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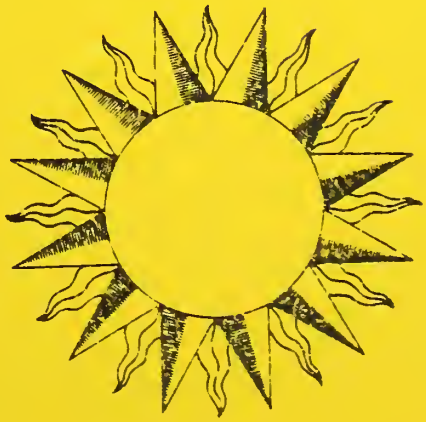
Residential Solar Data Center: Data Resources and Reports

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards
National Engineering Laboratory
Center for Building Technology
Washington, DC 20234

October 1981



Prepared for:
Department of Housing and Urban Development
Office of the Assistant Secretary for Policy Development and Research
Division of Energy, Building Technology and Standards
Washington, DC 20410

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RESIDENTIAL SOLAR DATA CENTER: DATA RESOURCES AND REPORTS

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U.S. DEPARTMENT OF COMMERCE, Malcolm Baldrige, *Secretary*
NATIONAL BUREAU OF STANDARDS, Ernest Ambler, *Director*

FOREWORD

From January to October 1978 the Residential Solar Data Center (SDC) of the National Bureau of Standards (NBS) issued a bimonthly publication known as "Status Reports".[1] These reports contained sets of tables and charts designed to inform selected participants (primarily the Department of Housing and Urban Development and its contractors) in the Residential Solar Heating and Cooling Demonstration Program about the volume of data stored in the solar data base maintained by the SDC, and about the types of computer printouts that were available. The availability of computer printouts to a larger, more varied group of potential users was announced at the Department of Energy's Solar Heating and Cooling Systems Operational Results Conference held in Colorado Springs, Colorado, November 28 - December 1, 1978.

In June 1979 the document, "Residential Solar Data Center Data Resources and Reports,"[2] was published in an effort to enhance comprehension of the computer printouts of Residential Solar Demonstration Program data by this more general audience. Included was a summary of the history and background of the SDC and the demonstration program, an explanation of grant cycles and data collection procedures, and a full description of the files which comprise the solar data base.

The present document is an update to the June 1979 issue. It contains much of the same information, updated to reflect the current status of the SDC. This is the final update. As of the date of publication, the Residential Solar Data Center no longer exists. The data described in this report have been archived with their sponsor at HUD.*

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The Residential Solar Data Center (SDC) was responsible for the establishment and operation of a computerized data base containing non-instrumented residential data collected from the DoE/HUD Solar Heating and Cooling Demonstration Program. This document includes a summary of the history and background of the SDC and its role in the demonstration program, a list of the final computer reports which are available, sample pages of representative reports, and a description of the data files which comprised the solar data base.

Key words: automatic data processing; data base; residential buildings; solar data base; solar heating and cooling; solar energy systems.

1. BACKGROUND

In 1974, Congress passed the Solar Heating and Cooling Demonstration Act to establish a program of research, development, and demonstration directed towards reducing the nation's dependence upon non-renewable resources through stimulating the development and use of solar energy systems. The Department of Energy (DoE) is responsible for the management of the total Federal Solar Energy Research, Development, and Demonstration Program. DoE was assisted in the demonstration portion of the program (which terminated in 1981) by the Department of Housing and Urban Development (HUD), the National Bureau of Standards (NBS), and other Federal agencies and private contractors.

The demonstration program was divided into two parts: a Residential Program for which HUD had prime responsibility; and a Commerical Program, directed by DoE. In both programs, funds were allocated for new and retrofit building projects in a variety of climatic and geographic regions. These projects were designed to demonstrate the economic viability of the use of solar energy systems for heating and cooling.

A principal objective of the demonstration program was to provide data on the technical aspects of solar energy systems and on their acceptance by the building industry, regulatory agencies, and the consumer. Data were collected in two ways: manually (non-instrumented data) and electronically (instrumented data).

Non-instrumented data, technical and non-technical, were collected on questionnaires or take-off forms for entry into the computer. Included were data describing the demonstration projects and their solar energy systems as well as data concerning the progress of the grant from construction through marketing, market acceptance, etc.

Instrumented technical data were derived principally from sensors installed when construction activities were completed at selected project sites. These data, when analyzed, defined the thermal performance of the solar energy systems and the climatic conditions affecting that performance.

DoE contractors were responsible for the collection of both instrumented and non-instrumented data in the commercial program and for the collection of instrumented data only in the residential program. The responsibility for collection of non-instrumented data in the residential program resided with HUD. Figure 1 illustrates the assignment of data collection, evaluation, and dissemination responsibilities in the Solar Demonstration Program. The Residential Solar Data Center (as shown in figure 1) was the entity responsible for storage, retrieval, and dissemination of non-instrumented solar data in the residential program.

Responsibilities / Activities	Commercial		Residential	
	Instrumented Data	Non-Instr. Data	Instrumented Data	Non-Instr. Data
Store, Retrieve, and Disseminate Data	DoE / Contractors			HUD Contractor (Solar Data Center of NBS)
Evaluate Data and Document Results				HUD/ Contractors
Maintain Printed Reports, etc.	DoE Technical Information Center (TIC) P. O. Box 62 Oak Ridge, Tennessee 37830			HUD User (see page iii)
Disseminate Information	Conservation and Renewable Energy Inquiry and Referral Service P. O. Box 1607 Rockville, MD 20850			

Figure 1. Solar demonstration program data collection, evaluation and dissemination activities and responsibilities.

In implementing the Residential Demonstration Program, HUD had established four main objectives. They were:

1. Residential demonstrations of solar equipment;

2. Development of performance criteria and certification standards for solar equipment;

3. Encouragement of the acceptance and use of solar technology by the housing industry and the general public; and

4. Dissemination of demonstration and market development data.

In order to accomplish these objectives, HUD funded demonstration projects (by awarding grants) in six cycles initiated approximately every nine to twelve months.* Data collected from funded projects in each cycle enabled HUD and its contractors to apply increased awareness of solar technology, marketplace dynamics, and data collection techniques towards enhancing the effectiveness of projects in succeeding cycles.

In addition, HUD, in cooperation with DoE, had established a national clearinghouse and reference center for the effective dissemination of information regarding solar energy systems - technical and non-technical, domestic and foreign, residential and commercial. The center functioned as a major reference resource for all elements of the solar community, as well as for the general public. The latest demonstration information was made available by the center through publications, conferences, and exhibits and through its toll-free telephone and national mailing response mechanism.

*For a count of grants per cycle, see section 7.

2. THE RESIDENTIAL SOLAR DATA CENTER

In the Fall of 1976, the design for a solar data center was initiated by the Institute for Computer Sciences and Technology (ICST) at the National Bureau of Standards (NBS). A series of publications [3] developed the framework for what was to become the Residential Solar Data Center (SDC).

In March 1977 the SDC became operational at NBS and operated until October 1981 when the program ended. The SDC was responsible for the establishment and operation of a data base containing non-instrumented solar data collected by participants in the Residential Solar Demonstration Program which was managed by the Department of Housing and Urban Development (HUD).

The principal data collection contractor for HUD in the demonstration program was the Boeing Aerospace Corporation (BAC) which had subcontracted with the American Institute of Architects/Research Corporation (AIA/RC); Dubin, Bloome Associates (DBA); and the Real Estate Research Corporation (RERC). These contractors collected and forwarded data to the SDC which maintained a solar data base consisting of the following files:

1. Grant File: This file contained basic project and system information for each application funded by HUD. These data were derived from grant applications submitted to HUD and updated with information from periodic field reports. More detailed information about this file is available in [4].

2. Grantee Report File: Data in this file were based upon reports submitted by each grantee to BAC describing the progress of the grant from design and award of construction financing through actual construction, sale, and permanent financing. The grantee's perception of the ease or difficulty in obtaining construction or permanent financing and building and zoning approval, as well as construction, equipment, or installation problems were included.

3. Technical Description File: This file contained basic system design and predicted performance data collected by DBA from a large number of selected non-instrumented systems and for all instrumented systems. A more detailed set of data was collected by AIA/RC for those systems which were instrumented. The data sample corresponded to the marketing survey and the utility consumption samples.

4. Technical Concerns File: Contained in this file were data on problems found during the design, construction or operational

phase which were recorded in field activity reports submitted by DBA and BAC field representatives. It also contained data on problems found after construction, as recorded by the grantee.

5. Marketing Survey File: This file contained extensive survey questionnaire results collected by RERC from selected builders, lenders, homebuyers, code officials, utility companies, and other market participants. The data sample included representatives of those who chose to build, lend, or buy a funded solar house and "comparatives" who did not become involved. Data were also collected after the sale to gauge builder and consumer reactions over a period of time. The data sample selected for these surveys (about 25 percent of all grants) is the same sample for which technical description data and utility consumption data were collected.

6. Utility Consumption File: This file contained information on auxiliary or "backup" fuel consumed for selected projects. The projects selected were those for which marketing survey results were collected. The data were collected from utility companies (with purchaser agreement). "Comparative" data were also collected.*

The following is a brief description of the services which were provided by the SDC:

Receipt and Maintenance of Data

The SDC provided a central location for the receipt, storage, processing and reduction of non-instrumented, residential solar data collected from the Solar Demonstration Program. Data were collected and transcribed onto computer forms by HUD and its contractors. These forms were sent to the SDC and from there to NBS contractors who keyed the information into machine-readable formats. The incoming data were then edited, catalogued, reformatted, translated, and validated. These activities provided the necessary control and prepared the data for use in the production of appropriate reports.

Production of Printed Reports

A major function of the SDC was the production of reports ranging from complete listings of all data in a file to more detailed "custom" computer reports. Custom reports were produced to meet specific user requirements and may have printed only selected data from a file and may have re-sorted the selected data into a new sequence. New report

*A more complete description of data files and specific data elements is contained in section 5.

requirements were defined by HUD or its contractors in the Residential Demonstration Program. These reports were generated whenever a data file was updated.*

Provision of Online Access to the Data

Some data files could be accessed by authorized users (as determined by HUD) via a computer terminal. Access was made possible through the use of a query package called MIRADS (Marshall Information Retrieval and Display System).

Ad Hoc Functions

In addition to the operation and maintenance of the data base, the SDC also provided the following user services (see [4], [5]):

1. technical expertise to answer user questions and to provide assistance;

2. development of computer programs in response to users' special needs;

3. user training in online access to the data base and in procedures for transcription and validation of data;

4. documentation of available data, reports, and online access techniques;

5. interface with data collectors and users;

6. development of standards for terminology, programs, and documentation.

7. archiving of files, computer listings, documentation, and programs.

*See section 3 for a list of the final computer reports available from HUD.

3. SUMMARY OF COMPUTER REPORTS AVAILABLE*

The tables in this section show final computer output reports which are available from HUD. (See address on page iii.) Tables 1 - 6 summarize content, and indicate report sequence (i.e., sorted by grant number, sorted by manufacturer, etc.). Sample pages from all these reports are contained in section 4.

The following is an explanation of terms used in the headings of tables 1 - 6:

Description: A brief description of the data elements included in each report. (See section 5 for additional information.)

Sequence of Data: The order in which line items are sorted.

Report Number: Number by which the report is referenced when requesting a copy from HUD. This same number appears at the top of each page of the report.

*Summary statistics of Grant, Grantee, Technical Description, and Utility Consumption file data are currently being compiled and will be available from the Department of Housing and Urban Development (HUD).

Table 1. Summary of Grant File Computer Reports

Description	Sequence of Data	Number of Report
Most of these computer reports are available in [4].		
Complete listing of all data collected for each grant awarded. (492 pages)	Grant Number	SG-C1
Analysis of units and costs for grant awarded showing average unit cost. (1 page)	System Type	SG-C2
Listing of grants awarded with grantee name, project city and state, housing type, construction type, dwelling count, solar system, number of buildings, system type, system kind, collector sq. ft., designer cost to government, builder cost to government, solar fraction, and solar manufacturer. (25 pages)	Grant Number	SG-C3
Same as SG-C3 except auxiliary fuel type and storage medium are shown instead of solar fraction. (25 pages)	Grant Number	SG-C3F
Same as SG-C3 except collector sq. ft. and cost per MBtu is shown instead of designer and builder costs to government. (25 pages)	Manufacturer	SG-C4BC
Same as SG-C3 except cost to government is shown instead of designer and builder costs to government and solar fraction. (32 pages)	Manufacturer	SG-C4CG
Same as SG-C3 except grantee city and state are shown instead of project city and state. (28 pages)	Grantee City and State	SG-C5AS
Same contents as SG-C3. (28 pages)	Project City and State	SG-C5PS
Same as SG-C3 except HUD region is also shown. (26 pages)	HUD Region	SG-C7

Table 2. Summary of Grantee File Computer Reports

Description	Sequence of Data	Number of Report
Listing of all Grantee Report data. (500 pages)	Grantee Report, Card Number, Project ID	BA-R1
One page per project of all Grantee Report 1, 3 and 4 data, with field titles. (937 pages)	Project ID	B-R2
Listing of all project IDs for each grantee report in the data base. (19 pages)	Project ID	B-P4

Table 3. Summary of Technical Description File Computer Reports

Description	Sequence of Data	Number of Report
Listing of data on instrumented and non-instrumented systems for which F-Chart calculations were done. This listing includes the F-Chart input and output data. (200 pages)	Project ID, System Number	DA-R1
Listing of data on instrumented systems including: - the site and building with a solar system - the collector subsystem - the thermal storage subsystem - the controls subsystem - the circulation subsystem - the auxiliary energy subsystem, and - the predicted system performance. (10,000 pages)	Project ID	AC-R1 available on micro-film or microfiche

Table 4. Summary of Technical Concerns File Computer Reports

Description	Sequence of Data	Number of Report
Listing of all technical concerns data for each system with problems. Codes are translated for hardware element, actions, and events. (223 pages)	Grant Number, System Number, Date	CB-D3
Simplified listing of CB-D3, with hardware element and events data in "summarized" form. Additional data shown is cycle, number of units, new or retrofit, housing type, system type, system kind, and transfer medium. (67 pages)	Grant Number, System Number	CB-D3A
Summary of hardware element with technical concerns. (22 pages)	Grant Number, System Number	CB-HAS

Table 5. Summary of Marketing Survey File Computer Reports

Description	Sequence of Data	Number of Report
Question and answer dictionary, showing abbreviated forms for all marketing survey questions and all the possible answers, both coded and uncoded. (463 pages)	Questionnaire ID, Question number, Project ID	RA-R1 thru RZ-R1
Listing of all answers for the marketing survey questionnaire from single family builder thru follow-up comparative renter. (200 pages)	Questionnaire ID, Question number, Project ID	RA-2 thru RZ-2

Table 6. Summary of Utility Consumption File Computer Reports

Description	Sequence of Data	Number of Report
Listing of all utility consumption data (usually monthly) and comparative data, including averages of fuel usage for each unit. (650 pages)	Project ID, Fuel type, Billing Start date	BF-R1
Listing of only the yearly average fuel usage data for each unit. (15 pages)	Project ID, Fuel type	BF-R1-AVG
Listing of utility supplier data for those companies supplying fuel to units. Report includes name and address of supplier, as well as code by which data was stored on computer. (6 pages)	Utility supplier code	BF-SUP-R1

4. SAMPLE PAGES OF REPORTS

This section contains copies of actual pages from each report. Since these examples may contain out-of-date or out-of-context data, they should be viewed as "samples" only. The title of the report, the date it was produced, the report identification number, and sequential page number are shown on the top of each page. An explanation of "not applicable" codes (as seen on pgs. 22 and 23) is given below. Other codes may be directly interpreted since meaningful abbreviations were used whenever possible. Codes are more fully explained with the complete report.

