Thermal Power Stations and other combustion installations

Technical Guidelines

January 2008

umweltbundesamt

Twinning Project MT05-IB-EN-01
Assistance to explore long-term projects to manage
Specific waste streams in a more sustainable manner

Project funded by the European Union
and implemented by
the Ministry for Rural Affairs and
the Environment of the Republic of Malta
and Umweltbundesamt GmbH Austria

Abbreviations

As	Arsenic
BAT	Best Available Techniques
Cd	Cadmium
CH_4	Methane
CO_2	Carbon Dioxide
Cr	Chromium
Cu	Copper
ECI	Environment Compatibility Investigation
EIA	Environment Impact Assessment
EIS	Environment Impact Statement
ELV	Emission Limit Values
EPS	Environment Planning Statement
ES	Environmental Statement
GWP	Global Warming potential
HFCs	Fluorohydrocarbons
Hg	Mercury
IPPC	Integrated Pollution Prevention and Control
L.N.	Legal Note
MBT	Mechanical-Biological Treatment
MEPA	Malta Environment and Planning Authority
Mn	Mangane
N_2O	Nitrogen Monoxide
N	Nitrogene
Ni	Nickel
NO_x	Nitro-oxygen
Pb	Lead
PDS	Project Description Statement
Sb	Tin
SF_6	Sulphur hexafluoride
Sn	Tin
SO_2	Sodium Bicarbonate
Ti	Titanium
TOR	Terms of Reference.
WIP	Waste Incineration plants
Zn	Zinc

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1 INTRODUCTION

The Directive on the assessment of the effects of certain public and private projects on the environment (EIA Directive; 85/337/EEC as amended by 2003/35/EC) shall apply to the assessment of the environmental effects of those public and private projects which are likely to have significant effects to the environment. Article 5 in connection with Annex IV of the EIA Directive determines the information the developer has to supply.

The requirements are also set forth under Article 13 of L.N. 204 of 2001 – Development Planning Act (Cap. 356) Environmental Impact assessment Regulations, 2001 Arrangement of Regulation, but these requirements are worded in a very general way from the technical point of view.

The **structure** of the guideline "Thermal power stations and other combustion installations" **follows** that of L.N. 204 of 2001 – Development Planning Act (Cap. 356) **Environmental Impact assessment Regulations**, 2001 Arrangement of Regulation. In particular it covers projects listed in point 7.3.1.1 of schedule 1 of L.N. 204 of 2001 (i.e. boilers and gasturbines with or without heat recovery steam generator). Similar to above mentioned projects, this Guideline can also be used for projects listed in point 7.3.2.1 of schedule 1.

One important step during the EIA-process is the preparation of the "**Terms of Reference (TOR**)". The TOR focus on the significant potential impacts which are likely to arise from a particular development project, so they should be considered as project-specific guidelines. The guideline "Thermal power stations and other combustion installations" is a **basic example for the elaboration of the TOR** from the technical point of view. The essential technical information to be provided by the project developer shall be set forth in accordance with this outline.

The guideline "Thermal power stations and other combustion installations" is a non-binding technical specification and is not considered to be complete. Information and investigations set forth in this guideline need not be submitted by the developer of the project if the developer can prove that particular information is not **relevant** for the project or the submission there of **cannot reasonably be expected** of the developer for the project given **the state of knowledge** and the **investigation methods**.

You will find more detailed information about the EIA-process you will find in chapter 1.1.

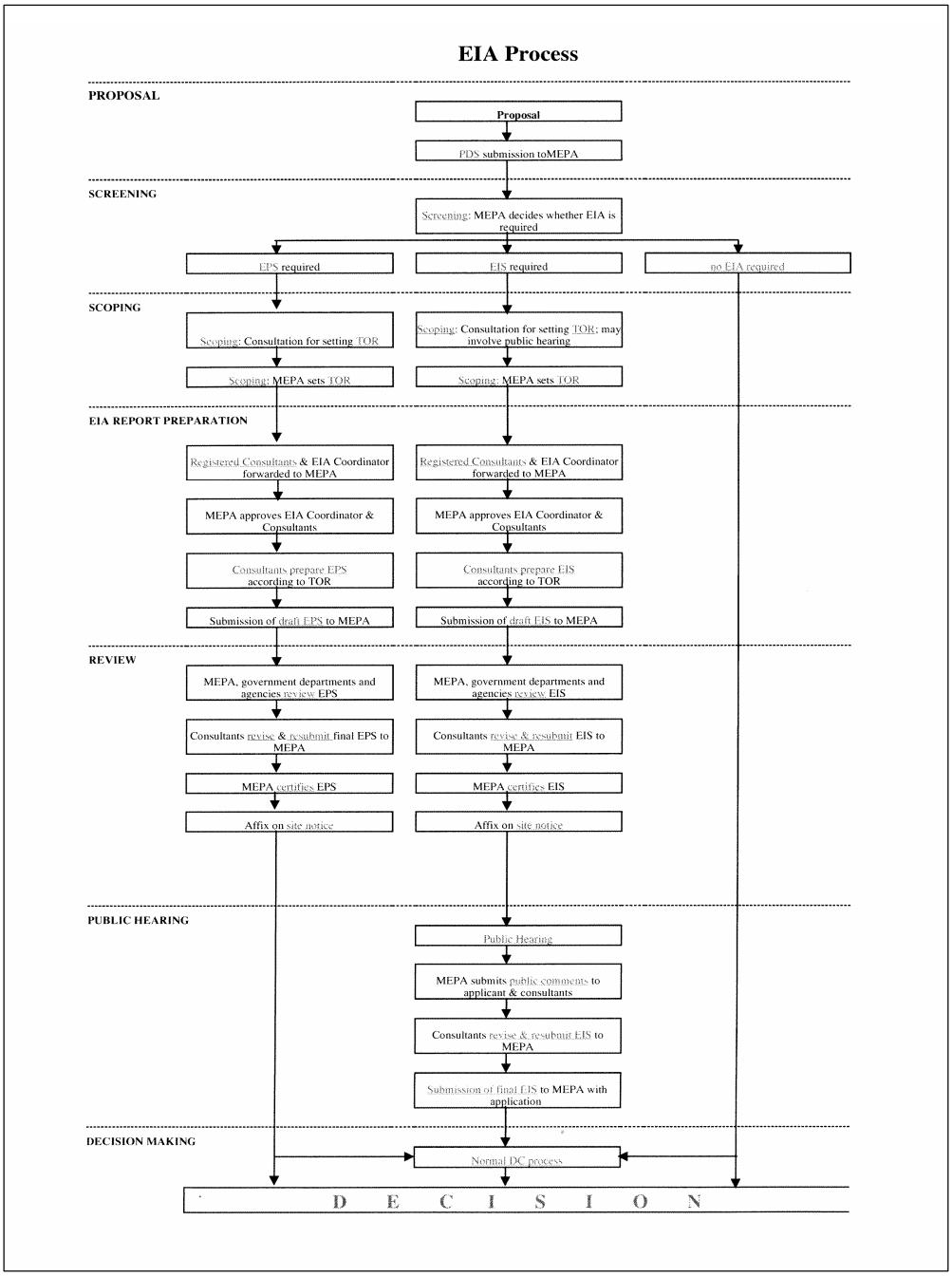
The evaluation of the **traffic situation** regarding thermal power plants is not part of an ES. But it has to be described according to the Structure Plan Policy/Structure Plan Policy Transport Topic Paper = Traffic impact assessment. Nevertheless, this guideline specifies in detail the information regarding the traffic situation which has to be supplied by the developer.

It is strongly recommended that the developer of a thermal power plant should contact the competent authority as soon as possible when starting a project (MEPA – Malta Environment & Planning Authority; homepage: **www.mepa.org.mt**).

1.1 EIA-process

In this chapter you will find a general description of the EIA-process in Malta. The process description is taken from the MEPA webpage (see **www.mepa.org.mt**) and has been slightly amended with a description of the most important steps concerning the guideline "Thermal Power Plants". For further information the developer should contact the MEPA – Malta Environment & Planning Authority, homepage: www.mepa.org.mt.

Figure 1: Workflow of the EIA-process in Malta (taken from www.mepa.org)



1.1.1 Environmental Statement (ES)

The outcome of an Environmental Impact Assessment (EIA) is a formal document. This report is referred to in a variety of ways throughout the world, although the term Environmental Statement (ES) is most widely used. An Environmental Statement is an independent study involving the collection and analysis of relevant information, some of which may require original research, to determine baseline conditions and to predict the likely impacts of the development. It is the result of the EIA study presented as a report to inform decisions on a development proposal.

Locally there are two types of Environmental Statements:

- Environmental Impact Statement (EIS)
- Environmental Planning Statement (EPS)

1.1.1.1 Environmental Planning Statement (EPS)

The EPS, also known as a limited EIA, is prepared for projects of a type and scale likely to produce impacts that, although significant, are more limited and more easily assessed. This statement is of a more limited nature, covering fewer topics and will not require a public meeting to discuss its findings, however the public will still be consulted. An EPS is usually required for those developments outlined in Category II of Schedule I in the EIA Regulations.

1.1.1.2 Environmental Impact Statement (EIS)

The EIS, also known as a full EIA, is prepared for development where significant impacts are expected to result from a proposal and a full EIA study is needed to determine the type and magnitude of impacts and how to address them. This Statement is of more detailed nature, covering a range of issues. An EIS is usually required for those developments outlined in Category I of Schedule I in the EIA Regulations.

Once the EIS is complete and accepted by MEPA, a public hearing is organized.

Since the results of the EIS may affect the project´s design, there must be a close working contact between the project´s architects/designers and the EIA team.

An EIS identifies, describes and assesses the following:

- Proposed development project
- Alternatives to the proposed development project (including alternative sites and technologies)
- Site and surrounding of the proposed development
- Potential impacts to be generated by the development
- Mitigation measures that prevent, minimise or offset any environmental impacts and
- Proposals to monitor the actual effects, should the development take place.

1.1.2 Scoping (ES)

Scoping is that procedure in the Environmental Impact Assessment (EIA) process that

establishes the key issues to be addressed in the Environmental Statement (ES) and the framework of approach that has to be taken. Scoping is used to identify significant impacts, key issues, alternatives to a proposal, and the affected and interested population groups.

1.1.2.1 Scoping (EPS)

Scoping results in the formulation of Terms of Reference (TOR) or guidelines for the preparation of the EPS.

The scoping process is outlined below:

- Assessment of all predictable and/or expected environmental impacts by MEPA based on, but not limited to, the information presented in the Project Description Statement (PDS)
- Relevant government departments and local councils are invited to provide information, within 21 days of notification on what they wish to see included in the TOR
- MEPA formulates the final TOR
- The approved TOR are forwarded to the applicant, the architect/consultants
- The final TOR may be accessed by the public

1.1.2.2 Scoping (EIS)

Scoping results in the formulation of Terms of Reference (TOR) or guidelines for the preparation of the EIS, which further help to focus the study on the more significant issues.

