Natural Resources Canada | Ressources naturelles Canada

Canada

RETScreen® International

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Clean Energy Project Analysis Software

Project information

See project database

Project name	Micro Hydro Feasibility Analysis Chiapas
Project location	Las Canastas
Prepared for	Humboldt State
Prepared by	Rachel Rivera Matt Allan Jessica Lamb Meghan Heintz
Project type	Power
Technology	Hydro turbine
Grid type	Central-grid
Analysis type	Method 1
Heating value reference	Higher heating value (HHV)
Show settings	☑
Language - Langue	English - Anglais
User manual	English - Anglais
Currency	Mexico
Units	Imperial units

Site reference conditions

Select climate data location

Climate data location	San Cristóbal de las Casas
Show data	☑

	Unit	Climate data location	Project location
Latitude	°N	16.8	16.8
Longitude	°E	-92.6	-92.6
Elevation	m	828	828
Heating design temperature	°C	13.8	
Cooling design temperature	°C	29.1	
Earth temperature amplitude	°C	10.9	

Month	Air temperature	Relative humidity	Daily solar radiation - horizontal	Atmospheric pressure	Wind speed	Earth temperature	Heating degree-days	Cooling degree-days
	°C	%	kWh/m²/d	kPa	m/s	°C	°C-d	°C-d
January	19.1	71.0%	4.67	92.4	3.1	19.9	0	281
February	20.5	65.6%	5.42	92.3	2.9	21.8	0	294
March	22.0	61.5%	6.20	92.2	2.7	23.8	0	371
April	23.4	62.6%	6.41	92.1	2.2	25.4	0	402
May	23.5	70.3%	6.05	92.0	2.0	25.1	0	419
June	23.0	78.2%	5.55	92.1	2.0	24.0	0	390
July	22.6	76.6%	5.89	92.2	2.4	23.4	0	390
August	22.8	75.0%	5.70	92.2	2.2	23.8	0	398
September	22.4	79.3%	4.99	92.1	2.0	23.2	0	371
October	21.3	79.3%	4.68	92.1	2.5	22.1	0	351
November	20.4	76.0%	4.67	92.2	2.8	21.1	0	311
December	19.3	74.3%	4.46	92.3	3.2	19.9	0	287
Annual	21.7	72.5%	5.39	92.2	2.5	22.8	0	4,264
Measured at (m)					10.0	0.0		

Complete Energy Model sheet

RETScreen Energy Model - Power project

Show alternative units

Proposed case power system

			Incremental initial costs	
Technology		Hydro turbine		
Analysis type		Method 1 Method 2		
Hydro turbine				
Power capacity	kW	0	MXN 17,221	See product database
Manufacturer		American Hydro		
Model		Propeller		
Capacity factor	%	60.0%		
Electricity exported to grid	MWh	1		
Electricity export rate	MXN/MWh	419.00		

Emission Analysis

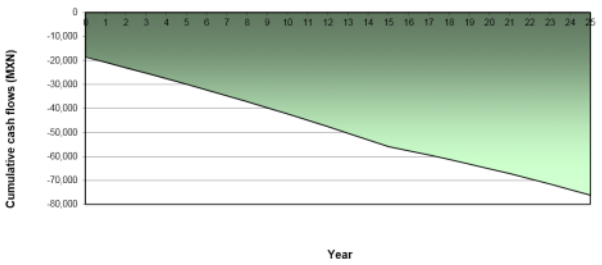
Base case electricity system (Baseline)		GHG emission factor (excl. T&D)	T&D losses	GHG emission factor
Country - region	Fuel type	tCO2/MWh	%	tCO2/MWh
Mexico	All types	0.500		0.500
Electricity exported to grid	MWh	1	T&D losses	10.0%

GHG emission					
Base case	tCO2	0.3			
Proposed case	tCO2	0.0			
Gross annual GHG emission reduction	tCO2	0.2			
GHG credits transaction fee	%	0.0%			
Net annual GHG emission reduction	tCO2	0.2	is equivalent to	0.6	Barrels of crude oil not consumed
GHG reduction income					
GHG reduction credit rate	MXN/tCO2	152.00			
GHG reduction credit duration	yr				
GHG reduction credit escalation rate	%				

