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NASA Surface meteorology and Solar Energy - Available Tables

At Latitude **45.3** and Longitude **-75.6**

Geometry Information Average elevation: **231** meters

Northern boundary **46**

Western boundary **-76** | Center Latitude **45.5** Longitude **-75.5** | Eastern boundary **-75**

Southern boundary **45**

Parameters for Solar Cooking:

Monthly Averaged Insolation Incident On A Horizontal Surface (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	1.42	2.31	3.44	4.30	5.01	5.55	5.67	4.76	3.51	2.20	1.45	1.20

Parameter Definition

Monthly Averaged Midday Insolation Incident On A Horizontal Surface (kW/m^2)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	0.23	0.34	0.45	0.48	0.53	0.56	0.59	0.53	0.43	0.28	0.21	0.19

Parameter Definition

Monthly Averaged Clear Sky Insolation Incident On A Horizontal Surface (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	2.08	3.10	4.80	6.56	7.59	8.02	7.54	6.60	5.17	3.61	2.36	1.76

Parameter Definition

Monthly Averaged Clear Sky Days (days)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	2	2	2	2	1	2	2	3	2	3	2	2

Parameter Definition

Parameters for Sizing and Pointing of Solar Panels and for Solar Thermal Applications:

Monthly Averaged Insolation Incident On A Horizontal Surface (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	1.42	2.31	3.44	4.30	5.01	5.55	5.67	4.76	3.51	2.20	1.45	1.20	3.40

Minimum And Maximum Difference From Monthly Averaged Insolation (%)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	-8	-15	-5	-20	-19	-13	-10	-15	-15	-20	-19	-11
Maximum	14	4	8	16	18	15	11	10	16	12	13	13

Parameter Definition

Monthly Averaged Diffuse Radiation Incident On A Horizontal Surface / Erbs et al. Method (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	0.65	0.93	1.49	1.97	2.32	2.47	2.38	2.10	1.67	1.10	0.74	0.57	1.54
Minimum	0.63	0.92	1.47	1.93	2.27	2.41	2.32	2.07	1.66	1.10	0.74	0.56	1.51
Maximum	0.65	0.95	1.50	1.93	2.28	2.47	2.40	2.10	1.65	1.08	0.72	0.57	1.53
10-year Average K	0.43	0.48	0.49	0.46	0.46	0.48	0.50	0.48	0.45	0.39	0.38	0.41	0.45
Minimum K	0.39	0.41	0.46	0.37	0.37	0.41	0.45	0.41	0.38	0.31	0.31	0.37	0.39
Maximum K	0.49	0.50	0.53	0.54	0.54	0.55	0.56	0.53	0.52	0.44	0.43	0.47	0.51

NOTE:	*Diffuse radiation, direct normal radiation and tilted surface radiation are not calculated when the clearness index (K) is below 0.3 or above 0.8.*

Parameter Definition

Monthly Averaged Diffuse Radiation Incident On A Horizontal Surface / Page Method (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	0.73	1.14	1.67	2.14	2.51	2.73	2.72	2.34	1.78	1.17	0.77	0.62	1.70
Minimum	0.79	1.16	1.74	2.31	2.73	2.92	2.86	2.45	1.93	1.26	0.84	0.67	1.81
Maximum	0.69	1.03	1.62	1.86	2.21	2.51	2.57	2.13	1.61	1.01	0.67	0.58	1.54

Parameter Definition

Monthly Averaged Direct Normal Radiation / RETScreen-type Method (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	2.63	3.35	3.85	3.94	4.03	4.77	5.22	4.28	3.24	2.46	2.17	2.08	3.50

NOTE:	*Diffuse radiation, direct normal radiation and tilted surface radiation are not calculated when the clearness index (K) is below 0.3 or above 0.8.*

Minimum And Maximum Difference From Monthly Averaged Direct Normal Radiation (%)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
Minimum	-14	-24	-8	-38	-33	-23	-16	-26	-28	-41	-41	-19	-26
Maximum	27	6	15	32	36	27	19	18	33	28	31	25	25

Parameter Definition

Monthly Averaged Direct Normal Radiation / Page Method (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	2.37	3.14	3.75	3.86	4.14	4.54	4.81	4.18	3.41	2.54	2.17	2.16	3.43

Minimum And Maximum Difference From Monthly Averaged Direct Normal Radiation (%)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
Minimum	-25	-31	-14	-48	-45	-33	-24	-33	-38	-50	-51	-31	-35
Maximum	34	17	19	44	48	36	26	27	42	42	44	35	35

Parameter Definition

Monthly Averaged Insolation Incident On A Horizontal Surface At Indicated GMT Times (kW/m^2)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average@0	n/a	n/a	n/a	0.00	0.02	0.05	0.04	0.02	n/a	n/a	n/a	n/a
Average@3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average@6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average@9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average@12	n/a	0.01	0.06	0.15	0.23	0.26	0.25	0.18	0.11	0.04	0.01	n/a
Average@15	0.17	0.26	0.37	0.44	0.49	0.54	0.55	0.49	0.40	0.28	0.19	0.15
Average@18	0.23	0.34	0.45	0.48	0.53	0.56	0.59	0.53	0.43	0.28	0.21	0.19
Average@21	0.04	0.11	0.21	0.25	0.31	0.35	0.37	0.30	0.19	0.08	0.03	0.01

Parameter Definition

Monthly Averaged Insolation Clearness Index (0 to 1.0)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average K	0.43	0.48	0.49	0.46	0.46	0.48	0.50	0.48	0.45	0.39	0.38	0.41	0.45
Minimum K	0.39	0.41	0.46	0.37	0.37	0.41	0.45	0.41	0.38	0.31	0.31	0.37	0.39
Maximum K	0.49	0.50	0.53	0.54	0.54	0.55	0.56	0.53	0.52	0.44	0.43	0.47	0.51

