



**Project Owner
Pamco**

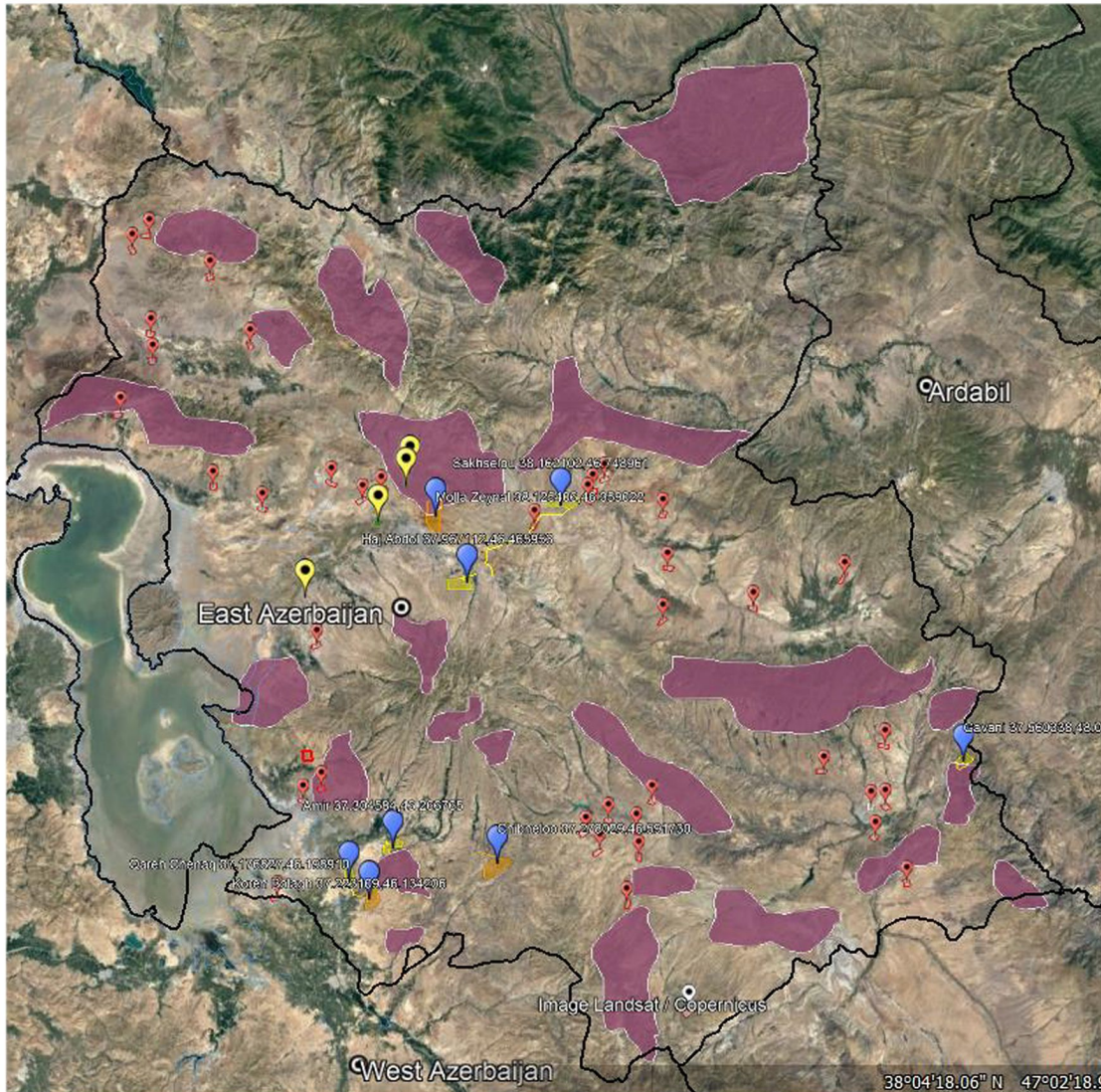


**Project Consultant
Retka co**

Feasibility Studies of the of a
**solar power plant
with a capacity of
1000 MW**

Winter 2022

Geographical location of East Azerbaijan



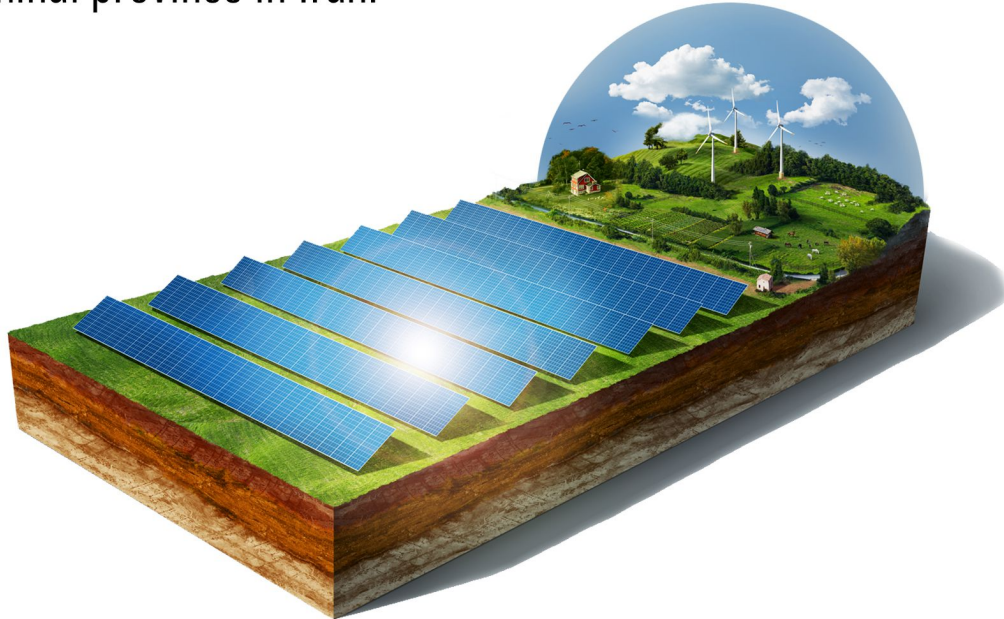
Geographical location of East Azerbaijan

East Azerbaijan is one of the provinces of Iran which is located in the region of Azerbaijan of Iran and was called East Azerbaijan during the Pahlavi rule. This province is the largest and most populous province in the northwestern region of Iran. East Azerbaijan Province is bounded on the north by the Republics of Azerbaijan, Armenia and Nakhchivan, on