

Saint Lucia's Geothermal Exploration Program (GRDP, RESDP): Best Practices & Gender Components

Upstream activities under the GRDP

- The LiDAR survey completed in Feb 2016 (ii) the geo-scientific studies completed in Mar 2016 (iii) the Pre-feasibility Study completed in Dec 2017 and (iv) the ESIA completed in Apr 2018;

Transaction and Regulatory Support under the GRDP

- A Financial Model for scenario analyses completed, draft PPA and GDA term sheets prepared;
- Very little progress achieved on the legislative and regulatory framework for GRD, drafting of ESIA regs under the Physical Planning Act and drafting of LAC regs for the PMA;
- The LAC was prepared to identify acceptable developments within the PMA policy areas.

Project Closing Date for the GRDP

- The WB closing date under the GRDP was 25 Jan 2019;

The Renewable Energy Sector Development Project (RESDP)

- The Implementing Agency is the DIPE;

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- The final drafts of (i) OM (ii) PPSD (iii) PP have been prepared.

CTF PPG Grant for the RESDP to be administered by IBRD

- The PPG was signed in Dec 2018;
- The objective is to assist GOSL prepare the RESDP.

Best Practices for the GRDP

- For two key upstream activities the consultant's budget far exceeded the threshold in the Procurement Plan;
- The preparation of a detailed Negotiation Strategy by the PCU, with budget options, prevented a breakdown in contract negotiations;
- For the Pre-feasibility study the drilling strategy and plan was to avoid the project area of interest inside the PMA;
- For the ESIA, public consultations were increased in line with SEP and ensuing comments on the draft final ESIA report.

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Best Practices for the RESDP Contd.

- It is important that drilling activities are subjected to rigorous standards in order to minimize residual negative impacts that could not be mitigated;
- Well prognoses – need to forecast geological formations to be penetrated, drilling conditions to be encountered at various depths and compare with results actually achieved & if there are changes to be made.
- Communication with the community is important to ensure successful outcomes;
- Aspects like resource management, environmental and social safeguards should not be compromised;
- Establish Geothermal Resource Reporting Codes based on international best practices. The Codes should highlight the principles of transparency and accountability;

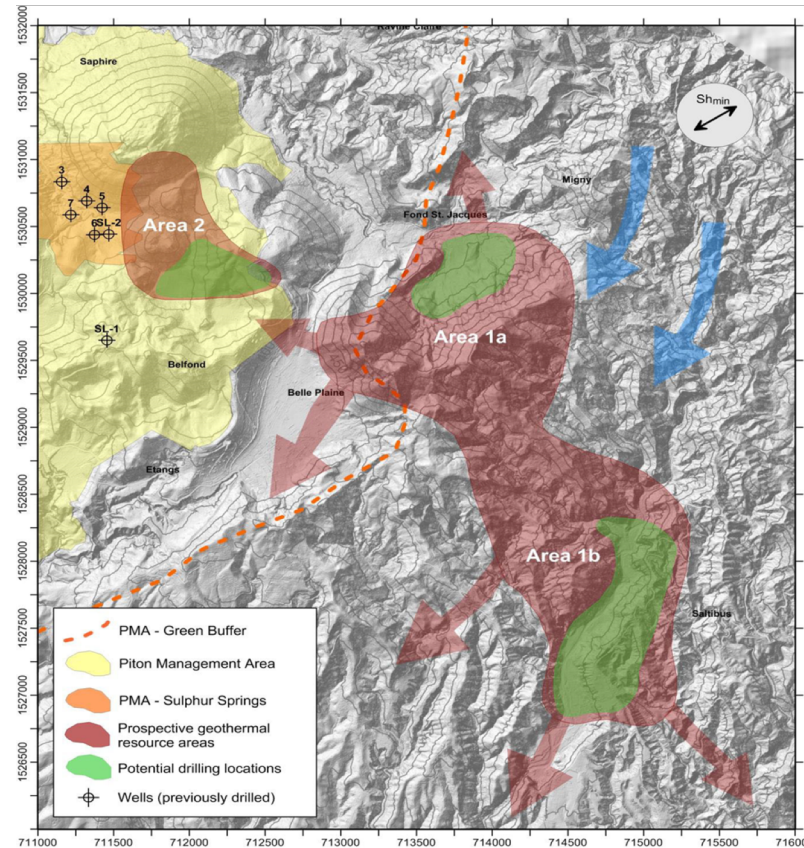
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Best Practices for the RESDP Contd.

- Ensure that the EMC adopts best practices for supervising the Integrated Drilling Services contract, to include the following technical elements:
 - Final clearance of drilling site location from a technical, environmental and social management perspective;
 - Well designs, drilling program and testing protocol, necessary to characterize the geothermal resource;
 - Drilling strategy and plans for completion of the exploration wells, including specialized drilling services;
 - Well logging, well testing and well completion;
 - Well prognoses as prepared by the EMC for each well;
 - Interventions to enhance and support the appropriate and implementable mitigation measures of the ESMP and RAP.

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Area of Exploration Interest Identified by Jacobs New Zealand Ltd.



- Area of Exploration Interest aligned with NW to SE fault of the Sulphur Springs valley;
- The potential geothermal resource development area delineated as Area 2 is inside the PMA (avoid this area for exploration drilling);

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Wellhead – Saint Lucia Well No. 2 (SL-2), drilled to a total depth of 1,400 m



- Looking on is GOSL's Technical Advisor;
- SL-2: Flowing Enthalpy – 2,900 kJ/kg;
- Mass flow rate – decreased from an initial 17.4 kg/s to 9.2 kg/s at the end of the short term test;
- Mechanical Failure – collapse of the lower casing of well.