Parameter Definition

Monthly Averaged Insolation Normalized Clearness Index (0 to 1.0)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	0.39	0.44	0.45	0.42	0.42	0.44	0.46	0.44	0.41	0.36	0.35	0.38

Parameter Definition

Monthly Averaged Clear Sky Insolation Incident On A Horizontal Surface (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	2.08	3.10	4.80	6.56	7.59	8.02	7.54	6.60	5.17	3.61	2.36	1.76

Parameter Definition

Monthly Averaged Clear Sky Insolation Clearness Index (0 to 1.0)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	0.63	0.64	0.69	0.71	0.70	0.69	0.67	0.67	0.66	0.64	0.63	0.61

Parameter Definition

Monthly Averaged Clear Sky Insolation Normalized Clearness Index (0 to 1.0)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	0.58	0.59	0.63	0.65	0.64	0.63	0.61	0.61	0.60	0.59	0.57	0.56

Parameter Definition

Solar Geometry:

Monthly Averaged Solar Noon (GMT time)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	1713	1717	1712	1703	1659	1702	1709	1707	1658	1649	1647	1656

Parameter Definition

Monthly Averaged Daylight (hours)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	9.16	10.4	11.9	13.5	14.8	15.5	15.2	14.0	12.5	11.0	9.58	8.81

Parameter Definition

Monthly Averaged Daylight Average Of Hourly Cosine Solar Zenith Angles (dimensionless)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	0.26	0.35	0.42	0.52	0.54	0.58	0.56	0.52	0.44	0.37	0.30	0.23

Parameter Definition

Monthly Averaged Cosine Solar Zenith Angle At Mid-Time Between Sunrise And Solar Noon (dimensionless)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	0.29	0.37	0.47	0.55	0.60	0.61	0.61	0.58	0.51	0.41	0.32	0.26

Parameter Definition

Monthly Averaged Declination (degrees)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	-20.7	-12.3	-1.8	9.70	18.8	23.0	21.2	13.7	3.09	-8.45	-18.1	-22.8

Parameter Definition

Monthly Averaged Sunset Hour Angle (degrees)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	67.4	77.1	88.1	99.9	110	115	113	104	93.1	81.3	70.6	64.7

Parameter Definition

Monthly Averaged Maximum Solar Angle Relative To The Horizon (degrees)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	23.9	32.3	42.8	54.4	63.5	67.7	65.9	58.4	47.7	36.2	26.5	21.8

Parameter Definition

Monthly Averaged Hourly Solar Angles Relative To The Horizon (degrees)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0000 GMT	n/a	n/a	n/a	n/a	3.11	6.70	6.35	0.61	n/a	n/a	n/a	n/a
0100 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0200 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0300 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0400 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0500 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0600 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0700 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0800 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0900 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1000 GMT	n/a	n/a	n/a	n/a	3.42	6.06	3.72	n/a	n/a	n/a	n/a	n/a
1100 GMT	n/a	n/a	n/a	6.36	13.4	15.8	13.5	8.63	2.64	n/a	n/a	n/a
1200 GMT	n/a	n/a	7.18	16.9	23.8	26.1	23.8	19.1	13.1	6.34	n/a	n/a
1300 GMT	2.58	8.42	17.3	27.3	34.4	36.6	34.3	29.5	23.3	15.9	8.38	3.43
1400 GMT	10.7	17.2	26.6	37.1	44.6	47.0	44.7	39.6	32.7	24.3	16.1	11.0
1500 GMT	17.3	24.5	34.6	45.7	53.8	56.7	54.3	48.6	40.5	31.0	22.0	16.9
1600 GMT	21.8	29.7	40.2	51.9	60.8	64.4	62.1	55.4	45.9	35.1	25.6	20.6
1700 GMT	23.8	32.1	42.8	54.4	63.5	67.7	65.8	58.4	47.7	36.1	26.4	21.7
1800 GMT	23.0	31.4	41.6	52.3	60.6	64.8	63.6	56.5	45.6	33.8	24.3	20.2
1900 GMT	19.5	27.7	37.1	46.4	53.5	57.3	56.8	50.4	39.9	28.6	19.6	16.1
2000 GMT	13.7	21.5	29.9	38.0	44.2	47.7	47.5	41.7	31.9	21.1	12.8	9.87
2100 GMT	6.17	13.5	21.0	28.2	34.0	37.3	37.2	31.8	22.4	12.1	4.46	2.01
2200 GMT	n/a	4.21	11.1	17.9	23.4	26.8	26.7	21.3	12.2	2.28	n/a	n/a
2300 GMT	n/a	n/a	0.73	7.38	13.0	16.5	16.3	10.8	1.71	n/a	n/a	n/a

Parameter Definition

Monthly Averaged Hourly Solar Azimuth Angles (degrees)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0000 GMT	n/a	n/a	n/a	n/a	293	296	293	289	n/a	n/a	n/a	n/a
0100 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0200 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0300 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0400 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0500 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0600 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0700 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0800 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0900 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1000 GMT	n/a	n/a	n/a	n/a	66.5	63.1	63.1	n/a	n/a	n/a	n/a	n/a
1100 GMT	n/a	n/a	n/a	82.7	76.7	73.0	73.2	78.9	88.1	n/a	n/a	n/a
1200 GMT	n/a	n/a	100	93.3	86.9	82.8	83.2	89.4	98.9	108	n/a	n/a
1300 GMT	123	117	111	104	97.8	93.3	93.8	100	110	120	126	127
1400 GMT	134	129	124	117	110	105	106	113	123	133	138	139
1500 GMT	147	142	138	133	127	121	121	129	139	148	152	152
1600 GMT	161	158	156	154	150	145	144	150	159	165	167	166