the west and southwest by West Azerbaijan Province, on the east by Ardabil Province and on the southeast by Zanjan Province. This province has a cold mountainous climate and the whole area of the province is made up of mountains and heights. East Azerbaijan Province covers an area of 45,491 square kilometers. This province is the only province in Iran that borders Armenia and is also the only province in the country that has both the main territory of the Republic of Azerbaijan and the Nakhchivan Autonomous Republic, which belongs to the Republic of Azerbaijan. , Has a common border.



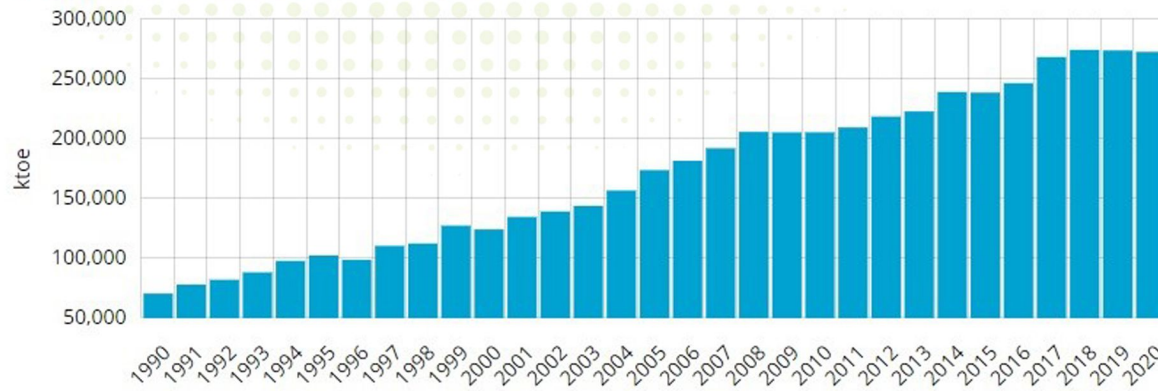
Geographical location of East Azerbaijan

