APPENDIX E

INSOLATION AND TEMPERATURE DATA FOR EIGHT FLORIDA CITIES

INTRODUCTION

In this appendix we present data on the solar energy available at each of eight Florida cities The average daily radiation is given in Btu/ft^2·day for each month of the year for a horizontal surface and for a variety of collector orientations. Data is presented for azimuth values of 0° (due south) 15°, 30° and 45°, and for slope (or tilt) values of 20°, 40°, 50°, 60°, 70° 80° and 90° (vertical). From this data one can compute the approximate energy that may be harvested annually at a given site in Florida, or estimate the best orientation for a system which will be used only in certain months of the year

Solar insolation levels for horizontal surfaces have been measured by weather stations in many American cities Pages E-3 through E-10 convert information to a more useful form for water and pool heating applications in eight Florida cities. These pages show daily averages as they apply to surfaces of varying tilt and orientation

A thorough discussion of how the conversions are made is beyond the scope of this text, but the following simplified explanation conveys the idea:

Since the earth moves in a slightly elliptical path around the sun, the quantity of energy impinging on a square foot of surface just outside the earth's atomosphere and normal to the sun's rays varies by about ±3 per- during the year. On the average it is 428 Btu/ft^2·hr (the solar constant). The amount of energy which impinges on a horizontal surface

outside the atmosphere (i.e., one parallel to a horizontal surface at a given latitude on earth) may be calculated by a straight-forward formula

any day of the year. That information is not too useful, however since the weather at identical latitudes varies greatly from place to place We can relate the computed extraterrrestial radiation to the measured horizontal surface radiation through a ratio which varies from month to month

any given location. This ration indicates the effects of clouds and atmosphere in reducing or attenuating the radiation striking a horizontal surface To estimate the radiation striking a tilted surface, collector tilt factors are derived and used as correction factors to the horizontal radia-

values These corrections lead to the average daily radiation data for tilted surfaces which are presented in the following pages

Solar Insolation Data
APALACHICOLA, FLORIDA

APALACHICOLA	FL 29.45												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
HORIZONTAL RAD.	1078	1340	1625	2025	2242	2176	1992	1866	1693	1539	1226	972	(BTU/DAY-FT2)
AVE. TEMP.	53.6	55.4	59.0	66.2	73.4	78.8	80.6	80.6	78.8	69.8	60.8	55.4	(F)
DEGREE-DAYS	347.	260.	180.	33.	0.	0.	0.	0.	0.	16.	153.	319.	(F-DAYS)

AVERAGE DAILY RADIATION ON TILTED SURFACES (BTU/DAY-FT2)

SLOPE	AZIMUTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
20	0	1425	1633	1803	2060	2131	2010	1868	1842	1812	1834	1604	1309
30	0	1549	1722	1830	2007	2010	1870	1752	1771	1809	1916	1736	1432
40	0	1634	1769	1814	1910	1848	1696	1603	1663	1764	1951	1824	1519
50	0	1677	1773	1756	1769	1651	1494	1428	1522	1679	1937	1865	1568
60	0	1678	1733	1656	1592	1426	1272	1231	1351	1556	1876	1859	1577
70	0	1637	1651	1519	1382	1181	1038	1020	1158	1398	1769	1805	1546
80	0	1554	1529	1348	1148	929	807	808	949	1212	1618	1705	1476
90	0	1435	1374	1152	903	692	606	615	740	1007	1434	1566	1371
20	15	1412	1621	1796	2061	2137	2017	1873	1845	1809	1821	1589	1296
30	15	1529	1704	1821	2013	2021	1883	1762	1778	1806	1898	1714	1413
40	15	1608	1747	1804	1921	1867	1716	1620	1676	1764	1928	1796	1495
50	15	1647	1746	1746	1789	1679	1522	1451	1541	1682	1911	1832	1539
60	15	1648	1703	1647	1621	1464	1308	1262	1379	1564	1846	1821	1544
70	15	1600	1618	1513	1423	1231	1084	1061	1196	1413	1736	1764	1511
80	15	1515	1494	1346	1204	991	861	857	999	1236	1585	1662	1439
90	15	1396	1339	1157	978	765	663	669	803	1042	1401	1522	1334
20	30	1373	1588	1778	2060	2152	2036	1888	1849	1797	1790	1547	1258
30	30	1472	1659	1799	2018	2051	1918	1790	1791	1794	1855	1653	1358
40	30	1536	1690	1781	1937	1916	1770	1665	1701	1755	1876	1718	1424
50	30	1561	1682	1724	1819	1761	1599	1515	1582	1680	1853	1740	1455
60	30	1547	1634	1632	1670	1562	1409	1347	1438	1571	1787	1718	1449
70	30	1495	1547	1506	1494	1356	1209	1168	1275	1434	1680	1654	1407
80	30	1407	1426	1353	1299	1145	1009	986	1101	1273	1536	1549	1331
90	30	1287	1279	1183	1101	944	826	815	928	1101	1365	1410	1225
20	45	1315	1540	1748	2052	2167	2060	1906	1851	1777	1741	1484	1201
30	45	1391	1593	1761	2016	2083	1961	1823	1801	1772	1790	1565	1277
40	45	1435	1612	1741	1945	1969	1837	1716	1723	1734	1801	1610	1324
50	45	1446	1596	1688	1843	1828	1690	1588	1619	1666	1774	1618	1339
60	45	1423	1546	1603	1711	1664	1526	1441	1493	1568	1709	1588	1323
70	45	1367	1464	1489	1557	1485	1351	1284	1349	1445	1610	1522	1276
80	45	1282	1353	1352	1385	1298	1173	1121	1195	1303	1480	1423	1200
90	45	1171	1220	1201	1209	1117	1004	965	1039	1150	1328	1296	1101