1700 GMT	176	175	176	178	180	178	175	176	180	183	183	181
1800 GMT	192	192	196	203	210	212	207	203	202	201	199	195
1900 GMT	206	208	214	224	233	237	232	226	221	217	213	209
2000 GMT	220	223	230	241	249	253	249	243	237	231	226	222
2100 GMT	231	236	244	254	262	265	262	256	250	244	238	233
2200 GMT	n/a	247	255	265	273	276	273	268	261	255	n/a	n/a
2300 GMT	n/a	n/a	266	276	283	286	283	278	272	n/a	n/a	n/a

Parameter Definition

Parameters for Tilted Solar Panels:

Monthly Averaged Radiation Incident On An Equator-Pointed Tilted Surface / RETScreen Method (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
SSE HRZ	1.42	2.31	3.44	4.30	5.01	5.55	5.67	4.76	3.51	2.20	1.45	1.20	3.40
K	0.43	0.48	0.49	0.46	0.46	0.48	0.50	0.48	0.45	0.39	0.38	0.41	0.45
Erbs DIF	0.65	0.93	1.49	1.97	2.32	2.47	2.38	2.10	1.67	1.10	0.74	0.57	1.54
RET DNR	2.63	3.35	3.85	3.94	4.03	4.77	5.22	4.28	3.24	2.46	2.17	2.08	3.50
Tilt 0	1.42	2.26	3.40	4.28	4.97	5.57	5.69	4.74	3.45	2.16	1.44	1.16	3.38
Tilt 30	2.34	3.27	4.17	4.60	4.96	5.30	5.50	4.94	3.96	2.80	2.17	1.94	3.83
Tilt 45	2.63	3.52	4.25	4.44	4.61	4.83	5.05	4.69	3.94	2.92	2.38	2.19	3.79
Tilt 60	2.77	3.58	4.12	4.07	4.05	4.16	4.38	4.22	3.73	2.90	2.46	2.31	3.56
Tilt 90	2.58	3.11	3.25	2.86	2.62	2.62	2.78	2.85	2.81	2.42	2.22	2.16	2.69
OPT	2.78	3.58	4.26	4.61	5.08	5.60	5.74	4.98	3.98	2.93	2.46	2.32	4.03
OPT ANG	66.0	57.0	43.0	26.0	15.0	7.00	9.00	21.0	36.0	50.0	61.0	67.0	38.0

NOTE:	*Diffuse radiation, direct normal radiation and tilted surface radiation are not calculated when the clearness index (K) is below 0.3 or above 0.8.*

Parameter Definition

Monthly Averaged Radiation Incident On An Equator-Pointed Tilted Surface / Perez/Page Method (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
SSE HRZ	1.42	2.31	3.44	4.30	5.01	5.55	5.67	4.76	3.51	2.20	1.45	1.20	3.40
K	0.43	0.48	0.49	0.46	0.46	0.48	0.50	0.48	0.45	0.39	0.38	0.41	0.45
PAGE DIF	0.73	1.14	1.67	2.14	2.51	2.73	2.72	2.34	1.78	1.17	0.77	0.62	1.70
PAGE DNR	2.37	3.14	3.75	3.86	4.14	4.54	4.81	4.18	3.41	2.54	2.17	2.16	3.43
Tilt 0	1.41	2.26	3.40	4.28	4.97	5.57	5.69	4.74	3.45	2.15	1.44	1.16	3.38
Tilt 30	2.70	3.58	4.60	4.96	5.26	5.60	5.82	5.28	4.30	3.00	2.38	2.25	4.15
Tilt 45	3.15	3.99	4.86	4.88	4.96	5.18	5.44	5.10	4.37	3.19	2.66	2.62	4.20
Tilt 60	3.43	4.18	4.86	4.54	4.39	4.49	4.76	4.65	4.20	3.20	2.79	2.84	4.03
Tilt 90	3.39	3.90	4.12	3.16	2.71	2.67	2.88	3.09	3.20	2.68	2.54	2.78	3.09
OPT	3.51	4.20	4.89	4.97	5.30	5.74	5.92	5.28	4.38	3.22	2.79	2.90	4.43
OPT ANG	74.0	66.0	53.0	34.0	22.0	16.0	18.0	29.0	42.0	53.0	64.0	72.0	45.1

Parameter Definition

Monthly Averaged Radiation Incident On An Equator-Pointed Tilted Surface / Perez/Erbs et al. Method (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
SSE HRZ	1.42	2.31	3.44	4.30	5.01	5.55	5.67	4.76	3.51	2.20	1.45	1.20	3.40
K	0.43	0.48	0.49	0.46	0.46	0.48	0.50	0.48	0.45	0.39	0.38	0.41	0.45
Erbs DIF	0.65	0.93	1.49	1.97	2.32	2.47	2.38	2.10	1.67	1.10	0.74	0.57	1.54
RET DNR	2.63	3.35	3.85	3.94	4.03	4.77	5.22	4.28	3.24	2.46	2.17	2.08	3.50
Tilt 0	1.41	2.26	3.40	4.28	4.97	5.57	5.69	4.74	3.45	2.15	1.44	1.16	3.38
Tilt 30	2.79	3.75	4.74	5.00	5.28	5.58	5.81	5.33	4.37	3.13	2.50	2.29	4.22
Tilt 45	3.27	4.21	5.04	4.94	4.98	5.16	5.41	5.17	4.47	3.36	2.83	2.69	4.29
Tilt 60	3.57	4.45	5.07	4.59	4.41	4.45	4.71	4.71	4.31	3.40	2.98	2.92	4.13
Tilt 90	3.55	4.18	4.31	3.19	2.70	2.60	2.80	3.11	3.29	2.88	2.75	2.86	3.18
OPT	3.67	4.47	5.09	5.01	5.32	5.73	5.90	5.33	4.47	3.41	2.99	2.98	4.53
OPT ANG	74.0	67.0	54.0	34.0	23.0	16.0	18.0	29.0	43.0	55.0	65.0	73.0	45.8

