Month         Air temperature "C         humidiy %         humidiy KWhim/id         pressure kPa         Wind speed m/s         temperature % C         degre % C <thdegre % C         degre % C         <thdegre % C         <thdegre % C         de</thdegre </thdegre </thdegre 			vw.retscreen.net <i>ny Project Analysis Soft</i> u	ware		V AND BELSON 'E W
Project location       La Canastas         Project docation       Rachel Rivera Matt Allan Lessaca Limb Meghan Hentz,         Project type       Project docation         Project type       Project docation         Technology       Hydro turbine         Analysis type       Medio 1         Analysis type       Medio 1         Language Language       English - Anglais         Currency       Mexico         Units       Imperial units         Site reference condition       San Cristobal de las Casas         Stow data       #         Language Language       English - Anglais         Currency       Mexico         Units       Imperial units         Site reference condition       San Cristobal de las Casas         Show data       #         Contradista location       San Cristobal de las Casas         Elevation       152         Condude       Envertion         Condude       152         Elevation       152         Novertion       152         Analysis       152         Condude       San Cristobal de las Casas         Stow data       20         Conding design temperature       152 <th>Project information</th> <th>See project databa</th> <th><u>se</u></th> <th></th> <th></th> <th></th>	Project information	See project databa	<u>se</u>			
Prepared or Prepared or		Micro Hydro Feasibility Analy Las Canastas	sis Chiapas			
Project type       Power         Grid type       Central-grid         Analysis type       Method 1         Heating value (reference       Higher heating value (HVV)         Show settings       *         Language - Langua       English - Anglais         Currency       Mexico         Units       imperial units         Currency       Mexico         Units       Select climate data location         Site reference conditions       Select climate data location         Show data       *         Language - Language - Language       Select climate data location         Climate data location       San Cristobal de las Casas         Show data       *         Latitude       Ionghuido         No       10.52         No       10.52         Vit       10.52         Vito       10.52	Prepared for	Humboldt State	mb Meghan Heintz			
Grid type       Central-grid         Analysis type       Method 1         Heating value reference       Higher heating value (HHV)         Show setings       F         Language - Langue       English - Anglais         Currency       Mesico         Units       imperial units         Site reference conditions       Select climate data location         Site reference conditions       Select climate data location         Show data       Image: Select climate data location         Comparison       Select climate data location         Show data       Image: Select climate data location         Vinit       Image: Select climate data location         Show data       Image: Select climate data location         The coaling data location       Select climate data location         The coaling data location       Image: Select climate data location         The coaling data location       Image: Select climate data location         The coaling data location       Image: Select climate data location         The coaling data location       Image: Select climate data location         The coaling data location       Image: Select climate data location         The coaling data location       Image: Select climate data location         The coaling data location       Ima						
Analysis type       Method 1         Heating value reference       Higher heating value (HHV)         Show settings       Image Langue         Currency       Mexico         Units       Imperial units         Currency       Mexico         Units       Imperial units         Site reference conditions       Select climate data location         Show data       Image View         Limate       San Cristobai de las Casas         Show data       Image View         Vinit       San Cristobai de las Casas         Show data       Image View         Vinit       San Cristobai de las Casas         Show data       Image View         Vinit       San Cristobai de las Casas         Show data       Image View         View       View View View         Coling design temperature       Image View View View         View       View View View View View         Coling design temperature       View View View View View View View View						
Show settings       Image Inglish - Anglais         Language - Language       English - Anglais         Currency       Mexico         Units       Imperial units         Currency         Maxico       Select climate data location         Climate data location         Climate data location         Show data         Only solar         Climate data location       Execution       Project location         Show data       T       Execution       Project location         Compluted       Nove mathematics       Daily solar       Month       Final data location         November       April       Telesting       April       Telesting       Colspan="2">Colspan="2"Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan= Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan= Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2"         Alin top paratur					10	
Language - Language         English - Anglais           User manual         English - Anglais           Currency         Mexico           Units         Imperial units           Site reference conditions           Select climate data location           Climate data location           Climate data location           Show data           W         Climate data           Climate data           Latitude         Unit         Climate data           Latitude         Unit         Climate data           Cooling design temperature         Climate data         Climate data           Cooling design temperature         Cooling design temperature <th< td=""><td></td><td></td><td>HHV)</td><td></td><td></td><td></td></th<>			HHV)			
Currency         Mexico           Units         Imperial units           Site reference conditions         Select climate data location           Climate data location         San Cristobal de las Casas           Show data         Imperial units           Latitude         Climate data location           Latitude         Imperial units           Vinit         Interval           Vin	Language - Langua	English - Anglais				
Site reference conditions         Select climate data location           Climate data location         San Cristobal de las Casas           Show data         Image: Climate data           Composition         San Cristobal de las Casas           Show data         Image: Climate data           Composition         San Cristobal de las Casas           Show data         Image: Climate data           Unit         Iocation         Project location           Longhude         Image: Climate data           Elevation         Image: Climate data           Cooling design temperature         Cooling design temperature           Cooling design temperature         Cooling design temperature           Cooling design temperature         Cooling design temperature           January         Fig: Thomperature         Project docation           January         Fig: Thomperature         Project docation           Variet         20.5         65.6%         5.42         92.3         2.9         21.8         0         2.9           January         Fig: Thomperature         Project docation         Project docation         1.0         1.0         1.0         1.0         1.0         1.0         1.0         1.0         1.0         1.0         1.0						
Site reference contributions           Climate data location         San Cristobal de las Casas           Show data         Image: Climate data           Latitude         N         16.8           Latitude         N         16.8         16.8           Longitude         E         92.6         82.8           Elevation         m         82.8         82.8           Coling design temperature         Coling design temperature <td>Units</td> <td>Imperial units</td> <td></td> <td></td> <td></td> <td></td>	Units	Imperial units				
Relative Month         Relative humidity         Relative horizontal         Rumospheric pressure         Earth Menge temperature         Earth degree-day         Heating degree-day         Core degree-day         degree-day         d	Latitude 'N Longitude 'E Elevation m Heating design temperature 'C Cooling design temperature 'C	t location Project location 16.8 16.8 -92.6 -92.6 828 828 13.8 29.1				
'C         %         KWh/m'd         kPa         m's         'C         'C-d         ''C-d	Month		radiation - Atmospheri			
March         22.0         61.5%         6.20         92.2         2.7         23.8         0         23.4           April         23.4         62.6%         6.41         92.1         2.2         25.4         0         4           Agril         23.5         70.3%         6.05         92.0         2.0         25.1         0         4           June         23.0         78.2%         5.55         92.1         2.0         24.0         0         3           July         22.6         76.6%         5.89         92.2         2.4         23.4         0         3           August         22.8         75.0%         5.70         92.2         2.2         23.8         0         3           September         22.4         79.3%         4.68         92.1         2.0         23.2         0         3           October         21.3         79.3%         4.68         92.1         2.5         22.1         0         3           November         20.4         76.0%         4.67         92.2         2.8         21.1         0         3           December         19.3         74.3%         4.46         92.3	January	°C % 19.1 71.0%	kWh/m²/d kPa 4.67 92.4	m/s 3.1	°C 19.9	°C-d °C- 0 28
May         23.5         70.3%         6.05         92.0         2.0         25.1         0         4           June         23.0         78.2%         5.55         92.1         2.0         24.0         0         23.0           July         22.6         76.6%         5.89         92.2         2.4         23.4         0         23.0           August         22.8         75.0%         5.70         92.2         2.2         23.8         0         23.2         10.2         23.2         10.2         23.2         10.2         23.2         10.2         23.2         10.2         23.2 </td <td>March</td> <td>22.0 61.5%</td> <td>6.20 92.2</td> <td>2.7</td> <td>23.8</td> <td>0 37</td>	March	22.0 61.5%	6.20 92.2	2.7	23.8	0 37
July         22.6         76.6%         5.89         92.2         2.4         23.4         0         33.4           August         22.8         75.0%         5.70         92.2         2.2         23.8         0         33.4           September         22.4         79.3%         4.99         92.1         2.0         23.2         0         33.2           October         21.3         79.3%         4.68         92.1         2.5         22.1         0         33.2           November         20.4         76.0%         4.67         92.2         2.8         21.1         0         33.4           December         19.3         74.3%         4.467         92.3         3.2         19.9         0         33.2		23.5 70.3%	6.41 92.1 6.05 92.0	2.0	25.1	
August         22.8         75.0%         5.70         92.2         2.2         23.8         0         53           September         22.4         79.3%         4.99         92.1         2.0         23.2         0         50           October         21.3         79.3%         4.68         92.1         2.5         22.1         0         50           November         20.4         76.0%         4.67         92.2         2.8         21.1         0         50           December         19.3         74.3%         4.46         92.3         3.2         19.9         0         50		23.0 78.2% 22.6 76.6%		2.0	24.0 23.4	
October         21.3         79.3%         4.68         92.1         2.5         22.1         0         33           November         20.4         76.0%         4.67         92.2         2.8         21.1         0         33           December         19.3         74.3%         4.46         92.3         3.2         19.9         0         33	August	22.8 75.0%	5.70 92.2	2.2	23.8	0 39
December 19.3 74.3% 4.46 92.3 3.2 19.9 0 22	October	21.3 79.3%	4.68 92.1	2.5	22.1	0 35
Annual 01.7 70.50 500 00.0 0.5 00.0 5						
Annual 21.7 72.5% 5.39 92.2 2.5 22.8 0 4, Measured at <u>m</u> <u>10.0 0.0</u>	Annual Measured at m	21.7 72.5%	5.39 92.2	2.5	22.8	0 4,26
Some Complete Energy Model sheet		Complete Energy Mode	<u>sheet</u>			
	UNEP GEF		ural Resources Canada 1997-200			NRCan/Canme

