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Techno-Economic Model and Feasibility Assessment of Utility Scale Solar Power Plant in Nepal

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Abstract: This research presents a comprehensive analysis of the techno-economic feasibility of utility-scale solar power projects in Nepal. With Nepal's growing economy and increasing electricity demand, the need for diverse and reliable energy sources becomes evident. This study focuses on a 5MW grid-connected solar PV plant, assessing its technical viability through site selection, design considerations, and energy yield estimation. The selection and sizing of various components, such as PV modules, inverters, transformers, LT panels, AC and DC wires, and protection devices, are carried out meticulously through calculations, including conductor selection, to facilitate power evacuation to the substation. This technical assessment will aid in understanding the technological requirements for the establishment of a solar power plant in Nepal. Additionally, the economic analysis covers capital and operational expenditures, revenue generation, and key financial indicators such as Project IRR, Equity IRR, NPV, and LCOE. Similarly, the analysis of energy generation over a 25-year period is conducted to comprehend the correlation between project size and revenue generation. By integrating technical and financial evaluations, this study demonstrates that large-scale solar projects are both technically sound and financially viable within Nepal's context. These findings offer valuable insights for developers, policymakers, and researchers, fostering informed decision-making for the country's energy future and could be part of the national strategy.

Keywords: Utility Scale Solar Power Plant, PVsyst, Helioscope, Meteonorm, AutoCAD, Single Line Diagram

1. Introduction

Nepal is experiencing a positive trajectory in its economic development, leading to an anticipated increase in electricity demand in the future. The country heavily relies on hydropower for its electricity generation. However, a significant portion of Nepal's hydropower projects follow the Run-off-River type, with a design discharge of Q40% to Q50%. This means that during the dry months (approximately six months per year), these projects can only generate around 40-50% of their full capacity, resulting in severe power shortages during this period. Moreover, since many of Nepal's rivers are fed by snow, the adverse effects of climate change are likely to impact hydro projects negatively. To address these challenges, the Ministry of Energy, Water Resources, and Irrigation (MoEWRI) released guidelines in February 2018 for the Development of Alternative Electricity Connected to the Grid [1]. This initiative opened up opportunities for the utility to procure electricity from sources such as solar, wind, and bioenergy, diversifying the country's energy mix and reducing its reliance on hydropower during the dry months. The grid-connected utility-scale solar PV plant produces electricity and injects its output to the grid. If the capacity of solar photovoltaic plant increases to the megawatt range, it could significantly enhance Nepal's power reliability. This would decrease the country's reliance on hydropower while also providing a solution to the reduced power generation during the dry hydropower season. Over the last few years, utility-scale solar PV power plants have been developed and built in Nepal, albeit at a relatively gradual pace. Most of these power plants are in licensing phase and some have already started production and have been feeding the electricity to the grid. As of August 2023, twelve Projects with a capacity of 58.38 MW have been feeding electricity to the grid, forty solar PV projects have acquired the survey license totaling to the projected production of 705 MW. Similarly fourteen solar PV projects contributing to a total of 99.36 MW have been granted construction license from Department of Electricity Development (DoED) [2].

Nepal possesses a remarkable potential for harnessing solar energy, characterized by an average of 300 sunny days and 6.8 hours of sunshine [3]. The specific solar photovoltaic (PV) electricity output capacity in the country falls within the range of 1400 kWh/kWp to 1600 kWh/kWp, resulting in an average daily total ranging from 3.8 to 4.4 kWh/kWp [4]. The mountainous regions, with their higher elevations and cooler air temperatures, exhibit even greater potential for PV energy yield. In light of these favorable conditions, the World Bank identified the hills and lower-elevation Mountains with optimal Global Horizontal Irradiance (GHI) and lower temperature as the most suitable areas for solar PV system development in Nepal in 2017. According to the Solar and Wind Energy Resource Assessment (SWERA) report by the Alternative Energy Promotion Center (AEPC), the estimated commercial potential for on-grid solar PV system in Nepal is 2,100 MW, as cited by UNEP/GEF in 2008 [5].

2. Objective and Methodology

The main objective of this research is to access the techno-economic viability for implementing utility scale solar projects in Nepal. In this research the technical and financial components involved in developing a utility-scale solar plant in Nepal were accessed. The technical aspects incorporates site assessment, technology selection options, solar resource assessment, design considerations, plant design, energy yield estimation and power evacuation plan. Meanwhile, the financial aspects encompasses project cost, revenue, income and cash flow. Ultimately, this study aims to provide valuable insights into the viability and best practices for solar projects in Nepal.

A series of steps and assumptions are done for conducting this research study. Initially, the land/area is selected for the study of solar PV system. The effective area for project sizing is calculated and designed through Helioscope. Monthly solar insolation values are obtained from Meteonorm. Simulation of designed PV system is made using PVSYST software. AutoCAD is employed to develop Single Line Diagrams (SLD). Consequently, a distinct spreadsheet is developed to carry out the financial analysis of the project.

3. Technical Assessment

3.1. Site Selection

The site's location was carefully chosen to ensure consistent solar radiation throughout the year and the sizing was done using Helioscope and Google Earth. The selected study site is situated in Godawari Municipality of Kailali District, Nepal (28.786422, 80.505842). The total area of the land is approximately 91,211.4 square meter and is located approximately 3.8 km from the East West Highway and 4.2 km from Mahakali Highway with access to the site area with motorable road, which connects directly with the East West Highway. The distance from the nearest population center Attariya, which is also a supply center, is approximately 5.5 km from the project site. Although the site would require Geological Survey, Topographical Survey and Initial Environmental Examination (IEE), during project development, these steps were not carried out for this research. Figure 1 illustrates the layout of the solar plant, featuring an office room, control room, switchyard, and space designated for the installation of lightning arrestors.

