to obliterate the radiation symbol and words “radioactive material”; the lead shield is considered hazardous waste and should be sent to a licensed lead recycling facility or returned to the product manufacturer
- Vials should be disposed of with normal glass waste If radioactive material is detected during the monitoring, vials should be held for further decay, and surveyed prior to disposal.

Mo-99/Tc-99m Generators:

Storage: Because they contain large amounts of radioactive material, Mo-99/Tc-99m generators should be stored as far from the routine operating area as possible, with additional lead shielding, to minimize radiation exposure to workers and patients.

Disposal: Generator manufacturer should be consulted to discuss disposal options. (Some manufacturers offer a generator-return service, whereby generators are sent to licensed radioactive materials facilities for breakdown, lead-recycling, and radioactive- component disposal.)

Contaminated Trash (with short-lived radioactive material):

- Should be stored in an appropriate receptacle for a minimum of 10 half-lives and _ Monitored with a suitable radiological survey instrument — and if no radioactive material is detected, dispose of with normal hospital trash

Contaminated Syringes and other Sharps (with short-lived radioactive material):

- Should be stored in an appropriate sharps container, using lead shielding as necessary, for at least 10 half-lives and
- Monitored with a suitable radiological survey instrument and, if no radioactive material is detected, dispose of along with normal syringe waste

Instrument Calibration Sources:

Disposal: Manufacturer should be consulted for return and proper disposal.

Storage: Instrument calibration sources contain long-lived radionuclides, making them useful for a long time. They typically contain Co-57 and Cs-137, half-lifes of 271 days and 30 years, respectively. They may also contain millicurie quantities of radioactive material. They should be stored well-shielded and away from immediate work areas, to minimize radiation exposure to hospital personnel and patients.

Energy Management

Energy conservation saves money, and helps organizations be more competitive. To begin saving energy, an Energy Management Team is needed to:

- audit energy use
- identify areas/equipment/systems having maximum energy consumption
- develop and implement projects such as buying and installing energy-efficient equipment
- perform preventive maintenance
- consult with experts on energy conservation ideas
- implement a program for energy savings
- meet periodically to review programs and seek management assistance as required
- keep the process moving

After identifying areas of opportunity where energy consumption can be reduced, the team should set goals, develop a plan of action, calculate potential cost savings and outline achievable short- and long-term benefits. Actions should include:

- inspecting or installing a combined
- evaluating energy-consumption profiles for heat and power system office equipment, motors, steam, services, etc.
- inspecting and cleaning HVAC systems
- improving lighting efficiency
- improving heat insulation

Combined Heat and Power Systems

Combined heat and power systems can reduce energy use by simultaneously generating electricity (and/or mechanical energy) and thermal energy. They recover waste heat and reduce energy use. Systems should be inspected and regularly maintained.

Heating Ventilation and Air Conditioning Systems

Opportunities for reducing heating ventilation and air-conditioning costs may include:

- re-circulating air
- reducing air-supply volume
- adjusting optimum temperature
- installing variable air-handling units
- recovering heat from exhaust air
- improving building insulation

Lighting

Electricity costs may be reduced by replacing incandescent (bulbs) with fluorescent lamps,

reducing overhead lighting, installing motion-sensors on light switches, using T5 lamps, incorporating monitoring of lighting-control settings and natural light (daylight) into new buildings or building renovations.

Alternative Energies

Solar panels can greatly reduce the amount of fossil fuel used. In Germany, and in certain other parts of Europe, solar panels for hot water production are widely used. Wind and geothermal energy should also be considered as potential energy sources.

Additional Energy Saving Tips

For Building Engineering, Use:

- site selection for best building location
- compact building design
- energy-favorable layout
- heat-storing materials
- protective thermal glazing
- solar protection systems (e.g., outside
- brightly-colored facades blinds) to avoid thermal loads
- natural lighting (i.e., daylight)
- “green building” design criteria

Design of new buildings and major renovations provide a healthcare facility with an opportunity to incorporate green/environmental principles into its design, construction, and operations.

