



MICA

Minerals Intelligence Capacity Analysis

FACT SHEET

Environmental Impact Assessment EIA

Environmental Impact Assessment (EIA) is a study of the expected effects of a proposed project, plan or program on the environment, including quarrying and mining activity.

Scope (conceptual model & main characteristics)

The best environmental policy consists of preventing the creation of pollution or damage at source; rather than subsequently trying to counteract their effects (85/337/EEC, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1985L0337:20090625:EN:PDF>) and for this reason the assessment procedures for the evaluation of the environmental effects is provided.

The scope of "environmental impact assessment" (EIA) is to identify, examine, describe and evaluate properly the direct and indirect environmental effects of the exploitation of natural resources, of a project (public or private) and assessing properly the constructional works or other installations, which are expected to have environmental impacts constituting the factors which are considered to be in interaction with and affecting the ecological balance, the quality of life and health of the population, the historical and cultural heritage and also the aesthetic values and includes data and the conditions existing on the surface, the water and the soil, all the layers of the atmosphere, all the organic and inorganic matter, all ecosystems and landscapes, the interrelationship among them and the economic and social conditions.

Contexts of use, application fields

-> contexts (e.g., environmental, economic, social assessment)
 -> which types of stakeholder questions are concerned?
 -> link to published studies that implement the method

Contexts like environmental, economic and social assessment can be analyzed by the types of impacts as biological and physico-chemical, social and economic impacts.

The range of EIA applications depends on the type of the project, the location, the capacity, the range and the size of the project.

The environmental impact assessment is an essential tool for the shaping and controlling of the land use during the management of the quarrying and mining of mineral resources.

Further details are provided below:

Biological and physico-chemical impacts

- 1) It relate to effects on biological resources such as vegetation, wildlife, crops and aquatic life.
- 2) Interaction with physical elements like air, water, soil, rocks and solar radiation.
- 3) Chemical impacts like chemical changes in air, water, soil quality etc.

Social impacts

- 1) Demographic – displacement and relocation effects and changes in population characteristics.
- 2) Cultural – traditional patterns, family structures, religious, archaeological features, social networks.
- 3) Gender – implication of projects on roles of women in society, employment opportunity and equity.
- 4) Institutional – housing, schools, criminal justice, health, welfare

Health Impacts

1. Dust emissions
2. Air emissions
3. Noise
4. Vibration
5. Additionally some more parameters could be contributed to the health impact e.g. asbestos or arsenic is considered harmful for human health.

Workers and residents of neighboring areas are the ones which are mostly affected by the above mentioned parameters

Economic Impacts

- 1) Duration of construction and operation
- 2) Workforce requirements for each period
- 3) Skill requirements (local availability)
- 4) Earnings
- 5) Raw material and other input purchases
- 6) Capital investment
- 7) Outputs
- 8) The characteristics of the local economy

The types of stakeholder questions are concerned are directly related to the contexts above.

Input parameters

-> which parameters are needed to run the method

The EIA process has three specific stages (KH-12-01-001-EN-N); **screening, scoping and EIS Review**. The aim of the guidance is to provide practical help to those involved in these stages in the EIA process. By following the Screening and Scoping Guidance it is hoped that better decisions will be made by EIA and in terms of reference of the studies required. The EIS Review guidance helps developers and consultants to prepare qualitative Environmental Impact Statements and competent authorities and other interested parties to review/assess them more effectively, so that the best possible information is made available for decision making.

Type(s) of related input data or knowledge needed and their possible source(s)

-> which types of data are needed to run the method, from which sources could they come...
-> could be qualitative data or quantitative data, and also tacit knowledge, hybrid, etc.