NOTE:	*Diffuse radiation, direct normal radiation and tilted surface radiation are not calculated when the clearness index (K) is below 0.3 or above 0.8.*

Parameter Definition

Monthly Averaged Equivalent Sun Hours Radiation Incident On An Equator-pointed Tilted Surface / RETScreen Method (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
SSE MIN	1.30	1.97	3.26	3.42	4.09	4.80	5.09	4.05	2.99	1.77	1.17	1.07	2.92
K	0.39	0.41	0.46	0.37	0.37	0.41	0.45	0.41	0.38	0.31	0.31	0.37	0.39
Erbs DIF	0.65	0.95	1.50	1.93	2.28	2.47	2.40	2.10	1.65	1.08	0.72	0.57	1.53
RET DNR	2.25	2.52	3.52	2.44	2.68	3.67	4.36	3.14	2.31	1.45	1.27	1.67	2.61
Tilt 0	1.30	1.93	3.22	3.40	4.05	4.83	5.10	4.04	2.94	1.73	1.16	1.03	2.90
Tilt 30	2.06	2.65	3.91	3.58	4.01	4.60	4.93	4.16	3.29	2.11	1.60	1.65	3.22
Tilt 45	2.30	2.82	3.98	3.44	3.74	4.20	4.54	3.94	3.25	2.16	1.71	1.83	3.16
Tilt 60	2.40	2.84	3.84	3.15	3.31	3.64	3.95	3.56	3.06	2.11	1.73	1.92	2.96
Tilt 90	2.22	2.45	3.02	2.24	2.20	2.36	2.55	2.43	2.30	1.74	1.53	1.78	2.23
OPT	2.41	2.85	3.98	3.59	4.12	4.85	5.15	4.20	3.29	2.16	1.74	1.93	3.36
OPT ANG	65.0	55.0	42.0	24.0	13.0	7.00	9.00	20.0	33.0	45.0	57.0	65.0	36.1

NOTE:	*Diffuse radiation, direct normal radiation and tilted surface radiation are not calculated when the clearness index (K) is below 0.3 or above 0.8.*

Parameter Definition

Monthly Averaged Equivalent Sun Hours Radiation Incident On An Equator-pointed Tilted Surface / Perez/Page Method (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
SSE MIN	1.30	1.97	3.26	3.42	4.09	4.80	5.09	4.05	2.99	1.77	1.17	1.07	2.92
K	0.39	0.41	0.46	0.37	0.37	0.41	0.45	0.41	0.38	0.31	0.31	0.37	0.39
PAGE DIF	0.69	1.03	1.62	1.86	2.21	2.51	2.57	2.13	1.61	1.01	0.67	0.58	1.54
PAGE DNR	1.76	2.16	3.22	1.99	2.23	3.04	3.63	2.77	2.09	1.25	1.05	1.48	2.23
Tilt 0	1.29	1.93	3.22	3.40	4.05	4.83	5.10	4.04	2.94	1.73	1.16	1.03	2.90
Tilt 30	2.31	2.87	4.29	3.84	4.25	4.85	5.21	4.45	3.58	2.38	1.86	1.83	3.48
Tilt 45	2.66	3.16	4.51	3.75	4.01	4.48	4.86	4.29	3.62	2.52	2.06	2.10	3.50
Tilt 60	2.87	3.28	4.50	3.46	3.55	3.89	4.26	3.91	3.47	2.51	2.14	2.25	3.34
Tilt 90	2.82	3.04	3.81	2.40	2.21	2.33	2.60	2.60	2.63	2.10	1.94	2.17	2.55
OPT	2.93	3.29	4.54	3.84	4.29	4.97	5.30	4.45	3.63	2.53	2.15	2.28	3.69
OPT ANG	73.0	64.0	52.0	31.0	22.0	16.0	18.0	28.0	41.0	52.0	63.0	70.0	44.0

Parameter Definition

Monthly Averaged Equivalent Sun Hours Radiation Incident On An Equator-pointed Tilted Surface / Perez/Erbs et al. Method (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
SSE MIN	1.30	1.97	3.26	3.42	4.09	4.80	5.09	4.05	2.99	1.77	1.17	1.07	2.92
K	0.39	0.41	0.46	0.37	0.37	0.41	0.45	0.41	0.38	0.31	0.31	0.37	0.39
Erbs DIF	0.65	0.95	1.50	1.93	2.28	2.47	2.40	2.10	1.65	1.08	0.72	0.57	1.53
RET DNR	2.25	2.52	3.52	2.44	2.68	3.67	4.36	3.14	2.31	1.45	1.27	1.67	2.61
Tilt 0	1.29	1.93	3.22	3.40	4.05	4.83	5.10	4.04	2.94	1.73	1.16	1.03	2.90
Tilt 30	2.49	3.09	4.44	3.79	4.21	4.84	5.23	4.50	3.54	2.32	1.81	1.95	3.52
Tilt 45	2.91	3.46	4.72	3.69	3.95	4.47	4.88	4.35	3.57	2.44	1.99	2.27	3.56
Tilt 60	3.17	3.63	4.74	3.41	3.49	3.88	4.27	3.97	3.41	2.43	2.06	2.45	3.41
Tilt 90	3.14	3.40	4.03	2.36	2.17	2.32	2.58	2.65	2.58	2.01	1.86	2.39	2.62
OPT	3.25	3.65	4.76	3.79	4.25	4.96	5.31	4.50	3.58	2.45	2.06	2.50	3.76
OPT ANG	74.0	66.0	54.0	30.0	20.0	16.0	18.0	29.0	40.0	51.0	62.0	72.0	44.2

