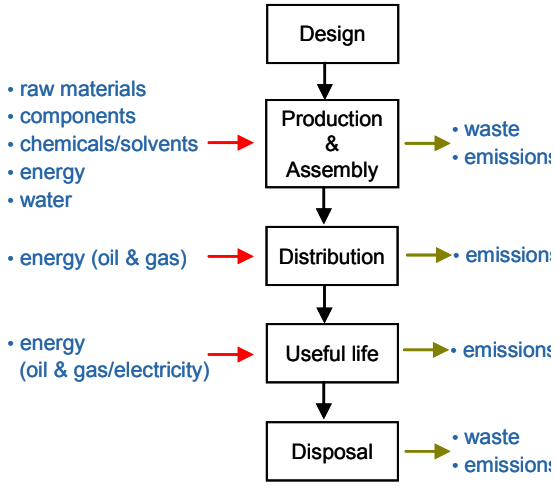
European Bank
for Reconstruction and Development

Sub-sectoral Environmental and Social Guidelines: ELECTRICAL GOODS (including white goods, lighting, audio and video, vehicle electronics)

PROCESS DESCRIPTION

This process guidance note deals with the manufacture and assembly of electrical goods including white goods, lighting, audio and video and vehicle electronics. These goods require a large number of components ranging from printed circuit boards, wiring and a range of plastic parts to larger scale metallic items for use in televisions, refrigerators, audio-visual equipment and other white goods. Often, some of these components are produced by the company responsible for the assembly of the final product itself.

Although a wide range of products are covered by this sub-sector, the following generic production flow diagram shows key stages in the manufacture of electrical goods.



Due to the wide range of component parts and final products, a variety of industrial processes are often involved in the production of electrical goods. These processes make use of inputs such as solvents for surface treatment/degreasing applications, machine and cutting oils, paints and other coatings, lubricants and dielectric oils that may have a negative impact on the environment and/or human health.

Facilities that produce electrical goods may also have on site auxiliary operations such as boilers or generators for energy generation, de-emulsification plants for oil recovery, re-distillation units for solvent recovery, water/wastewater treatment plants and ventilation systems for fumes.

KEY ENVIRONMENTAL, HEALTH AND SAFETY RISKS/LIABILITY FACTORS

Air Emissions

Air emissions may include the following:

- volatile organic compounds;
- particulate matter;
- combustion products including the oxides of carbon, nitrogen and sulphur.

In addition, the manufacture of certain goods may lead to emissions of other key pollutants, such as refrigerant gases from manufacture/assembly of refrigerator and air conditioning goods.

In many cases facilities that represent point sources of air emissions will be required to obtain air emission permits, which may stipulate limits for specific pollutants. In order to control these emissions, the facility is likely to be required to monitor its emissions and submit findings to the authorities. Depending on the nature or size of the process, pollution control equipment or abatement devices may be required, with cost implications.

Future regulation in the emerging economies of Central Asia may be based on existing legislation such as the US EPA Clean Air Act, the EU Air

Quality Framework Directive and the EU Ozone Depleting Substances Regulation and may act to control the levels of emissions that companies can produce without being subject to fines or penalties.

Global Warming and Climate Change

Electrical goods contribute to climate change in a number of ways. The greenhouse gas (GHG) emissions from the generation of energy required to manufacture and use them is perhaps the most obvious example but also of significance are releases of chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs) all of which contribute to global warming.

Ozone Depletion

Coolants used in refrigerators, freezers and air conditioners also represent an important issue for this sector and include CFCs and HCFCs which are both ozone depleting substances as well as being greenhouse gases. HFCs which are due to replace these two groups of compounds are also GHGs.

The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer led to the phase out of CFCs in developed countries. However, with ongoing use in developing countries and given that CFCs have a long lifetime in the stratosphere, historical emissions will continue impacting on global warming for many years to come.

Wastewater Discharges

Wastewater discharges from the manufacture of electrical goods is likely to comprise effluent from painting processes and associated effluent treatment and may include substances such as:

- solvents/organics;
- acids/alkalis;
- paint sludge;
- metals;
- oils.

Depending on the nature and volume of effluent and local regulations, companies may be required to install on-site effluent treatment facilities or pay costs for off-site treatment.

Trade effluent discharges to sewer and surface waters are likely to require discharge consents from the regulatory authorities. Depending on the nature of the operation and the final destination of the discharge (whether it undergoes secondary treatment, for example at a municipal sewage treatment works, or is discharged untreated) the parameters within the consent and the associated costs may vary.