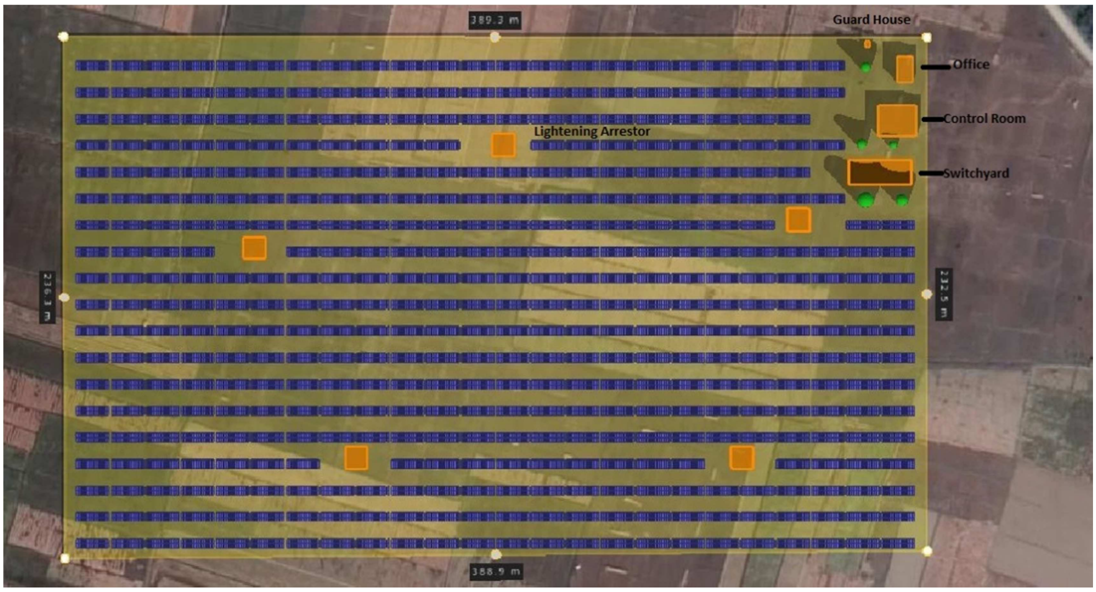

Figure 1. *Plant Layout.*

3.2. Climatic Characteristics

Site selection and planning of PV power plants requires reliable solar resource data. Power production depends linearly on the plane of array irradiance, at least to a first approximation. The solar resource of a location is usually defined by the values of the global horizontal irradiation, direct normal irradiation, and diffuse horizontal irradiation [6]. As there is no ground weather station available on the site that measures all required solar irradiation data, the data for the proposed site has been sourced from Meteonorm, which allows access to historical time series of irradiation, temperature, humidity, precipitation, and wind which contains archives of hourly data as illustrated in Figure 2. PVGIS, NASA-SSE and other solar irradiation datasets are also popularly used to estimate solar irradiation data.

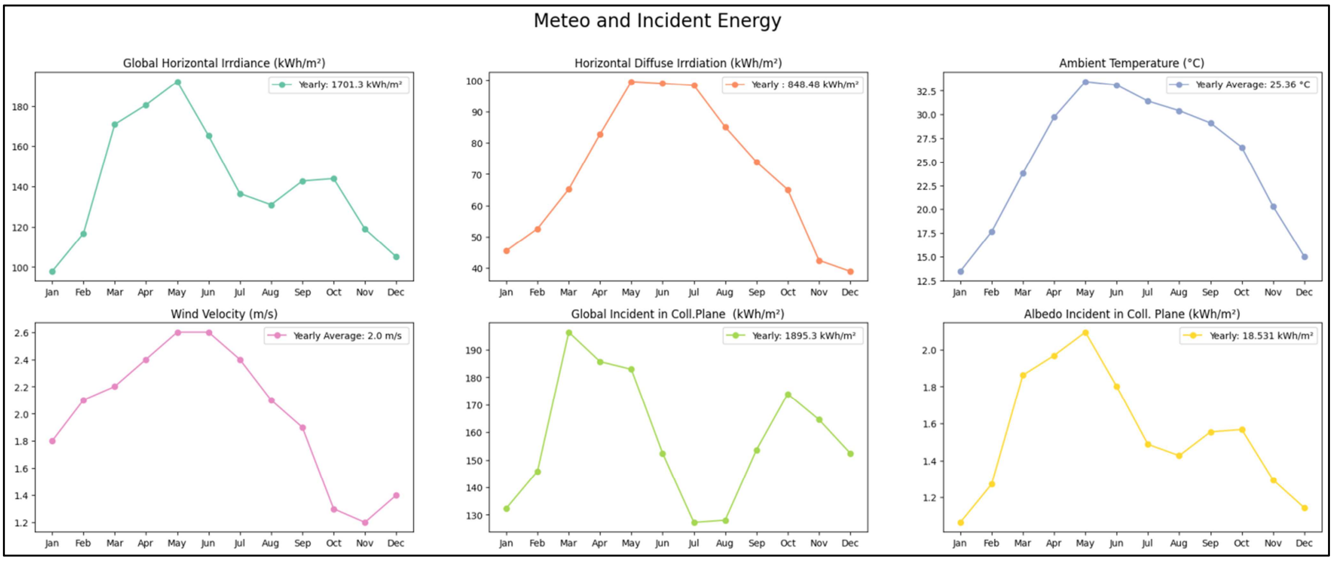

Figure 2. *Meteo Data of the Site.*

3.3. DC Components of Utility Scale Solar Plant

3.3.1. Solar PV Module

432 strings each containing 26 modules in series were used to design the solar Plant. The "Pitch", which is the ground distance between adjacent sheds, is optimized at 8 m to allow for minimum inter-row shading on adjacent solar panels [7]. The total number of 11,232 Monocrystalline PV Modules of 540Wp rating, 42.57 Vmp and 21.32% efficiency (STC) has been considered to convert the solar energy into DC electricity. The specification of the selected module is presented in Table 1.

