RETScreen® Financial Summary - Solar Water Heating Project

Annual Energy Balance

Project name		2 panel SDHW	Electricity required	MWh	0.0
Project location		Kingston			
Renewable energy delivered	MWh	3.26	GHG analysis sheet used?	yes/no	Yes
			Net GHG emission reduction	t_{CO2}/yr	0.87
			Net GHG emission reduction - 25 yrs	t_{CO2}	21.67
Heating fuel displaced	-	Electricity			

Financial Parameters

Avoided cost of heating energy	$/kWh	0.130	Debt ratio	%	0.0%
GHG emission reduction credit	$/$t_{CO2}$	-	Income tax analysis?	yes/no	No
Retail price of electricity	$/kWh	-			
Energy cost escalation rate	%	3.0%			
Inflation	%	2.0%			
Discount rate	%	10.0%			
Project life	yr	25			

Project Costs and Savings

Initial Costs				**Annual Costs and Debt**		
Feasibility study	1.9%	$	75	O&M	$	-
Development	0.0%	$	-	Fuel/Electricity	$	-
Engineering	0.0%	$	-			
RE equipment	65.1%	$	2,600	**Annual Costs - Total**	**$**	**-**
Balance of system	28.3%	$	1,130			
Miscellaneous	4.8%	$	190	**Annual Savings or Income**		
Initial Costs - Total	100.0%	**$**	**3,995**	Heating energy savings/income	$	498
Incentives/Grants		$	-			
				Annual Savings - Total	**$**	**498**
Periodic Costs (Credits)						
Valves and fittings		$	-			
Pool heat pump compressor		$	-			
		$	-			
End of project life -		$	-			

Financial Feasibility

Pre-tax IRR and ROI	%	15.0%	Calculate GHG reduction cost?	yes/no	No
After-tax IRR and ROI	%	15.0%			
Simple Payback	yr	8.0	Project equity	$	3,995
Year-to-positive cash flow	yr	7.1			
Net Present Value - NPV	$	1,920			
Annual Life Cycle Savings	$	212			
Profitability Index - PI	-	0.48			

