

Implementation of Geothermal Energy at Montserrat as a Public Private Partnership (PPP) Arrangement

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Abstract

Though geothermal energy is a much more involved and expensive undertaking than solar or wind, the benefits may well be worth the effort. It is geothermal energy that holds real promise for Montserrat as she seek to gain greater energy independence, reduce energy costs, and drive towards sustainable development. In this paper, we examine and discuss how the implementation of Geothermal Energy will be a contributing factor to the consumers and economic growth and development of Montserrat. The Institutional and Management mechanisms to be put in place if Geothermal Energy was to be implemented as a Public Private Partnership (PPP) arrangement are also discussed before explaining the challenges and solutions foreseen in implementation of Geothermal Energy as a Public Private Partnership (PPP) arrangement.

Keywords: Geothermal Energy; Public Private Partnership (PPP) arrangement; Energy Policy; Montserrat.

1. Introduction

Montserrat is part of the Leeward Islands chain of islands in the Caribbean. The island measures approximately 16 km (north-south) by 11 km [1]. Its Georgian era capital city of Plymouth was destroyed and two-thirds of the island's population fled abroad after an eruption of the previously dormant Soufriere Hills volcano in the southern part of the island that began on 18 July 1995 [1]. The former capital now lies under meters of volcanic ash and debris. Volcanic eruptions continue in the southern part of the island such that only the northern quarter of the island is habitable; the remainder of the island has been classified as an exclusion zone. For Montserrat the overarching strategic challenge is to accelerate economic development, reduce and eventually eliminate economic dependency on the UK.

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Major spikes in oil prices can cause severe economic stress for countries like Montserrat since the economy is 100% fossil fuel based. High energy prices on the island– diesel import prices are amongst the highest in the world – are a powerful brake on economic growth. The main constraints faced by Montserrat’s energy sector, according to the Caribbean Development Bank are: Total dependence on imported petroleum products to meet its energy requirements; The cost of operating Montserrat Utilities Limited (MUL) temporary generation facility at Brades Estates; and The barriers, mainly financial, to progress in the development of alternative energy sources. At the start of the volcanic activity in 1995 the former main power station at Plymouth was abandoned. Initially a temporary power station was constructed at Salem during 1997, but all generating capacity was subsequently transferred in the period 1998 to 2000 to Brades Estate on the North West coast of the island [2]. The existing power station at Brades consists of five high speeds containerised diesel generators. These sets were not built for permanent operation but instead designed to handle emergency situations and to provide top-up capacity during peak demand, with a normal service life of 10 years. Over the time of use they have been subject to major overhaul and engines replaced as needs have arisen. The power station remains operational through refits and increasingly expensive maintenance. Overall fuel efficiency is poor, and fuel consumption is approximately 3.2 million litres of diesel per year [2]. As well as high energy prices power cuts are frequent: an average of 880 minutes per customer is lost per year due to outages. This is around 10 times the figure for large multi-voltage distribution systems in developed economies. Government of Montserrat (GoM) recognizes the challenges it faces in the energy sector, and in the 2008 – 2027 Energy Sector Policy states that its over-dependence on fossil fuels is economically and environmentally unsound. It must reduce its dependence on fossil fuel energy sources to increase its resilience to changes in world fuel prices. Current peak demand on Montserrat in the last few years has been 2 MW although this has fallen recently to 1.7 MW as a result of the increasing electricity costs due to fuel price increases. This has forced people to cut back on their energy use and presents a serious impediment to any private sector activity. Geothermal energy has the potential to transform Montserrat’s economy by significantly reducing the cost of electricity generation. At present, Montserrat has one of the highest costs of electricity generation in the world due to the high fuel prices and the cost of freight to the island. Along with public investment in Little Bay town and Carr’s bay port, developing geothermal energy is a core part of the GoM’s strategic growth plan to move Montserrat towards financial self-sufficiency. As an aided Overseas Territory, the UK’s responsibilities to Montserrat are: Meeting the reasonable needs of aid dependent Overseas Territories (OTs); Accelerating towards self-sufficiency where possible; and Managing the risk of contingent liability and ensuring OTs meet international commitments [1]. Developing geothermal energy production is core parts of the UK’s support to the objective of helping Montserrat achieve financial self-sufficiency. Lowering the cost of electricity generation will allow GoM to make significant savings in its fuel costs – fuel import prices are the highest in the region – and will also help to make Montserrat more attractive to private sector investors. This will be an important element of driving long-term economic growth in ways that will help underpin other investments aimed at returning Montserrat to financial self-sufficiency. GoM and The Department for International Development (DFID) have already undertaken several surface level studies, economic appraisals and technical feasibility studies of potential geothermal reserves in Montserrat [2]. The recent evidence base goes back to Jan 2010 (although there have been various reports going back well before then), when the results of a thorough surface level exploration were presented by EGS Inc. The MON-1, MON-2 exploration wells successfully identified a production geothermal resource on the island of Montserrat [2].