Key regulations governing water quality and wastewater discharges include the Water Framework Directive and the US EPA Clean Water Act. As more countries begin to experience water stress and water shortages the regulation of water will become increasingly stringent. This will be increasingly important in developing countries where water resources have historically been poorly managed.

End of Life Product Disposal

The safe disposal of electrical goods is an increasingly important issue and increasing responsibility is being placed on manufacturers to put systems in place for the collection and disposal/recycling of their products

Legislation such as the EU Waste Electrical and Electrical Equipment (WEEE) and Landfill Directives are among the drivers increasing the visibility of end of life issues. Numerous countries around the world, including China, have either adopted or drafted legislation similar to the WEEE Directive and this spread is expected to continue.

OTHER POTENTIAL ENVIRONMENTAL, HEALTH AND SAFETY RISKS/LIABILITY FACTORS

Soil and Groundwater Contamination

Solvent based paints and degreasants are a potential source of soil and groundwater contamination. If handling and storage of solvents and oils is poor there is a high risk of soil and groundwater contamination.

Hazardous substances that are, or were historically, used in this sector and their potential impacts on human health include:

- trichloroethylene (TCE) – liver and lung damage, abnormal heartbeat, likely human carcinogen;
- trichloroethane (TCA) – loss of consciousness, reduced blood pressure, potential respiratory and liver damage;
- perchloroethylene (PCE) – liver and kidney damage, memory loss, likely human carcinogen;
- dielectric oils containing polychlorinated biphenyls (PCBs) or chlorinated benzenes – human carcinogen, negative developmental effects during pregnancy, impacts on endocrine and immune systems.

Local legislation on issues such as waste management and material storage has helped the sector to put controls in place to limit the use and impacts of some of these harmful compounds.

Storage and Spillage of Chemicals

Quantities of chemicals such as solvent degreasers, paints and thinners may be stored on-site. They may be stored in above or below ground tanks, tank farms or large drum storage compounds. Adequate measures must be taken to prevent the chemicals (some of which may be highly mobile) from entering the soil and polluting the ground water or nearby surface waters.

Chemicals can enter watercourses as a result of accidental releases, such as spillages or leakages from storage vessels, from accidents during the production processes or from deliberate disposal on-site. All storage facilities should be provided with appropriate secondary containment and constructed of appropriate, impermeable material. Where gases are being produced these may be stored in bulk pressurised vessels, and appropriate safety measures should be installed to prevent accidental releases and also explosions.

Waste Disposal

There are three options for dealing with waste arising from different stages in the manufacture of electrical goods. It can either be reused in the operation, recycled for use in another or secondary process or it may be disposed of.

Historically a large proportion of waste was either buried in landfill sites or burnt in waste incinerators.

The costs of waste disposal vary according the final disposal method, the hazards associated with

the particular waste stream, and the abundance or scarcity of suitable disposal sites.

The EU Hazardous Waste Directive and the US EPA's Hazardous Waste Program are examples of waste disposal regulations that led to a wider regulatory trend geared towards reducing the volume of hazardous waste entering the natural environment.

Energy Consumption

The production of electrical goods may require a substantial input of energy. This energy requirement may also represent a significant component of the company's total operating costs.

It may be possible to reduce energy consumption through improvements in operational efficiency and implementation of energy efficient technologies. Energy spend will become even more important if an increasing number of countries follow the lead of the UK by introducing carbon regulations such as the Climate Change Levy and the Carbon Reduction Commitment which impacts companies according to their energy spend.

Raw Material/Supply Chain Issues

The global production of electrical goods requires significant amounts of raw materials such as metals that are obtained through mining. These mining activities will have their own environmental, occupational health and community health and safety issues that are discussed in the EBRD Mining and Mineral Processing sub sector guidelines.

Packaging

Electrical goods generally require significant amounts of packaging including wood, cardboard, Styrofoam, paper and plastic which all have their associated environmental impacts. However, measures to reduce packaging must be balanced with the need to prevent damage to the product.

General Health and Safety Risks

In addition to the exposure to hazardous substances and materials discussed previously, there is a range of generic health and safety risks that will apply to a manufacturing facility such as this. These include:

- slips, trips and falls
- accidents resulting from the misuse of industrial machinery and processes
- electrical shocks
- burns from welding and heating activities
- fires and explosions.

KEY SOCIAL, LABOUR AND COMMUNITY RISKS/LIABILITY FACTORS

Community Exposure to Contaminated Land and Water

If the facility's activities result in the contamination of the surrounding land and water resources this may have a negative impact on the health of the local community exposing the company to significant liability risk.