ETScreen Energy Model - Power project						Show alternative units
roposed case power system					Incremental initial costs	
Technology		Hydro turbine				
Analysis type		Method 1 Method 2				
Hydro turbine						
Power capacity Manufacturer	kW 💿	0 American Hydro			MXN 17,221	See product databa
Model		Propeller				
Capacity factor	%	60.0%				
Electricity exported to grid	MWh	1				
Electricity export rate	MXN/MWh	419.00				
Emission Analysis						
		GHG emission factor	T&D	GHG emission		
Base case electricity system (Baseline)		(excl. T&D)	losses	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 Gross annual GHG emission reduction	tCO2	0.0				
GHG credits transaction fee	tCO2	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 GHG reduction credit duration	MXN/tCO2	152.00				
GHG reduction credit escalation rate	yr %					
inancial Analysis						
Financial parameters						
Inflation rate	%	3.7%				
Project life	уr	25				
Debt ratio	%	37%				
Debt interest rate Debt term	%	7.00%				
Deptierm	yr	15				
Initial costs						
Power system	MXN	17,221	58.4%			
See Costs Appendix Total initial costs	MXN	12,251 29,472	41.6%			
Incentives and grants	MXN	28,472	0.0%		Cumulative cash flows gr	
Annual costs and debt payments	MAN	0	0.0%		Cumulative cash nows gi	apn
O&M (savings) costs	MXN	1,176		0	4 5 6 7 8 9 10 11 12 13 14 15	46 47 48 40 20 24 22 22 2
Fuel cost - proposed case	MXN	0	-10,		4 5 6 7 8 9 10 11 12 13 14 15	16 17 18 19 20 21 22 23 2
Debt payments - 15 yrs	MXN	1,197				
Total annual costs	MXN	2,373	NXI -20,	000		
rotar annual Costs	MAN	2,3/3	.05- .06- .09- .03- .03- .07- .07-	000		
Annual savings and income			-40,	000		
Fuel cost - base case	MXN	0	⊈ -40, ⊈	000		
Electricity export income	MXN	220	<b>(SE</b> -50,	000		
GHG reduction income - 0 yrs	MXN MXN	36		000		
Total annual savings and income	MXN	256	,00, ativ			
i o tai annaal aavinga ana moome	THE REAL PROPERTY.	200	-70	000		