Table 1. *Technical Datasheet of the Selected PV Module.*

Description	Parameter
Solar PV Module	Monocrystalline
Peak Power Watt-Pmx	540Wp
Maximum Power Voltage-Vmpp	41.55 V
Maximim Power Current-Impp	13.00 A
Open Circuit Voltage-Voc	49.50 V
Short Circuit Current-Isc	13.81 Q
Module Efficiency	20.90
Solar Cells	144
Cell Orientation	Fixed
Module Dimensions	2278 mm*1134 mm*35 mm
Weight	27 Kg
Temperature Coefficient of Pmax	-0.34%/°C
Temperature Coefficient of Voc	-0.26%/°C
Temperature Coefficient of Isc	0.05%/°C
Operational Temperature	-40 to +85

3.3.2. Grid Connected Inverter

20 units of 250 kW Grid –Interface String Inverter with 12 inbuilt Maximum Power Point Trackers (MPPT) and high voltage capacity up to 1500 Vdc & 800 Vac has been considered to convert DC to three phase AC electricity. String inverters are selected for allowing quick and easy maintenance by swapping out defective units, thus lowering project outage time. The specification of the selected inverter is presented in Table 2.

Table 2. *Technical Datasheet of the Selected String Inverter Module.*

Description	Parameter
AC output Power	250kVA
Max. AC Output Current	180.5 A
Nominal AC Voltage	800 V
Max. PV Input Voltage	1500 V
Min. PV Input Voltage/Start-Up Input Voltage	550 V
Nominal PV Input Voltage	1150 V
Max. PV Input Current	312 A
Dimensions	990*643*275 mm
Weight	90 Kg

3.3.3. DC Cable

During the sizing of cable, appropriate calculations is done to determine the suitability of the cable for use. The majority of solar modules used in grid-connected systems are fitted with a pair of cables pre-wired with a plug and socket to interconnect the modules in a string. These cables are known as string cables. These cables are usually available with nominal area of 2.5mm^2 to 6mm^2. The string cables are terminated in a junction box generally called array junction box (or combiner box). The maximum voltage rating of any cable must never exceed. After evaluating the maximum current of the string and the correction factor, the PV string cable of 4 mm^2 is selected between PV strings and inverters.

3.3.4. Lightning Arrestor

Early Streamer Emission (ESE) air terminals type lightning conductor are employed in the solar plant. This type of ESE are proactive structural lightning protection devices and are designed to activate in the moments directly preceding an imminent direct strike. The installation of ESE air terminal provides direct path ground of a conventional lightning protection system. The protection radius (Rp) of the ESE terminal selected here is calculated using the NF C 17-102 standard for lightning devices. The ESE is a versatile device capable of providing dynamic protection levels for different heights and Rp with a singular device. Total five number of ESE lightning protection will installed at mast heights of 5 meters to provide protection for the solar power plant. They will also provide protection for the electrical room as well as the switchyard bay area. The technical specifications of the proposed lightening arrestor are specified in the Table 3.

Table 3. *Technical Specification of Lighting Arrestor.*

Standard Used	Specifications
IEC 62561-1, 62561-2 and 62561-7	ESE TYPE 107 m protection Delta T of 60 micro seconds 2 Earthpits for every LA. Mast to base, 95 Sq.mm Aluminium cable, base to earthpit 25*3 mm GI Strip Protection level 3, mast height of 5 meters NF C 17 – 102 Standard