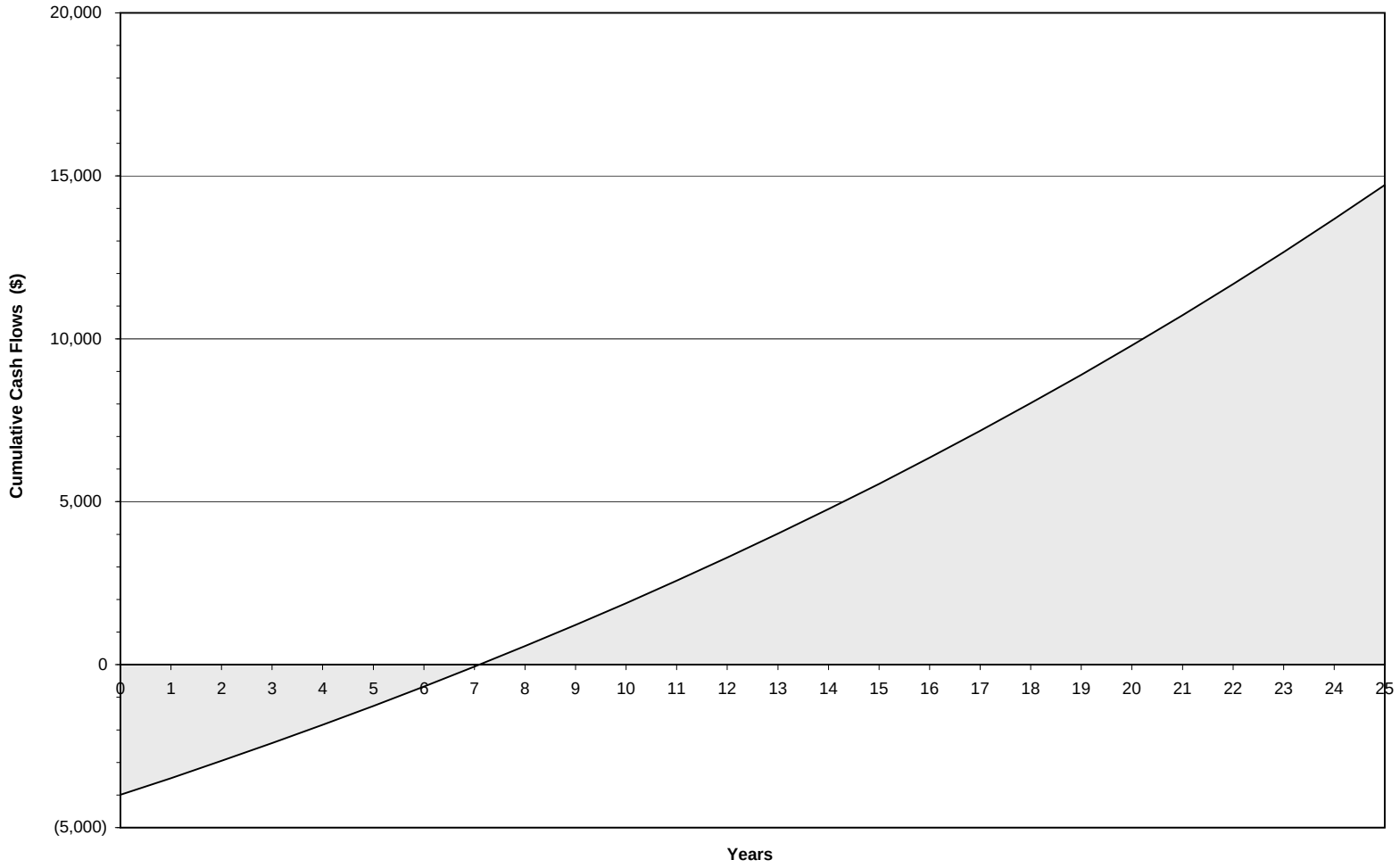
Yearly Cash Flows

Year #	Pre-tax $	After-tax $	Cumulative $
0	(3,995)	(3,995)	(3,995)
1	513	513	(3,482)
2	529	529	(2,953)
3	544	544	(2,409)
4	561	561	(1,848)
5	578	578	(1,270)
6	595	595	(675)
7	613	613	(62)
8	631	631	569
9	650	650	1,219
10	670	670	1,889
11	690	690	2,579
12	710	710	3,289
13	732	732	4,021
14	754	754	4,774
15	776	776	5,551
16	800	800	6,350
17	824	824	7,174
18	848	848	8,022
19	874	874	8,896
20	900	900	9,796
21	927	927	10,723
22	955	955	11,678
23	983	983	12,661
24	1,013	1,013	13,674
25	1,043	1,043	14,717

Cumulative Cash Flows Graph

SWH Project Cumulative Cash Flows
2 panel SDHW, Kingston

Year-to-positive cash flow 7.1 yr | **IRR and ROI 15%** | **Net Present Value $ 1,920**



RETScreen® Solar Resource and Heating Load Calculation - Solar Water Heating Project

Site Latitude and Collector Orientation		Estimate	Notes/Range
Nearest location for weather data		Ottawa Int'l. A, ON	See Weather Database
Latitude of project location	°N	45.3	-90.0 to 90.0
Slope of solar collector	°	27.0	0.0 to 90.0
Azimuth of solar collector	°	0.0	0.0 to 180.0

Monthly Inputs

(Note: 1. Cells in grey are not used for energy calculations; 2. Revisit this table to check that all required inputs are filled if you change system type or solar collector type or pool type, or method for calculating cold water temperature).

