ORKUSTOFNUN HS ORKA OR Orkuveita Reykjavíkur Landsvirkjun UMHVERFISSTOFNUN

GSAP

Geothermal Sustainability Assessment Protocol

Handed over to the International Geothermal Association on

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GSAP – prepared by:

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Adapted from:

HSAP - Hydropower Sustainability Assessment Protocol
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Introduction

The Hydropower Sustainability Assessment Protocol, HSAP, was prepared at the initiative of the International Hydropower Association, IHA, and issued in November 2010. The Protocol is a product of a considerable effort by multi-stakeholder parties, representing the hydropower industry, several developing and developed countries, the finance sector and international environmental and social NGOs. The aim is to provide a tool to measure, guide and improve the performance in the industry for the key sustainability factors, social, environmental and economic. It enables the production of a sustainability profile for a project through the assessment of performance within important sustainability topics. Separate protocol documents were provided for project stages; Early Stage, Preparation, Implementation and Operation. The HSAP is governed by the multi-stakeholder Hydropower Sustainability Assessment Council and assessments are performed by accredited assessors. Comprehensive information is found on the Council webpage: www.hydrosustainability.org and the general approach is explained in the first part of the Assessment Protocol: ***Background Document***.

Representatives from Iceland were active participants in the preparation of HSAP, including the multi-stakeholder Forum established for the Protocol. Also, Landsvirkjun, the National Power Company, has applied HSAP for assessments of several projects and operating facilities. These assessments were considered highly valuable and they initiated positive improvements of procedures and work methods. In addition to hydro, geothermal development has a long history in Iceland and is highly advanced, for electrical production, space heating and various industrial purposes. In this context, members of the Icelandic power sector proposed to adapt the internationally recognized and fully tested HSAP to geothermal plants.

Two governmental agencies and three power companies formed a Working Group for the GSAP initiative:

- **Orkustofnun,** National Energy Authority; Dr Gudni A Johannesson, Director General, *leads the working group*, Mr Jonas Ketilsson, Deputy Director General, Mr Kristinn Einarsson, Senior Advisor.
- **Landsvirkjun,** National Power Company; Mr Jon Ingimarsson, Manager Environmental Dept, Mrs Ragnheidur Olafsdottir, Environmental Manager, Mr Bjarni Palsson, Manager Geothermal Dept.
- **Orkuveita Reykjavikur,** Reykjavik Energy; Mr Bjarni Bjarnason, CEO, Mrs Hildigunnur H Thorsteinsson, Managing Director Research and Development, Mrs Hólmfríður Sigurðardottir, Head of Environmental Affairs.
- **HS Orka;** Mr Asgeir Margeirsson, CEO, Mrs Kristin Vala Matthiasdottir, VP Resources.
- **Umhverfisstofnun,** Environmental Agency of Iceland; Mrs Kristin Linda Arnadottir, Director General, Mrs Adalbjorg Guttormsdottir, Team Leader Integration Dept.
- **Moderator/Project Manager** is Mr Sigurdur St. Arnalds, Engineering firm **Mannvit hf** in Iceland.

As a first step, a Draft GSAP Preparation Stage was prepared in 2016 and a subsequent test assessment performed for the Theistareykir 90 MWe geothermal project in Northeast Iceland, under construction by Landsvirkjun at the time. The resulting assessment report was published on the www.landsvirkjun.com website, News archive, date 15.6.2017. As a next step a Draft GSAP Operation Stage was prepared in 2017 and a subsequent test assessment performed for the Hellisheidi 300 MWe/130 MWth geothermal plant in Southwest Iceland, owned and operated by ON Power, a subsidiary of Orkuveita Reykjavikur (OR), Reykjavik Energy. The resulting assessment report was published on the www.or.is website, *UTGEFID EFNI* (published material), 22.06.2018. In 2019, a newly added HSAP assessment Topic on Climate Change Mitigation and Resilience was adapted and added to the Draft GSAP.

The required adaption changes from HSAP to GSAP have been kept to a minimum with the aim to maintain as much as possible the international recognition and multi-stakeholder consensus obtained for the HSAP. Further modifications and streamlining remain to be addressed, preferably in co-operation with a prospective wider participation. In short, the test assessments illustrate the applicability of such an adapted GSAP, obstacles were not found in the process related to the fact that the plants were geothermal and not hydro. The products provide a good illustration of this method for sustainability assessment of a geothermal project.

Contents

P-1 Communications & Consultation

This topic addresses the identification and engagement with project stakeholders, both within the company as well as between the company and external stakeholders (e.g. affected communities, governments, key institutions, partners, contractors, geothermal area residents, etc.).

The intent is that stakeholders are identified and engaged in the issues of interest to them, and communication and consultation processes establish a foundation for good stakeholder relations throughout the project life.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** Stakeholder mapping has been undertaken to identify and analyse stakeholders, to establish those that are directly affected, and to establish communication requirements and priorities, with no significant gaps. **Management:** Communications and consultation plans and processes, including an appropriate grievance mechanism, have been developed at an early stage applicable to project preparation, implementation and operation that outline communication and consultation needs and approaches for various stakeholder groups and topics. **Stakeholder Engagement:** The project preparation stage has involved appropriately timed communications and engagement, often two-way, with directly affected stakeholders on topics of interest and relevance to them; engagement is undertaken in good faith; ongoing processes are in place for stakeholders to raise issues and get feedback. **Conformance/Compliance:** Processes and objectives relating to communications and consultation have been and are on track to be met with no major non-compliances or non-conformances, and any communications related commitments have been or are on track to be met.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, the stakeholder mapping takes broad considerations into account. **Management:** In addition, communication and consultation plans and processes show a high level of sensitivity to communication and consultation needs and approaches for various stakeholder groups and topics; and processes are in place to anticipate and respond to emerging risks and opportunities. **Stakeholder Engagement:** In addition, engagement with directly affected stakeholders has been inclusive and participatory; negotiations are undertaken in good faith; and feedback on how issues raised have been taken into consideration has been thorough and timely. **Conformance/Compliance:** In addition, there are no non-compliances or non-conformances.

Assessment Guidance:

Stakeholders are those who are interested in, involved in or affected by the geothermal project and associated activities.

Stakeholder mapping refers to identification and grouping of stakeholders in a meaningful way, for example based on stakeholder rights, risks and responsibilities. An example of "rights" would be land rights.

Directly Affected Stakeholders are those stakeholders with substantial rights, risks and responsibilities in relation to the issue. These may be inside the project affected area (e.g. project affected communities) or outside the project-affected area (e.g. government regulators, finance institution representatives, or investment partners).

Grievance mechanisms refer to the processes by which stakeholders are able to raise concerns, grievances and legitimate complaints, as well as the project procedures to track and respond to any grievances.

Needs and approaches for stakeholder groups could include consideration of: cultural norms, gender, literacy level, vulnerable social groups, disabilities, logistical constraints, etc.

Good faith engagement is engagement that is undertaken with an honest intent to reach a mutually satisfactory understanding on the issues of concern.

Broad considerations within stakeholder mapping could include, for example: the geographic or compositional extent of stakeholder groups identified and considered, the interrelationships amongst stakeholder groups, the level of vulnerability to adverse project impacts and risks, and consideration of rights, risks and responsibilities, etc.

Good faith negotiation involves (i) willingness to engage in a process; (ii) provision of information necessary for informed negotiation; (iii) exploration of key areas of importance; (iv) mutually acceptable procedures for negotiation; (v) willingness to modify position; (vi) provision of sufficient time to both parties for decision-making; (vii) agreements on proposed compensation framework, mitigation measures, and development interventions.

Potential interviewees: project communications staff; project manager; stakeholder representatives; project affected communities' representatives.

Examples of evidence: project stakeholder mapping document; project communications and/ or consultation plans; communications protocols; grievance mechanisms.

P-2 Governance

This topic addresses corporate and external governance considerations for the project.

The intent is that the developer has sound corporate business structures, policies and practices; addresses transparency, integrity and accountability issues; can manage external governance issues (e.g. institutional capacity shortfalls, political risks including transboundary issues, public sector corruption risks); and can ensure compliance.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** Assessments have been undertaken of political and public sector governance issues, and corporate governance requirements and issues, through the project development cycle with no significant gaps. **Management:** Processes are in place to manage corporate, political and public sector risks, compliance, social and environmental responsibility, grievance mechanisms, ethical business practices, and transparency; policies and processes are communicated internally and externally as appropriate; and independent review mechanisms are utilised to address sustainability issues in cases of project capacity shortfalls, high sensitivity of particular issues, or the need for enhanced credibility. **Stakeholder Engagement:** The business interacts with a range of directly affected stakeholders to understand issues of interest to them; and the business makes significant project reports publicly available, and publicly reports on project performance, in some sustainability areas. **Outcomes:** There are no significant unresolved corporate and external governance issues identified. **Conformance/Compliance:** The project has no significant non-compliances.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, there are no significant opportunities for improvement in the assessment of political and public sector governance issues and corporate governance requirements and issues. **Management:** In addition, contractors are required to meet or have consistent policies as the developer; and processes are in place to anticipate and respond to emerging risks and opportunities. **Stakeholder Engagement:** In addition, the business makes significant project reports publicly available and publicly reports on project performance in sustainability areas of high interest to its stakeholders. **Outcomes:** In addition, there are no unresolved corporate and external governance issues identified. **Conformance/Compliance:** The project has no non-compliances.

Assessment Guidance:

Governance broadly refers to the combination of processes and structures that inform, direct, manage and monitor the activities of the project toward the achievement of its objectives.

Corporate governance is a term that refers broadly to the rules, processes, or laws by which businesses are operated, regulated, and controlled.

Corporate governance requirements may include, for example: business administration, policies and processes, risk management, corporate social responsibility, ethical business practices, accountability and stakeholder relations, compliance, etc.

Corporate governance issues may relate to, for example: lack of capacity in key external institutional structures, policies and processes important to the project; public sector corruption risks; political risks; internal corruption risks; compliance; management of project risks; etc.

External governance considerations include legal, judicial, and institutional structures, processes and policies relevant to the project. Examples include: the executive, the legislature, political parties, anticorruption organizations, judiciary, grievance addressing mechanisms (e.g. the Ombudsman), specific civil service/public sector agencies, law enforcement agencies, Freedom of Information, media, local and national government, civil society, private sector, international institutions (e.g. some provide peer review of anti-corruption efforts), audit/oversight institutions, public contracting system, etc.

Political risk is a risk of financial loss or inability to conduct business faced by investors, corporations, and governments due to government policy changes, government action preventing entry of goods, expropriation or confiscation, currency inconvertibility, politically-motivated interference, government instability, or war.

Transboundary issues would take into account institutional arrangements that could address the management of impacts of the project and the sharing of the geothermal resources across boundaries.

Corruption risks may be within the business such as with how finances are managed, or within the public sector such as not addressing licence or permit violations. Public sector corruption risks during project preparation may include, for example, limited options considered, short-cutting of assessment/preparation requirements, or non-transparent approvals; and at the project implementation and operation may include, for example, a blind eye to licence and permit violations.