Solar Insolation Data
GAINESVILLE, FLORIDA

GAINESVILLE	FL	29.39											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
HORIZONTAL RAD.	1023	1351	1638	1984	2157	2003	1914	1870	1635	1355	1170	935	(BTU/DAY-FT2)
AVE. TEMP.	55.4	57.2	62.6	69.8	75.2	78.8	80.6	80.6	78.8	71.6	62.6	57.2	(F)
DEGREE-DAYS	332.	246.	174.	21.	0.	0.	0.	0.	0.	12.	144.	310.	(F-DAYS)

AVERAGE DAILY RADIATION ON TILTED SURFACES (BTU/DAY-FT2)

SLOPE	AZIMUTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
20	0	1340	1647	1820	2017	2052	1855	1797	1846	1745	1591	1519	1250
30	0	1452	1737	1847	1965	1936	1729	1686	1774	1741	1654	1640	1364
40	0	1528	1785	1831	1869	1782	1573	1545	1666	1697	1678	1719	1445
50	0	1566	1789	1772	1732	1594	1392	1378	1524	1614	1662	1756	1489
60	0	1565	1749	1672	1559	1379	1192	1190	1353	1496	1606	1748	1496
70	0	1524	1665	1533	1354	1147	981	990	1159	1345	1511	1695	1465
80	0	1446	1542	1359	1126	906	772	788	950	1167	1362	1600	1398
90	0	1335	1386	1162	888	681	590	604	739	970	1225	1469	1298
20	15	1327	1635	1813	2018	2057	1861	1802	1848	1742	1581	1505	1238
30	15	1434	1719	1839	1970	1947	1740	1698	1781	1738	1640	1620	1346
40	15	1505	1762	1822	1880	1799	1590	1561	1678	1696	1660	1694	1422
50	15	1538	1762	1762	1781	1620	1416	1400	1543	1617	1640	1725	1462
60	15	1534	1718	1663	1587	1415	1223	1220	1381	1503	1581	1713	1465
70	15	1490	1632	1526	1394	1193	1021	1028	1197	1359	1485	1658	1432
80	15	1410	1507	1357	1180	964	820	834	999	1189	1356	1561	1363
90	15	1299	1350	1166	960	749	639	655	803	1004	1199	1429	1263
20	30	1292	1602	1794	2017	2071	1878	1818	1853	1731	1555	1466	1202
30	30	1382	1673	1816	1975	1975	1771	1722	1794	1727	1604	1563	1295
40	30	1438	1705	1798	1896	1846	1638	1603	1704	1688	1617	1621	1355
50	30	1459	1697	1741	1781	1688	1483	1460	1584	1615	1593	1640	1383
60	30	1445	1648	1647	1634	1507	1311	1300	1440	1511	1534	1618	1376
70	30	1395	1561	1520	1463	1311	1130	1128	1276	1379	1440	1556	1336
80	30	1311	1439	1365	1273	1109	949	955	1102	1225	1316	1456	1262
90	30	1199	1290	1193	1080	917	782	792	929	1060	1170	1325	1161
20	45	1239	1553	1764	2010	2086	1899	1832	1855	1712	1516	1408	1149
30	45	1307	1607	1778	1974	2005	1810	1753	1804	1706	1552	1482	1220
40	45	1346	1626	1758	1904	1895	1696	1651	1726	1669	1557	1522	1262
50	45	1354	1610	1704	1803	1760	1563	1528	1622	1602	1529	1528	1275
60	45	1331	1560	1618	1675	1604	1414	1388	1495	1508	1471	1498	1258
70	45	1278	1477	1503	1524	1432	1254	1238	1351	1390	1383	1434	1213
80	45	1197	1365	1365	1356	1253	1092	1082	1196	1253	1270	1340	1140
90	45	1093	1231	1212	1184	1079	938	933	1040	1106	1140	1220	1045

