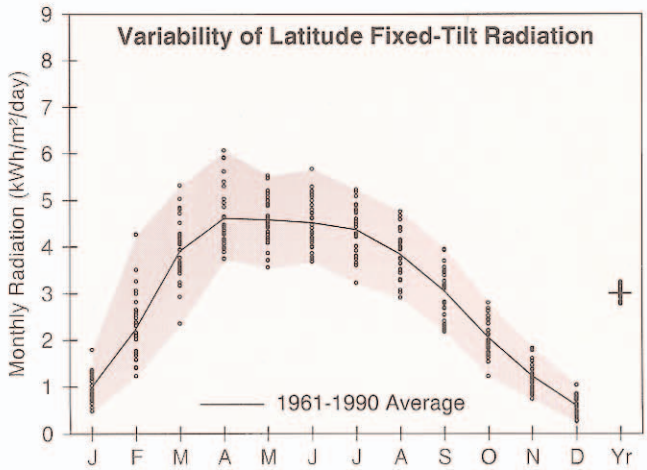
Anchorage, AK

WBAN NO. 26451

LATITUDE: 61.17° N
LONGITUDE: 150.02° W
ELEVATION: 35 meters
MEAN PRESSURE: 1004 millibars

STATION TYPE: Secondary



Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.3	1.0	2.3	3.6	4.6	4.9	4.6	3.5	2.2	1.1	0.4	0.2	2.4
	Min/Max	0.2/0.4	0.7/1.3	1.7/2.6	3.2/4.5	3.8/5.3	4.1/6.0	3.7/5.4	2.9/4.2	1.9/2.6	0.9/1.4	0.3/0.5	0.1/0.2	2.2/2.5
Latitude -15	Average	0.9	2.1	3.8	4.7	4.9	5.0	4.8	4.1	3.1	2.0	1.1	0.5	3.1
	Min/Max	0.4/1.6	1.2/3.8	2.3/5.0	3.9/6.1	3.9/5.9	4.1/6.2	3.5/5.7	3.1/5.0	2.3/3.9	1.2/2.7	0.7/1.6	0.3/0.9	2.8/3.3
Latitude	Average	1.0	2.2	3.9	4.6	4.6	4.5	4.4	3.8	3.1	2.1	1.2	0.6	3.0
	Min/Max	0.5/1.8	1.2/4.3	2.4/5.3	3.7/6.1	3.6/5.5	3.7/5.7	3.2/5.2	2.9/4.8	2.2/4.0	1.2/2.8	0.7/1.8	0.3/1.0	2.8/3.2
Latitude +15	Average	1.0	2.3	3.9	4.3	4.0	3.9	3.8	3.4	2.9	2.0	1.3	0.6	2.8
	Min/Max	0.5/1.9	1.2/4.5	2.3/5.3	3.4/5.8	3.1/4.8	3.2/4.9	2.8/4.5	2.6/4.3	2.0/3.8	1.2/2.8	0.7/1.9	0.3/1.1	2.6/3.0
90	Average	1.0	2.3	3.7	3.8	3.3	3.2	3.1	2.9	2.6	1.9	1.3	0.6	2.5
	Min/Max	0.5/1.9	1.2/4.4	2.2/5.1	3.0/5.3	2.6/4.0	2.6/4.0	2.3/3.7	2.2/3.6	1.8/3.4	1.1/2.6	0.7/1.9	0.3/1.1	2.3/2.8

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.5	1.5	3.5	5.2	6.1	6.3	6.0	4.7	3.1	1.6	0.7	0.3	3.3
	Min/Max	0.3/0.8	0.9/2.8	2.1/4.7	4.1/6.9	4.6/7.6	4.7/8.4	4.3/7.5	3.4/5.9	2.2/3.9	1.0/2.2	0.5/0.9	0.1/0.4	2.9/3.6
Latitude -15	Average	0.9	2.4	4.6	6.1	6.6	6.6	6.3	5.2	3.8	2.2	1.2	0.5	3.9
	Min/Max	0.5/1.7	1.3/4.6	2.6/6.5	4.8/8.3	4.8/8.3	4.8/8.9	4.3/8.0	3.6/6.7	2.5/4.9	1.3/3.2	0.7/1.8	0.3/0.9	3.4/4.2
Latitude	Average	1.0	2.5	4.8	6.1	6.4	6.3	6.1	5.1	3.8	2.3	1.3	0.6	3.9
	Min/Max	0.5/1.9	1.3/5.0	2.7/6.7	4.7/8.3	4.7/8.1	4.6/8.6	4.1/7.7	3.5/6.6	2.5/5.0	1.3/3.3	0.8/2.0	0.3/1.1	3.4/4.2
Latitude +15	Average	1.1	2.6	4.7	5.8	6.0	5.9	5.7	4.8	3.6	2.3	1.4	0.6	3.7
	Min/Max	0.5/2.0	1.3/5.1	2.6/6.7	4.5/8.1	4.3/7.6	4.2/8.1	3.8/7.3	3.3/6.2	2.4/4.8	1.3/3.3	0.8/2.1	0.3/1.2	3.3/4.1

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

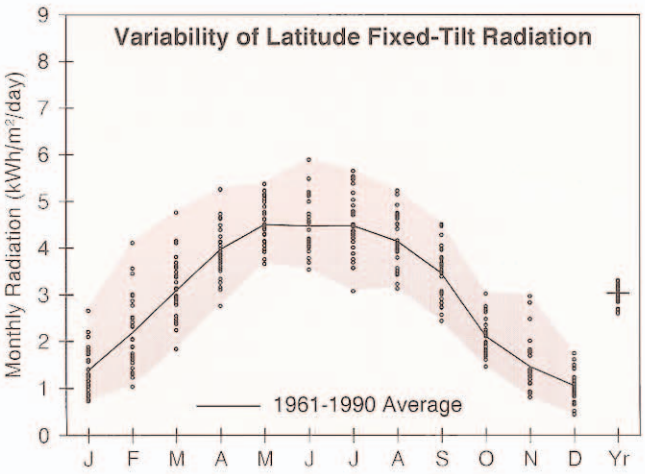
Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	1.1	2.6	4.8	6.1	6.7	6.8	6.5	5.2	3.8	2.4	1.4	0.7	4.0
	Min/Max	0.5/2.1	1.3/5.1	2.7/6.7	4.8/8.3	5.0/8.4	5.0/9.2	4.5/8.2	3.7/6.8	2.6/5.0	1.3/3.3	0.8/2.1	0.3/1.2	3.6/4.4

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	0.6	1.3	2.2	2.6	2.8	2.8	2.6	2.1	1.7	1.2	0.8	0.4	1.8
	Min/Max	0.2/1.5	0.4/3.4	0.8/3.7	1.5/4.3	1.6/4.0	1.6/4.5	1.2/3.8	1.2/3.2	0.9/2.6	0.5/1.9	0.3/1.4	0.1/0.8	1.5/2.0
1-Axis, N-S Horiz Axis	Average	0.2	0.8	1.9	3.0	3.5	3.4	3.3	2.5	1.7	0.8	0.3	0.1	1.8
	Min/Max	0.1/0.5	0.2/2.0	0.6/3.3	1.7/4.9	2.0/5.0	1.8/5.5	1.5/4.8	1.3/3.7	0.8/2.5	0.3/1.4	0.1/0.6	0.0/0.2	1.4/2.1
1-Axis, N-S Tilt=Latitude	Average	0.6	1.5	2.8	3.6	3.7	3.5	3.4	2.9	2.3	1.4	0.8	0.4	2.3
	Min/Max	0.2/1.5	0.4/3.9	1.0/4.8	2.1/6.0	2.2/5.4	1.9/5.7	1.6/5.0	1.5/4.3	1.1/3.5	0.6/2.3	0.3/1.5	0.1/0.8	1.8/2.6
2-Axis	Average	0.7	1.5	2.8	3.7	4.0	3.8	3.7	3.0	2.3	1.4	0.9	0.4	2.3
	Min/Max	0.2/1.6	0.4/4.0	1.0/4.9	2.1/6.1	2.3/5.7	2.1/6.2	1.7/5.4	1.6/4.4	1.1/3.5	0.6/2.3	0.3/1.5	0.1/0.9	1.9/2.7

Average Climatic Conditions

Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-9.5	-7.4	-3.5	2.1	8.1	12.4	14.7	13.5	9.1	1.4	-6.0	-8.7	2.2
Daily Minimum Temp	-13.1	-11.4	-7.7	-1.9	3.8	8.4	10.9	9.7	5.3	-1.8	-9.4	-12.2	-1.6
Daily Maximum Temp	-5.9	-3.4	0.6	6.0	12.4	16.4	18.4	17.2	12.9	4.7	-2.7	-5.3	5.9
Record Minimum Temp	-36.7	-32.2	-31.1	-20.0	-8.3	0.6	3.3	-0.6	-6.7	-20.6	-29.4	-34.4	-36.7
Record Maximum Temp	10.0	8.9	10.6	18.3	25.0	29.4	27.8	27.8	22.8	16.1	11.7	8.3	29.4
HDD, Base 18.3°C	863	720	677	487	317	177	114	150	277	523	730	839	5872
CDD, Base 18.3°C	0	0	0	0	0	0	0	0	0	0	0	0	0
Relative Humidity (%)	74	71	66	64	62	66	71	75	76	75	77	77	71
Wind Speed (m/s)	2.9	3.1	3.0	3.3	3.7	3.8	3.2	3.1	3.0	3.0	2.9	2.8	3.1



Annette, AK

WBAN NO. 25308

LATITUDE: 55.03° N
LONGITUDE: 131.57° W
ELEVATION: 34 meters
MEAN PRESSURE: 1009 millibars

STATION TYPE: Secondary

Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.6	1.2	2.2	3.5	4.7	5.0	4.9	4.0	2.7	1.4	0.7	0.5	2.6
	Min/Max	0.4/0.9	0.9/1.6	1.6/3.0	2.7/4.4	4.0/5.4	4.1/6.4	3.5/5.9	3.2/4.8	2.2/3.3	1.3/1.8	0.6/1.1	0.3/0.6	2.4/2.8
Latitude -15	Average	1.2	2.1	3.1	4.1	4.9	4.9	4.9	4.4	3.5	2.1	1.3	0.9	3.1
	Min/Max	0.7/2.3	1.0/3.7	1.9/4.6	2.9/5.4	4.0/5.8	3.9/6.4	3.4/6.1	3.3/5.5	2.5/4.5	1.5/2.9	0.8/2.6	0.4/1.5	2.7/3.4
Latitude	Average	1.4	2.2	3.1	4.0	4.5	4.5	4.5	4.2	3.5	2.1	1.5	1.1	3.0
	Min/Max	0.7/2.7	1.0/4.1	1.8/4.8	2.8/5.3	3.7/5.4	3.5/5.9	3.1/5.7	3.1/5.2	2.4/4.5	1.5/3.0	0.8/3.0	0.4/1.7	2.6/3.3
Latitude +15	Average	1.4	2.2	3.0	3.6	4.0	3.9	3.9	3.7	3.2	2.1	1.5	1.1	2.8
	Min/Max	0.7/2.8	1.0/4.3	1.7/4.7	2.5/4.8	3.2/4.7	3.1/5.1	2.7/4.9	2.8/4.7	2.3/4.3	1.4/3.0	0.8/3.1	0.4/1.9	2.4/3.1
90	Average	1.4	2.1	2.6	2.9	3.0	2.8	2.9	2.9	2.7	1.8	1.4	1.1	2.3
	Min/Max	0.7/2.8	0.9/4.1	1.5/4.1	2.0/3.9	2.5/3.6	2.3/3.6	2.0/3.6	2.2/3.6	1.9/3.6	1.2/2.7	0.7/3.0	0.4/1.9	2.0/2.5

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.9	1.8	3.1	4.7	6.1	6.4	6.3	5.3	3.7	1.9	1.0	0.6	3.5
	Min/Max	0.5/1.6	0.9/3.1	1.9/4.8	3.3/6.7	4.5/7.7	4.7/8.9	3.8/8.5	3.8/7.1	2.6/5.1	1.4/2.6	0.6/2.0	0.3/1.0	2.9/3.8
Latitude -15	Average	1.4	2.4	3.7	5.3	6.4	6.5	6.4	5.7	4.3	2.3	1.5	1.0	3.9
	Min/Max	0.7/2.7	1.1/4.6	2.1/6.0	3.5/7.5	4.6/8.2	4.7/9.3	3.8/8.9	4.0/7.8	2.9/6.1	1.6/3.4	0.8/3.1	0.4/1.7	3.3/4.3
Latitude	Average	1.5	2.5	3.7	5.2	6.2	6.2	6.2	5.6	4.3	2.4	1.6	1.1	3.9
	Min/Max	0.8/3.0	1.1/4.9	2.0/6.1	3.4/7.4	4.4/7.9	4.4/8.9	3.5/8.6	3.8/7.6	2.9/6.1	1.6/3.6	0.8/3.4	0.4/1.9	3.2/4.3
Latitude +15	Average	1.6	2.5	3.6	4.9	5.9	5.8	5.8	5.3	4.2	2.4	1.6	1.2	3.7
	Min/Max	0.8/3.2	1.0/5.1	2.0/6.0	3.2/7.2	4.1/7.5	4.1/8.4	3.3/8.1	3.6/7.2	2.7/5.9	1.5/3.6	0.8/3.5	0.4/2.0	3.1/4.1

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	1.6	2.5	3.8	5.3	6.6	6.7	6.6	5.8	4.4	2.4	1.7	1.2	4.0
	Min/Max	0.8/3.2	1.1/5.1	2.1/6.1	3.5/7.6	4.7/8.3	4.9/9.5	3.9/9.1	4.0/7.8	2.9/6.1	1.6/3.6	0.8/3.5	0.4/2.0	3.4/4.4

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	0.9	1.3	1.7	2.2	2.7	2.7	2.7	2.4	1.9	1.1	0.9	0.7	1.8
	Min/Max	0.2/2.1	0.3/3.5	0.6/3.4	1.1/3.7	1.3/3.8	1.4/4.9	0.9/4.8	1.3/3.8	1.0/3.2	0.4/1.9	0.3/2.4	0.1/1.4	1.3/2.0
1-Axis, N-S Horiz Axis	Average	0.4	0.9	1.6	2.7	3.5	3.4	3.5	3.0	2.1	0.9	0.5	0.3	1.9
	Min/Max	0.1/1.1	0.2/2.4	0.6/3.4	1.3/4.7	1.6/5.0	1.8/6.3	1.1/6.2	1.6/4.9	1.1/3.6	0.3/1.5	0.2/1.4	0.1/0.6	1.4/2.3
1-Axis, N-S Tilt=Latitude	Average	0.9	1.5	2.2	3.1	3.7	3.4	3.5	3.3	2.6	1.3	1.0	0.7	2.3
	Min/Max	0.2/2.2	0.4/4.1	0.8/4.6	1.5/5.3	1.7/5.2	1.8/6.2	1.1/6.3	1.8/5.3	1.4/4.5	0.5/2.4	0.3/2.6	0.1/1.4	1.7/2.7
2-Axis	Average	1.0	1.6	2.2	3.1	3.9	3.7	3.8	3.4	2.6	1.3	1.0	0.7	2.4
	Min/Max	0.3/2.3	0.4/4.2	0.8/4.6	1.5/5.4	1.8/5.5	2.0/6.8	1.2/6.8	1.8/5.5	1.4/4.5	0.5/2.4	0.3/2.7	0.1/1.5	1.8/2.8

Average Climatic Conditions

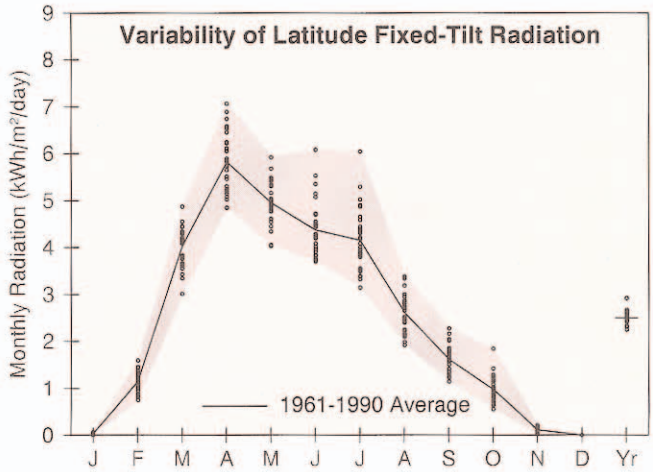
Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	1.3	2.8	4.1	6.3	9.4	12.4	14.6	14.8	12.3	8.3	4.1	2.1	7.7
Daily Minimum Temp	-1.3	0.1	1.1	2.8	5.7	8.8	11.1	11.3	8.9	5.5	1.5	-0.3	4.6
Daily Maximum Temp	3.8	5.5	7.1	9.7	13.2	16.0	18.1	18.3	15.7	11.0	6.6	4.4	10.8
Record Minimum Temp	-17.2	-16.7	-17.2	-6.1	-0.6	2.8	4.4	4.4	0.6	-7.8	-19.4	-17.2	-19.4
Record Maximum Temp	16.1	17.2	16.7	27.8	31.1	31.7	31.7	32.2	27.8	21.7	19.4	16.7	32.2
HDD, Base 18.3°C	529	436	443	362	276	181	119	113	180	312	428	504	3882
CDD, Base 18.3°C	0	0	0	0	0	0	4	3	0	0	0	0	7
Relative Humidity (%)	78	78	76	75	75	77	79	81	82	83	80	80	79
Wind Speed (m/s)	4.9	5.0	4.4	4.4	3.8	3.7	3.4	3.4	3.7	4.8	5.0	4.8	4.2

Barrow, AK

WBAN NO. 27502

LATITUDE: 71.30° N
LONGITUDE: 156.78° W
ELEVATION: 4 meters
MEAN PRESSURE: 1016 millibars