The "environmental impact assessment" (EIA) is based on the collection of all necessary data of the area under assessment such as in urban areas, rural areas and protected areas, the recommendations of the local authorities, the non-government organizations and the governmental departments (competent authorities) etc. The necessary information is obtained from the archives of the relevant governmental authorities as well as by local surveys of the area recording the current situation. The required types of data are provided below:

PART I

1. Description of the development, including in particular:
 - (a) A description of the physical characteristics of the whole project or development and the land-use requirements during the development and operational phases (such as quarry/mine and crushing/ processing plant);
 - (b) A description of the main characteristics of the production processes, for instance, nature and quantity of the materials used;
 - (c) 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 development.
2. An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for the choice made, taking into account the environmental effects.
3. A description of the aspects of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors.
4. A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from:

- (a) the existence of the development;
 - (b) the use of natural resources;
 - (c) the emission of pollutants, the creation of nuisances and the elimination of waste, and the description by the applicant or appellant of the forecasting methods used to assess the effects on the environment.
5. A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.
 6. A non-technical summary of the information provided under paragraphs 1 to 5 of this Part.

PART II

1. A description of the development comprising information on the site, design and size of the development.
2. A description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects.
3. The data required to identify and assess the main effects which the development is likely to have on the environment.
4. An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for the choice made, taking into account the environmental effects.
5. A non-technical summary of the information provided under paragraphs 1 to 4 of this Part.

The collection of data should be based on the Guidelines 2014/52/EE <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0052&from=EN>, 85/337 / EEC, <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31997L0011>, 97/11 / EC and 2003/35 / EC <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32003L0035> of the European Union for the EIA, and on the respective laws and regulations of the Member State in which the project will be carried out.

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| <p>Model used (if any, geological mathematical, heuristic...)</p> | <p>-> e.g., geological model for mapping -> e.g., mathematical model such as mass balancing, matrix inversion, can be stepwise such as agent -based models, dynamic including time or quasidynamic specifying time series... -> can also be a scenario</p> |
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There are available models depending on the type of the pollutant and the extent at which could affect. The measurements and the model used to evaluate the impacts should be reported in the assessment including characteristic parameters such the shape, size, composition, concentrations. The models used vary depending on the ones adopted/used by the national competent authorities of each Member State.

The Cyprus Environmental Department has prepared a Standard for the preparation of an Environmental Impact assessment study (EIA), based on the Article 20 of the regulations of the Law for the assessment of the environmental effects of certain projects

http://www.moa.gov.cy/moa/environment/environment.nsf/index_gr/index_gr?opendocumen

For the rest of the EU Member States, the relative mineral policies, and the resulting requirements can be reviewed at the web portal of the EU project Min- Guide (<http://www.min-guide.eu/project-results>) by inspecting the country profiles.

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| <h2>System and/or parameters considered</h2> | <p>-> the system can be described by its boundaries. These can refer to a geographic location, like a country, or a city, the time period involved, products, materials, processes etc. involved, like flows and stocks of copper, or the cradle-to-grave chain of a cell phone, or the car fleet, or the construction sector, or the whole economy...</p> <p>-> parameters could possibly refer to geographic co-ordinates, scale, commodities considered, genesis of ore deposits and others...</p> |
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The system limits are determined, indicating the type of the impacts and the area that the study will cover. Significant alternative solutions and impacts are detected, if there are any, and those which are considered not very important are abandoned. The impacts which seem to be the most decisive for the final decision are isolated. The examination of impacts that can be proven insignificant for the environmental study, it should be prevented to avoid delays and additional cost. The whole process is described in Directive 2014/52/EU (modification 2011/92/EU) and directive 2011/92/EU "CONCERNING the ASSESSMENT of IMPACTS on the ENVIRONMENT FROM CERTAIN PROJECTS LAW"

PROCEDURE

1. The applicant of the project/ development submits for evaluation copies of the study/report to the Environmental Authority through the competent authority, which will license the project/ development
2. The EIA is discussed at a meeting of the Environmental Impact Assessment Committee which has an advisory role towards the environmental authority
3. The Environmental Authority-prepares a relevant Opinion/Environmental Approval.
4. The Environmental Opinion is sent for approval to the competent authority
5. Approval or rejection of the town planning license for the project / development
6. Possible referral of the subject to a Ministerial Committee and if necessary to the Ministers Council