Solar Insolation Data
JACKSONVILLE, FLORIDA

JACKSONVILLE	FL	30.25											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
HORIZONTAL RAD.		984	1275	1559	1894	2049	1935	1924	1764	1411	1220	1010	847	(BTU/DAY-FT2)
AVE. TEMP.		53.6	55.4	60.8	68.0	73.4	78.8	80.6	80.6	77.0	69.8	60.8	53.6	(F)
DEGREE-DAYS		348.	282.	176.	24.	0.	0.	0.	0.	0.	19.	161.	317.	(F-DAYS)

AVERAGE DAILY RADIATION ON TILTED SURFACES (BTU/DAY-FT2)

SLOPE	AZIMUTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
20	0	1295	1556	1735	1931	1957	1800	1811	1736	1601	1426	1295	1128
30	0	1406	1643	1763	1884	1852	1683	1703	1672	1497	1482	1393	1230
40	0	1483	1689	1750	1796	1710	1536	1563	1574	1460	1502	1458	1302
50	0	1522	1695	1696	1669	1536	1364	1397	1445	1391	1488	1486	1342
60	0	1524	1659	1602	1507	1337	1174	1210	1288	1292	1438	1478	1349
70	0	1487	1582	1472	1318	1120	973	1009	1110	1167	1356	1434	1322
80	0	1413	1466	1310	1100	895	773	806	917	1018	1242	1354	1262
90	0	1307	1322	1124	876	682	595	619	723	855	1105	1244	1174
20	15	1283	1545	1726	1932	1962	1805	1818	1738	1499	1418	1284	1117
30	15	1389	1626	1754	1889	1861	1693	1712	1678	1495	1469	1377	1215
40	15	1460	1668	1740	1806	1726	1552	1576	1585	1459	1486	1436	1282
50	15	1495	1669	1686	1686	1560	1386	1419	1462	1393	1469	1461	1316
60	15	1493	1629	1593	1532	1369	1203	1239	1313	1297	1417	1450	1322
70	15	1454	1550	1466	1351	1162	1010	1046	1144	1177	1333	1403	1292
80	15	1378	1434	1307	1149	947	817	851	961	1035	1219	1322	1231
90	15	1271	1288	1126	941	743	641	669	779	881	1081	1211	1142
20	30	1248	1513	1710	1930	1974	1821	1829	1742	1490	1395	1251	1086
30	30	1338	1582	1732	1893	1886	1721	1738	1690	1485	1438	1330	1168
40	30	1396	1613	1716	1819	1767	1596	1620	1607	1452	1449	1377	1223
50	30	1418	1607	1664	1712	1621	1445	1478	1498	1390	1428	1391	1248
60	30	1406	1563	1577	1575	1452	1285	1318	1365	1302	1375	1371	1242
70	30	1359	1482	1458	1413	1268	1111	1146	1214	1191	1292	1319	1206
80	30	1280	1369	1312	1233	1078	936	970	1062	1062	1183	1235	1141
90	30	1173	1229	1149	1049	895	774	805	890	923	1054	1125	1051
20	45	1196	1467	1681	1922	1987	1840	1845	1743	1474	1361	1204	1039
30	45	1264	1519	1695	1890	1913	1756	1768	1698	1467	1392	1264	1101
40	45	1304	1539	1677	1828	1811	1649	1667	1626	1435	1396	1295	1139
50	45	1314	1525	1627	1731	1685	1522	1544	1530	1376	1371	1298	1151
60	45	1293	1478	1547	1610	1538	1380	1405	1413	1298	1319	1272	1136
70	45	1243	1401	1439	1467	1377	1227	1254	1279	1198	1241	1218	1096
80	45	1166	1296	1308	1308	1206	1070	1097	1135	1081	1141	1138	1031
90	45	1067	1171	1164	1144	1042	920	945	989	957	1025	1037	946

Solar Insolation Data
KEY WEST, FLORIDA

KEY WEST	FL	24.33											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
HORIZONTAL RAD.	1205	1511	1806	2106	2134	2001	1968	1845	1640	1452	1223	1076	(BTU/DAY-FT2)
AVE. TEMP.	69.8	69.8	73.4	77.0	80.6	82.4	84.2	84.2	82.4	78.8	73.4	69.8	(F)
DEGREE-DAYS	16.	25.	5.	0.	0.	0.	0.	0.	0.	0.	0.	18.	(F-DAYS)

AVERAGE DAILY RADIATION ON TILTED SURFACES (BTU/DAY-FT2)