East Azarbaijan province is the junction of two important and main mountain ranges of Iran, namely Alborz and Zagros, and its highest point is the peak of Sahand mountain. The capital of East Azarbaijan province is the metropolis of Tabriz. The important satellite cities of this province have a special governorate (including Maragheh, Marand and Miyaneh). East Azerbaijan ranks first in the country in non-oil exports. It is also the safest and least criminal province in Iran.

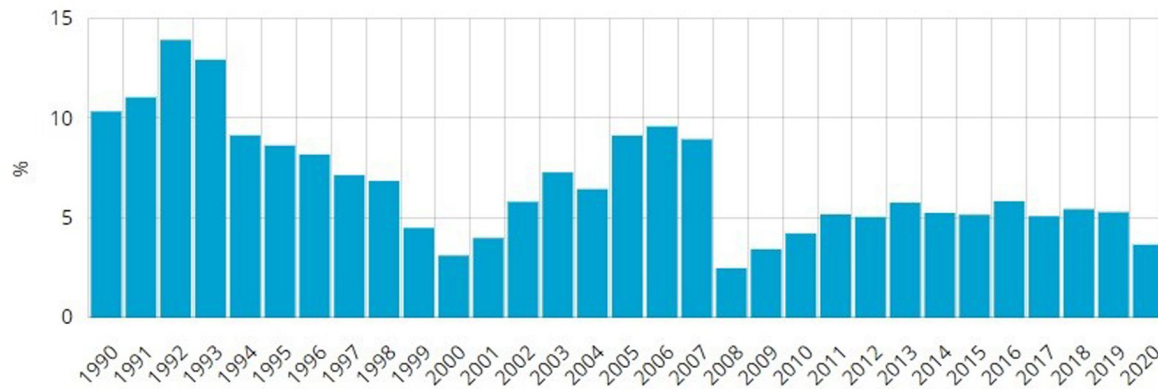


Energy statistics in iran

Interactive Chart Iran Total Energy Consumption



Interactive Chart Iran Share of Renewables in Electricity Production (incl hydro)



Project information

1000MW solar power plant is the largest solar project in Iran ever installed, Iran electric consumption is more than 63000 mwh and it has about 20000 mw demand shortage, load grow prediction in Iran is about 10% annually.