The evaluation process includes:

1. The design of the project / development based on the EIA study provided by the applicant.
2. The preparation of an EIA study by the owner of the project / development (article 30)
3. The evaluation process which includes:
 - a. Carrying out the necessary consultations (Articles 10, 31 and 44-Article 25),
 - b. The evaluation by the Environmental Authority of the information included in the study and any supplementary information provided, where is needed, from the owner of the project/ development [Article 32 (2) and (5)] as well as any other relevant information obtained through consultations (Articles 10, 31 and 44),

4. The advisory of the Environmental Authority (Article 33) with respect to the significant impacts of the project/ development to the environment, taking into consideration the results of the evaluation (including supplementary evaluation).
5. The incorporation of the opinion of the Environmental Authority to the Decisions (Article 35).
6. Environmental Approval or rejection (article 23)
7. Justified Confirmation (article 28)
8. Environmental Opinion (article 33)

Every study of EIA covers an area of which its boundaries are limited to the project's / development boundaries and of a buffer zone around it proportional to the type of the extent and the degree of the project/ development which is expected to affect the surrounded area throughout the different stages.

For example, for the creation of a mine or a quarry, the EIA includes the area of the development plans of the mine or quarry, its potential future extension, the area of the for the waste disposal, the degree of effect on the surrounding ecosystem, cultivated areas, cities – villages etc. and which can be used as a base on which the EIA local boundaries will be increased.

In the case of a cross-border project, the article 7 of the EU directive 2011/92/EU is applied which includes specific provisions for the cases in which a project is implemented in a Member State, is likely to have significant impacts to the environment of another Member State.

The EIA covers all the stages of the project such as planning, implementation, restoration and abandonment.

Phases:

1. Area preparation phase
2. Construction phase
3. Operational phase
4. Implementation face and project demolition
5. Phase of rehabilitation and restoration of the area

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| <p>Time / Space / Resolution / Accuracy / Plausibility...</p> | <p>-> to which spatio-temporal domain it applies, with which resolution and/or accuracy (e.g., near future, EU 28, 1 year, country/regional/local level...) -> for foresight methods can also be plausibility, legitimacy and credibility...</p> |
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The EIA is carried out in local level if the project /development is local or affects the environment locally. In case the project affects the environment to a greater extent «buffer zone » then the EIA should cover the area to be affected. There are projects which affect larger areas or even affect neighboring countries, as for example nuclear power plants, for which the EIA should cover a larger area, disproportional to the size of the project, which is not covered in this document.

The duration of the implementation of the project / development, such as the extraction of mineral resources, is in most of the cases proportional to the size of the deposit and to the environmental impacts will be caused by the project / development. Throughout the various stages of the project, in

most of the cases, the appropriate protection measures should be taken as well as periodic reevaluation of the remaining reserves.

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| <h2 style="margin: 0;">Indicators / Outputs / Units</h2> | <p>-> this refers to what the method is actually meant for. Units are an important part but that is most of the time not sufficient to express the meaning. For example, the indicators used in LCA express the cradle-to-grave environmental impacts of a product or service. This can be expressed in kg CO₂-equivalent. But also in €. Or in millipoints. Or in m²year land use.</p> <p>-> for foresight methods the outputs are products or processes</p> |
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The final results of the EIA study provide documented expected positive and negative impacts which will be caused by the project / development to the environment, the public health and the comforts, will give alternative solutions for the identified environmental problems, suggestions for the most environmentally acceptable alternative solutions (comparative table of alternative solutions), and having the main scope the minimization the recapitalization or the fulfillment of the negative impacts. It will also identify all the partial and overall effects, the degree at which will not be possible to be faced, prevented, reversed or implemented and which will remain serious, permanent or reversible even after the final measures will be taken by the designers.

In case of documented identification of major impacts to the environment or danger for considerable loss to the biological diversity, or serious damages to the environment and to the public health, a recommendation of not promoting the project / development or taking drastic measures could be adopted.

