RESIDENTIAL ROOFTOP HYBRID SOLAR SYSTEMS LEASING INSTRUMENTS

South Africa

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The signatories hereof, being duly authorised thereto, by their signatures hereto authorise the execution of the work detailed herein or confirm their acceptance of the contents hereof and authorise the implementation/adoption thereof, for and on behalf of the parties represented by them.

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1. Executive summary

Solar Lease (Pty) Ltd, a South African renewable energy projects developer is proposing financing instruments to support the development and installation of hybrid solar systems in the South African residential market. The proposed instruments are aimed to: -

a) Promote adoption of clean energy technologies
b) Lower the finance barriers for adoption of the technologies
c) Overcome the barriers of renewable adoption due to lack of enabling net metering policies
d) Reduce reliance on South Africa utility, Eskom, whose supply is 90% reliant on coal generation
e) Provide backup power supply during load shedding periods and outages

Solar Lease proposes to offer 2 funding options, solar leases and loans. The instruments will fund hybrid units comprising of solar panels, hybrid inverter and battery storage systems with the ability to generate power during the sun hours which can be used for daytime loads and as well as cover the early evening peak power usage. The proposed systems will have capacity of 3kW to 6kW with battery storage options ranging from 4kWh to 10kWh.The systems are designed to match the general household load profiles where net metering is not available to take up additional daytime generation by storing the power to use at later hours when demand peaks up. The proposed systems will also have the capability of providing backup power during load shedding events and power outages, which are also prevalent South Africa.

Technology providers identified for the proposed hybrid systems include Seraphim Energy for solar panels, ABB, Delta Energy, Eaton/Nissan, SolarEdge and Telsa for hybrid inverter storage systems. Additional service providers will be added to the list as and when the need arises.

The hybrid solar systems will be offered on 20-year duration leases and/or credit loan plans of 3 to 20 years. The leases will include the replacement of the hybrid inverter battery unit at the end of the 10-year warranty and the full maintenance of the solar systems. The lease instruments will be offered at a fixed price escalating at inflation rate per year for the duration of the lease period.

The lease or credit plan options will be available to clients with a minimum credit rating score of 600, which is considered average risk to default. Initial pilot project of 500 installations is planned across the large metropolitan municipalities where clear embedded generation rules have been developed and are clearly outlined.

2. Value Proposition

SOLAR LEASE (Pty) Ltd, herein referred to as “Solar Lease” is an alternative energy projects development company founded with the aim to deliver alternative energy power solutions to residential and commercial clients in order to reduce their energy costs, carbon footprint and reliance on the grid electricity supply. The company was built on the founding teams experience in energy efficiency and renewable energy projects rendered to clients like the Sentech, Dube Tradeport Corporation, DHL, Ekurhuleni Municipality, Pepsico Simba, Eskom and Continental Power Africa. The company is 100% black owned and managed with a Level 1 BBBEE rating and is an aspiring energy focused Black Industrialist organisation.

3. Opportunity

South Africa is well endowed with solar resource, with most areas averaging more than 2500 hours of sunshine per year with an average solar radiation level range of between 4.5 and 6.6kWh/m2 a day. Despite the good solar resource, South Africa is still heavily dependent on fossil fuel-based energy generation by the utility Eskom which generated about 95% of the electricity consumed in South Africa. Fossil fuel generation account for more than 90% of the total installed generation capacity of 51 309 megawatts (MW). The large reliance on fossil fuel-based generation means that South African electricity generation is the largest contributor of greenhouse gas (GHG) emissions.