STATION TYPE: Secondary



Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.0	0.3	1.6	3.7	4.7	4.9	4.5	2.6	1.3	0.5	0.0	0.0	2.0
	Min/Max	0.0/0.0	0.2/0.3	1.4/1.7	3.3/4.1	4.0/5.3	4.4/6.2	3.7/5.9	2.2/3.0	1.2/1.5	0.4/0.6	0.0/0.0	0.0/0.0	1.9/2.1
Latitude -15	Average	0.0	1.1	3.8	5.8	5.2	4.8	4.6	2.8	1.7	0.9	0.1	0.0	2.6
	Min/Max	0.0/0.1	0.7/1.5	2.9/4.6	4.9/7.0	4.3/6.2	4.1/6.6	3.5/6.6	2.1/3.6	1.2/2.3	0.6/1.7	0.0/0.2	0.0/0.0	2.3/3.0
Latitude	Average	0.0	1.1	4.0	5.8	4.9	4.4	4.2	2.6	1.6	1.0	0.1	0.0	2.5
	Min/Max	0.0/0.1	0.8/1.6	3.0/4.9	4.8/7.1	4.0/5.9	3.7/6.1	3.1/6.0	1.9/3.4	1.1/2.3	0.6/1.8	0.0/0.2	0.0/0.0	2.2/2.9
Latitude +15	Average	0.0	1.2	4.0	5.6	4.6	3.8	3.6	2.3	1.5	1.0	0.1	0.0	2.3
	Min/Max	0.0/0.1	0.8/1.6	3.0/4.8	4.6/6.7	3.6/5.5	3.2/5.4	2.7/5.2	1.7/3.0	1.0/2.1	0.5/1.9	0.0/0.2	0.0/0.0	2.1/2.7
90	Average	0.0	1.2	3.9	5.4	4.5	3.6	3.4	2.2	1.4	1.0	0.1	0.0	2.2
	Min/Max	0.0/0.1	0.8/1.6	2.9/4.8	4.5/6.6	3.5/5.4	3.0/5.1	2.6/5.0	1.6/2.9	1.0/2.0	0.5/1.8	0.0/0.2	0.0/0.0	2.0/2.6

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.0	0.5	3.2	6.5	6.3	6.4	6.0	3.2	1.6	0.7	0.0	0.0	2.9
	Min/Max	0.0/0.0	0.4/0.7	2.5/3.9	5.4/8.3	4.7/7.6	5.0/9.1	4.4/9.3	2.3/4.1	1.2/2.3	0.4/1.1	0.0/0.1	0.0/0.0	2.5/3.3
Latitude -15	Average	0.0	1.2	4.9	8.2	7.0	6.9	6.6	3.5	1.9	1.0	0.1	0.0	3.5
	Min/Max	0.0/0.1	0.8/1.6	3.6/6.0	6.8/10.6	5.1/8.7	5.2/10.3	4.6/10.6	2.3/4.8	1.3/2.9	0.6/2.0	0.0/0.2	0.0/0.0	3.0/4.1
Latitude	Average	0.0	1.2	5.0	8.2	6.9	6.7	6.4	3.4	1.9	1.1	0.1	0.0	3.4
	Min/Max	0.0/0.1	0.8/1.7	3.7/6.1	6.8/10.6	5.0/8.6	5.0/10.1	4.4/10.4	2.2/4.7	1.2/2.9	0.6/2.1	0.0/0.2	0.0/0.0	3.0/4.1
Latitude +15	Average	0.0	1.3	5.0	8.0	6.7	6.4	6.1	3.2	1.8	1.1	0.1	0.0	3.3
	Min/Max	0.0/0.1	0.8/1.8	3.7/6.1	6.7/10.4	4.8/8.3	4.8/9.7	4.1/10.0	2.0/4.4	1.2/2.8	0.6/2.1	0.0/0.2	0.0/0.0	2.9/4.0

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

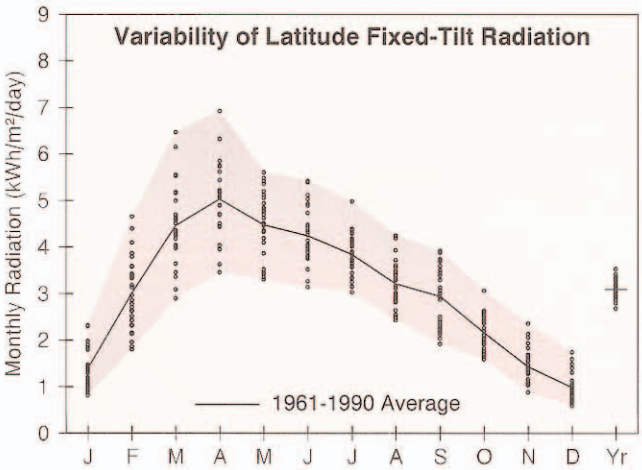
Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	0.0	1.3	5.0	8.3	7.1	7.3	6.9	3.6	1.9	1.1	0.1	0.0	3.6
	Min/Max	0.0/0.1	0.8/1.8	3.7/6.1	6.9/10.6	5.2/8.8	5.5/10.7	4.8/11.1	2.4/4.9	1.3/3.0	0.6/2.1	0.0/0.2	0.0/0.0	3.1/4.2

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	0.0	0.8	2.7	3.6	2.0	2.6	2.8	1.1	0.5	0.4	0.1	0.0	1.4
	Min/Max	0.0/0.1	0.4/1.2	1.6/3.5	2.6/5.1	0.8/3.2	1.3/4.8	1.4/5.6	0.4/1.9	0.2/1.2	0.1/1.1	0.0/0.2	0.0/0.0	1.1/1.8
1-Axis, N-S Horiz Axis	Average	0.0	0.3	2.0	3.9	2.4	3.0	3.2	1.2	0.5	0.2	0.0	0.0	1.4
	Min/Max	0.0/0.0	0.2/0.5	1.3/2.7	2.7/5.8	0.9/3.8	1.5/5.4	1.5/6.4	0.5/2.2	0.1/1.2	0.1/0.6	0.0/0.0	0.0/0.0	1.0/1.8
1-Axis, N-S Tilt=Latitude	Average	0.0	0.9	3.4	5.1	2.8	3.4	3.6	1.5	0.7	0.4	0.1	0.0	1.8
	Min/Max	0.0/0.1	0.5/1.3	2.2/4.6	3.7/7.5	1.0/4.4	1.7/6.1	1.8/7.3	0.6/2.7	0.2/1.7	0.1/1.3	0.0/0.2	0.0/0.0	1.4/2.4
2-Axis	Average	0.0	0.9	3.4	5.2	2.9	3.7	3.9	1.6	0.7	0.5	0.1	0.0	1.9
	Min/Max	0.0/0.1	0.5/1.3	2.2/4.6	3.7/7.6	1.1/4.7	1.8/6.6	1.9/7.9	0.6/2.8	0.2/1.8	0.1/1.3	0.0/0.2	0.0/0.0	1.5/2.5

Average Climatic Conditions

Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-25.2	-27.7	-26.2	-19.0	-7.1	1.1	4.1	3.3	-0.8	-10.3	-18.7	-24.0	-12.6
Daily Minimum Temp	-28.5	-30.9	-29.5	-22.8	-9.8	-1.3	0.9	0.7	-2.8	-12.9	-21.6	-27.3	-15.5
Daily Maximum Temp	-21.9	-24.3	-22.8	-15.2	-4.3	3.5	7.2	5.7	1.0	-7.7	-15.8	-20.7	-9.6
Record Minimum Temp	-47.2	-48.9	-46.7	-41.1	-28.3	-15.6	-5.6	-6.7	-17.2	-35.6	-40.0	-48.3	-48.9
Record Maximum Temp	2.2	2.2	0.6	5.6	7.2	21.7	25.6	24.4	16.7	6.1	3.9	1.1	25.6
HDD, Base 18.3°C	1350	1288	1379	1120	787	517	443	467	575	887	1112	1312	11237
CDD, Base 18.3°C	0	0	0	0	0	0	0	0	0	0	0	0	0
Relative Humidity (%)	73	70	71	77	87	89	88	91	91	86	79	74	81
Wind Speed (m/s)	5.5	5.0	5.1	5.2	5.3	5.3	5.2	5.6	6.0	5.8	5.6	5.2	5.4



Bethel, AK

WBAN NO. 26615

LATITUDE: 60.78° N
LONGITUDE: 161.80° W
ELEVATION: 46 meters
MEAN PRESSURE: 1003 millibars

STATION TYPE: Secondary

Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.4	1.1	2.5	3.9	4.5	4.8	4.3	3.2	2.2	1.2	0.5	0.2	2.4
	Min/Max	0.3/0.5	0.9/1.4	2.0/3.1	3.1/4.8	3.7/5.3	3.9/5.8	3.7/5.1	2.6/3.8	1.8/2.7	1.0/1.4	0.4/0.6	0.2/0.3	2.2/2.6
Latitude -15	Average	1.2	2.7	4.3	5.1	4.8	4.7	4.2	3.4	3.0	2.1	1.3	0.8	3.1
	Min/Max	0.7/2.0	1.7/4.2	2.8/6.1	3.6/6.8	3.6/5.9	3.5/5.9	3.4/5.4	2.6/4.5	2.0/3.9	1.6/2.9	0.8/2.1	0.5/1.5	2.7/3.5
Latitude	Average	1.4	3.0	4.5	5.0	4.5	4.2	3.8	3.2	2.9	2.2	1.4	1.0	3.1
	Min/Max	0.8/2.3	1.8/4.7	2.9/6.5	3.5/6.9	3.3/5.6	3.1/5.4	3.0/5.0	2.4/4.3	1.9/3.9	1.6/3.1	0.9/2.4	0.6/1.7	2.7/3.5
Latitude +15	Average	1.5	3.1	4.4	4.7	4.0	3.6	3.3	2.9	2.8	2.1	1.5	1.0	2.9
	Min/Max	0.9/2.5	1.8/4.9	2.8/6.5	3.2/6.7	2.9/5.2	2.7/4.7	2.6/4.3	2.1/3.8	1.8/3.7	1.5/3.1	0.9/2.5	0.6/1.9	2.5/3.4
90	Average	1.5	3.1	4.2	4.3	3.3	3.0	2.7	2.4	2.5	2.0	1.5	1.1	2.6
	Min/Max	0.8/2.5	1.8/4.8	2.7/6.2	2.7/6.1	2.4/4.6	2.2/3.8	2.2/3.5	1.8/3.2	1.5/3.3	1.4/2.9	0.9/2.5	0.6/1.9	2.3/3.1

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.7	2.1	4.1	5.9	6.1	6.1	5.3	4.0	3.1	1.7	0.8	0.4	3.4
	Min/Max	0.4/1.1	1.4/3.2	2.7/6.0	4.0/8.3	4.5/8.0	4.2/8.3	3.8/7.1	3.0/5.4	2.0/4.2	1.3/2.4	0.6/1.3	0.3/0.7	2.9/3.8
Latitude -15	Average	1.3	3.3	5.5	6.9	6.6	6.3	5.5	4.3	3.7	2.4	1.4	0.9	4.0
	Min/Max	0.8/2.3	1.9/5.2	3.3/8.2	4.4/10.0	4.6/8.7	4.1/8.7	3.7/7.6	3.0/6.0	2.3/5.2	1.7/3.5	0.9/2.4	0.6/1.6	3.3/4.6
Latitude	Average	1.5	3.5	5.6	6.9	6.4	6.0	5.3	4.1	3.7	2.5	1.6	1.0	4.0
	Min/Max	0.9/2.5	2.0/5.6	3.4/8.5	4.4/10.0	4.4/8.5	3.8/8.4	3.5/7.4	2.9/5.9	2.2/5.2	1.8/3.7	0.9/2.6	0.6/1.9	3.3/4.6
Latitude +15	Average	1.6	3.6	5.6	6.7	6.0	5.6	4.9	3.9	3.5	2.5	1.6	1.1	3.9
	Min/Max	0.9/2.7	2.0/5.7	3.3/8.5	4.2/9.8	4.1/8.1	3.5/7.9	3.2/6.9	2.7/5.6	2.1/5.0	1.7/3.7	1.0/2.8	0.6/2.0	3.2/4.5

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	1.6	3.6	5.6	6.9	6.7	6.5	5.7	4.3	3.7	2.5	1.6	1.1	4.2
	Min/Max	0.9/2.7	2.1/5.7	3.4/8.5	4.5/10.0	4.7/8.9	4.3/9.0	3.9/7.8	3.1/6.1	2.3/5.2	1.8/3.7	1.0/2.8	0.7/2.0	3.5/4.7

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	1.0	2.1	2.7	2.9	2.6	2.4	1.9	1.4	1.5	1.3	1.0	0.7	1.8
	Min/Max	0.4/2.0	0.8/4.0	1.0/5.0	0.9/4.8	1.3/4.1	0.7/4.0	0.6/3.6	0.6/2.8	0.6/2.5	0.7/2.2	0.4/1.9	0.3/1.5	1.3/2.2
1-Axis, N-S Horiz Axis	Average	0.4	1.3	2.5	3.4	3.4	3.1	2.5	1.7	1.6	0.9	0.4	0.2	1.8
	Min/Max	0.2/0.8	0.5/2.5	0.8/4.6	1.1/5.9	1.7/5.3	0.9/5.2	0.7/4.5	0.8/3.4	0.6/2.7	0.5/1.6	0.2/0.9	0.1/0.5	1.2/2.2
1-Axis, N-S Tilt=Latitude	Average	1.0	2.4	3.6	4.1	3.6	3.2	2.6	2.0	2.1	1.5	1.0	0.7	2.3
	Min/Max	0.4/2.0	0.9/4.6	1.3/6.7	1.3/7.1	1.8/5.7	1.0/5.3	0.8/4.7	0.9/4.0	0.8/3.5	0.9/2.7	0.5/2.0	0.3/1.5	1.6/2.9
2-Axis	Average	1.1	2.5	3.6	4.2	3.8	3.4	2.8	2.0	2.1	1.5	1.1	0.8	2.4
	Min/Max	0.4/2.2	0.9/4.7	1.3/6.7	1.3/7.2	1.9/6.0	1.1/5.7	0.8/5.1	0.9/4.1	0.8/3.5	0.9/2.7	0.5/2.1	0.3/1.6	1.7/3.0

Average Climatic Conditions

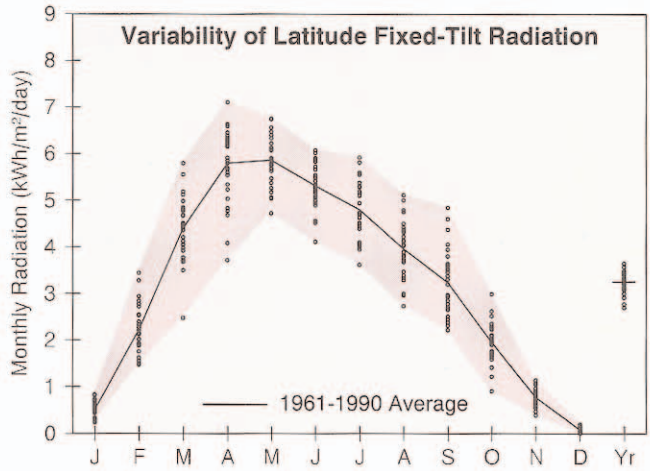
Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-14.1	-14.4	-10.4	-4.7	4.4	10.3	12.8	11.6	7.3	-1.4	-8.4	-13.1	-1.7
Daily Minimum Temp	-17.6	-18.2	-14.8	-9.1	-0.2	5.7	8.7	7.9	3.5	-4.6	-11.7	-16.6	-5.6
Daily Maximum Temp	-10.6	-10.7	-6.1	-0.4	9.0	14.9	16.8	15.3	11.1	1.7	-5.2	-9.6	2.2
Record Minimum Temp	-44.4	-38.9	-39.4	-30.0	-15.6	-2.2	-0.6	-2.2	-7.8	-20.6	-31.1	-38.3	-44.4
Record Maximum Temp	8.9	7.8	7.8	12.8	26.1	30.0	28.3	28.9	22.2	13.3	8.9	7.2	30.0
HDD, Base 18.3°C	1004	918	891	690	432	242	172	208	330	613	803	973	7277
CDD, Base 18.3°C	0	0	0	0	0	0	0	0	0	0	0	0	0
Relative Humidity (%)	76	73	78	80	76	76	80	84	83	84	82	77	79
Wind Speed (m/s)	6.5	6.8	6.3	5.8	5.2	5.0	4.8	4.9	5.2	5.6	5.9	6.4	5.7

Bettles, AK

WBAN NO. 26533

LATITUDE: 66.92° N
LONGITUDE: 151.52° W
ELEVATION: 205 meters
MEAN PRESSURE: 988 millibars