SLOPE	AZIMUTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
20	0	1520	1784	1960	2098	1989	1817	1810	1766	1709	1653	1509	1375
30	0	1624	1859	1969	2021	1855	1674	1679	1700	1686	1698	1599	1477
40	0	1689	1887	1931	1899	1685	1503	1517	1578	1625	1702	1651	1543
50	0	1712	1870	1847	1735	1485	1308	1331	1426	1528	1666	1663	1571
60	0	1693	1806	1720	1535	1262	1098	1127	1248	1399	1591	1634	1560
70	0	1631	1701	1555	1305	1026	884	916	1050	1240	1479	1565	1511
80	0	1530	1554	1355	1055	790	679	708	842	1057	1334	1458	1425
90	0	1394	1376	1132	800	582	525	538	641	861	1164	1320	1307
20	15	1507	1773	1954	2101	1995	1825	1817	1780	1707	1645	1497	1363
30	15	1606	1842	1961	2029	1868	1688	1691	1708	1685	1685	1582	1459
40	15	1665	1866	1923	1913	1706	1523	1536	1593	1627	1685	1629	1521
50	15	1684	1844	1840	1769	1515	1336	1356	1448	1534	1647	1637	1545
60	15	1661	1778	1715	1570	1303	1135	1163	1279	1410	1570	1604	1531
70	15	1597	1669	1553	1355	1079	929	960	1093	1258	1457	1533	1479
80	15	1493	1521	1360	1124	855	732	762	899	1085	1312	1425	1391
90	15	1358	1342	1147	893	656	569	591	713	903	1142	1286	1273
20	30	1471	1742	1938	2103	2013	1845	1835	1798	1700	1622	1464	1328
30	30	1553	1798	1942	2040	1901	1724	1724	1725	1679	1654	1535	1409
40	30	1598	1813	1905	1938	1759	1579	1588	1624	1625	1650	1569	1457
50	30	1605	1785	1825	1801	1592	1414	1430	1495	1540	1608	1565	1469
60	30	1572	1716	1711	1634	1406	1238	1258	1346	1426	1532	1526	1445
70	30	1501	1608	1562	1445	1209	1053	1079	1182	1269	1423	1450	1386
80	30	1395	1465	1387	1242	1014	876	903	1012	1134	1287	1340	1295
90	30	1261	1298	1196	1043	835	721	746	849	974	1131	1204	1176
20	45	1418	1696	1911	2103	2033	1872	1857	1805	1686	1588	1416	1278
30	45	1479	1736	1910	2048	1940	1770	1764	1743	1666	1609	1468	1338
40	45	1507	1740	1873	1960	1819	1647	1648	1655	1616	1599	1488	1368
50	45	1501	1708	1801	1841	1676	1506	1513	1543	1539	1556	1475	1367
60	45	1461	1639	1696	1698	1516	1352	1364	1413	1437	1483	1430	1335
70	45	1390	1538	1563	1530	1345	1192	1207	1269	1315	1383	1355	1274
80	45	1290	1409	1408	1352	1171	1033	1050	1117	1178	1260	1253	1186
90	45	1168	1261	1243	1175	1006	886	903	969	1035	1123	1130	1077

Solar Insolation Data
MIAMI, FLORIDA

MIAMI	FL	25.47											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
HORIZONTAL RAD.	1263	1531	1808	2003	2032	1955	1977	1870	1646	1432	1303	1174	(BTU/DAY-FT2)
AVE. TEMP.	66.2	66.2	69.8	73.4	77.0	80.6	80.6	82.4	80.6	77.0	71.6	68.0	(F)
DEGREE-DAYS	74.	56.	19.	0.	0.	0.	0.	0.	0.	0.	0.	65.	(F-DAYS)

AVERAGE DAILY RADIATION ON TILTED SURFACES (BTU/DAY-FT2)

