

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:



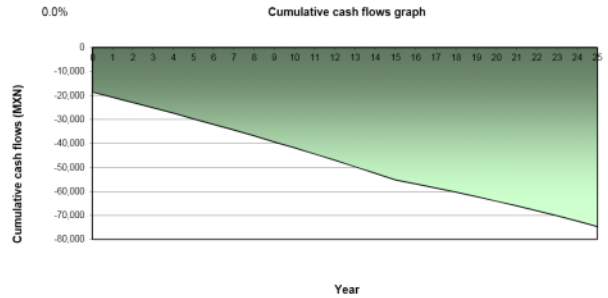
	Climate data	
	Unit	Project location
Latitude	°N	16.8
Longitude	°E	-92.6
Elevation	m	828
Heating design temperature	°C	13.8
Cooling design temperature	°C	29.1
Earth temperature amplitude	°C	10.9

Month	Air temperature	Relative humidity	Daily solar radiation - horizontal	Atmospheric pressure	Wind speed	Earth temperature	Heating degree-days	Cooling degree-days
	°C	%	kWh/m ² /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		

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
Manufacturer	American Hydro		
Model	Propelier		
Capacity factor	%	60.0%	See product database
Electricity exported to grid	MWh	1	
Electricity export rate	MXN/MWh	489.00	

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	MXN/tCO2	152.00		
GHG reduction credit rate	yr			
GHG reduction credit duration	%			
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				
OSM (savings) costs	MXN	1,176		
Fuel cost - proposed case	MXN	0		
Debt payments - 15 yrs	MXN	1,197		
Total annual costs	MXN	2,373		
Annual savings and income				
Fuel cost - base case	MXN	0		
Electricity export income	MXN	257		
GHG reduction income - 0 yrs	MXN	36		
Total annual savings and income	MXN	293		
Financial viability				
Pre-tax IRR - equity	%	negative		
Pre-tax IRR - assets	%	negative		
Simple payback	yr	>33.4		
Equity payback	yr	> project		



RETScreen Tools - Power project

Settings

- | | | |
|---|--|--|
| <input type="checkbox"/> As fired fuel | <input type="checkbox"/> Ground heat exchanger | <input type="checkbox"/> User-defined fuel - gas |
| <input type="checkbox"/> Biogas | <input type="checkbox"/> Heat rate | <input type="checkbox"/> User-defined fuel - solid |
| <input type="checkbox"/> Building envelope properties | <input type="checkbox"/> Heating value & fuel rate | <input type="checkbox"/> Water & steam |
| <input type="checkbox"/> Appliances & equipment | <input checked="" type="checkbox"/> Hydro formula costing method | <input type="checkbox"/> Water pumping |
| <input type="checkbox"/> Electricity rate - monthly | <input type="checkbox"/> Landfill gas | <input type="checkbox"/> Window properties |
| <input type="checkbox"/> Electricity rate - time of use | <input type="checkbox"/> Unit conversion | <input type="checkbox"/> Custom 1 |
| <input type="checkbox"/> GHG equivalence | <input type="checkbox"/> User-defined fuel | <input type="checkbox"/> 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	ft ³ /s	2.83	0
Gross head	ft	15	0
Number of turbines	turbine	1	
Type		Propeller	Kaplan
Flow per turbine	ft ³ /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](#)

	Amount	Adjustment	Amount	Relative costs
	MXN	factor	MXN	
Initial costs (credits)				
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 construction 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