"Not Applicable" Codes

Missing data in these reports were usually indicated by one of four "not applicable" codes. The four codes and their translations are shown below. When space is available in the report, the code was translated and only the interpretation was printed.

N/A Code	Translation
XX	Information will be available later
XA	Information will not be collected
XB	Information not required
XC	See additional comments

GRANT/ ID NUM	APPLCT NUMBER	CYC	BUILDER/APPLICANT ORGANIZATION AND ADDRESS	BUILDER/APPLICANT ORGANIZATION CONTACT PERSON	ORGN TYPE	TOT COST OF SOLAR	APPL REQUEST	GRANT AWARD
H2474	0177	1	PUERTO RICO URBAN RENEWAL CORP 606 BARBOSA AVE PO BOX W RIO PEDRAS PR 00928 TEL: 202 293-2139	DAVID C. BLUM TEL: 202 293-2139 EXT:	LHA	$ 48000	$ 48000	$ 21000

TYPE OF FINANCING: HUD PUBLIC HOUSING

BUILDING NUMBER 1: 1, 2, 3

PROJ LOC 01 ADR: CSZ: RIO PEDRAS PR 00928 COUNTY:
HUD/GSA REGION: 02 SEA: DEGREE DAYS: 1

MOD SEQ 1 HOUSING TYPE: MFM NUMBER DWELLING UNITS: 4 NUMBER SOLAR SYSTEMS: 4
CONSTRN TYPE: NEW NUMBER BUILDINGS: 1 COND AREA/SYSTEM(S): 26520 SQ FT

DESIGNATORS: 1

SYSTEM:	TYPE	KIND	TRANSFR MEDIUM	COL TYPE	COL SQ-FT	TOT COST OF SOLAR	COST TO GVT	LOAD MBTU/YR	USED MBTU/YR	BTU/DD/ SQ-FT	AUXILIARY MBTU/YR	SOLAR MANUFACTURER	STR MED	AUX FUEL
1	W	PAS	LIQUID	FLP	26	$ 4000	$ 1750	16	6		10.00	STATE INDUSTRIES	LQ	E

MOD SEQ 2 HOUSING TYPE: MFM NUMBER DWELLING UNITS: 4 NUMBER SOLAR SYSTEMS: 4
CONSTRN TYPE: NEW NUMBER BUILDINGS: 1 COND AREA/SYSTEM(S): SQ FT

DESIGNATORS: 2

SYSTEM:	TYPE	KIND	TRANSFR MEDIUM	COL TYPE	COL SQ-FT	TOT COST OF SOLAR	COST TO GVT	LOAD MBTU/YR	USED MBTU/YR	BTU/DD/ SQ-FT	AUXILIARY MBTU/YR	SOLAR MANUFACTURER	STR MED	AUX FUEL
1	W	PAS	LIQUID	FLP	38	$ 4000	$ 1750	16	8		8.00	HELIOTHERM INC	LQ	E

MOD SEQ 3 HOUSING TYPE: MFM NUMBER DWELLING UNITS: 4 NUMBER SOLAR SYSTEMS: 4
CONSTRN TYPE: NEW NUMBER BUILDINGS: 1 COND AREA/SYSTEM(S): SQ FT

DESIGNATORS: 3

SYSTEM:	TYPE	KIND	TRANSFR MEDIUM	COL TYPE	COL SQ-FT	TOT COST OF SOLAR	COST TO GVT	LOAD MBTU/YR	USED MBTU/YR	BTU/DD/ SQ-FT	AUXILIARY MBTU/YR	SOLAR MANUFACTURER	STR MED	AUX FUEL
1	W	PAS	LIQUID	FLP	36	$ 4000	$ 1750	16	8		8.00	SOLAR ENERGY PROD	LQ	E

GRANT/ ID NUM	APPLCT NUMBER	CYC	BUILDER/APPLICANT ORGANIZATION AND ADDRESS	BUILDER/APPLICANT ORGANIZATION CONTACT PERSON	ORGN TYPE	TOT COST OF SOLAR	APPL REQUEST	GRANT AWARD
H2475	0082	1	NEWARK HOUSING AUTHORITY 57 SUSSEX AVE NEWARK NJ 07103 TEL: 201 622-1030	MELVIN GLICKMAN TEL: 201 622-1030 EXT:	LHA	$ 30182	$ 30182	$ 30182

TYPE OF FINANCING: HUD PUBLIC HOUSING

* 81 JUL 22 PRINTED
81 JUL 20 LOADED

UNITS AND COST ANALYSIS FOR ALL GRANTS

SG-C2

CYCLES 1,2,3,4,4A,5 AND P1

	** OWELLING UNITS ** NEW	RETRO	TOTAL	********* COST TO GOVT ********* NEW	RETRO	TOTAL	** AVERAGE UNIT COST ** NEW	RETRO	TOTAL	SOLAR SYSTS	NO OF BLDGS
SINGLE FAMILY DETACHED											
HOT WATER ONLY	30	49	79	52072	77154	129226	1736	1575	1636	78	81
HOT WATER &/OR HEATING	467	19	486	3992097	188839	4180936	8548	9939	8603	560	485
HEATING & COOLING	166	11	177	1211711	23000	1234711	7299	2091	6976	177	177
HEATING, COOLING & HOTWATER	37	1	38	383957	2000	385957	10377	2000	10157	58	38
ALL UNITS TOTAL	700	80	780	5639837	290993	5930830	8057	3637	7604	873	781
SINGLE FAMILY ATTACHED											
HOT WATER ONLY	38	46	84	59143	57249	116392	1556	1245	1386	51	22
HOT WATER &/OR HEATING	283	33	316	1891451	194067	2085518	6684	5881	6600	304	141
HEATING & COOLING	6	4	10	46000	8000	54000	7667	2000	5400	10	7
HEATING, COOLING & HOTWATER	60	1	61	99996	11700	111696	1667	11700	1831	61	21
ALL UNITS TOTAL	387	84	471	2090590	271016	2367606	5418	3226	5027	426	191
GARDEN APARTMENTS											
HOT WATER ONLY	188	533	721	250199	449997	700196	1331	844	971	43	51
HOT WATER &/OR HEATING	333	251	584	1257148	893302	2150450	3775	3559	3682	91	75
HEATING & COOLING	0	0	0	0	0	0	0	0	0	0	0
HEATING, COOLING & HOTWATER	0	92	92	0	313500	313500	0	3408	3408	2	2
ALL UNITS TOTAL	521	876	1397	1507347	1656799	3164146	2893	1891	2265	136	128
MULTI-FAMILY MID RISE											
HOT WATER ONLY	498	1762	2260	447338	1521504	1968842	898	864	871	44	37
HOT WATER &/OR HEATING	406	492	898	788321	797359	1585680	1942	1621	1766	27	17
HEATING & COOLING	0	29	29	0	105000	105000	0	3621	3621	2	2
HEATING, COOLING & HOTWATER	0	28	28	0	60000	60000	0	2143	2143	4	2
ALL UNITS TOTAL	904	2311	3215	1235659	2483863	3719522	1367	1075	1157	77	58
MULTI-FAMILY HI RISE											
HOT WATER ONLY	694	2418	3112	345479	1563372	1908851	498	647	613	15	15
HOT WATER &/OR HEATING	0	317	317	0	209159	209159	0	660	660	1	1
HEATING & COOLING	0	0	0	0	0	0	0	0	0	0	0
HEATING, COOLING & HOTWATER	0	0	0	0	0	0	0	0	0	0	0
ALL UNITS TOTAL	694	2735	3429	345479	1772531	2118010	498	648	618	16	16
OTHER	0	1328	1328	0	1054307	1054307	0	794	794	8	11
ALL UNITS											
HOT WATER ONLY	1448	4808	6256	1154231	3669276	4823507	797	763	771	231	206
HOT WATER &/OR HEATING	1489	1112	2601	7929017	2282726	10211743	5325	2053	3926	983	719
HEATING & COOLING	172	44	216	1257711	136000	1393711	7312	3091	6452	189	186
HEATING, COOLING & HOTWATER	97	122	219	483953	387200	871153	4989	3174	3978	125	63
ALL UNITS GRAND TOTAL	3206	7414	10620	10824912	7529509	18354421	3376	1016	1728	1536	1185

NUMBER OF ACTIVE SYSTEMS 1036
NUMBER OF PASSIVE SYSTEMS 500

*CANCELLED AND DELETED GRANTS ARE NOT INCLUDED IN TOTALS.

DSG/BLD GRANT ID	B D	GRANTEE NAME	PROJECT CITY & STATE		HSG TYP	CNS TYP	DWL CNT	SOL SYS	NBR BLD	SYS TYP	A P	CLTR SQFT	DSGR COST TO GOVT	BLDR COST TO GOVT	SOLAR FRAC(%)	SOL MFGR
H2423	B	INNOVATIVE BUILDING SYSTEMS	HAMBURG	NY	SFD	NEW	1	1	1	H W	A	700		15000	64.8	PPGI
H2424	B	ARMSTRONG DEVELOPMENT CORP	CLAREMONT	CA	SFO	NEW	3	3	3	H W	A			(296B0)		SCOA
H2425	B	CITY OF ST PETERSBURG	ST PETERSBURG	FL	GAL	RET	4	4	1	W	A	212		942B	70.6	GULF
H2426	B	PERL-MACK ENTERPRISES CO	AURORA	CO	SFO	NEW	1	1	1	H W	A	432		5307B	70.B	LENX
H2427	B	SPECTRUM DEVELOPMENT CORP	MOODY	AL	SFD	NEW	1	1	1	H W	A	195		(8000)	40.9	SRON
H242B	B	CAMBRIDGE DEVELOPMENT GROUP INC	COLUMBIA	SC	SFA	NEW	4	2	2	H W	A	112D		39000	52.6	SITE
H2429	B	FRIEDMAN ROSEN & ZIEN	SUMMIT	WI	SFO	NEW	1	1	1	H	A	576		9732	57.3	ZIEN
								1		W	A	144			67.7	ZIEN
H243D	B	LAMAR SAVINGS ASSN	AUSTIN	TX	SFD	NEW	1	1	1	HCW	A			(295B1)		NORT
H2431	B	W BROWN CUSTOM BUILDERS	DALLAS	TX	SFD	NEW	1	1	1	H W	A	401		37600	56.4	MIRO
					SFD	NEW	1	1	1	H W	A	53B			48.2	MIRO
H2432	B	BLDG INDUSTRY ASSN OF CEN OHIO	DUBLIN	OH	SFD	NEW	1	1	1	H W	A	1166		(19100)		SRON
H2433	B	WAYNE NICHOLS COMMUNICO	SANTA FE	NM	SFO	NEW	1	1	1	H	P	409		795B	74.0	SITE
								1		W	A	38			50.0	SUNS
H2434	B	THE YEONAS COMPANY	VIENNA	VA	SFD	NEW	1	1	1	W	A	63		1875	54.5	SWOR
H2435	B	SELF HELP ENTERPRISES	SELMA	CA	SFD	NEW	3	3	3	HC	P	4143		12210	94.3	SKYT
H2436	B	DREXEL UNIVERSITY	PHILADELPHIA	PA	GAL	RET	5	1	1	W	A	270		6780	80.7	PPGI
H2437	B	WILLIAM F ETTLICH	SHINGLE SPRINGS	CA	SFO	NEW	1	1	1	H W	A			(4000)		TOMS
H2438	B	RUST CONSTRUCTION CO	ALEXANDRIA	VA	SFD	NEW	1	1	1	H W	A			(6000)		SOCA
H2439	B	WINFORD LINDSAY	DACULA	GA	SFD	NEW	1	1	1	H W	A	222		6400	79.2	REVE
H2440	B	ECO-ERA INC	FORT COLLINS	CO	SFD	NEW	1	1	1	H W	A	390		6000	72.8	SRON
H2441	B	TERRACOR UTAH	STANSBURY PARK	UT	SFD	NEW	1	1	1	H	A	585		15600	62.2	SRON
H2442	B	LEISURE TECH OF CALIFORNIA INC	CAMARILLO	CA	SFA	NEW	2	2	1	W	A	72		4400	80.0	RAYP
					SFD	NEW	2	2	2	W	A	72			80.0	RAYP
H2443	B	KORMAN CORP	BLACKWOOD	NJ	SFO	NEW	1	1	1	H W	A	614		31186	74.4	GENE
					SFD	NEW	1	1	1	H W	A	614			57.7	GENE
H2444	B	CITY OF SANTA CLARA	SANTA CLARA	CA	SFD	NEW	1	1	1	H W	A	192		40000	57.5	SKIN
					SFD	NEW	1	1	1	H W	A	216			58.8	SKIN
					SFD	NEW	1	1	1	H W	A	288			74.0	SKIN
					SFD	NEW	1	1	1	H W	A	192			74.0	SKIN
					SFD	NEW	1	1	1	H W	A	216			58.8	SKIN
H2445	B	CITY OF PUEBLO	PUEBLO	CO	SFD	RET	5	1	5	W	A	166		16000	27.8	RAYP
H2446	B	HOOKER BARNES	ATLANTA	GA	SFD	NEW	1	1	1	H W	A	465		22B0	68.3	REVE
H2447	B	GORDON DEERING	LUBBOCK	TX	SFD	NEW	1	1	1	H W	A	312		900D	71.2	SRON
H244B	B	SOLAR STRUCTURES INC	LAGRANGEVILLE	NY	SFD	NEW	1	1	1	H W	A	120D		15000	67.4	REVE
H2449	B	CITY OF COLORADO SPRINGS	COLORADO SPRINGS	CO	SFA	RET	12	1	2	H W	A	1152		69729	75.1	SRIS
H245D	B	HELIO THERMICS INC	GREENVILLE	SC	SFD	NEW	1	1	1	H W	A	351		3000	76.0	HLIO
H2451	B	UNIVERSITY OF PENNSYLVANIA	PHILADELPHIA	PA	SFA	RET	1	1	1	H W	A	583		129B0	39.8	PPIE
H2452	B	JESPA ENTERPRISES	OLD BRIDGE	NJ	SFD	NEW	1	1	1	H	A	420		10B00	58.2	SWOR
								1		W	A	62			63.3	SWOR
H2453	B	CLASSIC DEVELOPMENT CORP	BREA	CA	SFD	NEW	1	1	1	H W	A			(7000)		RAYP
H2454	B	LONG ISLAND SAVINGS BANK	MT SINAI	NY	SFD	NEW	1	1	1	H W	A			(10000)		GRUM
H2455	B	STONEBRAKER INVESTMENTS	BOULDER	CO	GAL	NEW	8	1	1	H W	A	864		22450	69.2	KTAC
H2456	B	UNITED DEVELOPMENT CO	VERNON HILLS	IL	SFA	NEW	1	1	1	H W	A	288		40000	41.9	OWEN
					SFA	NEW	1	1	1	H W	A	256			41.4	OWEN
					SFA	NEW	1	1	1	H W	A	256			39.8	OWEN
					SFA	NEW	1	1	1	H W	A	288			39.7	OWEN
H2457	B	BABCOCK COMPANY	MIAMI	FL	SFD	NEW	1	1	1	W	A	21		1B30	50.0	CPTL
			MIAMI	FL	SFA	NEW	1	1	1	W	A	21			50.0	CPTL
H2458	B	CHURCH COMMUNITY CORPORATION	NEWPORT	RI	SFD	NEW	1	1	1	H W	A	450		500D	55.7	SITE
H2459	B	COLBURN DEVELOPMENT CORP	STOW	MA	SFD	NEW	1	1	1	H W	A	646		(17062)		SRON
H246D	B	MARVIN H ANDERSON CONSTRUCTN CO	BLOOMINGTON	MN	SFD	NEW	1	1	1	H W	A	378		16250	58.B	LENX
H2461	B	KELLEY FISCHER CO	ST LOUIS	MO	SFD	NEW	1	1	1	H W	A			(17000)		REVE
H2462	B	UNIVERSITY OF WISCONSIN	MILWAUKEE	WI	SFD	RET	1	1	1	H W	A	507		13B00	56.8	SRON