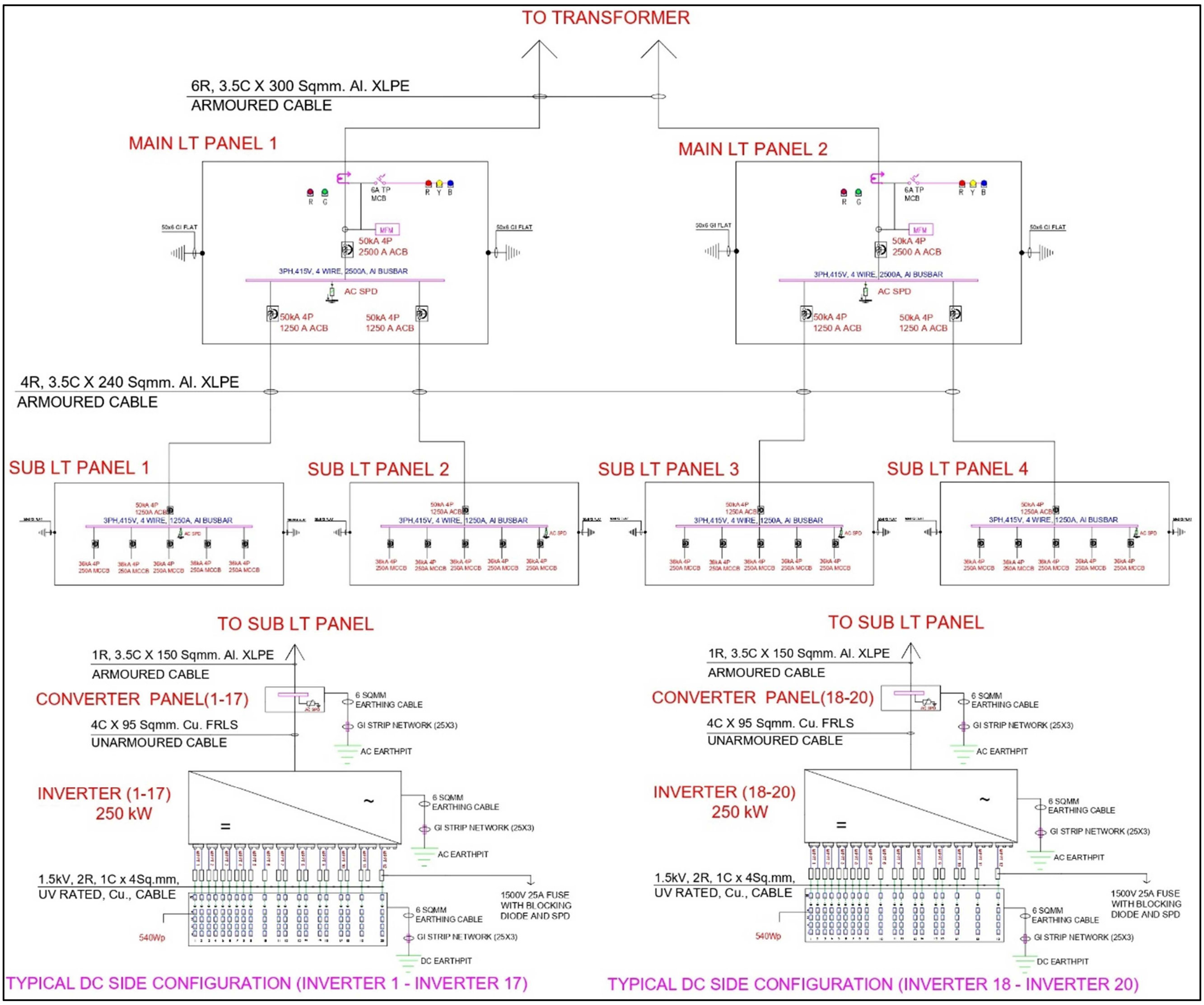

Figure 3. *Electrical connections in LT side.*

3.3.5. Array Mounting Structure

The installation of module mounting structures is of paramount importance for the establishment of a robust, enduring, and high-performance solar power plant. Prior to commencing the installation of module mounting structures, the foundational elements of these structures must be thoroughly assessed. The foundation can be constructed using various methods, such as pile foundations or ramming, among others. A strong foundation is the key to a table mounting structure. 432 mounting structures are required for this research project which would be safe for below 150 kmph wind speed at 27 degree tilt angle. Pile foundation of 350 mm diameter, for the depth of 2.5 meter is recommended.

3.4. AC Components of Utility Scale Solar Plant

3.4.1. LT Panel

Five string inverters are connected to a single SUB LT panels. Four number of SUB LT panels are used in the design. The output from these SUB LT Panels is connected to Main LT Panels. Two Main LT panels each consisting the input from two SUB LT panels is used in the project. LT panel consist of MCCB, MCB, Busbars and Breakers of appropriate rating.