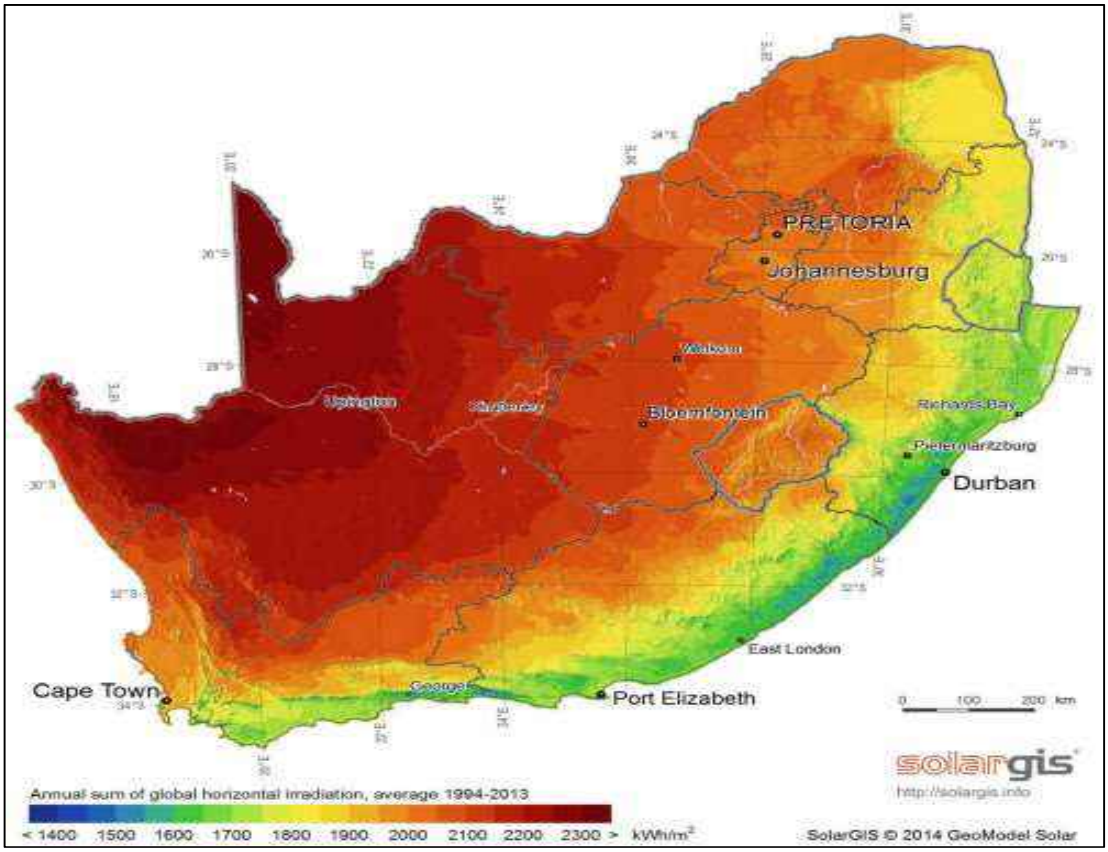


Figure1: Global Horizontal Irradiation (GHI) Map of South Africa

South African electricity consumers have been faced with above inflation electricity prices. Eskom electricity charges has had dynamic changes over the past few years with sharp increases in electricity tariffs having been a prominent feature. From the 2008, there is a clear and sharp inflection point for electricity tariffs. During the period starting from 2007 to 2015, electricity tariffs increased by 300% against an inflation rise of only 45%. Thus, electricity tariffs tripled in 8 years. Eskom has also put in application for a 3-year period annual increases of 15% for each of the years 2019/2020, 2020/2021 and 2021/2022. If approved, these will result in 19.41% increase for each year when adding an already approved R32.69bn Regulatory Clearing Account amounting to 4.41% per year over the next 4 years.

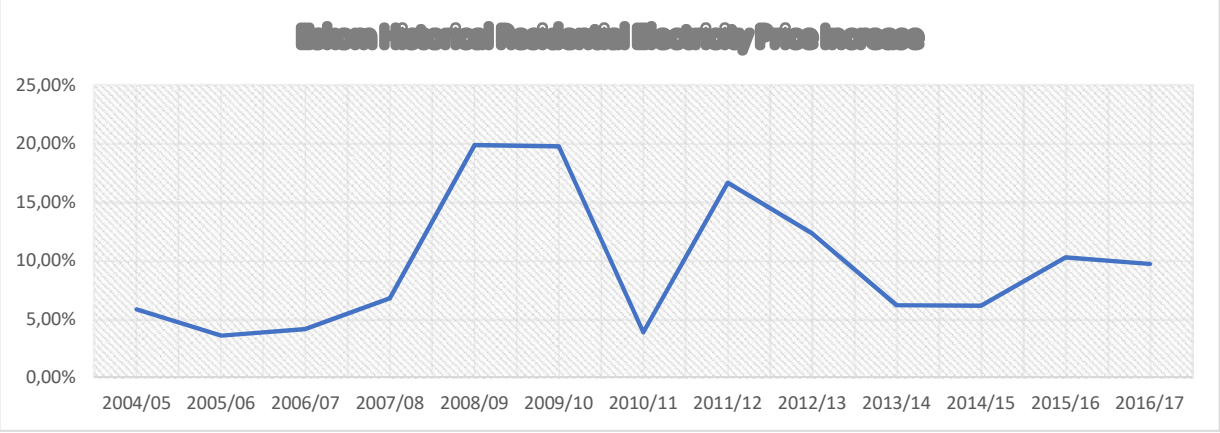


Figure2. Historical residential electricity price increase (Data Source: Eskom)

In addition to reliance on fossil fuel generation and above inflation tariff increases, South African consumers have been faced with electricity outages as a result of Eskom load shedding lasting up to 4 hours due to high demand, low coal stockpiles and maintenance breakdowns on the generation fleet.

