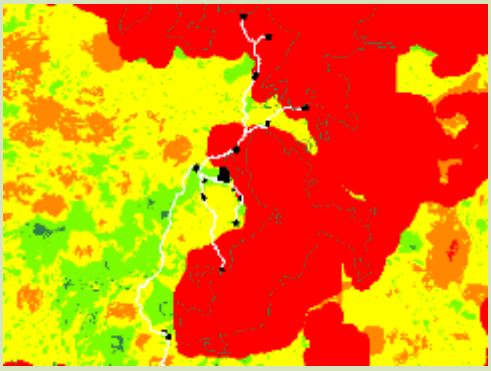
GEOCAP

Geothermal Capacity Building Program Indonesia - Netherlands

SEA FOR SUSTAINABLE GEOTHERMAL ENERGY DEVELOPMENT

Study guide



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Preface

This training manual on Strategic Environmental Assessment (SEA) for Sustainable Geothermal Energy Development is developed in the framework of the institutional strengthening and capacity building component of the Geothermal Capacity Building Programme (GEOCAP).

The Geothermal Capacity Building Programme - Indonesia-Netherlands (GEOCAP) is an international collaboration between Indonesian and Dutch entities with the goal to develop intimately linked geothermal programmes for education and training, research and subsurface databases.

This Public-Private-Partnership blends the capabilities of Universities, Knowledge Institutes and Industry Partners for the benefit of all involved, and to reach the common goal of supporting the Government of Indonesia in their quest to increase utilization of their geo-energy resources.

The Netherlands Ministry of Foreign Affairs, through the Netherlands Embassy, supported the GEOCAP Programme through funding.

The objective of the programme is to increase the capacity of Indonesia's ministries, local government agencies, public and private companies and knowledge institutions in developing, exploring and utilizing geothermal energy sources, and to assess and monitor its impact on the economy and environment.

GEOCAP includes several work packages to reach its objective and Environmental Assessment for geothermal energy (GTE) development, WP 1.08, is one of them.

Introduction

In the development of geothermal energy potential in Indonesia there are many issues that play a role, and these are not only technical issues. Although the Indonesian Government is strongly supporting the geothermal energy development there are a number of policy and governance issues that are still biased to fossil fuel and give rise to confusion. There seems to be a contradiction between the wish to develop geothermal energy as an sustainable alternative to the use of fossil fuel, and the existing rules and regulations of the different government agencies.

The division of power between central and local governments is another source of confusion, where procedures for fossil fuel remain centralized whereas procedures for geothermal energy are largely delegated to local governments. Encouraging provincial and district governments to develop geothermal energy is a big challenge, as expertise and understanding of tender processes, energy scenarios and energy development is limited (WWF-Indonesia, 2012).

In addition there is a strong need to bring about much better awareness and acceptance with local populations in areas where exploration and exploitation of geothermal resources is to take place.

Geothermal energy development in Indonesia is facing another challenge because much of the development is likely to take place in important forest areas. More than 40% of the potential resources are located in protected forest areas. Uncontrolled development initiatives can have undesired social, economic and ecological consequences. Rapid population growth, pollution, climate change, the exposure to hazards and disasters, and the loss of biodiversity and ecosystem services require effective assessment tools to assist sustainable planning and decision making. In geothermal energy development the continued tension between forest conservation and exploration and between ecosystem functioning and exploitation of reservoirs puts spatial planning under pressure.

According to the Environmental Protection and Management Law No 32/2009, which is strengthened by the Ministry of Environment Decree No 46 Year 2016 regarding the Procedures for Implementation of Strategic Environmental Assessment (SEA), every policy, plan and program that may impact environmental and/or social aspects must be subject to SEA in order to ensure sustainable development.

Environmental Impact Assessment (EIA) is a legal procedure established to evaluate the consequences of proposed projects, while SEA particularly relates to policies, plans and programs.

The key principles of EIA and SEA are (i) the involvement of relevant stakeholders, (ii) a transparent and adaptive planning process, (iii) a robust assessment of strategic issues and alternatives, and (iv) using the best possible information for sustainable decision and policy making.

