

## E&S Eligibility Criteria for Geothermal Projects

The Environmental and Social (E&S) eligibility criteria herein have been prepared to assist and to support EBRD’s partner Financial Intermediaries (FIs) who are considering the provision of financing to sponsors/developers of geothermal power projects. In the following, the term “Project” refers to the geothermal project considered for financing, including all of its associated facilities as defined by EBRD Environmental and Social Policy (ESP) dated 7<sup>th</sup> May 2014. This includes typically, but not limited to, access roads, temporary sites, borrow and spoil areas, and the connection to the grid. Also, the “Project” includes four temporal elements: 1) planning and siting of the facility, 2) construction, 3) operation and maintenance, and 4) decommissioning. All four elements are discussed herein. This is specific to new or “greenfield” projects and extensions to or remodelling of existing facilities.

The eligibility criteria are organized with reference to EBRD Performance Requirements (PR), as defined in the 2014 ESP. The key issues identified are typical of projects and technologies used in constructing a geothermal project but may not be exhaustive. Proposed Projects that use atypical construction or operation methods may require additional evaluation.

<b>EBRD ESP (2014)</b>	<b>Key Issue</b>	<b>Eligibility Criteria</b>	<b>Evidence</b>
<b>PR 1:</b> Assessment and Management of Environmental and Social Impacts and Issues	Regulatory Compliance - National	<p>The Project must comply with all requirements of national environment, health, and safety laws.</p> <p>The Project must have obtained all applicable local planning and zoning approvals to allow for the project development.</p>	<ul style="list-style-type: none"> <li>• If required by law, the developer has undertaken an Environmental Impact Assessment ("EIA") and the EIA has been disclosed to the public in accordance with national requirements.</li> <li>• The developer has obtained the required national licenses and permits to build and operate the Project.</li> <li>•</li> <li>• The developer has obtained the required local planning and zoning board approvals required to build and operate the Project.</li> </ul>

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<p><b>PR 1:</b> Assessment and Management of Environmental and Social Impacts and Issues</p>	<p>Compliance with EBRD PR on environment, health, and safety directives and relevant EU Directives.</p>	<p>The Project’s environmental and social impacts have been evaluated appropriately based on EBRD’s project categorization as outlined in the ESP 2014.</p> <ul style="list-style-type: none"> <li>• <b>Category A</b> projects could result in potentially significant adverse future environmental and/or social impacts which cannot readily be identified or assessed and will require the Client to carry out a comprehensive Environmental and Social Impact Assessment (ESIA). These are shown as follows: <ul style="list-style-type: none"> <li>○ Geothermal projects that include the construction of high voltage overhead electrical power lines.</li> <li>○ Geothermal projects that require the abstraction of over 10 million cubic meters per year.</li> <li>○ Projects likely to have a perceptible impact on sensitive locations of international, national, or regional importance</li> <li>○ Projects that result in significant adverse social impacts to local communities or other project affected parties.</li> <li>○ Projects which may involve significant involuntary resettlement or economic displacement.</li> </ul> </li> <li>• <b>Category B</b> projects involve potential adverse future environmental and social impacts that are typically site specific and/or readily identified and addressed through mitigation measures.</li> <li>• <b>Category C</b> projects are likely to have minimal or no adverse future environmental and social impacts and that are readily identified and addressed through mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>• The sponsor has established and maintained an Environmental and Social Management System (ESMS) appropriate and commensurate with the level of its environmental and social impacts and issues in line with Good International Practice (GIP).</li> <li>• The sponsor should obtain annual groundwater abstraction data to determine proper categorization.</li> <li>• <b>Category A</b> projects must include an ESIA that meets EBRD-applicable PRs.</li> <li>• <b>Category B</b> projects should include an environmental and social assessment that is proportionate to the project’s nature, size and location, as well as the characteristics of the potential impacts and risks. The assessment will characterise potential future adverse impacts associated with the project, identify potential improvement opportunities, and recommend any measures needed to avoid, or where avoidance is not possible, minimise and mitigate adverse impacts.</li> <li>• <b>Category C</b> projects should include monitoring and reporting on the project’s compliance with the PRs.</li> </ul>