The scoping process is outlined below:

- Assessment of all predictable and/or expected environmental impacts by MEPA based on, but not limited to, the information presented in the Project Description Statement (PDS)
- Relevant government departments and local councils are invited to provide information, within 21 days of notification, on what they wish to see included in the TOR
- The general public is invited, through an advert in the local press to inform the Director of Environment Protection, within 21 days of the publication of the advert, about the issues they wish to be included in the TOR
- For developments of major significance, MEPA may organize a public meeting before setting the TOR
- MEPA formulates the final TOR
- The approved TOR are forwarded to the applicant, the architect/consultants
- The final TOR are fully accessible to the public

1.1.3 Terms of Reference

The result of the scoping exercise is a formal document containing guidelines known as Terms of Reference (TOR) that are prepared for each development that requires an Environmental Impact Assessment (EIA). The TOR focus on the significant potential impacts likely to arise from a particular development project. They ensure that, as much

as possible, the impact assessment focuses on relevant issues.

Terms of Reference are not cast in stone: they should be considered as project-specific guidelines. Should consultants deem that certain issues are irrelevant to the development then they can be omitted so long as this is justified. Similarly should the TOR have overlooked important issues then these should still be included in the EIA. In this report, it is advisable that the consultants keep close contact with MEPA.

The TOR usually require:

- Description of the proposed development
- Description of the proposed site
- Alternatives to the proposed development (including alternative sites and technologies)
- Policy & legislative framework applicable to the development proposal
- Assessment of environmental impacts and risks of the proposed development
- Design of mitigation measures
- Design of monitoring programmes

1.2 Policy Frame

If a developer will build a thermal power plant different national and international legislation, standards, plans, etc. have to be taken into consideration for the Environmental Impact Statement (EIS). In Malta the most important legislation for this procedure is the L.N. 204 of 2001 – Development Planning Act (Cap. 356) Environmental Impact assessment Regulations, 2001 Arrangement of Regulation. Based on this national legislation the following guideline for thermal power plants will be explained.

In addition to L.N. 204 of 2001 the following national and European legislation are important for the Maltese situation.

1.2.1 European Union Directives in the field of large combustion plants

Council Directive 96/61/EC concerning Integrated Pollution Prevention and Control (IPPC-Directive)

Council Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants

Council Directive 2003/87/EC establishing a scheme for green house gas emission allowance trading within the community in respect of the kyoto-protocol`s projects mechanisms (as amended)

1.2.2 Legal Notice, Plans and Technical Standards

1.2.2.1 Legal Notice for relevant environmental regulations

- L.N. 204 of 2001 – Development Planning Act (Cap. 356) Environmental Impact assessment Regulations, 2001 Arrangement of Regulation
- L.N. 234 of 2002 – Environment Protection Act (Act No. XX of 2001) Integrated

Pollution Prevention and Control Regulations, 2002 amended by L.N. 230 of 2004

- L.N. 329 of 2002 – Environment Protection Act (Act No. XX of 2001) Limitations of Emissions of certain Pollutants into the Air from Large Combustion Plants Regulations, 2002
- L.N. 274 of 2006 – Environment Protection Act (chapter 435) European Community Greenhouse Gas Emissions Trading Scheme (Amendment) Regulations, 2006

1.2.2.2 Air quality

- L.N. 216 of 2001 **–** Environment Protection Act (Act No. XX of 2001) Ambient Air Quality Assessment and Management Regulations, 2001 amended by L.N. 235 of 2004

1.2.2.3 Water quality

- L.N. 194 of 2004 – Environment Protection Act, 2001 (Act No. XX of 2001) Water Policy Framework Regulations, 2004
- L.N. 203 of 2002 – Malta Resources Authority act, 2000 Regulations for the Protection of Groundwater against Pollution caused by Certain Dangerous substances, 2002
- L. N. 213/2001 – Environment Protection Act (Act No. XX of 2001) Pollution Caused by Certain Dangerous Substances Discharged into the Aquatic Environment Regulations, 2001.
- L.N. 227 of 2001 – Environment Protection Act, 2001 (Act No. XX of 2001) Limit Values and Quality Objects for Discharges of Certain Dangerous Substances into the aquatic Environment Regulations, 2001

1.2.2.4 Noise and health

- L.N. 193 of 2004 – Environment Protection Act (Cap. 435) Assessment and Management of Environment Noise Regulation, 2004
- L.N. 37 of 2003 – Occupational Health & Safety Authority Act (Cap. 424), 2003

1.2.2.5 Nature Conservation

- L.N. 311 of 2006 – Environment Protection Act (Cap. 435) Development Planning Act (Cap. 356) – Flora, Fauna and Natural Habitats Protection Regulations, 2006
- L.N. 257 of 2003 – Environment Protection Act, 2001 (Cap. 435) Development Planning Act, 1992 (Cap. 356) Flora, Fauna and Natural Habitats Protection Regulations, 2003
- L.N. 203 of 2003 – Environment Protection Act, 2001 (Act No. XX of 2001) Marine Mammals Protection Regulations of 2003
- L.N. 12 of 2001 – Environment Protection Act (Cap. 348) Trees and Woodland (Protection) Regulations, 2001

1.2.2.6 Plans

- Structure Plan for the Maltese Islands (1990 – 2010)

- Mineral subject Plans for the Maltese Islands (2002)
- Local Plans (e.g. South Malta Local Plan)
- Structure Plan Policy/Structure Plan Policy Transport Topic Paper = Traffic impact assessment

1.2.2.7 Technical Standards

The developer or the applicant has to consider – if available – international standards (CEN, ISO). For further information contact the Malta Standards Authority (homepage: http://www.msa.org.mt).

2 THERMAL POWER PLANTS – DESCRIPTION OF THE PROJECT

The description of the project constitutes a prerequisite for the other parts of the Environmental Statement (ES) and forms the basis for determining causes of effect and for planning measures to reduce negative impacts. The different parts of the ES are strongly linked to each other and show many interrelations. For example the description of the flue gas cleaning system forms both part of the project description as well as description of measures to prevent negative impacts on the environment. It is necessary that this description goes far into detail to allow for a plausible and transparent estimation of emissions during normal operation as well as of emissions e.g. during failure of flue gas cleaning devices or measuring systems.

The project description part aims at giving a detailed and consistent survey of the whole project, including consumption of raw materials and energy as well as emissions. Therefore detailed plans are regarded as parts of the technical application documents.

This chapter shall be applied to thermal power stations and gasturbines with or without heat recovery steam generator.

According to Articles 14 (1) of LN 204 of 2001, the proposed development should be described. According to Annex IV of Council Directive 2003/35/EC of May 2003 the contents of this chapter should include:

- A description of the physical characteristics of the whole project and the land-use requirements during the construction and operational phases;
- A Description of the main characteristics of the production processes, for instance, nature and quality of the material used;
- An estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc.) resulting from the operation of the proposed project.

2.1 Technical description of the project including land-use requirements during the construction and operational phases

An ES for thermal power plants should contain the following information:

- Description of the type, scope and objective of the project and the energy economic necessity;
- Description of the location (general map in a scale 1 : 25,000, land type categorisation, local development plan, ortho-photograph at a scale 1 : 5,000 with and without inclusion of the project components), possibly inclusion of areas worthy of protection, suspicious areas, dangerous areas and such like in the plan;
- Description of the infrastructure (energy and water supply, storage facilities, etc.)
- Description of the land-use during construction and operation (e.g. storage facilities, roads, parking areas);
- Description of the correlation and the interrelations with other plants or plant components, especially a description of or a reference to the possibility of using the waste heat generated for district heating, in other (industrial) plants or households;

- Description and estimation of the potential of using the heat produced either in district heating networks or as process steam in other industrial plants. Figures shall be given as maximum power [MW] and as yearly produced energy [GWh/a]. In addition to that the demand on heat shall be estimated for a period of ten years following commissioning of the plant in question. This estimation shall include already known or most probable developments on production and consumption side. Treaties or letters of intent covering use of heat should be added to the project description if existing (notice should be given if these treaties or letters of intent should not be made public available). Plans of the district heating/cooling network or process heat distribution system shall be added.
- Description of the delivery of fuels (e.g. gas with pipe lines, transport of fuel oil);
- Description of the distribution network for electrical energy;
- In case of changes of an existing plant: description of existing plants (including plant typ, plant technology, number of steam boilers/gasturbines, fuels, energy efficiency figures) as well as the date of first commissioning;
- Duration of the individual phases of the project (planning, construction, operation, post-construction maintenance) and sequence plan for individual phases..

Traffic-related details

- Description of the traffic infrastructure (geographical location with regard to traffic, lorry access) and transport logistics (transport and container systems for the delivery of materials or the removal of residues).

In the practice of preparing an ES, a separate "traffic evaluation" is useful:

- Description of the necessary construction of new or extension of existing traffic routes;
- Traffic volume (road, water) or changes in the traffic volume vis-à-vis the status quo if the plant is constructed.

As a rule, the area investigated with regard to traffic are the traffic routes to the next-higher traffic system.

The illustration of the additional traffic volume in comparison with the status quo is possible in the form of a matrix as set forth in Table 1.

Table 1: Matrix for showing the traffic volume

	Traffic volume			**Ratio**	
	Present status	**Construction phase**	**Operational phase**	**Construction phase/present status**	**Operational phase/ present status**
Lorries					
Cars					
Ships					
Total					

2.2 Description of the main production process characteristics especially related to the amount and quality of the material used

This part mainly consists of a short description of the basics regarding plant and process technology. The following shall be described. (Please note: Units shall be given as System International (SI) units.)

Survey of the total plant - description of the materials flow.

Table 2 shows a summary of the most important technical data of a thermal power plant.

Table 2: Technical data of a Thermal Power Plant

Type of plant[1]	
Combustion Technology[2]	
Used fuels[3]	
Type	
Mass flow (t/h; or 1,000 m^3/h)[4]	
Calorific value as mean value [MJ/kg, MJ/m^3]	
Possible range of calorific value [MJ/kg, MJ/m^3]	
Planned availability of the plant (%)	
Planned operating time (h/a)	
Thereof: full operating hours (as planned) (h/a)	
Number of planned start-up procedures per year (-/a)	

Remark: During start-up fuels are used until operating temperature is reached which affects energy efficiency and leads to emissions.