Financial viability Pre-tax IRR - equity Pre-tax IRR - assets Simple payback Equity payback

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% % yr yr

negative negative -32.0 > project

Cumulative

-80,000

Year

RETScreen Tools - Power project Settings						
As fired fuel		Ground heat exchar		_	User-defined fuel - gas	
Biogas		Heat rate	igei		User-defined fuel - solid	
<ul> <li>Building envelope properties</li> </ul>		Heating value & fuel	Inste		Water & steam	
Appliances & equipment		Hydro formula costir			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				See m
Design flow	ft <sup>a</sup> /s	2.83	0			
Gross head	ft	15	0			
Number of turbines	turbine	1	0			
Туре	<b>6</b> 1/-	Propeller	Kaplan			
Flow per turbine	ft <sup>3</sup> /s	2.83 0.51				
Turbine runner diameter per unit Facility type	ft	0.51 Micro	Micro			
Existing dam	yes/no	Yes	MICTO			
New dam crest length	ft	10				
Maximum hydraulic losses	%	15.0%	0.0%			
Miscellaneous losses	%	10.0%	0.070			
Road construction	70	10.078				
Canal						
Penstock						
Transmission line	•					
Grid type		Central-grid	Central-grid			
Length	km	1.0				
Difficulty of terrain		3.0				
Voltage	kV	25.0				
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	-	1.00	-	0.001		
Penstock	0	1.00	0	0.0%		
Canal	0	1.00	0	0.0%		
Tunnel Other	0	1.00	0	0.0%		

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Appendix 1 Additonal Initial Costs	(MXN)
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

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