Based on preliminary tests either of the wells is capable of producing steam sufficient to generate approximately 2MWe. The evaluate output depends on generation technology and production/injection management but two productive wells represent a significant initial success for the island's geothermal exploration program.

In this paper, we seek to address the following:

- How the implementation of Geothermal Energy will be a contributing factor to the consumers and economic growth and development of Montserrat.
- The Institutional and Management mechanisms to be put in place if Geothermal Energy was to be implemented as a Public Private Partnership (PPP) arrangement
- The challenges and solutions foreseen in implementation of Geothermal Energy as a Public Private Partnership (PPP) arrangement

2. Benefits of Geothermal Energy

Reduce the cost of electricity generation

GoM to make significant savings in its fuel costs

Lowering costs for investors

Provision of job

Provided a steady flow of economic activity and employment to support local businesses and communities;

Revenue generation for the Country

It reduces greenhouse gas emissions

Transforming Montserrat's wider economy

Returning Montserrat to financial self-sufficiency

3. Types of PPP Contracts

There are several different types of public-private partnership contracts (often known as PPPs and P3s), depending on the type of project, level of risk transfer, investment level and the desired outcome [3].

3.1. Build – Operate – Transfer (BOT)

A BOT model is generally used to develop a discrete asset rather than a whole network, for example a toll road. This simple structure provides the most freedom for the private sector partner during construction and the public sector bears the equity risk.

3.2. *Build – Own – Operate (BOO)*

This is a similar structure to BOOT (below), but the facility is not transferred to the public sector partner. A BOO transaction may qualify for tax exempt status and is often used for water treatment or power plants.

3.3. *Build – Own – Operate – Transfer (BOOT)*

The private sector builds and owns the facility for the duration of the contract, with the primary goal of recouping construction costs (and more) during the operational phase. At the end of the contract the facility is handed back to the government. This structure is suitable when the government has a large infrastructure financing gap as the equity and commercial risk stays with the private sector for the length of the contract. This model is often used for school and hospital contracts.

3.4. *Design – Build*

The contract is awarded to a private partner to both design and build a facility or a piece of infrastructure that delivers the performance specification in the PPP contract. This type of partnership can reduce time, save money, provide stronger guarantees (as the work is with a single entity rather than a consortium) and allocate additional project risk to the private sector

3.5. *Design – Build – Finance*

The private sector constructs an asset and finances the capital cost during the construction period only.

Design – Build – Finance – Operate (DBFO)
Design – Build – Finance – Maintain (DBFM)
Design – Build – Finance – Maintain – Operate (DBMFO)

Similar to BOOT, DBFO (and its variations) is more used in the UK for PFI (Private Finance Initiative) projects. The private sector designs, builds, finances, operates an asset, then leases it back to the government, typically over a 25 – 30 year period. Public sector long-term risk is reduced and the regular payments make it an attractive option to the private sector.

3.6. *Design – Construct – Maintain – Finance (DCMF)*

Design, Construct, Maintain and Finance is very similar to DBFM. The private entity creates the facility based on specifications from the government body and leases it back to them. This is generally the convention for PPP prison projects.

3.7. *O & M (Operation & Maintenance)*

In an O&M contract, a private operator operates and maintains the asset for the public partner, usually to an agreed level with specified obligations. The work is often sub-contracted to specialist maintenance companies.

The payment for this contract is either via a fixed fee, where a lump sum is given to the private partner, or more commonly a performance-based fee. In this situation, performance is incentivized using a pain share / gain share mechanism, which rewards the private partner for over-performance (according to the agreed SLAs) or induces a penalty payment for work which has fallen short [3].

4. Public Private Partnership (PPP) structure

A public-private partnership (PPP, 3P, or P3) is a cooperative arrangement between two or more public and private sectors, typically of a long-term nature. It involves an arrangement between a unit of government and a business that brings better services or improves the city's capacity to operate effectively [4]. A typical PPP structure can be quite complex involving contractual arrangements between a number of parties including the government, project sponsor, project operator, financiers, suppliers, contractors, engineers, third parties (such as an escrow agent), and customers. The next figure shows a simplified PPP structure. However, the actual structure of a PPP depends on the type of partnerships [5].