[1] e.g. Boiler, gasturbine (with or without heat recovery steam generator)

[2] e.g. fluidised bed reactor, grate firing

[3] Data should be given for each fuel separately

[4] Mass flow under full load conditions

Table 3: Relevant parameter for full load operation

	Number of combustion units[5]	Per combustion unit[5]	Total
Rated thermal input[6] of the plant [MW]			
Flue gas volume at stack (nm^3/h), dry, at reference oxygen content			
Reference oxygen content (%)			
Waste water from waste water treatment plant (m^3/h)			
Accumulation of fly ash and boiler ash (t/h)			
Accumulation of coarse ash (t/h)			
Accumulation of residues from flue gas cleaning (t/h) *(please specify)*			
Power generation in condensing mode - gross [MW_{el}]			
Maximum Heat production - gross [MW_{th}]			
Power generation at max. heat production - gross [MW_{el}]			

Description of fuels:

- Mass flow (average mass flow, maximum, minimum) per fuel;
- Origin of the fuel (z.B. State, distance);
- Minimum and maximum calorific value H_u [MJ/kg] or [MJ/m3] per fuel;
- Description of relevant physical and chemical parameters (mean value, distribution; relevant parameters are content of S, C, N, water, ash, Cl, (heavy) metals, alkali/earth, alkali metals);
- Saisonal deviations of physical and chemical properties;

Description of delivery of fuels:

- Way of delivery (ship, pipeline);
- Time frame of fuel delivery;
- Description of weight and quality control.

[5] e.g. Gasturbines, steam boiler or combustion plant

[6] Rated thermal input at full load operating conditions; In case of gas turbines rated thermal input should be given for three different ambient temperatures

Description of handling and storage of fuels:

- If relevant: Ratio of fuels [%] which are pretreated after delivery (e.g. drying, filtering)?
- If relevant: Description of aggregates for pretreatment of fuels (e.g. drying, cleaning, grinding) and their demand on (electrical and thermal) energy;
- Description of storage facilities;
- Capacity of storage facilities [m^3] or [t];
- Description of transport and dosing systems for fuels;
- Description of measures to reduce odour emissions from storage;
- Description of measures to reduce dust emissions from storage;
- Description of measures to collect and treat waste water from storage;
- Description of measures to prevent or extinguish fires;
- Description of measures to minimise fugitive emissions from fuel handling and storage;

Description of combustion system and distribution system for combustion air:

- Description of combustion technology (e.g. fluidised bed combustion, gasturbine), combustion temperature, geometry of combustion chamber, etc.
- Description of burners for start-up (if relevant):
    - Number
    - Rated thermal input [MW]
    - Fuels (type, physical/chemical parameters; mass flow)
- In case of gasturbines the following data should be given (both for full load and partial load conditions) for at least three different ambient air temperatures (including average pressure and humidity:
    - Rated thermal input [MW];
    - Mass flow of fuels [kg/sec];
    - Volumetric flow of fuels [m^3/sec];
    - Mass flow of combustion air [kg/sec];
    - Temperature of exhaust gas [°C];
    - Mass flow of exhaust gas [kg/sec];
    - Flue gas volume [m^3/sec];
    - Flue gas velocity at stack [m/sec];
    - Electrical efficiency [%].
- Furnace capacity diagram (minimum and maximum calorific value ($H_{u,min,\ max}$) of fuels; minimum and maximum fuel use [t/h]);
- Description of partial load operation (e.g. change of operating parameters; frequency of partial load operation);
- Description of combustion air distribution and flue gas recirculation (if relevant);
- Description of temperature profiles in the combustion and post-combustion zone and in the flue gas path (including description of temperature control);
- Description of furnace capacity control;
- Short description of process control system;
- Description of measurement systems for relevant operating parameters (such as flue gas temperature, flue gas volume, humidity, pressure, oxygen content).

Description of heat recovery boiler and energy generation system:

- Description of heat recovery boiler (e.g. evaporator, superheaters, steam parameters, economiser, forced/natural draft);
- Description of auxiliary boilers;
- Description of interrelations of the water-steam cycle with existing systems (if relevant);
- Description of the cooling system (type and design parameters);
- Description of distribution system for heat (e.g. capacity and number of pumps, steam parameters, temperature of heated water);
- Description of boiler feed water preparation;
- Parameters of boiler feed water (mass flow [t/h], pressure [bar(a)], temperature [°C]);
- Description of gasturbine/generator (e.g. nominal power [MW_{el}]);
- Description of steam turbine/generator (e.g. nominal power [MW_{el}]);
- Saturated steam parameters: mass flow [t/h], pressure [bar(a)], temperature [°C];
- Steam parameters after superheaters: mass flow [t/h], pressure [bar(a)], temperature [°C];
- Live steam parameters: mass flow [t/h], pressure [bar(a)], temperature [°C];
- Live steam parameters at partial load operating conditions: mass flow [t/h], pressure [bar(a)], temperature [°C];
- Boiler efficiency [%] under full load operating conditions after and before boiler cleaning (including standard which has been used for determining the boiler efficiency);
- Description of loss of power generation resulting from heat/steam withdrawal;
- Description of relevant efficiency figures under partial load operating conditions;

Description of flue gas cleaning system:

- Description of primary emission reduction measurements (e.g. use of low NOx burners);
- Pollutant concentrations in the flue gas before entry into the flue gas cleaning system;
- Description of aggregates for flue gas cleaning (secondary measures);
- Technical details of aggregates of flue gas cleaning systems (e.g. max. flue gas volume, temperature, efficiency, reagents, fuels for SCR);
- Stack height [m], open diameter of the stack [m];
- Flue gases at stack:
    - Max. flue gas temperature [°C];
    - Max. flue gas volume [wet, operational, m^3/h];
    - Operational oxygen content [Vol%];
    - Operational water content [Vol%].
- Flue gases at stack:
    - Max. flue gas temperature [°C];
    - Max. flue gas volume [dry, operational m^3/h];
    - Operational oxygen content [Vol%].
- Flue gases at stack (full load operating conditions):

  - Flue gas volume [wet, nm^3/h];
  - Reference oxygen content [Vol%].
- Flue gases at stack (full load operating conditions):
  - Flue gas volume [dry, nm^3/h];
  - Reference oxygen content [Vol%].
- Flue gases at stack (full load operating conditions):
  - Max. flue gas volume [dry, nm^3/h];
  - Reference oxygen content [Vol%].
- If flue gases from other plants are discharged via the same flue and/or via the same stack:
  - description of flue gases (e.g. volumetric flow, temperature, pollutant concentration, water content);
  - description of emission control.
- Description of sampling points for emission monitoring in the flue gas path (e.g. location of sampling points, flue gas velocity at the sampling point [m/sec] under full load and partial load operating conditions);
- Description of functioning control and efficiency of flue gas cleaning systems;
- Certificate from independent and approved expert to prove that sampling points are in line with legal requirements.

Description of waste water treatment plant:

- Water balance of the project;
- Description of waste water streams before entry into waste water treatment system (e.g. origin, volume, temperature, pollutant concentration);
- Description of the waste water treatment system (e.g. aggregates, used reagents, technology, efficiency);
- Waste water volume [m3/a];
- Maximum daily waste water volume [m3/d];
- Way of discharge (e.g. direct or into a sewage system);
- Description of functioning control and efficiency of waste water cleaning systems;
- Description of sampling points;
- If waste water is mixed with other waste water streams prior to discharge:
  - description of other waste water streams (e.g. origin, volume, temperature, pollutant concentration);
  - description of emission control.

Use of operating and auxiliary agents:

- Quality (e.g. concentration, purity) and planned consumption [kg/a, t/a] of e.g: Water, urea, ammonia, limestone, hydrated lime, activated coke, HCl, NaOH, polyelectrolyts.

Description of residues and waste:

- The description of each residue arising from the process (i.e. slag, boiler ash, bed ash, fly ash, gypsum, filter cake from waste water cleaning, scrap metals, others) should include the following:
    - Accumulation per hour [kg/h, t/h] under full load operating conditions;
    - Max. accumulation per hour [kg/h, t/h];
    - Yearly accumulation [t/yr];
    - Relevant chemical and physical parameters.
- If residues are treated on-site:
    - Description of residue treatment (e.g. technology, aggregates, energy demand, reagents);
- Description of storage facilities of residues and waste (capacity, measures to prevent emissions of odour, dust, spillages, fugitive emissions and emissions into water):
- Control of relevant physical and chemical parameters;
- Disposal and transport of residues and waste;
- Description of other waste from operation of the plant (waste management concept).

Drawings of the plant:

Drawings should be added to the description of the plant, including:

- Process flow schemes of the whole process;
- Process flow schemes of relevant subprocesses (including combustion system, water-steam cycle, air distribution system, flue gas cleaning system) plus P&I-schemes (process control & instrumentation);
- Material flows;
- Sampling and measuring points;
- Sankey diagrams.

Further information:

- State and condition of the site;
- Description of measurements to be taken upon cessation of activities to avoid any pollution risk and return the site of operation to a satisfactory state.
- Description of ancillary facilities (e.g. workshops, laboratories);
- Description of possible incidents and accidents (e.g. possible causes, duration, emissions, environmental impacts, preventive measures);
- Fire fighting plans.

2.2.1 Energy demand and energy efficiency

The energy balance comprises the valuation of the energy supplied to the plant with the fuel/fuels and those energy forms withdrawn out of the plant with material and energy flows.

For a better understanding of the power plant in question it is suggested to present data

and information about energy demand, energy production and energy efficiency within one section.

Energy related figures are essential criteria for assessing the environmental impact of a project, especially when considering issues such as climate change and the potential reduction of emissions by maximising energy efficiency.

These figures should be presented with the help of table, drawings and e.g. sankey-diagrams.

Common energy data

- Refer to 2.2.

Energy demand

- Electrical energy demand – total [MW_{el}];
- Thermal energy demand – total [MW_{th}];
- Description of relevant consumers including type and amount of energy [e.g. MWh, t, m^3] of used energy (e.g. steam, auxiliary fuels, power)
- Coverage of self demand (e.g. external, internal production)

Electrical energy

- Max. power production – gross [MW_{el}];
- Max. power production – net [MW_{el}];
- Power production per year [GWh_{el}/yr];
- Power delivered to the grid or to third parties [GWh_{el}/yr].

District/process heat (if relevant)

- Max. possible production of heat/process heat – gross [MW_{th}];
- Max. possible production of heat/process heat – net [MW_{th}];
- Heat/process heat production per year [GWh_{th}/a];
- Heat/process heat delivered to a grid or to third parties [GWh_{th}/a].

Energy efficiency (in case of combined heat-and-power plants for maximum power production and maximum heat production, respectively)

- Boiler efficiency (for calculation international standards should be used);
- Net energy efficiency – electrical and thermal [%];
- Plant efficiency or fuel use – net (design parameters) [%];
- Total yearly fuel use efficiency – net (expected data) [%].

