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Project Information Document/ Integrated Safeguards Data Sheet (PID/ISDS)

Concept Stage | Date Prepared/Updated: 08-May-2017 | Report No: PIDISDSC20691



BASIC INFORMATION

A. Basic Project Data

Country Dominica	Project ID P162149	Parent Project ID (if any)	Project Name Dominica Geothermal Risk Mitigation Project (P162149)
Region LATIN AMERICA AND CARIBBEAN	Estimated Appraisal Date Oct 09, 2017	Estimated Board Date Nov 30, 2017	Practice Area (Lead) Energy & Extractives
Financing Instrument Investment Project Financing	Borrower(s) The Government of the Commonwealth of Dominica	Implementing Agency Dominica Geothermal Development Company	

Proposed Development Objective(s)

The objective of the proposed Project is to help: a) diversify the domestic power generation mix in Dominica by integrating clean, renewable geothermal energy; and b) assess the viability of exporting geothermal-based electricity to regional islands.

Financing (in USD Million)

Financing Source	Amount
Borrower	15.00
Clean Technology Fund	10.00
Free-standing Single Purpose Trust Fund	7.00
International Development Association (IDA)	9.50
NEW ZEALAND: Ministry of Foreign Affairs	2.00
Single Purpose Trust Fund	2.00
Total Project Cost	45.50

Environmental Assessment Category A-Full Assessment	Concept Review Decision Track II-The review did authorize the preparation to continue
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Other Decision (as needed)

B. Introduction and Context

Country Context

Dominica has struggled to keep pace with other economies in the Eastern Caribbean region, and needs to shift away from its current low growth path. With an area of 750 square kilometers, a population of about 73,000 people¹, and a gross domestic product (GDP) per capita of US\$7,000, the Commonwealth of Dominica (Dominica) is an upper-middle income member of the Organization of Eastern Caribbean States (OECS). For years, OECS countries have been trapped in a spiral of low growth, high debt, and limited fiscal space. This was exacerbated by a number of exogenous shocks such as the loss of preferential access to the European Union (EU) market; contraction of foreign direct investment (FDI) due to the 2008 global economic crisis; and natural hazards that are frequent in the Caribbean. In this context, economic growth in Dominica has been more elusive than elsewhere. GDP growth over the past twenty years has averaged only 2.1 percent per annum against the 2.6 percent² observed in other OECS countries³. While the Government of the Commonwealth of Dominica (GoCD) has implemented a number of programs to assist the poor, because of the low growth trends and various external shocks, the poverty rate likely remains near the 2008 level of 28.8 percent.

Given the relatively fewer growth opportunities available, it is paramount for Dominica to enhance its competitiveness in traditional economic sectors and capture new ones. Owing to its rugged terrain and lack of sandy beaches, Dominica faces challenges in attracting traditional stay-over tourism on the par of other destinations in the region, and instead is visited mostly for short visits by cruise ship travelers. Also, while historically its economy has been heavily reliant on agriculture, agriculture's contribution to GDP has declined considerably from 30 percent in the early 1990s to the present 15 percent, mostly because of the loss of access to the EU market. Raising competitiveness in traditional sectors is critical. Agriculture's impact can be significantly lifted through a switch to new crop varieties and higher added-value businesses. Also, the rich biodiversity and various natural attractions of the island provide great potential for ecotourism, which would reposition Dominica vis-à-vis other Caribbean destinations. Furthermore, the country must explore and seize new economic opportunities. In particular, the large indigenous geothermal resources constitute a key asset as electricity produced domestically could become a new export commodity to neighboring islands, earning to Dominica significant revenues.