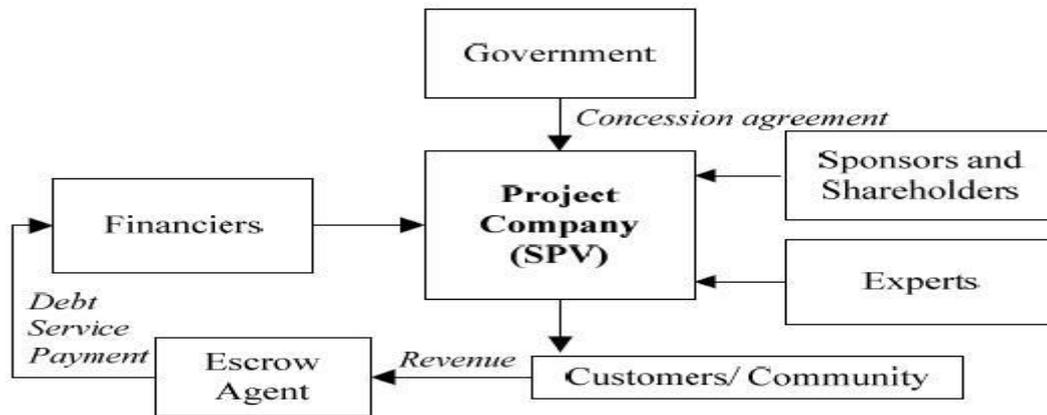


Figure 1: Typical structure of PPP project.

Note: The box on the right side labelled "experts" represents various participating groups in a PPP project including engineers (designer), contractor (builder), operator and insurer. Similarly, the box on the left side labelled "financiers" includes various parties investing in a project comprising equity and debt financiers which may include domestic and foreign banks and financial institutions, bi-lateral and multi-lateral donor agencies, development banks, and similar other agencies. The box labelled "escrow agent" represents normally a financial institution that is appointed by the project company and the lenders for managing an account called escrow account. The escrow account is set up to hold funds (including project revenues) accrued to the project company. The funds in the account are disbursed by the escrow agent to various parties in accordance with the conditions of the agreements. An escrow account is also used to hold a deposit in trust until certain specified conditions are met [5].

5. Institutional and management mechanism

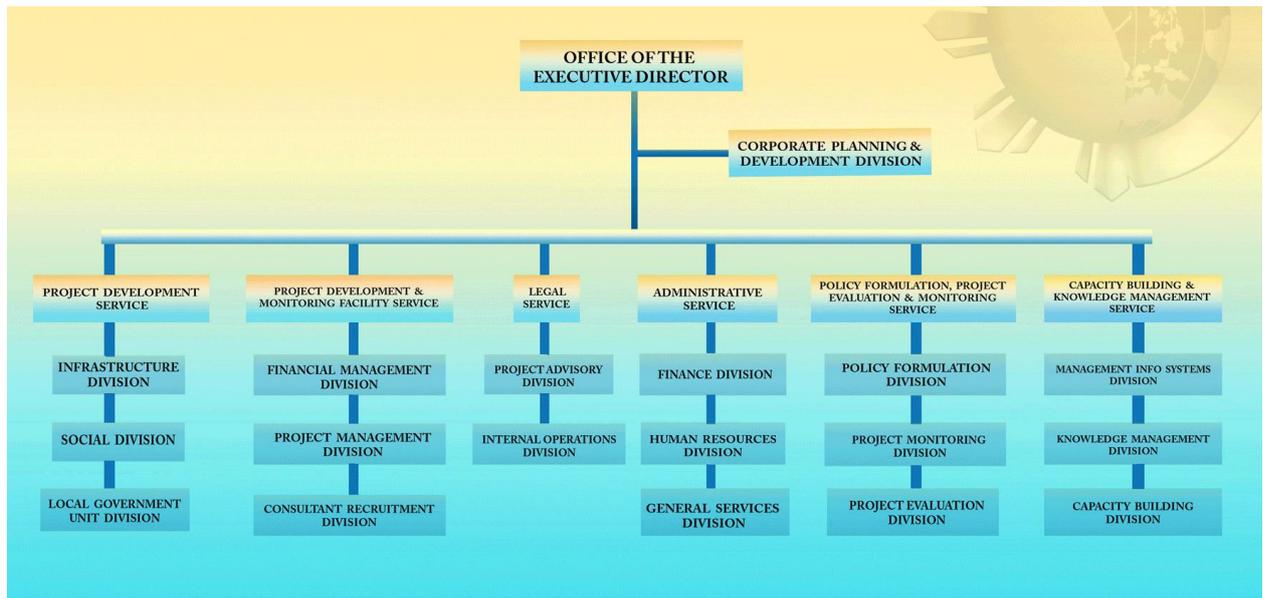


Figure 2: Institutional structure of PPP project

5.1. Project Development and Monitoring Facility Service (PDMFS)

The Service has the sole responsibility to screen, evaluate, and process applications for PDMF support through its Project Management Division; monitor and ensure availability and efficient utilization of the PDMF funds through its Financial Management Division; manage consultants and consulting service contracts, and leads in consultant selection through its Consultant Recruitment Division.