NOTE:	*Diffuse radiation, direct normal radiation and tilted surface radiation are not calculated when the clearness index (K) is below 0.3 or above 0.8.*

Parameter Definition

Monthly Averaged Peak Sun Hours Radiation Incident On An Equator-pointed Tilted Surface / RETScreen Method
(kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
SSE MAX	1.62	2.41	3.73	4.97	5.93	6.36	6.31	5.23	4.07	2.47	1.64	1.36	3.84
K	0.49	0.50	0.53	0.54	0.54	0.55	0.56	0.53	0.52	0.44	0.43	0.47	0.51
Erbs DIF	0.63	0.92	1.47	1.93	2.27	2.41	2.32	2.07	1.66	1.10	0.74	0.56	1.51
RET DNR	3.35	3.56	4.44	5.23	5.50	6.10	6.25	5.06	4.32	3.17	2.85	2.62	4.37
Tilt 0	1.62	2.36	3.69	4.95	5.88	6.39	6.33	5.20	4.00	2.42	1.63	1.31	3.82
Tilt 30	2.82	3.45	4.60	5.39	5.89	6.07	6.13	5.45	4.71	3.25	2.58	2.32	4.39
Tilt 45	3.21	3.73	4.71	5.22	5.46	5.52	5.63	5.18	4.71	3.42	2.86	2.64	4.36
Tilt 60	3.40	3.80	4.57	4.79	4.78	4.73	4.86	4.66	4.47	3.41	2.98	2.81	4.11
Tilt 90	3.20	3.31	3.62	3.34	3.02	2.90	3.02	3.11	3.37	2.88	2.72	2.65	3.09
OPT	3.43	3.80	4.71	5.40	6.03	6.42	6.39	5.49	4.74	3.44	2.99	2.83	4.64
OPT ANG	67.0	57.0	44.0	28.0	15.0	7.00	10.0	22.0	38.0	52.0	63.0	68.0	39.1

NOTE:	*Diffuse radiation, direct normal radiation and tilted surface radiation are not calculated when the clearness index (K) is below 0.3 or above 0.8.*

Parameter Definition

Monthly Averaged Peak Sun Hours Radiation Incident On An Equator-pointed Tilted Surface / Perez/Page Method
(kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
SSE MAX	1.62	2.41	3.73	4.97	5.93	6.36	6.31	5.23	4.07	2.47	1.64	1.36	3.84
K	0.49	0.50	0.53	0.54	0.54	0.55	0.56	0.53	0.52	0.44	0.43	0.47	0.51
PAGE DIF	0.79	1.16	1.74	2.31	2.73	2.92	2.86	2.45	1.93	1.26	0.84	0.67	1.81
PAGE DNR	3.20	3.69	4.47	5.58	6.15	6.21	6.11	5.34	4.85	3.63	3.13	2.94	4.61
Tilt 0	1.61	2.36	3.69	4.95	5.88	6.39	6.33	5.20	4.00	2.42	1.63	1.31	3.82
Tilt 30	3.12	3.78	5.08	5.78	6.23	6.41	6.49	5.82	5.07	3.50	2.83	2.57	4.73
Tilt 45	3.64	4.22	5.39	5.70	5.88	5.92	6.05	5.64	5.18	3.76	3.19	3.00	4.80
Tilt 60	3.96	4.44	5.41	5.30	5.20	5.12	5.29	5.15	5.00	3.80	3.36	3.26	4.61
Tilt 90	3.93	4.15	4.60	3.69	3.18	3.00	3.17	3.41	3.81	3.22	3.10	3.19	3.53
OPT	4.06	4.45	5.43	5.79	6.28	6.57	6.59	5.82	5.18	3.81	3.37	3.32	5.06
OPT ANG	74.0	66.0	54.0	34.0	23.0	16.0	18.0	29.0	43.0	55.0	65.0	72.0	45.6

Parameter Definition

Monthly Averaged Peak Sun Hours Radiation Incident On An Equator-pointed Tilted Surface / Perez/Erbs et al. Method (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
SSE MAX	1.62	2.41	3.73	4.97	5.93	6.36	6.31	5.23	4.07	2.47	1.64	1.36	3.84
K	0.49	0.50	0.53	0.54	0.54	0.55	0.56	0.53	0.52	0.44	0.43	0.47	0.51
Erbs DIF	0.63	0.92	1.47	1.93	2.27	2.41	2.32	2.07	1.66	1.10	0.74	0.56	1.51
RET DNR	3.35	3.56	4.44	5.23	5.50	6.10	6.25	5.06	4.32	3.17	2.85	2.62	4.37
Tilt 0	1.61	2.36	3.69	4.95	5.88	6.39	6.33	5.20	4.00	2.42	1.63	1.31	3.82
Tilt 30	3.27	3.93	5.16	5.82	6.28	6.40	6.52	5.85	5.19	3.71	3.00	2.67	4.82
Tilt 45	3.85	4.42	5.49	5.75	5.91	5.89	6.07	5.66	5.35	4.03	3.43	3.13	4.92
Tilt 60	4.21	4.67	5.53	5.34	5.21	5.05	5.27	5.15	5.18	4.12	3.64	3.41	4.73
Tilt 90	4.19	4.39	4.70	3.68	3.13	2.88	3.09	3.37	3.96	3.54	3.39	3.36	3.64
OPT	4.33	4.70	5.55	5.84	6.32	6.56	6.60	5.85	5.35	4.12	3.67	3.49	5.20
OPT ANG	74.0	67.0	54.0	34.0	23.0	15.0	20.0	29.0	45.0	57.0	67.0	73.0	46.4

NOTE:	*Diffuse radiation, direct normal radiation and tilted surface radiation are not calculated when the clearness index (K) is below 0.3 or above 0.8.*

Parameter Definition

Parameters for Sizing Battery or other Energy-storage Systems:

Minimum Available Insolation Over A Consecutive-day Period (%)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min/1 day	6.33	20.3	17.4	11.6	4.58	4.86	7.05	3.56	9.68	4.09	7.58	3.33
Min/3 day	26.2	51.0	43.4	23.5	16.7	43.2	43.2	17.1	37.8	24.3	34.4	33.8
Min/7 day	66.7	69.6	59.8	38.4	43.2	60.9	72.2	58.2	54.4	36.4	42.6	64.2
Min/14 day	76.1	75.3	73.4	57.6	69.7	77.3	78.5	67.9	65.3	64.1	60.8	77.7
Min/21 day	77.8	80.3	86.3	71.8	77.8	82.3	85.9	73.6	75.1	58.9	73.0	80.4
Min/Month	91.5	85.2	94.7	79.5	81.4	86.6	89.7	85.1	85.1	80.4	80.6	89.1

Parameter Definition

Solar Radiation Deficits Below Expected Values Incident On A Horizontal Surface Over A Consecutive-day Period (kWh/m^2)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 day	1.33	1.84	2.84	3.80	4.79	5.28	5.27	4.59	3.17	2.11	1.34	1.15
3 day	3.14	3.39	5.84	9.86	12.5	9.45	9.65	11.8	6.54	4.99	2.85	2.38
7 day	3.31	4.91	9.68	18.5	19.9	15.1	11.0	13.9	11.1	9.77	5.82	3.00
14 day	4.75	7.96	12.8	25.4	21.2	17.5	16.9	21.4	17.0	11.0	7.95	3.74
21 day	6.61	9.55	9.89	25.3	23.3	20.5	16.7	26.3	18.3	18.9	8.21	4.91
Month	3.71	9.51	5.58	26.4	28.8	22.1	17.9	22.0	15.6	13.3	8.40	4.02

Parameter Definition

Equivalent Number Of NO-SUN Or BLACK Days (days)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 day	0.93	0.79	0.82	0.88	0.95	0.95	0.92	0.96	0.90	0.95	0.92	0.96
3 day	2.21	1.46	1.69	2.29	2.49	1.70	1.70	2.48	1.86	2.26	1.96	1.98
7 day	2.33	2.12	2.81	4.30	3.97	2.73	1.94	2.92	3.18	4.44	4.01	2.50

14 day	3.34	3.44	3.72	5.92	4.24	3.16	2.99	4.48	4.84	5.01	5.48	3.11
21 day	4.65	4.13	2.87	5.90	4.64	3.70	2.94	5.52	5.21	8.62	5.66	4.09
Month	2.61	4.12	1.62	6.13	5.74	3.99	3.17	4.61	4.44	6.05	5.79	3.35

Parameter Definition

Parameters for Sizing Surplus-product Storage Systems:

Available Surplus Insolation Over A Consecutive-day Period (%)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max/1 day	194	164	186	185	173	164	152	166	183	210	234	195
Max/3 day	159	154	166	168	161	153	140	156	177	185	205	168
Max/7 day	141	136	146	140	145	138	128	131	155	158	158	148
Max/14 day	125	126	130	131	137	126	118	125	134	140	131	134
Max/21 day	119	113	116	128	132	120	116	116	124	123	123	124
Max/Month	114	104	108	116	118	115	111	110	116	112	113	113

Parameter Definition

Cloud Information:

Monthly Averaged Daylight Cloud Amount (%)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	76.7	68.7	70.9	73.4	72.4	68.1	62.6	64.8	67.8	73.5	78.7	73.7

Parameter Definition

Monthly Averaged Cloud Amount At Indicated GMT Times (%)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average@0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average@3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average@6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average@9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average@12	n/a	n/a	n/a	70.9	70.1	64.5	58.9	63.9	65.1	n/a	n/a	n/a
Average@15	75.5	68.0	72.9	72.2	71.3	66.0	58.5	62.4	67.9	72.1	78.8	72.8
Average@18	77.9	69.2	69.6	75.1	74.6	72.1	67.9	68.8	71.5	74.9	78.6	74.7
Average@21	n/a	68.8	70.2	75.4	73.8	69.8	65.1	64.0	66.9	n/a	n/a	n/a

Parameter Definition

Monthly Averaged Frequency Of Clear Skies At Indicated GMT Times (%)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
< 10% @0	n/a	n/a	n/a	n/a	9.24	9.67	12.6	9.09	n/a	n/a	n/a	n/a
< 10% @3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
< 10% @6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
< 10% @9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
< 10% @12	n/a	n/a	8.39	14.0	14.8	17.6	20.6	14.5	11.6	11.2	13.0	n/a
< 10% @15	5.16	10.6	9.02	11.0	11.6	12.6	20.6	15.8	10.6	11.2	7.33	7.42
< 10% @18	6.13	8.13	9.02	9.67	9.02	10.6	8.39	11.6	8.33	10.9	8.33	8.71
< 10% @21	6.13	12.7	11.2	8.33	9.02	10.0	11.9	13.5	13.0	11.9	8.33	8.71

Monthly Averaged Frequency Of Broken-cloud Skies At Indicated GMT Times (%)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10 - 70% @0	n/a	n/a	n/a	n/a	20.4	24.6	31.0	34.2	n/a	n/a	n/a	n/a
10 - 70% @3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10 - 70% @6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10 - 70% @9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10 - 70% @12	n/a	n/a	23.5	18.6	18.7	23.6	27.7	27.7	29.6	20.3	9.35	n/a
10 - 70% @15	25.1	27.2	23.5	20.3	22.9	28.0	28.7	28.7	25.6	20.0	15.6	24.5
10 - 70% @18	19.0	28.6	25.8	16.6	19.3	22.0	32.5	25.1	24.3	15.8	16.3	20.6
10 - 70% @21	19.0	27.9	22.2	17.6	20.6	25.6	30.9	30.9	25.3	16.4	16.3	20.6