STATION TYPE: Secondary



Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.1	0.6	2.0	3.9	5.3	5.7	5.0	3.5	2.1	0.8	0.2	0.0	2.4
	Min/Max	0.1/0.1	0.4/0.7	1.5/2.2	2.8/4.4	4.6/6.0	4.7/6.3	4.1/5.8	2.7/4.2	1.7/2.6	0.6/1.0	0.1/0.2	0.0/0.0	2.1/2.6
Latitude -15	Average	0.4	2.0	4.2	5.8	6.2	5.8	5.2	4.2	3.3	1.9	0.7	0.1	3.3
	Min/Max	0.2/0.7	1.4/3.1	2.4/5.4	3.7/7.0	5.1/7.2	4.6/6.6	4.0/6.4	2.9/5.4	2.3/4.8	0.9/2.8	0.3/1.0	0.0/0.2	2.8/3.7
Latitude	Average	0.5	2.2	4.4	5.8	5.9	5.3	4.8	4.0	3.2	2.0	0.8	0.1	3.2
	Min/Max	0.2/0.8	1.5/3.4	2.5/5.8	3.7/7.1	4.7/6.8	4.1/6.1	3.6/5.9	2.7/5.1	2.2/4.8	0.9/3.0	0.4/1.1	0.0/0.2	2.7/3.6
Latitude +15	Average	0.5	2.3	4.4	5.5	5.2	4.5	4.1	3.5	3.0	2.0	0.8	0.1	3.0
	Min/Max	0.3/0.9	1.5/3.6	2.4/5.8	3.5/6.8	4.2/6.2	3.5/5.2	3.1/5.1	2.4/4.6	2.1/4.6	0.9/3.0	0.4/1.2	0.0/0.2	2.5/3.4
90	Average	0.5	2.3	4.3	5.3	4.8	4.1	3.7	3.2	2.9	1.9	0.8	0.1	2.8
	Min/Max	0.3/0.9	1.5/3.5	2.4/5.7	3.4/6.5	3.8/5.8	3.1/4.6	2.8/4.6	2.2/4.2	1.9/4.3	0.9/3.0	0.4/1.2	0.0/0.2	2.3/3.2

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.1	1.3	3.8	6.6	8.3	8.3	7.1	5.0	3.2	1.4	0.3	0.0	3.8
	Min/Max	0.1/0.2	0.9/1.9	2.1/4.8	4.1/8.3	6.6/10.2	6.4/9.6	5.1/9.0	3.4/6.8	2.2/4.9	0.7/2.0	0.2/0.4	0.0/0.0	3.1/4.3
Latitude -15	Average	0.5	2.3	5.4	8.1	9.4	9.0	7.7	5.8	4.2	2.1	0.8	0.1	4.6
	Min/Max	0.2/0.8	1.5/3.6	2.8/7.2	4.9/10.4	7.3/11.6	6.7/10.5	5.3/9.9	3.7/7.9	2.7/6.6	0.9/3.3	0.4/1.1	0.0/0.2	3.7/5.3
Latitude	Average	0.5	2.5	5.5	8.1	9.2	8.8	7.5	5.6	4.2	2.2	0.8	0.1	4.6
	Min/Max	0.2/0.9	1.6/3.9	2.9/7.4	4.9/10.4	7.1/11.4	6.5/10.3	5.1/9.7	3.6/7.8	2.7/6.6	0.9/3.5	0.4/1.2	0.0/0.2	3.7/5.3
Latitude +15	Average	0.6	2.6	5.5	7.9	8.8	8.3	7.1	5.3	4.0	2.2	0.9	0.1	4.5
	Min/Max	0.3/0.9	1.6/4.0	2.9/7.4	4.8/10.3	6.8/11.0	6.2/9.8	4.7/9.2	3.4/7.4	2.6/6.4	0.9/3.5	0.4/1.3	0.0/0.2	3.5/5.1

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

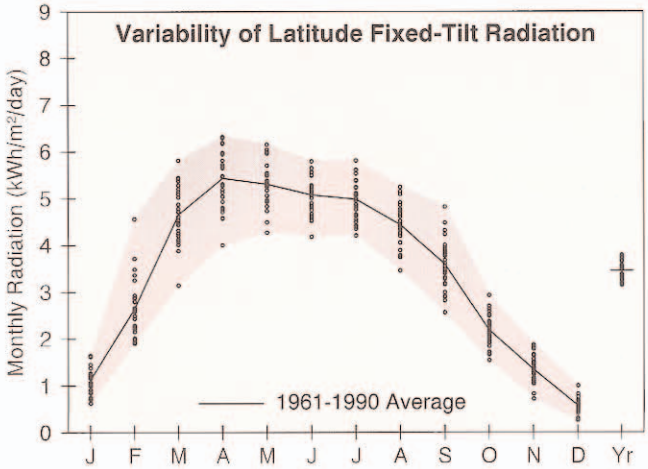
Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	0.6	2.6	5.5	8.1	9.5	9.4	8.0	5.8	4.2	2.3	0.9	0.1	4.8
	Min/Max	0.3/0.9	1.6/4.0	2.9/7.4	4.9/10.4	7.5/11.9	7.1/11.0	5.5/10.3	3.8/8.0	2.8/6.6	1.0/3.5	0.4/1.3	0.0/0.2	3.8/5.5

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	0.5	1.6	2.9	3.5	4.2	4.2	3.4	2.4	2.0	1.2	0.6	0.1	2.2
	Min/Max	0.2/0.8	0.8/2.9	1.1/4.4	1.8/5.1	2.6/6.1	2.7/5.3	1.6/4.8	1.2/3.7	1.0/3.7	0.3/2.1	0.2/0.9	0.0/0.2	1.5/2.7
1-Axis, N-S Horiz Axis	Average	0.1	0.8	2.4	3.9	5.3	5.1	4.2	2.8	1.9	0.7	0.2	0.0	2.3
	Min/Max	0.0/0.2	0.4/1.5	0.8/3.6	2.0/5.9	3.2/7.7	3.2/6.5	2.0/5.9	1.4/4.6	0.9/3.7	0.2/1.2	0.1/0.3	0.0/0.0	1.5/2.8
1-Axis, N-S Tilt=Latitude	Average	0.5	1.8	3.8	5.0	5.9	5.5	4.5	3.3	2.7	1.3	0.6	0.1	2.9
	Min/Max	0.2/0.8	0.9/3.2	1.4/5.7	2.5/7.5	3.6/8.5	3.5/6.9	2.2/6.5	1.7/5.4	1.4/5.1	0.3/2.5	0.2/0.9	0.0/0.2	2.0/3.6
2-Axis	Average	0.5	1.8	3.8	5.1	6.2	6.0	4.8	3.5	2.7	1.4	0.6	0.1	3.0
	Min/Max	0.2/0.9	0.9/3.3	1.4/5.7	2.6/7.6	3.8/9.0	3.8/7.6	2.3/6.9	1.7/5.5	1.4/5.2	0.3/2.5	0.2/1.0	0.0/0.2	2.1/3.8

Average Climatic Conditions

Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-24.8	-22.8	-16.2	-6.3	6.2	14.0	15.2	11.8	4.9	-7.5	-18.8	-22.9	-5.6
Daily Minimum Temp	-29.1	-27.9	-22.6	-12.4	0.8	8.3	9.6	6.6	0.2	-11.1	-22.7	-27.1	-10.6
Daily Maximum Temp	-20.5	-17.6	-9.8	-0.3	11.6	19.7	20.9	17.1	9.4	-3.9	-14.9	-18.8	-0.6
Record Minimum Temp	-56.7	-51.1	-48.9	-38.3	-23.3	-2.8	-1.7	-5.6	-16.7	-35.6	-49.4	-50.6	-56.7
Record Maximum Temp	8.9	4.4	6.7	13.3	30.0	33.3	33.9	30.6	26.1	11.7	7.2	3.3	33.9
HDD, Base 18.3°C	1338	1151	1069	738	376	132	107	207	403	801	1113	1279	8716
CDD, Base 18.3°C	0	0	0	0	0	0	10	6	0	0	0	0	16
Relative Humidity (%)	69	66	65	67	61	60	68	76	76	78	73	72	69
Wind Speed (m/s)	2.7	2.8	3.2	3.4	3.4	3.2	3.0	2.7	3.0	3.0	2.7	2.5	3.0



Big Delta, AK

WBAN NO. 26415

LATITUDE: 64.00° N
LONGITUDE: 145.73° W
ELEVATION: 388 meters
MEAN PRESSURE: 963 millibars

STATION TYPE: Secondary

Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.2	0.8	2.3	3.9	5.1	5.5	5.2	3.9	2.4	1.1	0.3	0.1	2.6
	Min/Max	0.2/0.2	0.7/1.1	1.8/2.5	3.2/4.3	4.4/5.7	4.7/6.2	4.5/5.8	3.3/4.3	2.0/2.8	0.9/1.2	0.3/0.4	0.1/0.1	2.4/2.7
Latitude -15	Average	1.0	2.4	4.4	5.5	5.7	5.6	5.4	4.7	3.6	2.1	1.2	0.5	3.5
	Min/Max	0.6/1.4	1.8/4.1	3.0/5.5	4.1/6.3	4.6/6.6	4.6/6.4	4.6/6.3	3.7/5.5	2.6/4.8	1.5/2.7	0.6/1.6	0.2/0.9	3.2/3.8
Latitude	Average	1.1	2.6	4.6	5.4	5.3	5.1	5.0	4.4	3.6	2.2	1.3	0.6	3.4
	Min/Max	0.6/1.6	1.9/4.6	3.1/5.8	4.0/6.3	4.3/6.2	4.2/5.8	4.2/5.8	3.5/5.2	2.6/4.8	1.5/2.9	0.7/1.9	0.3/1.0	3.1/3.8
Latitude +15	Average	1.2	2.7	4.6	5.1	4.7	4.4	4.3	4.0	3.4	2.2	1.4	0.6	3.2
	Min/Max	0.6/1.8	2.0/4.8	3.1/5.8	3.7/6.1	3.7/5.4	3.6/5.0	3.6/5.0	3.1/4.7	2.4/4.6	1.5/2.9	0.7/2.0	0.3/1.1	2.9/3.5
90	Average	1.2	2.7	4.5	4.8	4.1	3.7	3.7	3.5	3.1	2.1	1.4	0.6	2.9
	Min/Max	0.6/1.8	1.9/4.7	3.0/5.6	3.3/5.7	3.2/4.8	3.1/4.2	3.1/4.3	2.7/4.2	2.2/4.3	1.4/2.8	0.7/2.0	0.3/1.1	2.7/3.3

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.4	1.7	4.1	6.3	7.6	7.6	7.2	5.6	3.6	1.6	0.7	0.2	3.9
	Min/Max	0.3/0.6	1.2/2.8	2.7/5.2	4.7/7.5	6.0/9.3	5.9/9.3	5.8/8.9	4.4/6.7	2.6/4.8	1.2/2.1	0.4/0.9	0.1/0.3	3.5/4.3
Latitude -15	Average	1.1	2.8	5.7	7.6	8.3	8.1	7.8	6.4	4.6	2.4	1.3	0.5	4.7
	Min/Max	0.6/1.6	2.0/5.0	3.7/7.3	5.5/9.1	6.5/10.3	6.2/10.0	6.1/9.7	4.8/7.8	3.2/6.3	1.7/3.3	0.7/1.9	0.2/0.9	4.2/5.3
Latitude	Average	1.2	3.0	5.9	7.6	8.1	7.8	7.5	6.3	4.6	2.5	1.5	0.6	4.7
	Min/Max	0.6/1.8	2.1/5.4	3.8/7.6	5.4/9.1	6.3/10.1	5.9/9.7	5.9/9.4	4.7/7.7	3.2/6.3	1.7/3.4	0.8/2.0	0.3/1.0	4.2/5.3
Latitude +15	Average	1.3	3.1	5.9	7.3	7.7	7.4	7.1	5.9	4.5	2.5	1.5	0.6	4.6
	Min/Max	0.7/1.9	2.2/5.5	3.7/7.6	5.2/9.0	5.9/9.6	5.6/9.2	5.5/9.0	4.4/7.3	3.0/6.2	1.7/3.4	0.8/2.1	0.3/1.1	4.0/5.1

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	1.3	3.1	5.9	7.6	8.5	8.4	8.0	6.5	4.7	2.5	1.5	0.6	4.9
	Min/Max	0.7/1.9	2.2/5.5	3.8/7.6	5.5/9.1	6.6/10.5	6.4/10.4	6.3/10.0	4.9/7.9	3.2/6.4	1.7/3.5	0.8/2.1	0.3/1.1	4.4/5.5

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	0.9	1.9	3.1	3.4	3.8	3.6	3.4	2.8	2.2	1.2	1.0	0.5	2.3
	Min/Max	0.4/1.5	0.9/4.0	1.7/4.4	2.1/4.4	2.4/5.1	2.3/5.0	2.2/5.0	1.7/3.8	1.2/3.5	0.6/2.1	0.4/1.6	0.2/1.0	1.9/2.8
1-Axis, N-S Horiz Axis	Average	0.3	1.0	2.7	3.9	4.8	4.5	4.3	3.3	2.2	0.8	0.4	0.1	2.4
	Min/Max	0.1/0.5	0.5/2.3	1.3/4.0	2.3/5.2	3.0/6.6	2.8/6.3	2.6/6.2	2.1/4.5	1.2/3.4	0.4/1.4	0.1/0.6	0.1/0.2	1.9/2.8
1-Axis, N-S Tilt=Latitude	Average	0.9	2.1	4.1	4.8	5.2	4.7	4.6	3.9	3.0	1.5	1.0	0.5	3.0
	Min/Max	0.4/1.5	1.1/4.6	2.1/5.9	2.9/6.4	3.3/7.2	2.9/6.6	2.8/6.6	2.4/5.3	1.7/4.7	0.8/2.5	0.4/1.6	0.2/0.9	2.5/3.6
2-Axis	Average	1.0	2.2	4.1	4.9	5.5	5.1	4.9	4.0	3.0	1.5	1.1	0.5	3.1
	Min/Max	0.4/1.6	1.1/4.7	2.1/5.9	2.9/6.5	3.5/7.6	3.2/7.2	3.0/7.1	2.5/5.4	1.7/4.7	0.8/2.5	0.4/1.7	0.2/1.0	2.6/3.8

Average Climatic Conditions

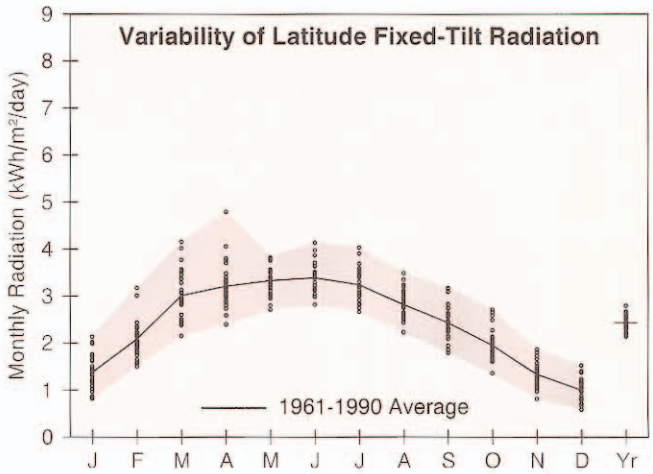
Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-20.0	-16.6	-10.3	-0.9	8.2	13.8	15.7	13.0	6.9	-4.2	-14.7	-18.7	-2.3
Daily Minimum Temp	-23.9	-21.2	-16.4	-6.4	2.7	8.4	10.4	7.8	2.1	-7.9	-18.7	-22.5	-7.1
Daily Maximum Temp	-16.1	-11.9	-4.2	4.6	13.7	19.1	20.9	18.2	11.8	-0.4	-10.7	-14.8	2.5
Record Minimum Temp	-52.8	-51.1	-45.0	-38.3	-18.3	-1.1	0.0	-5.6	-18.9	-39.4	-43.9	-52.2	-52.8
Record Maximum Temp	8.9	10.6	14.4	22.2	32.2	33.3	32.8	31.1	26.1	18.9	11.1	12.8	33.3
HDD, Base 18.3°C	1188	977	887	577	313	139	88	171	343	698	992	1147	7519
CDD, Base 18.3°C	0	0	0	0	0	0	5	5	0	0	0	0	10
Relative Humidity (%)	67	68	64	59	52	59	66	68	70	77	73	71	66
Wind Speed (m/s)	5.4	4.7	4.1	3.8	3.8	3.5	2.9	3.2	3.8	3.9	4.6	5.2	4.1

Cold Bay, AK

WBAN NO. 25624

LATITUDE: 55.20° N
LONGITUDE: 162.72° W
ELEVATION: 29 meters
MEAN PRESSURE: 1003 millibars

STATION TYPE: Secondary



Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.6	1.2	2.2	3.1	3.7	3.9	3.7	3.0	2.2	1.4	0.7	0.4	2.2
	Min/Max	0.5/0.8	1.0/1.5	1.8/2.8	2.6/4.1	3.1/4.1	3.3/4.6	3.2/4.3	2.5/3.5	1.8/2.6	1.2/1.6	0.5/0.9	0.3/0.5	2.0/2.5
Latitude -15	Average	1.2	2.0	3.0	3.3	3.6	3.7	3.5	3.0	2.5	1.9	1.2	0.9	2.5
	Min/Max	0.8/1.9	1.4/2.9	2.2/4.0	2.6/4.8	3.0/4.1	3.1/4.5	3.0/4.4	2.4/3.7	1.9/3.2	1.4/2.6	0.8/1.7	0.5/1.3	2.2/2.9
Latitude	Average	1.4	2.1	3.0	3.2	3.3	3.4	3.2	2.8	2.4	2.0	1.3	1.0	2.4
	Min/Max	0.8/2.1	1.5/3.2	2.2/4.2	2.4/4.8	2.7/3.8	2.8/4.1	2.7/4.0	2.2/3.5	1.8/3.2	1.4/2.7	0.8/1.9	0.6/1.5	2.1/2.8
Latitude +15	Average	1.4	2.1	2.9	2.9	2.9	2.9	2.8	2.5	2.2	1.9	1.4	1.1	2.3
	Min/Max	0.8/2.3	1.5/3.3	2.0/4.1	2.1/4.6	2.4/3.4	2.4/3.6	2.3/3.5	2.0/3.1	1.6/3.0	1.3/2.7	0.8/1.9	0.6/1.6	2.0/2.6
90	Average	1.4	2.0	2.6	2.4	2.3	2.2	2.2	2.0	1.9	1.7	1.3	1.0	1.9
	Min/Max	0.8/2.3	1.4/3.1	1.8/3.7	1.7/4.1	1.8/2.6	1.9/2.7	1.8/2.7	1.6/2.5	1.3/2.5	1.1/2.5	0.8/1.9	0.6/1.6	1.6/2.2