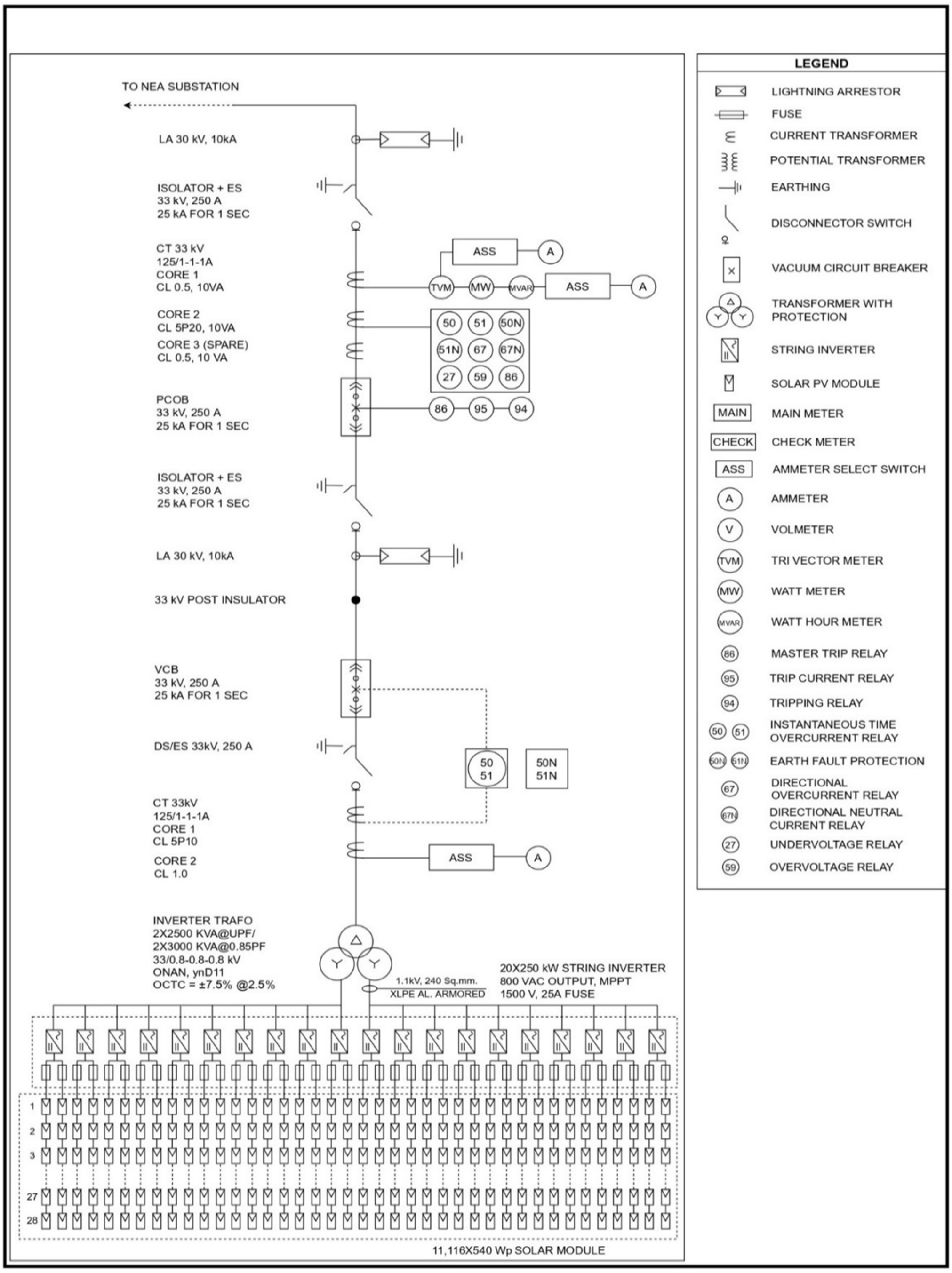

Figure 4. *Single Line Diagram of the PV Plant.*

3.4.2. Transformer

In general, the inverter supply power at low voltage. But for a commercial solar power plant, grid connection is typically made of 33kV (HV levels). It is therefore necessary to step up the voltage using a transformer between the inverter and the grid connection point [8]. Therefore, two numbers of 0.8/33kV 2.5 MVA, 3-phase, double-winding Step-Up Transformer are used to step up the 800 Vac inverter output Voltage to 33kVac. The secondary of these two transformers are connected to a 33kV Circuit Breaker and all necessary protection for safety.

3.4.3. AC Cables

The description of the cable used in LT side is shown in Figure 3 whereas, the description of cable used in HT side is shown in Figure 4.

3.5. Single Line Diagram of Plant Side

Figure 4 demonstrates the SLD of the utility scale solar power plant designed for the research study. The rating and sizing of different protection devices and instruments are shown in the figure. Additionally, the figure displays the names of the instruments and their corresponding symbols.

3.6. Single Line Diagram of Substation

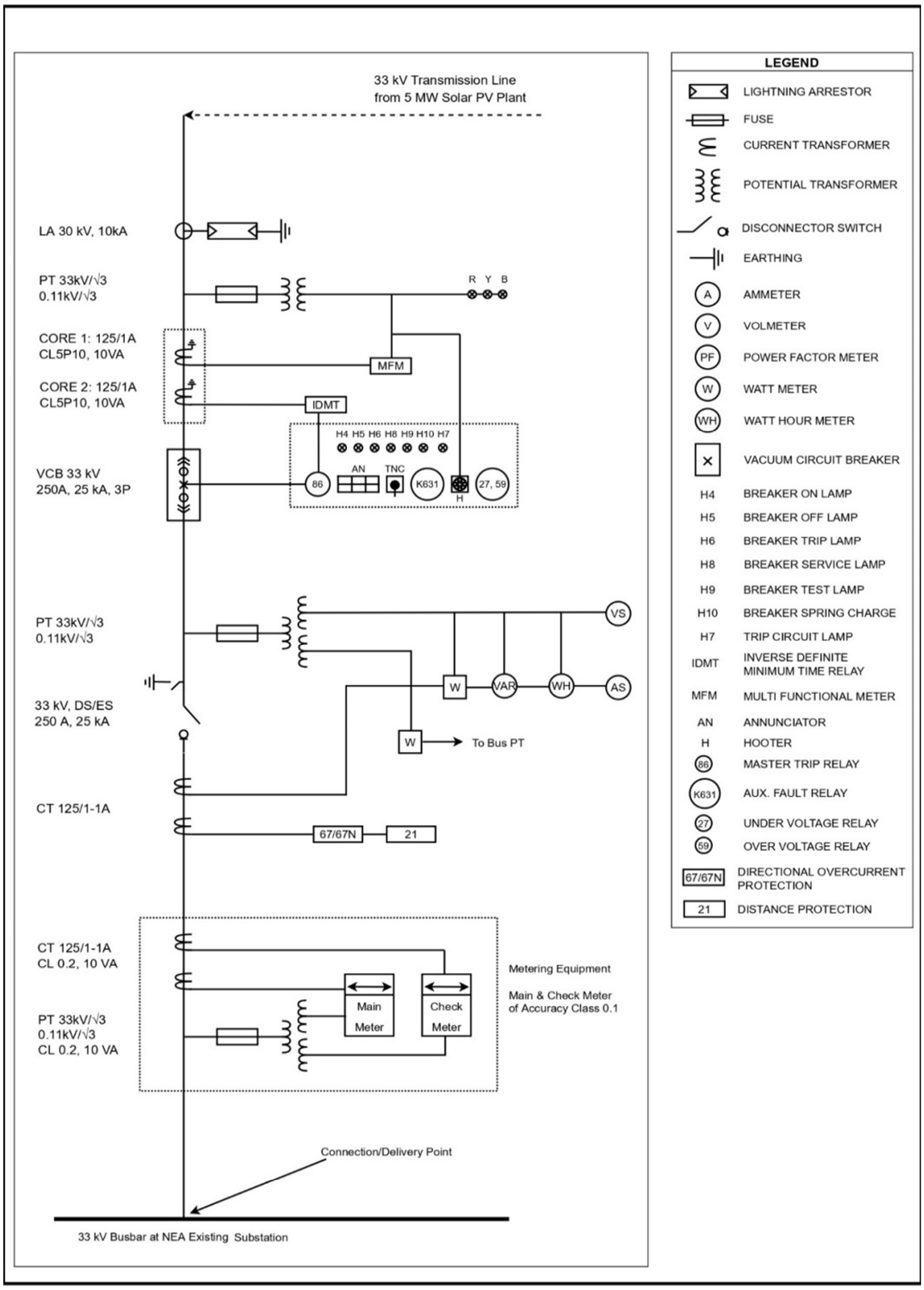

Figure 5. *Single Line Diagram of Substation.*

3.7. Power Evacuation Plan

Power from the designed solar plant is evacuated through a 33kV transmission line to NEA (Nepal Electricity Authority) owned Attariya substation which is approximately 8.55 km far from proposed power plant. The sizing of the transmission line is done through Economic Voltage Calculation as follows.