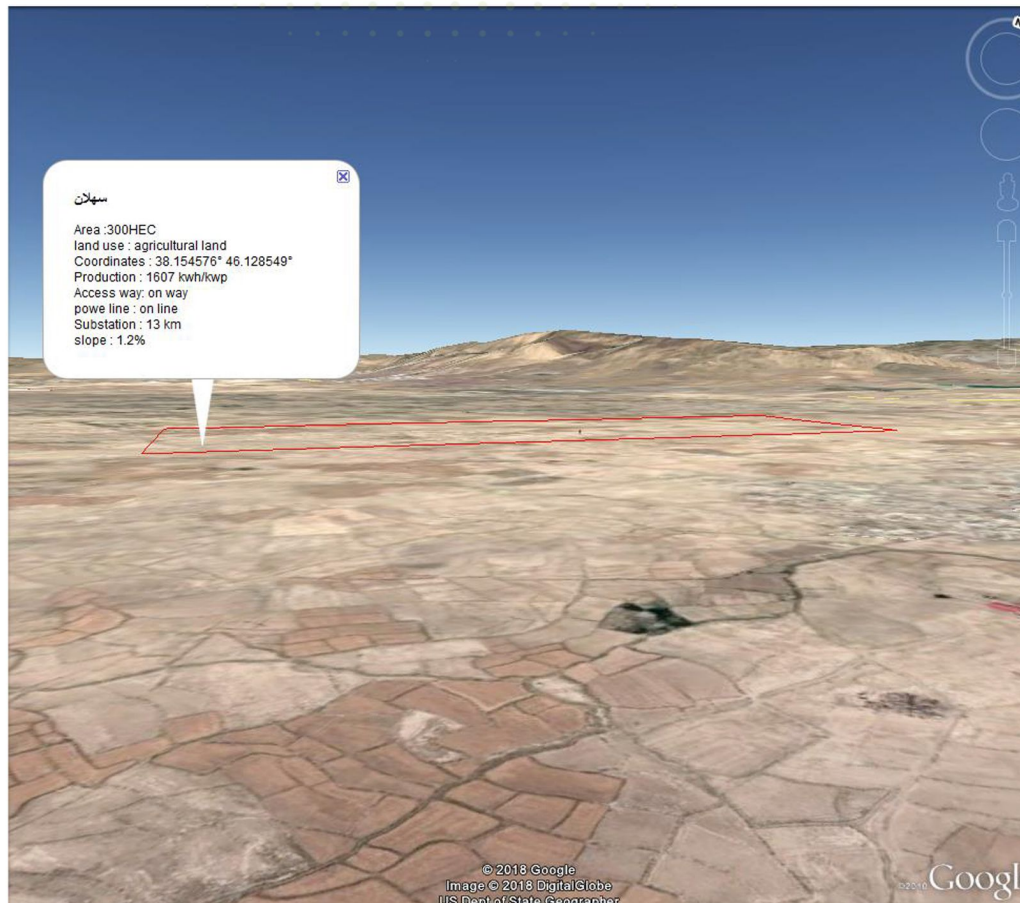
Selected site is nearby Tabriz city in northwest of Iran, it is a flat site with good irradiation.

Site area is about 1500 hectares.



Sahlan Tape Site

The site of the solar power plant with a capacity of 1000 MW is located in the west of the center of the province and at a distance of 13 km from the city of Tabriz.



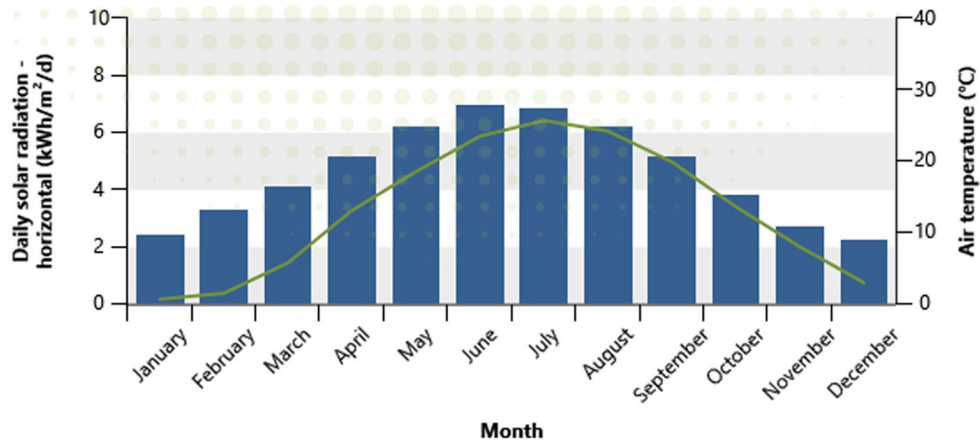
Sahlan Tape Site

This site is located in an agricultural area with a slope of about 1.2% in the west of Tabriz and is not connected by an asphalt road. The line passes through the site and the distance to posts 400kv and 132kv is about 3 km. The amount of radiation in this area is about 1607 and the extractable energy capacity is over 1450 MW.