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.9	1.7	2.9	3.6	4.2	4.3	4.0	3.3	2.6	1.7	0.9	0.6	2.6
	Min/Max	0.6/1.3	1.3/2.5	2.1/4.0	2.6/5.3	3.3/5.0	3.5/5.5	3.2/5.2	2.5/4.2	1.9/3.4	1.3/2.3	0.6/1.3	0.4/0.9	2.3/3.0
Latitude -15	Average	1.4	2.2	3.5	3.9	4.2	4.3	4.0	3.4	2.8	2.1	1.3	1.0	2.9
	Min/Max	0.8/2.2	1.6/3.5	2.4/5.0	2.7/5.9	3.2/5.1	3.4/5.6	3.2/5.3	2.5/4.4	2.0/3.9	1.5/3.0	0.8/1.9	0.6/1.5	2.5/3.3
Latitude	Average	1.5	2.3	3.6	3.8	4.1	4.1	3.8	3.2	2.8	2.2	1.4	1.1	2.8
	Min/Max	0.9/2.4	1.6/3.8	2.4/5.1	2.5/5.9	3.1/4.9	3.2/5.3	3.0/5.1	2.3/4.3	1.9/3.9	1.5/3.1	0.8/2.1	0.6/1.6	2.5/3.3
Latitude +15	Average	1.6	2.4	3.5	3.7	3.8	3.8	3.5	3.0	2.7	2.2	1.5	1.1	2.7
	Min/Max	0.9/2.5	1.6/3.8	2.3/5.1	2.4/5.8	2.8/4.6	3.0/4.9	2.8/4.7	2.1/4.0	1.8/3.7	1.4/3.1	0.9/2.1	0.6/1.8	2.4/3.2

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

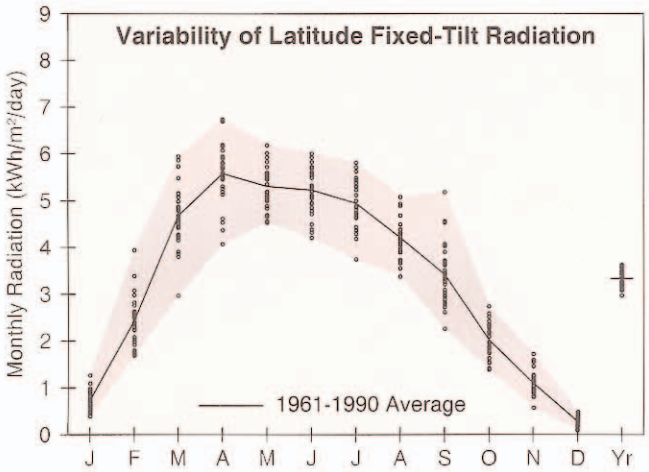
Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	1.6	2.4	3.6	4.0	4.4	4.5	4.2	3.4	2.9	2.2	1.5	1.1	3.0
	Min/Max	0.9/2.5	1.6/3.8	2.4/5.2	2.7/5.9	3.3/5.2	3.6/5.7	3.3/5.5	2.5/4.5	2.0/3.9	1.5/3.2	0.9/2.2	0.6/1.8	2.6/3.4

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	0.8	1.0	1.4	1.1	1.2	1.1	1.0	0.8	0.9	0.9	0.7	0.6	1.0
	Min/Max	0.3/1.5	0.3/2.2	0.7/2.6	0.4/2.2	0.6/1.8	0.5/2.1	0.4/1.8	0.3/1.5	0.3/1.5	0.4/1.7	0.3/1.3	0.2/1.1	0.7/1.2
1-Axis, N-S Horiz Axis	Average	0.4	0.7	1.3	1.3	1.5	1.4	1.2	1.0	0.9	0.7	0.4	0.2	0.9
	Min/Max	0.1/0.8	0.2/1.6	0.6/2.4	0.4/2.5	0.7/2.3	0.6/2.6	0.4/2.3	0.3/1.8	0.3/1.6	0.3/1.3	0.2/0.7	0.1/0.5	0.7/1.1
1-Axis, N-S Tilt=Latitude	Average	0.8	1.2	1.8	1.6	1.6	1.4	1.2	1.1	1.2	1.1	0.7	0.6	1.2
	Min/Max	0.3/1.6	0.4/2.6	0.8/3.3	0.5/2.9	0.8/2.4	0.6/2.6	0.4/2.4	0.4/2.0	0.4/2.1	0.5/2.0	0.4/1.4	0.2/1.1	0.9/1.5
2-Axis	Average	0.9	1.2	1.8	1.6	1.6	1.5	1.3	1.1	1.2	1.1	0.8	0.6	1.2
	Min/Max	0.3/1.7	0.4/2.7	0.8/3.3	0.5/3.0	0.8/2.5	0.7/2.8	0.5/2.6	0.4/2.0	0.4/2.1	0.5/2.0	0.4/1.5	0.3/1.2	0.9/1.5

Average Climatic Conditions

Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-1.9	-2.6	-1.2	0.7	4.2	7.6	10.3	10.8	8.7	4.2	1.3	-0.6	3.5
Daily Minimum Temp	-4.4	-5.1	-3.9	-1.9	1.6	4.9	7.8	8.4	6.2	1.6	-1.2	-3.0	0.9
Daily Maximum Temp	0.6	0.0	1.6	3.3	6.9	10.2	12.8	13.3	11.2	6.8	3.8	1.8	6.1
Record Minimum Temp	-22.2	-22.8	-25.0	-15.6	-7.8	-1.7	0.6	0.6	-2.8	-12.2	-17.2	-18.3	-25.0
Record Maximum Temp	10.0	10.0	13.3	15.6	19.4	20.6	25.0	25.6	24.4	20.6	15.0	12.2	25.6
HDD, Base 18.3°C	627	585	604	528	437	322	250	233	288	437	510	586	5407
CDD, Base 18.3°C	0	0	0	0	0	0	0	0	0	0	0	0	0
Relative Humidity (%)	84	84	83	82	82	84	87	88	85	82	83	84	84
Wind Speed (m/s)	8.0	8.0	7.7	8.0	7.3	7.1	7.0	7.2	7.4	7.6	7.8	7.8	7.6



Fairbanks, AK

WBAN NO. 26411

LATITUDE: 64.82° N
LONGITUDE: 147.87° W
ELEVATION: 138 meters
MEAN PRESSURE: 994 millibars

STATION TYPE: Primary

Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.1	0.8	2.3	4.0	5.1	5.6	5.1	3.7	2.3	1.0	0.3	0.0	2.5
	Min/Max	0.1/0.2	0.7/0.9	1.8/2.6	3.3/4.6	4.5/5.8	4.7/6.4	4.1/5.8	3.2/4.3	1.8/2.9	0.8/1.1	0.2/0.3	0.0/0.1	2.4/2.7
Latitude -15	Average	0.7	2.2	4.5	5.6	5.7	5.7	5.4	4.5	3.4	1.9	1.0	0.2	3.4
	Min/Max	0.3/1.1	1.6/3.5	2.9/5.6	4.2/6.7	4.9/6.6	4.6/6.6	4.1/6.3	3.6/5.3	2.3/5.1	1.4/2.6	0.5/1.5	0.1/0.4	3.1/3.7
Latitude	Average	0.7	2.4	4.7	5.6	5.3	5.2	4.9	4.2	3.4	2.0	1.1	0.3	3.3
	Min/Max	0.4/1.3	1.7/3.9	3.0/5.9	4.1/6.7	4.5/6.2	4.2/6.0	3.7/5.8	3.4/5.1	2.3/5.2	1.4/2.7	0.6/1.7	0.1/0.5	3.0/3.6
Latitude +15	Average	0.8	2.5	4.7	5.3	4.6	4.5	4.3	3.8	3.2	2.0	1.1	0.3	3.1
	Min/Max	0.4/1.3	1.7/4.1	2.9/5.9	3.7/6.4	4.0/5.4	3.6/5.1	3.2/5.0	3.0/4.6	2.1/4.9	1.4/2.8	0.6/1.8	0.1/0.5	2.7/3.4
90	Average	0.8	2.5	4.5	4.9	4.1	3.9	3.7	3.3	3.0	2.0	1.1	0.3	2.8
	Min/Max	0.4/1.4	1.7/4.1	2.8/5.8	3.4/6.1	3.5/4.8	3.1/4.4	2.8/4.4	2.7/4.1	1.9/4.6	1.3/2.7	0.6/1.8	0.1/0.5	2.5/3.1

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.3	1.5	4.1	6.4	7.5	7.8	7.1	5.3	3.4	1.5	0.5	0.1	3.8
	Min/Max	0.2/0.5	1.1/2.3	2.5/5.2	4.7/7.8	6.1/9.0	6.0/9.4	5.0/8.6	4.0/6.6	2.4/5.2	1.1/1.9	0.3/0.8	0.0/0.1	3.3/4.2
Latitude -15	Average	0.7	2.6	5.7	7.7	8.2	8.3	7.6	6.0	4.4	2.2	1.1	0.2	4.6
	Min/Max	0.4/1.2	1.8/4.2	3.4/7.4	5.5/9.5	6.6/10.1	6.3/10.1	5.3/9.4	4.4/7.6	2.8/6.9	1.5/3.0	0.5/1.7	0.1/0.4	3.9/5.1
Latitude	Average	0.8	2.7	5.8	7.7	8.0	8.0	7.4	5.8	4.4	2.3	1.2	0.3	4.5
	Min/Max	0.4/1.3	1.9/4.6	3.5/7.7	5.4/9.6	6.4/9.8	6.0/9.8	5.0/9.1	4.3/7.4	2.8/6.9	1.5/3.2	0.6/1.9	0.1/0.5	3.9/5.0
Latitude +15	Average	0.8	2.8	5.8	7.4	7.6	7.6	6.9	5.5	4.2	2.3	1.2	0.3	4.4
	Min/Max	0.4/1.4	1.9/4.7	3.4/7.7	5.2/9.3	6.1/9.3	5.7/9.3	4.7/8.6	4.0/7.1	2.7/6.8	1.5/3.2	0.6/2.0	0.1/0.5	3.7/4.9

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	0.8	2.8	5.8	7.7	8.4	8.7	7.9	6.0	4.4	2.3	1.2	0.3	4.7
	Min/Max	0.4/1.4	1.9/4.7	3.5/7.7	5.5/9.6	6.8/10.3	6.6/10.5	5.5/9.7	4.5/7.7	2.8/7.0	1.5/3.2	0.6/2.0	0.1/0.5	4.1/5.2

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	0.6	1.6	2.9	3.2	3.6	3.7	3.3	2.5	2.0	1.1	0.7	0.3	2.1
	Min/Max	0.2/1.1	0.8/3.3	1.2/4.4	1.6/4.6	2.3/4.9	2.3/4.8	1.8/4.6	1.5/3.5	1.0/3.8	0.5/1.8	0.2/1.4	0.1/0.5	1.7/2.6
1-Axis, N-S Horiz Axis	Average	0.2	0.8	2.4	3.7	4.6	4.5	4.1	2.9	2.0	0.7	0.3	0.1	2.2
	Min/Max	0.1/0.4	0.4/1.8	1.0/3.8	1.8/5.3	3.0/6.2	2.8/6.1	2.2/5.7	1.8/4.3	1.1/3.7	0.3/1.1	0.1/0.5	0.0/0.1	1.7/2.6
1-Axis, N-S Tilt=Latitude	Average	0.6	1.8	3.8	4.6	5.0	4.8	4.3	3.4	2.8	1.3	0.8	0.3	2.8
	Min/Max	0.2/1.1	0.9/3.7	1.5/5.8	2.3/6.6	3.2/6.8	3.0/6.4	2.3/6.1	2.1/5.0	1.5/5.2	0.6/2.1	0.2/1.4	0.1/0.5	2.1/3.3
2-Axis	Average	0.6	1.8	3.8	4.7	5.3	5.2	4.7	3.5	2.8	1.3	0.8	0.3	2.9
	Min/Max	0.2/1.2	0.9/3.8	1.5/5.8	2.3/6.7	3.4/7.2	3.2/6.9	2.5/6.6	2.1/5.1	1.5/5.2	0.6/2.2	0.3/1.5	0.1/0.5	2.2/3.5

Average Climatic Conditions

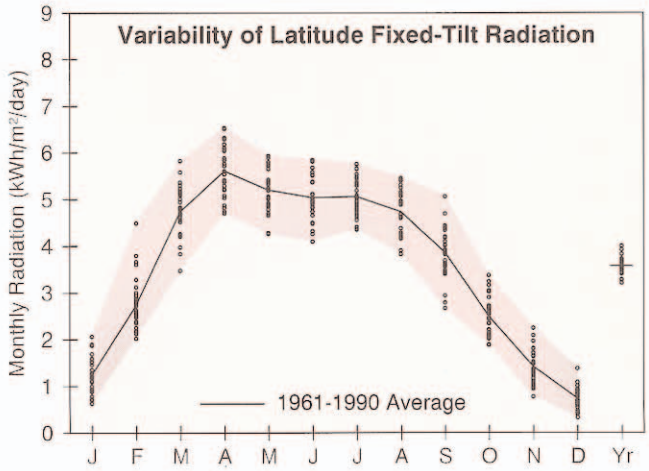
Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-23.4	-19.8	-11.7	-0.7	9.2	15.4	16.9	13.8	7.5	-3.8	-16.3	-21.4	-2.8
Daily Minimum Temp	-28.1	-25.8	-18.7	-6.4	3.3	9.7	11.4	8.4	2.3	-7.7	-20.9	-26.0	-8.2
Daily Maximum Temp	-18.7	-13.8	-4.6	5.0	15.2	21.2	22.4	19.1	12.7	0.0	-11.7	-16.8	2.5
Record Minimum Temp	-51.7	-48.9	-45.0	-31.1	-18.3	-0.6	1.7	-2.8	-12.2	-32.8	-43.3	-52.2	-52.2
Record Maximum Temp	10.0	8.3	10.6	23.3	31.7	35.6	34.4	32.2	28.9	18.3	7.8	6.7	35.6
HDD, Base 18.3°C	1293	1067	930	572	282	101	68	148	325	687	1038	1232	7744
CDD, Base 18.3°C	0	0	0	0	0	14	25	7	0	0	0	0	47
Relative Humidity (%)	70	66	60	56	50	57	64	71	69	74	73	71	65
Wind Speed (m/s)	1.5	1.9	2.5	3.1	3.5	3.4	3.1	2.9	2.8	2.5	1.7	1.5	2.5

Gulkana, AK

WBAN NO. 26425

LATITUDE: 62.15° N
LONGITUDE: 145.45° W
ELEVATION: 481 meters
MEAN PRESSURE: 952 millibars

STATION TYPE: Secondary



Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.3	1.0	2.5	4.1	5.1	5.5	5.3	4.1	2.6	1.2	0.4	0.2	2.7
	Min/Max	0.2/0.3	0.9/1.2	2.1/2.8	3.7/4.6	4.3/5.6	4.7/6.3	4.6/5.9	3.5/4.6	2.1/3.0	1.1/1.4	0.4/0.6	0.1/0.2	2.5/2.9
Latitude -15	Average	1.1	2.5	4.5	5.6	5.6	5.5	5.5	5.0	3.9	2.4	1.3	0.6	3.6
	Min/Max	0.6/1.8	1.9/4.0	3.3/5.5	4.8/6.5	4.6/6.3	4.5/6.4	4.7/6.3	4.1/5.7	2.7/5.0	1.8/3.1	0.7/2.0	0.3/1.2	3.3/4.0
Latitude	Average	1.2	2.7	4.7	5.6	5.2	5.0	5.1	4.7	3.9	2.5	1.4	0.7	3.6
	Min/Max	0.6/2.1	2.0/4.5	3.5/5.8	4.7/6.5	4.3/5.9	4.1/5.8	4.3/5.8	3.8/5.4	2.7/5.1	1.9/3.4	0.8/2.2	0.3/1.4	3.2/4.0
Latitude +15	Average	1.3	2.8	4.7	5.3	4.6	4.3	4.4	4.3	3.6	2.5	1.5	0.8	3.3
	Min/Max	0.6/2.2	2.1/4.7	3.4/5.8	4.3/6.3	3.7/5.3	3.5/5.0	3.8/5.0	3.4/4.9	2.5/4.8	1.9/3.4	0.8/2.4	0.3/1.5	3.0/3.7
90	Average	1.3	2.8	4.5	4.8	3.9	3.6	3.7	3.7	3.3	2.4	1.5	0.8	3.0
	Min/Max	0.6/2.2	2.0/4.6	3.3/5.6	3.8/5.8	3.2/4.6	2.9/4.1	3.2/4.2	3.0/4.2	2.2/4.4	1.8/3.3	0.8/2.4	0.3/1.5	2.7/3.4

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.6	1.8	4.3	6.6	7.5	7.7	7.4	6.0	4.0	1.9	0.8	0.3	4.1
	Min/Max	0.3/0.9	1.4/2.9	3.0/5.3	5.5/7.9	5.9/8.6	6.1/9.3	5.8/8.9	4.7/7.1	2.8/5.2	1.5/2.5	0.5/1.2	0.1/0.5	3.6/4.6
Latitude -15	Average	1.2	2.9	5.8	7.8	8.1	8.1	7.9	6.8	5.0	2.8	1.4	0.7	4.9
	Min/Max	0.6/2.0	2.1/4.9	4.0/7.3	6.5/9.4	6.4/9.4	6.2/9.8	6.1/9.6	5.2/8.1	3.3/6.7	2.0/3.8	0.8/2.3	0.3/1.3	4.3/5.5
Latitude	Average	1.3	3.1	6.0	7.8	7.9	7.8	7.6	6.7	5.0	2.9	1.5	0.8	4.9
	Min/Max	0.6/2.2	2.2/5.3	4.1/7.5	6.4/9.4	6.2/9.2	5.9/9.5	5.9/9.3	5.1/7.9	3.3/6.7	2.1/4.0	0.8/2.5	0.3/1.4	4.2/5.5
Latitude +15	Average	1.4	3.2	6.0	7.6	7.5	7.4	7.2	6.4	4.8	2.9	1.6	0.8	4.7
	Min/Max	0.7/2.4	2.3/5.4	4.1/7.5	6.2/9.1	5.8/8.9	5.6/9.0	5.5/8.8	4.8/7.6	3.1/6.6	2.1/4.0	0.8/2.6	0.3/1.5	4.1/5.4