Raising competitiveness, accelerating poverty reduction and achieving shared prosperity first and foremost require addressing the inadequacy and high costs of infrastructure services, especially electricity. The typical terrain of the island has made it more challenging to develop cost-effective and high-quality road networks and ports. Overly expensive electricity supply also drives up the cost of doing business. High electricity costs are among the causes that have prevented a shift to more energy-intensive, higher added-value businesses, such as agro-processing. They also affect the tourism industry as it is more difficult for Dominica to compete price-wise with other destinations in the region. Expanding the infrastructure base and providing more cost-efficient infrastructure services are key objectives of the GoCD. The two most recent Growth and Social Protection Strategies (GSPSs), covering the periods 2012-2014 and 2014-2018 respectively, focus on improving transport and energy infrastructure to boost productivity, attract large private sector investment and better position Dominican products and services in regional and international markets. In FY 2013/14 alone, the GoCD allocated US\$163 million to implement these strategies, with half earmarked for various

¹ Central Intelligence Agency. "World Fact Book"

² Based on the World Bank Annual GDP Growth Data (1996-2015).

³ Antigua and Barbuda, Grenada, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, which are all World Bank members.



infrastructure sectors. To improve economic performance, sizable investments in infrastructure are expected to continue, including in the energy sector.

Sectoral and Institutional Context

Because of the reliance on imported diesel to produce electricity, Dominica faces electricity prices that are among the highest in the world. Operated by the Dominica Electricity Services Limited (DOMLEC), a vertically integrated private utility, Dominica's power system is small, with a total installed capacity of 26.7 MW and 36,000 customers, of which 31,000 are residential. Except for 6.64 MW of hydropower, most of the installed generation capacity is fueled by imported diesel. As fuel costs are passed through onto customers, Dominica's retail electricity price, averaging around US\$0.40 per kilowatt hour (kWh), is among the highest in the world. The overreliance on diesel also exposes customers to the volatility of international oil prices, which makes it difficult for Dominica's people and firm to predict their electricity costs. As the cost of manufacturing and service provision increases, the country is challenged to maintain its competitiveness and attractiveness to investment. High and volatile electricity costs also severely hit domestic consumers, and especially the poor. The rising burden on households' spending affects living standards and constraints efforts towards poverty reduction. In addition, increased costs of diesel imports create a severe negative impact on the country's balance of trade.

Developing geothermal resources can critically help stabilize long-term electricity costs and be a 'game changer' for Dominica. Lowering and stabilizing electricity costs is the single most impending priority for Dominica's power sector and can be met by developing the country's significant geothermal potential. Geothermal energy is a unique renewable resource, one that can provide reliable and cost-efficient baseload capacity in an environmentally sustainable manner. As an indigenous resource, it also offers a natural hedge against the price volatility of imported fuels. Preliminary analyses indicate that switching baseload generation from diesel to geothermal could reduce wholesale electricity costs in Dominica by 15 to 25 percent⁴, and help stabilize price fluctuations in the domestic market. The share of renewables into the energy mix would more than double and greenhouse gas (GHG) emissions would be reduced significantly⁵. Moreover, according to preliminary estimates, the country's overall geothermal potential far exceeds the near-term baseload needs of its small domestic market. This provides Dominica with a unique opportunity to become a regional energy hub, transmitting excess supply produced from geothermal sources to neighboring islands and earning considerable royalties from electricity exports. Guadeloupe and Martinique – both French territories – have shown interest in importing electricity. Overall, developing geothermal capacity can transform Dominica's economy.

Dominica has become a front runner among the Caribbean countries that are pursuing development of geothermal resources. While at present there is very little installed geothermal capacity in Caribbean region⁶, several OECS countries are making efforts to exploit their respective geothermal potential⁷. Dominica is running ahead of its peers and has made major progress towards developing the Wotten Waven-Laudat geothermal field in the Roseau Valley. With the assistance of the EU, the Government of France, the Regional Councils of Guadeloupe and Martinique and the Agence Française de Développement (AfD), the GoCD completed surface studies and drilled three slim-hole wells, which confirmed the existence of a geothermal resource that could provide as much as 100 MW of geothermal capacity. The following drilling of two production/injection wells confirmed sufficient steam availability at the wellhead to develop a

⁴ Based on two feasibility assessments (ELC 2013, updated by Jacobs 2015), which will be further updated and analyzed during project preparation. The cost comparison is dependent upon the specification and scope of the power plant, the availability of concessional financing and the future price assumptions for diesel.

