

Guidelines – Environmental Management Tools

Issued by: Inspection Department – Operations Section

1.0 General

In order to improve industrial environmental performance cost-effectively, new environmental concepts, policies and management systems are being developed. This section introduces some of the main Environmental Management Tools (EMT) for awareness of PCFC clients.

Environmental management tools are structured with the overall aim of improving the environmental performance of industry. Thus, environmental management tools can be used by companies to monitor, better manage or improve their environmental performance.

The environmental management tools discussed here cannot be rigidly classified into different groups; there are overlaps between many of them, and most are still evolving. The descriptions that follow comprise basic definitions plus supplementary information illustrating how these tools are used in practice. The tools are presented in three groups - tools for action, tools for analysis and tools for communications. These tools can be used by industry for many benefits.

2.0 Tools for Action

2.1 Environmental Management Systems (EMS) / ISO 14000

An Environmental Management Systems (EMS) is that aspect of an organization's overall management structure that addresses the immediate and long term impact of its products, services and processes on the environment. It provides order and consistency in organizational methodologies through the allocation of resources, assignment of responsibilities, and ongoing evaluation of practices, procedures and processes.

An EMS is essential to an organization's ability to anticipate and meet growing environmental performance expectations and to ensure ongoing compliance with national and international requirements. EMS succeeds best when corporations make environmental management among their highest priorities.

ISO 14000 is an evolving series of generic standards being developed by the International Organizations of Standardization (ISO) that provides business management with the structure for managing environmental impacts. The standards include a broad range of environmental disciplines, including the basic management systems, auditing, performance evaluation, labeling and life – cycle assessment. ISO has assigned responsibility for the standard development to Technical Committee (TC) 207, which is made of sub committees and their working groups. The standards are basically of two types: guidance and specification. All the standards except ISO



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14001 are guidance standards. Companies register for ISO 14001- the specification standard for EMS.

PCFC recently received EMS ISO 14001 Certification and encourages companies to obtain the same, which can render them the following advantages:

- a. Improved environmental control;
- b. Integrated plant wide system;
- c. Ownership of environmental matters throughout the plant from the lowest level up;
- d. More cost efficient and environmentally effective plant production performance;
- e. Improved waste management; and
- f. Industrial respect and recognition.

EMS enables a firm to manage its environmental affairs in a planned and systematic way and thus identify those ways of improving its environmental performance that most benefit its business performance. In order to develop an EMS that meets the requirements of these schemes a firm must take the following steps.

- a. Produce an environmental policy that contains commitments to legislative compliance and to continually improve its environmental performance.
- b. Set targets relating to these commitments and device a programme for meeting these targets. Targets for improving environmental performance should be based on a comprehensive review of its environmental activities.
- c. Take measures necessary to implement the programme.
- d. Having implemented the programme, it needs to check that it has been successful in meeting its targets. Corrective action must be taken in instances where this is not the case. The EMS must be audited periodically to check it is functioning as it should.
- e. Finally, the firm needs to carry out a management review of the EMS, making any changes necessary in light of the audit results and changing circumstances. Having met its first set of targets, the firm must set itself a new set of targets so as to meet its policy commitment to continual improvement.

2.2 Integrated Pollution Prevention and Control (IPPC)



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Integrated Pollution Control (IPC) is the system by which the Authority regulates the largest and most polluting industrial processes. IPC is a permitting regime, under which no one may operate a process subject to IPC without an authorization issued by the Authority. The authorization must contain conditions based, primarily, on the use of the best available techniques not entailing excessive cost (BATNEEC) for preventing or minimizing polluting emissions, having regard to the best practicable environmental option (BPEO). Reductions in emissions secured through IPC make an important contribution to a number of environmental objectives, including those of reducing greenhouse gas emissions, acidification, dioxins and the precursors of low level ozone.

The Integrated Pollution Prevention and Control (IPPC) is derived in large measure from IPC itself, although there are some important differences.

IPPC requires to prevent or, where that is not possible, to reduce pollution from a range of industrial and other installations, by means of an integrated permitting process based on the application of “best available techniques” (BAT). This approach takes a wide range of environmental impacts into account – emissions of pollutants to air, water and land; energy efficiency; consumption of raw materials; noise and site restoration - with the aim of achieving a high level of protection for the environment as a whole. By implementation of IPPC industries would ensure to meet PCFC environmental requirements.

2.3 Cleaner Production

“Cleaner Production” is defined as the continuous use of industrial processes and products to increase efficiency to prevent the pollution of air, water and land, to reduce wastes at source, and to minimize risks to the human population and the environment.