SUMMARY OF SOLAR GRANTS, SORTED ON GRANT NUMBER CYCLES 1,2,3,4,4A,5 AND P1
WITH AUXILIARY FUEL TYPE AND STORAGE MEDIUM

DSG/BLD GRANT ID	B D	GRANTEE NAME	PROJECT CITY & STATE		HSG TYP	CNS TYP	DWL CNT	SOL SYS	NBR BLO	SYS TYP	A P	CLTR SQFT	DSGR COST TO GOVT	BLDR COST TO GOVT	AUX FUL	STO MED	SOL MFGR
H2423	B	INNOVATIVE BUILDING SYSTEMS	HAMBURG	NY	SFD	NEW	1	1	1	H W	A	700		15000	EE	LQ	PPGI
H2424	B	ARMSTRONG DEVELOPMENT CORP	CLAREMONT	CA	SFO	NEW	3	3	3	H W	A			(29680)	E	O	SCOA
H2425	B	CITY OF ST PETERSBURG	ST PETERSBURG	FL	GAL	RET	4	4	1	W	A	212		9428	E	LQ	GULF
H2426	B	PERL-MACK ENTERPRISES CO	AURORA	CO	SFD	NEW	1	1	1	H W	A	432		53078	E E	LQ	LENX
H2427	B	SPECTRUM DEVELOPMENT CORP	MOODY	AL	SFD	NEW	1	1	1	H W	A	195		(8000)	E	O	SRON
H2428	B	CAMBRIDGE DEVELOPMENT GROUP INC	COLUMBIA	SC	SFA	NEW	4	2	2	H W	A	1120		39000	E E	LQ	SITE
H2429	B	FRIEDMAN ROSEN & ZIEN	SUMMIT	WI	SFD	NEW	1	1	1	H	A	576		9732	E	ST	ZIEN
								1		W	A	144				E LQ	ZIEN
H2430	B	LAMAR SAVINGS ASSN	AUSTIN	TX	SFD	NEW	1	1	1	HCW	A			(29581)	E	O	NORT
H2431	B	W BROWN CUSTOM BUILDERS	DALLAS	TX	SFD	NEW	1	1	1	H W	A	461		37600	G E	LQ	MIRO
					SFD	NEW	1	1	1	H W	A	538			G E	LQ	MIRO
H2432	B	BLDG INDUSTRY ASSN OF CEN OHIO	DUBLIN	OH	SFD	NEW	1	1	1	H W	A	1166		(19100)	E	O	SRON
H2433	B	WAYNE NICHOLS COMMUNICO	SANTA FE	NM	SFD	NEW	1	1	1	H	P	409		7958	E	CO	SITE
								1		W	A	38				E LQ	SUNS
H2434	B	THE YEONAS COMPANY	VIENNA	VA	SFO	NEW	1	1	1	W	A	63		1875		E LQ	SWOR
H2435	B	SELF HELP ENTERPRISES	SELMA	CA	SFO	NEW	3	3	3	HC	P	4143		12210	EEE	LQ	SKYT
H2436	B	DREXEL UNIVERSITY	PHILADELPHIA	PA	GAL	RET	5	1	1	W	A	270		6780		O LQ	PPGI
H2437	B	WILLIAM F ETTLICH	SHINGLE SPRINGS	CA	SFD	NEW	1	1	1	H W	A			(4000)	E	O	TOMS
H2438	B	RUST CONSTRUCTION CO	ALEXANDRIA	VA	SFO	NEW	1	1	1	H W	A			(6000)	E	O	SOCA
H2439	B	WINFORD LINDSAY	DACULA	GA	SFO	NEW	1	1	1	H W	A	222		6400		LQ	REVE
H2440	B	ECO-ERA INC	FORT COLLINS	CO	SFD	NEW	1	1	1	H W	A	390		6000	G G	ST	SRON
H2441	B	TERRACOR UTAH	STANSBURY PARK	UT	SFD	NEW	1	1	1	H	A	585		15600	E	ST	SRON
H2442	B	LEISURE TECH OF CALIFORNIA INC	CAMARILLO	CA	SFA	NEW	2	2	1	W	A	72		4400	E G	LQ	RAYP
					SFD	NEW	2	2	2	W	A	72				G LQ	RAYP
H2443	B	KORMAN CORP	BLACKWOOD	NJ	SFD	NEW	1	1	1	H W	A	614		31186	E E	LQ	GENE
					SFD	NEW	1	1	1	H W	A	614			E E	LQ	GENE
H2444	B	CITY OF SANTA CLARA	SANTA CLARA	CA	SFD	NEW	1	1	1	H W	A	192		40000	G X	LQ	SKIN
					SFO	NEW	1	1	1	H W	A	216			G X	LQ	SKIN
					SFD	NEW	1	1	1	H W	A	288			G X	LQ	SKIN
					SFD	NEW	1	1	1	H W	A	192			G X	LQ	SKIN
					SFD	NEW	1	1	1	H W	A	216			GX	LQ	SKIN
H2445	B	CITY OF PUEBLO	PUEBLO	CO	SFD	RET	5	1	5	W	A	166		16000		G LQ	RAYP
H2446	B	HOOKER BARNES	ATLANTA	GA	SFD	NEW	1	1	1	H W	A	485		2280	G X	LQ	REVE
H2447	B	GORDON DEERING	LUBBOCK	TX	SFD	NEW	1	1	1	H W	A	312		9000	G X	ST	SRON
H2448	B	SOLAR STRUCTURES INC	LAGRANGEVILLE	NY	SFD	NEW	1	1	1	H W	A	1200		15000	E E	LQ	REVE
H2449	B	CITY OF COLORADO SPRINGS	COLORADO SPRINGS	CO	SFA	RET	12	1	2	H W	A	1152		69729	G G	LQ	SRIS
H2450	B	HELIO THERMICS INC	GREENVILLE	SC	SFD	NEW	1	1	1	H W	A	351		3000	G G	ST	HLIO
H2451	B	UNIVERSITY OF PENNSYLVANIA	PHILADELPHIA	PA	SFA	RET	1	1	1	H W	A	583		12980	G X	LQ	PPIE
H2452	B	JESPA ENTERPRISES	OLD BRIDGE	NJ	SFO	NEW	1	1	1	H	A	420		10800	O	ST	SWOR
								1		W	A	62				X LQ	SWOR
H2453	B	CLASSIC DEVELOPMENT CORP	BREA	CA	SFD	NEW	1	1	1	H W	A			(7000)	E	O	RAYP
H2454	B	LONG ISLAND SAVINGS BANK	MT SINAI	NY	SFD	NEW	1	1	1	H W	A			(10000)	E	O	GRUM
H2455	B	STONEBRAKER INVESTMENTS	BOULDER	CO	GAL	NEW	8	1	1	H W	A	864		22450	E E	LQ	KTAC
H2456	B	UNITED DEVELOPMENT CO	VERNON HILLS	IL	SFA	NEW	1	1	1	H W	A	288		40000	EE	LQ	OWEN
					SFA	NEW	1	1	1	H W	A	256			EE	LQ	OWEN
					SFA	NEW	1	1	1	H W	A	256			EE	LQ	OWEN
					SFA	NEW	1	1	1	H W	A	288			E	LQ	OWEN
H2457	B	BABCOCK COMPANY	MIAMI	FL	SFD	NEW	1	1	1	W	A	21		1830		E LQ	CPTL
			MIAMI	FL	SFA	NEW	1	1	1	W	A	21				E LQ	CPTL
H2458	B	CHURCH COMMUNITY CORPORATION	NEWPORT	RI	SFD	NEW	1	1	1	H W	A	450		5000	O X	ST	SITE
H2459	B	COLBURN DEVELOPMENT CORP	STOW	MA	SFO	NEW	1	1	1	H W	A	646		(17062)	E	O	SRON
H2460	B	MARVIN H ANDERSON CONSTRUCTN CO	BLOOMINGTON	MN	SFO	NEW	1	1	1	H W	A	378		16250	G G	LQ	LENX
H2461	B	KELLEY FISCHER CO	ST LOUIS	MO	SFD	NEW	1	1	1	H W	A			(17000)	E	O	REVE
H2462	B	UNIVERSITY OF WISCONSIN	MILWAUKEE	WI	SFD	RET	1	1	1	H W	A	507		13800	G X	ST	SRON

DSG/BLD GRANT ID	B/D	GRANTEE NAME	PROJECT CITY & STATE		HSG TYP	CNS TYP	DWL CNT	SOL SYS	NBR BLD	SYS TYP	A P	CLTR SQFT	COST /MBTU	SOLAR MANUFACTURER
H8813	D	CENTER FOR HOUSING PARTNERSHIP												
H8813	B	CENTER FOR HOUSING PARTNERSHIP	NEW YORK	NY	MFM	RET	98	1	1	W	A	1134	118	DAYSTAR
H8843	D	EAGLENEST HILL CORP												
H8843	B	EAGLENEST HILL CORP	FREEHOLD	NJ	SFD	NEW	0*	1	0*	HCW	A	210	*	DAYSTAR
H8853	D	DON WHITNER BUILDERS & DEVELOPER												
H8853	B	DON WHITNER BUILDERS & DEVELOPER	TOLEDO	OH	SFD	NEW	0*	1	0*	W	A		*	DAYSTAR
			TOTALS FOR MFR				2383*	38*	39*			47573*	$147*	
H8331	B	HOBMAR HOMES	MINNEAPOLIS	MN	SFD	NEW	1	1	1	H W	A	542	161	ENERGY ALTERNATIVE
			TOTALS FOR MFR				1	1*	1*			542	$161	
H8919	D	LARRY D RATLIFF CONSTRUCTION												
H8919	B	LARRY D RATLIFF CONSTRUCTION	POCATELLO	ID	SFD	NEW	0*	1	0*	W	A	58	21	ENERGY TRANSFER SY
			TOTALS FOR MFR				0	1*	0*			58	$21	
H8D16	B	SUNDMAN REALTY CO	BOURNE	MA	SFD	NEW	1	1	1	H W	A	351	308	FERN ENGINEERING C
			TOTALS FOR MFR				1	1*	1*			351	$308	
H27D5	B	FLETCHER MYERS INC	EAST DERRY	NH	SFD	NEW	1	1	1	H W	A	840	94	FLETCHER MYERS
			TOTALS FOR MFR				1	1*	1*			840	$94	
H2600	D	MISSION VIEJO CO												
H2600	B	MISSION VIEJO CO	MISSION VIEJO	CA	SFD	NEW	0	2	1	W	A		*	FRED RICE PROD
			TOTALS FOR MFR				0	2*	1*			0*	$0*	
H82D1	B	FRONTIER DEVELOPMENT CO	RENO	NV	SFD	NEW	5	5	5	H W	A	2625	(125)	FRONTIER DEVELOPME
			TOTALS FOR MFR				0*	0*	0*			0*	$0	
H2443	B	KORMAN CORP	JENKINTOWN	PA	SFD	NEW	1	1	1	H W	A	614	269	GENERAL ELECTRIC
					SFD	NEW	1	1	1	H W	A	614	347	GENERAL ELECTRIC
H2596	D	DAVIDSON-PHILLIPS INC												
H2596	B	DAVIDSON-PHILLIPS INC	COLUMBUS	OH	SFD	NEW	2	2	2	HCW	A	1280	355	GENERAL ELECTRIC
H2727	B	TOWN COUNCIL,CITY OF GRETNA	GRETNA	FL	SFD	NEW	16	16	16	H W	A	2784	368	GENERAL ELECTRIC
H2757	B	CITY OF FLINT/DEPT OF COMM DEV	FLINT	MI	SFA	NEW	6	1	1	HCW	A	1079	(64)	GENERAL ELECTRIC
			TOTALS FOR MFR				20*	20*	20*			5292*	$332	
H8338	B	ROY O MOON	SAN ANGELO	TX	SFD	NEW	1	1	1	H W	A	282	277	GENERAL ENERGY DEV
H8395	B	LOYOLA UNIVERSITY	NEW ORLEANS	LA	DTH	RET	225	1	1	W	A	5076	246	GENERAL ENERGY DEV
H8428	B	LAMPLIGHTER CONSTRUCTION CO	IDAHO FALLS	ID	SFD	NEW	1	1	1	H W	A	341	204	GENERAL ENERGY DEV
			TOTALS FOR MFR				227	3*	3*			5699	$245	
H819D	B	IPK CORPORATION	SALT LAKE CITY	UT	SFD	NEW	3	3	3	H	A	540	244	GRIEP HEATING
			TOTALS FOR MFR				3	3*	3*			540	$244	