Plant efficiency should be given for full load operating conditions and for other relevant operating conditions. Efficiency data for gasturbines should be given for at least three different ambient air temperatures (incl. humidity and pressure).

2.3 Residues and emissions (pollutants, noise, odour, etc.)

This part of the ES contains a description of the residues to be expected as well as the quality and quantity of emissions. It will also be useful to briefly describe the steps taken to avoid and reduce the residues and emissions identified.

Emission of gases and particles - operation

- Description of emissions of all relevant pollutants into air (concentration and load figures) – both for full load and partial load operating conditions.

Relevant parameters are depending on the fuels and may include: particles, SO_2, CO, CO_2, NO_x, NH_3, (heavy) metals, HCl, organic pollutants.

- In case cooling towers are erected: Formation of clouds;
- Description of sampling and measuring systems and techniques;
- Description of emission calculation systems;

Concentration should be given in mg/nm^3 (PCDD/F in ng/nm^3, as I-TEQ) together with the averaged measuring time (e.g. daily mean value), loads should be given in kg/h (PCDD/F in mg/h) or t/yr (g/yr). These data should be given for full load operating conditions. In addition highest possible emissions should be given as short term peak values (e.g. as a consequence of low grade fuels or failure of flue gas cleaning systems).

Concentration data should be normalised to a temperature of 0°C, a pressure of 1 atm(a) (i.e. 1.013 bar(a)), dry gas and referred to the reference oyxgen content.

Information about other emission sources (e.g. storage, pretreatment) should be added similar to above.

Emissions of green house gases should be given (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6).

Emission of gases and particles – construction phase

- Emissions during construction
- Emissions from traffic
- Emissions from diffuse sources

Emission of gases and particles – accidents or abnormal operating conditions

Odour emissions – construction and operation

Emissions into water – construction and operation

- Description of emissions into water: maximum and average concentrations and loads of relevant parameters (including heat)
- Description of treatment of waste water

Noise – construction and operation

Description of sources and quantification (noise charts)

Vibrations – construction and operation

Heat

Description of heat emissions into air and water.

Residues and waste – construction

- Description of mass, quality and treatment of excavated soil;
- Description of mass, quality and treatment of waste.

Residues and waste – operation

- Description of mass, quality and treatment of solid residues (including Waste classification number);
- Description of mass, quality and treatment of waste (including Waste classification number);
- Disposal and recovery of solid residues.

Accumulation of residues should be given in specific figures, such as kg/t fuel input, %(mass) of fuel input and %(vol) of fule input. If relevant, chemical and physical properties should be given, such as water content, loss on ignition, density, content of Al (total and elemental), P, Corg, and heavy metals, PCDD/f (I-TEQ), PAH. If possible leaching behaviour should be estimated.

2.3.1 Increase of immission and overall immission situation

It is preferable to describe the aspects of an increase in immission and of the overall immission in chapter 4 "Description of the environment and impact of the project".

The expected impact of a project should be taken into account when determining the scope of the investigation for an ES, both for recording the present situation and forecasting the overall immission situation. In particular, this should be considered when determining the parameters to be investigated.

2.3.2 Monitoring measures

Details regarding preservation of evidence and for concomitant monitoring

- Details regarding the direct monitoring of the plant (such as exhaust gas or waste water emission measurements);
- Description of measures for the preservation of evidence relevant to the protected object (e.g. bio-indication).

These measures are summarised in Table 4.

Connected to the description of environmental impact, preservation of evidence enables a comparison of the forecast made in the ECI (Environment Compatibility Investigation)

with the actual impact, because the data collected provide a standard for comparing the condition of the environment before realising a project.

Table 4: Summary of measures necessary for the preservation of evidence

	Measures for the preservation of evidence
Plant	
Emissions into air	Monitoring emissions
Emissions into water	Monitoring emissions
Protected objects	
Human Beings	Monitoring immission Monitoring sound immission
Fauna, fauna and related habitats (incl. woodland and agricultural land)	Monitoring immission and approximate values for vegetation and forests (incl. bio-indication); Bio-indication with (cultivated) plants; Evaluation of aquatic eco-systems.
Soil	Conducting soil tests and constant monitoring of the soil; Measuring depositions
Water	Monitoring of groundwater (above and under the flow of the groundwater); Monitoring of surface water
Air and climate	Meteorological measurement, measurement of immissions of air pollutants (organic parameters, heavy, metals, measurement of deposition)
Landscape	Documentation with photographs

3 ALTERNATIVE SOLUTIONS

Where appropriate, an outline of the main alternatives studied by the developer and an indication of the main reasons for his choice, taking into account the environmental effects should be carried out.

Zero variant

The developer for the project should submit a description of the advantages and disadvantages of not carrying out the project. In this case a consideration of the energy-economic-situation is recommended.

In addition, it would be useful to describe the following alternatives:

Technological alternatives

Possible criteria for a comparison of different techniques could be:

- Comparison of emissions;
- Criteria concerning energy economics and energy efficiency;
- Comparison of type, mass and quality of residues and waste;
- Transport of fuels/residues/waste.

Alternatives for the site:

Suitable selection of the site of a thermal power station will have positive effects on energy efficiency thus reducing emissions and impacts on the environment. On the other hand it helps to optimise the overall energy economic concept of a region/state. Highest efficiency of a plant can only be reached if there exists a certain heat demand in the surrounding of the power station. Therefore it makes sense to carefully compare different potential sites.

With regard to energy efficiency the following consideration should be taken into account (relevant parameters have been described in previous sections):

- Energy efficiency at the date of commissioning;
- Estimation of energy demand for power and heat for a period of at least 10 years after commissioning of the plant (known developments on supply and demand side should be considered);
- Estimation of energy efficiency based on trend data;

However, other important criteria need to be assessed:

- Meteorological criteria;
- Topographical criteria;
- Ambient air quality;
- Soil contamination;
- Traffic situation;
- Nature conservation;
- Landscape conservation;
- Townscape.

4 DESCRIPTION OF THE ENVIRONMENT AND OF THE IMPACT OF THE PROJECT INCLUDING MITIGATION MEASURES

4.1 Present status

According to Articles 15 § (a) of LN 204 of 2001 in combination with Terms of References for the preparation of an ES from MEPA , the present status of different physical features should be described.

The scope of the investigated area and the framework as well as the type of methods used depend on the environmental relevance of the project (e.g. construction of a new thermal power plant) and the equipment found in each case, sensitivity of the environment and whether it merits protection. When describing the environment that may be affected, the situation prevailing at the time the application is submitted is relevant (reference time).

4.1.1 Population, Land use, including recreational uses

According to TOR the present uses of the proposed site should be described together with a description of residential areas, workplaces, places of worship, commercial, recreational and other uses located within an area of influence from the site. Included should be:

- Nature, type
- magnitude
- proximity to site
- etc.

The description of the population to be protected primarily comprises the living environment of the population in the area under investigation which may be affected by the project.

Noise (level and distribution), odours and oscillations/vibrations can be limited to the investigated project

4.1.1.1 General information

The following general information should be provided:

- Structure and development of settlements (location, population)
- Utilisation of adjoining buildings (residential, other uses requiring increased protection such as hospitals, old people's homes, etc.)

4.1.2 Flora, Fauna and ecosystems (terrestrial and marine), including both habitants and species and, in particular, protected and endangered species and their habitats

The emission of air pollution caused by this project defines the maximum area to be investigated in connection with these organisms and habitats to be protected.

The use of land is usually restricted to the actual site if no other land use by infrastructural supply and disposal activities, other building activities or the temporary establishment of storage sites etc. during the construction phase are registered.

4.1.2.1 Terrestrial habitats

4.2.1.1.1 General observations

Flora

Description and ecological evaluation of the biotopes and biotope networks as well as the vegetation by the following criteria (in relation to the overall reference area as well as regional, national (e.g. L.N. 311 of 2006) and international definitions):

- Rareness (Red Lists, degree of jeopardy, protected species and biotopes, species with decreasing numbers);
- Naturalness (types of utilisation, intensity of exploitation, degree of deviation from the potentially natural vegetation);
- Variety (diversity, variety of species vis-à-vis the site-specific (species) spectrum, species placing high ecological demands on the habitat);
- Size of area;
- Possibilities of replacement with regard to time, site and ecology of the island (development times, biotic resettlement, degree of cross-linking, etc.)
- Existing influences (air pollution, noise, vibrations, light, etc.)

Fauna

Description and ecological evaluation by the following criteria (in relation to the overall reference area as well as regional, national (e.g. L.N. 311 of 2006) and international definitions):

- Rareness (Red Lists, degree of jeopardy, protected species and biotopes, species with decreasing numbers);
- Abundance (density of individuals);
- Structure of dominance (distribution of species/frequency);
- Variety (diversity, variety of species vis-à-vis the site-specific (species) spectrum, species placing high ecological demands on the habitat);
- Functional significance of areas (year-round habitat, part-time habitat);
- Daily and seasonal dynamics (bird migration routes, distribution patterns, radius of activities, networks);
- Possibilities of replacement with regard to time, site and ecology of the island (development periods, biotic resettlement, degree of cross-linking, etc.)
- Existing influences (air pollution, noise, vibrations, light, etc.)

- Wild animals and hunting situation:
  - Population of wild animals;
  - Description, evaluation and losses of habitat;
  - Crossing behaviour (consequences of possible lasting effects);
  - Graphic portrayal of the hunting situation.

Identification of nature protection areas

Description and illustration of conservation areas identified under national (different Maltese nature conservation Regulations e.g. L.N. 311 of 2006), international or EU law, identification of nature conservation areas (such as nature and landscape conservation areas, nature parks, protected parts of the landscape, natural monuments).

Details of the method

- Flora and fauna may serve as bio-indicators to show and describe the impact of existing immission. Therefore, the results of any monitoring programmes available should be evaluated.
- Differentiation between the areas at or near the site directly affected by interference with the natural balance and the further removed areas under investigation.
- As a rule, a detailed assessment as described above must be carried out for the site/site environment. Fauna indicator species/groups should be selected and substantiated depending on the conditions of the site.
- Survey results already in existence may be used if they are up to date and sound.

4.2.1.1.2 Trees

Zoning of the area under investigation in accordance with the specified investigation area for the dispersion of air pollutants.

Present situation

We may distinguish between the following main areas for a description for the resource "trees":

- Description and evaluation of the condition of trees
- Situation of:
  - Main types of trees
  - Age structure
  - Type of exploitation;
  - Endangered species (abiotic and biotic);
  - Land use and land scaping.
- Description of relevant parameters / limits;

Alternative bio-monitoring methods such as the investigation of e.g. mosses are also possible.