On the other hand industrialization has proven to be at some cost to public health and the environment. When no care is taken this is especially true. When end-of-pipe pollution controls are added to industrial systems, less immediate damage occurs. But these solutions come at increasing monetary costs to both society and industry and have not always proven to be optimal from an environmental aspect. End-of-pipe controls are also reactive and selective. Cleaner production, on the other hand, is a comprehensive, preventative approach to environmental protection. It requires people to be creative and to investigate all phases of manufacturing processes and product life cycles, including product usage in offices and homes. Cleaner production, thus, encompasses such actions as energy and raw materials conservation, eliminating toxic substances (as raw materials and as product constituents), and reducing the amount of wastes and pollutants created by processes and products, thereby lowering the amounts emitted to air, land and water. Following requirements would apply:

- a. It shall be an offence to cause the pollution of any segment of the environment or to do any act or thing likely to cause the pollution of any segment of the environment.
- b. In addition to the general provision of above item the following actions shall be deemed to be pollution of the environment.



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- Disposal of any solid or liquid waste to the land environment at a site not approved for that purpose by DM/PCFC.
 - Abandoning any wastes or chemical substances.
 - Placing any wastes or chemical substances in a place where there is a risk of them entering any segment of the environment and affecting any protected beneficial uses.

 - Emitting any substance to the air environment which affects the health or wellbeing of human beings.
 - Discharging oil to the water or land environment.
 - Emitting odorous substances into the air environment, which are deemed by the Authority to be offensive to human beings.
 - Discharges any oil, oily waste, waste water or solid waste from any vessel to the waters of PCFC.
- c. Where in the opinion of the Authority, a waste discharging from any premises is causing or is likely to cause the pollution of the environment or a condition of the environment unacceptable to the community; he may issue an order to cease that discharge immediately.
- d. Where a person receives an order under above item and that person does not act to cease the discharge in accordance with the order, that person shall be guilty of an offence and the Authority may take action to disconnect services to the premises and suspend the activities at the premises.

2.4 Waste Minimization

Waste minimization means the reduction of waste to the extent feasible at the source. It is based on the belief that prevention is better than cure. JAFZ industries should make use of Reduce, Reuse and Recycle (RRR) options. Following requirements would apply:

- a. The occupier of any premises which emits waste to the air environment or generates any solid or liquid wastes shall employ good control practice as a minimum requirement to control the activities at that premises.
- b. The waste generator shall have a duty of care to ensure that all wastes approved for disposal are securely packaged and loaded and reach the designated disposal facilities without alteration or loss.



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- c. Any person handling wastes at any site, where these wastes were not generated by operations under that persons control at that site, must hold a permit from the DM/PCFC specifying:
 - The type of waste permitted to be handled
 - Quantity which may be handled
 - How the waste must be handled
 - The information which must be collected and reported
- d. Any person generating any wastes must conduct an analysis of those wastes and report on the quantity and quality of those wastes, if directed by DM/PCFC.
- e. All industrial premises in the Free Zone shall conduct their activities in such a way as to minimize the quantities of waste produced to the maximum extent practically achievable based on accepted cleaner production standards for that industry.
- f. The competent department may require the occupier of any premises to prepare a waste audit and waste reduction plan to implement above item.
- g. The Authority may refuse any application for a new industrial or trade premises where it can be demonstrated that discharges or wastes from the project exceed the industry benchmark or an alternative lost waste technology is capable of achieving comparable output and product quality, unless the proponent modifies the proposed process.

2.5 Land Restoration / Remediation

PCFC believes that the land allocated to the clients must be used so that proper measures are taken to avoid contamination of the same. Upon permanent closure it is client's responsibility to restore the site to the Authority's satisfaction before closing operation. Following requirements would apply:

- a. Any person who has caused pollution of any segment of the environment or any person who has done any act or thing which is likely to cause the pollution of any segment of the environment may be directed by notice in writing from the Authority to clean up the segment of the environment so affected or remove any material or wastes likely to cause pollution of the environment.
- b. A notice to clean up any segment of the environment may specify:
 - A time limit within which a clean up must be completed
 - Requirements for sampling and testing



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- Standards prescribing acceptable residual levels in the environment
 - The means by which any wastes are to be treated and disposed of
 - Any procedures for conducting the clean up
 - Any requirements for protecting the health and safety of workers conducting the clean up
- c. When in the opinion of the Authority, the cleanup of any segment of the environment is an urgent matter to protect that segment from pollution or protect the health of any person, the competent department may conduct the clean up or direct any other person to conduct the cleanup and may recover all costs from the person proven to have caused the pollution or risk of pollution to occur.
- d. It shall be an offence to fail to carry out a cleanup of any segment of the environment if so directed by notice in writing from the Authority.
- e. A person conducting soil excavation of site or conducting any activity which causes the disturbance of any area of levels would get Authority's approval.

2.6 Energy Conservation

The energy should be used efficiently. The Authority and clients would take this principle in to account at the early stage of interaction. Use of natural light penetration roofs and windows are encouraged.