DSG/BLD GRANT ID	B O	GRANTEE NAME	PROJECT CITY & STATE		HSG TYP	CNS TYP	DWL CNT	SOL SYS	NBR BLD	SYS TYP	A P	CLTR SQFT	COST TO GOVT	SOLAR MANUFACTURER
H2730	B	CONTEMPORARY HOMES INC	COHUTTA	GA	SFD	NEW	1	1	1	W	A	48	(1400)	JACKSON
H2731	B	LAMAR WILBANKS	COMMERCE	GA	SFD	NEW	1	1	1	W	A	48	(1400)	JACKSON
H2733	B	OWEN AND PARKS INC	DALTON	GA	SFD	NEW	1	1	1	W	A	48	(1400)	JACKSON
H2736	B	WILBURN BROWN	ROSSVILLE	GA	SFD	NEW	2	2	2	W	A	96	(2800)	JACKSON
H2738	B	THOMSON AND ASSOC	ASHEVILLE	NC	SFD	NEW	1	1	1	W	A	48	(4200)	JACKSON
			ASHEVILLE	NC	SFD	NEW	2	2	2	W	A	96		JACKSON
H2739	B	FRANK RDBUCK JR INC	RALEIGH	NC	SFD	NEW	1	1	1	W	A	48	(1400)	JACKSON
H2743	B	GLS CONSTRUCTION CO	WINSTON-SALEM	NC	SFD	NEW	5	5	5	W	A	245	7000	JACKSON
H2746	B	MILES AND TEAL BLDRS	COWARD	SC	SFD	NEW	1	1	1	W	A	48	(1400)	JACKSON
H2748	B	RALSTON HOMES INC	HIXSON	TN	SFD	NEW	1	1	1	W	A	48	(1400)	JACKSON
H2749	B	LYNN REDMON	KNOXVILLE	TN	SFD	NEW	2	2	2	W	A	96	(2800)	JACKSON
H2750	B	RICHARD RAMSDEN	KNOXVILLE	TN	SFD	NEW	1	1	1	W	A	48	(1400)	JACKSON
H2751	B	R H SINCLAIR CONST CO INC	KNOXVILLE	TN	SFD	RET	1	1	1	W	A	48	(1400)	JACKSON
H2752	B	D K DOSSETT	KNOXVILLE	TN	SFD	NEW	5	5	5	W	A	240	(7000)	JACKSON
H2753	B	ARCHITECTURAL DEVELOPERS CORP	KNOXVILLE	TN	SFD	NEW	5	5	5	W	A	240	(7000)	JACKSON
		TOTALS FOR MFR					5*	5*	5*			485*	$7000*	
H8102	B	WALNUT RIDGE INC	WASHINGTON	PA	SFD	NEW	1	1	1	H W	A	502	10850	KALWALL
		TOTALS FOR MFR					1	1*	1*			502	$10850	
H2455	B	STONEBRAKER INVESTMENTS	BOULDER	CO	GAL	NEW	8	1	1	H W	A	864	22450	KTA CORP
H2712	B	D.W.S. HOLDINGS INC.	NEW YORK	NY	GAL	NEW	1	1	1	H W	A	254	(39180)	KTA CORP
					GAL	NEW	1	1	1	H W	A	254		KTA CORP
					GAL	NEW	1	1	1	H W	A	254		KTA CORP
					GAL	NEW	1	1	1	H W	A	254		KTA CORP
					GAL	NEW	1	1	1	H W	A	254		KTA CORP
					GAL	NEW	1	1	1	H W	A	254		KTA CORP
H2781	B	NAUMANN, ROBERT C	BOULDER	CO	SFA	RET	2	1	1	W	A	104	5000	KTA CORP
H8057	B	POMONA HEIGHTS INC	SPRING VALLEY	NY	SFD	NEW	1	1	1	H W	A	832	12000	KTA CORP
H8061	B	DAMASCUS LAND CORPORATION	WASHINGTON	DC	SFD	NEW	1	1	1	H W	A	315	11700	KTA CORP
H8181	B	DOUGLAS E MYERS	BOULDER	CO	SFD	NEW	1	1	1	H W	A	424	9250	KTA CORP
H8384	B	GREENBELT HOMES INC	GREENBELT	MD	SFA	RET	20	1	4	W	A	696	20000	KTA CORP
		TOTALS FOR MFR					33*	6*	9*			3235*	$80400*	
H2426	B	PERL-MACK ENTERPRISES CO	DENVER	CO	SFD	NEW	1	1	1	H W	A	432	53078	LENNOX-HONEYWELL
H2460	B	MARVIN H ANDERSON CONSTRUCTN CO	BLOOMINGTON	MN	SFD	NEW	1	1	1	H W	A	378	16250	LENNOX-HONEYWELL
H2463	B	SAN ANTONIO RANCH LTD	SAN ANTONIO	TX	SFD	NEW	1	1	1	HCW	A	752	75000	LENNOX-HONEYWELL
					SFD	NEW	1	1	1	HCW	A	752		LENNOX-HONEYWELL
					SFD	NEW	1	1	1	HCW	A	752		LENNOX-HONEYWELL
H2602	O	MISSION VIEJO CO											50107	
H2602	B	MISSION VIEJO CO	AURORA	CO	SFD	NEW	1	1	1	H W	A	233	45057	LENNOX-HONEYWELL
					SFD	NEW	1	1	1	H W	A	233		LENNOX-HONEYWELL
					SFD	NEW	1	1	1	H W	A	269		LENNOX-HONEYWELL
					SFD	NEW	1	1	1	H W	A	214		LENNOX-HONEYWELL
H2716	B	STEWART-TEELE-MITCHELL CONST	ELNORA	NY	SFD	NEW	1	1	1	H W	A	432	12995	LENNOX-HONEYWELL
H2717	B	FOREST CITY DILLON INC	CLEVELAND	OH	MFH	NEW	188	1	1	W	A	2592	129000	LENNOX-HONEYWELL
H2761	B	CREEK ASSOCIATES	MINNEAPOLIS	MN	MFM	NEW	77	1	1	H W	A	6048	225000	LENNOX-HONEYWELL
H2778	B	COLORADO UNIV OF	BOULDER	CO	MFM	RET	95	1	1	H W	A	3402	245025	LENNOX-HONEYWELL
H8096	B	MIDDLE CREEK INVESTMENT CORP	INWOOD	WV	SFO	NEW	6	6	6	H W	A	858	30000	LENNOX-HONEYWELL
H8100	B	UNITED METHODIST HOMES FOR AGING	MECHANICSBURG	PA	MFM	NEW	150	1	1	W	A	1790	97237	LENNOX-HONEYWELL
H8123	B	WILLOW CREEK II LTD PARTNERSHIP	E LANSING	MI	GAL	NEW	23	1	1	W	A	1145	71000	LENNOX-HONEYWELL

SUMMARY OF SOLAR GRANTS
SORTED ON GRANTEE CITY AND STATE

DSG/BLD GRANT ID	B D	GRANTEE NAME	GRANTEE CITY & STATE		HSG TYP	CNS TYP	DWL CNT	SOL SYS	N&R BLD	SYS TYP	A P	CLTR SQFT	OSGR COST TO GOVT	BLDR COST TO GOVT	SOLAR FRAC(%)	SOL MFGR
HB93B	D	SOLARCTIC CONSTRUCTION CO.	ANCHORAGE	AK									2000			
H893B	B	SOLARCTIC CONSTRUCTION CO.	ANCHORAGE	AK	SFD	NEW	1	1	1	H	P	565		DELTD	62.1	SITE
								1		W	A	129			81.8	RAYP
HB939	D	LAND TRUST DEV CON INT	ANCHORAGE	AK									2000			
H8939	B	LAND TRUST DEV CON INT	ANCHORAGE	AK	SFD	NEW	1	1	1	H	P	313		10000	42.2	SITE
								1		W	P	36			28.6	SITE
		TOTALS FOR STATE					2	4	2			1043	$4000	$10000*		
H2427	B	SPECTRUM DEVELOPMENT CORP	BIRMINGHAM	AL	SFD	NEW	1	1	1	H W	A	195		(8000)	40.9	SRON
H2725	B	CHESTER WEST INC	HUNTSVILLE	AL	SFD	NEW	1	1	1	H W	A	225		10000	63.2	DAYS
H2726	B	HOUSING DEVELPMENT CO	HUNTSVILLE	AL	SFA	NEW	5			W	A	240		(7000)		JACK
H8090	B	EDSEL INC	MOBILE	AL	SFD	NEW	1	1	1	H W	A	320		10000	95.7	REVE
H8B72	D	THE SOUTHARD COMPANIES	HUNTSVILLE	AL									2000			
H8B72	B	THE SOUTHARD COMPANIES	HUNTSVILLE	AL	SFD	NEW	1	1	1	H	P	413		10000	23.2	SITE
HBB73	D	SIMMONS BUILDERS	PRATTVILLE	AL									2000			
H8873	B	SIMMONS BUILDERS	PRATTVILLE	AL	SFD	NEW	1	1	1	HC	P	169		DELTD	36.8	SITE
								1		W	A	53			69.2	AIRN
		TOTALS FOR STATE					4*	5*	4*			1180*	$4000	$30000*		
H8443	B	PAULETTE & CO	LITTLE ROCK	AR	SFD	NEW	1	1	1	H W	A	156		7000	47.1	SRON
H8444	B	FAIRFIELD BAY INC	FAIRFIELD BAY	AR	SFD	NEW	1	1	1	H W	A	273		(5250)	61.8	SRON
H8897	D	WINROCK HOMES, INC	NO. LITTLE ROCK	AR									2000			
H8B97	B	WINROCK HOMES, INC	NO. LITTLE ROCK	AR	SFD	NEW	1	1	1	H	P	372		10000	58.3	SITE
HBB98	D	EDMISTON PREWITT BUILDERS	FAYETTEVILLE	AR									2000			
H8B9B	B	EDMISTON PREWITT BUILDERS	FAYETTEVILLE	AR	SFD	NEW	1	1	1	H W	P	758			54.2	SITE
HB899	D	VILLAGE HOMES INC	BENTONVILLE	AR									2000			
H8899	B	VILLAGE HOMES INC	BENTONVILLE	AR	SFD	NEW	1	1	1	H	P	578		10000	70.0	SITE
		TOTALS FOR STATE					4*	4*	4*			1864*	$6000	$27000*		
H2471	B	DANIEL W BROCK	MESA	AZ	SFD	NEW	1	1	1	H W	A			(6593)		
H2604	D	BOBRICK CONSTRUCTION CO	TUCSON	AZ									1500			
H2604	B	BOBRICK CONSTRUCTION CO	TUCSON	AZ	SFD	NEW	1	1	1	HC	P	2208		DELTD	74.6	SKYT
H2788	B	HERBERT L KAUFFMAN	MAYER	AZ	GAL	NEW	5	1	1	H W	P			(13000)		SITE
H8178	B	RAY L HASSE	PRESCOTT	AZ	SFD	NEW	1	1	1	H W	A	860		5500	100.0	SITE
H8179	B	HULLCO CONSTRUCTION COMPANY	PRESCOTT	AZ	SFD	NEW	1	1	1	H	P	440		6125	96.1	SITE
H8431	B	KIVEL MANOR WEST	PHOENIX	AZ	MFM	RET	65	1	1	H W	A	2760		(105429)	70.8	SGEN
H8737	D	GOLDBLATT COHEN & AROS	TUCSON	AZ									5000			
H8737	B	U S HOME CORP	TUCSON	AZ	SFD	NEW	1	1	1	HCW	P	168		9000	63.2	SITE
			TUCSON	AZ	SFD	NEW	1	1	1	HCW	P	168			63.2	SITE
HB738	D	JAMES HOFFMAN DESIGN GROUP	TEMPE	AZ									5000			
H873B	B	JAMES HOFFMAN, GEN. CONTRACTOR	TEMPE	AZ	SFD	NEW	1	1	1	HC	P	245		7000	84.2	SITE
H8739	D	SUN SYSTEM ENGINEERING	WEST SEDONA	AZ									5000			
H8739	B	CRANE ENTERPRISES	CAMP VERDE	AZ	SFD	NEW	1	1	1	HC	P	156		DELTD	89.5	SITE
HB740	D	ENVIRONMENTAL ARCHITECTURE	CHINO VALLEY	AZ	SFD	NEW	1	1	1	HC	P	750	5000		62.8	SITE
HB741	D	SOLARAMA	COLORADO CITY	AZ									5000			
H8741	B	INTERCITY BLDRS	COLORADO CITY	AZ	SFD	NEW	1	1	1	HC	P	350		DELTD	85.4	SITE
H8742	D	SOLARAMA	COLORADO CITY	AZ									5000			
H8742	B	C AND C CONSTRUCTION	HILDALE	UT	SFD	NEW	1	1	1	HC	P	366		7000	69.2	SITE
HB916	D	WILLIAM L PRITCHETT & SONS INC	TUCSON	AZ									2000			
H8916	B	WILLIAM L PRITCHETT & SONS INC	TUCSON	AZ	SFD	NEW	1	1	1	H	P	324		10000	70.4	SITE
								1		W	A	26			73.3	ISLC