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<b>PR 3: Resource Efficiency and Pollution Prevention and Control</b>	Construction of the project and both directly, and indirectly, increase local and regional economic activity which can generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels.	<ul style="list-style-type: none"> <li>• The project sponsor will adopt technically and financially feasible and cost effective measures for minimising its consumption and improving efficiency in its use of energy, water and other resources and material inputs and recovering and re-utilising waste materials.</li> <li>• The project sponsor will integrate resource efficiency measures and the principles of cleaner production into product design and production processes.</li> </ul>	<ul style="list-style-type: none"> <li>• The project sponsor has conducted an evaluation of consumables and wastes and has developed a strategy to minimize energy usage, re-use/recycle waste materials, and minimize carbon emissions.</li> <li>• The developer has anticipated the volumes of wastes that will need to be managed, and has a strategy to manage wastes through authorised companies.</li> </ul>
<b>PR 3: Resource Efficiency and Pollution Prevention and Control</b>	Discharges of geothermal fluid or cooling tower blow-down water containing metals could pollute streams and rivers if unmanaged. Additionally, if reinjected improperly, potable groundwater could be polluted. Geothermal fluids contain dissolved gases, mainly carbon dioxide (CO <sub>2</sub> ) and hydrogen sulfide (H <sub>2</sub> S), small amounts of ammonia, hydrogen, nitrogen, methane and radon, and minor quantities of volatile species of boron, arsenic, and mercury.	<ul style="list-style-type: none"> <li>• Project must provide for proper treatment and/or disposal of wastewater.</li> <li>• Project design must include features that prevent contamination of potable groundwater.</li> </ul>	<ul style="list-style-type: none"> <li>• Laboratory analysis, for the appropriate suite of analytes, of samples of geothermal fluid has been conducted to identify potential contaminants.</li> <li>• Project sponsor has developed a water management plan that provides for proper treatment and/or disposal of wastewater.</li> <li>• Project design includes a wastewater reinjection plan which addresses potential for potable groundwater contamination and measures to prevent contamination.</li> </ul>

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<b>PR 3:</b> Resource Efficiency and Pollution Prevention and Control	Use of geothermal fluids for electrical production can emit contaminants in geothermal fluids. Binary plants have no significant emissions. Flash plants may emit gases found in the geothermal fluids.	<ul style="list-style-type: none"> <li>Project must include design features to control air emissions to acceptable levels if flash technology is being used.</li> </ul>	<ul style="list-style-type: none"> <li>If using flash technology, project design incorporates H<sub>2</sub>S vent gas abatement systems.</li> <li>If mercury is present in geothermal systems, carbon filtration is incorporated in the project emission control design.</li> </ul>
<b>PR 3:</b> Resource Efficiency and Pollution Prevention and Control	Project site preparation and construction will disturb the ground surface and increase likelihood of soil erosion and sedimentation, potentially polluting streams and rivers and adversely impacting aquatic life.	<ul style="list-style-type: none"> <li>The project must demonstrate that sediments in stormwater will be managed in a manner that avoids or minimizes impacts to streams and rivers.</li> </ul>	<ul style="list-style-type: none"> <li>The project proposes the use of best management practices (BMPs) for soil erosion and runoff (e.g. sediment settling basins, silt fencing, hay bales, physical barriers, grassed swales, etc.).</li> </ul>
<b>PR 3:</b> Resource Efficiency and Pollution Prevention and Control	Deep drilling required for geothermal wells will produce a large amount of waste material including geothermal fluid and cuttings. Both may contain high concentrations of heavy metals. If not properly managed, these wastes could potentially pollute streams and rivers and adversely impact aquatic life	<ul style="list-style-type: none"> <li>Project waste materials during project construction must be properly managed by the sponsor.</li> </ul>	<ul style="list-style-type: none"> <li>The project sponsor has prepared a waste management plan that adequately addresses the management and disposal of drilling wastes in accordance with national law and international BMPs.</li> </ul>