Processes to ensure ethical business practices could include, for example: a business Code of Ethics, an employee Code of Conduct, a business Integrity Pact, anti-bribery or anti-corruption policies and procedures for reporting and investigation (such as Transparency International's Business Principles for Countering Bribery (BPCB), a whistle-blowing arrangement, etc.

Compliance is with respect to all relevant laws, policies, permits, agreements, codes of practice and publicly stated commitments.

Independent review refers to expert review by someone not employed by the project and with no financial interest in profits made by the project. An expert is a person with a high degree of skill in or knowledge of a certain subject, as a result of a high degree of experience or training in that subject. Forms of independent review may vary from contracting an expert consultant to provide a written review of a particular assessment, plan or report, to a panel of experts comprising a mix of expertise appropriate to the project and providing periodic assessment and written reports on issues identified to be within its scope of review. Areas of particular sensitivity would be identified in the environmental and social impact assessment.

Potential interviewees: a Board member; the project manager; business managers for corporate governance, compliance, internal audit, business risk; experts on public sector governance; other relevant third parties such as anti-corruption civil society organisations.

Examples of evidence: business internal website and external website for vision, values, policies, structure, procedures, annual reports; assessment of public sector governance issues; internal audit reports; project compliance plan; reports to Board on ethical business practices and compliance; log of ethical business practices grievance; third party review reports; relevant documentation on public sector governance issues such as reports of Transparency International on National Integrity Systems (NIS) and the Corruption Perceptions Index (CPI).

P-3 Demonstrated Need & Strategic Fit

This topic addresses the contribution of the project in meeting demonstrated needs for electrical power and, if applicable, direct use, as identified through broadly agreed local, national and regional development objectives and in national and regional policies and plans.

The intent is that the project can demonstrate its strategic fit with development objectives and relevant policies and plans can be demonstrated, and that the project is a priority option to meet identified needs for electrical power and, if applicable, direct use.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** An assessment has been undertaken of needs for electrical power and, if applicable, direct use, of options to meet these needs; and of national and regional policies and plans relevant to those needs, with no significant gaps. **Stakeholder Engagement:** The results of the assessment of strategic fit are publicly disclosed. **Outcomes:** The strategic fit of the project with needs for electrical power and, if applicable, direct use, and relevant policies and plans can be demonstrated.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, the assessment is based on dialogue with government planners, policy makers and key stakeholder groups; and the assessment shows a strong emphasis on social and environmental related needs, policies and plans including the need for sustainable development of the geothermal reservoir. **Stakeholder Engagement:** (No addition to basic good practice) **Outcomes:** In addition, the project is one of the priority options to address demonstrated needs.

Assessment Guidance:

Needs for electrical power and, if applicable, direct use, are those identified through broadly agreed local, national and regional development objectives, policies and plans. A geothermal development to meet the energy requirements of an energy-intensive off-taker (e.g. an aluminium smelter) would be considered a demonstrated need if it is included in broadly agreed development objectives, policies and plans.

Energy services examples include: provision of electricity to meet local, national and/or regional demand or opportunities; provision of grid stability; provision of base load; provision of ancillary benefits such as system regulation and improved overall power system efficiency, etc. Direct use energy services examples include space heating, various industrial applications, food production and health and tourism services, etc.

National and regional policies and plans examples include: development, energy, biodiversity, climate, conservation, transboundary, land use, etc.

Social and environmental related needs, policies and plans examples include: poverty eradication, food security, protection of high value sites (e.g. national parks. World Heritage sites, sites of cultural significance, recognised significant landscapes), etc.

Potential interviewees: project manager; government representatives (e.g. energy and industry, development departments); stakeholder representatives; project affected communities' representatives.

Examples of evidence: Energy Master Plan; Country Development Report; strategic environmental assessments; options assessments; energy demand projections; local, national or regional development assessments including livelihoods and living standards; conservation plans; climate policies and adaptation plans; report on analysis of relevant policies and plans; report on project demonstrated need and strategic fit; use of multi-criteria analysis in assessing options.

P-4 Siting & Design

This topic addresses the evaluation and determination of project siting and design options, including power station with associated structures and wells with connecting geothermal supply system and other infrastructure.

The intent is that siting and design are optimised as a result of an iterative and consultative process that has taken into account technical, economic, financial, environmental and social considerations.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** Technical information has been analysed at an early stage alongside social, environmental, economic, financial, and regulatory considerations in order to develop a preliminary project design and some options around this. **Management:** An optimisation process has been undertaken to assess the project siting and design options. **Stakeholder Engagement:** The siting and design optimisation process has involved appropriately timed, and often two-way, engagement with directly affected stakeholders; ongoing processes are in place for stakeholders to raise issues and get feedback. **Outcomes:** The final project siting and design has responded to many sustainability considerations for siting and design.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, options take into consideration have been thoroughly analysed with respect to sustainable perspectives. **Management:** (No addition to basic good practice) **Stakeholder Engagement:** In addition, engagement with directly affected stakeholders has been inclusive, and participatory; and feedback on how issues raised have been taken into consideration has been thorough and timely. **Outcomes:** The final project siting and design is optimal with respect to sustainability considerations for siting and design.

Assessment Guidance:

Sustainability considerations for siting and design examples include: prioritising alternatives that provide opportunities for multiple use benefits, that maximize opportunities for and do not pose unsolvable threats to vulnerable social groups, that enhance public health and minimize public health risks, that minimize population displacement, that avoid disturbing unique landscapes, protected areas and exceptional natural and human heritage sites, that have lower impacts on rare, threatened or vulnerable species and avoids negative impact on sensitive water aquifers. Relative to the geothermal field, there is a certain flexibility for the siting of power station and associated structures to minimize negative impacts, the geothermal supply system is adjusted accordingly. The siting of drilling pads also is flexible, e.g. valuable surface areas and volcanic features can be avoided by using directional drilling.

Technical considerations for siting and design examples include: siting of power station and associated structures is optimized with respect to quality of ground foundation, access and transportation, connection to the electrical grid, minimum negative visual impact and the design facilitates associated utilization as relevant, etc. Geothermal supply systems are optimized by combining wells on well pads and minimizing the pipe system, routing of pipes takes environmental as well as social issues into consideration. The planned disposal of residual geothermal fluid takes into account maximum efficiency of the resource, recharge if relevant and multiple use as relevant. Minimizing noise is accounted for in the location process and design.

Optimal in this context means best fit once all identified sustainability considerations have been factored in, based on the outcomes of a consultative process.

Potential interviewees: project manager; project designers; stakeholder representatives; project affected communities' representatives; (if relevant) representatives of resettlement or host communities.

Examples of evidence: pre-feasibility studies; feasibility studies; reports on options assessment e.g. multi-criteria analyses; records of design change to avoid or minimize disturbance and/or maximise opportunities; reports on stakeholder input and responses; minutes from public meetings.

P-5 Environmental & Social Impact Assessment & Management

This topic addresses the assessment and planning processes for environmental and social impacts associated with project implementation and operation throughout the area of impact of the project.

The intent is that environmental and social impacts are identified and assessed, and avoidance, minimisation, mitigation, compensation and enhancement measures designed and implemented.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** Assessments of project environmental and social impacts have been undertaken for project implementation and operation, including evaluation of associated facilities, scoping of cumulative impacts, role and capacity of third parties, and impacts associated with primary suppliers, using appropriate expertise and with no significant gaps; and a baseline has been established and well-documented for the pre-project condition against which post-project changes can be compared. **Management:** Environmental and social issues management plans and processes have been developed with appropriate expertise (internal and external) for project implementation and operation with no significant gaps; in addition to key social and environmental issues relating to the geothermal project, plans address construction related waste, noise, air quality, land disturbance and rehabilitation; the environmental and social impact assessment and key associated management plans are publicly disclosed. **Stakeholder Engagement:** The environmental and social impact assessment and management planning process has involved appropriately timed, and often two-way, engagement with directly affected stakeholders; ongoing processes are in place for stakeholders to raise issues and get feedback. **Outcomes:** Environmental and social plans avoid, minimise and mitigate negative impacts with no significant gaps.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, the assessment takes broad considerations into account, and both risks and opportunities; and the social impact assessment incorporates assessment of human rights. **Management:** In addition, processes are in place to anticipate and respond to emerging risks and opportunities; plans are embedded within an internationally recognised environmental management system which is third party verified, such as IS0 14001; and independent review mechanisms are utilised. **Stakeholder Engagement:** In addition, engagement with directly affected stakeholders has been inclusive and participatory; and feedback on how issues raised have been taken into consideration has been thorough and timely. **Outcomes:** In addition, environmental and social plans avoid, minimise, mitigate and compensate negative project impacts with no identified gaps; and plans provide for enhancements to pre-project environmental or social conditions or contribute to addressing issues beyond those impacts caused by the project.

Assessment Guidance:

Key environmental issues include aquatic and terrestrial biodiversity, threatened species, critical habitats, ecosystem integrity and connectivity issues, gas emissions and air quality, geothermal fluid discharge, water quality, noise and vibrations, valuable geological formations and landscapes, induced seismic activity, ground subsidence, erosion and visual impact of structural installations and plumes. Environmental impacts of the project that extend beyond the jurisdictional boundaries in which the project is located would need to be assessed and included in management plans.

Key social issues include project-affected communities, employment, access and traffic, tourism, land use, indigenous peoples, ethnic minorities, resettlement, cultural heritage (both physical and non-physical), and public health; and are analysed with respect to socio-economic indicators (including living standards, livelihoods, and health statistics) as well as gender. Social impacts of the project that extend beyond the jurisdictional boundaries in which the project is located would need to be assessed and included in management plans.

Associated facilities are defined as those facilities that would not be constructed if the project did not exist, and where the project would not be viable without the other facility. These facilities may be funded, owned, constructed, and/or operated separately from the project, and in some cases, by third parties. Examples pertinent to a geothermal project could include roads, transmission lines, buildings, etc.

Cumulative impacts are those that result from the incremental impact of the project when added to other past, present, and reasonably foreseeable future actions. Effects should be assessed in terms of the capacity of the geothermal resource, ecosystem, and/or affected communities to accommodate such impacts. Analyses need to be defined within realistic boundaries. Geothermal utilization is associated with significant uncertainties and assessments need updating with increased level of knowledge over time.

Third parties are local and national governments, contractors, and suppliers; an effective assessment should identify the different entities involved and the roles they play, and the corresponding risks they present to the client in order to help achieve environmental and social outcomes.

Primary suppliers are those first-tier suppliers who are providing goods or materials essential for the project, which may incur environmental and social impacts in this supply activity. An example pertinent to a geothermal project could be drilling companies supplying the required geothermal wells.

Non-physical cultural heritage refers to traditions, festivals, rituals, folklore, storytelling, drama, etc.

Land rehabilitation is the process of returning project-affected land to some degree of its former state after disturbance or damage associated with project implementation.

Appropriate expertise refers to specialists with experience in the key identifiable topical areas of the assessment and management plans, giving particular attention to the differences between environmental areas and social impact areas. These specialists could be internal or external to the project developer; internal expertise in managing environmental and social issues is of particular importance with respect to this topic.