⁵ Based on preliminary analysis, the displacement of diesel-based generation capacity with geothermal-based capacity developed under the proposed Project would earn GHG emission savings in the range of 0.74-1.03 million tons of CO₂ over a 25-year period.

⁶ The only geothermal plant in operation in the Caribbean is Bouillante in Guadeloupe, which was commissioned over 30 years ago.

⁷ Including, in addition to Dominica, St. Lucia, St. Kitts and Nevis, and St. Vincent and the Grenadines.



5-7 MW plant. In line with industry practice worldwide, the GoCD has decided to embrace a modular expansion of the geothermal field. Specifically, a 5-7 MW small geothermal power plant (SGPP) will first be developed to feed domestic demand. This will also confirm the production capability of the steamfield, which is a pre-requisite to further expansion of the Wotten Waven-Laudat field. Thereafter, depending on resource availability, a large geothermal power plant (LGPP) with a capacity of 40-100 MW could be developed for supplying electricity exports to Guadeloupe and/or Martinique through undersea cables.

The GoCD has taken the lead and borne the initial and riskier investments with the clear objective to de-risk the geothermal program progressively so as to attract a qualified private developer for the next stage of geothermal development. Green-field sites like Wotten Waven-Laudat pose inherent risks, primarily related to the uncertainty regarding subterranean resource availability and the limited information on the steamfield characteristics that determine the viability of a future power generation facility. The exploratory investments undertaken by the GoCD have considerably reduced the resource risks associated with SGPP. Nonetheless, it is only natural that the incipient stage of the geothermal market and the lack of a track record of deals in the Caribbean region still create a perception of a high-risk environment among prospective private investors. In Dominica, the problem is compounded by the very small size of the domestic market and the limited human capacity available to the sector. Following two failed attempts to enlist a private partner, and pressed by the urgent need to displace diesel generation so as to reduce electricity costs in the country, the GoCD has resolved to develop SGPP with public funding. Even if commercial capital were mobilized, owing to the perceived risks, the cost of financing would likely be high. The higher risk premium would raise the cost of electricity produced at Wotten Waven-Laudat, which directly conflicts with GoCD's primary goal to reduce and stabilize electricity prices in the country. Going forward, only the private sector can develop LGPP and achieve the scale at which Dominica expects to expand its geothermal capacity. A larger resource area in line with the capacity envisaged for the LGPP needs to be confirmed, which will require more investments in exploration and drilling. Also, considerably higher investments will be needed for the construction of the above-ground infrastructure as well as transmission infrastructure to export electricity. Prospects for LGPP are inextricably linked to SGPP. A SGPP that is successfully developed and properly operated will confirm the viability of expanding the Wotten Waven-Laudat field and investing in LGPP. Therefore, in addition to accommodating a key national goal, the development of SGPP is an integral part of the GoCD's strategy to de-risk the next, larger and more complex investments in the field and find a qualified private developer for LGPP.

Arranging low-cost financing, mobilizing global industry knowledge, and enhancing investor confidence are critically needed to move the geothermal program forward. In order to maximize the benefits associated with SGPP, and notably reduce electricity costs as much as possible, it is critical that GoCD is able to mobilize an adequate amount of low cost financing, in the form of concessional loans and grant funds, for the development of SGPP. Equally important is to develop and operate SGPP successfully and ensure proper steamfield management, so as to further decrease risks associated with the geothermal program and enhance investor confidence. To this extent, insurance against contingencies, and global industry knowledge and practices are also needed. The development community can critically help in all these areas. To address the remaining barriers associated with the development of the Wotten Waven-Laudat field, upon request by the GoCD, the World Bank in coordination with other development partners has designed the ***Dominica Geothermal Risk Mitigation Project*** (the Project).