EIA and SEA therefore improve both the (spatial) planning process and the information used in this process. Currently the planning process in Indonesia hardly makes use of spatial information. Subsequently there is little attention for the spatial implications of policies and interventions, and the analysis of spatial information is hardly ever used to consider alternatives and cumulative effects.

In European countries the spatial context plays an indispensable role in the planning process and specific tools and techniques are available to do this. It is therefore considered important to explore how (i) spatial information (GIS), (ii) Spatial Decision Support Systems (SDSS) that include scenario development and dynamic modelling and (iii) participatory approaches like Participatory GIS (PGIS) can be used to improve sustainable planning and decision-making.

In this training special emphasis will be given to these aspects because it will greatly enhance the spatial planning, management and decision making process for geothermal energy development. As SEA is supported by Government Regulations, relevant planning and SEA regulations in Indonesia are dealt with as well.

Development of a training course on SEA for GTE development

The aim of the training module on SEA for GTE development is to ease a transparent and adaptive planning process in the context of accepted policies involving a multitude of stakeholders. The training components/module will be based on a set of modern techniques and tools to provide geo-information (GIS) as a basis for environmental assessment of policies, plans or programmes. Basic principles, procedures and steps in SEA and their interaction with the planning process will be introduced. Hands-on experience will be a major part of the course. The different stages of the SEA and plan process will be illustrated using examples and pilot case studies that are taken directly from the work environment to ensure optimal relevance and effectiveness. Though at least one site visit of an existing geothermal energy plant was originally scheduled in the training, it was not possible to organise this in the end.

The training will not only include technical skills and know-how about SEA for geothermal energy development, but more importantly also a sense for the philosophy of the process. Practical exercises and brainstorm sessions to simulate stakeholder involvement in the different stages of the SEA for GTE development is the central theme of the training materials. GIS is applied in the environmental assessment process to identify and prioritize key environmental, social and economic issues, objectives and alternatives using indicators and metrics. Spatial decision support (SDSS) tools are used for site selection of geothermal infrastructure and vulnerability and risk assessment. Besides the development of training materials for lectures and practical exercises, the training manual can also be used to design a training of trainers program to support capacity building of staff in areas where competences need to be further enhanced.

Aim and learning objectives

The long-term objective of this training is to increase the capacity of staff working in the field of SEA for geothermal energy (GE) as a tool to gain up to date knowledge and practical skills in SEA for GTE development to enhance sustainable GTE planning and decision-making in Indonesia.

This training aims to increase the knowledge and technical skills through appropriate presentations, videos and challenging practical sessions and discussions using several Indonesian data sets from pilot case study areas and up-to-date tools and techniques to illustrate the integration of SEA in the (spatial) planning process.

The general objectives of the proposed training are to:

- understand the principles, concepts and procedures in SEA and the integration in the planning process;
- gain knowledge on relevant laws and regulations on SEA in Indonesia
- distinguish GTE Policy and Plan objectives
- appreciate stakeholder involvement at different stages in the GTE plan and SEA process;
- identify key elements, strategic issues, SEA objectives and indicators
- formulate relevant strategic alternatives and options for GTE development
- determine optimal locations for GTE development
- demonstrate a transparent planning and decision making process;

Target group

The target group may exist of planners and decision makers, practitioners, academics, staff working in the field of GTE and NGO's, as described in the table below.

Target Groups		**Training**	**Training the Trainer**
Planners & Decision Makers (DM)	Central Government	Yes	not necessary*)
	Local Government	Yes	not necessary
	Top DM Industry/Private companies	Yes	not necessary
Practitioners/Academics (P/A)	Practitioners/Professionals	Yes	Yes
	Academicians	Yes	Yes
GTE staff		Yes	Yes
NGO's		Yes	Yes

*) it depends on the number of groups/batches; if only one or two groups of participants then it might be covered/handled by the persons who designed the training materials.

Content & Learning Outcomes

The course of four days is based on task-based learning, which integrates theory and practice. The course exists of fourteen modules, basically following the different phases in the SEA process. The specific learning outcomes of this course are described per module.

Course Structure & Study Load

- The course will take four days.
- A detailed overview of the study load per module is given in Annex 1.
- The minimum requirement (entry requirement)
    - Minimum degree Bachelor
    - Minimum of two year experience in the related field.