SLOPE	AZIMUTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
20	0	1625	1829	1975	2002	1905	1785	1826	1817	1724	1642	1640	1542
30	0	1748	1913	1990	1933	1784	1651	1698	1733	1705	1690	1761	1672
40	0	1828	1960	1956	1822	1628	1488	1539	1613	1648	1699	1818	1760
50	0	1862	1938	1877	1672	1444	1302	1354	1461	1553	1667	1840	1803
60	0	1848	1879	1753	1487	1237	1101	1152	1282	1426	1596	1816	1800
70	0	1785	1774	1589	1274	1016	893	939	1083	1288	1469	1746	1751
80	0	1683	1626	1390	1040	793	693	730	872	1085	1347	1633	1658
90	0	1539	1444	1167	801	594	534	553	666	888	1180	1483	1527
20	15	1610	1816	1969	2004	1911	1792	1833	1821	1722	1633	1627	1528
30	15	1727	1895	1981	1940	1795	1663	1710	1741	1704	1677	1731	1651
40	15	1801	1926	1948	1835	1647	1508	1557	1627	1649	1682	1793	1733
50	15	1830	1910	1869	1693	1471	1328	1381	1483	1558	1647	1810	1771
60	15	1812	1845	1747	1519	1273	1135	1187	1313	1436	1574	1762	1764
70	15	1749	1740	1587	1319	1063	935	984	1126	1285	1465	1709	1712
80	15	1641	1590	1394	1101	852	743	783	928	1112	1323	1594	1617
90	15	1497	1408	1180	884	680	579	608	737	928	1157	1444	1485
20	30	1569	1783	1951	2005	1926	1811	1850	1828	1714	1609	1586	1486
30	30	1667	1848	1960	1949	1825	1697	1742	1758	1697	1645	1676	1590
40	30	1725	1869	1927	1857	1694	1556	1607	1657	1646	1645	1722	1655
50	30	1739	1848	1853	1730	1539	1400	1451	1530	1583	1607	1727	1678
60	30	1710	1780	1739	1575	1365	1229	1280	1379	1451	1534	1689	1659
70	30	1640	1672	1592	1398	1181	1051	1100	1214	1314	1429	1611	1599
80	30	1529	1528	1417	1207	996	876	922	1040	1158	1295	1494	1499
90	30	1385	1356	1227	1017	823	724	762	873	996	1142	1346	1366
20	45	1508	1733	1922	2003	1944	1835	1871	1834	1699	1574	1532	1424
30	45	1582	1781	1926	1955	1859	1739	1780	1774	1682	1599	1597	1502
40	45	1620	1790	1893	1874	1747	1622	1666	1687	1635	1591	1627	1545
50	45	1620	1761	1823	1764	1614	1486	1532	1576	1559	1562	1619	1553
60	45	1583	1695	1721	1628	1464	1337	1383	1445	1459	1482	1576	1524
70	45	1511	1594	1589	1472	1302	1182	1228	1299	1337	1385	1496	1460
80	45	1408	1464	1434	1304	1137	1026	1067	1145	1199	1264	1389	1363
90	45	1275	1312	1266	1135	979	881	917	994	1054	1128	1256	1241

Solar Insolation Data
PENSACOLA, FLORIDA

PENSACOLA	FL	30.28											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
HORIZONTAL RAD.		921	1183	1493	1876	2071	2094	1979	1876	1585	1452	1024	825	(BTU/DAY-FT2)
AVE. TEMP.		51.8	53.6	59.0	68.0	73.4	78.8	80.8	80.6	77.0	69.8	59.0	53.6	(F)
DEGREE-DAYS		427.	323.	211.	37.	0.	0.	0.	0.	0.	32.	189.	359.	(F-DAYS)

AVERAGE DAILY RADIATION ON TILTED SURFACES (BTU/DAY-FT2)

SLOPE	AZIMUTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
20	0	1200	1431	1656	1912	1978	1943	1862	1858	1697	1731	1317	1094
30	0	1299	1506	1681	1866	1871	1813	1750	1789	1695	1810	1416	1192
40	0	1366	1545	1667	1779	1728	1650	1605	1683	1655	1844	1465	1260
50	0	1400	1547	1615	1653	1552	1460	1433	1543	1576	1833	1515	1298
60	0	1399	1512	1526	1493	1350	1250	1239	1373	1465	1777	1507	1304
70	0	1364	1441	1402	1303	1130	1029	1031	1160	1321	1678	1462	1277
80	0	1295	1336	1248	1091	902	808	821	970	1150	1539	1382	1219
90	0	1197	1204	1073	869	686	613	627	758	961	1368	1270	1133
20	15	1168	1420	1649	1913	1983	1949	1867	1860	1694	1720	1306	1084
30	15	1283	1491	1673	1870	1861	1824	1780	1796	1693	1793	1402	1177
40	15	1346	1526	1656	1788	1744	1668	1621	1695	1654	1823	1463	1241
50	15	1376	1524	1606	1670	1576	1486	1456	1562	1660	1808	1489	1275
60	15	1372	1486	1517	1518	1383	1284	1269	1400	1472	1749	1478	1277
70	15	1334	1413	1396	1339	1173	1071	1070	1217	1334	1648	1431	1249
80	15	1264	1307	1248	1139	955	858	868	1019	1171	1508	1348	1189
90	15	1165	1174	1076	933	748	666	680	821	992	1336	1236	1103
20	30	1158	1393	1632	1911	1995	1966	1881	1864	1883	1689	1273	1054
30	30	1237	1452	1652	1874	1908	1856	1787	1808	1881	1752	1354	1132
40	30	1287	1478	1636	1801	1786	1718	1664	1720	1846	1773	1402	1184
50	30	1306	1469	1585	1695	1638	1556	1517	1602	1677	1753	1417	1207
60	30	1293	1427	1502	1560	1467	1376	1352	1458	1477	1693	1398	1201
70	30	1249	1363	1389	1399	1281	1185	1174	1295	1351	1594	1344	1166
80	30	1176	1248	1250	1222	1066	994	993	1119	1203	1460	1259	1103
90	30	1077	1121	1098	1040	903	817	822	946	1043	1300	1148	1016
20	45	1111	1352	1605	1903	2008	1988	1898	1865	1663	1644	1224	1008
30	45	1171	1396	1618	1871	1933	1896	1818	1817	1659	1691	1286	1068
40	45	1208	1411	1600	1807	1831	1779	1714	1741	1626	1702	1319	1104
50	45	1212	1396	1551	1714	1703	1640	1587	1638	1562	1678	1322	1114
60	45	1192	1362	1474	1594	1555	1484	1443	1512	1472	1618	1296	1100
70	45	1145	1281	1371	1453	1391	1317	1287	1368	1359	1525	1241	1060
80	45	1073	1184	1245	1295	1220	1146	1126	1212	1226	1404	1160	997
90	45	981	1069	1109	1133	1053	983	969	1055	1084	1261	1057	915