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<b>PR 4: Health and Safety</b>	Project activities, equipment, and infrastructure may increase the potential for worker and community exposure to health and safety risks and impacts, including those associated with construction, operations, and decommissioning, or of transport of raw and finished materials.	<ul style="list-style-type: none"> <li>• The project sponsor must take steps to identify and prevent accidents, injury and disease to workers and affected communities arising from or associated with, or occurring in the course of the project activities and prepare and implement preventative measures and plans to manage health and safety risks.</li> <li>• The project sponsor must provide workers and affected communities with relevant information, guidance, and training.</li> <li>• The project site area should be restricted to avoid unauthorised entrance during construction.</li> <li>• The project sponsor must have a system to investigate, document and analyse any project-related accident, injury and disease and notify and cooperate with the relevant authorities when required to do so by law.</li> </ul>	<ul style="list-style-type: none"> <li>• The project sponsor has a documented Health and Safety programme in place that contain employee training, awareness, and reporting elements.</li> <li>• The project sponsor has, or will have, a procurement system in place that ensures that contractors abide by the provisions of their health and safety programme and national law.</li> </ul>
<b>PR 4: Health and Safety</b>	Withdrawal of aquifer water could facilitate ground subsidence in certain geology. Additionally, development of geothermal projects using Enhanced Geothermal System (EGS) technology requires hydraulic fracturing to create a reservoir and may produce seismic impacts such as local “micro earthquakes”. Science is not clear on this potential.	<ul style="list-style-type: none"> <li>• The project design should address measures to manage ground subsidence.</li> </ul>	<ul style="list-style-type: none"> <li>• The project design should incorporate re-injection of used geothermal water into the same aquifer as that from which it was withdrawn to minimize reductions on aquifer pressure and risk of ground subsidence, especially in sedimentary geology.</li> <li>• Where EGS technology is proposed, the project should evaluate the potential for induced seismic activity and stakeholder engagement activities (PR10) should inform the local community of these risks.</li> </ul>

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<b>PR 4:</b> Health and Safety	Drilling and construction activities (and to a lesser extent, operations), increase local noise than can adversely impact nearby residential communities.	<ul style="list-style-type: none"> <li>The project must address, and when required by national requirements or international standards, include noise abatement measures to eliminate or minimize impacts to nearby communities.</li> </ul>	<ul style="list-style-type: none"> <li>The selection of the project site has maximized distance from residential communities to the greatest extent possible.</li> <li>An acoustic study has been conducted to evaluate impacts to nearby communities in accordance with national and international standards.</li> <li>Where unabated noise from construction and operation of the geothermal plant has been shown to present an unacceptable risk to nearby residents, abatement and management measures have been included to reduce to acceptable levels.</li> </ul>
<b>PR 5:</b> Land Acquisition, Involuntary Resettlement and Economic Displacement	A project may result in physical displacement (relocation or loss of shelter) and economic displacement (loss of assets or resources, and/or loss of access to assets or resources that leads to loss of income sources or means of livelihood) as a result of project-related land acquisition and/or restrictions on land use.	<ul style="list-style-type: none"> <li>The project sponsor must identify if the project and its components will require the relocation and/or loss of residences, commercial/industrial establishments, or rights to land of economic value.</li> <li>If the project would result in the relocation and/or loss of residences, commercial/industrial establishments, or land of economic value, a Resettlement Action Plan (RAP) and/or compensation plan would be required.</li> </ul>	<ul style="list-style-type: none"> <li>An alternatives analysis was conducted to identify alternative sites and transmission routings.</li> <li>If resettlement or economic displacement is unavoidable, the project sponsor has prepared a RAP and/or compensation plan.</li> </ul>

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<b>PR 5:</b> Land Acquisition, Involuntary Resettlement and Economic Displacement	In some cases, development of geothermal energy may compete with, or adversely impact, tourism associated with use of geothermal springs	<ul style="list-style-type: none"> <li>The selection of a site for the project should consider nearby recreational uses and maintain local opportunities for tourism.</li> </ul>	<ul style="list-style-type: none"> <li>An alternatives analysis was conducted to identify alternative sites and minimize current and future impacts on tourism.</li> </ul>
<b>PR 6:</b> Biodiversity Conservation and Sustainable Management of Living Natural Resources	Discharges of geothermal fluid, cooling tower blow-down water, and sediment could pollute streams and rivers if unmanaged.	<ul style="list-style-type: none"> <li>See criteria presented earlier for PR3.</li> </ul>	<ul style="list-style-type: none"> <li>See evidence presented earlier for PR3.</li> </ul>
<b>PR 6:</b> Biodiversity Conservation and Sustainable Management of Living Natural Resources	The siting and construction of the geothermal plant and related transmission lines could adversely impact protected species or their habitat.	<ul style="list-style-type: none"> <li>The project must avoid impacts to protected species and their habitats to the greatest extent possible.</li> <li>Project sponsor has identified any potential protected species that may be affected by the proposed development in accordance with national legislation and international treaties.</li> </ul>	<ul style="list-style-type: none"> <li>The project sponsor has relied on work conducted by qualified and experienced specialists to identify protected species that may be affected as part of the ecological baseline with reference to at least national regulations and IUCN and CITES Lists.</li> <li>An alternatives analysis was conducted to identify alternative sites and minimize current and future impacts on protected species</li> <li>Where impacts cannot be avoided, the project sponsor has developed a mitigation strategy to limit the effect of the development on protected species.</li> </ul>