Avoid, minimise, mitigate and compensate is a concise expression for what is understood to be a sequential process. Measures to avoid or prevent negative or adverse impacts are always prioritised, and where avoidance is not practicable, then minimisation of adverse impacts is sought. Where avoidance and minimisation are not practicable, then mitigation and compensation measures are identified and undertaken commensurate with the project's risks and impacts.

Broad considerations within the assessment might be exhibited by, for example: a broad view of the project affected area; consideration of the project wider geothermal area; a broad view of relevant issues; a broad interpretation of important concepts such as livelihoods or living standards; a broad range of approaches considered; a broad view of stakeholder perspectives on the various issues; a focus on interrelationships amongst issues; sustainable geothermal development considerations keeping in mind associated uncertainties; geothermal resource management considerations; legacy issues; and more detailed analysis of cumulative impacts; etc.

Human rights are the basic rights and freedoms to which all humans are entitled, encompassing civil, political, economic, social, and cultural rights, and enshrined in international declarations such as the Universal Declaration on Human Rights 1948.

Independent review refers to expert review by someone not employed by the project and with no financial interest in profits made by the project. An expert is a person with a high degree of skill in or knowledge of environmental and social subjects relevant to geothermal impacts, as a result of a high degree of experience or training in that subject. Forms of independent review may vary from contracting an expert consultant to provide a written review of a particular assessment, plan or report, to a panel of experts comprising a mix of expertise appropriate to the project and providing periodic assessment and written reports on issues identified to be within its scope of review.

Potential interviewees: project managers responsible for environmental and social issues assessment and management; government representatives responsible for environmental and social issues; stakeholder representatives; project affected communities' representatives; external experts.

Examples of evidence: regulatory requirements for EIA / SIA; EIA / SIA and associated reports; environmental and social management plans; records of consultation and stakeholder involvement; records of response to stakeholder issues; third party review report; qualifications of experts utilised; evidence of appropriate separate expertise used for environmental and social issues recognising that in many cases single experts may not have sufficient breadth of expertise to cover both aspects.

P-6 Integrated Project Management

This topic addresses the developer's capacity to coordinate and manage all project components, taking into account project construction and future operation activities at the project-affected area.

The intent is that the project meets milestones across all components, delays in any component can be managed, and one component does not progress at the expense of another.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Management:** An integrated project management plan and processes have been developed that takes into account all project components and activities with no significant gaps; and a construction management plan has been developed that identifies resource related risks, construction risks and describes processes that contractors and others are required to follow to manage these risks. **Outcomes:** The project is likely to meet overall budget and timing objectives and targets, and plans avoid, minimise and mitigate risks with no significant gaps.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Management:** In addition, the integrated project management plan sets out measures to manage geothermal field development, interface and delay issues without impinging on overall project timetables and budgets; construction management plans ensure that land disturbance and waste generation activities will be managed so that later rehabilitation activities can be undertaken efficiently and effectively; and processes are in place to anticipate and respond to emerging risks and opportunities. **Outcomes:** In addition, the project is highly likely to meet overall budget and timing objectives and targets; and plans avoid, minimise, mitigate and compensate construction risks with no identified gaps.

Assessment Guidance:

Project components refers to components of the overall geothermal development programme including exploration, drilling, design, construction, environmental, social, resettlement, finance, communications and procurement; examples include: design, construction, environmental, social, resettlement, finance, communications and procurement, etc.

Integrated project management plan examples of considerations include: scheduling, interface targets, significant path analysis, communications, cost control, etc.

Development and construction risks examples include: rate of success of drilling, health and safety, noise, air, and water pollution, land contamination, land disturbance, geothermal resource management, waste management, migratory workforce/local community conflicts, etc. These may be identified and evaluated in the environmental and social impact assessment.

Construction management plan examples of considerations include: chemical and waste storage and handling, pollution, land disturbance, health and safety, community relations, and site zoning for special area protection. The plans may be developed by the project managers, or by the contractors themselves. Early in the preparation stage management of construction risks may be outlined in environmental and social management plans, and later incorporated into construction management plans.

Land disturbance and waste generation activities in the construction management plans can incorporate many measures which are mindful of the later requirements for construction site restoration and rehabilitation; example include: stockpiling of topsoil, seed collection, location of works areas, quarries, cuttings and discharge from drilling, etc.

Avoid, minimise, mitigate and compensate is a concise expression for what is understood to be a sequential process. Measures to avoid or prevent negative or adverse impacts are always prioritised, and where avoidance is not practicable, then minimisation of adverse impacts is sought. Where avoidance and minimisation are not practicable, then mitigation and compensation measures are identified and undertaken commensurate with the project's risks and impacts.

Potential interviewees: project manager; resource manager; construction manager; municipal representative.

Examples of evidence: organisational structure; management team qualifications; integrated programme management plans, analyses and reports; drilling and construction management plan; drilling and construction contracts.

P-7 Geothermal Resource

This topic addresses the level of understanding of the geothermal resource and the assessment of the geothermal production capacity. Also, predicted response to the planned production and the planned generation efficiency based on the assessed geothermal conditions and utilization strategy.

The intent is that the project's planned power generation takes into account a good understanding of the geothermal resource availability, renewability and reliability in the short- and long-term, as well as efficient utilization of the energy resource.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** An assessment of the geothermal resource production capacity has been undertaken utilising available data, field measurements, testing of wells, appropriate statistical indicators, and geothermal reservoir models; issues which may impact on geothermal availability or reliability have been identified and factored into the modelling; and scenarios, uncertainties and risks have been evaluated. **Management:** A plan and processes for generation operations have been developed to ensure efficiency of geothermal energy utilization, based on analysis of the geothermal production capacity, a range of scientific and technical considerations, an understanding of power system opportunities and constraints, and social, environmental and economic considerations.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, issues that may impact on steam and fluid availability, renewability and reliability have been comprehensively identified; and uncertainties and risks including reservoir drawdown and geothermal system response have been extensively evaluated over the short- and long-term. **Management:** In addition, generation operations planning has a long-term perspective; shows exemplary energy efficiency and comprehensive plans exist for monitoring of the effect of operation on the resource and updating of the conceptual and numerical models to ensure that geothermal fluid balance can be achieved in the long run and goals of sustainable yield will be met, e.g. with reinjection as applicable. Predictions are presented with quantified and well supported uncertainty boundaries.

Assessment Guidance:

At the preparation stage the capacity of the resource has been preliminarily scientifically and technically estimated on the basis of chemical, geological and geophysical research as well as testing of available wells. Environmental, social and economical constraints also affect the reserve estimate. For the project to be within the limits of sustainable yield, the planned production is within the limits that can sustain long-term steady energy production from the system. Re-injection of geothermal fluid into the geothermal reservoir can support long-term utilization. Models for re-assessment of production capacity are maintained on the basis of continuous data obtained during operation.

If the project is based on geothermal resources that can have an effect beyond the jurisdictional boundaries in which the project is located, the implications of this would need to be fully considered.

Technical considerations for generation planning examples include: pre-planned acceptable limitations to pressure drawdown and cooling in the geothermal reservoir, monitoring plans for changes in physical characteristics and plans for updating reservoir assessment models, plans for maintenance of wells and drilling of make-up wells, plans for re-injection of geothermal fluid if applicable, location of wells and steam supply system, etc.

Power system opportunities and constraints examples include: patterns of demand for energy (e.g. base vs peak load), power prices, other generators and their capacities and constraints, transmission issues, etc.

Fully optimise and maximise efficiency of the geothermal steam and fluid means that the plan is to maximize the utilization of the available geothermal energy given the opportunities and constraints relating to scientific, technical, social, economic, environmental, financial considerations and is based on an iterative and consultative process. Efficiency can be directly related to the technical installations, e.g. efficiency of geothermal supply system and turbines. Efficiency can be estimated by assessment of the exergy efficiency and primary energy efficiency. Multiple use and/or cascaded use and re-injection into the reservoir affects this assessment.

Potential interviewees: company, government and/or independent geothermal scientists; power system planners; project designers; stakeholder representatives; project affected communities' representatives; ecosystem specialists; neighbouring stakeholders in a transboundary context.

Examples of evidence: geothermal analyses; results of well testing; geothermal model reports; analyses of power system and market opportunities; simulation and optimisation model scenarios and outputs; systems operations plan for the project.

P-8 Public Health and Safety

This topic addresses health and safety planning for geothermal drilling, supply system and power station and other health and safety issues for the public and neighbouring communities during project preparation, implementation and operation.

The intent is that life, property and the environment are protected from the consequences of the geothermal energy harnessing and facility operation and other associated health and safety risks.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** An assessment has been undertaken of health and safety issues related to geothermal drilling, supply system and power station and other health and safety risks with appropriate expertise during project preparation, construction and operation, with no significant gaps. **Management:** Health and safety management plans and processes for hazardous and polluting geothermal impact of geothermal drilling, supply system and power station, have been developed for project implementation and operation in conjunction with relevant regulatory and local authorities with no significant gaps and provide for communication of public health and safety measures; emergency response plans include awareness and training programs and emergency response simulations. **Outcomes:** Plans avoid, minimise and mitigate health and safety risks with no significant gaps.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, the assessment includes consideration of a broad range of scenarios, and includes both risks and opportunities. **Management:** In addition, processes are in place to anticipate and respond to emerging risks and opportunities; plans provide for public health and safety measures to be widely communicated in a timely and accessible manner; and emergency response plans are independently reviewed. **Outcomes:** In addition, plans contribute to addressing health and safety issues beyond those risks caused by the project itself.

Assessment Guidance:

Health and safety risks examples include: high pressure and high temperature installations at geothermal wells and supply system, high concentration of hazardous gases, extreme noise, low visibility (dense steam), seismic and volcanic risk, avalanche risk, general construction risk for installations, electric shock, injury from hot water or steam, road accidents, accidents arising from community interactions with project activities, disease introduced by construction workforce (e.g. HIV, Aids); vector borne diseases (e.g. malaria, schistosomiasis); communicable and non-communicable diseases, malnutrition, psychological disorders, social well-being; loss or contamination of traditional resources; mercury or heavy metal bio-accumulation; etc.

Appropriate expertise refers to specialists with proven experience designing and constructing projects of a similar complexity, giving particular attention to engineering and construction safety competencies such as geothermal, structural, electrical, mechanical, and fire specialities.

Health needs, issues and risks for different community groups would be with respect to, for example: gender, age, ethnicity, use of and access to traditional medicines, etc.

Safety management measures examples include: HSE-Plan including risk assessments for public health and safety risks, signage, exclusion zones, emergency preparedness, monitoring, inspections, training, incident response, communication, allocation of responsibilities, etc.

Communication of public safety measures could be, for example, through public signage, documentation appropriately lodged with local authorities, awareness raising through various types of community engagements, verbal communication by on-site patrolmen or other similar mechanisms, etc.

Emergency response simulations may be undertaken, for example, through training or workshop exercises for company staff, regional authorities, etc.

Independent review refers to expert review by someone not employed by the project and with no financial interest in profits made by the project. An expert is a person with a high degree of skill in or knowledge of construction and infrastructure safety, as a result of a high degree of experience or training in that subject. Forms of independent review may vary from contracting an expert consultant to provide a written review of a particular assessment, plan or report, to inclusion of a safety expert in a panel of experts.