Saint Lucia's Geothermal Exploration Program (GRDP, RESDP): Gender Components (Gender Lens)

Allocation of Personnel to Geothermal Activities

1987-1988 Deep Drilling

- **GOSL:** Project Management: 1 man; Technical: 3 men; Financial Management: 1 woman; Admin: 1 woman.
- **USAID:** Project Management: 2 men; Technical: 1 man; Financial Management: 1 woman; Legal: 1 man.
- **UNDP:** Project Management: 3 men; Admin: 1 woman.
- **EMC (Aquater SpA, Italy):** Project Management: 1 man; Drilling Engineer: 1 man; Geoscientists: 4 men; Admin: 1 woman.
- **Well Testing (KRTA, New Zealand):** Reservoir Engineer: 1 man.
- **Drilling Contractor (Big Chief Drilling Company, USA):** Floor men/women (Local Staff): 6 men.
- **GOSL's Consultant (GENZL, New Zealand):** Consultant: 1 man.
- **USAID's Consultants (USDOE, USGS, LANL):** 3 men.
- Neither staff complement of drilling contractor nor support services (non-consulting services) included above.

Saint Lucia's Geothermal Exploration Program (GRDP, RESDP): Gender Components (Gender Lens)

2015-2016 GRDP

- **GOSL:** Project Management: 1 man; Project Coordination (PC, FM [2], Procurement): 4 women; Technical: 2 men; Legal: 1 woman; Admin: 2 women.
- **WORLD BANK:** Project Management (TTL): 1 man; Procurement: 1 woman; FM: 1 woman; Safeguards: 1 woman.
- **SURFACE EXPLORATION (JACOBS, New Zealand):** Geoscientists: 4 Men, 1 woman; GIS: 2 men; MT: 3 men, 1 woman; Aeromagnetic survey: 2 men, 1 woman; SRDF support: 10 men (local), 1 woman (local); Project Management: 2 men; NZ Govt: 2 men, 4 women; Ormat: 3 men, 1 woman.
- **LiDAR (McElhanney, Canada):** Mapping Management: 1 man; Project Management: 1 woman; Operations/Field Management: 2 men; Production Supervision: 1 man; LiDAR Specialist: 1 man.

Saint Lucia's Geothermal Exploration Program (GRDP, RESDP): Gender Components (Gender Lens)

2017-2018 GRDP

- **GOSL:** Project Management: 2 men; Project Coordination: (PC & Deputy, FM [2], Procurement, Safeguards): 6 women; Technical: 2 men, 2 women; Legal: 1 woman; Admin: 2 women.
- **WORLD BANK:** Project Management (TTL): 1 woman; Procurement: 1 woman; FM: 1 woman; Safeguards: 1 woman.
- **PRE-FEASIBILITY (GeothermEx, USA):** Project Management: 1 man; Geoscientist: 1 woman; Reservoir Engineer: 1 man; Drilling Engineer: 1 man; Power Plant and Power Systems Engineers: 2 men; Civil Engineer: 1 man; Financial/Economic Expert: 1 man.
- **ESIA (Panorama Environmental, USA):** Project Management 2 women; Documentalists: 1 man, 1 woman; Local Social Assessment Specialist: 1 woman; Local Land Use Specialist: 1 man; Local ESIA Specialist: 1 woman, Botanist: 1 man; Wildlife Biologist: 1 man; Archaeologist/Anthropologist: 1 man; Hydrologist/Hydrogeologist: 1 man.
- **TRANSACTION ADVICE (Clean Infra Partners, USA):** Senior Advisor: 1 man; Senior Analyst: 1 man.

Saint Lucia's Geothermal Exploration Program (GRDP, RESDP): Gender Components (Gender Lens)

2019 RESDP

- **GOSL:** Project Management: 2 men; Project Coordination: (PC & Deputy, FM [2], Procurement, Safeguards): 6 women; Technical: 2 men, 2 women; Legal: 1 woman (AG's Chambers); Admin: 2 women.
- **WORLD BANK:** Project Management (TTL): 1 woman; Procurement: 1 woman; FM: 1 woman; Safeguards: 1 woman.

2020 RESDP (Projected)

- **GOSL:** Project Management: 3 men; Project Coordination/Implementation (PCU & PIU): (PC, FM [2], Procurement, Environmental Safeguards, Social Safeguards & Communications): 6 women; Technical: 2 men, 2 women; Admin: 2 women.
- **WORLD BANK:** Project Management (TTL): 1 woman; Procurement: 1 woman; FM: 1 woman; Safeguards: 1 woman.

Saint Lucia's Geothermal Exploration Program (GRDP, RESDP): Gender Components (Gender Lens)

2020 RESDP Contd.

- **EMC:** Project Management: 1 man; Drilling Engineer: 2 men; Geologist: 2 men; Drilling Supervisor (Company Man): 1 man; Civil Engineer: 1 man; Environmental Safeguards Expert: 1 woman; Social Safeguards Expert: 1 woman.
- **ESIA** for specific drilling locations (Local Consultant): Environmental Expert: 1 woman; Social Safeguards Expert: 1 woman.

Legend

GDA = Geothermal Development Agreement; GRD = Geothermal Resource Development; PMA = Piton Management Area; LAC = Limits of Acceptable Change; CTF = Clean Technology Fund; PPG = Project Preparation Grant; PCU = Project Coordination Unit; PIU = Project Implementation Unit; SEP = Stakeholder Engagement Plan; ESMP = Environmental and Social Management Plan; RAP = Resettlement Action Plan; EMC = Exploration Management Consultant; IUCN = International Union for Conservation of Nature; TTL = Task Team Leader; DIPE = Department of Infrastructure, Ports & Energy; GOSL = Government of Saint Lucia.

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