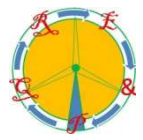




Design of a photovoltaic solar plant: Distributed generation in medium tension to a bar of the electricity substation



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ABSTRACT

The province of El Oro is placed in the south of Ecuador and in the extremal of the electricity distribution network. Thus, it is very far from the electricity production centres, an also from the National Transmission System (SNT) optimal charge point. These facts do that the electricity product is of low quality, and shortages and tension lowering are not unusual. Smart distribution networks would solve these problems, going from a static and unidirectional gestion to another one dynamic and bidirectional [1]. We propose the construction of a photovoltaic solar plant of 1.5 MW to improve quality and quantity of electricity in the area [2].

CONTENT



Figure 1. Localitation of the solar field in Arenillas (El Oro), Ecuador.

Generación Fotovoltaica.



WGS_1984_UTM_Zone_17S
WKID: 32717 Authority: EPSG
Projection: Transverse_Mercator
False_Easting: 500000.0
False_Northing: 1000000.0
Central_Meridian: -81.0
Scale_Factor: 0.9996
Latitude_Of_Origin: 0.0
Linear Unit: Meter (1.0)

Elaborado por:
Ing F. Vladimir Jaramillo G, MSc
Revisado por:
Dr. Oscar Cabeza Gras

Irradiación sobre el plano horizontal

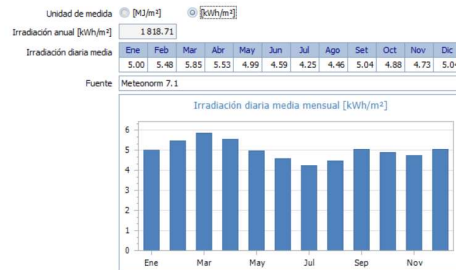


Figure 2. Global solar radiation in the area.



Figure 3. Scheme in S of the solar panels field.

5882 módulo (s) : 5 inversor(es) [1 indiv inv., 3 config.]					
✓ Puede validar la configuración seleccionada:					
2 x Ingeteam SA- Ingecon Sun 250TL B400 : 54 cadena(s) x 23 módulo (s)	Vco (V)	Vmpp (V)	Isc (A)	Pinv / Ppico (%)	Pmax Inv / Ppico (%)
	✓ 977.0	✓ 606.4	✓ 448.2	✓ 78.9	93.1
1 x Ingeteam SA- Ingecon Sun 250TL B400 : 52 cadena(s) x 22 módulo (s)	✓ 934.5	✓ 580.0	✓ 431.6	✓ 85.7	101.1
2 x Ingeteam SA- Ingecon Sun 250TL B400 : 49 cadena(s) x 23 módulo (s)	✓ 977.0	✓ 606.4	✓ 406.7	✓ 87.0	102.6

Figure 4. Configuration and number of the inverters used

Int. Flujo de caja (USD):

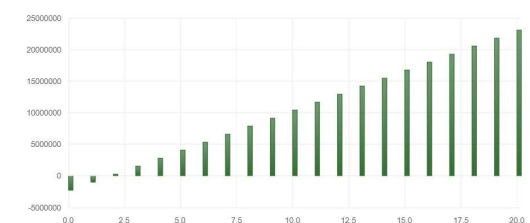


Figure 3. Economical cash flow in 20 years of operation.

RESULTS AND CONCLUSIONS

The geo-localization, physical characteristics of the terrain chosen to install the 1.5 MW photovoltaic solar plant, and the sunny weather all months of the year are all optimal parameters. In addition, the terrain chosen is near an existing electrical substation of the distribution network which guaranties an easy connection with the consumers.

The estimated cost of the investment is about 2.25 million USD, being the return period of only 2 years, and a overall income of 25.3 million USD during the 20 years period of the plant life with a rentability as big as 55,2 % (if future perspectives are right).

It is important to note the tons of GHG saved respecting a similar fuel power plant. In addition, the strengthening of the electrical system in El Oro province of Ecuador to improve the quality of the service and the quantity of electricity available to be used.

REFERENCES

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