$$\text{Economic Voltage } (V_{eco}) = 5.5 * \sqrt{(Lt/1.6 + (P * 1000)/(COS\emptyset * Nc * 150))} \quad (1)$$

Where, Lt is the Length of Transmission Line = 8.55 km; P is Power to be Transmitted = 5 MW; Nc is Number of Circuit = 1 and $\cos\emptyset$ = 0.98. Calculating using above parameters we get the value of Economic Voltage of 34.5 kV which is the nearest standard Voltage of 33 kV. Again, the Surge Impedance of the overhead Line, Surge Impedance Loading and Power Limit are calculated by using following formulas.

$$\text{Surge Impedance of the overhead line } (Z_L) = 400/N_C \quad (2)$$

$$\text{Surge Impedance Loading (SIL)} = V_2/Z_L \quad (3)$$

$$P_{limit} = \text{Multiplying Factor (mf)} * \text{SIL} \quad (4)$$

From equations 2, 3 and 4 the values of ZL, SIL and P_{limit} are 400 Ω, 2.7225 MW and 7.14 MW. Since the value of P_{limit} is greater than 5 MW, therefore 33kV single circuit transmission line is used for evacuating the power to Attariya Substation. Likewise the transmission losses should be at an acceptable limit to yield maximum returns from the project. The transmission losses should be at an acceptable limit to yield maximum returns from the project. The Line Current is calculated by using the following formula.

$$\text{Line Current (I)} = P/(1.7 * V_L * \cos\emptyset * Nc) \quad (5)$$

The value of line current obtained from formula 5 is 92.1 Amps. Table 4 shows the calculation of transmission line efficiency for different conductor options.

Table 4. *Transmission Line Efficiency Calculation for Different Conductor Options.*

Conductor	Resistance at 20°C R (20) (Ω/km)	Linear Coefficient of expansion (a) (10^-6)(/°C)	Resistance at 65°C R (65) (Ω/km)	Total Resistance at 65°C Rt (65) (Ω)	Power Loss During Transmission (Ploss) (MW)
MOLE	2.7057	19.31	2.708051118	2.6538901	0.589201017
SQUIRREL	1.3677	10.31	1.368888463	1.34151069	0.297834287
WEASEL	0.9075	19.31	0.908288572	0.8901228	0.197619811
RABBIT	0.5425	19.31	0.542971405	0.53211198	0.118136361
DOG	0.2733	19.86	0.273544248	0.26807336	0.059516066

Based on the evaluations, DOG conductor is deemed ideal for the transmission line as it offers efficiency greater than other conductors. Furthermore, it is the most used type of conductor in a 33kV line of Nepal [9]. Therefore, comparing this value of current with the current carrying capacities from standard ASCR conductor table, the efficiencies for different conductor types were evaluated. Based on the evaluations, DOG conductor is deemed ideal for the transmission line as it offers highest efficiency.

4. Energy Yield Estimation

There are many simulation software that are commonly used to design Solar PV systems worldwide such as Homer Pro, PV.

F – Chart, PVsyst, RET screen, System Advisor Model (SAM), Solar Pro etc. [10]. Due to its widespread used and higher reliability PVSyst has been selected for this research study [11]. The annual energy yield simulation has been performed using PVsyst for the plant capacity. The energy that will be injected into the grid annually is shown by the graph in Figure 5.

As per the PVsyst simulation, the average annual energy production that is injected into the grid is 9.4 GWh/year. The annual energy production at P50, P75 and P90 are 9.429 GWh/year, 9.091 GWh/year and 8.786 GWh/year. In Nepal, Department of Electricity Development considers P75 scenario for providing approval.

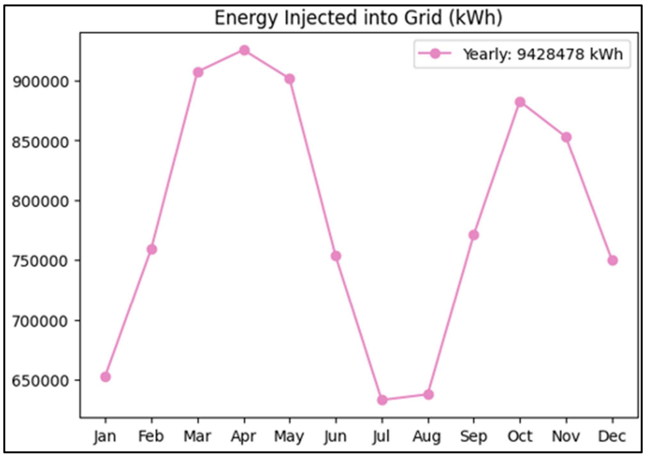

Figure 6. *Energy Injected into Grid.*

4.1. Specific Yield

Specific yield quantifies the amount of energy (kWh) generated per kilowatt-peak (kWp) of module capacity throughout a typical year. Although typical figures can fluctuate between 1,000 kWh/kWp and exceeding 2,000 kWh/kWp, the precise value is influenced by various factors, such as geographical location, weather data, module orientation, module choice, and overall system efficiency [12].

From the PVsyst simulation it was found that this project will have a specific yield of 1499 kWh/kWp/year.