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

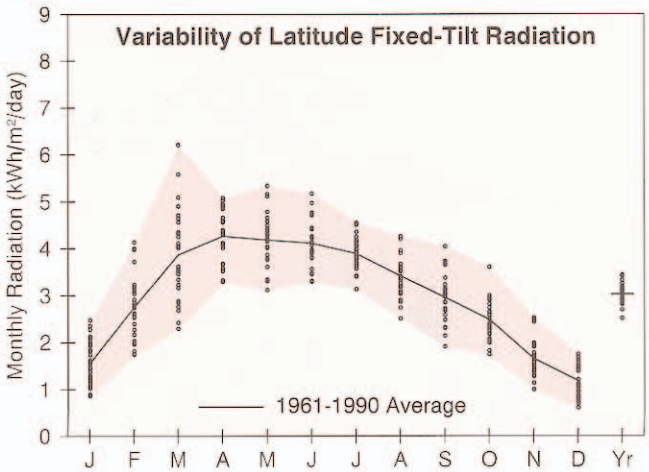
Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	1.4	3.2	6.0	7.9	8.3	8.4	8.1	6.9	5.0	2.9	1.6	0.8	5.1
	Min/Max	0.7/2.4	2.3/5.4	4.1/7.5	6.5/9.5	6.5/9.6	6.5/10.2	6.3/9.9	5.3/8.1	3.3/6.8	2.1/4.0	0.8/2.6	0.3/1.6	4.4/5.7

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	0.9	1.8	2.9	3.5	3.6	3.6	3.5	3.0	2.4	1.5	0.9	0.6	2.4
	Min/Max	0.3/1.8	0.9/3.8	1.6/4.2	2.5/4.8	2.5/4.5	2.3/5.0	2.3/4.7	1.9/3.9	1.2/3.6	0.7/2.4	0.3/1.7	0.2/1.2	1.9/2.9
1-Axis, N-S Horiz Axis	Average	0.3	1.0	2.6	4.1	4.6	4.5	4.4	3.7	2.4	1.1	0.4	0.2	2.5
	Min/Max	0.1/0.7	0.5/2.3	1.3/3.8	2.9/5.9	3.1/5.8	3.0/6.3	2.7/6.1	2.3/4.7	1.2/3.6	0.5/1.6	0.1/0.8	0.0/0.4	2.0/3.0
1-Axis, N-S Tilt=Latitude	Average	0.9	2.0	3.9	5.0	5.0	4.7	4.7	4.3	3.3	1.8	1.0	0.5	3.1
	Min/Max	0.3/1.8	1.0/4.3	2.1/5.5	3.5/7.1	3.4/6.3	3.0/6.5	2.9/6.4	2.7/5.5	1.7/4.9	0.9/2.8	0.3/1.8	0.2/1.2	2.5/3.7
2-Axis	Average	1.0	2.1	3.9	5.1	5.3	5.1	5.0	4.4	3.3	1.8	1.0	0.6	3.2
	Min/Max	0.3/2.0	1.0/4.4	2.1/5.6	3.6/7.2	3.6/6.6	3.3/7.1	3.1/6.8	2.7/5.7	1.7/4.9	0.9/2.9	0.3/1.9	0.2/1.3	2.6/3.9

Average Climatic Conditions

Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-20.9	-15.9	-9.2	-0.7	6.5	11.8	14.1	11.9	6.6	-2.6	-14.9	-19.6	-2.7
Daily Minimum Temp	-25.5	-21.7	-16.3	-6.7	0.3	5.7	8.0	5.7	0.8	-6.9	-19.2	-23.8	-8.3
Daily Maximum Temp	-16.4	-10.2	-2.2	5.3	12.7	17.9	20.2	18.2	12.3	1.8	-10.7	-15.2	2.8
Record Minimum Temp	-51.1	-53.9	-44.4	-41.1	-15.0	-2.2	-1.7	-6.7	-15.0	-30.6	-42.2	-50.0	-53.9
Record Maximum Temp	7.8	7.8	10.0	19.4	29.4	32.2	32.8	30.0	23.3	18.3	8.9	6.7	32.8
HDD, Base 18.3°C	1218	960	854	572	367	197	131	198	353	648	998	1174	7671
CDD, Base 18.3°C	0	0	0	0	0	0	0	0	0	0	0	0	0
Relative Humidity (%)	73	73	67	63	58	59	65	68	71	77	78	75	69
Wind Speed (m/s)	1.6	2.2	2.7	3.4	3.7	3.8	3.4	3.5	3.2	2.8	1.8	1.8	2.8



King Salmon, AK

WBAN NO. 25503

LATITUDE: 58.68° N
LONGITUDE: 156.65° W
ELEVATION: 15 meters
MEAN PRESSURE: 1005 millibars

STATION TYPE: Secondary

Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.5	1.2	2.4	3.6	4.4	4.6	4.3	3.4	2.3	1.4	0.6	0.3	2.4
	Min/Max	0.4/0.6	0.9/1.5	1.8/3.1	3.0/4.0	3.5/5.3	3.9/5.5	3.7/4.9	2.7/4.0	1.9/2.8	1.2/1.7	0.5/0.7	0.2/0.4	2.2/2.6
Latitude -15	Average	1.4	2.5	3.7	4.4	4.5	4.5	4.3	3.6	3.0	2.4	1.5	1.0	3.1
	Min/Max	0.8/2.1	1.6/3.7	2.3/5.8	3.4/5.2	3.4/5.7	3.6/5.7	3.5/5.0	2.7/4.5	2.0/4.0	1.7/3.4	0.9/2.2	0.5/1.5	2.6/3.4
Latitude	Average	1.5	2.7	3.9	4.3	4.2	4.1	3.9	3.4	2.9	2.5	1.6	1.2	3.0
	Min/Max	0.9/2.5	1.7/4.1	2.3/6.2	3.3/5.1	3.1/5.3	3.3/5.2	3.1/4.5	2.5/4.3	1.9/4.0	1.7/3.6	1.0/2.5	0.6/1.7	2.5/3.4
Latitude +15	Average	1.6	2.8	3.8	3.9	3.7	3.6	3.4	3.0	2.8	2.5	1.7	1.3	2.8
	Min/Max	0.9/2.6	1.8/4.3	2.2/6.3	3.0/4.7	2.7/4.7	2.8/4.5	2.7/3.9	2.2/3.8	1.7/3.8	1.7/3.6	1.0/2.7	0.6/1.9	2.3/3.3
90	Average	1.6	2.7	3.5	3.4	3.0	2.8	2.7	2.5	2.4	2.3	1.7	1.3	2.5
	Min/Max	0.9/2.6	1.7/4.1	2.0/5.9	2.5/4.3	2.2/3.7	2.3/3.5	2.2/3.1	1.8/3.2	1.5/3.3	1.5/3.4	1.0/2.7	0.6/1.9	2.0/2.9

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.8	2.0	3.7	5.0	5.7	5.7	5.2	4.2	3.1	2.0	1.0	0.6	3.3
	Min/Max	0.5/1.3	1.3/3.0	2.2/5.9	3.7/6.3	4.1/7.6	4.2/7.3	4.1/6.4	3.1/5.4	2.1/4.3	1.5/2.9	0.6/1.5	0.3/0.8	2.8/3.7
Latitude -15	Average	1.5	3.0	4.7	5.8	6.0	5.8	5.4	4.5	3.6	2.8	1.7	1.1	3.8
	Min/Max	0.8/2.5	1.8/4.6	2.6/7.8	4.1/7.3	4.1/8.2	4.2/7.6	4.1/6.6	3.2/5.9	2.3/5.2	1.9/4.1	1.0/2.6	0.6/1.7	3.2/4.4
Latitude	Average	1.7	3.2	4.8	5.7	5.8	5.6	5.2	4.3	3.6	2.9	1.8	1.3	3.8
	Min/Max	0.9/2.7	1.9/4.9	2.6/8.1	4.0/7.2	4.0/7.9	3.9/7.3	3.9/6.4	3.0/5.7	2.2/5.2	2.0/4.3	1.0/2.8	0.6/1.9	3.1/4.4
Latitude +15	Average	1.8	3.2	4.8	5.5	5.4	5.2	4.8	4.1	3.5	2.9	1.9	1.3	3.7
	Min/Max	0.9/2.9	2.0/5.1	2.5/8.1	3.8/7.0	3.7/7.5	3.6/6.8	3.6/6.0	2.8/5.4	2.1/5.1	1.9/4.3	1.1/3.0	0.6/2.0	3.0/4.3

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	1.8	3.3	4.8	5.8	6.1	6.0	5.6	4.5	3.7	2.9	1.9	1.3	4.0
	Min/Max	0.9/2.9	2.0/5.1	2.7/8.1	4.1/7.3	4.3/8.3	4.3/7.8	4.2/6.8	3.2/5.9	2.3/5.3	2.0/4.3	1.1/3.0	0.6/2.0	3.3/4.6

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	1.1	1.9	2.3	2.4	2.3	2.1	1.9	1.5	1.4	1.5	1.1	0.9	1.7
	Min/Max	0.4/2.2	0.7/3.6	0.8/4.7	1.4/3.5	1.0/3.8	1.0/3.5	1.0/2.8	0.7/2.5	0.5/2.6	0.8/2.6	0.5/2.0	0.3/1.5	1.2/2.1
1-Axis, N-S Horiz Axis	Average	0.5	1.2	2.1	2.8	3.0	2.6	2.4	1.9	1.5	1.1	0.5	0.3	1.7
	Min/Max	0.2/1.0	0.4/2.4	0.8/4.4	1.6/4.3	1.4/4.9	1.2/4.3	1.2/3.5	0.9/3.0	0.6/2.7	0.6/1.9	0.2/1.0	0.1/0.6	1.2/2.0
1-Axis, N-S Tilt=Latitude	Average	1.2	2.1	3.0	3.4	3.1	2.7	2.4	2.1	2.0	1.8	1.2	0.9	2.2
	Min/Max	0.4/2.3	0.8/4.2	1.1/6.3	1.9/5.1	1.5/5.2	1.2/4.3	1.3/3.7	1.0/3.4	0.8/3.5	1.0/3.2	0.5/2.2	0.3/1.5	1.6/2.7
2-Axis	Average	1.2	2.2	3.0	3.4	3.3	2.9	2.6	2.2	2.0	1.8	1.2	0.9	2.2
	Min/Max	0.5/2.4	0.9/4.3	1.1/6.3	2.0/5.1	1.6/5.5	1.3/4.7	1.4/3.9	1.1/3.5	0.8/3.5	1.0/3.2	0.6/2.3	0.4/1.7	1.7/2.8

Average Climatic Conditions

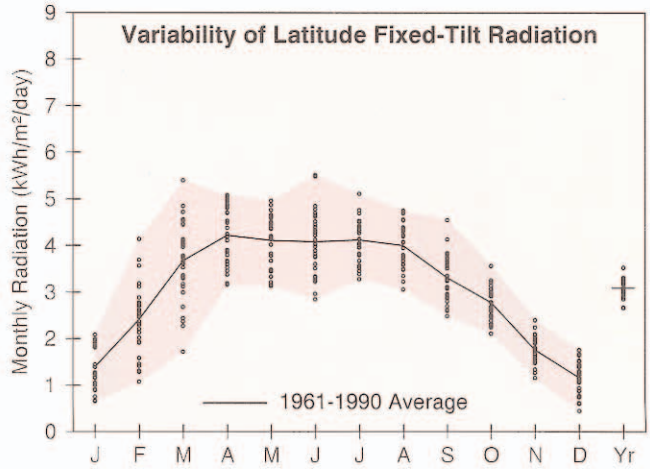
Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-9.5	-9.6	-5.3	-0.4	5.8	10.0	12.6	12.2	8.4	0.2	-5.4	-8.9	0.8
Daily Minimum Temp	-13.6	-14.1	-9.9	-4.8	1.1	5.2	8.0	8.0	4.3	-3.8	-9.4	-13.2	-3.5
Daily Maximum Temp	-5.5	-5.1	-0.7	3.9	10.5	14.8	17.2	16.3	12.6	4.3	-1.3	-4.8	5.2
Record Minimum Temp	-44.4	-40.6	-41.1	-26.1	-15.6	-1.7	0.6	-3.9	-9.4	-24.4	-33.3	-38.9	-44.4
Record Maximum Temp	11.7	13.9	13.3	18.3	25.0	31.1	30.0	28.9	23.3	19.4	13.3	8.9	31.1
HDD, Base 18.3°C	863	781	734	563	389	250	177	191	297	562	712	846	6364
CDD, Base 18.3°C	0	0	0	0	0	0	0	0	0	0	0	0	0
Relative Humidity (%)	76	73	73	72	70	74	78	80	79	79	81	77	76
Wind Speed (m/s)	4.9	5.1	5.1	5.0	5.0	4.9	4.5	4.7	4.7	4.6	4.7	4.9	4.8

Kodiak, AK

WBAN NO. 25501

LATITUDE: 57.75° N
LONGITUDE: 152.33° W
ELEVATION: 34 meters
MEAN PRESSURE: 1003 millibars

STATION TYPE: Secondary



Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.5	1.1	2.3	3.5	4.3	4.6	4.5	3.8	2.5	1.5	0.7	0.3	2.5
	Min/Max	0.3/0.6	0.8/1.5	1.4/3.0	2.9/4.0	3.4/4.9	3.4/6.1	3.7/5.4	3.1/4.4	2.1/3.1	1.2/1.6	0.5/0.8	0.2/0.4	2.2/2.7
Latitude -15	Average	1.2	2.2	3.5	4.3	4.4	4.5	4.5	4.2	3.3	2.6	1.6	1.0	3.1
	Min/Max	0.6/1.8	1.0/3.7	1.8/5.1	3.3/5.2	3.4/5.3	3.1/6.0	3.6/5.6	3.3/5.0	2.5/4.5	2.0/3.3	1.1/2.1	0.4/1.5	2.7/3.5
Latitude	Average	1.4	2.4	3.7	4.2	4.1	4.1	4.1	4.0	3.3	2.8	1.8	1.2	3.1
	Min/Max	0.6/2.1	1.1/4.1	1.7/5.4	3.2/5.1	3.1/5.0	2.8/5.5	3.3/5.1	3.1/4.8	2.5/4.6	2.1/3.6	1.2/2.4	0.4/1.8	2.7/3.5
Latitude +15	Average	1.5	2.5	3.6	3.9	3.6	3.5	3.6	3.6	3.1	2.8	1.8	1.2	2.9
	Min/Max	0.6/2.2	1.0/4.3	1.6/5.4	2.9/4.7	2.7/4.3	2.5/4.7	2.8/4.4	2.7/4.3	2.3/4.3	2.1/3.6	1.2/2.5	0.5/1.9	2.4/3.3
90	Average	1.4	2.4	3.3	3.3	2.9	2.7	2.8	2.9	2.7	2.6	1.8	1.2	2.5
	Min/Max	0.6/2.2	1.0/4.1	1.4/5.1	2.4/4.1	2.2/3.4	1.9/3.6	2.3/3.5	2.2/3.5	2.0/3.8	1.9/3.4	1.1/2.5	0.4/1.9	2.1/2.9

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.8	1.8	3.5	5.0	5.6	5.8	5.8	5.1	3.5	2.3	1.1	0.6	3.4
	Min/Max	0.4/1.1	0.9/3.0	1.6/5.2	3.6/6.0	3.9/7.0	3.7/8.7	4.3/7.5	3.6/6.4	2.6/4.9	1.8/2.8	0.8/1.4	0.3/0.8	2.9/3.8
Latitude -15	Average	1.4	2.6	4.5	5.7	5.9	5.9	5.9	5.5	4.2	3.2	1.8	1.1	4.0
	Min/Max	0.6/2.1	1.1/4.6	1.9/6.7	4.0/7.0	4.0/7.4	3.6/9.0	4.4/7.9	3.9/7.0	3.0/6.0	2.4/4.1	1.2/2.5	0.4/1.7	3.4/4.5
Latitude	Average	1.5	2.8	4.6	5.7	5.7	5.7	5.7	5.4	4.2	3.3	2.0	1.2	4.0
	Min/Max	0.7/2.3	1.1/4.9	1.9/6.9	3.9/6.9	3.8/7.1	3.4/8.7	4.2/7.6	3.7/6.8	3.0/6.0	2.5/4.3	1.3/2.7	0.5/1.9	3.4/4.5
Latitude +15	Average	1.6	2.8	4.5	5.4	5.3	5.3	5.3	5.1	4.0	3.3	2.0	1.3	3.8
	Min/Max	0.7/2.4	1.1/5.1	1.8/6.9	3.7/6.7	3.5/6.7	3.2/8.3	3.9/7.2	3.5/6.5	2.9/5.9	2.5/4.3	1.3/2.8	0.5/2.0	3.2/4.4