Relationship to CPF

The proposed Project can critically contribute to help reduce poverty and boost shared prosperity in Dominica as envisaged by the Regional Partnership Strategy (RPS) for the OECS for the period FY15-19. In order to achieve the twin goals, the RSP has identified three main areas of engagement including: (i) competitiveness; (ii) public sector modernization; and (iii) resilience. More predictable and lower electricity prices, a goal to which the proposed Project



will significantly contribute, are critical to boost productivity in all business sectors, enabling Dominica to become a more competitive destination for private investment, trade and tourism. By providing access to more reliable and cost-efficient geothermal energy resources, the Project will be instrumental to improving the investment climate and increasing tourism benefits, both key outcomes of the engagement on competitiveness. Strengthening capacity for public-private partnerships (PPPs) is a key objective of the Bank's engagement on sector modernization, and this is well supported by the Project, which will critically help reduce risks associated to geothermal development and attract a qualified private developer. Finally, the diversification of the country's energy mix away from imported fuel will reduce Dominica's vulnerability to high and volatile fuel prices, in line with the Bank's engagement on resilience. In light of the above, the RPS has identified the development of geothermal resources in Dominica as a priority area for support.

The Project is also consistent with the GoCD's GSPS 2014-18, which seeks to increase the use of geothermal resources to spur growth. The GSPS highlight three main objectives for the energy sector: (i) containing energy costs; (ii) encouraging energy conservation; and (iii) diversifying energy sources and reducing reliance on fossil fuels. The development of renewable energy, and especially geothermal, is seen as the solution to achieve such objectives and ultimately support Dominica's quest for competitiveness, growth and long-term sustainability. The GoCD's energy sector policy⁸, which underpins the GSPS' energy sector goals, explicitly calls for the development of Dominica's geothermal potential, both to meet domestic energy needs and to export electricity. Therefore, developing Dominica's geothermal resources is a national priority.

C. Proposed Development Objective(s)

Note to Task Teams: The PDO has been pre-populated from the datasheet for the first time for your convenience. Please keep it up to date whenever it is changed in the datasheet.

The objective of the proposed Project is to help: a) diversify the domestic power generation mix in Dominica by integrating clean, renewable geothermal energy; and b) assess the viability of exporting geothermal-based electricity to regional islands.

Key Results (From PCN)

The primary results arising upon completion of the proposed Project are expected to be:

- (a) Generation capacity of geothermal energy constructed under the Project (MW, as measured by the installed capacity of SGPP);
- (b) Increased share of renewable energy capacity in the domestic generation mix (percentage);
- (c) Preliminary feasibility ascertained regarding the prospects for regional electricity trade through exports of geothermal power; and
- (d) Estimated GHG emissions reduction compared to a business-as-usual baseline (tCO₂e).

D. Concept Description

The proposed Project is designed to build on efforts that have been taken by the GoCD to date to advance geothermal development in the Wotten Waven-Laudat field in the Roseau Valley, and help reduce project risks and ease key barriers to a level that would allow to attract a qualified private developer to partner with and undertake further expansion of the field. The Project will first develop the Small Geothermal Power Plant for domestic supply. This alone has transformational potential as it can critically contribute to stabilize electricity costs in the country. Its operation will also help confirm the operational capability of the reservoir, which is a pre-condition to further expand the Wotten Waven-

⁸ Draft National Energy Policy of the Commonwealth of Dominica, which is the GoCD's policy document for the sector.



Laudat field. A contingent finance facility will be established to provide insurance against potential residual resource risks that may arise in a first-time, green field operation of a reservoir. Once the SGPP is fully functioning, the green-field will convert to a far less risky brown-field, one that is better positioned to be considered for further expansion and for the development of a Large Geothermal Power Plant feeding electricity exports to neighbor islands. A comprehensive assessment will be needed to evaluate the viability of LGPP. Therefore, the GoCD will be in the position to make an informed decision on expanding the field and on the scope and design of LGPP.

The Project will be developed by the Dominica Geothermal Development Company (DGDC), which has been established by the GoCD with the sole mandate to develop and operate the Wotten Waven-Laudat field. The company is founded under corporate law and is a private entity in all respects, despite the GoCD currently being its only shareholder.