The expected positive impacts are the exports per year e.g. copper exports and the creation of various jobs, in some cases the improvement of the environment due to natural contamination due to the existence of particular mineral resources etc.

The expected negative impacts which the project will cause to the environment are the permanent change of the topography (open pit quarries / mines), the large amount of wastes which will be generated from mining, the carbon dioxide emissions from the use of machinery, the transportation and processing of mineral resources, etc.

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| <h2 style="margin: 0;">Treatment of uncertainty, verification, validation</h2> | <p>-> evaluation of the uncertainty related to this method, how it can be calculated/estimated</p> |
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▶ Not applicable

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| <h2 style="margin: 0;">Main publications / references</h2> | <p>-> e.g. , ILCD handbook on LCA, standards (e.g. , ISO)</p> <p>-> can include reference to websites/pages</p> <p>-> references to be entered with their DOI</p> |
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- <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0052&from=EN>,
- http://www.moa.gov.cy/moa/environment/environment.nsf/index_gr/index_gr?opendocum en
- <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011L0092&from=EN>
- <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31985L0337&from=EN>
- <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013R1316>
- <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013R1315>
- <https://publications.europa.eu/en/publication-detail/-/publication/579d92a9-acc7-11e2-ab01-01aa75ed71a1/language-el/format-PDFA1A>
The Habitats Directive
- http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm
<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52010IP0326>
- <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:020:0007:0025:en:PDF>
- <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32003L0035> (DIRECTIVE 2009/147/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 November 2009 on the conservation of wild birds)
- <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32013L0030>
- <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32014L0052>
- <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52013IP0368>
- <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32001L0042>
- Antonis Zorpas (Open University of Cyprus), Paris A. Fokaidis (Frederic University), Michael Loizides. Έργο: «Παροχή υπηρεσιών για την ενημέρωση και κατάρτιση του προσωπικού που ασχολείται με την περιβαλλοντική νομοθεσία σχετικά με τη ΣΕΠΕ και την ΕΠΕ» (Presentations - October 2016).
- https://www.ceaa-acee.gc.ca/050/documents_staticpost/63169/93967/Sisson_EIA_July2013_Section_5-0_EIA_Methods.pdf

Related methods

-> List of comparable methods, their particularities... (or a link to one or several other fact sheet(s))

The related methods have to study the Biological and physico-chemical impacts, the social, health and economic impacts. The methods for impact analysis are the impact identification, impact prediction and impact evaluation.

The Impact analysis is the stage of EIA that identifies and predicts the likely Environmental and social impact of proposed project as well the evaluation of the significance.

The basic methods of environment impact identification are presented below:

1. Ad hoc method
2. Checklists
3. Matrices
4. Networks
5. GIS-Overlays
6. Professional judgments
7. Multi-criteria analysis

The Impact Prediction is the accumulated knowledge of the findings of the environmental investigations based on the impacts prediction.

Once a potential impact has been determined during scoping process, it is necessary to identify which project activity will cause the impact, and its magnitude and extent.

Other available methods:

Many organizations and universities have already produced methodologies for the assessment of the environmental impacts.

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| Some examples of operational tools (CAUTION, this list is not exhaustive) | -> e.g., software... Only give a listing and a reference (publication, website/page...) -> should be provided only if ALL main actors are properly cited |
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Tools for preparation of the EIA study

1. National law
2. European legislation
3. Study of similar projects / developments
4. Maps
5. Photos
6. Use models
7. Additional studies that may be requested
8. Questionnaires
9. Checklists
10. Environmental impact assessment Software
11. Reviewed of international practices
12. Existing databases with base values for many environmental parameters

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| Key relevant contacts | -> list of relevant types of organisations that could provide further expertise and help with the methods described above. |
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European Commission <http://ec.europa.eu/environment/eia/eia-legalcontext.htm>

ENECE <http://www.unece.org/env/eia/welcome.html>

| Glossary of acronyms /abbreviations used | -> Definition |
|---|--------------------------------|
| EIS | Environmental Impact Statement |
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