Financial Analysis

Financial parameters			
Inflation rate	%	3.7%	
Project life	yr	25	
Debt ratio	%	37%	
Debt interest rate	%	7.00%	
Debt term	yr	15	
Initial costs			
Power system	MXN	17,221	58.4%
See Costs Appendix	MXN	12,251	41.6%
Total initial costs	MXN	29,472	100.0%
Incentives and grants	MXN	0	0.0%
Annual costs and debt payments			
O&M (savings) costs	MXN	1,176	
Fuel cost - proposed case	MXN	0	
Debt payments - 15 yrs	MXN	1,197	
	MXN	0	
Total annual costs	MXN	2,373	
Annual savings and income			
Fuel cost - base case	MXN	0	
Electricity export income	MXN	220	
GHG reduction income - 0 yrs	MXN	36	
	MXN		
Total annual savings and income	MXN	256	
Financial viability			
Pre-tax IRR - equity	%	negative	
Pre-tax IRR - assets	%	negative	
Simple payback	yr	-32.0	
Equity payback	yr	> project	

Cumulative cash flows graph



RETScreen Tools - Power project

Settings

☐ As fired fuel	☐ Ground heat exchanger	☐ User-defined fuel - gas
☐ Biogas	☐ Heat rate	☐ User-defined fuel - solid
☐ Building envelope properties	☐ Heating value & fuel rate	☐ Water & steam
☐ Appliances & equipment	☑ Hydro formula costing method	☐ Water pumping
☐ Electricity rate - monthly	☐ Landfill gas	☐ Window properties
☐ Electricity rate - time of use	☐ Unit conversion	☐ Custom 1
☐ GHG equivalence	☐ User-defined fuel	☐ Custom 2

Hydro formula costing method

Country		Mexico		
Local vs. Canadian equipment cost ratio		0.55		
Local vs. Canadian fuel cost ratio		0.55		
Local vs. Canadian labour cost ratio		0.56		
Equipment manufacture cost coefficient		1.50		
Exchange rate	MXN/CAD	12.26		
Cold climate	yes/no	Yes		
Frost days at site	day	0		
Design flow	ft³/s	2.83	0	
Gross head	ft	15	0	
Number of turbines	turbine	1	0	
Type		Propeller	Kaplan	
Flow per turbine	ft³/s	2.83		
Turbine runner diameter per unit	ft	0.51		
Facility type		Micro	Micro	
Existing dam	yes/no	Yes		
New dam crest length	ft	10		
Maximum hydraulic losses	%	15.0%	0.0%	
Miscellaneous losses	%	10.0%		
Road construction				
Canal				
Penstock				
Transmission line	◉			
Grid type		Central-grid	Central-grid	
Length	km	1.0		
Difficulty of terrain		3.0		
Voltage	kV	25.0		

See maps

Initial costs (credits)	Amount MXN	Adjustment factor	Amount MXN	Relative costs
Feasibility study	0	1.00	0	0.0%
Development	0	1.00	0	0.0%
Engineering	25,000	1.00	25,000	1.3%
Power system				
Hydro turbine	904,000	1.00	904,000	47.8%
Road construction	0	1.00	0	0.0%
Transmission line	961,000	1.00	961,000	50.8%
Substation	2,000	1.00	2,000	0.1%
Balance of system & miscellaneous				
Penstock	0	1.00	0	0.0%
Canal	0	1.00	0	0.0%
Tunnel	0	1.00	0	0.0%
Other	0	1.00	0	0.0%
Sub-total:	0		0	
Total initial costs	**1,892,000**		**1,892,000**	**100.0%**

Appendix 1	(MXN)
Additonal Initial Costs	
Permit for using federal water	$2,745.00
Permit for contruction 10 m from federal water	$1,630.00
AQUW 1.2 meter mounting pole	$2,635.50
AQUW mounting pole clamps	$1,115.00
Interrumper Magnetico/Dump Load Controller	$253.45
AC Breaker Panel/Caja Interrumper	$92.00
Kilowatt hour meter	$280.10
Transmission Line/Acometeda per km	$1,500.00
Power Pole/Mofa	$2,000.00
Initial Labor	$1,470.00
Total	$12,251.05