Site Climate Studies

Month	Air temperature °C	Relative humidity %	Precipitation mm	Daily solar radiation - horizontal kWh/m ² /d	Atmospheric pressure kPa	Wind speed m/s	Earth temperature °C	Heating degree-days °C-d	Cooling degree-days °C-d
January	-2.7	70.1%	39.34	2.03	87.0	4.2	-3.5	642	0
February	-0.4	61.9%	34.94	2.83	86.8	4.6	-2.2	515	0
March	5.2	52.8%	47.12	3.75	86.3	5.8	3.4	397	0
April	11.1	52.3%	60.59	4.81	86.0	6.7	10.9	207	33
May	16.6	47.2%	60.44	6.22	85.8	6.3	16.3	43	205
June	21.9	36.9%	29.28	7.72	85.4	7.7	21.9	0	357
July	26.2	35.0%	19.66	7.61	85.0	9.7	24.2	0	502
August	25.6	33.1%	9.79	6.83	85.2	9.3	22.6	0	484
September	21.2	36.8%	21.21	5.56	85.7	6.5	18.0	0	336
October	13.9	45.9%	34.30	3.83	86.3	4.7	11.7	127	121
November	7.1	62.7%	35.88	2.58	86.7	3.7	4.4	327	0
December	1.0	68.2%	32.49	1.94	86.9	3.9	-1.5	527	0
Annual	12.3	50.2%	425.04	4.65	86.1	6.1	10.6	2,785	2,037

Sahlan Tape Site

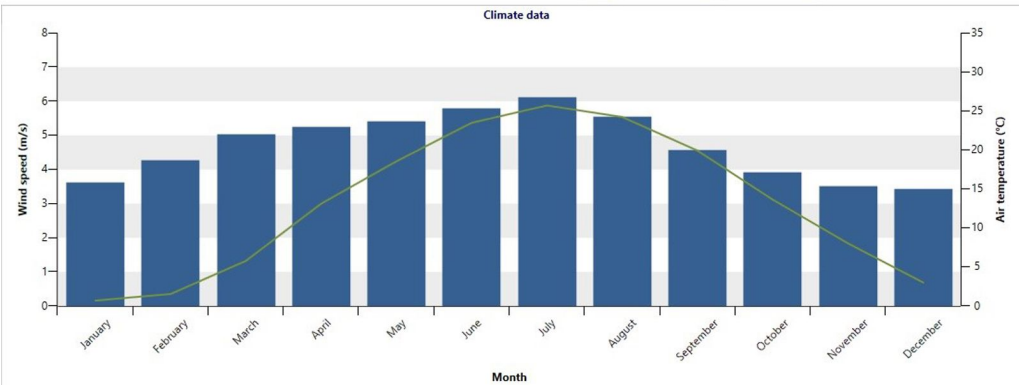


Legend



-  Daily solar radiation - horizontal
-  Air temperature

Measured at

m 10 0



Legend

-  Wind speed
-  Air temperature



Technical studies of the plan Extractable amount of energy from the sun at the site

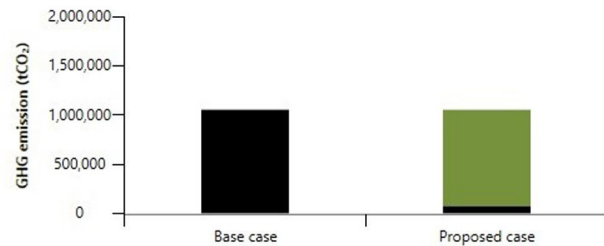
Month	Daily solar radiation - horizontal kWh/m ² /d	Daily solar radiation - tilted kWh/m ² /d	Electricity export rate IRR/kWh	Electricity exported to grid MWh
January	2.03	3.09	25,000	96,084.154
February	2.83	3.77	25,000	104,361.306
March	3.75	4.33	25,000	129,325.943
April	4.81	4.97	25,000	139,808.292
May	6.22	5.90	25,000	166,705.308
June	7.72	6.98	25,000	184,869.467
July	7.61	7.02	25,000	188,273.103
August	6.83	6.88	25,000	184,581.843
September	5.56	6.38	25,000	169,142.923
October	3.83	5.02	25,000	143,182.377
November	2.58	3.94	25,000	112,877.099
December	1.94	3.11	25,000	95,076.941
Annual	4.65	5.12	25,000	1,714,288.755