Assessment

Target Groups		Training	Training the Trainer
Planners & Decision Makers(DM)	Central Government	×	✓
	Local Goverment	×	✓
	Top DM Industry/Private companies	×	✓
Practitioners/Academics (P/A)	Practitioners/Proffesionals	✓	✓
	Academicians	✓	✓
NGO's			
GTE staff?			

Note:

× : No Assessment

✓: With Assessment

Teaching Materials

- Materials per module
- Hardware and software requirement

Symbols used in the training manual

Power point presentation

Exercise, group assignment and/or brainstorm session

Demonstration (on SMCE)

Module 1 Introduction in SEA for GTE

Introduction

Introduction

What is SEA and how is conducted worldwide and in Indonesia? This module includes three presentations and one assignment. The first presentation is on SEA in a worldwide perspective and according to international practice. The second one on SEA in Indonesia and the third one on Existing rules & regulations related to SEA for GTE development in Indonesia.

In the assignment you are asked to write down what you think are the main differences between SEA and EIA.

Learning outcomes

At the end of this course section participants should be able to:

- understand the key elements, principles and stages in SEA worldwide and in Indonesia
- indicate how SEA is organised in the planning process
- describe existing rules & regulations relevant for SEA and GTE development
- explain the synchronization with other related laws and regulations (at national and local Level)
- compare the process of SEA in Indonesia with international practice

understand the difference between SEA and EIA.

SEA in a worldwide perspective and according to international practice

SEA in Indonesia

Existing rules & regulations related to SEA for GTE development in Indonesia

Module 2 GTE policies and plan objectives

Introduction

What are the main geothermal energy policy, plan and programme objectives and how are they related? Module 2 includes a presentation and a brainstorm exercise.

Learning outcomes

At the end of this course section participants should be able to:

- understand Geothermal Energy Policy, Plan and Programme objectives
- create a logical hierarchy in GTE Policy, Plan and Programme objectives
- get an idea about the main policy and plan objectives of the Wayang Windu GTE plant

GTE policies and plan objectives

Exercise on tiering of policy, plan and programme objectives related to energy – from policy into plan objectives.

Module 3 Preparation for SEA implementation

Introduction

Why and what is strategic thinking in SEA? How to prepare a SEA for GTE development?
This module contains two presentations. The first one clarifies the concept of strategic thinking in Sea and the difference with strategic planning. The second one explains what should be considered in preparing a SEA according to the Government regulations on SEA in Indonesia.

Learning outcomes

At the end of this course section participants should be able to explain how to:

- explain the difference between strategic thinking & strategic planning
- prepare a Terms of Reference for SEA
- compose a SEA Team
- describe the SEA process (according to Gov. Regulation on SEA in Indonesia)
- engage relevant stakeholders
- prepare a SEA Working Plan

Strategic thinking

SEA preparation

Module 4 Scoping

Introduction

What are the main activities in scoping and who to involve and how? In this module an introduction into scoping and an overview of its five main activities is given. Each activity will be explained in more detail in a separate module (modules 6 – 10).

Learning outcomes

At the end of this course section participants should be able to:

- understand the purpose of scoping
- know the main tasks/activities in scoping
- know who are the key stakeholders and how to involve them in the SEA for GTE development

Scoping and its main activities

Module 5 EA methods and tools

Introduction

How to carry out SEA? In this Module an overview is given of the different methods, tools and approaches that can be applied in the different SEA stages.

Learning outcomes

At the end of this course section participants should be able to:

- understand the main methods and tools used in SEA.

EA Methods and tools

Module 6 Key elements

Introduction

What are the key elements of the proposed GTE plan? In this Module you will identify the key elements of a GTE plan and the type of activities expected to be carried out after its implementation. The module includes a presentation, a video and an exercise.