4.1.2.2 Aquatic eco-systems

If there is a risk that aquatic (e.g. marine) eco-systems will be affected, an estimate of the ecological functionality in accordance with local laws concerning water must be carried out. According to TOR by MEPA particular reference is to be made to any species or biotopes/habitat types found in the area under study and listed in relevant nature protection legislation, relevant nature protection treaties and the EU Nature Protection Acquis. Identification of important and/or protected species shall be included as well as of indicator or key species relevant to characterisation of the habitat and monitoring purposes. This shall include adequate maps, plans, diagrams, photographs of the marine biotopes/habitats types of the area.

The assessment of the parameters relevant for evaluation is highly complex and comprises the following aspects:

- Hydrology
- Morphology of water bodies
- Physical-chemical oxygen balance
- Vitality and eco-toxicology
- Saprobiology
- Macrophytes and algae
- Benthic and Infaunal survey
- Pelagic Organisms Survey
- Fish
  - Lists of species encountered in the survey according to the area were they were encountered;
  - A generic assessment as regards the abundances of species i.e. individuals, frequency, shoals, etc.
  - A qualitative assessment of the above in terms of the ecological niches to which the species pertain
- Flora and fauna of the water body

4.1.3 Soil, agricultural quality and produce

Zoning of the area under investigation according to the specified investigation area for the dispersion of air pollutants.

4.1.3.1 General aspects

The following essential elements must be cited when describing the soil in an EIS:

General characterisation

- Present and former forms of soil utilisation and management, agricultural profitability, nutrient status;
- Relief description (slope gradient), tendency towards erosion, geological classification, description under the aspect of soil science and type of soil;
- Details on the soil water balance;

- Relevant aspects of geology, hydrogeology and geotectonics; nature of the subsoil.

Impact of materials

- Contaminant contents (overall contents, soluble portion), possibly classified by horizons of stages of depth;
- Existence of residual pollution;
- Causes of contamination;
- Parameters influencing the mobility of contaminants (primarily the pH value, cation exchange capacity, calcium content, levels of carbon with organic bonds);
- Parameters describing the microbial metabolisation capacity (e.g. CO_2 respiration, dehydrogenase activity).

4.1.3.2 Examination of soil in an ES

As far as necessary for the specific project, soil samples from the area under investigation will be taken and tested In particular, tests for heavy metals and organic contaminants (PCDD/F and PAH) at the immission maximum will be carried out.

The relevant immission and deposition data for the resource air will be included in the description of the resource soil including agriculture. It is intended to describe or investigate the following parameters:

- Soil description, pH value, type of soil, carbonate content, organic C;
- Heavy metals (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Sn, Ti, V, Zn), organic contaminants.

For the purpose of conservation of evidence, especially with regard to accidents, the present situation should be documented by creating permanent observation spaces, especially in sensitive areas.

4.1.3.3 Agricultural or horticultural production

Portrayal of existing loads on agricultural and horticultural products against the background of the expected additional burden by contaminants (e.g. heavy metals and persistent organic contaminants that might affect humans through the food chain). Agricultural and horticultural products that are conventionally produced in the area and sensitive to accumulation should be taken into account.

Keeping of livestock

In this respect, organic contamination of fauna products is the focus of interest. Among livestock in the region, suitable fauna products should be examined especially with regard to accumulating organic contaminants. The portrayals might be based, for example, on test results from monitoring programmes. If no data are available for the area under investigation, the necessity and scope of primary surveys should be determined.

Agriculture

If relevant at the site in question, the agricultural situation in the area under investigation

will be described. In addition, the agricultural structure will be shown on the basis of the structural assessment, utilisation of soil and the livestock count:

- Agricultural structure and forms of agricultural production; consolidation and mergers; and the significance of organic agriculture in the region.
- Utilisation of the space;
- Eco-toxicological situation of farming: In particular, there will be portrayal of
  - Existing immission and deposition loads of NO_2, SO_2, HCl, HF;
  - Immission and depositions of heavy metals and organic contaminants;;
  - Concentration or inorganic and organic contaminants in the soil and in flora; in doing so, soil and bio-indicator systems for the conservation of evidence may be used or an investigation of relevant cultivated plants carried out.

Subsequent checks and monitoring of the environment

One year before implementation of the project, additional continuous tests must be carried out. A selection of cultivated plants representative for the region should be planted under controlled conditions at locations which will presumably be influenced and not influenced by flora and tested for heavy metals and persistent organic contaminants, if necessary also for fluorine.

The present situation shall be assessed for contaminant impact with suitable bio-indicator methods before commencement of the project and continuously checked while flora is operational.

4.1.4 Geology and geomorphology, palaeontology

According to the Terms of References for the preparation of an ES from MEPA the present status should include a survey and characterisation of the sites' geology, geomorphology and soils and palaeontology.

The Information for this issue is mostly gained from public records. Sources for geological information could be e.g. Geological Map of the Maltese Island and also samples from laboratories.

4.1.4.1 Geology

The Geological Settings are:

- Stratigraphy

  The geological setting of site, surrounding area and cross section could be shown in the publised geological map for Malta. The results of the setting from stratigraphy (site and surrounding) could be summarised in a table.
- Palaeontology
- Structure
- Resource evaluation

4.1.5 Water and hydrological features

The area under investigation in connection with thermal power plants will primarily be determined by the extension, flow direction and velocity of surface water and ground water. This area under investigation may have to be modified in accordance with possible influences via dispersion of air pollutants.

The intensity of the statement and of the necessary tests regarding he resource ‘water’ will mainly be determined by the relevant features of the plant process management.

4.1.5.1 Ground water

When describing the present situation regarding the resource "ground water", it seems useful to first make a classification into

- hydro-geological conditions and ground water balance, and
- quality of the ground water.

4.4.1.1.1 Hydrogeology

When describing the present situation, the following details should be included:

- Existing national water legislations (e.g. L.N. 203 of 2002 see chapter 1.2.2.1);
- Extensive hydro-geological conditions;
- Hydro-geological conditions at the site;
- Interaction between ground and surface water;
- Ground water balance (formation of new water, direction of flow, strength, per meability, etc.);
- Existing waster rights (for waste extraction, waste discharge etc)
- Enlisting of conservation, special protection and redevelopment areas;
- Size of the catchment area;
- Specification of water extraction facilities and utilisation facilites;
- Influence of neighbouring open water bodies (e.g. marine) and the changing surface thereof as well as introduction into the ground water - surface water;
- Hydrological information regarding the amount of rain, surface drainage, seepage rate, evaporation, formation of new ground water.

4.4.1.1.2 Quality of the ground water

If it cannot be ruled out that contaminants will be discharged into the ground water, the parameters established for waste water should first be examined.

On this occasion, reference is made to the significance of describing construction measures in the ES (e.g. sealing of the waste silo) in order to prove that detrimental effects on the ground water have been ruled out.

When portraying the present situation, existing surveys will be taken into account.

As a rule, sampling of the ground water must be carried out before commencement of operations both upstream and downstream of the plant at least once every summer and winter. This is also necessary for reasons of conservation of evidence.

4.1.5.2 Surface water (marine)

The possible impact on surface water bodies and thus the descriptions of the present situation are highly dependent on the method used and the differences in the utilisation of surface water bodies as well as the type of the water body that may be affected. This also results in a wide range when describing the present situation of the surface water bodies in the area under investigation.

- Description of the hydrological situation; description of the quality of the water and water body, collection of relevant quality data (also taking possible flood areas into account);
- If need be, assessment of the water quality;
- Assessment of existing handicaps of the ecological functionality;
- Existing influences (industrial waste water, rain water, water from fire fighting) and water rights;
- Degree of naturalness;
- Significance of the water body to the landscape;
- Recreational function (use);
- Fishing;
- Exploitation rights;
- Details on the structure of the water body;
- Drift and particulates balance.

For plants with waste-water free flue gas purification facilities, the description of the present situation of the surface water bodies may be reduced under certain circumstances.

4.1.6 Cultural heritage sites and real assets

The area under investigation for thermal power plants is primarily defined by the dispersion of air pollutants. This delimitation should essentially also be selected for the resource "cultural heritage sites and real assets".

The current situation of the cultural heritage sites and real assets should be described and, where possible, shown in the plan. In particular, these include and should be taken into account in each case:

- Cultural Heritage Sites

Cultural heritage are building monuments, archaeological objects, historical cultivated landscapes and components thereof as well as historical forms of land utilisation.

If there is reason to assume that archaeological deposits may be found at the selected location, such locations should be examined in cooperation with the authorities in charge both before and during the construction phase.

- Real Assets

Real assets are social values that had or have considerable functional significance such as bridges, building and towers. They also include infrastructural facilities for supply and disposal that may have to be subjected to structural changes in connection with the project so that a demolition, building or operation permit may be necessary according to

other legal regulations.

4.1.7 Landscape and topography, including the coast and submarine features

The area under investigation for thermal power plants is primarily defined by the dispersion of air pollutants. This delimitation should essentially also be selected for the resource "landscape", taking into account connected landscape units.

Particular attention should be given to the visibility of a location from various directions (visibility relations).

The present situation for the resource "landscape" should be described not only in the geographical sense, but attention should also be given to ecological and utilisation-related aspects and to the scenery (or townscape, depending on the location).

4.1.7.1 General characterisation of the landscape

- Description of the landscape area;
- Main features (water bodies, terraces, coasts, etc.);
- Main landscape structures;
- History of the landscape;
- Protection status (international, national) protection awards.

4.1.7.2 Natural space potential (landscape, coast, marine)

- Nature conservation potential (based on the unspoilt quality, variety of species, valuable areas that are protected or worthy of protection);
- Potential of raw material;
- Biotic yield potential (fertility of the soil);
- Water supply potential (water bodies that may be used under water resources management aspects);
- Potential for energy generation;
- Climatic regeneration potential.

4.1.7.3 Landscape as a natural and cultural space (including coast)

- Description of the landscape elements including anthroprogenic influences (geological-morphological elements, hydrological elements, vegetation elements);
- Natural monuments;
- Elements important under cultural-historical aspects (such as ground monuments, buildings and parks);
- Regional planning and dedication of spaces; infrastructure;
- Utilisation (such as agriculture, fishing).

4.1.7.4 Landscape as a recreational and adventure space

- Suitability for recreational activities and existing leisure facilities;
- Utilisation and facilities for tourism.
- Marine see chapter 4.1.5.2

4.1.7.5 Scenery/aesthetics

- Delimitation of the aesthetic sphere (i.e. the location where the object in question is visible);
- Analysis of the scenery or townscape, taking into account (traditional) sight relations with distinct cultural and material assets (especially in connection with the recreational infrastructure), lookouts and existing disadvantages.

A photographic documentation is suggested for visualisation.