For Heating Engineering, use:

- solar collectors for hot water
- several small boilers in lieu of one
- night-time temperature lowering large boiler for load-dependent operation thermostats
- thermal insulation on pipes, heat
- adequately sized hot water storage tanks generators, and storage units

For Electrical Engineering, buy or install:

- modern lighting elements with
- use-dependent controls (daylight better light yield and/or motion sensors)
- electronic ballast units
- power-efficient instruments, equipment and appliances
- night switch-off

For Air Conditioning Engineering, check:

- specific room parameters (temperature,
- air flow reductions in fume hoods and humidity, air exchange) bio-cabinets when not in use
- control settings (temperature, humidity)
- use absorption refrigeration machines
- lagging/insulating pipes and conduits
- heat-recovery preheat loop
- air flow reductions are in place when
- variable speed pumping rooms are unoccupied _ cooling coil condensate recovery

Additional miscellaneous strategies for saving energy:

- use of photo-voltaic panels to generate electricity
- use of trees and plants to reduce solar gains and block winds
- supply air located on windward side to increase positive pressure
- increased duct size and reduced sharp turns within ductwork to reduce pressure drops
- fan size matched with fan loads
- motor controls installed to reduce the speed of electric motor systems
- installation of a building automation system
- films on the windows to prevent heat loss
- option to use both mechanical and natural ventilation
- reduced redundancy in controls and equipment
- multiple circuits to turn lights on and off

Indoor Environmental Conditions

The temperature and humidity and indoor air quality inside our workplaces is critical to ensure Associate and visitor comfort. The conditions that will be maintained inside our workspace will be as per the following guideline.

SPACE OCCUPANCY TYPE	ROOM TEMP oC RANGES	RELATIVE HUMIDITY %	REMARKS
WORKSTATION AREAS	24-26	NOT CONTROLLED	TO BE MEASURED INSIDE WORKSTATION AREA
CANTEEN	24-28	NOT CONTROLLED	
COMMON AREAS			NOT AIR CONDITIONED
UPS ROOM	24-25	NOT CONTROLLED	TO BE MEASURED AT AIR INTAKE OF

			UPS
UPS BATTERY ROOM	24-25	NOT CONTROLLED	TO BE MEASURED AROUND BATTERY RACKS
DATA CENTER	22-26	40-60	TO BE MEASURED AT AIR INLET OF RACKS
SWITCH ROOMS	24-26	NOT CONTROLLED	TO BE MEASURED AT AIR INLET OF RACKS

All our facilities are equipped with Air conditioning equipment to maintain the above conditions. Depending on the size and occupancy of the building, the type of cooling equipment used will vary from split AC's to centralized chilled water plant with dedicated Air handling systems.

The AC system will be switched on 1 hour prior to occupancy to ensure above conditions are met. This schedule will be developed in discussion with location project teams to ensure Associate comfort is ensured and wastage of electricity is minimized. AC's will be provided after business hours if one of the following conditions is met.

- Associates working in late shifts/ 24/7 (as their regular business hours) shall be supported with AC provision. This is irrespective no. of associates working on floor. The site condition to verify to operate AC judiciously and maintain comfort temperature
- 12 Hrs. for regular business hours timing (day time) operations on weekdays. The site condition to verify to operate AC judiciously and maintain comfort temperature
- Weekend AC support for non 24/7 support or Non business hours working if there is a 20 or above associates in each work area of AC system.
- If there is a client visit

Room conditions will be monitored by our facility maintenance technicians and recorded manually or using a Building Automation system if installed. The data will be recorded in a log book or saved in an electronic format.

Level of Carbon dioxide (CO2) is a good indicator of Indoor air quality. As per ASHRAE 62.1.2007 standard a level of 1000 ppm below will be maintained in our workspaces. This is ensured by introducing sufficient fresh air into the work space. Quarterly Indoor Air Quality surveys will be conducted by an outside certified testing agency to ensure proper air quality is being maintained in our facilities. The following parameters should be monitored as part of the indoor air quality surveys,
Ambient / Outdoor Sample Collection:-
At least one sample of CO2 should be taken at the entrance to the building or at the entrance of the fresh air intake
Indoor Sample Collection: - The sampling probe should be located between 75 and 120 cm from the floor at the center of the room or an occupied zone At least one sample should be taken from each floor or from each area serviced by a separate air handling unit

