PROVINCIAL DEVELOPMENT UNIT

Sustainable Minerals Extraction

Project overview

Name of the project	Sustainable Minerals Extraction Project
Region	Bay of Plenty
Tier and type	Tier 2: Sectors - Energy
Applicant	Geo40 Limited
Total project value	$Commercial Information
Amount of funding sought from the PGF	$Commercial Information (CAPEX)
Financial instrument	Loan (or loan/ equity/grant mix)
PDU recommendation	**Approve**

155. Geo40 Ltd is seeking $Commercial Information from the PGF in order to build and operate a silica removal plant (using proprietary innovative technology) at the Ohaaki geothermal site in Taupo. The removed silica will be exported to be used in different industrial products.

156. This is the first silica extraction technology (patent pending) from geothermal that has been demonstrated successfully to this level globally. There is also potential to extract lithium (used for battery manufacturing) and other minerals from geothermal fluids.

157. Silica scaling of geothermal power station pipelines and the reinjection wells that the pipelines feed is a significant cost for geothermal power generators. The patent pending Geo40 silica extraction technology is a world first and has applications in the global geothermal power generation industry. Silica has wider industrial applications in paper making, paint, concrete and other binding materials. Future production includes other minerals such as lithium and boron.

158. Commercial Information

i. Construction and successful running of a commercial demonstration of a completed Ngawha Plant

ii. Successful construction and running of the Northern Plant.

159. The first milestone has been fully funded by Geo40 and successfully completed. The project is now de-risked. PGF funding now sought for the second milestone – constructing and running the Northern Plant. Geo40 will undertake a feasibility study and detailed design to finalise the actual build costs followed by procurement, construction and commissioning.

PROVINCIAL DEVELOPMENT UNIT

PDU recommendation

160. T**he PDU recommends that a financial package be negotiated with the applicant which could include the following options:**

i. A $Commercial Information loan (PDU prefers this option); or

ii. A $Commercial Information loan and $Commercial Information equity; or

iii. A $Commercial Information loan, $Commercial Information equity, and $Commercial Information grant for the feasibility study.

161. The PDU recommends that:

i. Any PGF loan option will:

- carry an indicative interest rate of one-year Commercial Information
- Commercial Information
- Commercial Information
- Commercial Information

ii. Commercial Information

162. The PDU also recommends a stage gate approach to funding with a stop/go decision based on the outcomes of the feasibility study that will be undertaken prior to the substantive build.

Local support

163. Taupo District Council has provided a letter of support for the project, as geothermal energy is a significant contributor to Taupo's economy.

Governance

164. The plant will be project managed by Geo40, who have a board of five directors who would provide project governance. External consults will be used for engineering, procurement and construction management.

165. The plant will be owned and managed by Geo40. The Ohaaki geothermal plant is operated by Contact Energy and the land is owned by NTTLT.

Benefits

166. If successful, the project may have the following benefits:

i. Creation of high skilled jobs in the region

ii. Enable higher returns for Māori owned land

PROVINCIAL DEVELOPMENT UNIT

iii. Enhanced sustainability of natural resources. Silica produced in this process comes from a renewable (geothermal fluid) source and requires lower amount of energy to produce than conventional silica. The life and efficiency of geothermal power generation plants are improved.

Costs and funding sources

167. The project has a total project value of $Commercial Information with PGF funding making up $Commercial Information (capital expenditure), and the applicant proposing to fund $Commercial Information (operating expenditure).

Past and future funding

168. Geo40 has raised $Commercial Information to fund this development to date. They have also received a Commercial Information grant of $Commercial Information. This was used to fund the first milestone and will be used to make up the difference for the second milestone.

169. Commercial Information

170. Following the completion of the Northern Plant, it is planned that operations on the site will be expanded to include a Southern Plant. Due to economies of scale and ability to share the fixed operating costs over a doubling of production, the inclusion of the Southern Plant will significantly improve financial performance as operating overheads and existing infrastructure will then be able to be spread over the Ngawha Plant, the Northern Plant and the Southern Plant. The Southern Plant will therefore be able to be funded through a mixture of debt and equity.