Solar Lease has identified an opportunity to offer alternative energy solutions that will help residential market reduce reliance on Eskom generation, secure their energy supply and hedge against above inflation rise in electricity costs.

3.1 Size of the Industry

There are currently approximately 16 million households in South Africa, which is expected to increase to 19-20 million by 2030 (Department of Energy, 2016b). The sector relies heavily on grid electricity, accounting for around 84% of total residential energy consumed, equivalent to 49 GWh.

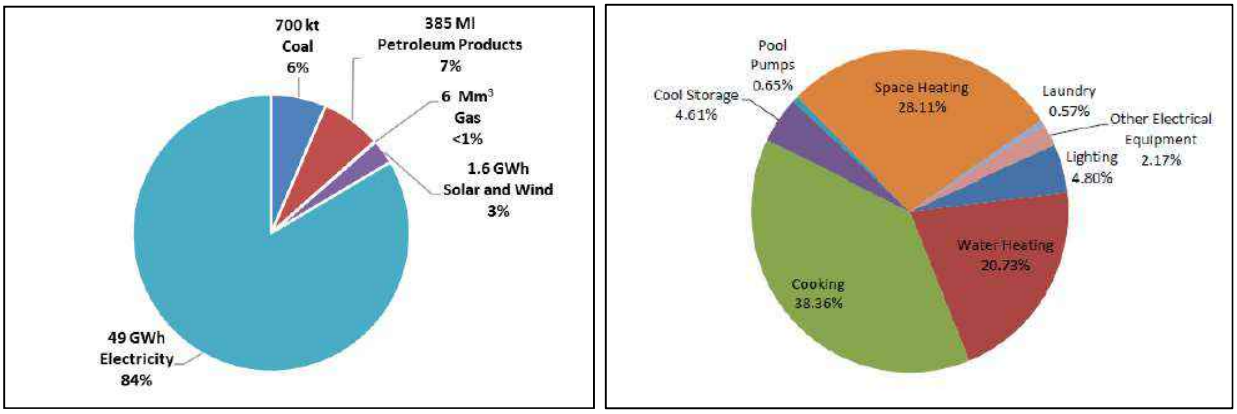


Figure3. Residential Energy Usage patterns (Source: Department of Energy)

Grid electricity (which is largely generated from coal) is the major source of energy consumed by the residential sector. Cooking is the most energy intensive activity accounting for 38% of the end use of energy in the sector. The residential sector is estimated to contribute around 24.8 MtCO2e to the national energy emissions in 2010 (Department of Environmental Affairs, 2014a).

While some residential customers buy electricity directly from Eskom, the majority purchase electricity from the ~187 municipalities that also distribute electricity. Because of the wide variation in residential tariffs across municipalities we have included tariffs from 3 large metropolitan areas – Cape Town, City Power (Johannesburg) and Ekurhuleni.

Table1. Large Municipal Domestic Electricity Tariffs (US cents)

City of Johannesburg

Block 1 (0-500kWh)	Block 2 (501-1000kW)	Block 3 (1001-2000kWh)	Block 4 (2001-3000kWh)	Block 5(>3000kWh)
8,2404	9,4566	10,1543	10,7137	11,2391

City of Ekurhuleni

Block 1 (0-600kWh)	Block 2 (601-700kWh)	Block 3 (>700kWh)
7,7269	13,1341	37,3023

City of Cape Town

Block 1 (0-600kWh)	Block 2 (>600kWh)
9,4934	13,7491

The South African residential energy market is segmented into three groups; LSM 1-3, LSM4-7 and LSM 8-10 as depicted below.