Avoid, minimise, mitigate and compensate is a concise expression for what is understood to be a sequential process. Measures to avoid or prevent negative or adverse impacts are always prioritised, and where avoidance is not practicable, then minimisation of adverse impacts is sought. Where avoidance and minimisation are not practicable, then mitigation and compensation measures are identified and undertaken commensurate with the project's risks and impacts.

Public health opportunities examples include: improved access to electricity, warm water for space heating and other purposes e.g. resulting in reduced burning for heating, health spas, clean drinking water and sanitation; development or upgrading of public health facilities; provision of equipment, training, health education, immunisations, etc.

Minimisation and mitigation of safety risks can be achieved by, for example, identifying and performing the necessary analyses to determine or eliminate safety risks according to relevant standards and to the extent necessary, implement measures in the project design to mitigate identified safety concerns.

Contributions to safety issues beyond project risks might include, for example, improving the safety of some existing roads or traffic infrastructure, signage in public places about suitable and safe track routes, etc.

Potential interviewees: project manager; project designers; project safety manager; local/government authorities on health and safety; independent expert; stakeholder representatives; project affected community representatives

Examples of evidence: health and safety risk assessments; health and safety management plans; emergency preparedness plans; national and international safety standards; independent review reports.

P-9 Financial Viability

This topic addresses both access to finance, and the ability of a project to generate the required financial returns to meet project funding requirements, including funding of measures aimed at ensuring project sustainability.

The intent is that projects proceed with a sound financial basis that covers all project funding requirements including social and environmental measures, financing for resettlement and livelihood enhancement, delivery of project benefits, and commitments to shareholders/investors.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** An assessment of corporate financial viability, including potential project costs and likely revenue streams, has been undertaken using recognised models with no significant gaps; analyses include risk assessment, especially adequate resource assessment based on physical parameters from surveys including well testing, scenario testing and sensitivity analyses including decay of yield over time. **Management:** Financial management plans and processes have been developed for project implementation and operation with no significant gaps, and opportunities for project financing have been evaluated and pursued. **Outcomes:** The project can manage financial issues under a range of scenarios, can service its debt, can pay for all plans and commitments including social and environmental, and access to capital can be demonstrated.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, project costs and revenue streams are fully detailed; and financial viability of the project has been analysed and optimised including extensive scenario testing, risk assessment, confirmation of resource capacity based on drilling, testing and geothermal resource modelling, detailed cash flow modelling and sensitivity analyses. **Management:** In addition, financial management plans provide for well-considered contingency measures for all environmental and social mitigation plans and commitments; and processes are in place to anticipate and respond to emerging risks and opportunities. **Outcomes:** In addition, the project can manage financial issues under a broad range of scenarios

Assessment Guidance:

Financial viability is the ability of an entity to continue to achieve its operating objectives and fulfil its mission from a financial perspective over the long term. Some projects may be multi-purpose, e.g. combined electricity and warm water production or even further utilization of excess geothermal heat and possible bi-products from the geothermal fluid. For some projects the financial contribution is measured from the perspective of the system within which it operates; for example, dependency on variable load for power as well as heating if relevant.

Project cost examples include: cost for drilling and construction, operations and maintenance including drilling of make-up wells, and includes equipment, supplies, labour, tax, land / geothermal resource rights, and cost of environmental and social mitigation plans and possible provision for de-commissioning.

Revenue streams examples include: the electricity market, the Power Purchase Agreement, other possible revenue streams and revenue associated with investment drivers for new market entrants (e.g. access to carbon finance).

Financial models at a minimum have the project cost and revenue streams as input and financial returns as output; examples of uses include: examine implications of various market conditions, trends and risks on financial viability of the project through scenario testing, risk assessment, sensitivity analysis, etc.

Financial issues and risks examples include: very high project costs; inability to meet required costs; uncertainties with respect to revenue streams; currency exchange instability; difficulties in access to project finance; access to renewable incentive schemes; regional pricing; market stability; market access; likelihood of major inflation or depreciation; financial viability of the principal power off-takers etc.

Some **financial information** may have a high degree of commercial sensitivity, and evidence for this topic may need to be viewed under a confidentiality agreement.

Potential interviewees: project financial officers; corporate financial officers; principal financing institution representative; independent financial expert and regulatory authorities.

Examples of evidence: analysis of financing options; financial modelling reports; financial risk analysis; financial plans; financial status reports; third party review reports; annual financial reports for company, project, and principal off-taker(s).

P-10 Project Benefits

This topic addresses the additional benefits that can arise from a geothermal project, and the sharing of benefits beyond one-time compensation payments or resettlement support for project affected communities.

The intent is that opportunities for additional benefits and benefit sharing are evaluated and implemented, in dialogue with affected communities, so that benefits are delivered to communities affected by the project.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** An assessment of opportunities to increase the development contribution of the project through additional benefits and/or benefit sharing strategies or further or associated use of the resource has been undertaken; and the pre-project baseline against which delivery of benefits can be evaluated post-project is well- documented. **Management:** Project benefit plans and processes have been developed for project implementation and operation that incorporate additional benefit or benefit sharing commitments; commitments to project benefits are publicly disclosed. **Stakeholder Engagement:** The assessment and planning process relating to project benefits has involved appropriately timed, and often two-way, engagement with directly affected stakeholders; ongoing processes are in place for stakeholders to raise issues and get feedback. **Outcomes:** Plans deliver benefits for communities affected by the project.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, broad considerations have been taken into account in identifying opportunities related to or associated to the project. **Management:** In addition, processes have been developed to anticipate and respond to emerging risks and opportunities. **Stakeholder Engagement:** In addition, engagement with directly affected stakeholders has been inclusive and participatory; and feedback on how issues raised have been taken into consideration has been thorough and timely. **Outcomes:** In addition, plans deliver significant and sustained benefits for communities affected by the project.

Assessment Guidance:

Additional benefits refers to benefits that can be leveraged from the project; examples include: capacity building, training and local employment; infrastructure such as bridges, access roads; improved services such as for health and education; support for other benefits associated with further utilization of the geothermal resource or excess heat like for spa resort, food production and processing, chemical production; etc.

Benefit sharing is distinct from one-time compensation payments or resettlement support; examples include:

- equitable access to electricity services and, if applicable, direct use for space heating and other multiple use - project affected communities are among the first to be able to access the benefits of energy services from the project, subject to contextual constraints (e.g. power safety, preference);
- non-monetary entitlements to enhance resource access - project affected communities receive enhanced local access to natural resources;
- revenue sharing - project affected communities share the direct monetary benefits of geothermal energy installations according to an approach defined in regulations; this goes beyond a one-time compensation payment or short-term resettlement support; and trust funds.

Broad considerations might be exhibited by, for example: a broad view of the geographic area under consideration; a breadth of types of benefits or approaches and further or associated use of the resource; a breadth of stakeholder interests; an understanding of interrelationships amongst opportunities and policies, plans and development objectives; a broad analysis of trends, approaches and existing and emerging standards relating to benefit sharing; etc.

Potential interviewees: project manager; government representative (e.g. department of economic development); stakeholder representatives; project affected communities' representatives.

Examples of evidence: analysis of relevant development indicators; analysis of potential project benefits; analysis of benefit sharing options and opportunities; meeting minutes or reports demonstrating stakeholder input and involvement; benefit sharing plan.

P-11 Economic Viability

This topic addresses the net economic viability of the project.

The intent is that there is a net benefit from the project once all economic, social and environmental costs and benefits are factored in.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** An assessment of economic viability has been undertaken with no significant gaps; the assessment has involved identification of costs and benefits of the project and either valuation in monetary terms or documentation in qualitative or quantitative dimensions. **Stakeholder Engagement:** The results of the economic viability analysis are publicly disclosed. **Outcomes:** From an economic perspective, a net benefit can be demonstrated.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, the assessment takes broad considerations into account, and includes sensitivity analyses. **Stakeholder Engagement:** The economic viability analysis is publicly disclosed. **Outcomes:** In addition, the project benefits outweigh project costs under a wide range of circumstances.

Assessment Guidance:

Cost-benefit analysis (CBA) seeks to quantify all of the costs and benefits of a proposal in monetary terms, including items for which the market does not provide a satisfactory measure of economic value.

Demonstration of net benefits could be provided through qualitative or quantitative indicators. An example of a quantitative indicator is rate of return. Rate of return from an economic perspective is an indicator for the developmental impact of a project proposal, allowing comparisons with other energy sector investment options. Unlike the financial rate of return, which is mainly of interest to the organisations with commercial stakes in a proposal, the economic rate of return is of interest to society at large. Depending on the perspective of the evaluation, alternative indicators such as the net present value of the project, or the economic costs per unit of capacity installed or power generated, may be used.

Broad considerations might be exhibited by, for example: a broad view on relevant issues requiring costs and benefits; a broad view of stakeholder perspectives on what is a cost or a benefit; a recognition and method of addressing interrelationships amongst issues; a broad analysis of approaches to economic viability analyses as a foundation to the approach taken; etc.

Some economic information may have a high degree of commercial sensitivity, and evidence for this topic may need to be viewed under a confidentiality agreement.

Potential interviewees: project manager; government representative (e.g. department of economic development); funding agency economist; independent experts.

Examples of evidence: analysis of economic context; analysis, quantification and valuation of project costs and benefits; loan appraisal reports; economic analyses of natural resources and project affected livelihoods.

P-12 Procurement

This topic addresses all project-related procurement including works, goods and services.

The intent is that procurement processes are equitable, transparent and accountable; support achievement of project timeline, quality and budgetary milestones; support developer and contractor environmental, social and ethical performance; and promote opportunities for local industries.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** An assessment of major supply needs, supply sources, relevant legislation and guidelines, supply chain risks and corruption risks has been undertaken with no significant gaps. **Management:** Procurement plans and processes have been developed for project implementation and operation with no significant gaps. **Conformance/Compliance:** Processes and objectives relating to procurement have been and are on track to be met with no major non-compliances or non-conformances, and any procurement related commitments have been or are on track to be met. **Outcomes:** Procurement of works, goods and services across major project components is equitable, efficient, transparent, accountable, ethical and timely, and contracts are progressing or have been concluded within budget or that changes on contracts are clearly justifiable.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, the assessment includes opportunities for local suppliers and local capacity development. **Management:** In addition, processes are in place to anticipate and respond to emerging risks and opportunities; sustainability and anti-corruption criteria are specified in the pre-qualification screening; and anti-corruption measures are strongly emphasised in procurement planning processes. **Conformance/Compliance:** In addition, there are no non-compliances or non-conformances. **Outcomes:** In addition, opportunities for local suppliers including initiatives for local capacity development have been delivered or are on track to be delivered.

Assessment Guidance:

Major supply needs examples include: design, economic, financial, technical, environmental and social consultancies; contractors for project construction works; supply of major goods and complex control equipment for project construction, etc.

Supply chain risks relate to inability to meet the contract provisions (e.g. with respect to cost, time, quality, specifications), corruption, transport impediments, human rights (e.g. child labour, forced labour used by suppliers of suppliers), etc.