DSG/BLD GRANT ID	D	GRANTEE NAME	PROJECT CITY & STATE		HSG TYP	CNS TYP	DWL CNT	SOL SYS	NBR BLD	SYS TYP	A P	CLTR SQFT	DSGR COST TO GOVT	BLDR COST TO GOVT	SOLAR FRAC(%)	SOL MFGR
H8938	D	SOLARCTIC CONSTRUCTION CO.											2000			
H8938	B	SOLARCTIC CONSTRUCTION CO.	MAT-SU	AK	SFD	NEW	1	1	1	H	P	565		DELTD	62.1	SITE
								1		W	A	129			81.8	RAYP
H8939	D	LAND TRUST DEV CON INT											2000			
H8939	B	LAND TRUST DEV CON INT	EAGLE RIVER	AK	SFD	NEW	1	1	1	H	P	313		10000	42.2	SITE
								1		W	P	36			28.6	SITE
		TOTALS FOR STATE					2	4	2			1043	$4000	$10000*		
H809D	B	EDSEL INC	MOBILE	AL	SFD	NEW	1	1	1	H W	A	320		10000	95.7	REVE
H2427	B	SPECTRUM DEVELOPMENT CORP	MOODY	AL	SFD	NEW	1	1	1	H W	A	195		(8000)	40.9	SRON
H2725	B	CHESTER WEST INC	HUNTSVILLE	AL	SFD	NEW	1	1	1	H W	A	225		10000	63.2	DAYS
H2726	B	HOUSING DEVELPMENT CO	MADISON	AL	SFA	NEW	5			W	A	240		(7000)		JACK
H8872	D	THE SCUTHARD COMPANIES											2000			
H8872	B	THE SCUTHARD COMPANIES	HUNTSVILLE	AL	SFD	NEW	1	1	1	H	P	413		10000	23.2	SITE
H8873	D	SIMMONS BUILDERS											2000			
H8873	B	SIMMONS BUILDERS	PRATTVILLE	AL	SFD	NEW	1	1	1	HC	P	169		DELTD	36.8	SITE
								1		W	A	53			69.2	AIRN
		TOTALS FOR STATE					4*	5*	4*			1180*	$4000	$30000*		
H8443	B	PAULETTE & CO	LITTLE ROCK	AR	SFD	NEW	1	1	1	H W	A	156		7000	47.1	SRON
H8444	B	FAIRFIELD BAY INC	FAIRFIELD BAY	AR	SFD	NEW	1	1	1	H W	A	273		(5250)	61.8	SRON
H8897	D	WINROCK HOMES, INC											2000			
H8897	B	WINROCK HOMES, INC	LITTLE ROCK	AR	SFD	NEW	1	1	1	H	P	372		10000	58.3	SITE
H8898	D	EDMISTON PREWITT BUILDERS											2000			
H8898	B	EDMISTON PREWITT BUILDERS	SPRINGDALE	AR	SFD	NEW	1	1	1	H W	P	758			54.2	SITE
H8899	D	VILLAGE HOMES INC											2000			
H8899	B	VILLAGE HOMES INC	HOT SPRINGS VIL.	AR	SFD	NEW	1	1	1	H	P	578		10000	70.0	SITE
		TOTALS FOR STATE					1*	4*	4*			1864*	$6000	$27000*		
H8178	B	RAY L HASSE	YAVAPAI	AZ	SFD	NEW	1	1	1	H W	A	860		5500	100.0	SITE
H8179	B	HULLCO CONSTRUCTION COMPANY	PRESCOTT	AZ	SFD	NEW	1	1	1	H	P	440		6125	96.1	SITE
H8431	B	KIVEL MANOR WEST	PHOENIX	H AZ	MFM	RET	65	1	1	H W	A	2760		(105429)	70.8	SGEN
H2471	B	DANIEL W BROCK	MESA	AZ	SFD	NEW	1	1	1	H W	A			(6593)		
H2604	D	BOBRICK CONSTRUCTION CO											1500			
H2604	B	BOBRICK CONSTRUCTION CO	TUCSON	AZ	SFD	NEW	1	1	1	HC	P	2208		DELTD	74.6	SKYT
H8736	D	BURNS/PETERS GROUP ARCH-PLANNERS	TSAILE	AZ	SFA	NEW	24	24	6	HCW	P	4032	5000		67.5	SITE
					SFA	NEW	20	20	10	HCW	P	3360			55.4	SITE
					SFA	NEW	16	16	4	HCW	P	2688			48.5	SITE
H8737	D	GOLDBLATT COHEN & AROS											5000			
H8737	B	U S HOME CORP	TUCSON	AZ	SFD	NEW	1	1	1	HCW	P	168		9000	63.2	SITE
			TUCSON	AZ	SFD	NEW	1	1	1	HCW	P	168			63.2	SITE
H8738	D	JAMES HOFFMAN DESIGN GROUP											5000			
H8738	B	JAMES HOFFMAN, GEN. CONTRACTOR	TEMPE	AZ	SFD	NEW	1	1	1	HC	P	245		7000	84.2	SITE
H8739	D	SUN SYSTEM ENGINEERING											5000			
H8739	B	CRANE ENTERPRISES	COTTONWOOD	AZ	SFD	NEW	1	1	1	HC	P	156		DELTD	89.5	SITE
H874D	D	ENVIRONMENTAL ARCHITECTURE	FLAGSTAFF	AZ	SFD	NEW	1	1	1	HC	P	750	5000		62.8	SITE
H2788	B	HERBERT L KAUFFMAN	MAYER	AZ	GAL	NEW	5	1	1	H W	P			(13000)		SITE
H8916	D	WILLIAM L PRITCHETT & SONS INC											2000			
H8916	B	WILLIAM L PRITCHETT & SONS INC	TUCSON	AZ	SFD	NEW	1	1	1	H	P	324		10000	70.4	SITE
								1		W	A	26			73.3	ISLC
H8917	D	GARY E WAGLEY GENERAL CONTRACTOR											2000			

81 JUL 22 PRINTED — SUMMARY OF SOLAR GRANTS — CYCLES 1,2,3,4,4A,5 AND P1 — PAGE NO. 1
81 JUL 20 LOADED — SORTED AND TOTALED BY PROJECT HUD REGIONS — SG-C7

DSG/BLD GRANT ID	B/D	GRANTEE NAME	PROJECT CITY & STATE	HUD RGN	HSG TYP	CNS TYP	DWL CNT	SOL SYS	N8R BLD	SYS TYP	A/P	CLTR SQFT	DSGR COST TO GOVT	BLDR COST TO GOVT	SOLAR FRAC(%)	SOL MFGR
H2469	B	CRANE BUILDERS	GRANBY	CT 01	SFD	NEW	1	1	1	HCW	A			(5500)		SWOR
H2700	B	J. CAPONE CONSTRUCTION CO.	NEW HAVEN	CT 01	SFA	NEW	10	1	1	H W	A	1242		50000	66.1	SWOR
H8045	B	UTILITY ELECTRICAL CONTRACTOR	NEW HAVEN	CT 01	GAL	RET	26	1	1	H W	A	5134		26000D	52.8	SWOR
			NEW HAVEN	CT 01	GAL	RET	26	1	1	H W	A	4471			50.0	SWOR
H8046	B	FRANK CHAPMAN	NEW HAVEN	CT 01	GAL	NEW	5	1	1	H W	A	1155		18600	29.5	SEST
H8047	B	WILLIAM FRANCINI	UNIONVILLE	CT 01	SFD	NEW	1	1	1	H W	A	315		12500	50.5	DAYS
H8048	B	THE MADRID CORP	VERNON	CT 01	SFD	NEW	1	1	1	H W	A	315		11000	50.5	DAYS
H8310	B	JEAN CAYER INC	SHELTON	CT 01	SFD	NEW	1	1	1	H W	A	331		25065	64.5	SWOR
				01	SFD	NEW	1	1	1	H W	A	576			76.3	SITE
H8311	B	MARY ANN INC	CHESHIRE	CT 01	MFM	RET	54	1	1	H W	A	5341		207633	43.3	SWOR
H8312	B	SUMMERWOOD ASSOCIATES	NORWALK	CT 01	SFA	NEW	2	2	1	H W	A	756		42412	83.1	SWOR
				01	SFA	NEW	1	1	1	H W	A	448			70.5	SITE
H8362	B	NEW MILFORD INTERFAITH HSG IN	NEW MILFORD	CT 01	GAL	RET	18	1	1	W	A	362		105345	79.3	REVE
				01	GAL	RET	12	1	1	W	A	226			78.6	REVE
				01	GAL	RET	48	4	1	W	A	812			83.1	REVE
				01	GAL	RET	24	2	1	W	A	542			80.2	REVE
H8363	B	ACTION FOR BRIDGEPORT COMM DE	BRIDGEPORT	CT 01	SFD	RET	1	1	1	H W	A	490		13600	53.3	SURE
H8364	B	CHESHIRE HILLSIDE VILLAGE	NEW HAVEN	CT 01	GAL	NEW	50	1	5	H W	A	4037		112277	47.5	SWOR
H8365	B	VILLAGE ASSOCIATES	GLASTONBURY	CT 01	SFA	NEW	3	3	1	H W	A	1011		(134232)	67.1	REVE
				01	SFA	NEW	7	7	1	H W	A	2359			73.5	REVE
H861B	D	SUNBORNE DESIGNS	STAMFORD	CT 01	SFD	NEW	1	1	1	HC	P	465	5D00		62.7	SITE
H8619	D	TEAMWORKS											50D0			
H8619	B	CHAS MIGANI & SONS	ANSONIA	CT 01	SFA	NEW	2	2	1	HC	P	800		DELTD	40.9	SITE
H8620	D	NORMSER SCIENTIFIC CORP											5D00			
H862D	B	JEAN CAYER INC	SHELTON	CT D1	SFD	NEW	1	1	1	HC	P	504		7000	67.9	SITE
H8621	D	STEPHAN LASAR, ARCHITECT											50D0			
H8621	B	DESIGN ASSOCIATES	WASHINGTON	CT 01	SFD	NEW	1	1	1	HC	P	552		DELTD	49.1	SITE
H8806	D	BRIDGEPORT NEIGHBORHOOD HSG S											(5000)			
H8806	B	BRIDGEPORT NEIGHBORHOOD HSG S	BRIDGEPORT	CT 01	UNS	UNS	6	1	1					DELTD		
H8807	D	NEIGHBORHOOD HOUSING INC											5000			
H8807	B	NEIGHBORHOOD HOUSING INC	NEW HAVEN	CT 01	GAL	RET	6	1	1	H	P	880		DELTD	30.1	SITE
				01	GAL	RET	7	1	1	H	P	1428			41.8	SITE
H8835	D	HARTFORD WEST INC											20D0			
H8835	B	HARTFORD WEST INC	WEST SIMSBURY	CT 01	SFD	NEW	1	1	1	H	P	396		10000	35.0	SITE
								1		W	A	74			60.0	SWOR
H8836	D	H AND H CUSTOM HOMES											2000			
H8836	B	H AND H CUSTOM HOMES	NEW MILFORD	CT 01	SFD	NEW	1	1	1	H W	P	503			61.1	SITE
H8837	D	BUILDING CO-ORDINATORS INC											20D0			
H8837	B	BUILDING CO-ORDINATORS INC	SHELTON	CT 01	SFD	NEW	1	1	1	H	P	225		DELTD	48.8	SITE
								1		H	A	160			47.4	CTEM
H8838	D	SUNCATCHER CONSTRUCTION											2000			
H8838	B	SUNCATCHER CONSTRUCTION	SHELTON	CT 01	SFD	NEW	1	1	1	H	P	349		DELTD	58.5	SITE
H2459	B	COLBURN DEVELOPMENT CORP	HUDSON	MA 01	SFD	NEW	1	1	1	H W	A	646		(17D62)		SRON
H2593	D	THE NYQUIST COMPANY											DELTD			
H2593	B	THE NYQUIST COMPANY	ACTON	MA 01	SFD	NEW	2	2	2	W	A			(1100)		SWOR
				01	SFD	NEW	1	1	1	W	A					RAYP
H2594	D	SADDLE HILL TRUST											3000			
H2594	B	SADDLE HILL TRUST	NEEDHAM	MA 01	SFD	NEW	1	1	1	W	A	45		21400	52.6	DAYS
			NEEDHAM	MA 01	SFD	NEW	1	1	1	H W	A	315			54.7	DAYS
			NEEDHAM	MA 01	SFD	NEW	1	1	1	W	A	78			40.0	SRON
H2701	B	GREENFIELD HOUSING AUTHORITY	GREENFIELD	MA 01	GAL	RET	16	1	2	W	A			(12329)		SWOR
H2702	B	TOWN OF MARION	MARION	MA 01	SFA	NEW	12	6	3	H W	A	2160		95000	59.1	DAYS
H2703	B	EXEC.OFFICE OF COMMUN & DEVEL	BOSTON	MA 01	SFD	RET	1	1	1	H W	A	952		(20000)	45.1	SNSV
H8D15	B	FRIENDS' COMMUNITY DEVELOPMEN	NORTH EASTON	MA 01	SFA	NEW	7	7	6	H W	A	819		112851	60.0	SRON

**NUMBER 1 CARDS

PROJ ID	GRANT AWARD DATE	REPT 1 DATE	INST OR NOT (GRANT)	NEW OR RETRO
21501BA01	012376	040276	NO	RE
21502BA01	012376	320976	NO	NE
21504BA01	012376	020576	NO	NE
21505BA01	012376	030376	NO	NE
21507BA01	012376	020376	NO	NE
21509BA01	012376	022576	NO	NE
21510BA01	012376	030376	NO	NE
21511BA01	012376	020676	NO	RE
21512BA01	012376	031777	NO	NE
21514BA01	012376	112276	NO	NE
21515BA01	012376	031276	NO	NE
21519BA01	012376	020476	NO	NE
21521BA01	012376	032576	NO	RE
21523BA01	012376	060276	NO	NE
21525BA01	012376	060376	NO	NE
21527BA01	012376	031376	NO	NE
21530BA01	012376	030276	NO	NE
21531BA01	012376	032476	NO	RE
21532BA01	012376	020676	NO	NE
21533BA01	012376	022776	NO	NE
21534BA01	012376	020976	NO	NE
21535BA01	012376	042276	NO	NE
21536BA01	012376	030176	NO	NE
21537BA01	012376	022076	NO	NE
21538BA01	012376	072678	NO	NE
21539BA01	012376	021776	NO	NE
21540BA01	012376	021176	NO	RE
21541BA01	012376	031076	NO	NE
21542BA01	012376	020276	NO	NE
21544BA01	012376	012876	NO	NE
21545BA01	041476	012976	NO	
21546BA01	012376	021176	NO	NE
21547EA01	012076	012676	NO	NE
21548BA01	012376	021676	NO	NE
21549BA01	012676	032476	NO	RE
21550BA01	012376	022776	NO	NE
21551BA01	XX	041676	NO	XX
21552BA01	012376	031176	NO	NE
21554BA01	012376	02-676	NO	NE
21555BA01	012376	021176	NO	NE
22501BA01	102076	112276	IN	NE

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      ************************************
      * GRANTEE REPORT 1 DATA SUMMARY *
      ************************************
PROJECT ID = 230908A010000
  GRANT AWARD DATE = 06/07/77     REPORT DATE  = 06/08/77
 INSTRUMENTATION (GRANT) = NO     CONSTRUCTION = NE
  ADDRESS = ALBUQUERQUE
            BERNALILLO
            NM     87122
CONSTRUCTION FINANCIAL STATUS = YES
CONSTRUCTION FINANCE PROBLEMS:
    - NO PROBLEM
```

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      ************************************
      * GRANTEE REPORT 4 DATA SUMMARY *
      ************************************
PROJECT ID = 230908C010000
 REPORT DATE = 06/08/78     INSTRUMENTATION (UNIT) = NO
 INITIAL SALES PRICE = 0119000          UNIT STATUS =    SOLD
   FINAL SALES PRICE =  0119000
 INITIAL RENTAL RATES:  1 BR =         OTHER  =
                        2 BR =         STUDIO =
                        3 BR =
   FINAL RENTAL RATES:  1 BR =         OTHER  =
                        2 BR =         STUDIO =
                        3 BR =
MORTGAGE DATA:   APPROVAL DATE = 06/20/78     TYPE = CONV
  AMOUNT = 0088000       INT RATE =  9.78%  PERIOD (MOS) = 360
 POINTS/FEES =          MTG ARRANGED BY = PURCHASER
 MORTGAGOR = ALBUQUERQUE FEDERAL SAVINGS & LOAN
  ADDRESS =  6400 UPTOWN BLVD. N.E.
             ALBUQUERQUE        NM  87110 PHONE:(505) 883-3100
MORTGAGE PROBLEMS:
    - NONE
    - NONE
    - FAVORABLE, ENTHUSIASTIC
MARKETING DATA: HOUSE IST OFFERED XB        MKT PER 1WKS) XA
 SALES CONTRACT = 06/20/78   OCCUP DATE = 07/15/78
 NO. OF VISITORS = XA       NO OF PURCHASERS =  XA
MARKETING PROBLEMS:
MARKETING PUBLIC REACTION:
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      ************************************        REPORT B-R2
      * GRANTEE REPORT 3 DATA SUMMARY *        DATE   05 JAN 79
      ************************************        PAGE  360
PROJECT ID = 230908B010000  REPORT 2 DATE = 09/07/77
  REPORT 3 DATE = 08/21/78  FINAL DESIGN COMPLETE DATE = 08/01/77
CONSTRUCTION: BEGIN = 08/28/77   BEGIN SOLAR INSTAL    = 10/25/77
          COMPLETE = 06/14/78   SOLAR TEST COMPLETE    = 05/10/78
BUILDING PERMIT DATA:           PERMIT APPROVAL DATE  = 08/17/77
    APPROVING AUTHORITY = BERNALILLO COUNTY ZONING
  BUILDING PERMIT PROBLEMS: - NONE
  ADDRESS = 513 6TH N.W.
            ALBUQUERQUE        NM   87102
OCCUPANCY PERMIT DATA:          PERMIT APPROVAL DATE  = 07/07/78
    APPROVING AUTHORITY = BERNALILLO COUNTY ZONING
 OCCUPANCY PERMIT PROBLEMS: - NO PROBLEM
  ADDRESS = 513 6TH N.W.
            ALBUQUERQUE        NM   87102
ZONING/LAND USE DATA:           ZONING APPROVAL DATE  = 08/31/73
    APPROVING AUTHORITY = BERNALILLO COUNTY ZONING
  ZONING/LAND USE PROBLEMS: - NO PROBLEM
  ADDRESS = 513 6TH N.W.
            ALBUQUERQUE        NM   87102
BUILDING CODES:   LOCAL CODE BASED/NOT BASED ON NAT'L CODE = NO
 NATIONAL =              LOCAL =BERNALILLO COUNTY UNIFORM BLDG CO
CONSTRUCTION FINANCING:  APPROVAL DATE = 08/17/77
  TYPE = NORMAL  AMT = $70,500    RATE =  9.00% PERIOD (MOS): 009
FINANCING ORGANIZATION =   UTAH MORTGAGE CO.
  ADDRESS = 8015 MOUNTAIN RD. PL. N.E.
            ALBUQUERQUE        NM  87122  PHONE: (505) 265-8555
SOLAR WARRANTY = YES OWNERS MANUAL = YES  SALES/RENTAL TERMS = YES
   HUD TERMS = YES AUX TYPE = ELECTRIC  AUX OTHER =
CONSTRUCTION PROBLEMS; ETC:
         DELIVERY PROBLEMS: - NONE
        BREAKDOWN PROBLEMS: - NONE
            LABOR PROBLEMS: - NONE
   BLDG INTERFACE PROBLEMS: - NONE
                            - MORE INFO. IN FILES
     OTHER CONSTR PROBLEMS: - NONE
ADDITIONAL COMMENTS:
            SOLD DURING CONSTRUCTION - NO MARKETING
```