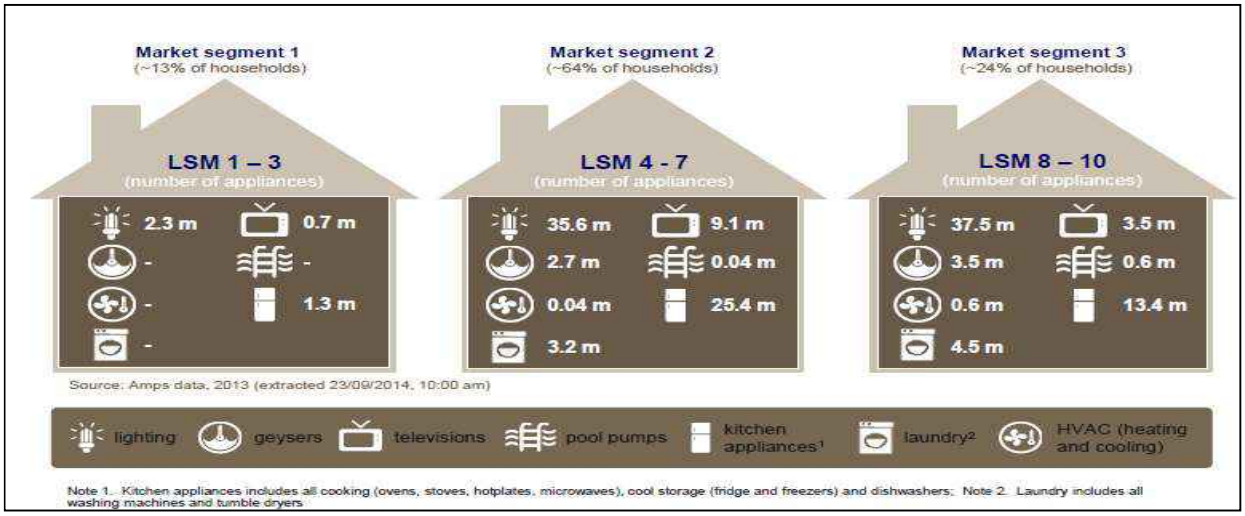


Figure4. Residential Market segmentation

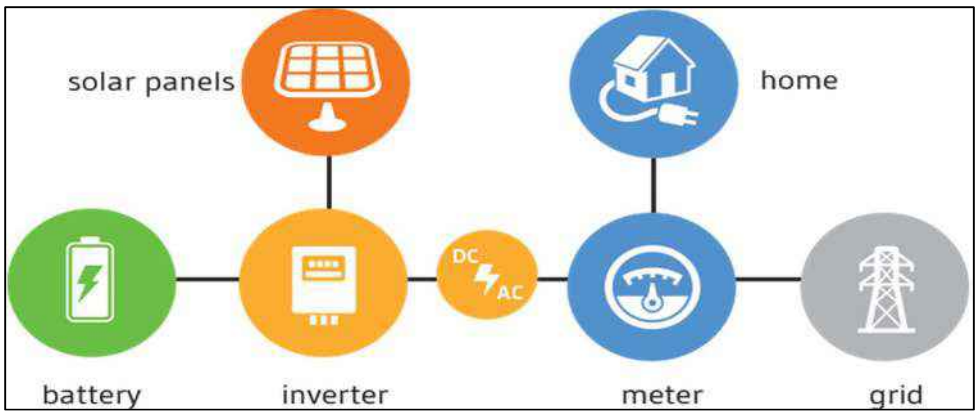
Solar Lease will initially target Market Segment 3 residing within the large metropolitan municipalities. This market has a higher energy demand and pay higher electricity tariffs as they sit on the higher portion of the sliding scale electricity usage charge in Table1. The economic benefits of the proposed model will be more realised in this Market Segment.

The target market is comprised of about 3.84 million (24% of 16 million) households and assuming an average of 4.0kw solar system per installation, the market has a potential to install a total of 15 360MW, assuming full adoption of solar power.

4. Proposed Solar Offering

South African residential electricity providers currently do not have net metering in place and solar systems are either sized of full residential consumption during daytime hours and curtailed where more power than required is produced. Some municipalities do buy back electricity but at much lower rates than supply rates and therefore not economical to design above daytime energy use.