S.No	Parameter / Test	Units	Permissible Limit	Reference	Frequency

1	Oxygen (O^2)	%	19.5 to 23.5	OSHA	Yearly
2	Carbon monoxide (CO)	Ppm	<9 ppm for max 8 hrs.	ASHRAE 62.1.-2016	Yearly
3	Carbon dioxide (CO^2)	Ppm	<1000	ASHRAE 62.1.-2016	Quarterly & Yearly
4	RSPM	$mg.m^3$	5	ASHRAE 62.1.-2016	Yearly
5	TVOC (Volatile Org. compound)	Ppm	3	ASHRAE 62.1.-2016	Yearly
6	Temperature (T)	0C	23^0C – 26^0C in summers and 20^0C – 24^0C in winters	ASHRAE 62.1.-2016	Yearly
7	Relative Humidity [RH]	%	30 – 60	ASHRAE 62.1.-2016	Yearly
8	Ventilation Rate	Cfm/person	17	ASHRAE 62.1.-2016	Yearly
9	Total Bacterial counts	CFU/M3	500	AIHA	Quarterly & Yearly
10	Total Fungal counts	CFU/M3	500	AIHA	Quarterly & Yearly
11	Legionella	Cfu/Plate/10 Min	Absent	AIHA	Quarterly & Yearly

Lighting

Our facilities are equipped with modern office lighting design. The lighting is standardized as per IS 3646 and BIS standards which has a recommended range of lighting levels for all types of buildings including office buildings. Lighting is measured in terms of Lux. Recess Mounted Anti-Glare CFL luminaries is used in most workstation areas and CFL / TFL fixtures are used in common areas and corridors. The design and layout of the lighting is to ensure comfortable and safe work conditions, minimize health risks such as headaches, repetitive strain injury, and stress and eye fatigue. At least 20% of the fixtures would act as Emergency lighting and will be connected to UPS and light up during power failures before the alternative / captive power source is activated. Emergency Lux Level: - The emergency lux level inside office (working area) and common area inside building including Refugee area, Staircase, Vehicle Parking at basement shall maintain 10 lux

Luminaire maintenance will be done to ensure standard lighting levels are maintained. This is done by replacement of failed or flickering bulbs, damaged ballasts, bulbs which have reduced lighting output (aged ones) and by periodic cleaning of fixtures (its reflective optics, metal surface & diffusers). Track of the life of the bulb will be made to ensure that product failures before the committed life of the bulb is escalated back to the manufacturer.

Lighting levels in our facilities will be maintained as per following guideline

S.No	Workspace / Area Type	Lux Level range to be maintained
1	At Workstations, cabins, cubicles	250 - 300
2	Corridor inside office	150 – 200
3	Reception area	150 – 200
4	Rest rooms	100 – 150
5	Meeting rooms/conference room	300 – 350
6	Basement/Parking area	50 – 75
7	Electrical/AHU room	150 – 200
8	Data Centre/Switch rooms	300 - 350

For workstations Lux level should be measured at each individual seat on a Quarterly basis, no sampling check should be done for workstations.

Noise Level

The Indoor noise level inside workspaces will be maintained as per the following limits:
65dBA from 0600 to 2200
55dBA from 2200 to 0600
This will ensure the work environment is conducive to conducting daily business activities without causing undue stress to our associates. The check of noise level is done bi annually to ensure the noise level is within acceptable limits.

Lifts

All our facilities have dedicated elevators to haul men and materials and will function 24 hours these elevators are backed up by Diesel Generators. In the event of power failure, AMF Panels ensure a smooth changeover and the elevators are provided with Alarm to alert BMS and Maintenance personnel.

Pest Control:

HCG, As part of general office upkeep and maintenance, is responsible for pest control activities.

The following are the general pest control measures that HCG ensures:

Spraying of insecticide is done once a month. This is done on Friday nights (with due notice to Associates) in order to ensure minimum 'nausea effect'. Rodent Control Measures are carried out

once a fortnight. Traps are laid at specific points to trap rodents. These traps are removed the next day. These are carried out after office hours.

Valid contracts are in place to ensure that these are carried out with minimum hindrance.

Anti-Termite Measures are generally carried out on need basis and generally on weekends.

Fire Extinguishers:

As per the national building code guidelines, our office areas are considered high risk zones and classified under SH (special hazards) category. Every 500 square feet of floor area should be covered with an appropriate type of fire extinguisher.

Fire extinguishers are classified as follows

Class A
Ordinary combustibles or fibrous material, such as wood, paper, cloth, rubber and some plastics.
Class B
Flammable or combustible liquids such as gasoline, kerosene, paint, paint thinners and propane.
Class C
Flammable or combustible gases such as LPG, methane, ethane etc.
Class D
Certain combustible metals, such as magnesium, titanium, potassium and sodium. These metals burn at high temperatures and give off sufficient oxygen to support combustion.

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