The proposed Project will comprise of three strategic components:

Component 1: Development of Domestic Geothermal Power Generation Capacity (Estimated costs US\$34 million) –

This component will entail construction of a 5-7 MW power plant and associated steam above-ground systems (SAGS), based on the existing well inventory that has been drilled by the GoCD, plus the transmission interconnection to the nearest sub-station at Laudat⁹ for dispatching electricity into the grid operated by DOMLEC. Existing wells will be used for reinjection, which together with the use of the existing transmission easement, will significantly reduce the environmental and social impacts associated to the Project.

Component 2: Contingent Financing in Aid of Additional Drilling (Estimated costs US\$9 million) – Under this component, funds will be set aside to finance the drilling of additional (make-up) production and/or reinjection wells if the productivity of the existing production well declines below an acceptable level and/or the injectivity of the reinjection well does not adequately support power production. While the technical assessments carried out thus far indicate that these risks are not substantial, contingencies of this kind would have major implications and need to be adequately addressed. First, an unexpectedly rapid decrease of steam productivity could compromise the entire operation of SGPP. The costs associated with contingent drilling would place an undue burden on DGDC, undermining the company's financial viability just when it is beginning to operate on a commercial basis. If such costs were to be passed through, Project's benefits in terms of electricity price reductions would be much lower. Second, such contingencies would raise questions regarding the capability of the steamfield, deterring interest by investors potentially interested in its further development. In addition to restoring SGPP operational capacity without hardship on DGDC, any additional drilling would reduce resource risks associated with LGPP. Addressing unexpected declines in steam productivity early on is key to maintain the viability of the geothermal field in view of its further expansion. Also, the additional drilling would provide vital information regarding the steamfield characteristics at Wotten Waven-Laudat, which would help delineate the larger geothermal resource and inform the design and scope of LGPP.

Component 3: Technical Assistance for Advancing LGPP to Development Status and Soliciting Private Sector Investment (Estimated costs US\$2.5 million) – This component will finance a comprehensive set of analysis that will help make an informed decision on expanding the geothermal field and identify a clear roadmap for developing LGPP. Specifically, the following key activities will be carried out: (i) additional geological surveys and scientific studies to better identify the likely boundaries of the larger geothermal resource at Wotten Waven-Laudat; (ii) preliminary assessment of the feasibility of the transmission infrastructure (the transmission lines and undersea cables) that would be likely needed to transfer electricity to neighbor islands (Guadeloupe and/or Martinique); (iii) feasibility study to

⁹ The transmission interconnection to Laudat will include the construction of a new transmission line to the existing hydro power station, covering a distance of about 300 meters. If there are other transmission upgrades required for integrating the SGPP into the domestic power system, these will be identified during project preparation.



confirm the viability of LGPP including defining its potential scope, need for additional delineation drilling, and its “bankability”; (iv) based on results of studies highlighted at point (iii), preparation of an Environmental and Social Impact Assessment (ESIA) that meets international standards; and (v) development of an investor prospectus and market outreach effort to solicit private sector interest to invest in LGPP. With these studies in hand and investor interest peaked, the GoCD would be able to fully engage the market and identify and select a qualified private partner with the expertise needed to expand the Wotten Waven-Laudat field, and unlock its potential for further transformational impact.