5.2. Project Development Service (PDS)

In the course of project development, the Service provides facilitation, advisory, and technical assistance to various implementing agencies in the process of evaluation, formulation, development, structuring, and packaging of PPP projects to ensure that infrastructure projects go through the proper selection, preparation and bidding process. As PPP projects undergo intense scrutiny with various approving bodies, the Service, in close collaboration with the implementing agencies, assists in the preparation and review of transaction documents, negotiation of PPP proposals, review of technical assumptions and market assessment, securing of approval from relevant approving government bodies, and conduct of the procurement process. With its function of monitoring the development of pipeline of the PPP Program, the Service ensures that the entire process is characterized by transparency, accountability, predictability, and participation.

5.3. Legal Service (LS)

As the legal arm of the PPP Center, the Service plays a significant role in rendering a responsive and insightful legal advice and assistance in the course of project development in all projects in the PPP pipeline to ensure that all transactions, project documents, and organizational processes are legally sound and strictly compliant with

legal requirements. The Service also assesses potential litigation arising from contract variations and other related operational policy concerns. In conducting legal research and studies, the Service also monitors various laws, administrative issuances, court decisions, and other legal issuances relative to PPP. In delivering legal support in aid of the smooth operations of the PPP Center, the Service also provides legal opinion and advice on contracts, documents and other legal matters significant to its operations and processes.

5.4. Policy Formulation, Project Evaluation and Monitoring Service (PFPEMS)

With the end goal of strengthening the PPP policy environment, the Service shall take initial steps in identifying, formulating, recommending, and advocating policy procedures and guidelines, reviews, studies and researches, and reforms on the numerous policy issues and bottlenecks for the development, appraisal, implementation, and monitoring and evaluation of PPP projects and contracts in consultation with appropriate oversight committees, implementing agencies, and the private sector. In contract monitoring of PPP projects for implementation, the Service renders its technical, financial, and legal advisory assistance and intervention to various issues and concerns in coordination among the implementing agencies, winning concessionaire and its contractors, and the independent consultant to ensure that contractual milestones and obligations are observed by all parties.

5.5. Administrative Service (AdS)

In sustaining the operations of the PPP Center, the Service provides general administration, support, and coordination services to ensure and promote effective and cost-efficient systems, procedures, and practices through human, financial, and physical resources management. The Service establishes various financial systems and mechanisms for the smooth implementation of policies and guidelines set by regulatory government agencies, and improves the human resource management and processes for proper implementation of program and policies on hiring and selection, career development, personnel administration, training and education, performance evaluation, and collective negotiation between management and employees. It also takes charge of the physical resources management thru maintenance and improvement of tangible properties and resources of the Center for greater service satisfaction among clients and employees.

5.6. Capacity Building and Knowledge Management Service (CBKMS)

Working hand in hand with national government agencies and departments, government-owned and controlled corporations, and local government units, the Service provides capacity building activities to implementing agencies in undertaking PPP processes, such as project identification and selection, development, preparation, procurement, and implementation, to ensure a sustainable pipeline of properly-prepared PPP projects. As a knowledge center on PPP, the Service provides timely, reliable, and accurate information and promotes the agenda of the PPP Program thru various media, and establishes networks and institutional linkages with various organizations involved in PPP. With its ICT infrastructure, the Service manages and maintains a knowledge management (KM) portal and its components as a strategic KM tool for an accurate and updated, detailed and comprehensive IT implementation strategy [6].

6. Challenges and Key Questions

One of the challenges all governments face in promoting PPP is instigating the procedures and processes involved in delivering successful PPP and establishing new institutions. Some governments undertake PPPs without an overall PPP policy, which leads to ill-defined goals and a greater likelihood of problems with the projects [7].

The key questions asked are:

- (a) What does governance mean in PPP?
- (b) How can governments improve their governance?
- (c) What technical, financial, legal, and other challenges must be overcome to build capacity?
- (d) How can PPP improve efficiency and achieve social, economic and environmental objectives simultaneously?