Solar Insolation Data
TALLAHASSEE, FLORIDA

TALLAHASSEE	FL	30.26											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
HORIZONTAL RAD.		909	1145	1557	1778	2018	1752	2003	1977	1561	1299	1340	1145	(BTU/DAY-FT2)
AVE. TEMP.		51.8	53.6	60.8	66.2	73.4	78.8	80.6	80.6	77.0	68.0	59.0	53.6	(F)
DEGREE-DAYS		375.	266.	202.	36.	0.	0.	0.	0.	0.	26.	198.	360.	(F-DAYS)

AVERAGE DAILY RADIATION ON TILTED SURFACES (BTU/DAY-FT2)

SLOPE	AZIMUTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
20	0	1182	1379	1732	1809	1927	1635	1884	1959	1669	1530	1802	1611
30	0	1278	1449	1761	1765	1824	1532	1769	1886	1668	1593	1967	1786
40	0	1343	1485	1747	1683	1685	1403	1622	1773	1628	1618	2081	1914
50	0	1376	1486	1693	1565	1515	1252	1448	1623	1552	1604	2140	1992
60	0	1374	1451	1600	1415	1320	1084	1251	1442	1441	1553	2143	2017
70	0	1339	1383	1471	1238	1107	907	1040	1238	1300	1465	2089	1988
80	0	1271	1282	1309	1039	886	730	826	1012	1132	1342	1980	1907
90	0	1176	1154	1123	832	676	571	630	786	946	1193	1824	1778
20	15	1171	1369	1728	1810	1932	1640	1889	1961	1666	1520	1784	1594
30	15	1262	1435	1752	1769	1833	1541	1780	1893	1665	1579	1941	1760
40	15	1323	1467	1738	1692	1700	1417	1639	1786	1627	1600	2047	1881
50	15	1352	1464	1684	1580	1538	1271	1471	1644	1554	1583	2100	1952
60	15	1347	1427	1592	1438	1351	1108	1282	1472	1447	1529	2098	1972
70	15	1310	1356	1464	1270	1147	936	1080	1276	1312	1439	2040	1940
80	15	1241	1254	1306	1083	937	767	874	1066	1151	1316	1929	1856
90	15	1144	1126	1126	890	736	610	684	854	977	1167	1771	1727
20	30	1140	1343	1708	1808	1943	1653	1903	1966	1656	1496	1733	1542
30	30	1217	1398	1730	1773	1857	1565	1807	1907	1654	1544	1866	1685
40	30	1266	1422	1714	1704	1741	1464	1683	1813	1618	1559	1952	1784
50	30	1284	1412	1682	1604	1597	1324	1534	1667	1551	1538	1988	1837
60	30	1271	1371	1575	1476	1432	1178	1366	1535	1453	1482	1972	1842
70	30	1227	1299	1456	1326	1251	1024	1186	1361	1328	1394	1906	1798
80	30	1155	1196	1311	1159	1064	868	1002	1174	1183	1276	1790	1708
90	30	1057	1076	1148	988	885	723	829	989	1026	1137	1634	1577
20	45	1095	1304	1678	1802	1956	1669	1920	1967	1637	1457	1657	1464
30	45	1163	1345	1693	1770	1883	1595	1839	1916	1633	1494	1760	1575
40	45	1186	1359	1675	1709	1784	1499	1733	1835	1599	1500	1822	1646
50	45	1192	1343	1625	1621	1660	1386	1606	1727	1537	1475	1840	1678
60	45	1172	1300	1545	1508	1516	1259	1459	1593	1448	1420	1814	1668
70	45	1126	1231	1437	1374	1357	1122	1301	1441	1336	1337	1744	1617
80	45	1055	1138	1307	1226	1191	982	1137	1275	1206	1230	1635	1527
90	45	964	1027	1162	1074	1028	847	979	1109	1066	1105	1493	1405