Monthly Averaged Frequency Of Near-overcast Skies At Indicated GMT Times (%)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
>= 70% @0	n/a	n/a	n/a	n/a	70.3	65.6	56.3	56.6	n/a	n/a	n/a	n/a
>= 70% @3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
>= 70% @6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
>= 70% @9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
>= 70% @12	n/a	n/a	68.0	67.3	66.4	58.6	51.6	57.7	58.6	68.3	77.5	n/a
>= 70% @15	69.6	62.1	67.4	68.6	65.4	59.3	50.6	55.4	63.6	68.7	77.0	68.0
>= 70% @18	74.8	63.2	65.1	73.6	71.6	67.3	59.0	63.2	67.3	73.2	75.3	70.6
>= 70% @21	74.8	59.3	66.4	74.0	70.3	64.3	57.1	55.4	61.6	71.6	75.3	70.6

Parameter Definition

Meteorology (Temperature):

Monthly Averaged Air Temperature At 10 m Above The Surface Of The Earth (° C)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	-10.8	-9.33	-2.7	6.16	12.0	16.0	19.1	18.4	13.2	6.59	-0.57	-9.13	4.99

Parameter Definition *Units Conversion Chart*

Average Daily Temperature Range (° C)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	9.03	9.80	9.36	9.35	9.35	8.74	8.90 *	9.53	10.6	9.99	8.40	7.82

*** Warmest month**

Parameter Definition

Monthly Averaged Cooling Degree Days Above 18° C

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Sum
10-year Average	0	0	0	0	5	23	60	55	15	0	0	0	158

Parameter Definition

Monthly Averaged Heating Degree Days Below 18° C

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Sum
10-year Average	870	751	619	341	183	77	27	40	142	327	536	824	4737

Parameter Definition

Monthly Averaged Arctic Heating Degree Days Below 10° C

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	622	525	376	131	34	3	0	1	21	118	302	576

Parameter Definition

Monthly Averaged Arctic Heating Degree Days Below 0° C

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	315	245	123	8	0	0	0	0	0	3	72	274

Parameter Definition

Monthly Averaged Earth Skin Temperature (° C)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	-15.7	-13.6	-4.88	6.01	11.9	16.0	18.9	18.2	12.9	5.95	-2.27	-13.5	3.42

Parameter Definition

Average Minimum, Maximum and Amplitude Of The Daily Mean Earth Temperature (° C)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Amplitude
Minimum	-29.0	-25.8	-19.6	-4.41	2.25	8.32	12.2	10.3	3.14	-3.45	-13.3	-28.2	
Maximum	-0.94	-0.26	11.8	16.8	19.5	22.0	23.7	23.8	21.7	17.2	13.1	1.15	
Amplitude	14.0	12.7	15.7	10.6	8.64	6.88	5.70	6.76	9.32	10.3	13.2	14.6	26.4

Parameter Definition

Monthly Averaged Frost Days (days)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Sum
10-year Average	30	27	24	12	3	0	0	0	2	13	23	30	164

Parameter Definition

Monthly Averaged Dew Point Temperature (° C)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	n/a	n/a	n/a	5.62	9.34	12.6	14.6	13.8	9.81	5.79	n/a	n/a	n/a

Parameter Definition

Monthly Averaged Air Temperature At 10 m Above The Surface Of The Earth For Indicated GMT Times (° C)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average@2230	-8.00	-6.09	0.21	9.34	15.1	18.9	22.0	21.6	16.9	10.0	1.98	-6.76
Average@0130	-9.78	-8.36	-1.86	6.99	12.7	16.6	19.5	18.9	13.8	7.54	0.36	-8.13
Average@0430	-11.1	-10.0	-3.51	5.00	10.5	14.4	17.2	16.6	11.6	5.72	-0.81	-9.22
Average@0730	-12.3	-11.4	-4.83	3.43	8.84	12.6	15.5	14.9	10.1	4.34	-1.72	-10.1
Average@1030	-13.4	-12.6	-6.11	2.14	7.75	11.8	14.6	13.7	8.69	3.06	-2.75	-11.0
Average@1330	-13.9	-12.7	-5.44	3.99	10.8	15.5	18.7	17.1	10.5	3.27	-3.28	-11.7
Average@1630	-10.7	-8.27	-1.24	8.26	14.5	18.8	22.1	21.7	16.1	7.84	-0.7	-9.49
Average@1930	-7.28	-5.04	1.15	10.1	15.7	19.7	22.9	22.6	17.9	10.8	2.27	-6.56

Parameter Definition *Units Conversion Chart*

Meteorology (Wind):

Monthly Averaged Wind Speed At 50 m Above The Surface Of The Earth (m/s)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	4.40	4.28	4.44	4.34	4.21	4.13	3.75	3.78	4.15	4.26	4.46	4.41	4.21

Minimum And Maximum Difference From Monthly Averaged Wind Speed At 50 m (%)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
Minimum	-12	-9	-10	-7	-5	-14	-11	-11	-7	-10	-9	-7	-9
Maximum	9	11	8	9	9	12	11	7	7	7	10	5	9

It is recommended that users of these wind data review the SSE Methodology, Section 7. The user may wish to correct for biases as well as local effects within the selected grid region.

All height measurements are from the soil, water, or ice/snow surface instead of "effective" surface, which is usually taken to be near the tops of vegetated canopies.