These questions should be well addressed in establishing new institutions for PPP

7. The challenges and solutions foreseen in implementation of Geothermal Energy as a Public Private Partnership (PPP) arrangement in Montserrat

7.1. POLICY

Some governments undertake PPPs without an overall PPP policy, which leads to ill-defined goals and a greater likelihood of problems with the projects [7].

Solution

PPPs require a new type of public expertise that facilitates projects and monitors their performance.

Principle 1 - The PPP process requires coherent policies that lay down clear objectives and principles, identifies projects, sets realistic targets and the means of achieving them,

A PPP policy is needed to set a 'roadmap' for implementation. Without it, there will be no mechanism to enable aspirations to materialize into concrete projects.

The PPP policy should begin by fixing clear economic objectives;

With strong social objective;

That is linked to core values and principles;

And reach consensus both within government and outside government.

Which have realistic target and establish procedures for consultation while simultaneously communicating the benefits of the PPP;

And building market interest;

PPP Policies should incorporate the possibility of change;

Means of achieving the goals:

Once the objectives and principles have been set governments will need to examine how these should be implemented. For example, each of the following should be taken into account by governments:

- The forms of PPP it will consider;
- The degree of risk it is prepared to accept;
- How it intends to manage risk;
- The risks it is not prepared to accept;
- The criteria for determining whether PPP are a viable method of service delivery; and
- Its policy on the involvement of stakeholders.

7.2. CAPACITY-BUILDING

Developing skills inside governments presents a major challenge. There are a number of new skills that must be developed for PPPs, such as negotiation, contractual and financial skills.

Solution

Principle 2 – Governments can build the necessary capacities in a combined approach which establishes new institutions and trains public officials while at the same time using external expertise

7.3. Improving legal framework

Legal processes in many jurisdictions are insufficient, overly complex and fail to provide sufficient security and incentives to investors in PPP arrangements.

Solution

Principle 3 – Investors in PPPs need predictability and security in legal frameworks, which means fewer,

simpler and better rules. In addition, the legal framework needs to take account of the beneficiaries and empower them to participate in legal processes, protecting their rights and guaranteeing them access in decision-making.

7.4. Risk

Theory in project finance suggests that risks should be borne by the party best able to manage them, but many PPP projects often fail because the parties cannot agree on the allocation of risk, with each side trying to shift the risk to the other. It is also difficult to calculate risks, especially in transition economies when the rate of economic growth is sometimes less predictable, which makes forecasting demand a difficult exercise.

Solution

Principle 4 – PPPs allow risk which is most able to be managed by the private sector, to be transferred to them. However, governments also need to accept their share and help to mitigate those allocated to the private sector in mutual support.

7.5. Ppp procurement

There is a gap in capacity to organize competitive tenders and a public perception of inadequate transparency in awarding PPP deals, and the lack of adequate administrative procedures for competitive tendering.

Solution

Principle 5 – The selection of the bidder should be undertaken following a transparent, neutral and non-discriminatory selection process that promotes competition and strikes a balance between the need to reduce the length of time and cost of the bid process and, acquiring the best proposal. Along these lines, corruption should be penalized as well.

7.6. Putting people first

Members of the public are often insufficiently consulted in the PPP process and their interests and needs are not addressed. This lack of transparency and accountability has led to a governance challenge that must be confronted in order for PPPs to move forward [7].

Solution

Principle 6 – The PPP process should put people first by increasing accountability and transparency in projects and through these improving people's livelihoods, especially the socially and economically disadvantaged [7].

8. Conclusion

Even though partnering is often considered good in itself, it is important to keep in mind that there is no

universal solution that fits all problems. The parties involved in a PPP need to master several challenges. A PPP tends to be more successful when realistic goals are set and the project allows for enough time. Time is an important factor and being under time pressure might negatively impact the decision-making. In this context, communication, project management and rules for procedures should all aim at ensuring an optimal decision-making process. If conflicts among and within the different parties are not resolved through communication or if available information is not communicated to the executive, how can any decision be based on solid grounds? That is why clear governance structures, clear lines of responsibility and accountability and well-functioning communication structures need to be in place. Methods like monitoring and evaluating help to optimize future decisions. Furthermore, it is important to assure a real competition for the market and to choose the project partner carefully. Only when all parties are committed and the risk is transferred in the best possible way, can added value be realized. Thus among the key elements of a successful partnership are political legitimacy, incentives, commitment, a clear organizational structure and a detailed plan. With these entire put in place, Implementation of Geothermal Energy at Montserrat as a Public Private Partnership (PPP) arrangement can be realized.

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