GRANTEE REPORTS SUMMARY

REPORT B-P4

BATCH NO.: 1-118 DATE SUBMITTED TO NBS: OCT 1980

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	215018B010000	215018C010000	1	
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	215048B010000	215048C010000	4	
	215048B020000	215048C020000	5	
	215048B030000	215048C030000	6	
	215048B040000	215048C040000	7	
	215048B050000	215048C050000	8	
215048A980000			9	
215058A980000	215058B980000	215058C980000	10	
215078A980000	215078B980000	215078C980000	11	
	215098B010000	215098C010000	12	
215093A980000			13	
215108A980000	215108B980000	215108C980000	14	
215118A980000	215118B980000	215118C980000	15	
	215128B010000	215128C010000	16	
	215128B020000	215128C020000	17	
	215128B030000	215128C030000	18	
	215128B040000	215128C040000	19	
	215128B050000	215128C050000	20	
215128A980000			21	
215148A980000	215148B980000	215148C980000	22	
215158A980000	215158B980000	215158C980000	23	
215198A980000	215198B980000	215198C980000	24	
215218A980000	215218B980000	215218C980000	25	
	215228B030000	215228C030000	26	
	215228B050000	215228C050000	27	
	215228B060000	215228C060000	28	
215228A980000			29	
	215258B010000	215258C010000	30	
	215258B020000	215258C020000	31	
215258A980000			32	
215278A980000	215278B980000	215278C980000	33	
		215308C010000	34	1
		215308C020000	34	2
		215308C030000	34	3
215308A980000	215308B980000		35	
215318A980000	215318B980000	215318C980000	36	
215328A980000	215328B980000	215328C980000	37	
215338A980000	215338B980000	215338C980000	38	
215348A980000	215348B980000	215348C980000	39	
215358A980000	215358B980000	215358C980000	40	
215368A980000	215368B980000	215368C980000	41	
215378A980000	215378B980000		42	
215388A980000	215388B980000	215388C980000	43	
	215398B010000	215398C010000	44	