Solar Insolation Data
TAMPA, FLORIDA

TAMPA	FL	27.58											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
HORIZONTAL RAD.	1204	1439	1756	2006	2191	2110	1962	1822	1671	1491	1314	1112	(BTU/DAY-FT2)
AVE. TEMP.	60.8	60.8	66.2	69.8	75.2	78.8	80.6	80.6	78.8	73.4	66.2	60.8	(F)
DEGREE-DAYS	202.	148.	102.	0.	0.	0.	0.	0.	0.	0.	60.	171.	(F-DAYS)

AVERAGE DAILY RADIATION ON TILTED SURFACES (BTU/DAY-FT2)

SLOPE	AZIMUTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
20	0	1579	1739	1939	2024	2068	1937	1828	1785	1770	1743	1698	1490
30	0	1711	1827	1963	1964	1942	1795	1708	1710	1759	1808	1829	1626
40	0	1799	1870	1939	1860	1778	1622	1557	1600	1708	1830	1913	1722
50	0	1842	1868	1870	1716	1581	1423	1360	1458	1618	1807	1949	1773
60	0	1838	1819	1756	1536	1358	1205	1163	1289	1493	1740	1935	1779
70	0	1786	1726	1602	1325	1118	979	974	1099	1335	1632	1872	1740
80	0	1690	1591	1411	1092	873	758	766	895	1151	1485	1761	1655
90	0	1554	1422	1196	852	648	572	582	693	949	1309	1609	1532
20	15	1564	1726	1932	2025	2073	1944	1834	1788	1767	1733	1682	1475
30	15	1689	1809	1954	1970	1954	1808	1719	1717	1757	1793	1806	1605
40	15	1772	1847	1929	1872	1798	1642	1574	1613	1708	1810	1885	1694
50	15	1809	1840	1860	1736	1610	1451	1404	1478	1622	1784	1915	1741
60	15	1800	1788	1748	1568	1397	1242	1215	1317	1502	1714	1897	1742
70	15	1746	1692	1597	1368	1168	1024	1016	1137	1351	1604	1830	1699
80	15	1648	1555	1412	1150	936	811	816	946	1176	1457	1717	1613
90	15	1511	1385	1204	929	720	625	636	758	987	1281	1565	1489
20	30	1522	1693	1913	2026	2089	1963	1849	1794	1758	1705	1639	1433
30	30	1627	1762	1931	1977	1985	1844	1748	1732	1748	1755	1744	1543
40	30	1693	1790	1906	1891	1848	1697	1620	1639	1703	1765	1805	1615
50	30	1716	1775	1840	1769	1683	1528	1470	1519	1623	1735	1822	1646
60	30	1696	1718	1735	1618	1496	1342	1302	1377	1513	1665	1792	1635
70	30	1633	1621	1595	1442	1295	1149	1125	1217	1376	1558	1719	1584
80	30	1531	1489	1427	1250	1090	957	947	1048	1217	1419	1603	1492
90	30	1394	1328	1241	1057	899	785	784	883	1050	1256	1452	1367
20	45	1459	1643	1882	2021	2106	1989	1868	1797	1740	1663	1575	1369
30	45	1539	1695	1893	1978	2019	1886	1783	1744	1729	1700	1655	1453
40	45	1584	1710	1867	1903	1903	1764	1674	1664	1687	1701	1697	1503
50	45	1592	1688	1805	1797	1762	1619	1545	1559	1615	1668	1699	1517
60	45	1562	1631	1709	1664	1600	1459	1399	1434	1515	1600	1662	1495
70	45	1497	1539	1584	1510	1425	1289	1244	1293	1393	1501	1588	1439
80	45	1399	1418	1434	1341	1244	1119	1085	1143	1252	1375	1478	1349
90	45	1274	1275	1270	1168	1070	958	933	994	1103	1230	1342	1233

SUMMARY OF

PERTINENT COLD WEATHER DATA FOR

NINE FLORIDA CITIES

The following summary of weather data for nine Florida cities includes those inputs required for many solar pool heating calculations: wind speed (mph), wind direction, average temperatures for both 24 hour and daytime (solar collection) periods (°F) and horizontal radiation data ($Btu/ft^2 \cdot day$). Heating degree days (for a 65°F base) are included for comparative purposes The monthly listings progress from the coldest to the warmest months of the year during which the 24 hour average temperature is less than 75°F

APALACHACOL, FLORIDA

Coldest Month	Wind (mph)	Degree Days	Avg. Temp. 24 Hrs	D/T	Horizontal Radiation
Jan.	8.4 N	347	53.6	58.6	1078
Dec.	8.0 N	319	55.4	60.4	972
Feb.	8.8 N	260	55.4	60.4	1340
Mar.	9.0 SE	180	59.0	64.0	1623
Nov.	8.1 N	153	60.8	65.8	1226
April	8.7 SE	33	66.2	71.2	2025
Oct.	8.1 NW	16	69.8	74.8	1539
May	7.8 SE	0	73.4	78.4	2242