4.1.8 Air, including prevailing meteorological factors and air quality

The area under investigation for thermal power plants is primarily determined via the dispersion of air pollutants. In order to help delimit the area under investigation, the relevance / irrelevance of the additional immission load may be used.

The area under investigation should be delimited as follows:

The additional load is to be classified as irrelevant if additional immission caused by gaseous or dust contaminants and by the deposition of contaminants in the soil or surface water bodies is

- less than 3 % as a short-term value (< daily mean value) and
- less than 1 % as a long-term value (≥ daily mean value)

of an immission limit for population and the resources "vegetation" or "soil" and "buildings".

The following are to be taken into account:

- Gaseous: SO_2, NO_2, NMVOC, benzene, HCl, PAH, PCB, PCDD/F (I-TEQ), HCB, HF;
- Particulate dust, PM10 and heavy metals;
- Measurement of depositions

There different Maltese legislation e.g. L.N. 163 of 2002 amended by L.N. 231 of 2004 available If no national legal immission limits are available, the Air Quality Guidelines of the World Health Organisation (WHO) may be used alternatively.

As a result, a joint area under investigation is determined for all air contaminants and for the resource "air", respectively, the size of which is determined by the air contaminant the additional immission load of which is classified as not irrelevant at the greatest distance from the envisaged emission source.

Dissemination of air contaminant emissions caused by the plant

In connection with the project types under consideration here, simulation models for calculating the dissemination of air contaminants have special significance.

Taking the climatic/meteorological conditions including concentration-increasing effects such as calms or layers of atmospheric inversion as well as dissemination class statistics characterising the dissemination conditions into account, a dissemination calculation for air contaminants emitted during the normal operation of the plant must be carried out. Depending on the individual aspect of the project, different emission scenarios should be considered, such as stationary operation (full load operation / partial load operation) and non-stationary operation (Start up and Shut down phase / load change). Starting values to be taken into account for the dissemination calculation are the relevant emission limits and the guaranteed value of the manufacturer(s) of the plant. Operational values based on the experience with comparable plants may be used in addition.

As a matter of principle, the maximum additional and total immission to be expected must be identified and described, taking seasonal changes into account. In any case, these evaluations must be carried out for all reporting periods used in threshold limit and guide value formulations.

Likewise, dissemination calculations must be carried out for identifying additional immission loads in case of malfunctions.

The impact of steam emissions from the cooling tower on the climate may be estimated on the basis of literature studies and calculations of the drift steam spread.

Dispersion of air pollution emmissions caused by traffic

In order to determine traffic-specific additional emmissions of air contaminants, dispertion calculations will usually have to be carried out.

4.1.8.1 Air

The description of the present situation for the resource "air" requires a description of the existing contaminant load (immission concentration and contaminant deposition) and must take into account the emissions related to the project.

First, it is advisable to evaluate all the results of continuous and intermittent measurements carried out in the area under investigation with regard to relevant data on existing contaminations.

If no up-to-date and confirmed data are available, measurements of existing loads must be carried out in accordance with the state of the art with specific quality assurance measures in order to obtain a representative portrayal of the immission situation in the area under investigation.

Any existing contamination should be described on the basis of the following parameters, in dependence of the fuels parameters can be limited:

- SO_2, particulate dust, PM10, NO, NO_2, CO, benzene, NMVOC (by continuous assessment);
- HCl, HF, benzo(a)pyrene, PCB, PCDD/F, HCB (assessment by spot checks of air contaminants);
- Total dust deposition, dust ingredients: As, Cd, Cr, Cu, Hg, Ni, Mn, Pb, Sn, Zn, Sb, V, Ti, total N (assessment by deposition measurement);
- Existing ozone load.

When describing existing loads, special attention should be given to the evaluation of the

air quality in the area of the expected maximum of the additional load (see chapter 4.2.7) and at the location within the area under investigation with the most severe load at present.

4.1.8.2 Climate

The description of the present climatic situation in the area under investigation is important under two aspects:

- for the description of the transmission conditions for air contaminants (as an influential parameter for determining the additional load);
- for the characterisation of the local microclimatic conditions.

Due to strong seasonal variations, meteorological/climatic investigations must be carried out over a longer period of time. In order to identify seasonal influences, meteorological measurements must be carried out over the course of one year.

It will be necessary to check in each individual case whether existing meteorological data may be used for other locations and how long a meteorological investigation for a maximum estimate should take. For the calculation of dispersion with the objective of determining the additional immission load, a dispersion class statistic representative for the location must be used.

In order to describe the present situation, the following information is particularly important, also indicating the location of the measuring points:

- Temperature;
- Humidity;
- Rain;
- Fog;
- Direction and speed of the wind, frequency of calms (taking into account the ground relief and existing buildings):

4.1.8.3 Existing air pollution/health

The quantity of existing air pollution including individual contaminants must be evaluated on the basis of national and international limit values and rules established to protect the inhabitants of the area.

In order to complete the analysis of the present situation, existing surveys regarding conspicuous symptoms or causes of death in the area under investigation may also be evaluated. National statistics permitting a comparison with the conditions in the area under investigation are suitable for such purposes.

4.1.9 Odour, Vibrations, Light, etc.

Description and evaluation of the present situation regarding odours, vibrations and possibly light immission, etc.

In order to determine existing odours:

- Evaluate statistics of complaints and surveys;
- Carry out scan surveys in individual cases.

Essential criteria of evaluation:

- Concentration of odours;
- Intensity and quality of odours;
- Duration and frequency of the odour immission.

4.1.10 Noise

Description of the present sound immission situation (measurements of the sound level, background noise levels both in terms of frequency and intensity).

The location and number of the measuring spots are determined by

- Structural conditions of settlement, with special attention to residential areas, possibly individual residential buildings and other sensitive uses in the neighbourhood of the location,
- should also be provided in the sphere of influence of the traffic (road and water) in the area under investigation.
- Other potential noise sources in the area, including new developments;
- Sensitive receptors including sensitive recreational areas in the vicinity;
- Features that might shield noise.

Sufficient measuring periods are necessary for a reliable data base (continuous long-term 24 hour measurements at selected measuring points). Baseline survey should follow parameters given in BS4142:1997 and other relevant guidelines.

4.1.11 Any others relevant environmental features

4.2 Impact

According to Article 16 L.N. 204 of 2001 – Development Planning Act (Cap. 356) Environmental Impact assessment Regulations, 2001 Arrangement of Regulation, all significant impacts of the proposed development shall be considered and assessed.

Impact

Based on the assessment of the current situation, the impact of the project on the environment for the project stages construction, operation, accident or interrupted operation should be estimated with relevance to the resource to be protected.

Interaction

Interaction is understood to mean the mutual (direct and indirect) correlations between resources to be protected, environmental factors, and components of the ecological system. Accordingly, this also includes feedback effects, cumulative and synergistic effects as well as impact shifts. Depending on the project and the site, a more specific evaluation of the individual instances of interaction may be necessary.

Methods

Forecasts of impact on the environment within the framework of an EIS are based on a general method which establishes a correlation of the impact causes resulting from an envisaged project during the individual project phases vis-à-vis the condition of the environment during the investigated period. The forecast of the impact on the environment is made by analysing the impact on the environment caused by the project. In doing so, findings from comparable cases are often applied to the actual situation by modelling.

It is important to regard the impacts of construction, operation and accidents by themselves.

According to Article 16 Sub (3) Environmental Impact assessment Regulations hazard and risk assessment are described as Accidents/interruptions of operation in chapter 4.2.1

4.2.1 Population, Land use, including recreational uses

4.2.1.1 Impact of the existence of the project

If necessary, the impact on the quality of living in neighbouring settlements and possible detrimental effects on recreational areas must be investigated.

4.2.1.2 Impact of the use of natural resources

As a rule, no relevant impact is expected.

4.2.1.3 Physical effects

If necessary the impact of the development on the surrounding area e.g. earth-moving, stability, deposits and waste must be included.

First the development should be considered in isolation and then assess the impacts arising from the various proposed activities upon each other. It shall then consider the development in a wider context and assess the effects of:

- the development on the surrounding land uses; and
- the effects of the surrounding land uses on the development.

4.2.1.4 Impact of emissions

Details regarding the impact of the project on health and safety must be provided in compliance with the relevant regulations.

Gaseous and particulate emissions

- Construction
  Immission forecast, taking into account air pollution emissions caused by incoming and outgoing traffic during the construction phase: evaluation of the impact on the population concerned under environmental medicine aspects.
- Operation
  Immission forecast, taking into account the air pollution emissions caused by the operation of and the traffic to and from the plant: evaluation of the impact on the population concerned under environmental medicine aspects.

In this respect, the results of the calculation of dispersion (additional immission and depositions) will be taken into account. The determined extent of the air pollution to be expected must be assessed according to national and international guidelines and limits, taking into account the population to be protected.

- Accidents/interruptions of operation
  Immission forecast, taking into account air pollution emissions caused by interruptions of operation or accidents as well as evaluation of the impact on the population concerned under environmental medicine aspects.

Odour

- Operation
  Estimate of odour emissions caused by the operation of the plant (taking into account possible loading operations): description and evaluation of the impact on the population concerned.
- Accidents, malfunctions
  Estimate of odour emissions resulting from accidents or malfunctions: Descrption and evaluation of the impact on the population concerned.

Emissions into water

- Construction, operation and accidents: Description and evaluation of the impact of emissions on drinking water during the construction and operational phase or in case of accidents (e.g. if the waste silo leaks).

Noise

- Construction
  Sound immission forecast, taking into account the sound emissions caused by the operation on the building site and the traffic: Portrayal and evaluation of the additional and the total burden for the construction scenarios with relevance to sound (such as demolition, concrete work on the foundations, boarding and concrete work, overground workings, steel construction).
- Operations
  Sound immission forecast, taking into account the sound emissions caused by the operation of the plant and related traffic: Portrayal and evaluation of the additional and the total burden.
- When making the forecast, the traffic noise caused by the project should also be

taken into account. As a matter of principle, all sources of sound on the plant site (inside and outside) must be included both during the construction phase and during the operational phase and the remaining sound level portrayed. The same applies to sound emissions expected in connection with extra traffic. Time limits regarding certain activities or operational modes imposed by the management (day/night) must be observed. The immission must be determined for the immission sites for which an existing burden has already been identified. The evaluation of the forecast results should be made with a view to changes vis-à-vis the existing noise level during day and night times.

Vibrations

- Construction
  Estimate of the vibrations caused by work on the building site: Description and evaluation of the vibrations on the population affected.
- Operation
  Estimate of the vibrations caused by the operation of the plant: Description and evaluation of the vibrations on the population affected.

Miscellaneous

The impact of possible emissions of light, ionising and non-ionising radiation (if any) must be described.