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

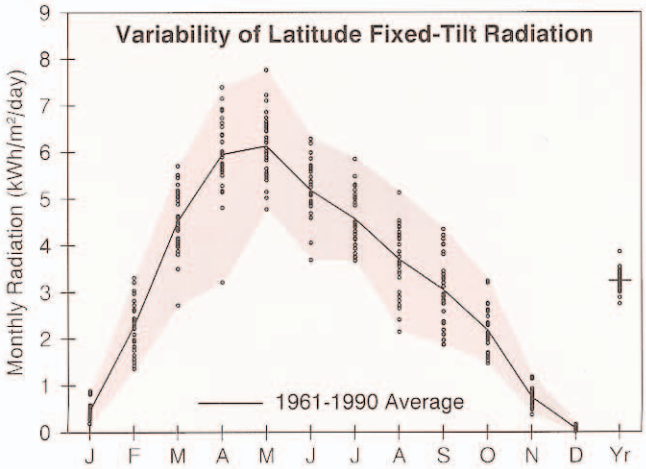
Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	1.6	2.8	4.6	5.8	6.0	6.2	6.1	5.6	4.2	3.3	2.0	1.3	4.1
	Min/Max	0.7/2.4	1.1/5.1	1.9/6.9	4.0/7.0	4.1/7.5	3.8/9.4	4.5/8.1	3.9/7.1	3.0/6.1	2.5/4.3	1.3/2.8	0.5/2.0	3.5/4.7

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	1.0	1.5	2.2	2.5	2.3	2.3	2.3	2.3	1.8	1.8	1.3	0.9	1.9
	Min/Max	0.3/1.6	0.3/3.5	0.6/3.6	1.5/3.5	0.9/3.4	0.9/4.5	1.3/3.5	1.2/3.3	1.0/3.0	1.3/2.7	0.7/2.0	0.3/1.5	1.5/2.2
1-Axis, N-S Horiz Axis	Average	0.4	1.0	2.1	3.0	3.0	3.0	3.0	2.9	2.0	1.4	0.6	0.3	1.9
	Min/Max	0.1/0.8	0.2/2.4	0.5/3.4	1.8/4.1	1.1/4.3	1.2/5.9	1.6/4.6	1.4/4.3	1.1/3.3	0.9/2.0	0.4/1.0	0.1/0.6	1.5/2.2
1-Axis, N-S Tilt=Latitude	Average	1.0	1.8	3.0	3.5	3.2	3.0	3.1	3.2	2.5	2.2	1.4	0.9	2.4
	Min/Max	0.3/1.7	0.4/4.1	0.8/4.8	2.1/4.9	1.2/4.6	1.2/5.9	1.7/4.7	1.6/4.8	1.5/4.3	1.5/3.3	0.7/2.1	0.3/1.5	1.9/2.8
2-Axis	Average	1.1	1.8	3.0	3.6	3.4	3.3	3.3	3.3	2.6	2.3	1.4	0.9	2.5
	Min/Max	0.3/1.8	0.4/4.2	0.8/4.8	2.1/4.9	1.2/4.8	1.3/6.4	1.8/5.1	1.6/4.9	1.5/4.3	1.5/3.3	0.8/2.2	0.3/1.6	2.0/2.9

Average Climatic Conditions

Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-1.2	-0.8	0.5	3.1	6.4	9.8	12.4	12.9	10.0	4.8	1.3	-0.7	4.9
Daily Minimum Temp	-4.1	-3.9	-2.8	-0.3	3.1	6.4	9.0	9.1	6.3	1.2	-1.8	-3.8	1.6
Daily Maximum Temp	1.7	2.3	3.8	6.5	9.7	13.1	15.8	16.6	13.7	8.4	4.4	2.4	8.2
Record Minimum Temp	-26.7	-24.4	-21.1	-13.9	-6.7	-1.1	2.8	2.2	-3.3	-12.2	-17.8	-18.3	-26.7
Record Maximum Temp	12.2	13.3	13.9	17.8	26.7	30.0	27.8	28.3	22.8	16.7	12.2	13.3	30.0
HDD, Base 18.3°C	604	537	553	458	371	257	183	169	250	418	510	589	4898
CDD, Base 18.3°C	0	0	0	0	0	0	0	0	0	0	0	0	0
Relative Humidity (%)	78	77	73	72	76	80	82	82	81	75	75	75	77
Wind Speed (m/s)	5.5	5.5	5.3	5.2	4.6	4.1	3.4	3.6	4.1	4.9	5.4	5.5	4.7



Kotzebue, AK

WBAN NO. 26616

LATITUDE: 66.87° N
LONGITUDE: 162.63° W
ELEVATION: 5 meters
MEAN PRESSURE: 1011 millibars

STATION TYPE: Secondary

Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.1	0.6	2.1	4.1	5.5	5.5	4.8	3.3	2.0	0.9	0.2	0.0	2.4
	Min/Max	0.1/0.1	0.5/0.7	1.7/2.3	2.6/4.7	4.6/6.5	4.4/6.4	4.0/5.8	2.4/4.1	1.5/2.4	0.7/1.0	0.1/0.2	0.0/0.0	2.2/2.7
Latitude -15	Average	0.4	2.1	4.3	6.0	6.4	5.7	5.0	3.9	3.1	2.1	0.7	0.1	3.3
	Min/Max	0.2/0.8	1.3/3.0	2.7/5.4	3.3/7.3	5.1/8.0	4.1/6.8	4.1/6.4	2.3/5.4	1.9/4.3	1.4/3.0	0.3/1.0	0.0/0.2	2.8/3.9
Latitude	Average	0.5	2.3	4.5	6.0	6.1	5.2	4.6	3.7	3.1	2.2	0.7	0.1	3.2
	Min/Max	0.2/0.9	1.4/3.3	2.7/5.7	3.2/7.4	4.8/7.8	3.7/6.3	3.7/5.8	2.2/5.1	1.9/4.3	1.5/3.2	0.4/1.2	0.0/0.2	2.8/3.9
Latitude +15	Average	0.5	2.3	4.5	5.7	5.6	4.4	3.9	3.3	2.9	2.2	0.8	0.1	3.0
	Min/Max	0.2/0.9	1.4/3.4	2.7/5.7	3.0/7.1	4.3/7.2	3.2/5.6	3.2/5.0	1.9/4.6	1.7/4.1	1.5/3.3	0.4/1.2	0.0/0.2	2.6/3.6
90	Average	0.5	2.3	4.4	5.4	5.2	4.0	3.5	3.0	2.7	2.1	0.8	0.1	2.8
	Min/Max	0.2/0.9	1.4/3.4	2.6/5.5	2.9/6.7	4.0/6.7	2.8/5.1	2.8/4.5	1.7/4.2	1.6/3.9	1.4/3.2	0.4/1.2	0.0/0.2	2.4/3.4

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.1	1.3	3.9	6.8	8.4	8.0	6.7	4.7	3.1	1.5	0.3	0.0	3.8
	Min/Max	0.1/0.3	0.8/1.8	2.3/4.8	3.5/8.6	6.3/11.4	5.3/9.8	5.0/9.3	2.7/6.7	1.9/4.5	1.0/2.2	0.2/0.5	0.0/0.0	3.1/4.6
Latitude -15	Average	0.4	2.4	5.5	8.4	9.5	8.7	7.3	5.3	3.9	2.4	0.7	0.1	4.6
	Min/Max	0.2/0.8	1.4/3.5	3.1/7.1	4.1/10.7	7.0/13.1	5.4/10.9	5.3/10.3	2.8/7.9	2.2/5.9	1.6/3.7	0.3/1.1	0.0/0.2	3.7/5.6
Latitude	Average	0.5	2.5	5.7	8.4	9.4	8.4	7.1	5.2	3.9	2.5	0.8	0.1	4.5
	Min/Max	0.2/0.9	1.5/3.8	3.2/7.3	4.1/10.7	6.8/13.1	5.2/10.6	5.1/10.0	2.6/7.7	2.2/5.9	1.6/3.8	0.4/1.3	0.0/0.2	3.7/5.6
Latitude +15	Average	0.5	2.6	5.7	8.2	9.0	8.0	6.7	4.9	3.8	2.5	0.8	0.1	4.4
	Min/Max	0.2/1.0	1.5/3.9	3.1/7.3	4.0/10.5	6.5/12.7	4.8/10.1	4.8/9.6	2.5/7.4	2.1/5.8	1.6/3.9	0.4/1.3	0.0/0.2	3.5/5.5

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	0.5	2.6	5.7	8.4	9.6	9.0	7.6	5.4	4.0	2.5	0.8	0.1	4.7
	Min/Max	0.2/1.0	1.5/3.9	3.2/7.3	4.1/10.7	7.1/13.3	5.7/11.3	5.5/10.6	2.8/8.0	2.2/5.9	1.6/3.9	0.4/1.3	0.0/0.2	3.8/5.8

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	0.4	1.6	2.9	3.5	4.0	4.1	3.3	2.2	1.9	1.4	0.5	0.1	2.2
	Min/Max	0.1/0.9	0.7/2.8	1.0/4.2	1.2/5.1	2.5/6.5	1.8/5.8	2.0/5.4	0.6/3.8	0.7/3.2	0.7/2.5	0.2/1.0	0.0/0.2	1.5/3.0
1-Axis, N-S Horiz Axis	Average	0.1	0.8	2.4	4.1	5.0	5.0	4.0	2.6	1.8	0.9	0.2	0.0	2.2
	Min/Max	0.0/0.2	0.3/1.4	0.7/3.5	1.4/5.9	3.0/8.3	2.1/6.9	2.5/6.8	0.8/4.6	0.6/3.2	0.4/1.6	0.0/0.3	0.0/0.0	1.5/3.1
1-Axis, N-S Tilt=Latitude	Average	0.4	1.8	3.8	5.1	5.5	5.3	4.3	3.1	2.6	1.7	0.6	0.1	2.9
	Min/Max	0.1/0.9	0.8/3.1	1.2/5.4	1.7/7.4	3.3/9.2	2.3/7.4	2.7/7.3	0.9/5.5	0.9/4.5	0.9/3.0	0.2/1.0	0.0/0.2	1.9/3.9
2-Axis	Average	0.4	1.8	3.8	5.2	5.9	5.8	4.7	3.2	2.6	1.7	0.6	0.1	3.0
	Min/Max	0.1/0.9	0.8/3.2	1.2/5.4	1.8/7.6	3.5/9.7	2.5/8.1	2.9/7.9	0.9/5.7	0.9/4.5	0.9/3.1	0.2/1.1	0.0/0.2	2.0/4.1

Average Climatic Conditions

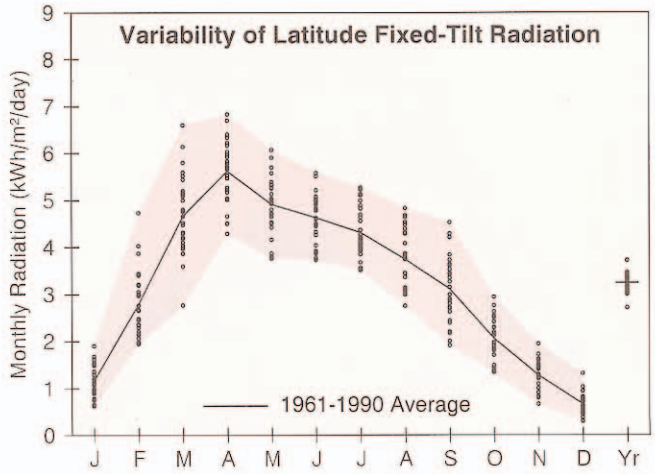
Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-18.3	-20.4	-17.6	-11.5	-0.4	6.6	12.1	11.2	5.6	-5.1	-13.4	-18.3	-5.8
Daily Minimum Temp	-21.9	-24.4	-22.2	-16.5	-4.2	3.2	9.2	8.5	2.8	-7.7	-16.4	-21.9	-9.3
Daily Maximum Temp	-14.7	-16.5	-12.9	-6.5	3.3	9.8	15.1	13.9	8.3	-2.4	-10.5	-14.7	-2.3
Record Minimum Temp	-45.0	-46.7	-44.4	-42.2	-27.8	-6.7	-1.1	-1.1	-9.4	-28.3	-37.8	-43.9	-46.7
Record Maximum Temp	3.9	4.4	3.9	8.9	23.3	29.4	29.4	26.7	20.6	10.6	3.3	2.8	29.4
HDD, Base 18.3°C	1137	1086	1113	895	582	353	196	226	383	725	953	1135	8784
CDD, Base 18.3°C	0	0	0	0	0	0	3	4	0	0	0	0	7
Relative Humidity (%)	72	70	71	76	81	82	81	81	79	79	76	74	77
Wind Speed (m/s)	6.2	5.5	5.1	5.3	5.2	5.4	5.6	5.6	6.0	5.9	6.4	6.3	5.7

McGrath, AK

WBAN NO. 26510

LATITUDE: 62.97° N
LONGITUDE: 155.62° W
ELEVATION: 103 meters
MEAN PRESSURE: 997 millibars

STATION TYPE: Secondary



Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.3	1.0	2.4	4.2	4.8	5.1	4.6	3.5	2.2	1.1	0.4	0.1	2.5
	Min/Max	0.2/0.3	0.8/1.2	1.9/2.9	3.5/4.7	3.9/5.7	4.3/5.9	4.0/5.4	2.8/4.1	1.7/2.8	0.9/1.3	0.3/0.4	0.1/0.1	2.2/2.8
Latitude -15	Average	1.0	2.5	4.4	5.6	5.3	5.1	4.7	4.0	3.1	2.0	1.1	0.6	3.3
	Min/Max	0.6/1.6	1.8/4.2	2.7/6.2	4.4/6.8	4.1/6.5	4.1/6.1	3.9/5.8	3.0/5.1	2.0/4.5	1.3/2.8	0.6/1.7	0.3/1.1	2.8/3.8
Latitude	Average	1.2	2.8	4.7	5.6	4.9	4.6	4.3	3.7	3.1	2.1	1.3	0.6	3.2
	Min/Max	0.6/1.9	1.9/4.7	2.8/6.6	4.3/6.8	3.8/6.1	3.7/5.6	3.5/5.3	2.8/4.8	1.9/4.5	1.3/2.9	0.7/1.9	0.3/1.3	2.7/3.7
Latitude +15	Average	1.2	2.9	4.6	5.4	4.4	4.0	3.7	3.3	2.9	2.1	1.3	0.7	3.0
	Min/Max	0.6/2.0	2.0/4.9	2.7/6.6	4.0/6.6	3.3/5.4	3.2/4.8	3.0/4.6	2.4/4.3	1.7/4.3	1.3/2.9	0.7/2.0	0.3/1.4	2.5/3.5
90	Average	1.2	2.8	4.5	5.0	3.8	3.3	3.2	2.9	2.7	2.0	1.3	0.7	2.8
	Min/Max	0.6/2.0	2.0/4.9	2.6/6.4	3.6/6.1	2.8/4.8	2.7/4.0	2.6/3.9	2.1/3.8	1.6/3.9	1.2/2.8	0.7/2.0	0.3/1.4	2.3/3.2

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.5	1.8	4.2	6.5	6.9	6.9	6.2	4.7	3.2	1.6	0.7	0.2	3.6
	Min/Max	0.3/0.8	1.3/3.0	2.5/5.9	4.9/7.9	5.1/9.1	5.1/8.4	4.8/7.9	3.6/6.2	2.0/4.8	1.1/2.2	0.4/1.0	0.1/0.4	3.0/4.3
Latitude -15	Average	1.1	3.0	5.7	7.7	7.5	7.2	6.6	5.3	4.0	2.3	1.3	0.6	4.3
	Min/Max	0.6/1.8	2.0/5.2	3.1/8.3	5.6/9.6	5.5/10.1	5.2/9.0	4.9/8.5	3.8/7.1	2.2/6.1	1.5/3.3	0.6/1.9	0.3/1.2	3.5/5.2
Latitude	Average	1.2	3.2	5.9	7.7	7.3	7.0	6.3	5.1	4.0	2.4	1.4	0.7	4.3
	Min/Max	0.6/2.0	2.2/5.6	3.2/8.6	5.6/9.6	5.3/9.9	4.9/8.7	4.7/8.2	3.7/6.9	2.2/6.2	1.5/3.5	0.7/2.1	0.3/1.4	3.5/5.2
Latitude +15	Average	1.3	3.3	5.9	7.5	7.0	6.6	5.9	4.9	3.8	2.4	1.4	0.7	4.2
	Min/Max	0.7/2.2	2.2/5.7	3.2/8.6	5.5/9.4	5.0/9.4	4.6/8.3	4.4/7.8	3.4/6.6	2.0/6.0	1.5/3.5	0.7/2.2	0.3/1.5	3.3/5.1

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

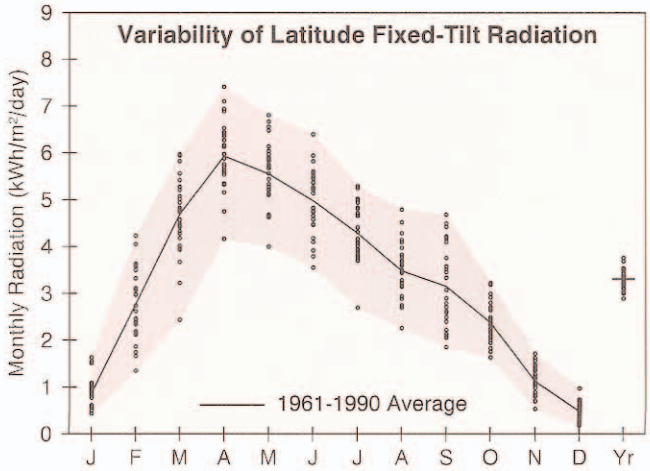
Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	1.3	3.3	5.9	7.7	7.7	7.5	6.8	5.3	4.0	2.4	1.4	0.7	4.5
	Min/Max	0.7/2.2	2.2/5.7	3.2/8.6	5.7/9.6	5.6/10.3	5.4/9.4	5.1/8.7	3.8/7.2	2.2/6.2	1.5/3.5	0.7/2.2	0.3/1.5	3.6/5.4