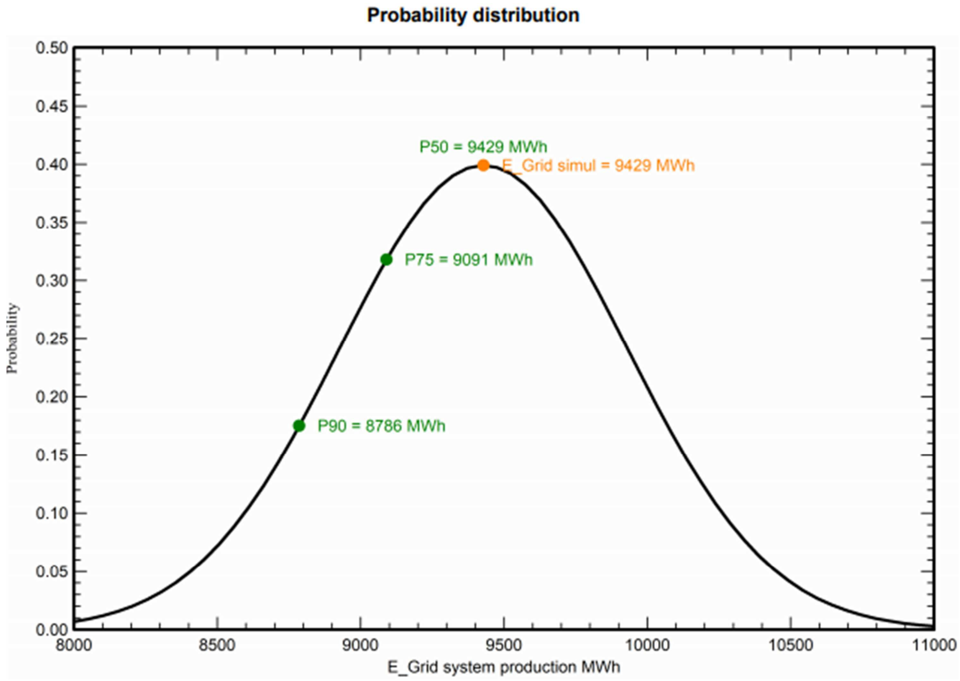

Figure 7. *P50, P75 and P90 Simulation.*

4.2. Performance Ratio

The performance ratio is one of the most important variables for evaluating the efficiency of a PV plant. It is the ratio of the actual and theoretically possible energy output. The performance ratio is the ratio of the energy effectively produced, with respect to the energy which would be produced if the system was continuously working at its nominal STC efficiency [13]. From the PVsyst simulation it was found that the project will have a Performance Ratio of 82.02%.

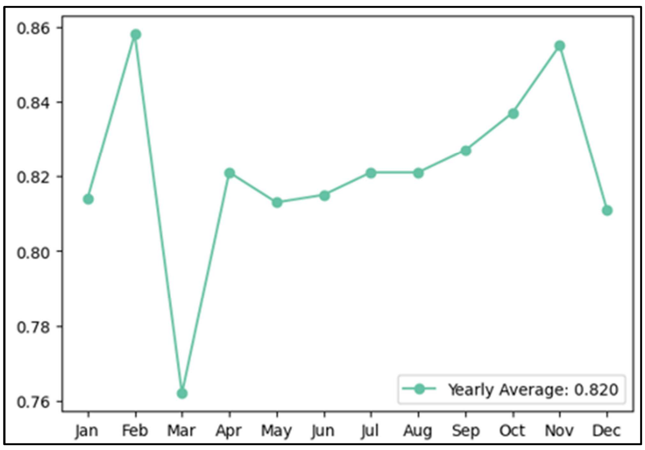

Figure 8. *Performance Ratio.*

4.3. Capacity Utilization Factor

For a Solar Photovoltaic (SPV) project, Capacity Utilization Factor (CUF) is the ratio of actual energy generated by Solar Photovoltaic project over the year to the equivalent energy output at its rated capacity over the yearly period [14]. Annual Energy production at P75 is considered for the calculation of CUF. The CUF of the project has been calculated as follows.

$$CUF = AEP/AEP_{24} \quad (6)$$

Where AEP is the Total Annual Energy Generation form Solar PV Plant = 9.091GWh and AEP_{24} is the Total Annual Energy Generation from solar PV plant if it is operated 24 hours and 365 days, the value of which is 43.80 GWh. From equation 6 the value of CUF is 20.75%.

5. Financial and Economic Analysis

Financial analysis of this project is conducted to determine the key economic and financial performance indicators such as Project Internal Rate of return (PIRR), Equity Internal Rate of Return (EIRR), Net Present Value (NPV), Simple Payback Period (SPP), Specific Average Energy Cost, Levelized cost of electricity (LCOE), sensitivity analysis and Debt Coverage Ratio (DSCR) of the project.

5.1. Capital Expenditure (CAPEX)

The capital investment needed to execute the project is displayed in Table 5, detailing costs in both Nepalese Rupees (NPR). These calculations are based on the current study period and may vary in the future due to fluctuations. A 13% VAT and custom duty are applicable to all components except the PV module, in accordance with the regulations of the Government of Nepal [15]. According to the Foreign Exchange Rate of Nepal Rastra Bank, 132 NPR = 1 USD [16].

Table 5. Bill of Quantities and Cost Estimate of the Entire Project.