GAINESVILLE, FLA

Coldest Month	Wind (mph)	Degree Days	Avg. Temp. 24 Hrs	D/T	Horizontal Radiation
Jan.		332	55.4	60.4	1023
Dec.	NOT	310	57.2	62.2	935
Feb.	AVAILABLE	246	57.2	62.2	1351
Mar.		174	62.6	67.6	1638
Nov.		144	62.6	67.6	1170
April		21	69.8	74.8	1984
Oct.		12	71.6	76.6	1355
May		0	75.2	80.2	2157

JACKSONVILLE, FL.

Coldest Month	Wind (mph)	Degree Days	Avg. Temp. 24 Hrs	D/T	Horizontal Radiation
Jan.	8.4 NW	348	53.6	58.6	984
Dec.	8.2 NW	317	53.6	58.6	847
Feb.	9.4 SW	282	55.4	60.4	1275
Mar.	9.4 NW	176	60.8	65.8	1559
Nov.	8.1 NW	161	60.8	65.8	1010
April	9.15 E	24	68.0	73.0	1894
Oct.	3.6 NE	19	69.8	74.8	1220
May	3.6 SW	0	73.0	78.0	2049

KEY WEST, FL

Coldest Month	Wind (mph)	Degree Day	Avg. Temp. 24 hrs.	D/T	Horizontal Radiation
Feb.	12.0 SW	25	69.8	74.8	1511
Dec.	12.0 NE	18	69.8	74.8	1076
Jan.	12.0 NE	16	69.8	74.8	1205
Mar.	12.5 SW	5	73.4	78.4	1806
Nov.	12.0 NE	0	73.4	78.4	1223

MIAMI, FL.

Coldest Month	Wind (mph)	Degree Day	Avg. Temp. 24 hrs	D/T	Horizontal Radiation
Jan.	9.4 NWN	74	66.2	71.2	1263
Dec.	9.1 N	65	68.0	73.0	1174
Feb.	10.1 SE	56	66.2	71.2	1531
Mar.	10.4 SE	19	69.8	74.8	1808
Nov.	9.5 N	0	71.6	76.6	1303
April	10.7 SE	0	73.4	78.4	2003

ORLANDO, FL

Coldest Month	Wind mph)	Degree Day	Avg. Temp. 24 hrs.	D/T	Horizontal Radiation
Jan.	1.0 NNE	197	60.3	65.3	1096
Feb.	9.8 S	184	61.5	66.5	1218
Dec.	9.7 NNE	170	61.5	66.5	1074
Mar.	1.9 S	94	65.9	70.9	1520
Nov.	3.7 N	75	66.6	71.6	1155
April	9.5 SE	11	71.3	76.3	1708
Oct.	8.7 N	0	74.3	79.3	1351

PENSACOLA, FL.

Coldest Month	Wind (mph)	Degree Day	Avg. Temp. 24 hrs.	D/T	Horizontal Radiation
Jan.	.0	427	51.8	56.8	921
Dec.	.0	359	53.6	58.6	825
Feb.	.4	323	53.6	58.6	1183
Nov.	.2	189	59.0	64.0	1024
Mar.	.7	211	59.0	64.0	1493
April	.3	37	68.0	73.0	1876
Oct.	.0	32	69.8	74.8	1452
May	5	0	73.4	78.4	2071

TALLAHASSEE, FL

Coldest Month	Wind (mph)	Degree Day	Avg. Temp. 24 hrs.	D/T	Horizontal Radiation
Jan.	.7 N	375	51.8	55.8	909
Dec.	.9 N	360	53.6	58.6	1145
Feb.	.9 S	286	53.6	58.6	1145
Nov.	6.6 N	198	59.0	64.0	1340
Mar.	8.4 S	202	60.8	65.8	1557
April	7.5 S	36	66.2	71.2	1778
Oct.	6.9 N	28	68.0	73.0	1299
May	6.8 E	0	73.4	78.4	2018

TAMPA, FL.

Coldest Month	Wind (mph)	Degree Day	Avg. Temp. 24 hrs.	D/T	Horizontal Radiation
Jan.	8.9 N	202	60.8	65.8	1204
Dec.	10.0 N	171	60.8	65.8	1112
Feb.	9.5 E	148	60.8	65.8	1439
Mar.	9.8 S	102	66.2	71.2	1756
Nov.	10.0 E-NE	60	66.2	71.2	1314
April	9.6 E-NE	0	69.8	74.8	2006
Oct.	10.1 E-NE	0	73.4	78.4	1491