Parameter Definition *Units Conversion Chart*

Monthly Averaged Percent Of Time The Wind Speed At 50 m Above The Surface Of The Earth Is Within The Indicated Range (%)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
0 - 2 m/s	15	15	15	14	15	16	21	22	17	15	14	16	16
3 - 6 m/s	77	79	76	78	78	79	77	76	78	77	74	75	77
7 - 10 m/s	7	6	9	8	7	6	2	3	5	7	11	9	7
11 - 14 m/s	0	0	0	0	0	0	0	0	0	0	1	0	0
15 - 18 m/s	0	0	0	0	0	0	0	0	0	0	0	0	0
19 - 25 m/s	0	0	0	0	0	0	0	0	0	0	0	0	0

Parameter Definition

Monthly Averaged Wind Speed At 50 m Above The Surface Of The Earth For Indicated GMT Times (m/s)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
Average@2230	4.62	4.49	4.54	4.37	4.23	4.32	3.77	3.72	4.17	4.36	4.46	4.59	4.30
Average@0130	5.19	5.11	4.96	4.59	4.46	4.49	4.17	4.28	4.71	4.82	4.91	5.04	4.72
Average@0430	5.11	5.00	5.05	4.84	4.80	4.76	4.44	4.51	4.90	4.88	4.97	5.04	4.85
Average@0730	5.01	4.88	4.93	4.76	4.69	4.59	4.30	4.36	4.73	4.74	4.91	4.98	4.74
Average@1030	4.86	4.70	4.73	4.40	4.09	3.73	3.60	3.89	4.30	4.47	4.76	4.79	4.35
Average@1330	4.28	3.62	3.47	3.24	3.02	2.78	2.27	2.13	2.61	3.48	4.30	4.38	3.29
Average@1630	2.73	2.68	3.55	4.07	4.04	4.01	3.59	3.50	3.56	3.26	3.38	3.08	3.45
Average@1930	3.40	3.78	4.26	4.47	4.33	4.42	3.88	3.83	4.20	4.16	3.94	3.36	4.00

Parameter Definition *Units Conversion Chart*

Monthly Averaged Wind Direction At 50 m Above The Surface Of The Earth (degrees)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	245	257	263	265	266	268	268	267	263	261	258	257

Parameter Definition

Monthly Averaged Wind Direction At 50 m Above The Surface Of The Earth For Indicated GMT Times (degrees)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average@2230	245	277	291	318	278	280	276	270	252	251	244	239
Average@0130	250	279	296	7	276	274	271	261	241	246	241	245
Average@0430	250	276	291	35	267	274	266	251	236	236	238	246
Average@0730	245	273	278	53	259	276	260	248	233	229	233	243
Average@1030	241	274	276	75	258	274	258	245	231	229	233	245
Average@1330	237	269	275	137	264	279	272	259	236	233	237	241
Average@1630	239	276	280	248	265	274	270	266	252	249	244	236
Average@1930	249	272	284	266	269	275	269	265	250	249	246	240

Parameter Definition

Monthly Averaged Wind Speed At 10 m Above The Surface Of The Earth For Terrain Similar To Airports (m/s)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	3.48	3.38	3.51	3.43	3.33	3.27	2.96	2.99	3.28	3.37	3.52	3.48	3.33

It is recommended that users of these wind data review the SSE Methodology, Section 7. The user may wish to correct for biases as well as local effects within the selected grid region.

All height measurements are from the soil, water, or ice/snow surface instead of "effective" surface, which is usually taken to be near the tops of vegetated canopies.

Parameter Definition *Units Conversion Chart*

Difference Between The Average Wind Speed At 10 m Above The Surface Of The Earth And The Average Wind speed At 50 m Above The Surface Of The Earth (%)

Vegetation type **"Airport": flat rough grass**

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	-20	-21	-20	-21	-20	-20	-20	-20	-20	-20	-20	-20	-20

Parameter Definition

Monthly Averaged Wind Speed Adjusted For Height And Vegetation Type (m/s)
Height **100 meters**
Vegetation type **"Airport": flat rough grass**

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	4.88	4.74	4.92	4.81	4.67	4.59	4.16	4.19	4.60	4.73	4.94	4.89	4.68

Parameter Definition

Meteorology (Other):

Monthly Averaged Relative Humidity (%)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	85.9	85.1	83.7	83.2	81.2	80.3	76.4	75.8	78.7	82.6	84.5	84.7

Parameter Definition

Monthly Averaged Humidity Ratio (kg/kg)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	0.0015	0.0017	0.0032	0.0059	0.0084	0.0106	0.0121	0.0116	0.0089	0.0061	0.0037	0.0017

Parameter Definition

Monthly Averaged Atmospheric Pressure (kPa)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	97.8	97.9	97.9	97.7	97.9	97.7	97.9	98.0	98.2	98.1	97.9	97.9	97.9

Parameter Definition

Monthly Averaged Total Column Precipitable Water (cm)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	0.55	0.56	0.82	1.28	1.77	2.21	2.56	2.52	2.02	1.46	1.06	0.63	1.45

Parameter Definition

Monthly Averaged Precipitation (mm/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	2.12	2.06	2.25	2.58	2.76	2.85	2.96	3.30	2.93	2.97	3.08	2.60	2.71

Parameter Definition

Supporting Information:

Monthly Averaged Top-of-atmosphere Insolation (kWh/m^2/day)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	3.29	4.80	6.96	9.16	10.7	11.5	11.1	9.78	7.79	5.57	3.74	2.88

Parameter Definition

Monthly Averaged Surface Albedo (0 to 1.0)

Lat 45.3 Lon -75.6	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	0.53	0.50	0.37	0.12	0.12	0.13	0.13	0.13	0.15	0.12	0.11	0.36

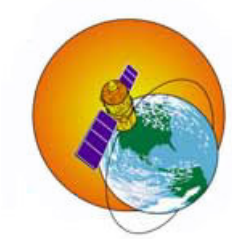
Parameter Definition

Find a different location

Click on a desired map location	Enter latitude and longitude

Additional information about the SSE data set

Accuracy	Methodology	Parameters (Units & Definition)



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Questions?

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