CO2 Emission reduction

GHG emission

Base case	tCO ₂	1,064,798.4
Proposed case	tCO ₂	74,535.9
Gross annual GHG emission reduction	tCO ₂	990,262.5



990,262.5 tCO₂ is equivalent to 2,302,936.0

Barrels of crude oil not consumed

Gross annual GHG emission reduction (93%)

GHG reduction revenue

GHG reduction credit rate	IRR/tCO ₂	3,000,000.00
GHG reduction credit duration	yr	20
GHG reduction credit escalation rate	%	0.0%
GHG credits transaction fee	%	0.0%
Net annual GHG emission reduction	tCO ₂	990,262.5
GHG reduction revenue	IRR	2,970,787,497.9...

As can be seen from the figure above, the amount of reduction in greenhouse gas emissions resulting from the implementation of this project was about one million tons equivalent to carbon dioxide, which is equivalent to reducing consumption of two million and three hundred thousand barrels equivalent to crude oil in the country and about 2900 billion rials Foreign exchange earnings from the sale of carbon shares have foreign exchange for the province.

Financial Studies

Financial and economic studies for the construction of a solar power plant with a capacity of ten megawatts are presented. First, a review of the project's investment costs, operating costs, and project revenues over the operation period is reviewed. Then, the financial indicators of the project such as internal rate of return, net present value, return on investment period, head-to-head point, etc. are calculated and examined, and the justifiability of the project will be discussed.



Financial Model Assumptions

- The life of the project is 20 years.
- The expected interest rate of investors is 15% equal to the official bank interest.

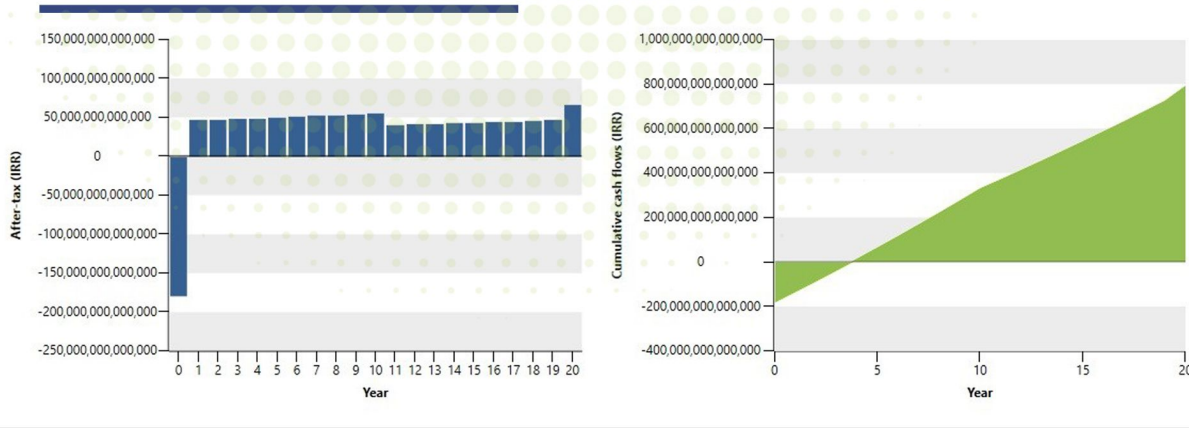
In this project, it is assumed that all the capital required to launch the project will be provided through the investor's cash flow and no financial facilities will be used

Summary financial

Financial viability		
Pre-tax IRR - equity	%	27.5%
Pre-tax IRR - assets	%	27.5%
After-tax IRR - equity	%	26.8%
After-tax IRR - assets	%	26.8%
Simple payback	yr	3.9
Equity payback	yr	3.8
Net Present Value (NPV)	IRR	263,852,017,837,591
Annual life cycle savings	IRR/yr	28,904,058,477,917
Benefit-Cost (B-C) ratio		2.5
Debt service coverage		No debt
GHG reduction cost	IRR/tCO ₂	-29,188,279
Energy production cost	IRR/kWh	12,305