Corruption risks at the contracting / bid evaluation stage examples include: non-transparent prequalification, confusing tender documents, non-transparent or non-objective selection procedures, bid clarifications not shared with other bidders, award decisions not made public, or not justified, deception and collusion, unjustified agents' fees, conflicts of interest of officials and consultants, etc.

Procurement plans and processes should address provision of a procurement policy, pre-qualification screening, bidding, awarding of contracts, anti-corruption measures, and mechanisms to respond to bidder complaints. Development of procurements plans and processes for implementation and operation may not have been done during the project preparation stage in cases where the project is sent to a bidding process at the end of the preparation stage. In such cases, the plan for procurement could consist of a commitment to utilize the corporate entity's procurement plans and processes which would then be required to meet the stated criteria.

Screening could be for, by way of example, quality, reputation, cost, contractor prior performance on meeting contractual obligations (time, cost, specifications), etc.

Contracts have already been awarded during the project preparation stage for investigations, design, environmental and social impact assessments, etc. If contracts have not been concluded within budget, evidence should be provided to show that the changes on contracts are clearly justifiable.

Screening based on sustainability criteria might encompass additional criteria which could include, by way of example, social, environmental, ethics, human rights, health and safety performance, preference and support to local suppliers where they meet other criteria, etc.

Procurement opportunities may relate to new suppliers, new technologies, capacity development opportunities through liaising with government economic development initiatives, grants, R&D initiatives, contractual arrangements, etc.

Local suppliers are those within geographic proximity of the project-affected area who can or have the potential to meet the need to deliver required good and services; the definition of 'local' will be context specific (e.g. those in the project affected area or local government district).

Local capacity development refers to assistance that is provided to entities in the proximity of the project which have an identified need to develop a certain skill or competence or general upgrading of performance ability in order to meet or deliver a desired service.

Screening to address anti-corruption might specify, by way of example, that companies tendering must have a code of conduct addressing anti-corruption.

Anti-corruption measures examples include: open bidding contracting processes to be above a low threshold, contracting authority and its employees commit to an anti-corruption policy, project integrity pacts, mechanisms to report corruption and protect whistle blowers, confidentiality limited to legally protected information, etc.

Potential interviewees: project manager; project procurement officer; representative of an anti-corruption NGO.

Examples of evidence: relevant purchasing policy and procedures; project procurement plan; analysis of local supply sources and capacities; tender requirements /specifications; bidding documents; supplier screening criteria; evaluation of supplier performance; bidder grievance log; record of compliance with relevant legislation and guidelines including those of financing agencies.

P-13 Project-Affected Communities & Livelihoods*

This topic addresses impacts of the project on project affected communities, including economic displacement, impacts on livelihoods and living standards, and impacts to rights, risks and opportunities of those affected by the project.

The intent is that livelihoods and living standards impacted by the project are improved relative to pre-project conditions for project affected communities with the aim of self-sufficiency in the long-term, and that commitments to project affected communities are fully delivered over an appropriate period of time.

Topics P-14 'Resettlement' and P-15 'Indigenous Peoples' that follow specifically address two subsets of project affected communities.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** An assessment of issues relating to project affected communities has been undertaken with no significant gaps, utilising local knowledge. **Management:** Management plans and processes for issues that affect project affected communities have been developed with no significant gaps including monitoring procedures, utilising local expertise when available; and if there are formal agreements with project affected communities these are publicly disclosed. **Stakeholder Engagement:** Engagement with project affected communities has been appropriately timed and often two-way; ongoing processes are in place for project affected communities to raise issues and receive feedback. **Stakeholder Support:** Affected communities generally support or have no major ongoing opposition to the plans for the issues that specifically affect their community. **Outcomes:** Plans provide for livelihoods and living standards impacted by the project to be improved, and economic displacement fairly compensated, preferably through provision of comparable goods, property or services.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, the assessment takes broad considerations into account, and both risks and opportunities. **Management:** In addition, processes are in place to anticipate and respond to emerging risks and opportunities. **Stakeholder Engagement:** In addition, engagement with project affected communities has been inclusive and participatory; and feedback on how issues raised have been taken into consideration has been thorough and timely. **Stakeholder Support:** In addition, formal agreements with nearly all the directly affected communities have been reached for the mitigation, management and compensation measures relating to their communities. **Outcomes:** In addition, plans provide for livelihoods and living standards that are impacted by the project to be improved with the aim of self-sufficiency in the long-term; and the project contributes to addressing issues for project affected communities beyond impacts caused by the project itself.

Assessment Guidance:

Project affected communities are the interacting population of various kinds of individuals in the area surrounding the geothermal project who are affected either positively or negatively by the geothermal project and its associated infrastructure.

Assessment of project affected communities would include their livelihoods, living standards, the nature of the impacts of the project on their livelihoods and living standards, and the degree of economic displacement; analysis of gender and vulnerable groups should be included.

Livelihood refers to the capabilities, assets (stores, resources, claims and access) and activities required for a means of living. Improvement of livelihoods refers to compensatory measures taken to address impacts of the project on pre-project livelihoods so that those affected are able to move forward with viable livelihoods with improved capabilities or assets relative to the pre-project conditions; for example supporting farmers to continue to be able to farm or to pursue alternatives, accompanied by sufficient support mechanisms that not only enable any changes to livelihoods to be well-established but also so that they have increased capabilities or access to the necessary resources (including training, information, materials, access, supplies etc.).

Living standards refer to the level of material comfort as measured by the goods, services, and luxuries available to an individual, group, or nation; indicators of household well-being; examples include: consumption, income, savings, employment, health, education, nutrition, housing, and access to electricity, clean water, sanitation, health services, educational services, transport, etc. Improvement in living standards would be demonstrated by improvement in the indicators of the level of material comfort.

Economic displacement refers to the loss of assets, access to assets, or income sources or means of livelihoods as a result of (i) acquisition of land, (ii) changes in land use or access to land, (iii) restriction on land use or access to natural resources including water resources, legally designated parks, protected areas or restricted access areas such as geothermal production areas and (iv) changes in environment leading to health concerns or impacts on livelihoods. Economic displacement applies whether such losses and restrictions are full or partial, and permanent or temporary.

Issues that affect project affected communities may include, for example: loss or constraints on livelihoods, lowering of living standards, or economic displacement brought about due to changes associated with the project such as changes to land-use. Specific examples could include: impacts on health or safety; impacts on cultural practices; impacts on lands, forest and riverbanks; loss of paddy lands, of home gardens; loss of ownership, access to, or use of sacred sites, community forest, or other natural resources, etc.

In cases the impacts may result in project affected communities needing to move, but they may not be considered part of the resettlement community because the physical resettlement was a secondary impact and not a primary impact of the project.

Stakeholder support may be expressed through community members or their representatives, and may be evident through means such as surveys, signatures on plans, records of meetings, verbal advice, public hearing records, public statements, governmental license, court decisions, etc.

Broad considerations might be exhibited by, for example: a broad view of the project affected area; a broad view of relevant issues; a broad interpretation of important concepts such as livelihoods or living standards; a broad range of approaches considered; a broad view of stakeholder perspectives on the various issues; a focus on interrelationships amongst issues; legacy issues; cumulative impacts; a human rights based approach; etc.

Opportunities for project-affected communities may include, for example: training and capacity building; education; health services; employment; transportation; contributions to provide for cultural traditions or events, etc.

Measures to address project affected communities' issues may include, for example: support for new industries, e.g. related to further use of the resource; access agreements to project lands to enable continued access to sacred sites, community forest, traditional medicinal plants; protection of sacred sites; etc.

Potential interviewees: representatives of project affected communities; project social issues manager; government expert; local authority; independent experts.

Examples of evidence: assessment report on project affected communities and livelihoods; gender analysis; human rights issues analysis; records of consultation and project affected community involvement; records of response to project affected community issues; third party review report; report on compensation measures; agreements on compensation measures; assessments and agreements on cultural sensitive areas and customs.

* This was a topic with an area of non-consensus in development of the HSAP Protocol, relating to the Stakeholder Support criterion. It is the belief of Oxfam that basic good practice (Level 3) should be "Affected communities generally support or have no major ongoing opposition to the project".

P-14 Resettlement*

This topic addresses physical displacement arising from the geothermal project development.

The intent is that the dignity and human rights of those physically displaced are respected; that these matters are dealt with in a fair and equitable manner; and that livelihoods and standards of living for resettlees and host communities are improved.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** An assessment of the resettlement implications of the project has been undertaken early in the project preparation stage to establish the socio-economic baseline for resettlement for potential resettlees and host communities, and has included an economic assessment of required resettlement including ongoing costs for improvement in living standards. **Management:** A Resettlement Action Plan and associated processes have been developed in a timely manner for project implementation and operation, which includes an up-to-date socio-economic baseline, compensation framework, grievance mechanisms, and monitoring procedures; and formal agreements with resettlees and host communities are publicly disclosed. **Stakeholder Engagement:** Engagement with directly affected stakeholders has been appropriately timed, culturally appropriate and two-way; ongoing processes are in place for resettlees and host communities to raise issues and get feedback; and resettlees and host communities have been involved in the decision-making around relevant resettlement options and issues. **Stakeholder Support:** Resettlees and host communities generally support or have no major on-going opposition to the Resettlement Action Plan. **Outcomes:** Plans provide for resettlement to be treated in a fair and equitable manner, and resettlees and host communities to experience a timely improvement in livelihoods and living standards.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, the assessment takes broad considerations into account, and both risks and opportunities. **Management:** In addition, processes are in place to anticipate and respond to emerging risks and opportunities. **Stakeholder Engagement:** In addition, engagement with resettlees and host communities has been inclusive and participatory; and feedback on issues how raised have been taken into consideration has been thorough and timely. **Stakeholder Support:** In addition, there is consent with legally binding agreements by the resettlees and host communities for the Resettlement Action Plan. **Outcomes:** In addition, plans provide for resettlees and host communities to experience a timely improvement in livelihoods and living standards with the aim of self-sufficiency in the long term.

Assessment Guidance:

Topic relevance: This topic will not be relevant if credible evidence provided shows that there is no requirement for resettlement arising from the project activities.

Resettlement is the process of moving people to a different place to live, because due to the project they are no longer allowed to stay in the area where they used to live.

Livelihood refers to the capabilities, assets (stores, resources, claims and access) and activities required for a means of living. Improvement of livelihoods refers to compensatory measures taken to address impacts of the project on pre-project livelihoods so that those affected are able to move forward with viable livelihoods with improved capabilities or assets relative to the pre-project conditions; for example supporting farmers to continue to be able to farm or to pursue alternatives, accompanied by sufficient support mechanisms that not only enable any changes to livelihoods to be well-established but also so that they have increased capabilities or access to the necessary resources (including training, information, materials, access, supplies etc.).

Living standards refer to the level of material comfort as measured by the goods, services, and luxuries available to an individual, group, or nation; indicators of household well-being examples include: consumption, income, savings, employment, health, education, nutrition, housing, and access to electricity, clean water, sanitation, health services, educational services, transport, etc.

Resettlees are those people who are required to be resettled, including those who have formal legal rights, customary or traditional rights, as well as those who have no recognizable rights to the land.

Socio-economic baseline for resettlement includes analysis of community structures, gender, vulnerable social groups, living standards and economic valuation of livelihoods and asset loss.