Month	Fraction of month used (0 - 1)	Monthly average daily radiation on horizontal surface (kWh/m²/d)	Monthly average temperature (°C)	Monthly average relative humidity (%)	Monthly average wind speed (m/s)	Monthly average daily radiation in plane of solar collector (kWh/m²/d)
January	1.00	1.53	-10.8	70.0	4.4	2.62
February	1.00	2.58	-9.2	67.0	4.4	3.91
March	1.00	3.64	-2.7	65.5	4.4	4.55
April	1.00	4.64	5.6	61.5	4.4	4.98
May	1.00	5.36	12.8	62.0	3.9	5.29
June	1.00	5.94	17.9	65.5	3.6	5.66
July	1.00	5.86	20.8	67.5	3.1	5.67
August	1.00	4.92	19.2	71.0	3.1	5.08
September	1.00	3.58	14.3	73.5	3.3	4.10
October	1.00	2.33	7.9	72.0	3.6	3.09
November	1.00	1.31	1.0	76.0	4.2	1.92
December	1.00	1.08	-7.6	76.0	4.2	1.79

		Annual	Season of Use
Solar radiation (horizontal)	MWh/m²	1.30	1.30
Solar radiation (tilted surface)	MWh/m²	1.48	1.48
Average temperature	°C	5.8	5.8
Average wind speed	m/s	3.9	3.9

Water Heating Load Calculation		Estimate	Notes/Range
Application type	-	Service hot water	
System configuration	-	With storage	
Building or load type	-	House	
Number of units	Occupant	4	
Rate of occupancy	%	100%	50 to 100
Estim. hot water use (at ≈60 °C)	L/d	240	
Hot water use	L/d	240	
Desired water temperature	°C	65	
Days per week system is used	d	7	1 to 7
Cold water temperature	-	Auto	
Minimum	°C	1.0	1.0 to 10.0
Maximum	°C	11.0	5.0 to 15.0
Months SWH in use	month	12.0	
Ener. demand for months analysed	MWh	6.04	
	kWh	6037	

Return to Energy Model sheet

RETScreen® Energy Model - Solar Water Heating Project

Site Conditions		Estimate	Notes/Range
Project name		**2 panel SDHW**	
Project location		**Kingston**	
Nearest location for weather data		Ottawa Int'l. A, ON	*Complete SR&HLC sheet*
Annual solar radiation (tilted surface)	MWh/m²	1.48	
Annual average temperature	°C	5.8	
Annual average wind speed	m/s	3.9	
Desired load temperature	°C	65	
Hot water use	L/d	240	
Number of months analysed	month	12.0	
Energy demand for months analysed	MWh	6.04	

System Characteristics		Estimate	Notes/Range
Application type		Service hot water (with storage)	
Base Case Water Heating System			
Heating fuel type	-	**Electricity**	
Heating system seasonal efficiency	%	85%	60% to 300%
Solar Collector			
Collector type	-	Glazed	*See Technical Note 1*
Solar water heating collector manufacturer		Solcan	*See Product Database*
Solar water heating collector model		2100 B	
Area per collector	m²	3.00	1.00 to 5.00
Fr (tau alpha) coefficient	-	0.76	0.50 to 0.90
Fr UL coefficient	(W/m²)/°C	4.48	3.50 to 6.00
Suggested number of collectors		2	
Number of collectors		2	
Total collector area	m²	6.0	
Storage			
Ratio of storage capacity to coll. area	L/m²	45.9	37.5 to 100.0
Storage capacity	L	275	
Balance of System			
Heat exchanger/antifreeze protection	yes/no	Yes	
Heat exchanger effectiveness	%	85%	50% to 85%
Suggested pipe diameter	mm	10	8 to 25 or PVC 30 to 38
Pipe diameter	mm	10	8 to 25 or PVC 30 to 38
Pumping power per collector area	W/m²	3	3 to 22, or 0
Piping and solar tank losses	%	1%	1% to 10%
Losses due to snow and/or dirt	%	3%	2% to 10%
Horz. dist. from mech. room to collector	m	5	5 to 20
# of floors from mech. room to collector	-	1	0 to 20

Annual Energy Production (12.00 months analysed)		Estimate	Notes/Range
Pumping energy (electricity)	MWh	**0.03**	
Specific yield	kWh/m²	543	
System efficiency	%	37%	
Solar fraction for months analysed	%	54%	
Renewable energy delivered	MWh	**3.26**	
	kWh	3258	
			Complete Cost Analysis sheet