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SAFEGUARDS

A. Project location and salient physical characteristics relevant to the safeguard analysis (if known)

The Wotten Waven-Laudat geothermal field is located in the southwestern part of Dominica, in the Roseau Valley about 5 to 6 km east of the capital Roseau. The valley lies inland from the coast and is mainly covered by forest with rich vegetation. Mountains surround the valley on three sides and the entrance to the valley is marked by narrow cliffs. The mountains located farthest to the West belong to the Mornes Trois Pitons National Park (MTPNP), which was established in 1975 under the National Parks and Protected Areas Act. In 1997, MTPNP was established as a UNESCO World Heritage Site. This is a main tourist attraction and is close to the Wotten Waven-Laudat field. Other touristic attractions in or close to the Roseau Valley include: the hot springs at Wotten Waven; the Trafalgar Falls; the Boiling Lake; the Titou Gorge; the Valley of Desolation; and the Freshwater Lake. The assessment of the geothermal resource at Wotten Waven-Laudat has been based on the results of geoscientific investigations carried out during 1997-2008 and an exploration drilling program conducted by the Government. Three slim holes were drilled from three separate well pads in 2011 and 2012 (WW-01 located along the Trafalgar-WW link road; and WW-02 and WW-03 located in the Laudat area). In 2013/14, a production well was also drilled (WW-P1) in the same pad as WW-03 and a re-injection well (WW-R1) was drilled in the South-Western boundary of the resource. About 1,800 total people live in the Roseau Valley, of which nearly 1,000 are located in Trafalgar and Shawford, and the remaining in the hamlets of Wotten Waven/Casseau, Copthall, and Laudat. A fairly robust process of stakeholder consultations and dialogue was carried out, primarily in 2013, and will be continued for the upcoming Environmental and Social Impact Assessment (ESIA), which will carry out further consultations as well as formulate a Stakeholder Engagement Strategy. The consultations documented community concerns with regard to potential risks associated with the geothermal plant; the potential impacts (which can be both positive and negative) on ecotourism that is a key economic activity in the valley; and the prospects for job creation, among others.

B. Borrower’s Institutional Capacity for Safeguard Policies

The proposed project will be implemented by the Dominica Geothermal Development Company (DGDC), which has been specifically established to develop and operate the Wotten Waven geothermal field. DGDC is founded under the Companies Act (1994) and is a private entity in all respects. As such, it is intended to serve as a special purpose vehicle to attract a private partner. Given its nature, the company meets the criteria envisaged under Operational Policy 4.03 Performance Standards for Private Activities for application of the Performance Standards. DGDC will be responsible for the proposed project investments, including construction, testing, commissioning, operation and ownership of all infrastructure financed under the project. It will operate autonomously on a commercial basis, with the day-to-day management entrusted to a management team within the company. The nascent nature of DGDC and the limited



geothermal development expertise available in Dominica to undertake the proposed project make it necessary to strengthen the capacity of DGDC. The company has a clear and dedicated mandate to develop the proposed project and its strategy calls for significantly augmenting its capacity through internationally reputable consultancies with extensive experience in designing and overseeing geothermal investments, as well as through local/regional specialists. With support from the Government of New Zealand (GoNZ), DGDC has acquired the services of Jacobs International, who will assist the company throughout preparation and implementation of the project. Jacobs International is a global consultancy firm with international experience in geothermal development and familiar with the application of performance standards. The GoNZ will also fund the position of a Project Manager/Chief Operating Officer recruited internationally, who will have in-depth, applied experience related to all aspects of geothermal development, including safeguards compliance. DGDC will be staffed with at least one Safeguard Officer. The GoNZ is closely coordinating its support with the World Bank, in order to ensure compliance with good industry practices and the requirements under the Performance Standards.

C. Environmental and Social Safeguards Specialists on the Team

Judith M. Lisansky, Ximena Rosio Herbas Ramirez

D. Policies that might apply

Safeguard Policies	Triggered?	Explanation (Optional)
Environmental Assessment OP/BP 4.01	No	As the project will be implemented by the Dominica Geothermal Development Corporation, which is a private entity, safeguards will be assessed using Performance Standards, rather than OP/BPs.
Natural Habitats OP/BP 4.04	No	
Forests OP/BP 4.36	No	
Pest Management OP 4.09	No	
Physical Cultural Resources OP/BP 4.11	No	
Indigenous Peoples OP/BP 4.10	No	
Involuntary Resettlement OP/BP 4.12	No	
Safety of Dams OP/BP 4.37	No	
Projects on International Waterways OP/BP 7.50	No	
Projects in Disputed Areas OP/BP 7.60	No	

E. Safeguard Preparation Plan

Tentative target date for preparing the Appraisal Stage PID/ISDS

Jun 01, 2017



Time frame for launching and completing the safeguard-related studies that may be needed. The specific studies and their timing should be specified in the Appraisal Stage PID/ISDS

January to June, 2017

CONTACT POINT

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APPROVAL

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Approved By

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