Table 5: Relevance matrix – population to be protected

	Project phase		
	Construction	**Operation**	**Accident, interruption of operations**
Existence of the project		**X**	**X**
Use of natural resources			
Emissions			
Gaseous and particulate emissions	**X**	**X**	**X**
Odour		**X**	**X**
Emissions into water	**X**	**X**	**X**
Noise	**X**	**X**	
Vibrations	**X**	**X**	
Waste, excavated soil	**X**	**X**	
Heat		**X**	

4.2.2 Flora, Fauna and ecosystems (terrestrial and marine), including both habitants and species and, in particular, protected and endangered species and their habitats

4.2.2.1 Impact resulting from the existence of the project

- Construction
  - Description and evaluation of the possible impacts of lowering the ground water level;
  - Description and evaluation of the (possibly) temporary and lasting effects.

- Description and evaluation of the possible impact on benthic, pelagic, infaunal and fish communities. Changes in communities and ecosystems shall be highlighted.
- Description and evaluation of the possible effects on biological, physico-chemical and hydromorphological characteristics of the coastal water body. Impacts on sediment characteristics on the area should be included.

- Operation
  - Description and evaluation of the impact of lowering the ground water level through flora or other construction measures;
  - Description and evaluation of the impact of using land through flora and other construction measures taking up space;
  - Description and evaluation of impact of lasting effects and the sealing of soil, taking into account traffic routes.
  - Description and evaluation of the possible impact on benthic, pelagic, infaunal and fish communities. Changes in communities and ecosystems shall be highlighted.
  - Description and evaluation of the possible effects on biological, physico-chemical and hydromorphological characteristics of the coastal water body. Impacts on sediment characteristics on the area should be included.
- Special considerations regarding trees and woodland:
  - Usage of woodland areas during construction and operation
  - Possible impacts on woodland, wildlife habitats (e.g. noise, traffic etc)

4.2.2.2 Impact of the use of natural resources

- Operation
  Description and evaluation of the impact by extraction water (cooling, process and drinking water withdrawal).

4.2.2.3 Impact of emissions

Gaseous and particulate emissions

- Construction
  Description and evaluation of the impact by air pollution immission on habitats, fauna, flora or agricultural plants caused by building site activities and traffic.
- Operation
  - Description and evaluation of the impact by air pollution immission on habitats, fauna, flora or agricultural plants caused by building site activities and traffic.
  - In this respect, the identified extent of the expected air pollution (maximum short- and long-term additional and total immission) on the resources to be protected should be evaluated.
  - Estimate of the entry of acid into plants (used for agriculture).
- Considering the transfer of contaminants (especially heavy metals) from the soil into flora.
- Accidents/interruption of operation
  - Description and evaluation of the impact of air pollutant immissions caused by interruptions of operation,malfunctions or accidents.

Emissions into water

- Operation
  Description and evaluation of the impact by discharging waste water especially into aquatic eco-systems.

Noise

- Construction
  Description and evaluation of the impact caused by sound immission resulting from construction activities and traffic.
- Operation
  Description and evaluation of the impact caused by sound immission resulting from the regular operation of the facility and traffic.

The investigations carried out with regards to the human population to be protected should also include whether relevant changes of the noise situation will influence the fauna. In particular, the impact on sound-sensitive bird species should be taken into account.

Heat

- Operation
  Description and evaluation of the impact of possible discharge of cooling water.

Table 6: Relevance matrix – resources "fauna", "flora" and their habitats

	Project phase		
	Construction	**Operation**	**Accident, interruption of operations**
Existence of the project	**X**	**X**	
Use of natural resources		**X**	
Emissions			
Gaseous and particulate emissions	**X**	**X**	**X**
Odour			
Emissions into water		**X**	
Noise	**X**	**X**	
Vibrations			
Waste, excavated soil	**X**		
Heat		**X**	

4.2.3 Soil, agricultural quality and produce

4.2.3.1 Impact as a result of the existence of the project

- Construction
  - Description and evaluation of the (temporary) sealing of the soil and traffic space;
  - Description of soil consumption during the construction phase;
  - Details regarding the use or disposal of excavated material.
- Operation

- Description and evaluation of the (temporary) sealing of the soil by buildings and traffic space (including rail links and roads);
- Description of the soil consumption, especially the consumption of agricultural acreage;
- Changes to the soil during construction and operation;
- Description of possible lasting effects.

4.2.3.2 Impact resulting from the use of natural resources

In this respect, the impact on the function of the soil as a supplier of raw materials must be investigated.

4.2.3.3 Impact resulting from emissions

Gaseous and particulate emissions

- Construction
  Description and evaluation of the impact of air pollution immission caused by activities at the construction site and traffic.
- Operation/accident
  Immission forecast for the soil: Description of the impact on the soil characteristics established during assessment of the present situation and evaluation of the additional contaminant loads. Reference will be made to the results of the dispersion calculation (additional immission and depositions). The following aspects will receive special attention:
  - Forecast of the immission and deposition of: NO_2, total N, SO_2, HCl, HF and heavy metals;
  - Evaluation of the acid and nitrogen load on the soil. These should be evaluated on the basis of “Critical Loads”;
  - Description of the impact of the heavy metal load to the soil;
  - Description of the impact resulting from the load of organic contaminants, especially of PCDD/F;
  - Forecast of the accumulation of potential contaminants in the soil;
  - Forecast of the transfer of contaminants from the soil into plants;
  - Forecast of the transfer of contaminants from the soil into ground water.

Emissions into water

- Construction
  Impact of emissions on the resource "soil" (e.g. by contamination of the soil during the construction phase.)
- Operation/accident
  Impact of emissions during operation or in case of an accident (e.g. leakage from the waste silo) on the resource "soil"; if possible also considering direct or indirect influences on the ground water.

Table 7: Relevance matrix – resource soil

	Project phase		
	Construction	**Operation**	**Accident, interruption of operations**
Existence of the project	**X**	**X**	
Use of natural resources			
Emissions			
Gaseous and particulate emissions	**X**	**X**	**X**
Odour			
Emissions into water	**X**		**X**
Noise			
Vibrations			
Waste, excavated soil	**X**		
Heat			

4.2.4 Geology and geomorphology, palaeontology

This assessment shall include the impacts of the geology including the economic feasibility of the reuse of the excavated material, giving due consideration to all possible alternative uses. The assessment shall also investigate the effects and risks of excavations on the stability of the surrounding land, given the type of rock in the area.

This should comprise palaeonthological, geomorphological, and physiographic aspects. The assessment of significance of impacts (positive and negative) should also include

- soil and coastal erosion
- slope stability / instability.

If the impact assessment predicts potential hazards like slope instability or subsidence a risk assessment should be carried out.

4.2.5 Water and hydrological features

4.2.5.1 Impact as a result of the existence of the project

- Construction and operation
  Description of the impact onto the ground water, e.g. impact on the rate of formation of new ground water and the water balance; changes of flow characteristics, impact of the sealing of soil.

4.2.5.2 Impact as a result of using natural resources

- Operation
  Description of extraction - envisaged extracted quantities of cooling water, water for fighting fires, drinking water, etc

4.2.5.3 Impact of emissions

Emissions into water

Construction / operation / accident

An EIS/EPS must include a portrayal of the following impact on the resource "water":

- Immission forecast for the water, including a risk estimate of transfer of contaminants from the soil into the ground water;
- Description of the impact of a possible idischarge of contaminants into the (ground) water, for example if the waste silo leaks;
- In case of accidents: taking into account the possible impact of water used for fire fighting.

Gaseous and particulate emissions

Construction / operation / accident

- Description of the possible impact of gaseous and particulate emissions on water bodies during the construction and operational phase as well as in case of accidents.

Heat

- Operation
  Description of the possible impact of increasing the temperature of a water body (marine) by discharging cooling water.

Table 8: Relevance matrix – resource "water"

	Project phase		
	Construction	**Operation**	**Accident, interruption of operation**
Existence of the project	**X**	**X**	
Use of natural resources		**X**	
Emissions			
Gaseous and particulate emissions	**X**	**X**	**X**
Odour			
Emissions into water	**X**	**X**	**X**
Noise			
Vibrations			
Waste, excavated soil	**X**	**X**	
Heat		**X**	

4.2.6 Cultural heritage and protected sites and areas

4.2.6.1 Impact resulting from the existence of the project

- Construction/operation
  Description and evaluation of the impact of land use (damages, destruction) on real and cultural assets; description and evaluation of visual changes of the landscape and townscape in the context of cultural assets (monuments, etc.)

4.2.6.2 Impact resulting from the use of natural resources

Under normal conditions, no relevant impact is to be expected.

4.2.6.3 Impact caused by emissions

Gaseous and particulate emissions

- Construction/operation
  Description and evaluation of the air contaminant immission caused by building activities, operation of the plant and traffic (lorries, cars and ships).

Vibrations

- Construction/Operation
  Description and evaluation of the vibrations caused by construction activities and the operation of the plant.

Table 9: Relevance matrix – resource "material and cultural assets"

	Project phase		
	Construction	**Operation**	**Accident, interruption of operation**
Existence of the project	**X**	**X**	
Use of natural resources			
Emissions			
Gaseous and particulate emissions	**X**	**X**	
Odour			
Emissions into water			
Noise			
Vibrations	**X**	**X**	
Waste, excavated soil			
Heat			

4.2.7 Air and climate, including prevailing meteorological factors and air quality

4.2.7.1 Impacts resulting from the existence of the project

Construction and Operation:

- Description and evaluation of changes in the micro-climate caused by changes in the surface characteristics (sealing, building).

4.2.7.2 Impacts resulting from the use of natural resources

In normal cases, no relevant impact is to be expected.

4.2.7.3 Impacts of emissions

Gaseous and particulate emissions

Climate

- Operation:
  - Description and evaluation of the impact caused by the release of humidity through the chimney (formation of fog or haze).
  - Description and evaluation of the impact of the emission of gases relevant to the climate.

When assessing the impact on the climate, the emission of "greenhouse" gases, especially the 6 Kyoto gases

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (N_2O);
- Fluorohydrocarbons (HFCs);
- Perfluorohydrocarbons (PFCs);
- Sulfur hexafluoride (SF_6)

should also be taken into account.

Air

So as to obtain a maximum estimate, unfavourable meteorological conditions for the dispersion of the contaminants close to the ground should be used as a basis. i.e. stable dissemination conditions and low wind speeds.

- Construction
  Description and evaluation of air contaminant immission caused by activities at the construction site and traffic.
- Operation
  Description and evaluation of air contaminant immission caused by the operation of the plant and traffic.

Description of a possible positive impact on the resource air, e.g. by substituting existing emissions.

- Accident / interruption of operations
  Portrayal and evaluation of air contaminant immission caused by interruption of operations, events relevant for a stoppage or malfunctions (e.g. emission of ammonia, fire in the silo, malfunction of flue gas cleaning).