Due to lack of net metering, to maximise the solar usage and offset above inflation rise in electricity costs, battery storage is considered necessary to store additional power generated during daytime hours for use during evening peak time. A hybrid solar system with solar, grid and battery backup offering are proposed for the South African residential market with its configuration and application illustrated below: -



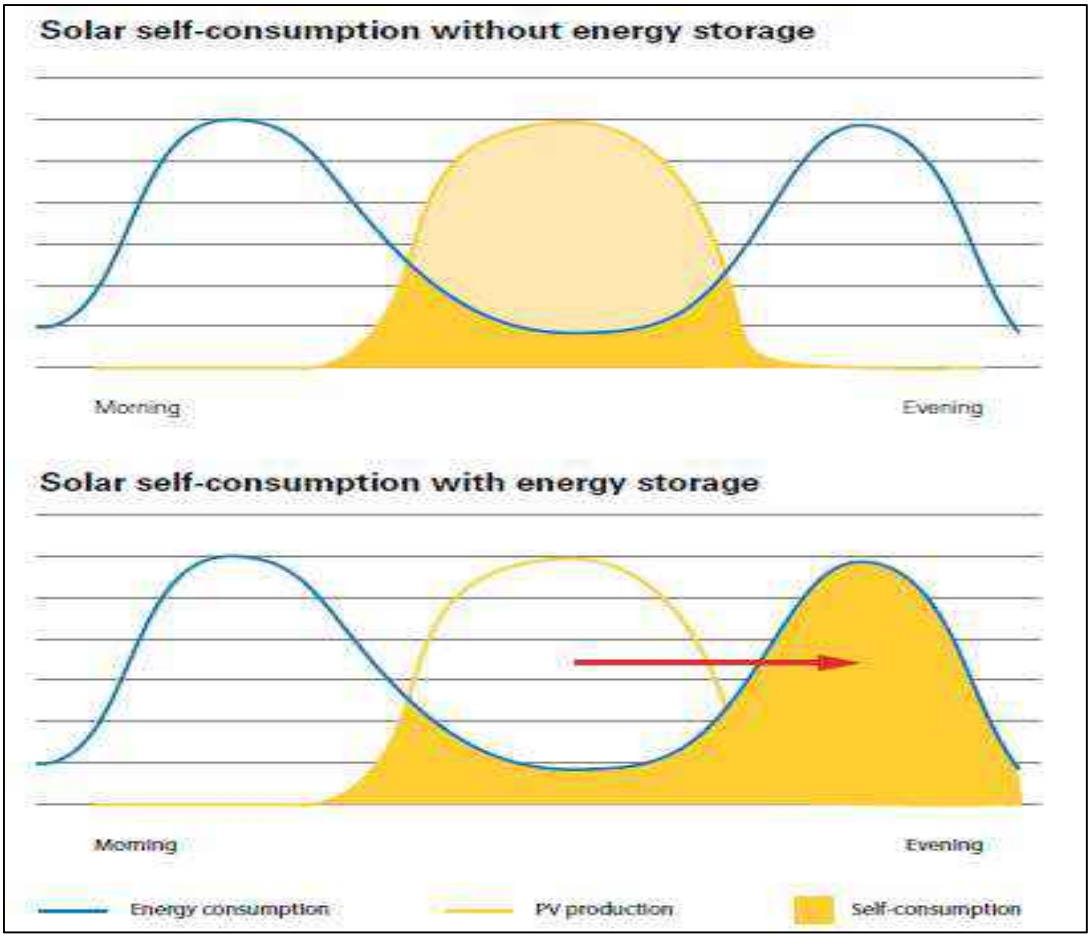


Figure5. Solar PV Hybrid System configuration and application for the South African residential market

The above is the economical way of maximising the usage of solar installation with no net metering. The proposed solar systems will be offered to client on long term leases with fixed payments contracted over a 20-year period. The lease offers will cover maintenance of the solar systems, replacement of the battery inverter units at the end of their 10-year warranty period. The offered solution will be a hassle-free offering to clients that will lower their electricity costs as illustrated below:

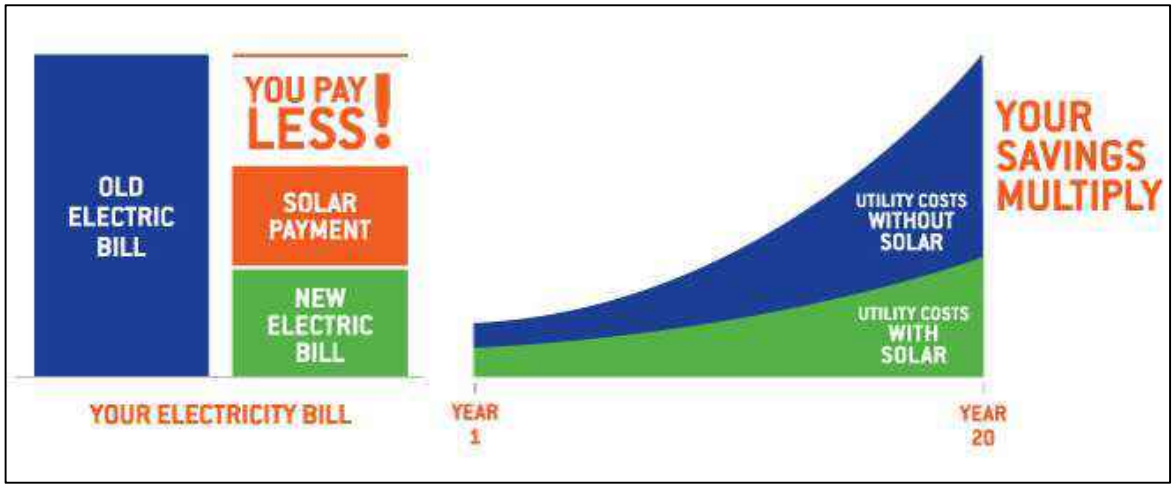


Figure6. Solar Lease hybrid solar savings illustration compared to utility electricity bill over 20 years

5 Solar Projects Financial and Technical Evaluation

5.1 Cost Structure

The proposed solar plants are to be implemented at households with high electricity consumption as illustrated below:

Figure7. Illustration of a solar powered household

The tariff charge will be based on the cost to develop, finance, construct, commission, operate and maintain the solar plants over the contracted power purchase agreement period. The cost structure of the solar systems will cover the following major equipment and activities:

a) Solar Panel Costs – Tier 1 Solar Panels – 25 Year Production Guarantee
b) Hybrid Battery Inverter Units -Only Lithium ion battery considers -10 Year Warranty
c) Balance of System – DC and AC Cables, DC and AC Protection and all required accessories
d) Procurement, Site survey and installation costs

The financing costs at term for loans and leases are shown below;

Terms	**Solar Lease**	**Solar Loan**
System Ownership	Solar Lease (Pty) Ltd	Client
Term	20 Years	3 to 20 years
Finance Costs/Interest Cap	Prime Rate* + 1.6%	Prime Rate* + 1.6%

Prime Rate =10.25 (2018/11/23)*

5.2 Financing Requirements

Solar Lease is seeking funding support for the initial pilot project that will consider 500 hybrid solar systems across the major metropolitan municipalities. The funding is expected to install solar systems with an average of 4.6kW 6kWh mostly funded through loan (60%) and lease options (40%).

The proposed technologies for the pilot project will use a Seraphim Solar Modules and Eaton/Nissan xStorage System. Additional technologies will also be considered. The following solar system configuration options will be offered:

Table4. Solar xStorage system and costs with expected annual kWh generation for Johannesburg area

System Capacity	Installed Solar	Phases	Solar Generation	System Cost
3.6kW 6.0kWh	3.96kWp (12 x 330W)	1 Phase System	7 409 kWh/year	USD 10 863,65
4.6kW 6.0kWh	4.62kWp (14 x 330W)	1 Phase System	8 644 kWh/year	USD 11 702,08
6.0kW 6.0kWh	6.60kWp (20 x 330W)	1 Phase System	12 348 kWh/year	USD 13 289,40
3.6kW 10.08kWh	3.96kWp (12 x 330W)	1 Phase System	7 409 kWh/year	USD 11 998,31
4.6kW 10.08kWh	4.62kWp (14 x 330W)	1 Phase System	8 644 kWh/year	USD 12 836,75
6.0kW 10.08kWh	6.60kWp (20 x 330W)	1 Phase System	12 348 kWh/year	USD 14 424,07

Table5. Pilot Project Estimated Costs

Number of Systems	Cost per System	Customer Acquisition Cost	Total Cost of Project
500	11 702.08	8%	USD 6 319 123.20

6 High-level project plan

Below are the high-level milestones for the proposed solar plant project at Amandelbult Complex. The project is expected to take 22 months from inception to construction completion with first power generated from the solar plant expected in August 2020.

Idea Proposal & Evaluation	Structure & Feasibility	Financial Close	Implementation
(2 Months)	*(6 Months)*	*(2 Months)*	*(8 Months)*

Proposal Submission:

Key Finance terms

Required Instruments

Technical Proposal and Compliance Requirements

Project Structuring:

Legal structure establishment

Environmental and Social Attributes Assessments

Technical Assessments

Capex and Opex Verification

Finance Close:

Negotiate Funding Term Sheet

Technical Due Diligence

Project Finance Terms Agreement

Contracting and Resource Mobilisation

Implementation:

Project Management

Cost Control

Quality Assurance

Billing and Cost Recovery