Host communities refers to the communities to which resettlees are relocated.

Resettlement Action Plan refers to a document or set of documents specifically developed to identify the actions that will be taken to address resettlement. It would typically include identification of those being resettled; the socioeconomic baseline for the resettlees; the measures to be implemented as part of the resettlement process including those relating to resettlement assistance and livelihood support; the legal and compensation frameworks; organisational roles and responsibilities; budget allocation and financial management; the timeframe, objectives and targets; grievance redress mechanisms; monitoring, reporting and review provisions; and understandings around consultation, participation and information exchange. In cases where resettlees' livelihoods have been land-based, and where consistent with resettlees' preferences, strong consideration may be given to land-for-land compensation.

Grievance mechanisms refer to the processes by which stakeholders are able to raise concerns, grievances and legitimate complaints, as well as the project procedures to track and respond to any grievances.

Stakeholder support may be expressed through community members or their representatives, and may be evident through means such as surveys, signatures on plans, records of meetings, verbal advice, public hearing records, public statements, governmental license, court decisions, etc.

Broad considerations might be exhibited by, for example: a broad interpretation of definitional terms; a broad view of relevant issues; a broad view of stakeholder perspectives on the various issues; a broad approach to types of data collection and important indicators; a focus on interrelationships amongst issues; a broad analysis of trends, approaches and existing and emerging standards relating to resettlement; consideration of legacy issues; consideration of cumulative impacts; etc.

Consent means signed agreements with community leaders or representative bodies who have been authorised by the affected communities which they represent, through an independent and self- determined decision-making process undertaken with sufficient time and in accordance with cultural traditions, customs and practices.

Potential interviewees: community representatives affected by resettlement and land acquisition; representatives from resettlement host communities; project social issues manager; independent reviewer; representative from the responsible governmental authority.

Examples of evidence: assessment report on resettlement and land acquisition; records of consultation and affected stakeholder involvement; records of response to resettlement and land acquisition issues; third party review report; resettlement action plans; land acquisition plans; compensation agreements; agreements on resettlement action plan; baseline social conditions report; livelihood analysis; impoverishment risk analysis; mitigation, resettlement and development action plans, including project benefit sharing mechanisms; NGO reports.

PREPARATION

* This was a topic with two areas of non-consensus in development of the HSAP Protocol, both relating to the Stakeholder Support criterion. It is the belief of Oxfam that basic good practice (Level 3) should be "Resettlees and host communities generally support or have no major on-going opposition to the project" and that proven best practice (Level 5) should be "In addition, there is consent with legally binding agreements by the resettlees and host communities for the project" noting that those forced to resettle and host communities may choose to express that consent through their support for a Resettlement Action Plan.

P-15 Indigenous Peoples*

This topic addresses the rights, risks and opportunities of indigenous peoples with respect to the project, recognising that as social groups with identities distinct from dominant groups in national societies, they are often the most marginalized and vulnerable segments of the population.

The intent is that the project respects the dignity, human rights, aspirations, culture, lands, knowledge, practices and natural resource-based livelihoods of indigenous peoples in an ongoing manner throughout the project life.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** An assessment of the representation of indigenous peoples in the project affected community, their rights, risks and vulnerabilities, and any cultural sensitivities and needs has been undertaken with no significant gaps, utilising local knowledge and expertise. **Management:** Plans and processes have been developed for project implementation and operation to address issues that may affect indigenous peoples in relation to the project; and formal agreements with indigenous peoples are publicly disclosed. **Stakeholder Engagement:** Engagement with indigenous peoples has been appropriately timed, culturally appropriate and two-way with self-selected community representatives; and ongoing processes are in place for indigenous peoples to raise issues and get feedback. **Stakeholder Support:** Directly affected indigenous groups generally support or have no major on-going opposition to the plans for issues that specifically affect their group. **Outcomes:** Plans provide for major negative impacts of the project to indigenous peoples and their associated culture, knowledge, access to land and resources, and practices to be avoided, minimised, mitigated or compensated with no significant gaps, and some practicable opportunities for positive impacts to be achieved.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, the assessment has been undertaken with the free, prior and informed participation of indigenous peoples; and the assessment takes broad considerations into account, including both risks and opportunities. **Management:** In addition, plans and processes have been developed with the free, prior and informed participation of indigenous peoples; processes are in place to anticipate and respond to emerging risks and opportunities; and plans are supported by commitments that are public, formal and legally enforceable. **Stakeholder Engagement:** In addition, engagement with indigenous peoples has been inclusive and participatory; feedback on how issues raised have been taken into consideration has been thorough and timely; and directly affected indigenous peoples have been involved in the decision-making around relevant issues and options. **Stakeholder Support:** In addition, consent has been sought and gained by directly affected indigenous groups for the project. **Outcomes:** In addition, opportunities for positive impacts have been thoroughly identified and maximised as far as practicable.

Assessment Guidance:

Topic relevance: This topic will not be relevant if credible evidence provided shows that there are no indigenous peoples in the project affected area.

Indigenous peoples refers to a distinct social and cultural group possessing the following characteristics in varying degrees: self-identification as members of a distinct indigenous cultural group and recognition of this identity by others; collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories; customary cultural, economic, social or political institutions that are separate from those of the dominant society or culture; an indigenous language, often different from the official language of the country or part of the country within which they reside. In some countries, interactions with indigenous peoples may be required to be conducted through a specific government agency.

Issues that may affect indigenous peoples are ideally self-identified, and may include, for example: impacts of project activities and infrastructure on cultural practices, direct or indirect impacts to traditional lands, impacts to community cohesion, public health risks, disturbance of customary practices, and impeded access to natural resource- based livelihoods.

Measures to address issues that may affect indigenous peoples are ideally self-identified, and may include, for example: avoidance measures, protection of cultural practices, land entitlement and protection, health assistance, scheduling of project activities to not disturb customary practices, support for festivals or traditions, improved or more secure access to natural resource-based livelihoods, etc.

Stakeholder support may be expressed through community members or their representatives, and may be evident through means such as surveys, signatures on plans, records of meetings, verbal advice, public hearing records, public statements, governmental license, court decisions, etc.

Avoid, minimise, mitigate and compensate is a concise expression for what is understood to be a sequential process. Measures to avoid or prevent negative or adverse impacts are always prioritised, and where avoidance is not practicable, then minimisation of adverse impacts is sought. Where avoidance and minimisation are not practicable, then mitigation and compensation measures are identified and undertaken commensurate with the project's risks and impacts.

Broad considerations might be exhibited by, for example: a broad definitional view of indigenous peoples (e.g. including ethnic minorities); a broad view of the project affected area; a broad view of indigenous rights and relevant issues; a broad interpretation of important concepts such as cultural sensitivities; a broad range of approaches considered; a focus on interrelationships amongst issues; legacy issues; cumulative impacts; a broad analysis of trends, approaches and existing and emerging standards relating to indigenous peoples; etc.

Opportunities for indigenous peoples are ideally self-identified, and may include, for example: better access to education, health facilities, fresh water, new land or resource access, new housing or better access to materials for housing, new livelihood opportunities, development of treaties or formal agreements that give greater security over the long-term, etc.

Consent means signed agreements with community leaders or representative bodies who have been authorised by the affected communities which they represent, through an independent and self- determined decision-making process undertaken with sufficient time and in accordance with cultural traditions, customs and practices.

Potential interviewees: representatives of project affected indigenous communities; project social issues manager; independent reviewer; representative from the responsible governmental authority.

Examples of evidence: assessment report on indigenous peoples; records of consultation and project affected community involvement; records of response to issues that may affect indigenous peoples; third party review report; indigenous peoples' management plans; agreements on measures for indigenous peoples.

PREPARATION

* This was a topic of non-consensus in development of the HSAP Protocol, relating to the focus of support and consent given by indigenous peoples (whether for management plans or for the project itself). With respect to the Stakeholder Support criterion, it is the belief of IHA that the level 5 language does not represent proven best practice. There is a consensus within the Forum that this issue requires priority focus and attention in the further development and testing of the Protocol. There is a recognition that the language of the scoring statements may need to be refined if there are significant developments in this issue.

P-16 Labour & Working Conditions

This topic addresses labour and working conditions, including employee and contractor opportunity, equity, diversity, health and safety.

The intent is that workers are treated fairly and protected.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** An assessment has been undertaken of human resource and labour management requirements for the project, including project occupational health and safety (OH&S) issues, risks, and management measures, with no significant gaps. **Management:** Human resource and labour management policies, plans and processes have been developed for project implementation and operation that coverall labour management planning components, including those of contractors, subcontractors, and intermediaries, with no significant gaps. **Stakeholder Engagement:** Ongoing processes are in place for employees and contractors to raise human resources and labour management issues and get feedback. **Outcomes:** There are no identified inconsistencies of labour management policies, plans and practices with internationally recognised labour rights.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, the assessment takes broad considerations into account, and both risks and opportunities. **Management:** In addition, processes are in place to anticipate and respond to emerging risks and opportunities. **Stakeholder Engagement:** In addition, feedback on how issues raised have been taken into consideration has been thorough and timely. **Outcomes:** In addition, labour management policies, plans and practices are demonstrated to be consistent with internationally recognised labour rights.

Assessment Guidance:

Labour management plan components include: human resources policies, staff and workforce planning, occupational health and safety, equal opportunity, staff development and training, grievance mechanisms, and (where appropriate) collective bargaining mechanisms.

Occupational health and safety is about protecting the safety, health and welfare of people engaged in work or employment, for example through preventing disease or injury that might arise as a direct result of the workplace activities.

Intermediaries are workers engaged through third parties who are either performing work directly related to the functions essential for the project for a substantial duration, or who are geographically working at the project location.

Broad considerations might be exhibited by, for example: a broad view of relevant issues; a broad approach to types of data collection and important indicators; a focus on interrelationships amongst issues; a broad analysis of trends, approaches and existing and emerging standards relating to labour and working conditions; understanding of relevant human rights; etc.

Internationally recognised labour rights are documented in places such as the IFC Performance Standard 2, the International Labour Organisation standards, and the Human Rights Council 2008 Report of John Ruggie: "Protect, Respect and Remedy: A Framework for Business and Human Rights". They include freedom of association, right to equal pay for equal work, right to organize and participate in collective bargaining, right to equality at work, right to non-discrimination, right to just and favourable remuneration, abolition of slavery and forced labour, right to a safe work environment, abolition of child labour, right to rest and leisure, right to work, right to family life. Evidence of no inconsistencies would be no policies, plans or practices that show workers are prevented from the ability to exercise these rights; evidence of consistency could be for example an analysis of alignment.

Potential interviewees: project human resources staff; company human resources staff; project manager, contracted workforce manager, project safety officer; staff or contractor representatives; external experts; unions and shop stewards; female workers.

Examples of evidence: policies, plans and programs relating to human resources, employees, contractors, equity, occupational health & safety, workforce planning, and grievance mechanisms; national and international standards for labour and OH&S.

P-17 Cultural Heritage

This topic addresses cultural heritage, with specific reference to physical cultural resources, at risk of damage or loss by the geothermal project and associated infrastructure impacts (e.g. new roads, transmission lines).