The consumption of raw materials and their energy efficiency is also one of the factors to be considered when determining Best Available Technology (BAT). The levels of improvement in energy efficiency to be secured by installations will, as with other improvements required by the Authority, need to take into account costs and advantages, but as a minimum, it is likely that operators will be required to take up all energy efficiency measures which are cost effective on normal commercial criteria. Alternatively, it could be argued that the balance of costs and benefits might suggest that operators should be required to go further than implementing cost effective measures. In addition, the requirement to take energy efficiency into account means that regulators will not automatically penalize measures, which involve combustion on site rather than remotely (such as combined heat and power or the use of processes which are driven by fuel rather than electricity) where such processes lead to higher emissions from the installation itself.

3.0 Tools for Analysis

3.1 Environmental Impact Assessment (EIA)



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Environmental Impact Assessment (EIA) is an activity designed to identify and predict the impact on the bio-geophysical environment and on man's health and well-being of legislative proposals, policies, programs, projects and operational procedures, and to interpret and communicate information about the impacts.

In other words “The term ‘environmental assessment’ [a synonym of EIA] describes a technique and a process by which information about the environmental effects of a project is collected, both by the developer and from other sources, and taken into account by the planning authority in forming its judgment on whether the development should go ahead. In EIA there is an emphasis on systematic analysis, using the best practicable techniques and the best available sources of information, and on the presentation of information in a form that provides a focus for scrutiny of the project. The assessment should address both ecological and human health considerations, as well as such other effects as habitat modification and noise pollution.

- a. A separate guideline is available for reference. These guidelines apply to the assessment of new projects in the Free Zone.
- b. The proponent of any new or substantially modified industrial project or major service or utility project shall submit an environmental impact report at the planning stage in accordance with the guidelines of the Authority.
- c. On receipt of any environmental impact report as per above item, the authority may request any additional information required to adequately assess the project.
- d. On the final acceptance of an environmental impact report the Authority shall issue its assessment and recommendations.

3.2 Environmental Auditing

An environmental audit is a management tool comprising a systematic documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing, with the aim of helping to safeguard the environment by facilitating management control of environmental practices; and assessing compliance with company policies, which would include meeting regulatory requirements. It is a tool for checking whether a firm is doing what it should be doing. For instance, a legislative compliance audit checks that those activities of the firm covered by environmental legislation (i.e., what it is doing) actually comply with that legislation (i.e., what it should be doing). An environmental audit will tell a firm whether its waste management practices (i.e., what it is doing) conform to the industry sector best practice guidelines it has committed itself to following (i.e., what it should be doing).



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Auditing is an important part of an environmental management system. ISO 14001 requires that an audit to be undertaken to check whether a firm's EMS meets its requirements and the same is true for EMAS.

Stated in other terms than the definition above, auditing is a methodological examination, involving analyses, tests, and confirmations of a facility's procedures and practices with a goal of verifying whether they comply with legal requirements and internal policies, and evaluating whether they conform with good environmental practices. In this context, auditors base their judgments of compliance on evidence gathered during the audit and documented in the auditor's working papers. Environmental auditing thus differs from assessments or inspections, which offer an opinion based primarily on professional judgment. Various names are used to describe the application of audit principles to environmental programs. Audit is the most common, although review, surveillance, survey, appraisal, evaluation, and assessment are also used.

In this context following requirements would apply:

- a. The Authority may require the occupier of any premises to conduct an independent environmental audit, if such an audit has not been carried out in the previous 2 years, in accordance with the PCFC guidelines.
- b. The PCFC shall seek pre-qualification documents from environmental consultants and experts and based on their experience shall prepare an approved list of auditors to conduct audits or certify environmental management systems in accordance with earlier sections.
- c. No person shall offer professional services as an auditor or assessor of environmental management systems without the approval of the PCFC.

3.3 Life Cycle Analysis (LCA)

Life Cycle Analysis (LCA) is a systematic evaluation of the needs and opportunities to reduce the environmental burden associated with energy and raw materials use and environmental releases throughout the whole life cycle of the product, process or activity. This analysis may include both quantitative and qualitative measures of improvements, such as changes in product, process and activity design; raw material use; industrial processing; consumer use, and waste management.

Life Cycle Analysis (LCA) is a tool for identifying and assessing the various environmental impacts associated with a particular product. LCA takes a "cradle to grave" approach looking at the impacts of the product throughout its life cycle – i.e. from the raw materials acquisition (the cradle) through its production and use to its final disposal (the grave). LCA allows manufacturers to find ways of cost-effectively reducing the environmental impact of a product over its life-cycle and to support their claims about the environmental impact of their products.



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Life Cycle Analysis is sometimes used interchangeably with life-cycle assessment. While the term life cycle assessment has been used interchangeably, analysis is now preferred, as embodying fewer assumptions about the exhaustiveness of the evaluation. The terms analysis and assessment are also sometimes given different senses; analysis applying to the quantitative life-cycle inventory, and assessment to the qualitative interpretation of inventory results.