CARD NUMBER: 1

* TECHNICAL DESCRIPTION (FCHART) DATA REPORT *

REPORT : DA-R1
DATE : 05 JUN 81
PAGE : 8

PROJECT I.D.	AZIMUTH ANGLE	TILT ANGLE	NET AREA (SQ.FT.)	COVER PLATES MATL. KIND	ADDITIONAL MATERIAL INFO	COVER PLATES MATL. DESC.	COVER PLATES THICK (IN.)	COVER PLATES NO. CP	COVER PLATES MATL. KIND	ADDITIONAL MATERIAL INFO	COVER PLATES MATL. DESC.	COVER PLATES THICK (IN.)	COVER PLATES NO. CP	ABSORBER COATING	ABSORBER SUBST MATL.
23148FC0001	0010	50	0350	GL		TE	.125	02						FL	ST
23151FC0001	0010	34	0790	FR		SH	.040	01						FL	AL
23152FC0001	0000	30	0504	GL		TE	.125	01						FL	AL
23152FC0002	0000	37	0367	GL		TE	.125	01						FL	AL
23152FC0003	0002	27	0357	GL		TE	.125	01						FL	AL
23152FC0004	0002	34	0357	GL		TE	.125	01						FL	AL
23155FC0001	0000	50	0249	GL		TE	.188	01	PS		SH	.008	D1	FL	CO
23156FC0001	0000	50	0500	FR		PO	.037	02						FL	OT
23157FC0001	0000	37	0225	GL		TE	.187	02						FL	CO
23162FC0001	0000	57	0333	GL		TE	.188	01	PS		SH	.005	01	FL	CO
23164FC0001	0000	29	0249	GL		SS	.125	02						FL	CO
24002FC0001	0000	30	0149	GL		TE	.188	01						SE	CO
24004FC0001	0000	43	0640	PS		SH	.040	02						FL	OT
24005FC0001	0000	57	0534	GN		TE	.125	01	MY		SH	.197	D1	FL	OT
24010FC0001	0000	60	0210	GN		TE	.188	01						FL	CO
24014FC0001	0000	45	0244	GW		TE	.187	01						FL	AL
24014FC0002	0000	45	0303	GW		TE	.187	01						FL	AL
24014FC0003	0000	45	0244	GW		TE	.187	01						FL	AL
24014FC0004	0000	45	0305	GW		TE	.187	01						FL	AL
24014FC0005	0000	45	0244	GW		TE	.187	01						FL	AL
24014FC0006	0000	45	0244	GW		TE	.187	01						FL	AL
24014FC0007	0000	45	0244	GW		TE	.187	01						FL	AL
24014FC0008	0000	45	0183	GW		TE	.187	01						FL	AL
24014FC0009	0000	45	0244	GW		TE	.187	01						FL	AL
24014FC0010	0000	45	0305	GW		TE	.187	01						FL	AL
24014FC0011	0000	45	0244	GW		TE	.187	01						FL	AL
24014FC0012	0000	45	0244	GW		TE	.187	01						FL	AL
24014FC0013	0000	45	0244	GW		TE	.187	01						FL	AL
24014FC0015	0000	45	0183	GW		TE	.187	01						FL	AL
24020FC0001	0005	58	0273	GL		TE	.125	01						SE	CO
24020FC0002	0015	58	0273	GL		TE	.125	01						SE	CO
24032FC0001	0006	45	0299	GL		TE	.188	01						SE	CO
24032FC0002	0006	34	0552	PS		SH	.250	01						FL	CO
24033FC0001	0000	30	0259	FR		SH	.040	01						FL	AL
24036FC0001	0020	60	0352	FR		SH	.040	01						FL	CO
24036FC0002	0023	34	0198	FR		SH	.040	01						FL	CO
24036FC0003	0023	34	0198	FR		SH	.040	01						FL	CO
24036FC0004	0020	34	0306	FR		SH	.040	01						FL	CO
24036FC0005	0+23	50	0340	GW		TE	.125	01						SE	CO
24036FC0006	0+23	50	0340	GW		TE	.125	01						SE	CO
24036FC0007	0020	60	0352	FR		SH	.040	01						FL	CO
24101FC0001	0000	40	0252	OT	GLASS TUBE		.125	02						SE	OT
24101FC0002	0000	40	0252	OT	GLASS TUBE		.125	02						SE	OT
24106FC0001	0000	28	2669	FR		RE	.040	01						FL	CO
24116FC0001	0014	40	3150	GL		TE	.188	01	PS	FOLDED	SH	.010	01	FL	CO
24116FC0002	0014	40	2704	GL		TE	.188	01						SE	CO
24122FC0001	0000	45	0270	GN		TE	.188	01						FL	AL
24122FC0002	0000	45	0270	GN		TE	.188	01						FL	AL
24122FC0003	0000	45	0270	GN		TE	.188	01						FL	AL

```
**********************************
*  BUILDING AND SITE DESCRIPTION  *
**********************************
 PROJECT LOCATION
  CITY:    MEDWAY
  STATE:   MA
  ZIP:   02053
 BUILDING DESIGNER
  FIRM:   DAYSTAR CORP
  CONTACT:   DOUG PECK LESS NELSON
  ADDRESS:   90 LANBRIDGE ST.
  CITY:   BURLINGTON
  STATE:   MA
  ZIP:   01803
  PHONE:   617    2728460
 SOLAR SYSTEN DESIGNER
  FIRM:   DAYSTAR CORP
  CONTACT:   DOUG PECK LESS NELSON
  ADDRESS:   90 LANBRIDGE ST.
  CITY:   BURLINGTON
  STATE:   MA
  ZIP:   01803
  PHONE:   617    4353509
 OTHER PARTICIPANT
  FIRM:   PATIEN'S PLUMBING AND HEATING
  CONTACT:   GORDON HENDERSON
  ADDRESS:   2 WOOD ST.
  CITY:   HOPKINTON
  STATE:   MA
  ZIP:   01748
  PHONE:   617    4353509
 DI MONITOR
  FIRM:   MASSDESIGN INC.
  CONTACT:   JOHN M BUCHANAN
  ADDRESS:   18 BRATTLE ST.
  CITY:   CAMBRIDGE
  STATE:   MA
  ZIP:   02138
  PHONE:   617    4910961
 TYPE OF SOLAR SYSTEN INTEGRATION:
  AFTER BLDG DESIGN WAS FIXED
 APPLICABLE REGULATORY CODES
  STATE
 NAME AND YEAR OF CODE/REGULATION
  BUILDING:   MASS. STATE BUILDING CODE 1975
  MECHANICAL:   MASS.STATE BUILDING CODE 1975
  ELECTRICAL:   MASS.STATE BUILDING CODE 1975
  PLUMBING:   MASS STATE BUILDING CODE 1975
 MODEL CODES: BASIS FOR REGS-NAME/YR
  BUILDING:   BOCA
  MECHANICAL:   BOCA
  ELECTRICAL:   BOCA
  PLUMBING:   BOCA
 GENERAL CHARACTERISTICS
  BUILDING TYPE
   SINGLE FAMILY DETACHED
  PLANNED TYPE OF OWNERSHIP
   INDIVIDUAL OR FAMILY
  PLANNED TYPE OF OCCUPANCY
   OWNER
  DEVELOPMENT TYPE
   SUBDIVISION
SITE
 LATITUDE (DEGREES)   42
 LONGITUDE (DEGREES)    71
 ALTITUDE (FEET)    200
BUILDING
 FRONT OF BUILDING FACES
  N
 AVERAGE STORIES ABOVE GROUND    2.0
 AVERAGE STORIES BELOW GROUND    1.0
 TOTAL HGT ABOVE GROUND (FEET)    33
 CONDITIONED FLOOR AREA (SQ FT)     1913
 ROOF TYPE AT COLLECTOR LOCATION
  SLOPED: PITCH ANGLE (DEG)   42
 ATTIC:
  VENTILATED
 DESIGN SHADED GLASS AREAS
  HEATING SEASON (SQ FT)       0
  COOLING SEASON (SQ FT)       0
 BUILDING VENTILATION RATES
  HEATING SEASON-MECHANICAL (CHG PER HR)   0.0
  HEATING SEASON-NATURAL(CHG PER HR)   1.3
 INTERNAL HEAT GAIN ASSUMPTIONS:
  METABOLIC LOAD(BTU PER OCCUPANT PER HR)   480
  NUMBER OF OCCUPANTS . . . . . .     6
  DOMESTIC HOT WATER DAILY DEMAND (GAL/DAY)     120
SITE
          (1)     (2)
 MONTH HEATNG  INSOLTN
       DEGREE  BTU/FT2
        DAYS   PER DAY
  JAN   1088     553
  FEB    972     797
  MAR    846    1144
  APR    513    1438
  MAY    208    1776
  JUN     36    1994
  JUL      0    1881
  AUG      9    1622
  SEP     60    1314
  OCT    316     941
  NOV    603     592
  DEC    983     482
 HEATING DEGREE DAYS PER YEAR:    5634
 FOOTNOTE (1)   ASHRAE-SYSTEMS 1973
 FOOTNOTE (2)   NAT'L CLIMATIC CENTER      01
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HUD SOLAR DEMONSTRATION RESIDENTIAL PROJECTS

* TECHNICAL CONCERNS SUMMARY REPORT *

DATE :06 JUL 81

SORTING KEYS ARE : ID #, SYS #, DATE

PAGE : 1
REPORT : CB-D3

ID #	SYS #	DATE	STAT	PERF AREA	HARDWARE ELEMENT	ACTIONS	EVENTS	FREQ	DIRECT COST	ACT TAKEN BY	SOPR
2423	01	03/05/77	4	THER	TRAN/HEAT EXCHANGER	REPLACE	FREEZE-UP	1	$	O	N
		09/19/80	4	MECH	AUX/HEAT PUMP	REPAIR	MECHANICAL OPERATING. BUT IMPROPERLY INCORRECT MANUFACTURING	1	$*	H	C
		05/19/80	4	DURA	COLL/LIQUID PIPE ASSEMBLY	REPAIR	LEAKAGE DAMAGED LEAKAGE OF SYSTEM FLUIDS ACCESS FOR REPAIRS INADEQUATE	1	$ 11342	H	R
		05/19/80	4	THER	CONTROLS	REPLACE	ELECTRICAL	1	$*	H	R
		08/09/80	4	GENE	TRAN/INSULATION	REPAIR	THERMAL	1	$	O	N
		12/12/80	4	DURA	COLLECTOR UNITS	REPAIR	LEAKAGE DAMAGED LEAKAGE OF SYSTEM FLUIDS FROM COMPONENTS	3	$	O	N
		CYCLE: 1	NO.SYS: 001	NO.UNITS: 1	N/R: N	HSGTYPE: SFD	SYSTYPE: H W	SYSKIND: A	TRMED: L	FCHART: *			
2426	01	07/16/78	4	THER	COLL/LIQUID PIPE ASSEMBLY	REPLACE	STRUCTURAL FAILED TO OPERATE BURST	5	$	O	N
		09/23/78	2	DURA	COLL/HEADERS-CONNECTORS	REPAIR	LEAKAGE DAMAGED LEAKAGE OF SYSTEM FLUIDS BETWEEN COMPONENTS	1	$	O	N

HUD SOLAR DEMONSTRATION RESIDENTIAL PROJECTS

* TECHNICAL CONCERNS SIMPLIFIED DUMP *

DATE: 06 JUL 81
PAGE: 1
REPORT: CB-D3A

SORTING KEYS ARE: ID #, SYS #

ID #	# OF SYS	SYS #	HARDWARE ELEMENT	ACTION	EVENT	CYCLE	# OF UNITS	NEW/ RET	HSGTYPE	SYSTYPE	SYSKIND	TRMED
2423	1	D1	TRANSPORT/OIST	REPLACE	FREEZE-UP	1	1	N	SFD	H W	A	L
			AUXILIARY	REPAIR	MECHANICAL							
			COLLECTOR	REPAIR	LEAKAGE							
			CONTROLS/SENSORS	REPLACE	ELECTRICAL							
			TRANSPORT/DIST	REPAIR	THERMAL							
			COLLECTOR	REPAIR	LEAKAGE							
	% DF SYSTEMS IN GRANT WITH FAILURES: 10D.0D%											
2426	1	01	COLLECTOR	REPLACE	STRUCTURAL	1	1	N	SFD	HCW	A	L
			COLLECTOR	REPAIR	LEAKAGE							
			COLLECTOR	REPLACE	DEGRADATION							
			COLLECTOR	PENDING	LEAKAGE							
			CONTROLS/SENSORS	PENDING	ELECTRICAL							
			ACTIVE SYSTEM	REMOVE	STRUCTURAL							
			TRANSPORT/DIST	REPLACE	FREEZE-UP							
			CONTROLS/SENSORS	REPLACE	MECHANICAL							
			TRANSPORT/DIST	REPLACE	MECHANICAL							
			AUXILIARY	REPAIR	MECHANICAL							
	% OF SYSTEMS IN GRANT WITH FAILURES: 1DD.DD%											
2428	2	D1	TRANSPORT/DIST	REPAIR	STRUCTURAL	1	4	N	SFA	H W	A	L
			COLLECTOR	REPAIR	LEAKAGE							
			COLLECTOR	REPAIR	STRUCTURAL							
			TRANSPORT/OIST	REPAIR	CORROSION							
			COLLECTOR	REPAIR	LEAKAGE							
		D2	TRANSPORT/DIST	REPAIR	STRUCTURAL	1	4	N	SFA	H W	A	L
			COLLECTOR	REPAIR	LEAKAGE							
			COLLECTOR	REPAIR	STRUCTURAL							
			TRANSPORT/DIST	REPAIR	CORROSION							
	% OF SYSTEMS IN GRANT WITH FAILURES: 1DD.DO%											
2429	2	D1	TRANSPORT/DIST	REPLACE	FREEZE-UP	1	1	N	SFD	H	A	A
			COLLECTOR	REPAIR	LEAKAGE							
			CONTROLS/SENSORS	REPAIR	ELECTRICAL							
		02	COLLECTOR	REPAIR	MATERIALS DURA	1	1	N	SFD	W	A	A

HUD SOLAR DEMONSTRATION RESIDENTIAL PROJECTS

* TECHNICAL CONCERNS SUMMARY REPORT - HARDWARE ELEMENT *

DATE: 06 JUL 81
PAGE: 2
REPORT: CB-HAS

SORTING KEYS ARE: ID #, SYS #

ID #	# OF SYS	SYS #	HARDWARE ELEMENT COLL	TRAN/OIST	STOR	CONT	AUX	OTHER	TOTAL	CYCLE	# OF UNITS	NEW/ RET	HSGTYPE	SYSTYPE	SYSKIND	TRMED
24S1	1	01	1						1	1	1	R	SFA	H W	A	L
24SS	1	01	1			1			2	1	8	N	GAL	H W	A	L
24S8	4	01	2		1			1	4	1	4	N	SFA	H W	A	L
		02	2		1			1	4	1	4	N	SFA	H W	A	L
		03	2		1			1	4	1	4	N	SFA	H W	A	L
		04	2		1			1	4	1	4	N	SFA	H W	A	L
2463	3	01		2			3	2	7	1	3	N	SFO	HCW	A	L
		02					3	1	4	1	3	N	SFO	HCW	A	L
		03					3	1	4	1	3	N	SFO	HCW	A	L
2465	1	01	2						2	1	1	N	SFO	H W	A	L
2466	1	01						1	1	1	1	N	SFO	H W	A	L
2468	1	01		1					1	1	1	N	SFO	H	A	A
2470	1	01	3	4	1	1	1	1	11	1	1	N	SFO	H W	A	L
2472	1	01			1	1			2	1	1	N	SFO	H W	A	L
		02		1					1							
2473	5	01	4	1	1	1		2	9	1	5	R	SFO	H W	A	L
		02	1	1	1	1			4	1	5	R	SFD	H W	A	L
		03	1	1	1	1			4	1	5	R	SFO	H W	A	L
		04	1	1	1	1			4	1	5	R	SFD	H W	A	L
		05						1	1	1	5	R	SFO	H W	A	L
2474	12	01		1					1	1	12	N	MFM	W	P	L
2475	8	01						1	1	1	6	N	SFA	W	A	L
		03	1			1		1	3	1	6	N	SFA	W	A	L
		05	1						1	1	6	N	SFA	H W	A	L
2476	1	01	2	1	2	1			6	1	1	N	SFO	H W	A	L
2477	5	01	1	1		1		1	4	1	5	N	SFD	H W	A	A
		02	1	1		1		1	4	1	5	N	SFO	H W	A	A
		03	1			1		1	3	1	5	N	SFO	H W	A	A
		04	1	1		1	1	2	6	1	5	N	SFO	H W	A	A

R.E.R.C. QUESTION/ANSWERS DICTIONARY

SINGLE FAMILY BUILDER QUESTIONAIRE

QUESTION NUMBER	QUESTION	CODED VALUES WHAT CODE MEANS	CODE
		TECHNICAL FEASIBILTY	08
		FINAN INST ACCPTNCE	09
91A	OTHER BLDRS OUTLOOK TOWARD SOLAR IN RES		
		INTRSTD & COMMITTED	01
		INTRSTD, NOT COMMITD	02
		NOT INTERESTED	03
		NOT AT ALL INTRSTD	04
		NO OPINION/DON'T KNW	05
		DID NOT ANSWER	06
91B	PLEASE EXPLAIN		
		WAIT & SEE ATTITUDE	01
		LACK OF FIN COMTMNT	02
		PAYBACK/FIN FEASBLTY	03
		LACK OF PAYBCK KNOWL	04
		PUBLIC INTEREST	05
		NOT ENUF RES + DEVEL	06
		CONVNTL HOMES SELLNG	07
		UNAWRE OF FUTRE TRND	08
		LACK OF KNOWLEDGE	09
		EXPRESSED INTREST	10
92A	TRADE PUBL AS SOURCE FOR MECH/OPER DATA		
		YES	01
		NO	02
92B	OTHR DEVS AS SOURCE FOR MECH/OPER DATA		
		YES	01
		NO	02
92C	MFRS AS SOURCE FOR MECH/OPER DATA		
		YES	01
		NO	02
92D	NTL/LOC ASN AS SOURCE FOR MECH/OPER DATA		
		YES	01
		NO	02
92E	UNIV/IND ORG AS SOURCE FOR MECH/OPER DAT		
		YES	01
		NO	02
92F	GOVT AGENCY AS SOURCE FOR MECH/OPER DATA		
		YES	01
		NO	02

SOURCE-ID

	1A	1B	2	3	4A	4B	5A	5B	6A	6B	6C	6D	6E	6F	6G	6H	6I	6J	6K	6L	6M	7A	7B	8A	8B	8C	8D
21501RA98A	4	9	2	1	5	125	5	12000	25	48	0	42	0	0	0	0	0	0	25	90		1		38000	75000	27500	27500
21505RA98A	6	24	1	1	5	150	4	7000	75	85	25	25	0	0	0	0	0	0	100	110		1		31000	100000	55000	70000
21510RA98A	5	11	1	1	6	400	5	12000	180	0	120	0	0	0	0	0	0	0	300			3		39000	55000	35000	45000
21512RA98A	7	22	2	1	6	700	5	50000	700	700	0	0	0	0	0	0	0	0	700	700		1		70000	90000		
21515RA98A	2	1	2	1	6	350	5	10000	150	350	0	0	0	0	0	0	0	0	150	350		1		38000	40000		
21518RA98A	1	1	1	1	5	100	3	3500	30	100	0	0	0	0	0	0	0	0	30	100		1		32000	60000		
21519RA98A	4	8	1	1	1	7	1	300	0	1	0	0	0	0	0	0	0	0	0	1		4		62500	67500		
21525RA98A	6	41	2	1	6	450	5	10000	100	70	100	250	200	200	0	0	0	0	400	520		2		33500	40000	27950	33950
21527RA98A	5	11	1	1	5	100	3	2500	100	100	0	0	0	0	0	0	0	0	100	100		1		35500	45000		
21532RA98A	5	15	1	1	6		4	7000	200	175	100	0	150	0	0	0	0	0	450	175		3		35000	45000	30000	40000
21533RA98A	4	6	2	3	4	50	3	2500	5	5	50	50	0	2	0	0	0	0	55	57		2		32000	35000	30000	32000
21534RA98A	6	31	1	1	7	750	5		500	450	0	0	450	0	0	0	0	0	950	450		3		25000	44000	23000	30000
21536RA98A	6	32	1	1	7	900	5	28000	30	92	397	503	0	0	0	0	0	0	427	595		2		28000	62000		
21538RA98A	4	9	1	4	1	1	3	2000	50	2	0	0	0	0	0	0	0	0	50	2		1		45000	55000		
21541RA98A	4	6	1	1	5	100	4	5000	0	0	100	100	0	0	0	0	0	0	100	100		2				40000	70000
21543RA98A	4	5	2	1	4	70	4	6000	9	24	60	45	0	0	0	0	0	0	69	69		2		80000	286000	40000	130000
21544RA98A	5		1	1	5	150	5		0	0	150	0	0	0	0	0	0	0	150			2				40000	45000
21545RA98A	3	3	1	1	1	1	1	30	1	1	0	0	0	0	0	0	0	0	1	1		1		30000	30000		
21546RA98A	3	3	1	1	1	3	1	300	2	3	0	0	0	0	0	0	0	0	2	3		1		80000	120000		
21547RA98A	4	6	1	1	1	1	1		1	1	0	0	0	0	0	0	0	0	1	1		1		18000	39000		
21550RA98A	5	18	1	2	1	2	1	75	1	1	0	0	0	0	0	0	0	0	1	1		1		45000	75000		
21551RA98A	6	20	1	1	1	1	4	5000	1	1	50	0	0	0	0	0	0	0	51	1		1		50000	150000		
21552RA98A	6	57	2	1	7	1600	5	67000	100	80	600	600	600	600	300	300	0	0				2		45000	50000	33000	47000
21555RA98A	6	23	1	1	6	260	4	8000	0	10	107	403	0	0	0	0	0	0	107	413		2				40000	65000
21903RA98A	5	11	2		6	650	5	35000														1		38000	55000		
21907RA98A	3	2	1	1	1	6	1	250	0	4	0	0	0	0	0	0	0	0	0	4		1		40000	50000		
21909RA98A	5	15	1	1	2	11	1	300	10	10	4	0	0	0	0	0	0	0	14	10		1		30000	50000		
21910RA98A	6	20	1	1	2	20	3	1000	20	20									20	20		1		55000	75000		