OTHER SOCIAL, LABOUR AND COMMUNITY RISKS/LIABILITY FACTORS

Labour Standards

Labour standards are rules that govern working conditions and industrial relations. They may be formal, such as national level regulation and international agreements, or informal, expressed through norms and values. In general, developed countries have more robust labour standards than developing countries where the associated risks are higher. The commonly accepted rights and principles enshrined in the International Labour Organisation Conventions are the right to collective bargaining, elimination of forced or compulsory labour, abolition of child labour and elimination of all forms of discrimination. In addition, fair wages and working hours, treatment with respect and acceptable working conditions should be expected.

Acceptable labour standards should apply to the company's own employees as well as to all contractors and sub-contractors engaged. In addition, labour standards should be expected to be enforced by key suppliers.

Raw Materials/Supply Chain Issues

The manufacture of electrical goods requires significant amounts of raw materials that are obtained through mining. These mining activities will have their own environmental, occupational health and community health and safety issues that are discussed in the EBRD Mining and Mineral Processing sub-sector guidelines.

Air Quality

If the sites' activities result in localised air pollution this may have a negative impact on the health of members of the local community, particularly that of infants, the elderly and those with existing respiratory conditions. This may expose the company to significant liability risk.

FINANCIAL IMPLICATIONS

Air Emissions

Obtaining air emissions permits may require the company to conduct an analysis of current emissions and frequent or continuous monitoring for specified pollutants. Some emissions, such as organic compounds and dusts, may require pollution control devices or abatement measures, the costs of which may be significant.

It is also possible that facilities in the developing world will be exposed to carbon abatement costs if an international agreement on limiting carbon emissions, including developing countries, is reached.

Effluent Discharges

Charges for wastewater are often based on the quality and quantity of the discharge, but may also be influenced by the level of subsequent treatment required.

For example, if the quality of the wastewater remains within the parameters set out in the discharge consent, the charges would be set at an agreed rate. However, if the consent limits are exceeded, the charges may increase or, alternatively, fines may be imposed for persistent breaches. Managers may face pressure from the regulatory authorities to install an on-site effluent treatment plant which may involve significant cost.

Determining the quality of the wastewater may require ongoing sampling and analysis of the

wastewater discharges, requiring investment in sampling equipment or contract services.

Soil and Groundwater Contamination

Where contamination has been identified on-site, the actions required (which may include clean up of the site), will depend upon the regulatory authorities, the local regulations and the specific site circumstances. Certain organic compounds may be highly mobile in the soil and may be able to migrate to surface or groundwater.

The cost of clean up varies depending chiefly upon the nature and extent of contamination and the local geological/hydrogeological conditions. In general, costs for clean up are significant, remediation of groundwater generally being more costly than for soil.

End of Life Product Disposal

If local legislation requires the company to set up or participate in a process for end of life disposal of its products this will represent a significant financial cost.

Refrigerant Substitution Costs

While the cost of retrofitting older systems to utilise HCFCs or HFCs instead of CFCs is likely to be relatively low, it may be necessary to purchase new equipment at higher cost if retrofitting is not possible. The costs of collection and disposal of old refrigerant will also result in a cost to the company.

IMPROVEMENTS

Environmental, Health and Safety

Potential environmental improvements may include:

- Introduce good environmental engineering practices, preventative maintenance programmes and spill response procedures to limit the release of harmful substances into the natural environment.
- In areas where groundwater resources are considered to be sensitive, consideration should be given to the installation of groundwater monitoring wells and the implementation of a routine groundwater quality monitoring programme in the vicinity of the facility. At a minimum the programme should include analytical testing covering the main volatile organic compounds used in the facility, typical breakdown products of those volatile organic compounds and selected metals.
- Develop and implement a clear environment, health and safety policy/strategy.
- Recover and re-use/recycle raw materials and wastes where practicable.
- Eliminate certain hazardous waste streams from processes or product lines.
- Wherever possible, eliminate fugitive emissions, particularly of hazardous substances, CFCs, HCFCs and HFCs.
- Improve chemical bulk storage, to minimise the risk of accidental discharge to surface and groundwater.
- Establish the optimum efficiency of effluent treatment plant;
- Installation of groundwater monitoring wells and the implementation of a routine groundwater quality monitoring programme;

Social, Labour and Community

Potential social, labour and community improvements may include:

- Working together with local communities to identify potential areas of concern and address the issues identified.
- Remediating contaminated land, groundwater and surface water courses upon site decommissioning to limit community health impacts.
- Maintaining high labour standards and good quality working conditions.
- In the event of trading difficulties, explore all ways of limiting compulsory redundancies.