Heat

- Operation
  Identification and evaluation of the increase in air temperature in the neighbourhood of the plant by the release of heat through the chimney. A possible increase in air temperature should be evaluated in relation tof the significantly higher temperature of the exhaust gas trail vis-à-vis the air in the neighbourhood.

Table 10: Relevance matrix – resource "air and climate"

	Project phase		
	Construction	**Operation**	**Accident, Interruption of Operations**
Existence of the project	**X**	**X**	
Use of natural resources			
Emissions			
Gaseous and particulate emissions	**X**	**X**	**X**
Odour			
Emissions into water			
Noise			
Vibrations			
Waste, excavated soil			
Heat			

4.2.8 Landscape and topography, including the coast and submarine features

4.2.8.1 Impact resulting from the existence of the project

- Construction and operation

Description and evaluation of the impact caused on:

- The natural space potential;
- Landscape as a natural and cultural space;
- Landscape as a recreational and adventure space;
- Scenery/aesthetics (for visualisation, for example by photomontage).

4.2.8.2 Impact resulting from the utilisation of natural resources

As a rule, no relevant impact is to be expected.

4.2.8.3 Impact caused by emissions

As a rule, no relevant impact is to be expected.

Table 11: Relevance matrix – resource landscape

	Project phase		
	Construction	**Operation**	**Accident, interruption of operations**
Existence of the project	**X**	**X**	
Use of natural resources			
Emissions			
Gaseous and particulate emissions			
Odour			
Emissions into water			
Noise			
Vibrations			
Waste, excavated soil			
Heat			

4.3 Mitigation Measures

According to Article 17 of LN 204/ 2001 the consultants shall state clearly what significance they attribute to these effects and the mitigation measures they propose to be incorporated in the development and evaluate their effectiveness.

The description of measures for offsetting detrimental effects on the environment (for example as a result of unavoidable interference with the nature and landscape balance) depends on each individual case so that the following comments should be seen as a framework for orientation.

4.3.1 Population

4.3.1.1 Measures against detrimental effects

As far as the avoidance of detrimental effects on the population to be protected is concerned, an ES will focus especially on the following aspects:

- Choice of location, measures for planting grass, trees or shrubs, compensating measures, architectural design and integration of the plant into the landscape/townscape (see fauna and plants be protected and their habitat as well as landscape);
- Measures for avoiding detrimental effects on the water (see "water" as a resource to be protected);
- Measures for decreasing the emission of polluting contaminants (see "air" and "climate" as resources to be protected);
- Measures for decreasing the emission of odours from thermal power plants:
  - Selection of appropriate container systems (e.g. sealed containers);
  - Useful measures for storing areas (e.g. casings, self-closing doors in the hall where the waste is delivered);
  - Guiding malodorous air from relevant areas of the plant via the combustion line(s), approach in case of malfunction of the combustion line(s) and, for example, waste residues in the silo.
- Measures for avoiding/reducing the impact caused by vibrations (proper selection of the site, building site management, technical design of the plant);
- Measures for avoiding/reducing the impact caused by sound emissions (traffic on the site of the plant, selection of routes for incoming and outgoing traffic, building site management, times of operation, technically useful design of the plant, encapsulation, sound insulation of building components).

4.3.2 Flora, Fauna and ecosystems (terrestrial and marine), including both habitants and species and, in particular, protected and endangered species and their habitats

4.3.2.1 Measures against detrimental effects

In order to avoid detrimental effects on the resources "fauna", "flora" and their habitats, an ES will especially describe the following aspects:

- Measures to avoid detrimental effects on water (see resource "water");
- Measures to reduce the emission of contaminants polluting the air (see resource "air and climate");
- Measures for avoiding/reducing the effects of sound emission and vibrations (see "population to be protected");
- Avoidance/reduction of detrimental effects by proper selection of the location;
- Avoidance of unnecessary use of land;
- Avoidance of lasting effects;
- Measures for planting grass, shrubs and trees;
- Compensating measures, establishing new biotopes, replanting of trees;
- Description of measures for the conservation of evidence.

4.3.3 Soil, agricultural quality and produce

4.3.3.1 Measures against detrimental effects

In order to avoid detrimental effects on the resource "soil", an ES will focus on the following aspects when describing the project:

- Avoidance/reduction of detrimental effects by appropriate selection of the location;
- Avoidance of unnecessary use of land (see resource flora and fauna, biotopes and eco-systems):
- Avoidance of lasting effects;
- Steps for reducing emissions of polluting contaminants (see resources "air" and "climate");
- Steps for avoiding the emission of contaminated water into the soil (sealing of the waste silo; precautionary measures for malfunctions).

4.3.4 Water and hydrological features

4.3.4.1 Measures against detrimental effects

As far as the avoidance of detrimental effects on the resource water is concerned, an ES should especially include the following aspects:

- Measures for protecting the ground water (sealing of the foundations and the waste silo, etc.)
- Operating the flue gas cleaning plant without generating waste water;
- Other measures for avoiding negative effects on the resource water.

4.3.5 Air and climate, including prevailing meteorological factors and air quality

In order to avoid detrimental effects on the resources air and climate, an ES should place particular emphasis on the following aspects:

4.3.5.1 Reduction of the emission of air-polluting contaminants

- Organisational measures during the construction period (wetting of dusty areas);

- Emissions through the chimney: For example, control of the thermal treatment process (residence times, treatment temperature), flue gas cleaning (separation and retention of dust, scrubber, reduction or elimination of nitrogen);
- Diffuse emissions: Exhaustion of air from relevant sections of the plant (such as the waste silo, reception area, possibly the sludge silo) and use as combustion air;
- Air contaminants caused by traffic: Traffic management on site, selection of routes for arrivals and departures,.

4.3.5.2 Avoidance/reduction of an impact on the climate

- Macro-climate: Selection of the location, consideration of heat extraction for off-site heating or cooling purposes.
- Micro-climate: Selection of the location, placement of the buildings, possibly planting grass, shrubs and trees around the plant.

4.3.5.3 Measures for monitoring the quality of the air

For thermal power plants, the following continuous and intermittent monitoring measures are usually called for:

- Continuous measurements
  - in purified exhaust gas: dust, HCl, SO_2, CO, CO_2, NO_x (given as NO_2), hydrocarbons not combusted, oxygen, combustion gas temperature;
  - in the post-combustion chamber: combustion gas temperature.
- Intermittent measurements: HF, NH_3, Pb, Zn, Cr, As, Co, Ni, Cd, Hg, Cu and Mn, PCDD and PCDF.

Individual measurements should be carried out for the operation conditions in which the plant is verifiable mainly operated. The individual measurements with the necessary quality assurance steps must be carried out in accordance with the state of the art.

4.3.6 Landscape and topography, including the coast and submarine features

4.3.6.1 Measures against detrimental effects

As far as the avoidance of detrimental effects on the resource landscape is concerned, the following aspects should be emphasised in an ES:

- Selection of the location, avoidance of unnecessary use of land, avoidance of lasting effects, integration of the plant into the landscape, measures for planting grass, shrubs and trees, compensating measures, replanting of temporarily cleared spaces (see resource "fauna", "flora" and their habitats);
- Suitable selection of the location with a view to integrating it into existing structures;
- Architectural design of the plant.

4.3.7 Cultural heritage and protected sites and areas

4.3.7.1 Measures against detrimental effects

With a view to avoid detrimental effects on the resource real and cultural assets, an ES shall especially describe the following aspects:

- appropriate selection of the location in order to avoid damages to material and cultural assets;
- measures for reducing emissions, (especially SO_2) and the avoidance of vibrations.

4.3.8 Any others relevant environmental features

4.3.9 Summary of Impacts and Mitigation

In the following table you can find a summary of the impacts.

Table 12: Summary of the impacts (by MEPA), part 1

Predicted Impact	Beneficial/ Adverse	Cons/Operation	Extent of Impact	Direct/ Indirect	Short/ Long term	Permanent/ Temporary

Table 13: Summary of the impacts (by MEPA), part 2

Reversible/ Irriversible	Policy Importance	Probability of Impact Occurring	Significance of Impact	Proposed Mitigation Measures	Significance of Residual Impact

5 NON-TECHNICAL SUMMARY

According to Article 20 § (b) Sub. (1) Environmental Impact assessment Regluations, 2001 Arrangement of Regulation, a non-technical summary has to be presented in Maltese and English language. The objective of this summary is closely related to the legal right to information and involvement of the public in an EIA process.

This summarised description l shall give those parties involved in the process who are not technical experts easy access to the results of the investigations carried out by the developer in connection with the project. Therefore, it is essential to process the vast amount of information gathered in connection with an EIS/EPS in compact form and to publicise it in a way that is easy to understand. Therefore, a minimum of technical and scientific terms should be used and a form of presentation with a high content of information selected (structure, the use of colour as a design element, graphic illustrations, etc.)

The summary should be conceived as a separate and conclusive document.

Requirements of a Non-technical summary:

- Completeness;
- Clear structure and outline:
  - Description of the project;
  - Alternative solutions;
  - Description of the present situation, the key impact and the mitigation measures classified by resources worth protecting; and
  - Description of the interaction between the resources concerned.
- Comprehensibility, no technical terms;
- Comprehensibility lists of data and detailed explanations of scientific reasoning
- Compact wording, concentration on the essentials;
- No cross-references to individual technical reports;
- Clear layout both from a factual and optical point of view.

6 SHORT DESCRIPTION OF POSSIBLE DIFFICULTIES

Problems may arise in connection with drawing up an ES which (in the opinion of the developer or the consultant) may prevent a conclusive evaluation of facts.

In particular, this is related to missing data and "technical gaps". However, any problems that have arisen must be explained in a comprehensible manner. Therefore, the "burden of proof" of an EIS/EPS is not unlimited, but focused on that information and descriptions which are obtainable on the basis of existing or accessible knowledge.

7 LIST OF REFERENCES

(1) Council Directive 97/11/EC of March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment

(2) Malta (2001): Development Planning Act (Cap. 356) – environmental Impact assessment Regulations, 2001. Arrangement of Regulations, Valetta.

(3) MEPA (2007): Description of project at location – Terms of Reference for the preparation of an environmental impact/planning statement (Draft).

(4) Umweltbundesamt (2001): BE-196 Leitfaden zur Erstellung von Umweltverträglichkeitserklärungen für Abfallverbrennungsanlagen and thermische Kraftwerke, Umweltbundesamt, Wien.

(5) Umweltbundesamt (Entwurf): Leitfaden zur Erstellung von Umweltverträglichkeitserklärungen für Verbrennungs- und Mitverbrennungsanlagen, thermische Kraftwerke und Gasturbinen; Umweltbundesamt, Wien. to be published.