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	0.9	1.9	2.8	3.1	3.2	3.1	2.7	2.1	1.8	1.1	0.8	0.5	2.0
	Min/Max	0.3/1.7	0.9/4.1	1.0/5.1	1.5/4.4	1.8/5.2	1.5/4.2	1.4/4.0	1.1/3.3	0.5/3.2	0.5/2.1	0.3/1.5	0.2/1.3	1.4/2.6
1-Axis, N-S Horiz Axis	Average	0.3	1.1	2.5	3.6	4.1	3.9	3.4	2.5	1.8	0.8	0.3	0.1	2.0
	Min/Max	0.1/0.6	0.5/2.4	0.8/4.5	1.7/5.1	2.4/6.7	1.9/5.3	1.8/5.0	1.5/3.9	0.5/3.4	0.3/1.5	0.1/0.6	0.0/0.3	1.4/2.8
1-Axis, N-S Tilt=Latitude	Average	0.9	2.1	3.8	4.5	4.4	4.0	3.5	2.9	2.5	1.4	0.9	0.5	2.6
	Min/Max	0.3/1.7	1.0/4.7	1.2/6.7	2.1/6.3	2.6/7.3	2.0/5.5	1.9/5.3	1.7/4.6	0.7/4.6	0.6/2.6	0.3/1.6	0.1/1.2	1.8/3.5
2-Axis	Average	0.9	2.2	3.8	4.5	4.7	4.4	3.8	3.0	2.5	1.4	0.9	0.5	2.7
	Min/Max	0.3/1.8	1.0/4.8	1.2/6.7	2.1/6.4	2.7/7.7	2.2/6.0	2.1/5.7	1.8/4.7	0.7/4.6	0.6/2.6	0.3/1.7	0.2/1.3	1.9/3.6

Average Climatic Conditions

Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-22.6	-19.2	-12.1	-3.1	6.9	12.9	14.8	12.4	6.8	-4.1	-15.3	-21.1	-3.6
Daily Minimum Temp	-27.7	-25.7	-19.4	-8.9	1.4	7.3	9.4	7.2	1.9	-7.8	-19.8	-25.9	-9.0
Daily Maximum Temp	-17.6	-12.8	-4.8	2.8	12.5	18.6	20.2	17.5	11.6	-0.4	-10.9	-16.3	1.7
Record Minimum Temp	-59.4	-53.3	-46.1	-40.0	-18.9	-1.1	0.6	-3.9	-14.4	-33.3	-47.2	-55.0	-59.4
Record Maximum Temp	12.2	12.8	10.6	19.4	27.2	32.2	31.7	31.7	24.4	15.0	9.4	9.4	32.2
HDD, Base 18.3°C	1269	1052	944	642	353	162	115	188	347	694	1010	1223	7998
CDD, Base 18.3°C	0	0	0	0	0	0	7	3	0	0	0	0	10
Relative Humidity (%)	72	69	64	62	59	63	70	75	74	78	77	74	70
Wind Speed (m/s)	1.4	2.0	2.5	3.1	3.1	3.0	2.8	2.8	2.8	2.6	1.8	1.5	2.5



Nome, AK

WBAN NO. 26617

LATITUDE: 64.50° N
LONGITUDE: 165.43° W
ELEVATION: 7 meters
MEAN PRESSURE: 1009 millibars

STATION TYPE: Secondary

Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.2	0.8	2.3	4.3	5.3	5.5	4.6	3.3	2.1	1.0	0.3	0.1	2.5
	Min/Max	0.1/0.2	0.7/1.0	1.7/2.7	3.6/4.8	4.0/6.2	4.2/6.8	3.3/5.5	2.5/4.1	1.6/2.8	0.8/1.2	0.2/0.3	0.0/0.1	2.3/2.7
Latitude -15	Average	0.8	2.5	4.5	5.9	5.9	5.5	4.7	3.7	3.2	2.2	1.0	0.4	3.4
	Min/Max	0.4/1.4	1.3/3.8	2.4/5.6	4.2/7.3	4.3/7.1	3.9/7.0	3.0/5.8	2.5/5.0	1.9/4.7	1.6/3.0	0.5/1.5	0.2/0.8	2.9/3.8
Latitude	Average	0.9	2.8	4.7	5.9	5.6	5.0	4.3	3.5	3.2	2.4	1.1	0.5	3.3
	Min/Max	0.4/1.6	1.4/4.2	2.4/6.0	4.2/7.4	4.0/6.8	3.5/6.4	2.7/5.3	2.3/4.8	1.9/4.7	1.6/3.2	0.5/1.7	0.2/1.0	2.9/3.8
Latitude +15	Average	0.9	2.9	4.7	5.6	5.0	4.3	3.7	3.1	3.0	2.4	1.2	0.5	3.1
	Min/Max	0.4/1.8	1.4/4.4	2.4/6.0	4.0/7.1	3.6/6.3	3.0/5.4	2.3/4.6	2.0/4.3	1.7/4.4	1.6/3.2	0.6/1.8	0.2/1.0	2.7/3.5
90	Average	0.9	2.8	4.5	5.3	4.5	3.7	3.2	2.7	2.7	2.3	1.2	0.5	2.9
	Min/Max	0.4/1.8	1.3/4.4	2.3/5.8	3.7/6.7	3.2/5.8	2.6/4.7	2.0/4.0	1.7/3.8	1.5/4.1	1.5/3.1	0.5/1.8	0.2/1.1	2.5/3.2

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.3	1.7	4.2	6.9	7.9	7.8	6.3	4.5	3.3	1.8	0.5	0.1	3.8
	Min/Max	0.2/0.6	1.0/2.6	2.3/5.3	4.6/8.8	5.3/10.2	4.8/10.6	3.8/8.4	2.8/6.2	1.9/4.9	1.2/2.3	0.3/0.8	0.1/0.3	3.2/4.4
Latitude -15	Average	0.8	3.0	5.8	8.3	8.7	8.3	6.7	5.0	4.1	2.7	1.1	0.4	4.6
	Min/Max	0.4/1.6	1.4/4.6	2.8/7.5	5.2/10.8	5.6/11.4	4.8/11.4	3.8/9.0	2.9/7.1	2.2/6.3	1.8/3.7	0.5/1.7	0.2/0.9	3.8/5.4
Latitude	Average	0.9	3.2	5.9	8.3	8.5	8.0	6.4	4.8	4.1	2.8	1.2	0.5	4.6
	Min/Max	0.4/1.8	1.5/4.9	2.8/7.7	5.1/10.8	5.5/11.2	4.6/11.1	3.6/8.8	2.8/6.9	2.2/6.4	1.9/3.9	0.6/1.9	0.2/1.0	3.8/5.4
Latitude +15	Average	1.0	3.2	5.9	8.1	8.1	7.6	6.1	4.6	4.0	2.8	1.3	0.5	4.4
	Min/Max	0.5/1.9	1.5/5.1	2.8/7.7	5.0/10.6	5.2/10.7	4.3/10.6	3.3/8.4	2.6/6.6	2.1/6.2	1.8/3.9	0.6/1.9	0.2/1.1	3.7/5.3

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	1.0	3.2	5.9	8.4	8.8	8.6	6.9	5.0	4.1	2.8	1.3	0.5	4.7
	Min/Max	0.5/1.9	1.5/5.1	2.8/7.7	5.2/10.8	5.8/11.7	5.1/11.9	3.9/9.4	3.0/7.1	2.2/6.4	1.9/3.9	0.6/2.0	0.2/1.1	4.0/5.6

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	0.7	2.0	3.0	3.5	3.8	4.0	2.9	1.9	1.9	1.6	0.8	0.5	2.2
	Min/Max	0.2/1.5	0.4/3.6	0.7/4.4	1.1/5.3	1.3/6.4	1.4/6.4	0.9/4.5	0.7/3.4	0.8/3.5	0.9/2.5	0.2/1.4	0.2/1.0	1.6/2.9
1-Axis, N-S Horiz Axis	Average	0.2	1.1	2.6	4.2	4.8	5.0	3.6	2.4	2.0	1.1	0.3	0.1	2.3
	Min/Max	0.1/0.5	0.2/2.0	0.6/4.0	1.2/6.3	1.6/8.1	1.7/8.0	1.3/5.8	0.9/4.3	0.8/3.6	0.6/1.7	0.1/0.6	0.0/0.2	1.6/3.0
1-Axis, N-S Tilt=Latitude	Average	0.7	2.2	3.9	5.1	5.3	5.2	3.8	2.8	2.7	1.9	0.8	0.5	2.9
	Min/Max	0.2/1.5	0.5/4.1	0.9/6.0	1.5/7.7	1.8/8.9	1.8/8.4	1.3/6.2	1.1/4.8	1.0/4.8	1.1/3.1	0.2/1.5	0.2/1.0	2.1/3.8
2-Axis	Average	0.7	2.3	3.9	5.2	5.6	5.7	4.1	2.9	2.7	2.0	0.9	0.5	3.0
	Min/Max	0.2/1.6	0.5/4.2	0.9/6.0	1.5/7.8	1.9/9.4	1.9/9.1	1.5/6.6	1.1/5.0	1.0/4.9	1.1/3.1	0.2/1.5	0.2/1.1	2.2/4.0

Average Climatic Conditions

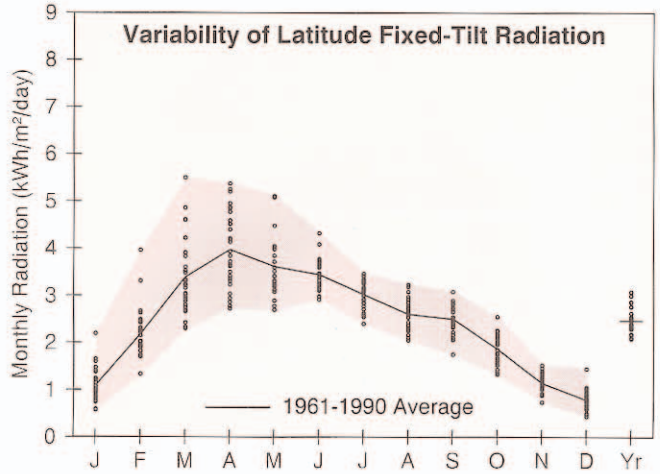
Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-13.9	-15.6	-13.0	-8.0	2.0	7.7	10.8	10.1	5.8	-2.2	-8.9	-13.7	-3.2
Daily Minimum Temp	-18.2	-20.3	-17.9	-12.4	-1.6	3.8	7.3	6.7	2.4	-5.4	-12.6	-18.1	-7.2
Daily Maximum Temp	-9.6	-11.0	-8.1	-3.6	5.6	11.6	14.3	13.4	9.3	0.9	-5.3	-9.4	0.7
Record Minimum Temp	-47.8	-41.1	-43.3	-34.4	-23.9	-5.0	-0.6	-2.8	-9.4	-23.3	-39.4	-40.6	-47.8
Record Maximum Temp	6.1	8.9	6.1	10.6	25.6	27.2	30.0	27.2	21.7	15.0	7.2	6.1	30.0
HDD, Base 18.3°C	999	951	971	790	506	318	235	255	375	637	818	994	7849
CDD, Base 18.3°C	0	0	0	0	0	0	0	0	0	0	0	0	0
Relative Humidity (%)	72	69	71	74	74	74	79	80	75	74	74	72	74
Wind Speed (m/s)	5.2	4.6	4.5	4.7	4.6	4.5	4.5	4.9	5.2	4.9	5.1	5.0	4.8

St Paul Is., AK

WBAN NO. 25713

LATITUDE: 57.15° N
LONGITUDE: 170.22° W
ELEVATION: 7 meters
MEAN PRESSURE: 1006 millibars

STATION TYPE: Secondary



Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.5	1.2	2.4	3.5	3.9	4.0	3.6	2.9	2.2	1.3	0.6	0.4	2.2
	Min/Max	0.4/0.6	0.9/1.6	1.9/3.1	2.7/4.4	3.2/5.1	3.5/4.7	3.0/3.9	2.4/3.4	1.8/2.4	1.1/1.5	0.5/0.7	0.3/0.5	2.0/2.5
Latitude -15	Average	1.0	2.0	3.3	4.1	3.9	3.8	3.3	2.8	2.6	1.8	1.1	0.7	2.5
	Min/Max	0.6/1.9	1.3/3.6	2.3/5.2	2.9/5.4	3.0/5.3	3.2/4.7	2.7/3.8	2.3/3.5	1.9/3.1	1.3/2.4	0.7/1.4	0.4/1.3	2.2/3.1
Latitude	Average	1.1	2.2	3.4	4.0	3.6	3.4	3.0	2.6	2.5	1.9	1.1	0.8	2.5
	Min/Max	0.6/2.2	1.3/4.0	2.3/5.5	2.7/5.4	2.7/5.1	2.9/4.3	2.4/3.5	2.0/3.2	1.8/3.1	1.3/2.5	0.7/1.5	0.4/1.4	2.1/3.1
Latitude +15	Average	1.1	2.2	3.3	3.7	3.2	3.0	2.6	2.3	2.3	1.8	1.2	0.8	2.3
	Min/Max	0.6/2.3	1.3/4.1	2.2/5.5	2.5/5.2	2.3/4.8	2.5/3.8	2.1/3.0	1.8/2.9	1.6/2.9	1.3/2.5	0.7/1.6	0.4/1.5	1.9/2.9
90	Average	1.1	2.1	3.1	3.3	2.6	2.3	2.1	1.9	2.0	1.7	1.1	0.8	2.0
	Min/Max	0.5/2.3	1.2/4.0	1.9/5.2	2.0/4.6	1.9/4.2	2.0/2.9	1.6/2.4	1.4/2.3	1.3/2.5	1.1/2.3	0.7/1.5	0.4/1.6	1.6/2.6

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.7	1.7	3.3	4.5	4.4	4.4	3.7	3.0	2.6	1.6	0.8	0.5	2.6
	Min/Max	0.4/1.3	1.1/3.0	2.3/5.2	3.0/6.2	3.2/6.5	3.5/5.4	2.8/4.3	2.3/3.8	1.8/3.2	1.2/2.1	0.5/1.0	0.3/0.7	2.2/3.2
Latitude -15	Average	1.1	2.3	4.0	4.9	4.6	4.3	3.6	3.1	3.0	2.0	1.1	0.8	2.9
	Min/Max	0.6/2.2	1.4/4.4	2.7/6.8	3.2/6.9	3.2/6.9	3.4/5.6	2.7/4.4	2.3/4.0	1.9/3.8	1.4/2.8	0.7/1.5	0.4/1.4	2.4/3.7
Latitude	Average	1.2	2.5	4.1	4.9	4.4	4.1	3.4	2.9	2.9	2.1	1.2	0.8	2.9
	Min/Max	0.6/2.4	1.4/4.7	2.7/7.0	3.1/6.9	3.0/6.8	3.1/5.3	2.5/4.2	2.2/3.8	1.9/3.8	1.4/3.0	0.7/1.6	0.4/1.5	2.4/3.7
Latitude +15	Average	1.2	2.5	4.0	4.7	4.1	3.8	3.1	2.7	2.8	2.1	1.2	0.9	2.8
	Min/Max	0.6/2.6	1.4/4.8	2.6/7.0	2.9/6.8	2.7/6.5	2.9/4.9	2.3/3.9	2.0/3.6	1.8/3.6	1.4/2.9	0.7/1.7	0.4/1.6	2.3/3.6

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	1.2	2.5	4.1	5.0	4.7	4.5	3.8	3.1	3.0	2.1	1.3	0.9	3.0
	Min/Max	0.6/2.6	1.5/4.8	2.7/7.0	3.2/7.0	3.3/7.0	3.5/5.8	2.8/4.6	2.4/4.0	1.9/3.8	1.5/3.0	0.8/1.7	0.4/1.7	2.5/3.9

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	0.5	1.1	1.5	1.4	1.2	1.1	0.7	0.6	1.0	0.9	0.6	0.4	0.9
	Min/Max	0.1/1.7	0.5/2.8	0.8/3.6	0.6/2.5	0.4/2.4	0.2/2.2	0.2/1.4	0.2/1.1	0.4/1.5	0.4/1.5	0.3/0.9	0.1/0.9	0.7/1.4
1-Axis, N-S Horiz Axis	Average	0.2	0.7	1.3	1.7	1.5	1.3	0.8	0.7	1.0	0.6	0.3	0.2	0.9
	Min/Max	0.1/0.8	0.4/2.0	0.7/3.3	0.7/3.0	0.6/3.0	0.2/2.5	0.2/1.7	0.3/1.4	0.4/1.6	0.3/1.1	0.1/0.5	0.1/0.4	0.7/1.4
1-Axis, N-S Tilt=Latitude	Average	0.6	1.2	1.9	2.0	1.5	1.3	0.8	0.8	1.3	1.0	0.6	0.4	1.1
	Min/Max	0.1/1.8	0.6/3.3	1.0/4.7	0.9/3.5	0.6/3.2	0.2/2.6	0.2/1.8	0.3/1.5	0.5/2.1	0.6/1.8	0.3/1.0	0.1/0.9	0.9/1.8
2-Axis	Average	0.6	1.3	1.9	2.0	1.6	1.4	0.9	0.9	1.3	1.1	0.6	0.4	1.2
	Min/Max	0.1/1.9	0.6/3.4	1.0/4.7	0.9/3.5	0.6/3.4	0.3/2.8	0.2/1.9	0.3/1.6	0.5/2.1	0.6/1.8	0.3/1.0	0.1/1.0	0.9/1.9