Cash Flow



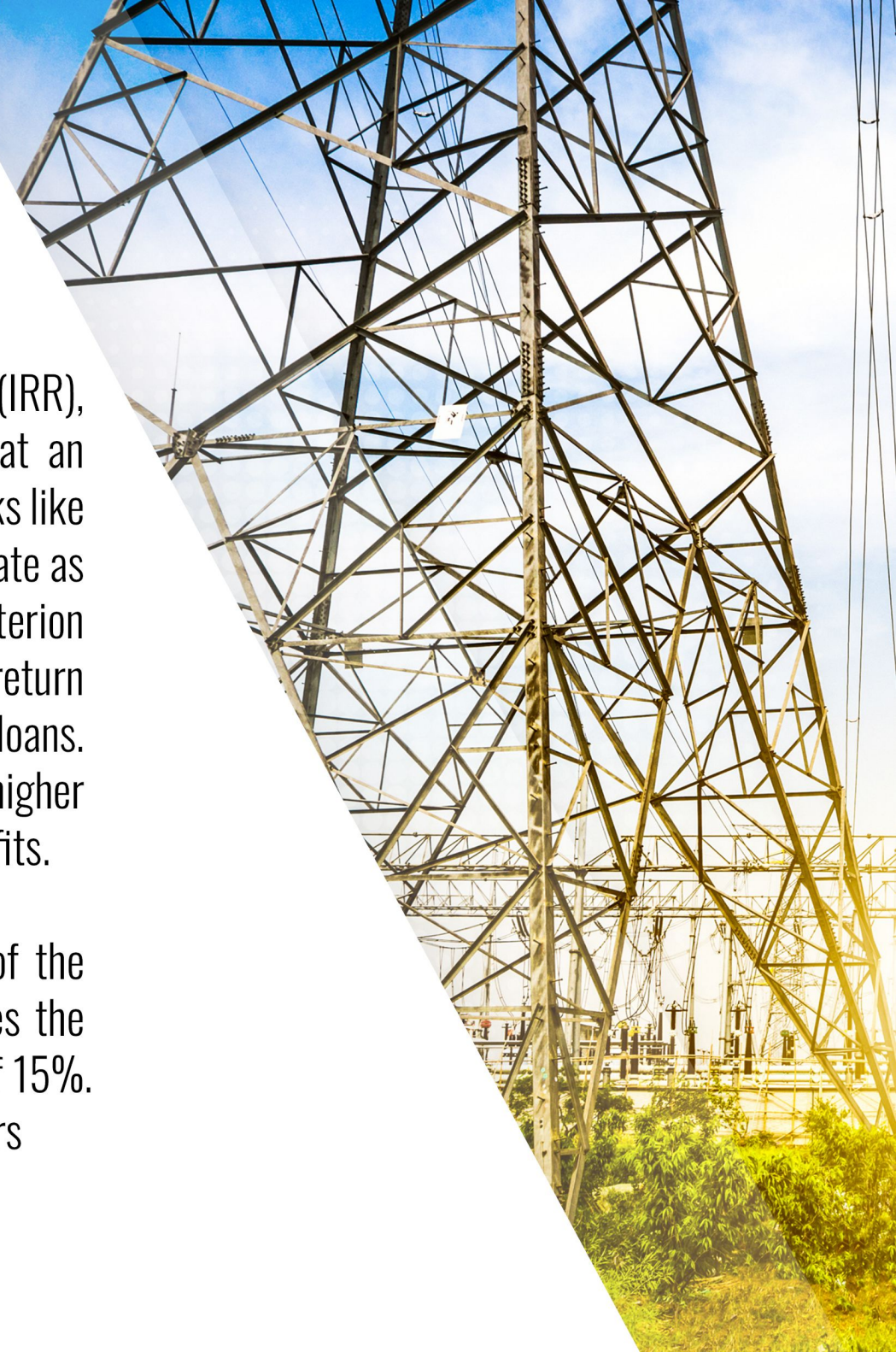
Cumulative Cash Flow in 20 years

Year #	Pre-tax IRR	After-tax IRR	Cumulative IRR
0	-180,000,000,000	-180,000,000,000	-180,000,000,000
1	46,685,150,700	46,685,150,700	-133,314,849,300
2	47,559,438,000	47,559,438,000	-85,755,411,300
3	48,451,211,000	48,451,211,000	-37,304,200,300
4	49,360,819,400	49,360,819,400	12,056,619,200
5	50,288,620,100	50,288,620,100	62,345,239,400
6	51,234,976,700	51,234,976,700	113,580,216,100
7	52,200,260,500	52,200,260,500	165,780,476,600
8	53,184,850,000	53,184,850,000	218,965,326,600
9	54,189,131,200	54,189,131,200	273,154,458,000
10	55,213,498,100	55,213,498,100	328,367,956,100
11	56,258,352,300	40,997,436,300	369,365,392,400
12	57,324,103,600	41,662,632,800	411,028,025,200
13	58,411,169,900	42,346,791,200	453,374,816,400
14	59,519,977,600	43,050,007,900	496,424,824,300
15	60,650,961,400	43,772,395,400	540,197,220,000
16	61,804,564,900	44,514,081,700	584,711,301,700
17	62,981,240,400	45,275,210,300	629,986,512,000
18	64,181,449,500	46,055,939,500	676,042,451,500
19	65,405,662,700	46,856,442,600	722,898,894,100
20	66,654,360,200	66,654,360,200	789,553,254,300

Financial Summary of Projecs

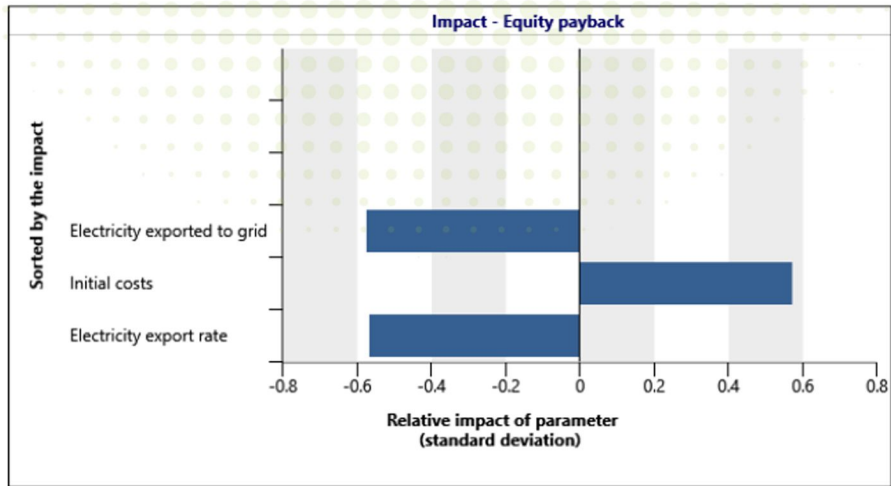