GUIDE TO INITIAL DUE DILIGENCE SITE VISITS

The issues and risks associated with a site will vary depending on factors including the type and size of the operation, site location, and the quality of management. However, due diligence visits should consist of a tour of the entire site.

When visiting the sites of potential borrowers or during loan supervision, financial intermediaries may wish to use the following suggestions to guide the initial due diligence process. However, note that this does not represent an exhaustive list of issues for consideration.

During the initial site visit, it will be important to assess the following:

Environmental, Health and Safety

- compliance with air emission permits and actions to minimise the occurrence of visible emissions;
- fugitive emissions - check the means of identifying and quantifying unauthorised releases;
- compliance with effluent discharge consents - check discharge points;
- the operation and maintenance of the wastewater treatment plant, if present;
- disposal of solid waste - check final disposal routes and methods and housekeeping, the general manner in which wastes are handled and the overall appearance of the site;
- condition and adequacy of chemical storage facilities/compounds;
- evidence of oil or chemical spillage or surface staining;
- accident/spill response procedures;
- the status and nature of complaints and the manner in which they are processed;
- site location/surrounding area activities
- site security and the safety of all site personnel, contractors and visitors;
- provisions for on site health and safety management;
- Observe working conditions and the use of personal protective equipment.

Social, Labour and Community

- Check that labour standards, contracting and remuneration are in line with national law and are consistent with the average for the sector;
- Check that hours worked, including overtime, are recorded and staff should receive written details of hours worked and payment received;
- Has the Company received inspections from the local labour inspectorate in the previous three years? Have these resulted in any penalties, fines, major recommendations or corrective action plans?
- Does the organisation have a grievance mechanism which allows employees to raise workplace concerns?
- Are employees free to form, or join, a worker's organisation of their choosing?
- Observe working conditions through process and document review and interview staff;
- Observe waste disposal procedures to identify potential soil, water or air contamination pathways that may affect local communities; Review company's history of community engagement and look for evidence of meaningful dialogue that takes into consideration the community's concerns about human health impacts of the facility.

ACTION PLANS

Any lending or investment should take place within the context of Environmental and Social Action Plans. Typically plans include:

Environmental, Health and Safety Action Plan

- Provision of a financial plan and budget for management of environmental issues and performance improvement;
- Establishment of clear roles and responsibilities for environmental, health and safety issues;
- Development of key performance indicators and monitoring systems to allow for the setting of performance targets to meet regulatory standards and industry best practice;
- Setting of timescales for the achievement of performance targets;
- Development of plans and procedures for managing environmental issues including materials storage, materials handling and emergency response procedures, chemical and oil spill cleanup and waste disposal;
- Development of a training plan for site personnel to ensure awareness of material environmental issues;
- Development of a schedule and procedure for review and updating of the action plan.

Social, Labour and Community Action Plan

- Design and communicate an appropriate code of business conduct that considers concerns of key stakeholders (shareholders, employees, government bodies, NGOs);
- Implement best-practice labour standards (in line with ILO principles); consider signing up to international frameworks such as the UN Global Compact;

- Development of plans and procedures for managing social issues including community health impacts and working conditions;

- Implement a process to assess labour and human rights conditions for contractors and sub-contractors;

- Design a robust and on-going community engagement process to measure and report on impacts (positive and negative) on local communities;

- Consider measuring and communicating wider socio-economic impacts (job creation, infrastructure development) – for example using the World Business Council for Sustainable Development (WBCSD) Measuring Impact Framework.

REFERENCES AND OTHER SOURCES

Agency for Toxic Substances and Disease Registry - http://www.atsdr.cdc.gov/

Department of Trade and Industry Refrigeration and Air Conditioning CFC and HCFC Phase Out - http://www.berr.gov.uk/files/file29101.pdf

European Union environmental legislation - http://europa.eu/scadplus/leg/en/s15000.htm

International Finance Corporation Environmental, Health and Safety Guidelines - http://www.ifc.org/ifcext/sustainability.nsf/content/EnvironmentalGuidelines

Inter-governmental Panel on Climate Change - http://www.ipcc.ch/

International Labour Organisation - http://www.ilo.org/global/lang--en/index.htm

UK Environment Agency Pollution Prevention Guidelines - http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx

United Nations Environment Program: Montreal Protocol on Substances that Deplete the Ozone Layer - http://www.unep.org/ozone/pdf/Montreal-Protocol2000.pdf

United States Environmental Protection Agency - http://www.epa.gov/