S.N.	Particulars	Cost in NPR (Including Customs and Taxes)	% of Total Cost
1	Solar PV Modules	147,900,000	40.18%
2	Central Inverters and Accessories	20,500,000	5.57%
3	PV Mounting and Accessories	20,500,000	5.57%
4	Civil Foundation, Cable Trench & Accessories	12,000,000	3.26%
5	All DC/AC Cables and Wires	8,000,000	2.17%
6	Balance of System (Cable Tray, earthing/ACDB/Isolation AJBs etc)	8,500,400	2.31%
7	Installation & Commissioning up to Low Tension (LT)	5,000,000	1.36%
8	Supply of 33 kV Transformer with Accessories	10,000,000	2.72%
9	Supply of 33 kV Switchyard with Accessories	9,500,000	2.58%
10	Erection of 33 kV Substation	2,000,000	0.54%
11	Supply of 33 kV HT line	2,000,000	0.54%
12	Erection of 33 kV HT line	14,000,000	3.80%
13	Civil Works of HT/LT, Metering Panels	5,100,000	1.39%
14	Land Acquisition	60,000,000	16.30%
15	Land Levelling	1,000,000	0.27%
16	Drainage, Plumbing, and Water Filtration	5,000,000	1.36%
17	Roads	6,000,000	1.63%
18	Boundary Wall, Electric Fencing, CCTV,	11,000,000	2.99%
19	Powerhouse Building/ Enclosure	7,700,000	2.09%
20	UPS Control Room with SCADA & Data Acquisition	4,500,000	1.22%
21	Transport Costs up to Project Site	7,900,000	2.15%
	GRAND TOTAL COST	368,100,400	100%

5.2. Operational Expenditure (OPEX)

The detail description of the OPEX is shown in the Table 6.

Table 6. Operational Expenditure.

S.N.	Particulars	Description	Remarks
1	O&M Cost	0.5% of revenue per annum	O&M inflation rate was assumed 5% per annum
2	Insurance Cost	0.25% of the revenue per annum	
3	Royalty	No Royalty in capacity and revenue	
4	Depreciations	4% straight line per annum	Equipment salvage value assumed zero based on 4% annual depreciation.
5	Reserves	1% of the revenue	0.5% major maintenance cost and 0.5% for Debt Service Reserve Account (DSRA)
6	Bonus and Welfare	0%	
7	Interest on Debt	10%	Loan term is 10 years

5.3. Revenue

Revenue will be generated from sales of solar energy. Total saleable energy of the project would be 218.04 GWh. The tariff rate set by Nepal Electricity Authority (NEA) is fixed to NPR.7.30 per unit (i.e., NPR. 7.30 per kWh). This is fixed rate for 25 years and there is no escalation on this rate. The energy degradation or loss is taken 2% for 1st year and 0.2% for each year afterwards.

Table 7. Revenue of Solar Project for Lifetime.

Year	Year After COD	Tariff (NRP)	Energy (GWh)	Adjusted Revenue in NPR (In Lakhs)
0	-	-	-	-
1	-	-	-	-
2	1.00	7.300	9.09	663.57
3	2.00	7.300	8.91	650.30
4	3.00	7.300	8.89	649.00
5	4.00	7.300	8.87	647.70
6	5.00	7.300	8.85	646.40
7	6.00	7.300	8.84	645.11
8	7.00	7.300	8.82	643.82
9	8.00	7.300	8.80	642.53
10	9.00	7.300	8.78	641.25
11	10.00	7.300	8.77	639.97
12	11.00	7.300	8.75	638.69
13	12.00	7.300	8.73	637.41
14	13.00	7.300	8.71	636.13

Year	Year After COD	Tariff (NRP)	Energy (GWh)	Adjusted Revenue in NPR (In Lakhs)
15	14.00	7.300	8.70	634.86
16	15.00	7.300	8.68	633.59
17	16.00	7.300	8.66	632.33
18	17.00	7.300	8.64	631.06
19	18.00	7.300	8.63	629.80
20	19.00	7.300	8.61	628.54
21	20.00	7.300	8.59	627.28
22	21.00	7.300	8.58	626.03
23	22.00	7.300	8.56	624.78
24	23.00	7.300	8.54	623.53
25	24.00	7.300	8.52	622.28
26	25.00	7.300	8.51	621.03
	Total		218.04	15,917

5.4. Financial Outputs

A financial model is developed to analyze the financial performance of the project based on a given set of input data and assumptions. The Debt Equity Ratio is taken as 70:30. The loan term is for 10 years. The interest rate for debt is assumed at 10% and discount rate is also assumed at 10%. The financial analysis and modelling exercises assess the investment costs such as the operating revenues generated, and costs incurred by the project. To achieve this, a computer financial model using the MS-Excel was developed considering the prevailing tax and tariff rate. The figures in the table are in Nepalese Rupee (NPR) and 1 lakhs = NPR 100,000.

Table 8. *Financial Output Parameters.*

Output Parameters 1		
Base Project Cost	384,664,918	95.00%
IDC	17,009,181	5.00%
Financing fee	1,370,408	0.35%
Total Project Cost after Financing	403,061,155	100.00%
Output Parameters 2		
Total Equity	120,918,347	30%
Total Debt	282,142,809	70%
Total Project Cost	403,061,155	100.00%
Output Parameters 3		
Project IRR	12.57%	
Equity IRR	13.68%	
DSCR Minimum	1.15	
Average DSCR	1.19	
Equity NPV	55,301,000	
Equity B/C Ratio	1.50	
LCOE	6.42	
Simple Project Payback	7.15	

6. Conclusion

A comprehensive study is conducted for a 5MW grid-connected solar power plant. The study encompassed various technical aspects including plant layout, sizing of AC and DC components, electrical diagrams, power evacuation and energy yield estimation. The findings strongly indicate the technical viability of utility-scale solar projects within Nepal. Additionally, the Economic analysis involves CAPEX and OPEX evaluation, in conjunction with considerations about revenue generation. Financial analysis yielded essential metrics such as Project IRR, Equity IRR, DSCR, NPV and LCOE. Considering the profitability of the project, favorable future cash flows, favorable equity and project IRR, positive DSCR ratio, B/C ratio greater than 1, lower payback period, favorable LCOE ratio (i.e., lower than sales rate) and positive NPV, it can be concluded that the utility scale solar projects are financially feasible in Nepal wherein the input parameters are as per the practice in solar projects and prevailing laws of Nepal. This study not only offers valuable insights into the procedural aspects but also serves as a potential stepping stone for developers, engineers and researchers interested in venturing into solar project development within the Nepalese context.

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