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<p><b>PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources</b></p>	<p>The siting and construction of the geothermal plant and related transmission lines could adversely impact designated national or international protected areas.</p> <p>Designated areas (e.g. a national park, a Natura 2000 site – both official and shadow lists) are typically listed as such because they contain threatened, rare, or sensitive fauna and flora and the construction and operation of turbines in such areas may be detrimental to those species.</p> <p>Natura 2000 represents European Union (EU) policy on the conservation of Biodiversity.</p>	<ul style="list-style-type: none"> <li>• The project must avoid impacts to designated national or international protected areas to the greatest extent possible.</li> <li>• Project sponsor has identified any designated national or international protected areas that may be affected by the proposed development in accordance with national legislation and international treaties.</li> </ul>	<ul style="list-style-type: none"> <li>• Project sponsor has identified national or international protected areas that may be affected by the project.</li> <li>• An alternatives analysis was conducted to identify alternative sites and minimize current and future impacts on national or international protected areas.</li> <li>• Where impacts cannot be avoided, the project sponsor has developed a mitigation strategy to limit the effect of the development national or international protected areas and a full ESIA has been conducted as per Category A projects (see PR1)</li> </ul>
<p><b>PR 7: Indigenous Peoples</b></p>	<p>Project development may negatively impact on or create opportunities for Indigenous Peoples (applicable to projects in certain regions in Russia).</p>	<p>If the project is located in, or its supply chain relies on feedstock from areas inhabited by Indigenous Peoples, the Sponsor is to rely on expert advice to:</p> <ul style="list-style-type: none"> <li>• ascertain whether any population group potentially affected (positively or negatively) is considered Indigenous People, and</li> <li>• establish whether EBRD PR7 is applicable to the Project.</li> </ul>	<ul style="list-style-type: none"> <li>• If EBRD PR7 is triggered, the project Sponsor has demonstrated that all requirements of this PR are met.</li> </ul>



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<b>PR 8:</b> Cultural Heritage	Project construction may cause damage or disturbance to irreplaceable sites (areas of archaeological or historic interest to local communities), features, or practices of tangible or intangible cultural heritage value.	<ul style="list-style-type: none"> <li>• The project must avoid impacts to cultural heritage assets to the greatest extent possible.</li> <li>• Project sponsor has identified any potential tangible and intangible heritage that may be affected by the proposed development in accordance with national legislation and international treaties.</li> <li>• Project sponsor has relied on work (e.g. Archaeological surveys as appropriate) conducted by qualified and experienced specialists to identify and assess heritage that may be affected</li> </ul>	<ul style="list-style-type: none"> <li>• The project avoids impacts to cultural heritage assets wherever possible</li> <li>• Where impacts cannot be avoided, the project sponsor has developed a mitigation strategy to limit the effect of the development on heritage.</li> <li>• All site-specific cultural studies and mitigation strategies have been implemented by recognized archaeologists or cultural historians in accordance with international standards.</li> </ul>
<b>PR 10:</b> Information Disclosure and Stakeholder Engagement	Community acceptance of a project will greatly assist in the implementation of that project.	<ul style="list-style-type: none"> <li>• To achieve community acceptance, it is necessary to identify stakeholders and impacted communities and provide them an opportunity to have input into the decision making process.</li> <li>• Affected stakeholders should participate in the development and implementation of any required mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>• The locally affected community has been notified and consulted prior to the development of the Project.</li> <li>• Implement a Stakeholder Engagement Plan (SEP)</li> <li>• A formal grievance mechanism has been developed and implemented by the developer to cover both the construction and operational phases of the project. The mechanism has been publicised on bulletin boards in public venues in local communities and via local media (newspapers/radio)</li> <li>• A communication records procedure has been developed which will log the key information provided to stakeholders</li> </ul>