The intent is that physical cultural resources are identified, their importance is understood, and measures are in place to address those identified to be of high importance.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** A cultural heritage assessment has been undertaken with no significant gaps; the assessment includes identification and recording of physical cultural resources, evaluation of the relative levels of importance, and identification of any risks arising from the project. **Management:** Plans and processes to address physical cultural resources have been developed for project implementation and operation with no significant gaps; plans include arrangements for chance finds, and ensure that cultural heritage expertise will be on site and regularly liaised with by the project management team during construction. **Stakeholder Engagement:** The assessment and planning for cultural heritage issues has involved appropriately timed, and often two-way, engagement with directly affected stakeholders; ongoing processes are in place for stakeholders to raise issues and get feedback. **Stakeholder Support:** There is general support or no major ongoing opposition amongst directly affected stakeholder groups for the cultural heritage assessment, planning or implementation measures. **Outcomes:** Plans avoid, minimise, mitigate, and compensate negative impacts on cultural heritage arising from project activities with no significant gaps.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, the assessment takes broad considerations into account, and both risks and opportunities. **Management:** In addition, processes are in place to anticipate and respond to emerging risks and opportunities; and plans are supported by public, formal and legally enforceable commitments. **Stakeholder Engagement:** In addition, engagement with directly affected stakeholders has been inclusive and participatory; and feedback on how issues raised have been taken into consideration has been thorough and timely. **Stakeholder Support:** In addition, formal agreements with the directly affected stakeholder groups have been reached for cultural heritage management measures. **Outcomes:** In addition, plans avoid, minimise, mitigate and compensate negative cultural heritage impacts with no identified gaps; and contribute to addressing cultural heritage issues beyond those impacts caused by the project.

Assessment Guidance:

Topic relevance: This topic will not be relevant if credible evidence provided shows that there are no physical cultural resources identified in the project affected area.

Cultural heritage refers to the legacy of physical artefacts and intangible attributes of a group or society that are inherited from past generations, maintained in the present and bestowed for the benefit of future generations.

Physical cultural resources refer to movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level, or within the international community.

Non-physical cultural heritage examples include: traditions, festivals, rituals, folklore, storytelling, drama, etc. These should be addressed under Topic P-5 Environmental & Social Impact Assessment & Management in this Protocol assessment.

Cultural heritage risks may include, for example: damage or destruction to important sites or artefacts due to drilling and construction activities; loss of access to important sites due to changes to access routes (e.g. pipelines or linear infrastructure with barrier fencing, major roads); disturbance of spirits associated with special sites; etc.

Plans and processes to address physical cultural resources may include, for example: documentation and record-keeping; relocation; creation of protected areas; new access routes; appeasement ceremonies; etc.

Avoid, minimise, mitigate and compensate is a concise expression for what is understood to be a sequential process. Measures to avoid or prevent negative or adverse impacts are always prioritised, and where avoidance is not practicable, then minimisation of adverse impacts is sought. Where avoidance and minimisation are not practicable, then mitigation and compensation measures are identified and undertaken commensurate with the project's risks and impacts.

Protection means to keep in safety and protect from harm, decay, loss, damage or destruction.

Stakeholder support may be expressed through community members or their representatives, and may be evident through means such as surveys, signatures on plans, records of meetings, verbal advice, public hearing records, public statements, governmental license, court decisions, etc.

Broad considerations might be exhibited by, for example: a broad view of relevant issues; a broad approach to types of data collection; a focus on interrelationships amongst issues; a broad analysis of trends, approaches and existing and emerging standards relating to cultural heritage; a broad perspective with respect to the assessment of significance of the heritage finds; etc.

Cultural heritage opportunities may include, for example: partnerships with heritage organisations; establishment of initiatives recognising heritage values such as festivals, museums or visiting experts; programmes to preserve traditional activities; access to special grants for heritage protection works; etc.

Potential interviewees: project environmental and social issues manager, local cultural heritage expert, representative from relevant government department (e.g. heritage or environment); external experts; project affected community representatives.

Examples of evidence: cultural heritage impact statements; conservation plans; records of consultation and response to stakeholder issues; heritage plans and agreements; national and international standards.

P-18 Biodiversity & Invasive Species

This topic addresses ecosystem values, habitat, species and specific issues such as threatened species in the development areas and surrounding, as well as potential impacts arising from pest and invasive species associated with the planned project.

The intent is that there are healthy, functional and viable aquatic and terrestrial ecosystems in the project-affected area that are sustainable over the long-term, and that biodiversity impacts arising from project activities are managed responsibly.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** An assessment of terrestrial and aquatic biodiversity including loss of connectivity to significant habitat; and risks of invasive species has been undertaken with no significant gaps. **Management:** Plans and processes to address identified biodiversity issues have been developed for project implementation and operation with no significant gaps. **Outcomes:** Plans avoid, minimise, mitigate, and compensate negative biodiversity impacts arising from project activities with no significant gaps.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, the assessment takes broad considerations into account, and both risks and **opportunities.** **Management:** In addition, processes are in place to anticipate and respond to emerging risks and opportunities; and commitments in plans are public, formal and legally enforceable. **Outcomes:** In addition, plans avoid, minimise, mitigate and compensate negative biodiversity impacts due to project activities with no identified gaps; and plans provide for enhancements to pre-project biodiversity conditions or contribute to addressing biodiversity issues beyond those impacts caused by the project.

Assessment Guidance:

Biodiversity issues may include, for example: loss of habitat; loss of habitat connectivity; loss or declines in important food chain species; loss of wetlands; poaching, hunting or over-exploitation of significant species; introduction of weed or pest species; etc.

Measures to protect or enhance biodiversity examples include: creation of reserves or protected areas, habitat conservation and improvement, species management plans, translocations, habitat rehabilitation, new habitat creation, etc.

Measures to address invasive species examples include: vegetation clearing, physical barriers to pest species passage, pollution control, physical removal or containment, chemical treatment, etc.

Avoid, minimise, mitigate and compensate is a concise expression for what is understood to be a sequential process. Measures to avoid or prevent negative or adverse impacts are always prioritised, and where avoidance is not practicable, then minimisation of adverse impacts is sought. Where avoidance and minimisation are not practicable, then mitigation and compensation measures are identified and undertaken commensurate with the project's risks and impacts.

Compensate in the context of biodiversity impacts in cases may be in the form of establishing or supporting offset programs. Offsets are measurable conservation outcomes resulting from actions designed to compensate for significant adverse biodiversity impacts arising from project development and persisting after appropriate avoidance, minimization, and restoration measures have been taken. These can be outside the project site.

Broad considerations may include, for example: consideration of cumulative impacts; a wider development area perspective; a broad view of the project affected area; a broad view of relevant issues; a broad approach to data collection; a focus on interrelationships amongst issues; etc.

Biodiversity opportunities may include, for example, forming partnerships with wildlife protection groups; development area management committees and projects; joint research ventures around volcanic features; employing or working with local communities to act as wardens for protected areas; capacity building and educational initiatives, eco-tourism ventures, creation of geothermal habitat sanctuaries, wetland protection, etc.

Potential interviewees: project environmental issues manager; aquatic and terrestrial ecologists; project design engineers and geothermal specialists; representatives of relevant government departments (e.g. flora and fauna, wildlife, environment); representatives of local communities; independent experts.

Examples of evidence: assessment of terrestrial and aquatic biodiversity; third party review reports; biodiversity management plans; invasive species management plans; commitments and agreements; economic and livelihood valuation from local communities.

P-19 Induced Seismicity and Subsidence

This topic addresses the management of induced seismicity and subsidence issues associated with the project.

The intent is that physical impacts such as induced seismicity and subsidence caused by the project are managed responsibly and do not present problems with respect to other social, environmental and economic objectives, and that these impacts are recognised and managed.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** Assessments of induced seismicity and subsidence issues have been undertaken with no significant gaps; the assessments identify impacts that may be caused by the project, issues that may impact on the project, and establishes an understanding of the expected seismic behaviour and surface subsidence as relevant. **Management:** Plans and processes to address identified induced seismicity and subsidence issues have been developed for project implementation and operation with no significant gaps. **Stakeholder Engagement:** The induced seismicity and subsidence issues, as relevant, have been explained and discussed with directly affected stakeholders; ongoing processes are in place for stakeholders to raise issues and get feedback. **Outcomes:** Plans avoid, minimise and mitigate induced seismicity and subsidence issues arising from project activities and induced seismicity and subsidence issues that may impact on the project with no significant gaps.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, the assessment takes broad considerations into account, and both risks and opportunities. **Management**: In addition, processes are in place to anticipate and respond to emerging risks and opportunities. **Stakeholder Engagement:** In addition, engagement with directly affected stakeholders has been inclusive, and participatory; and feedback on how issues raised have been taken into consideration has been thorough and timely. **Outcomes:** In addition, plans avoid, minimise, mitigate and compensate induced seismicity and subsidence issues due to project activities with no identified gaps; and plans contribute to addressing induced seismicity and subsidence issues beyond those impacts caused by the project.

Assessment Guidance:

Induced seismicity issues that may be caused by the project are related to injection of fluid into wells. The purpose of the injection can be: environmental disposal; maintaining of pressure and fluid in the aquifer/bedrock; a requirement of the operating permit or regulation; well stimulation by hydraulic pressure to enhance yield of existing or new wells. In the case of EGS systems (Enhanced Geothermal Systems) the purpose of the injection is to enhance bedrock permeability by hydraulic shearing or fracking and to facilitate circulation of fluid through the reservoir for operation.

Subsidence issues that may be caused by the project are related to the exploitation of the geothermal field. The withdrawal of geothermal fluid and the resulting lowering of pressure can result in localized subsidence in the area of the well fields, mostly vertical and to a lesser extent horizontal displacements. The countermeasure applied is re-injection of fluid.

Issues that may impact on the project itself are ground movements (seismicity and subsidence) that can affect stability and integrity of project structures and operation and durability of equipment.

Assessment of geological and geophysical conditions to address induced seismicity and subsidence risks includes natural seismic and induced seismic potential and geological conditions that can result in subsidence.

Induced seismicity and subsidence management measures might include, for example: monitoring networks for seismic measurements and topographic surface ground displacements; risk assessment and mitigating strategies and plans for different degrees of seismic or topographic movements; procedures for evaluation and remedy of eventual inconvenience or damage of property; plans for dialogue with regional authorities, education of stakeholders and the general public and interaction with stakeholders; etc.

Avoid, minimise, mitigate and compensate is a concise expression for what is understood to be a sequential process. Measures to avoid or prevent negative or adverse impacts are always prioritised, and where avoidance is not practicable, then minimisation of adverse impacts is sought. Where avoidance and minimisation are not practicable, then mitigation and compensation measures are identified and undertaken commensurate with the project's risks and impacts.

Potential interviewees: project manager; project designers and geological or/and geophysical experts; independent expert; project communications staff; local authorities; stakeholder representatives; project affected community representatives.

Examples of evidence: induced seismicity and subsidence assessment reports; induced seismicity and subsidence management plans for construction and operation, risk assessment and communication plans with stakeholders.

P-20 Air Quality and Water Quality

This topic addresses the management of air and water quality issues associated with the project.