Average Climatic Conditions

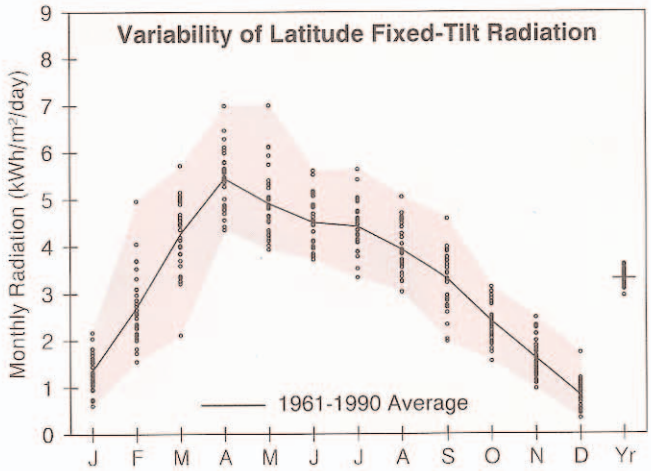
Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-3.0	-5.3	-4.3	-2.1	1.8	5.3	7.8	8.7	7.0	3.2	0.6	-1.7	1.5
Daily Minimum Temp	-5.3	-7.8	-7.0	-4.5	-0.4	2.8	5.8	6.9	4.6	0.9	-1.7	-4.0	-0.8
Daily Maximum Temp	-0.7	-2.8	-1.7	0.4	4.1	7.7	9.8	10.6	9.3	5.6	2.8	0.7	3.8
Record Minimum Temp	-32.2	-26.7	-28.3	-22.2	-13.3	-8.9	-2.2	-1.7	-3.9	-11.1	-15.6	-20.6	-32.2
Record Maximum Temp	8.9	6.7	10.0	8.9	14.4	16.7	17.2	18.9	16.1	12.2	10.0	11.1	18.9
HDD, Base 18.3°C	661	663	703	612	513	392	326	298	340	468	533	620	6128
CDD, Base 18.3°C	0	0	0	0	0	0	0	0	0	0	0	0	0
Relative Humidity (%)	84	84	85	85	87	90	93	93	88	82	82	83	86
Wind Speed (m/s)	8.6	8.9	8.3	8.0	6.8	6.1	5.5	6.1	7.0	8.0	8.4	8.8	7.5

Talkeetna, AK

WBAN NO. 26528

LATITUDE: 62.30° N
LONGITUDE: 150.10° W
ELEVATION: 105 meters
MEAN PRESSURE: 996 millibars

STATION TYPE: Secondary



Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.3	1.0	2.3	4.1	4.8	5.0	4.7	3.6	2.3	1.2	0.4	0.2	2.5
	Min/Max	0.3/0.3	0.8/1.3	1.6/2.7	3.4/4.7	4.0/6.2	4.3/6.0	3.9/5.7	3.0/4.3	1.7/2.8	1.0/1.3	0.4/0.6	0.1/0.2	2.3/2.7
Latitude -15	Average	1.2	2.5	4.1	5.5	5.2	5.0	4.8	4.2	3.3	2.3	1.4	0.7	3.3
	Min/Max	0.6/1.9	1.5/4.4	2.1/5.4	4.4/6.9	4.3/7.3	4.1/6.1	3.7/6.1	3.3/5.3	2.0/4.5	1.5/2.9	0.9/2.2	0.3/1.5	3.0/3.6
Latitude	Average	1.3	2.7	4.3	5.4	4.9	4.5	4.4	3.9	3.3	2.4	1.6	0.8	3.3
	Min/Max	0.6/2.2	1.5/5.0	2.1/5.7	4.3/7.0	3.9/7.0	3.7/5.6	3.3/5.6	3.0/5.1	2.0/4.6	1.5/3.1	1.0/2.5	0.3/1.7	2.9/3.6
Latitude +15	Average	1.4	2.8	4.2	5.2	4.4	3.9	3.8	3.5	3.1	2.4	1.7	0.9	3.1
	Min/Max	0.6/2.3	1.6/5.2	2.0/5.7	4.0/6.7	3.4/6.4	3.2/4.8	2.9/4.9	2.7/4.5	1.8/4.3	1.5/3.2	1.0/2.6	0.3/1.9	2.7/3.4
90	Average	1.4	2.7	4.0	4.8	3.8	3.2	3.2	3.0	2.8	2.3	1.7	0.9	2.8
	Min/Max	0.6/2.3	1.5/5.1	1.8/5.5	3.5/6.2	2.9/5.8	2.7/4.0	2.4/4.1	2.3/3.9	1.6/4.0	1.4/3.1	1.0/2.6	0.3/1.9	2.5/3.1

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.6	1.8	3.9	6.3	6.8	6.5	6.2	4.9	3.4	1.9	0.9	0.3	3.6
	Min/Max	0.3/0.9	1.2/3.2	2.0/5.2	5.0/8.5	5.3/9.4	5.2/8.6	4.7/8.4	3.6/6.6	2.0/4.6	1.3/2.3	0.6/1.3	0.1/0.6	3.2/4.1
Latitude -15	Average	1.3	2.9	5.2	7.5	7.3	6.8	6.6	5.5	4.2	2.7	1.6	0.8	4.4
	Min/Max	0.6/2.1	1.6/5.5	2.4/7.2	5.8/10.3	5.7/10.5	5.3/9.1	4.7/9.0	3.9/7.5	2.3/5.9	1.7/3.5	1.0/2.5	0.3/1.6	3.8/4.9
Latitude	Average	1.4	3.1	5.3	7.5	7.1	6.6	6.3	5.3	4.2	2.8	1.8	0.9	4.4
	Min/Max	0.6/2.4	1.7/5.9	2.4/7.4	5.8/10.3	5.5/10.4	5.1/8.8	4.4/8.8	3.7/7.3	2.3/6.0	1.7/3.7	1.0/2.8	0.3/1.8	3.8/4.9
Latitude +15	Average	1.5	3.2	5.3	7.3	6.8	6.2	5.9	5.0	4.1	2.8	1.8	0.9	4.2
	Min/Max	0.7/2.5	1.7/6.1	2.3/7.4	5.6/10.1	5.2/10.0	4.7/8.3	4.1/8.3	3.5/7.0	2.2/5.8	1.7/3.7	1.1/2.9	0.4/2.0	3.6/4.7

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	1.5	3.2	5.3	7.5	7.5	7.1	6.8	5.5	4.2	2.8	1.8	0.9	4.5
	Min/Max	0.7/2.5	1.7/6.1	2.5/7.4	5.9/10.3	5.8/10.6	5.5/9.4	4.8/9.3	3.9/7.6	2.4/6.0	1.8/3.7	1.1/2.9	0.4/2.0	3.9/5.1

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	1.0	1.8	2.6	3.1	3.1	2.9	2.8	2.3	2.0	1.5	1.2	0.7	2.1
	Min/Max	0.2/1.9	0.4/4.4	0.9/4.2	1.7/5.1	1.5/4.8	1.6/4.5	1.2/4.5	1.2/3.7	0.8/3.2	0.6/2.3	0.4/2.0	0.2/1.7	1.7/2.4
1-Axis, N-S Horiz Axis	Average	0.4	1.1	2.3	3.6	3.9	3.6	3.4	2.7	2.0	1.0	0.5	0.2	2.1
	Min/Max	0.1/0.7	0.3/2.7	0.8/3.8	2.0/6.2	1.8/6.0	2.1/5.7	1.6/5.6	1.4/4.5	0.8/3.2	0.4/1.5	0.2/0.9	0.1/0.5	1.6/2.5
1-Axis, N-S Tilt=Latitude	Average	1.0	2.1	3.4	4.4	4.3	3.7	3.6	3.2	2.7	1.8	1.2	0.6	2.7
	Min/Max	0.2/2.0	0.5/5.1	1.2/5.6	2.5/7.5	2.0/6.5	2.1/5.9	1.6/5.9	1.6/5.2	1.0/4.4	0.8/2.7	0.5/2.2	0.2/1.6	2.1/3.1
2-Axis	Average	1.1	2.1	3.4	4.5	4.5	4.0	3.9	3.3	2.7	1.8	1.3	0.7	2.8
	Min/Max	0.3/2.1	0.5/5.2	1.2/5.6	2.5/7.6	2.1/6.9	2.3/6.4	1.8/6.4	1.6/5.3	1.0/4.4	0.8/2.8	0.5/2.3	0.2/1.8	2.2/3.3

Average Climatic Conditions

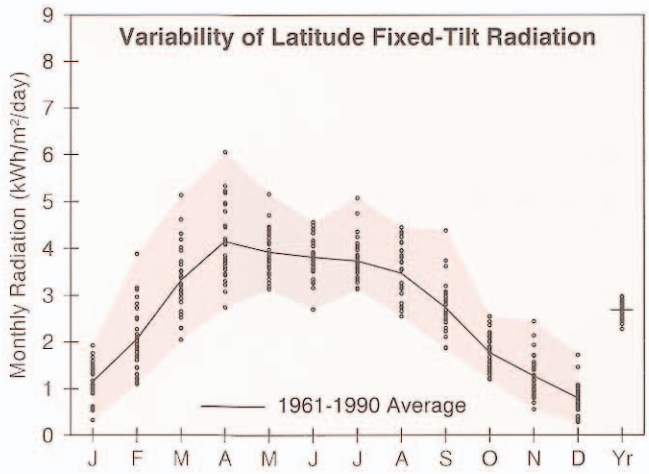
Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-12.3	-9.6	-5.8	0.5	7.2	12.5	14.7	12.8	7.8	-0.4	-8.6	-11.5	0.6
Daily Minimum Temp	-17.4	-15.6	-12.3	-5.3	1.0	6.9	9.4	7.6	2.6	-4.9	-13.4	-16.2	-4.8
Daily Maximum Temp	-7.1	-3.7	0.8	6.3	13.3	18.0	19.8	18.1	13.1	4.1	-3.8	-6.8	6.0
Record Minimum Temp	-44.4	-43.3	-41.7	-38.3	-20.6	-2.2	0.6	-3.9	-9.4	-29.4	-40.6	-42.8	-44.4
Record Maximum Temp	7.2	10.6	11.7	20.6	27.8	32.8	32.2	29.4	25.6	20.0	10.0	8.3	32.8
HDD, Base 18.3°C	949	782	747	535	344	175	114	171	315	582	808	925	6448
CDD, Base 18.3°C	0	0	0	0	0	0	0	0	0	0	0	0	0
Relative Humidity (%)	72	72	69	68	66	70	75	81	82	81	76	75	74
Wind Speed (m/s)	2.9	2.7	2.7	2.5	2.5	2.6	2.4	2.0	1.9	2.1	2.7	2.8	2.5

Yakutat, AK

WBAN NO. 25339

LATITUDE: 59.52° N
LONGITUDE: 139.67° W
ELEVATION: 9 meters
MEAN PRESSURE: 1009 millibars

STATION TYPE: Secondary



Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±9%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.4	1.0	2.2	3.5	4.1	4.4	4.2	3.4	2.2	1.1	0.5	0.3	2.3
	Min/Max	0.2/0.5	0.7/1.4	1.6/2.8	2.6/4.7	3.5/4.9	3.3/5.1	3.6/5.3	2.7/4.1	1.7/3.0	0.9/1.3	0.4/0.7	0.2/0.3	2.0/2.5
Latitude -15	Average	1.0	1.9	3.2	4.2	4.2	4.2	4.1	3.7	2.8	1.7	1.2	0.7	2.8
	Min/Max	0.3/1.7	1.1/3.5	2.0/4.9	2.9/6.1	3.4/5.4	3.0/5.0	3.5/5.5	2.8/4.7	2.0/4.4	1.2/2.4	0.6/2.2	0.3/1.5	2.4/3.0
Latitude	Average	1.2	2.1	3.3	4.2	3.9	3.8	3.7	3.5	2.7	1.8	1.3	0.8	2.7
	Min/Max	0.3/1.9	1.1/3.9	2.0/5.1	2.7/6.1	3.1/5.2	2.7/4.6	3.1/5.1	2.5/4.4	1.9/4.4	1.2/2.5	0.6/2.4	0.3/1.7	2.3/3.0
Latitude +15	Average	1.2	2.1	3.3	3.9	3.5	3.3	3.2	3.1	2.5	1.7	1.3	0.8	2.5
	Min/Max	0.3/2.0	1.1/4.1	1.9/5.1	2.5/5.8	2.7/4.8	2.3/3.9	2.7/4.4	2.3/4.0	1.7/4.1	1.1/2.5	0.6/2.6	0.3/1.9	2.1/2.8
90	Average	1.2	2.0	3.1	3.5	2.8	2.6	2.6	2.6	2.2	1.6	1.3	0.8	2.2
	Min/Max	0.3/2.1	1.0/4.0	1.8/4.8	2.1/5.2	2.3/4.2	1.9/3.1	2.2/3.5	1.9/3.3	1.5/3.7	1.0/2.4	0.5/2.5	0.3/1.9	1.8/2.5

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±9%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	0.6	1.5	3.2	4.9	5.3	5.3	5.0	4.3	2.9	1.5	0.8	0.4	3.0
	Min/Max	0.2/1.0	0.9/2.8	2.1/4.8	3.3/7.5	4.1/6.7	3.6/6.7	3.9/7.4	3.1/5.8	1.9/4.8	1.0/2.1	0.4/1.5	0.2/0.8	2.6/3.3
Latitude -15	Average	1.1	2.2	4.0	5.5	5.5	5.4	5.2	4.7	3.4	2.0	1.3	0.8	3.4
	Min/Max	0.3/1.9	1.1/4.3	2.4/6.3	3.6/8.6	4.2/7.2	3.5/6.9	3.9/7.9	3.3/6.4	2.1/5.9	1.3/2.9	0.5/2.5	0.3/1.6	2.9/3.8
Latitude	Average	1.2	2.3	4.0	5.5	5.3	5.1	4.9	4.5	3.4	2.0	1.4	0.8	3.4
	Min/Max	0.3/2.1	1.2/4.6	2.5/6.5	3.5/8.6	4.0/6.9	3.3/6.6	3.6/7.6	3.2/6.2	2.0/5.9	1.3/3.0	0.6/2.8	0.3/1.9	2.9/3.8
Latitude +15	Average	1.3	2.4	4.0	5.3	5.0	4.8	4.6	4.3	3.2	2.0	1.4	0.9	3.3
	Min/Max	0.3/2.2	1.2/4.7	2.4/6.5	3.3/8.4	3.7/6.7	3.1/6.2	3.3/7.2	2.9/5.9	1.9/5.7	1.3/3.0	0.6/2.9	0.3/2.0	2.8/3.7

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±9%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	1.3	2.4	4.1	5.6	5.7	5.6	5.3	4.7	3.4	2.0	1.4	0.9	3.5
	Min/Max	0.3/2.2	1.2/4.7	2.5/6.5	3.6/8.6	4.3/7.3	3.7/7.2	4.0/8.1	3.3/6.4	2.1/5.9	1.3/3.0	0.6/2.9	0.3/2.0	3.0/3.9

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±8%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	0.7	1.1	1.6	2.0	2.0	1.9	1.8	1.7	1.3	0.9	0.8	0.5	1.4
	Min/Max	0.1/1.5	0.2/3.0	0.8/3.2	1.0/3.7	1.0/3.2	0.7/2.9	0.7/3.8	0.7/2.8	0.4/3.2	0.3/1.7	0.1/1.9	0.1/1.4	1.1/1.7
1-Axis, N-S Horiz Axis	Average	0.3	0.7	1.5	2.5	2.6	2.4	2.3	2.1	1.4	0.7	0.4	0.2	1.4
	Min/Max	0.1/0.6	0.2/1.9	0.7/3.0	1.3/4.7	1.3/4.0	0.9/3.7	0.9/4.8	0.8/3.5	0.4/3.5	0.3/1.3	0.1/1.0	0.0/0.5	1.2/1.8
1-Axis, N-S Tilt=Latitude	Average	0.7	1.3	2.2	2.9	2.8	2.4	2.3	2.4	1.9	1.1	0.8	0.5	1.8
	Min/Max	0.1/1.5	0.3/3.5	1.1/4.2	1.5/5.4	1.4/4.4	0.9/3.8	0.9/5.0	0.9/4.0	0.5/4.5	0.4/2.1	0.1/2.1	0.1/1.4	1.5/2.2
2-Axis	Average	0.8	1.3	2.2	3.0	2.9	2.6	2.5	2.5	1.9	1.1	0.9	0.5	1.9
	Min/Max	0.1/1.6	0.3/3.6	1.1/4.2	1.5/5.5	1.5/4.6	1.0/4.1	1.0/5.3	0.9/4.1	0.5/4.5	0.4/2.2	0.2/2.2	0.1/1.5	1.5/2.3

Average Climatic Conditions

Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-3.8	-2.2	-0.6	2.4	6.3	9.7	12.0	11.8	9.0	4.9	-0.4	-2.7	3.9
Daily Minimum Temp	-7.4	-6.1	-4.6	-1.6	2.5	6.3	8.8	8.1	5.0	1.5	-3.8	-6.1	0.2
Daily Maximum Temp	-0.3	1.7	3.4	6.4	10.0	13.1	15.2	15.4	12.9	8.4	2.9	0.6	7.5
Record Minimum Temp	-30.0	-28.9	-28.9	-16.1	-6.1	-1.7	1.7	-1.7	-6.1	-14.4	-21.1	-31.1	-31.1
Record Maximum Temp	12.8	12.2	15.0	20.0	26.1	27.8	28.9	30.0	25.0	17.2	12.8	11.1	30.0
HDD, Base 18.3°C	687	576	586	478	374	260	196	203	280	415	562	653	5269
CDD, Base 18.3°C	0	0	0	0	0	0	0	0	0	0	0	0	0
Relative Humidity (%)	83	83	81	81	83	84	88	88	89	88	85	84	85
Wind Speed (m/s)	3.2	3.1	3.0	3.0	3.2	3.1	2.9	2.8	3.0	3.4	3.1	3.2	3.1