171. Geo40 has signed a non-exclusive silica distribution agreement with Commercial Informa

PDU assessment of the project

172. This section needs to provide an overview of PDU's assessment against the PGF eligibility and assessment criteria.

Assessment against PGF criteria

Criteria	Rating (1✓ to 5✓)	Comment
Sustainable regional economic development	✓✓✓	High skilled jobs and export earnings from silica will have a flow on effect on the local economy which would benefit local communities.
Productivity and innovation	✓✓✓✓	The Bay of Plenty region has a strong presence of geothermal industry and innovative technologies

PROVINCIAL DEVELOPMENT UNIT

Criteria	Rating (1✓ to 5✓)	Comment
		like this proposed project would certainly act as a catalyst for further innovation in geothermal space. Operationally, this technology will improve production efficiency of geothermal operators.
Increased employment, training or work readiness for the sectors workforce	✓✓✓✓	Comme FTEs after the completion of Ohaaki and Kawerau projects, mostly technical (chemical and process engineers) and high skilled jobs. PGF funding would enable current Comme contract jobs to become permanent, including Com technical operators from Ngati Tahu. Silica exports would also create additional jobs (logistics) in the region. Geo40 currently employs Com PhD graduate and would employ more when Geo40 will establish a research and development facility to support ongoing development.
NZ's ability to meet climate change commitments	✓✓✓	Silica with lower carbon footprints can be used in New Zealand for industrial applications. Globally, this disruptive technology to produce silica with low environmental effects will fetch a premium price and help industrial users of silica to manage their carbon footprints.
Māori aspirations for utilising land and other resources and achieving cultural objectives	✓✓✓✓	NTTLT owns the land and currently receives payments for land lease and processing of geothermal water. This money is used by them to develop tourism and other projects. The first plant already constructed on

PROVINCIAL DEVELOPMENT UNIT

Criteria	Rating (1✓ to 5✓)	Comment
		the Ohaaki site (Ngawha Plant) has resolved a long-standing disagreement between NTTLT and the Government over the local Ngawha which has now been restored to its historical clean appearance. NTTLT has shown interest in investing in the future stage of this project and may get good financial returns.
Additionality	✓✓✓✓	New Zealand is seen as a leader in geothermal space and this technology will further strengthen the position. Geo40 can easily expand its operation in New Zealand through utilising existing geothermal plants.
Connections and alignment with regional priorities	✓✓✓	Geothermal is a priority sector for the Bay of Plenty regional council.
Environmental sustainability and/or productivity of natural assets	✓✓✓✓	Sustainable extraction of silica and potentially lithium and boron. Silica produced in this process comes from a renewable (geothermal fluid) source and requires lower amount of energy to produce than conventional silica. Improves the life and efficiency of geothermal power generation plants.

Agency comments

MBIE Energy & Resource Markets

173. Officials from MBIE's Energy & Resource Markets branch visited the plant to learn about the silica filtration process and future business plans of Geo40, and are supportive of this proposal.

PROVINCIAL DEVELOPMENT UNIT

MFAT

174. Free and frank opinions

NZTA

175. The NZTA sees merit in this application based on its inclusion in the preferred programme of the draft Twin Coast Discovery Route Programme Business Case which:

i. has developed a programme, in conjunction with key stakeholders in Northland, to improve the economic performance of the region

ii. recognises development of Ngawha Springs as achieving geographical dispersal of visitors throughout the Northland region, assisting with the spread of visitation throughout the year.

Risk assessment

176. The applicant has provided a risk register with mitigation approaches.

177. Availability of funding to build the plant is the single largest risk. In the event of no funding becoming available, the applicant may move to the United States or Japan with their technology.

178. The PDU also considers that the below risks remain:

Type of risk	Mitigation
Plant may take longer to commission than anticipated.	Geo40 has an experienced team who are capable of managing a project such as this.
Plant may not perform to expectations.	Geo40 will use the learnings from the Ngawha plant to ensure that the Northern plant meets performance standards.

Recommendations and next steps

179. The PDU recommends that you approve the request for $Commercial Information in funding from the PGF towards Geo40 Ltd's Sustainable Minerals Extraction project. The PDU recommends that a financial package be negotiated with the applicant which could include the following options:

i. A $Commercial Information loan (PDU prefers this option); or

ii. A $Commercial Information loan and $Commercial Information equity; or

iii. A $Commercial Information loan, $Commercial Information equity, and $Commercial Information grant for the feasibility study.