one of the important indicators is the internal rate of return (IRR), which by definition is equivalent to the interest rate that an investor can achieve by investing in a project. In fact, it works like a bank, offering a return on its annual income at the same rate as the IRR. This parameter is used as an important and main criterion in deciding to implement projects. The internal rate of return should be at least equal to the interest rate on long-term loans. The internal rate of return of this plan is 27.6%, which is higher than the amount of profit desired by investors and bank profits.

Another indicator required in the economic justification of the plan is the present value of the plan (NPV), which reaches the amount of 263852017837591 Rials with a discount rate of 15%. The return on investment of this project (BEP) will be 5 years



Risk Analysis

Impact



Rate of return due to project risk effects

Perform analysis on		Equity payback			
Number of combinations		500			
Random seed		No			
Parameter	Unit	Value	Range (+/-)	Minimum	Maximum
Initial costs	IRR	1,811,300,000,000	25%	1,358,475,000,000	2,264,125,000,000
Electricity exported to grid	MWh	17,179.26	25%	12,884.44	21,474.07
Electricity export rate	IRR/MWh	9,100,000.00	25%	6,825,000.00	11,375,000.00
Median				yr	4.9
Level of risk				%	10%
Minimum within level of confidence				yr	4.3
Maximum within level of confidence				yr	5.6



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for your
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