Learning outcomes

At the end of this course section participants should be able to:

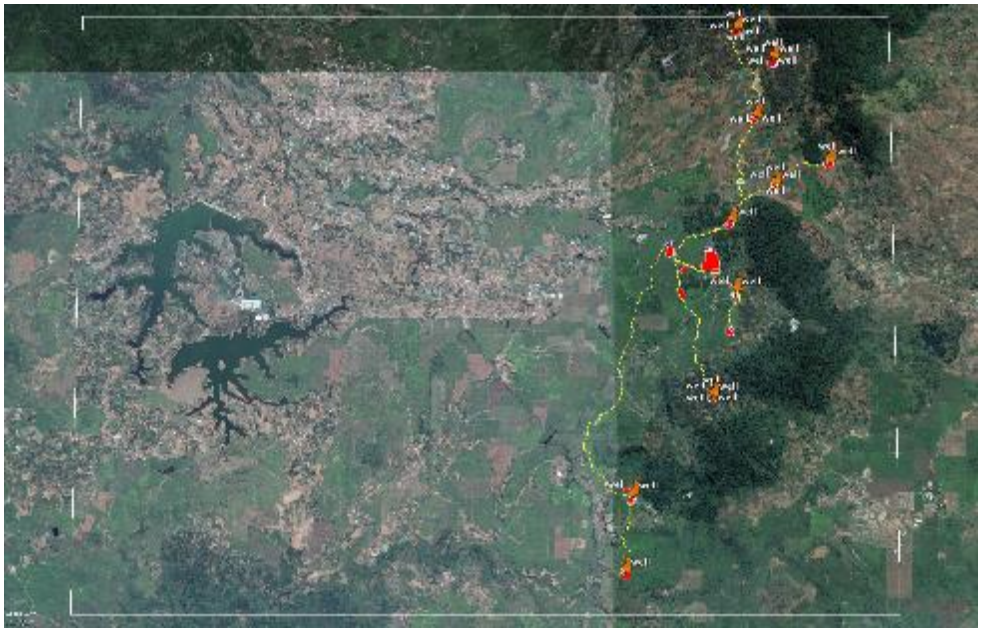
- determine the key elements and type of activities of a GTE plan.

Key elements

Exercise to determine key elements of the GTE plan

First show the video on Wayang Windu (ca 10 minutes).

Next show the Wayang Windu powerplant on Google earth. Add the kml files of the wells, the basins, the pipelines).



Module 7 Key sustainability issues

Introduction

Which environmental, social and economic aspects may be affected by the proposed GTE plan and therefore to be assessed in the SEA? This module comprises a presentation and an exercise.

Learning outcomes

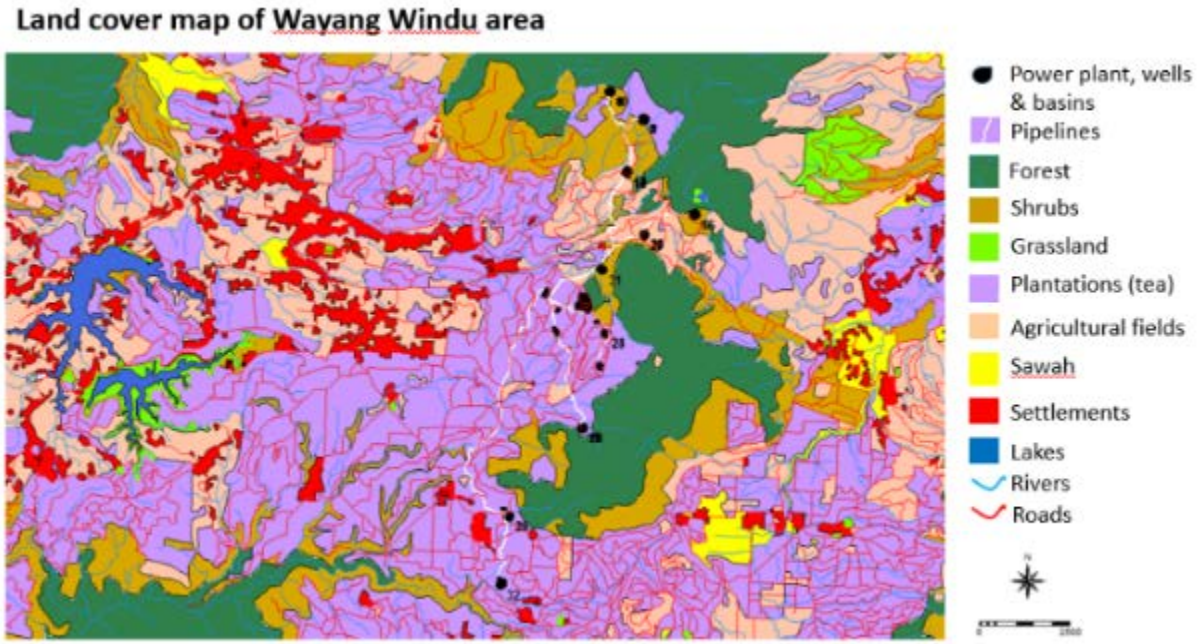
At the end of this course section participants should be able to:

- identify and prioritize key sustainability issues

Key issues

Exercise: Determine strategic sustainability issues to be

First show different possible issues within the Wayang Windu area based on GIS layers (map) + Google earth image.



Module 8 SEA objectives, targets and indicators

Introduction

How sustainable are the GTE plan objectives? This module includes a presentation and an exercise.

Learning outcomes

At the end of this course section participants should be able to:

- determine SEA objectives, targets and indicators against which the objectives and impacts of the GTE plan can be tested.

SEA objectives, targets and indicators

Identification of SEA objectives and indicators

Module 9 Alternatives and options

Introduction

What are strategic alternatives to reach the plan objectives? This module includes a presentation and an exercise.

Learning outcomes

At the end of this course section participants should be able to:

- identify strategic alternatives and options

Alternatives and options

Formulation of alternatives and options

Module 10 Assessment

Introduction

After defining the key elements, sustainability issues, SEA objectives and alternatives & options, which are usually part of the scoping stage in SEA, the actual assessment starts. Like was mentioned before, in Indonesia scoping and assessment activities are all part of assessment. This module includes a general introduction on assessment and the preparation of a SEA report.

Learning outcomes

At the end of this course section participants should be able to understand how:

- compile baseline information (for the pilot area)
- organise stakeholder meetings
- identify, predict and determine the significance of potential impacts
- mitigate significant impacts
- set up a monitoring programme
- apply environmental assessment methods and tools
- compare alternatives and justify preferred alternative(s)
- prepare an environmental assessment report (SEA report outline and its substance)
- explain possible mixed media communication

Note: due to lack of time, not all objectives and related topics could be covered in this training. Mitigation, and the comparison of alternatives are dealt with in separate module at a later stage.

Assessment

Module 11 Site selection for GTE development using SMCE

Introduction

What are optimal locations for GTE development? Though GTE is a sustainable energy source, the plant and associated infrastructure can have impacts. In this module you will learn how spatial multi criteria evaluation (SMCE) can be used to establish alternative locations for particularly pipelines and other related GTE infrastructure. Wayang Windu will be used as case study. This module includes a general introduction of the case study area, a presentation on SMCE and a demonstration how SMCE can be used to derive at one or more optimal locations for GTE infrastructure.

Learning outcomes

At the end of this course section participants should be able to:

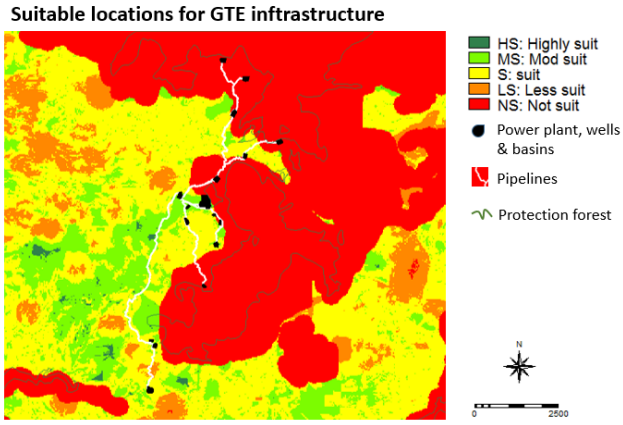
- Understand the principles and concepts of spatial multi criteria evaluation (SMCE)
- Apply SMCE techniques in spatial planning & SEA
- Define objectives, criteria and indicators
- Apply value functions - standardisation
- Assess the importance of criteria – assign weights
- Create visions (options)
- Generate composite index maps and intermediate maps (SMCE)
- Compare alternatives (locations!)
- Interpret and critically review the results

Note: Due to lack of time only a demonstration of the application of SMCE for GTE could be given.