The intent is that air and water quality in the vicinity of the project is not adversely impacted by project activities.

Scoring:

1	*There are significant gaps relative to basic good practice.*
2	*Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*
3	**Assessment:** Air and water quality issues assessment has been undertaken with no significant gaps. **Management:** Plans and processes to address identified air and water quality issues have been developed for project implementation and operation with no significant gaps. **Outcomes:** Plans avoid, minimise and mitigate negative air and water quality impacts arising from project activities with no significant gaps.
4	*All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*
5	**Assessment:** In addition, the assessment takes broad considerations into account, and both risks and opportunities. **Management:** In addition, processes are in place to anticipate and respond to emerging risks and opportunities. **Outcomes:** In addition, plans avoid, minimise, mitigate and compensate negative air and water quality impacts with no identified gaps; and plans provide for enhancements to pre-project air and water quality conditions or contribute to addressing air and water quality issues beyond those impacts caused by the project.

Assessment Guidance:

Air and water quality issues examples include at the construction stage: fluid and airborne pollutants from construction activity and geothermal discharge from wells and non-condensable gases (NCG) such as CO2 and H2S and chemical elements such as Rn, Hg and As; and at the operation stage: contamination of streams, lakes and groundwater aquifers by geothermal fluid discharge, air pollution by various geothermal gas emissions and fluid and airborne emissions from operational and service equipment, etc.

Air quality management measures involve NGC gas distribution prediction modelling to find the impacts on local air quality, based on meteorological data etc. and plans for mitigation measures. Monitoring programs.

Water quality management measures include hydrological studies to manifest the ground water flow in the area, determine the chemical characteristics of river water and lakes, at the construction stage these are often oriented around avoidance or mitigation of spot issues e.g. oil bunding, sediment traps, etc.

At the operation stage the measures are often longer-term and may be built into design features; they may include, for example: design features such as design of discharge and emission measures including eventual re-injection; vegetation and soil management to address surface disturbance and effects of discharge and emission; addressing pollutants from non-project activities such as sewage, wastes, contaminated sites, etc. Monitoring programs.

Avoid, minimise, mitigate and compensate is a concise expression for what is understood to be a sequential process. Measures to avoid or prevent negative or adverse impacts are always prioritised, and where avoidance is not practicable, then minimisation of adverse impacts is sought. Where avoidance and minimisation are not practicable, then mitigation and compensation measures are identified and undertaken commensurate with the project's risks and impacts.

Broad considerations may include, for example: consideration of cumulative impacts; a broad approach to data collection; a focus on interrelationships amongst issues (e.g. air and water quality affecting populated areas, other industries and habitats, access to drinking water, inter-linkages with land-use practices); etc.

Air and water quality opportunities may include, for example: reduction of greenhouse gas emissions; addressing pollutants from non-project activities such as sewage, wastes, contaminated sites; new technologies; new service providers; etc.

Potential interviewees: project environmental manager; government and municipal representative (e.g. from environment departments), representatives of local communities; independent expert.

Examples of evidence: air and water quality monitoring reports; air and water quality management plans for construction and operation.

P-21 Climate Change Mitigation and Resilience

This topic addresses the estimation and management of the project's greenhouse gas (GHG) emissions, analysis and management of potential risks of climate change for the project, and the project's role in climate change adaptation. The intent is that the project's GHG emissions are consistent with low carbon power and heat generation, the project is resilient to the effects of climate change, and the project contributes to wider adaptation to climate change.

Scoring:

1 *There are significant gaps relative to basic good practice.*

2 *Most relevant elements of basic good practice have been undertaken, but there is one significant gap.*

3 **Assessment:**

For climate mitigation: if net GHG emissions (gCO2e) of energy generation (electricity plus heat) have been estimated and independently verified; if estimated emissions are above 100 gCO2e/kWh, a site-specific assessment of GHG emissions has been undertaken; and an assessment of the project's fit with national and/or regional policies and plans on mitigation has been undertaken.

For climate resilience: an assessment of the project's resilience to climate change has been undertaken, which incorporates an assessment of plausible climate change at the project site, identifies a range of resulting climatological conditions at the project site, and applies these conditions in a documented risk assessment or stress test, other infrastructural resilience, environmental and social risks, and power and heat generation availability; and an assessment of the project's potential adaptation services and fit with national and/or regional policies and plans for adaptation has been undertaken.

Management:

For climate mitigation: if GHG emissions estimates assume design and management measures, there are plans to put these measures in place.

For climate resilience: the project design is based on plausible climate change scenarios; and structural and operational measures are planned for design, implementation and operation phases to avoid or reduce the identified climate risks.

Stakeholder Engagement:

For climate mitigation: estimated GHG emissions and / or the results of a site-specific assessment have been publicly disclosed.

For climate resilience: plans for the management of climate risks have been discussed with stakeholders.

Outcomes:

For climate mitigation: the project's GHG emissions are demonstrated to be consistent with low carbon power and heat generation, and the fit of the project with national and regional policies and plans for mitigation can be demonstrated.

For climate resilience: plans will deliver a project that is resilient to climate change under a range of scenarios; and the fit of the project with national and regional policies and plans for adaptation can be demonstrated.

4 *All relevant elements of basic good practice have been undertaken and in one or more cases exceeded, but there is one significant gap in the requirements for proven best practice.*

5 **Assessment:**

For climate mitigation: in addition, if a site-specific assessment is required, it incorporates a broad range of scenarios, uncertainties and risks.

For climate resilience: in addition, if a site-specific assessment of resilience is required, it can for example incorporate sensitivity analysis and project-specific modelling using recognized models: and an assessment of the project's potential adaptation services has been undertaken.

Management:

For climate mitigation: in addition, design and management measures have been developed for implementation and operation phases of the project to respond to risks and opportunities including offsetting emissions, for example by reinjecting the GHGs, use of GHGs for production of products; plans have been developed to monitor parameters used in GHG emissions estimates or to monitor GHG stocks.

For climate resilience: in addition, resilience measures take account of a broad range of risks and inter-relationships, and processes are in place to respond to unanticipated climate change; and plans have been developed to provide adaptation services if necessary.

Stakeholder Engagement:

In addition, the assessment of project resilience has been publicly disclosed.

Outcomes:

For climate mitigation: in addition, project net emissions are minimised or project operations facilitate system emissions reductions.

For climate resilience: in addition, the project is resilient under a broad range of scenarios; and the project will contribute to climate change adaptation at a local, regional or national levels.

Assessment Guidance:

Climate change mitigation is defined, by the Inter-governmental Panel on Climate Change (IPCC, Fifth Assessment Report, glossary), as a human intervention to reduce the sources or enhance the sinks of GHG and other substances which may contribute directly or indirectly to climate change.

Resilience is the capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation (IPCC, Fifth Assessment Report, glossary).

Climate Change adaptation is defined by the Inter-governmental Panel on Climate Change (IPCC, Fifth Assessment Report, glossary) as the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

Net GHG emissions estimates should deliver an estimate of emissions in gCO2e per kWh, using recognized methods and site/reservoir specific calculations. Recognised tools or site and reservoir specific calculations should take into account pre-construction baseline emissions if available, chemical analysis of the fluid, emissions from drilling, construction and ongoing operational activities, the life cycle of the project (at least 30 years), and the allocation of emissions between electricity generation and other services provided by multipurpose projects as applicable.

The estimation of GHG emissions may be an **iterative process** during design and preparation. For projects with emissions estimated at more than 100 gCO2e per kWh, design, construction and operational measures would be identified to lower emissions below this figure.

A broad range of scenarios, uncertainties and risks in emissions assessment would encompass potential changes of the content of GHGs in the geothermal fluids and if relevant, the injection rate.

Estimates of pre-construction emissions should be based on site measurements if applied.

Design and operational measures that influence GHG emissions can include the capture of emissions, reinjection, use and/or storage.

Measures that can be taken during implementation that may reduce emissions include drilling management, vehicle fleet management and transport planning, and the selection of cement supplier.

Consideration has been given to use the residual heat; for example for heating or cooling.

Measures to respond to risks of higher emissions than anticipated may include design features or operational measures that can be instigated in response to emissions measurements.

Opportunities concerning emissions reductions include opportunities to increase the efficiency of the turbines, use the effluent heat and use the gases for production of products.

Consistency with low carbon power/energy generation may be demonstrated by alignment with national plans for mitigation, and: net emissions intensity that is less than internationally recognised thresholds at the time of the assessment (such as less than 100 gCO2e/kWh); or emissions reductions at the system level.

For the purposes of the assessment, **system emissions** shall mean greenhouse gas emissions associated with the local, regional or national power grid and energy infrastructure to which the project is connected.

A risk assessment or stress test would be documented, for example in a risk register or matrix. This would set out the range of potential risks and hazards, assess the probability and magnitude of the impacts of each. It would identify and prioritise measures to avoid, minimise and mitigate the risks and impacts, and promote an approach of decision making under uncertainty.

Measures for project resilience may not be only engineering measures. Non-engineering measures may include risk monitoring and risk management plans, disaster risk reduction and management plans, or other climate risk management plans.

Sensitivity analysis in the assessment of resilience refers to analysis of the increased probability and severity of impacts in relation to ranges of conditions.

Risks and inter-relationships in resilience refers to lower probability risks, and inter-relationships between issues, for example an increase in temperatures resulting in increased peak electricity demand which results in need for flexibility and in the case of combined heat and power (CHP) a changed balance in production.

Environmental and social risks refers to the increased risk for the local environment and communities that result from the project within a context of a changing climate.

Conversely, the project may have opportunities to provide **adaptation services** to the local environment and communities, above and beyond the risks created by the project.

Public disclosure of emissions calculations is important for credibility. Public disclosure refers to the disclosure of the details of the calculation, demonstrating how the calculation conforms to the emissions criteria for power/energy production and public information on the project design.

In stakeholder engagement, it is important that plans for the management of environmental and social risks have been discussed with stakeholders, for example in the development of plans for emergency preparedness.

National or regional policies and plans relevant to mitigation may include NDCs (nationally determined contributions), NAMAs (nationally appropriate mitigation

actions), national climate change mitigation plans, etc. A project would fit with national or regional policies and plans if, for example, generation with similar emissions are cited in policies and plans, or the project is below baseline power and heating sector emissions. In some jurisdictions there may be more stringent requirements for emissions than values in the scoring statements, and the project should fit with the requirements applying currently. There are also likely to be national policies plans and commitments on adaptation (for example national adaptation plans).

Potential interviewees: GHG emissions assessment researchers; verifier of GHG emissions assessment; design engineers; geothermal reservoir specialists; environmental manager; social experts; ESIA consultants; regional and national climate scientists; designated national authorities (DNAs); disaster preparedness authorities; emergency response services.

Examples of evidence: register and methods used for sampling of fluids from the reservoir and geothermal field; chemical data for the geothermal fluids; tools and methods used for analysis of the samples; calculation of estimated emissions; climate change studies in the region; analysis of plausible climate change, and conditions at the project site; risk assessment or stress tests; national and regional policies and plans on mitigation and adaptation; feasibility study; operational plans; environmental and social management plans; disaster preparedness and response plans; minutes of meetings with stakeholders; evidence of public disclosure, etc.