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AZPROMO PROJECT PLAN

PROJECT: Solar PV

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1) Background and Sector review

Alternative Energies in Azerbaijan

Alternative Energy accounts for 10% of electricity production, but the Ministry of the Energy, and the the State Agency on Alternative and Renewable Energy Sources (SAARES) want to increase this up to 20% by 2020. It wants to raise over $7bn in alternative energy investments and to increase total renewables capacity to 2,000 MW.

Hydropower is the most developed alternative energy source, and has the biggest potential to help the nation reach the 2020 target. It accounts for 9.8% of the country's entire electricity production, and Azerbaijan's rivers have the ability to generate 16 billion kWh of economically viable power. In November 2014, the second unit of the Sheki Hydropower Station was launched, with equipment from the Chinese company 'Hunan Allonward'.

Solar in Azerbaijan

Although domestic production is low, Solar PV cells are well suited to Azerbaijan. It plans to have 1 GW installed by 2020 and a feed-in tariff of about 0.20 €/KWh. This will require US$3.8 Billion of investment, according to the US Energy Administration.

They can be stand-alone, grid-connected or building integrated and are therefore suitable for a large range of applications, from calculators to domestic rooftops to large grid-connected arrays of panels.

One major advantage of solar PV is that the panels can be placed in otherwise unused space such as on rooftops and are particularly suited to urban electricity generation. Increasingly solar PV is used as a design feature and costs can be reduced by integrating panels into the buildings themselves.

PV can however be cost-effective in certain situations, particularly in areas where grid connection is expensive or not feasible, as in Baku. This could be for example in a very remote location or in an urban environment, for example on parking meters or bus stops.

Outside of Baku, solar power and Wind will help to meet domestic energy needs. The South Korean, IIAN Tech, invested US$2.25min a hybrid solar power project in the Neftchala region.

2) Project Objective

To create a Solar PV production plant in Azerbaijan, to produce cells capable of producing 1MW of power .

3) Project Description

The complex will include a Solar PV production plant. The project will be implemented in partnership with the State Agency for Alternative and Renewable Energies.

5) Marketing Strategy

Market Size: The market for Solar PV is small but growing. According to the International Energy Agency, current production in the region could be 2 Gwh.

Key Customers: The main Azerbaijani consumer of the PV cells will be the state company, Azerishiq, and construction companies. The plant will also serve the regional market of Georgia and Kazakhstan.

Key Competitors: There are no known competitors.

Cost and Return on Investment to Consumer.

General Information	
Currency	EUR
Useful life (years)	25
Nominal power (kWp)	5
Annual Yield *per kWp*(kWh/kWp)	871
Degradation (%/year)	0.5
Proposed Feed in tariffs	
Years	20
Price (per kWh)	0.2
Index linked	0
Own consumption	
FIT subsidy (€/kWh)	0
Own consumption (kWh/year)	0
Electricity price projection	
Price now (per k h)	0.18
Energy Price Inflati n (%/year)	3

Setup cost (all in)	
Price (per kWp)	50

Running cost	
Lease (€/year)	0
Insurance prem. (%)	0.5
Maintenance (%)	0.5
Inflation rate (%/year)	2

6) Production, Manufacturing Operations Overview

A PV cell consists of two or more thin layers of semi-conducting material, most commonly silicon. When the silicon is exposed to light, electrical charges are generated. The electrical output from a single cell is small, so multiple cells are connected together and encapsulated (usually behind glass) to form a module (sometimes referred to as a “panel”).

The PV module is the principle building block of a PV system and any number of modules can be connected together to give the desired electrical output.

PV equipment has no moving parts and as a result requires minimal maintenance and is virtually silent.

The main types of PV cell are:

- Monocrystalline silicon cells - principle advantage is high efficiency, typically around 15%, although manufacturing process is higher cost than other technologies.
- Multicrystalline silicon cells - cheaper to produce than monocrystalline ones, due to the simpler manufacturing process. However, they tend to be slightly less efficient, with average efficiencies of around 12%
- Thick-film silicon - another kind of multicrystalline technology
- Amorphous silicon - absorbs light more effectively than crystalline silicon, so the cells can be thinner. For this reason, amorphous silicon is also known as a "thin film" PV technology, and is ideal for curved surfaces and "fold-away" modules. Efficiency is however sacrificed, with typical efficiencies of around 6%, but they are easier and therefore cheaper to produce.

R&D focuses on scaling up the mass production processes for mono- and multicrystalline solar modules, which currently have an 85% market share worldwide. There is also a focus on developing and improving thin film cells and production technology, including a number of other promising materials such as cadmium telluride (CdTe) and copper indium diselenide (CIS), which could potentially be manufactured by relatively inexpensive industrial processes and are typically more efficient that amorphous silicon.

7) Project Management and Organization Structure

The Project will be led by the State Agency on Alternative and Renewable Energies, with support from AZPROMO.

8)Project implementation schedule

The project will take up to 1 year to be realized, from initial creation of project team, and implementation. Return on Investment will be 3 years.

Project Implementation				
	Year 0,25	Year 0.5	Year 0.75	Year 1
Project Team				
Location review and acquisition				
Site operations construction				
Asset Procurement				
Asset Implementation				

9)Balance sheet

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To create a Solar PV production plant, capable of making 1MW of Cells, will require an investment of approximately USD 3.8 Million. These calculations are based on the US Energy Administration estimates of USD3,873 capital cost per Kwh.

Estimated Project Balance Sheet			
	Year 1	Year 2	Year 3
Assets US$ Million			
Land	0.5	0.5	0.5
Building	1	1	1
Equipment	2	2	2
Total Assets			
Liabilities	3.8	1.8	0
Owners Equity	0	2	3.8