SEA Case study area

Spatial Multi Criteria Evaluation (SMCE)

Site selection for optimal locations for GTE infrastructure using SMCE



Module 12 Mitigation

Introduction

Is there potential to mitigate any significant impacts? This module contains a presentation.

Learning outcomes

At the end of this course section participants should be able to:

- distinguish different mitigation measures

Note: due to lack of time it was not possible to include an exercise on mitigation measures. This should be done after the identification of key sustainability issues and significant impacts.

Mitigation

Module 13 Comparison of alternatives and justification of preferred one

Introduction

The formulation and assessment of alternatives is the hearth of SEA. How to compare alternatives and identify which one(s) to prefer? How to document the assessment results? This will be illuminated in this module.

Learning outcomes

At the end of this course section participants should be able to:

- compare alternatives for GTE development
- justify one or more preferred ones

Comparison of alternatives and justification of preferred one

Module 14 Recommendations for improvement of the proposed GTE PPP, Quality assurance and Validation

Introduction

How to incorporate the results of the assessment into the GTE policy, plan or programme? How good is the SEA? What is its validity? This will be explained in one presentation.

Learning outcomes

At the end of this course section participants should be able to explain:

- recommendations for improvement of a GTE policy, plan or programme
- quality assurance criteria and its methods
- validity criteria and its methods

Recommendations and incorporation into the PPP, quality assurance, documentation and validity.

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Annex 1 Training programme for a four days course on SEA for geo-thermal energy (GTE) development

Period	Monday 9 October 2017	Tuesday 10 October 2017
08.15h – 08.45h	Registration	
08.45h – 10.30h	• Welcoming speech: Energy sector and sustainable development (INAGA) • Introduction: SEA in international context (JL)	(1) Impact assessment and strategic thinking (JL and TN) • Introduction scoping & exercise • methods and approaches
10.30h – 10.45h	• Coffee/tea break	Coffee/tea break
10.45h – 12.30h	Introduction: SEA in Indonesia context (TN)	Scoping and exercise (JL/TN/RN) • Key elements, issues, objectives, criteria & indicators
12.30h – 14.00h	Lunch	Lunch
14.00h – 15.30h	• GTE policy & plan objectives (ESDM) • Pilot case: Wayang Windu (Star Energy)/TN	(2) Impact assessment and strategic thinking (JL/TN/RN) a) Identification of key SD issues (incl. exercise)
15.30h – 15.45h	Coffee/tea break	Coffee/tea break
15.45h – 16.30h	Planning and SEA regulation in Indonesia (TN): • Law and Government regulation • Ministry Regulation	(3) Impact assessment and strategic thinking (JL/TN/RN) b) Identification of strategic SD issues, priorities and indicators (incl. exercise)
16.30h – 17.30h	Preparing SEA implementation (TN): • SEA TOR • SEA team • SEA steps (Gov. Regulation on SEA): ➢ Stakeholders engagement	Presentations & discussion

Period	Wednesday 11 October 2017	Thursday 12 October 2017
08.15h – 08.45h		
08.45h – 10.30h	Strategic alternatives and options & exercise (JL/TN/RN)	Discussion on application of SMCE for GTE
10.30h – 10.45h	Coffee/tea break	Coffee/tea break
10.45h – 12.30h	Strategic alternatives and options & exercise (JL/TN/RN)	• Refining alternatives and/or mitigations (methods) (JL/EH) • Discussion & action points
12.30h – 14.00h	Lunch	
14.00h – 15.30h	Introduction on Wayang Windu case study (EH)	Recommendation and integrating into its PPP (JL/EH/TN)
15.30h – 15.45h	Coffee/tea break	
15.45h – 16.30h	Site selection for GTE development (pipelines) using SMCE (demo) (JL/RN/EH)	SEA report and documentation (TN)
16.30h – 17.30h	Site selection for GTE development (pipelines) using SMCE (demo) (JL/RN/EH)	• Final discussion and wrap up • Closing ceremony by PPSDM-KEBTKE

JL: Joan Looijen (University of Twente)

RN: Raymond Nijmeijer (University of Twente)

TNU: Triarko Nurlambang (University of Indonesia)

EH: Dyah Rahmawati Hizbaron (University of Gajah Mada)