21912RA98A	5	10	1	1	6	250	5	13500	210	260				20					210	280		1		45000	60000		
22 7RA98A	5	10	1	1	2	20	2	800	18	25	0	0	0	0	0	0	0	0	18	25		1		55000	65000		
22 10RA98A	3	5	1	1	1	8	2	600	8	10	0	0	0	0	0	0	0	0	8	10		1		70000	150000		
22 11RA98A	3	3	2	1	2	17	2	800	0	17	0	0	0	0	0	0	0	0	0	17		1		37000	45000		
22 12RA98A	3	2	1	1	1	1	1	60	0	1	0	0	0	0	0	0	0	0	0	1		1		45000	95000		
22 20RA98A	5	15	1	1	2	20	2	1000	0	0	0	0	0	0	0	0	0	0	0			1		80000	120000		
22 23RA98A	5	19	1	1	1	5	2	600	3	5	0	0	0	0	0	0	0	0	3	5		1		130000	175000		
22 25RA98A	3	2	1	1	2	10	2	700	1	6	0	0	0	0	0	0	0	0	1	6		1		65000	110000		
22 26RA98A	2	1	1	1	1	3	1		0	1	0	0	0	0	0	0	0	0	0	1		1		60000	80000		
22 32RA98A	1	1	1	1	2	10	2	500	0	1	0	10	0	0	0	0	0	0	0	11		2				45000	52000
22 35RA98A	6	25	1	1	6	250			0	0	200	150	119	0	0	0	0	0	319	150		2		67500	78000	45000	58000
22 36RA98A	3	3	1	2	1	9	3	1500	12	9	0	0	0	0	0	0	0	0	12	9		1		55000	70000		
22 41RA98A	6	32	1	1	6	275	5		450										450			1		45000	70000		
22 42RA98A	3	4	2	1	5	150	3	3000	20	20	0	0	150	97	0	0	0	0	170	117		4		45000	50000		
22 43RA98A	4	5	2	1	1	7	1	400	6	8	0	0	0	0	0	0	0	0	6	8		1		45000	80000		
22 46RA98A	1	1	1	1	1	1	1	90	0	0	0	0	0	0	0	0	0	0	0	0		1		86000	90000		
22 48RA98A	6	22	1	1	5	140	4	8200	137	154	0	0	30	0	0	0	0	0	167	154		1		62000	70000		
22 51RA98A	1	1	1	1	1	1	6		0	1	0	0	0	0	0	0	0	0		1		1					
22 52RA98A	3	3	1	1	3	25	3	1250	0	4	0	20	0	0	0	0	0	0	0	24		2		69500	105000	50000	75000
22 53RA98A	5	15	1	1	1	5	3	1000	4	4	1	3	0	0	0	0	0	0	5	7		1		80000	200000	75000	130000
22 55RA98A	4	5	1	1	2	18	2	500	9	22	0	0	0	0	0	0	0	0	9	22		1		75000	175000		
22 58RA98A	5	11	1	1	4	50	3	4000	10	10	80	80	0	0	0	0	0	0	90	90		2		90000	110000	55000	65000
22 62RA98A	3	4	1	1	2	10	2	650	12	9			6						18	9		1		55000	100000		
22 63RA98A	4	5	1	1	2	10	2	750	2	6	0	0	0	0	0	0	0	0	2	6		1		60000	100000		

UTILITY CONSUMPTION REPORT

PROJECT ID: 21504BF020000

ENERGY TYPE: ELECTRIC

SUPPLIER: EAST CENTRAL ELECTRIC CODE: OK 03
ADDRESS: DRAWER 1178
OKMULGEE OK 74447

START DATE OF BILLING PERIOD	END DATE OF BILLING PERIOD	PRESENT METER READING	PREVIOUS METER READING	ENERGY CONSUMED	UNITS	RATE CODE	ENERGY COST	SURCHARGE	TAX	TOTAL COST THIS PERIOD	FLGS 1234
060877	070577	8562	8146	416	K		20.32	3.00		23.32	
070577	080577	9112	8562	550	K		23.80	3.00		26.80	
080577	090577	9510	9112	398	K		18.50	3.00		21.50	
090577	100577	10053	9510	543	K		24.29	3.00		27.29	
100577	110577	11027	10053	974	K		40.68	3.00		43.68	
110577	120577	11327	11027	300	K		16.30	3.00		19.30	
120577	010578	11557	11327	230	K		13.13	3.00		16.13	
010578	020578	11762	11557	205	K		11.78	3.00		14.78	
020578	030578	12359	11762	597	K		24.91	3.00		27.91	
030578	040578	12609	12359	250	K		13.67	4.05		17.72	
040578	050578	12997	12609	388	K		20.52	4.05		24.57	
050578	060578	13382	12997	385	K		19.81	4.05		23.86	
AVERAGE ENERGY CONSUMED FOR 1 YR:				436 ***		AVERAGE ENERGY COST FOR 1 YR:				23.90 ***	
060578	070578	13724	13382	342	K		17.31	4.05		21.36	
070578	080578	14274	13724	550	K		24.10	4.05		28.15	
080578	090578	14274	14274		K		4.03	4.05		8.08	
090578	100578	14656	14274	382	K		19.99	4.05		24.04	
100578	110578	15630	14656	974	K		42.31	4.05		46.36	
110578	120578	15630	15630		K		4.03	4.05		8.08	
120578	010579	16263	15630	633	K		28.42	4.05		32.47	
010579	020579	16468	16263	205	K		11.29	4.05		15.34	
020579	030579	17213	16468	745	K		31.24	4.05		35.29	
030579	040579	18086	17213	873	K		37.65	4.05		41.70	
040579	050579	18474	18086	388	K		21.92	4.05		25.97	
050579	060579	18533	18474	59	K		5.78	4.05		9.83	
AVERAGE ENERGY CONSUMED FOR 1 YR:				429 ***		AVERAGE ENERGY COST FOR 1 YR:				24.72 ***	
060579	070579	18885	18533	352	K		19.59	4.05		23.64	
070579	080579	19924	18885	1039	K		40.46	4.05		44.51	
080579	090579	20543	19924	619	K		27.06	4.05		31.11	
090579	100579	20925	20543	382	K		20.60	4.05	.47	25.12	
100579	110579	21064	20925	139	K		10.87	4.05		14.92	
110579	120579	21064	21064		K		4.03	4.05		8.08	
120579	010580	21697	21064	633	K		30.03	4.05		34.08	

UTILITY PROVIDES A MONTHLY BILL

UTILITY CONSUMPTION AVERAGES REPORT

21504BF020000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	436	K	AVERAGE ENERGY COST FOR 1 YR:	23.90	***
21504BF020000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	429	K	AVERAGE ENERGY COST FOR 1 YR:	24.72	***
21504BF020000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	517	K	AVERAGE ENERGY COST FOR 1 YR:	27.01	***
21504BF020000	P	AVERAGE ENERGY CONSUMED FOR 1 YR:	115	G	AVERAGE ENERGY COST FOR 1 YR:	43.68	***
21504BF030000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	391	K	AVERAGE ENERGY COST FOR 1 YR:	21.36	***
21504BF030000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	420	K	AVERAGE ENERGY COST FOR 1 YR:	25.52	***
21504BF030000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	73	C	AVERAGE ENERGY COST FOR 1 YR:	15.50	***
21504BF030000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	70	C	AVERAGE ENERGY COST FOR 1 YR:	16.20	***
21504BF030000	P	AVERAGE ENERGY CONSUMED FOR 1 YR:	85	G	AVERAGE ENERGY COST FOR 1 YR:	30.13	***
21504BF030000	P	AVERAGE ENERGY CONSUMED OVER 17 MOS:	43	G	AVERAGE ENERGY COST OVER 17 MOS:	15.36	***
21505BF010000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	504	K	AVERAGE ENERGY COST FOR 1 YR:	.00	***
21505BF010000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	713	K	AVERAGE ENERGY COST FOR 1 YR:	17.86	***
21505BF010000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	631	K	AVERAGE ENERGY COST FOR 1 YR:	31.67	***
21505BF010000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	35	C	AVERAGE ENERGY COST FOR 1 YR:	10.37	***
21505BF010000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	47	C	AVERAGE ENERGY COST FOR 1 YR:	14.96	***
21505BF010000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	39	C	AVERAGE ENERGY COST FOR 1 YR:	13.04	***
21505BG99A000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	953	K	AVERAGE ENERGY COST FOR 1 YR:	45.94	***
21505BG99A000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	1130	K	AVERAGE ENERGY COST FOR 1 YR:	50.84	***
21505BG99A000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	1159	K	AVERAGE ENERGY COST FOR 1 YR:	56.16	***
21505BG99A000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	177	C	AVERAGE ENERGY COST FOR 1 YR:	41.91	***
21505BG99A000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	179	C	AVERAGE ENERGY COST FOR 1 YR:	48.22	***
21505BG99B000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	143	C	AVERAGE ENERGY COST FOR 1 YR:	34.67	***
21505BG99B000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	148	C	AVERAGE ENERGY COST FOR 1 YR:	40.59	***
21510BF010000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	916	K	AVERAGE ENERGY COST FOR 1 YR:	45.96	***
21512BF010000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	34	T	AVERAGE ENERGY COST FOR 1 YR:	6.99	***
21512BF010000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	18	T	AVERAGE ENERGY COST FOR 1 YR:	5.67	***
21512BF020000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	70	T	AVERAGE ENERGY COST FOR 1 YR:	13.37	***
21512BF020000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	57	T	AVERAGE ENERGY COST FOR 1 YR:	15.46	***
21512BF030000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	26	T	AVERAGE ENERGY COST FOR 1 YR:	4.46	***
21512BF030000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	16	T	AVERAGE ENERGY COST FOR 1 YR:	5.16	***
21512BF040000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	78	T	AVERAGE ENERGY COST FOR 1 YR:	15.79	***
21512BF040000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	47	T	AVERAGE ENERGY COST FOR 1 YR:	12.83	***
21512BF050000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	66	T	AVERAGE ENERGY COST FOR 1 YR:	12.75	***
21512BF050000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	34	T	AVERAGE ENERGY COST FOR 1 YR:	9.40	***
21512BG04A000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	44	T	AVERAGE ENERGY COST FOR 1 YR:	7.29	***
21512BG04A000	G	AVERAGE ENERGY CONSUMED FOR 1 YR:	47	T	AVERAGE ENERGY COST FOR 1 YR:	9.43	***
21515BF010000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	1502	K	AVERAGE ENERGY COST FOR 1 YR:	59.13	***
21515BF010000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	1549	K	AVERAGE ENERGY COST FOR 1 YR:	69.99	***
21515BF010000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	1661	K	AVERAGE ENERGY COST FOR 1 YR:	78.87	***
21519BF010000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	2310	K	AVERAGE ENERGY COST FOR 1 YR:	51.33	***
21519BG99A000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	936	K	AVERAGE ENERGY COST FOR 1 YR:	22.55	***
21525BF010000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	1691	K	AVERAGE ENERGY COST FOR 1 YR:	73.53	***
21525BF010000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	1973	K	AVERAGE ENERGY COST FOR 1 YR:	87.85	***
21525BF020000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	1366	K	AVERAGE ENERGY COST FOR 1 YR:	58.02	***
21525BG99A000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	1240	K	AVERAGE ENERGY COST FOR 1 YR:	55.32	***
21525BG99A000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	1227	K	AVERAGE ENERGY COST FOR 1 YR:	54.35	***
21525BG99B000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	949	K	AVERAGE ENERGY COST FOR 1 YR:	41.37	***
21525BG99B000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	727	K	AVERAGE ENERGY COST FOR 1 YR:	32.27	***
21525BG99C000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	1119	K	AVERAGE ENERGY COST FOR 1 YR:	48.43	***
21525BG99C000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	1086	K	AVERAGE ENERGY COST FOR 1 YR:	47.67	***
21525BG99D000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	1611	K	AVERAGE ENERGY COST FOR 1 YR:	73.94	***
21527BF010000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	675	K	AVERAGE ENERGY COST FOR 1 YR:	30.43	***
21527BF010000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	811	K	AVERAGE ENERGY COST FOR 1 YR:	39.56	***
21527BF010000	E	AVERAGE ENERGY CONSUMED FOR 1 YR:	909	K	AVERAGE ENERGY COST FOR 1 YR:	52.17	***

UTL-CODES STATE	LN	SUPPLIER NAME	SUPPLIER ADDRESS	CITY	ST	ZIP
IN	04	NORTHERN INDIANA PUB. SERVICE CO.	74 N. BROADWAY	PERU	IN	46970
IN	05	INDIANA & MICHIGAN ELECTRIC CO.	PO BOX 60	FT. WAYNE	IN	46801
KS	01	THE KANSAS POWER & LIGHT COMPANY	BOX 59	SALINA	KS	67401
LA	01	NEW ORLEANS PUBLIC SERVICE INC	317 BARONNE STREET	NEW ORLEANS	LA	70112
LA	02	CLECO	BOX 32	PINEVILLE	LA	71360
MA	01	BAY STATE GAS CO.	2025 ROOSEVELT AVENUE	SPRINGFIELD	MA	01101
MA	02	BOSTON EDISON COMPANY	P.O. BOX 488	BOSTON	MA	02199
MA	03	BAY STATE GAS COMPANY	120 ROYALL STREET	CANTON	MA	02021
MA	04	BAY STATE GAS CO.	995 BELMONT STREET	BROCKTON	MA	02401
MA	05	MASSACHUSETTS ELECTRIC	170 MEDFORD STREET	MALDEN	MA	02148
MA	06	WESTERN MASS. ELECTRIC CO.	300 CADWELL DRIVE	SPRINGFIELD	MA	01104
MA	07	C & S OIL HEATING CO.;INC.	TMIDDLESEX AVE	NATICK	MA	01760
MA	08	PINTO'S FUEL SERVICE	319-1/2 MAIN STREET	MILFORD	MA	01757
MA	09	WESTERN MASS. ELEC. CO.	174 BRUSH HILL AVE.	W. SPRINGFIELD	MA	01089
MD	01	BALTIMORE GAS & ELECTRIC CO.	150B WOODLAWN DRIVE	BALTIMORE	MD	21207
MI	01	BERRIEN CTY FARM BUREAU OIL CO	M-140 &M-62	EAU CLAIRE	MI	49111
MI	02	CONSUMERS POWER COMPANY	4000 CLAY AVE SW	GRAND RAPIDS	MI	49508
MI	03	BATTLE CREEK GAS COMPANY	23 EAST MICHIGAN MALL	BATTLE CREEK	MI	49018
MN	01	MINNEGASCO/MINNESOTA GAS CO.	626 NICOLLET MALL	MINNEAPOLIS	MN	55402
MN	02	NORTHERN STATES POWER	414 NICOLLET MALL	MINNEAPOLIS	MN	55401
MN	03	DAKOTA ELECTRIC ASSOCIATION	4300 220TH STREET WEST	FARMINGTON	MN	55204
MN	04	EAST CENTRAL ELECTRIC ASSN	412 NORTH MAIN	BRAHAM	MN	55006
MO	01	THE GAS SERVICE CO.	2460 PERSHING RD.	KANSAS CITY	MO	64108
MO	02	KANSAS CITY POWER & LIGHT CO.	13330 BALTIMORE AVENUE	KANSAS CITY	MO	64145
MO	03	BOONE ELECTRIC COOPERATIVE	1413 RANGE LINE	COLUMBIA	MO	65201
MO	04	CUIVER RIVER ELECTRIC	PO BOX 160	TROY	MO	63379
MT	01	PACIFIC POWER AND LIGHT	PO BOX 250	KALISPELL	MT	59901
NC	01	DUKE POWER COMPANY	DRAWER A D SALEM STATION	WINSTON-SALEM	NC	27108
NC	02	CAROLINA POWER & LIGHT COMPANY	205 WEST CABARRUS STREET	RALEIGH	NC	27698
NE	01	CENGAS/MINNESOTA GAS CO.	1201 N STREET	LINCOLN	NE	68512
NE	02	LINCOLN ELECTRIC SYSTEM	1200 N STREET STE 300	LINCOLN	NE	68501
NH	01	PUBLIC SERVICE CO. OF NEW HAMPSHIRE	CRYSTAL AVENUE	DERRY	NH	03038
NH	02	PUBLIC SERVICE CO. OF NEW HAMPSHIRE	370 AMHERST STREET	NASHUA	NH	03061
NH	03	NEW HAMPSHIRE ELEC. COOPERATIVE, INC.	RED 2 TENNEY MT HWY	PLYMOUTH	NH	03264
NH	04	LAMOUREUX OF DIVISION OF JAMES HORNE	63 FOURTH STREET	DOVER	NH	03820
NH	05	NORTHERN UTILITIES	78 MARKET STREET	PORTSMOUTH	NH	03801
NH	06	EXETER HAMPTON ELECTRIC	WATER STREET	EXETER	NH	03842
NH	07	PUBLIC SERVICE OF NEW HAMPSHIRE	1000 ELM STREET, PO BOX 330	MANCHESTER	NH	03105
NJ	01	PSE & G COMPANY	222 E STATE STREET	TRENTON	NJ	08604
NJ	02	H AND H GAS CORP	PO BOX 208	HIGHTSTOWN	NJ	08520
NJ	03	JERSEY CENTRAL POWER AND LIGHT CO	501 GRAND AVE	ASBURY PARK	NJ	07712
NM	01	GAS CO. OF NEW MEXICO	P.O. BOX 1692	ALBUQUERQUE	NM	87103
NM	02	PUBLIC SERVICE CO. OF NEW MEXICO	414 SILVER AVE. N.W.	ALBUQUERQUE	NM	87103
NM	03	PUBLIC SERVICE CO. OF NEW MEXICO	124 E. MARCY	SANTA FE	NM	87501
NM	04	PUBLIC SERVICE OF NEW MEXICO	PO BOX 407	BELEN	NM	87002
NM	05	EL PASO ELECTRIC	BOX 910	LAS CRUCES	NM	88001
NV	01	SIERRA PACIFIC POWER CO.	PO BOX 10100	RENO	NV	89510
NY	01	NEW YORK STATE ELECTRIC & GAS	150 LANCASTER STREET	LANCASTER	NY	14075
NY	02	NATIONAL FUEL GAS	455 MAIN STREET	BUFFALO	NY	14203
NY	03	ORANGE & ROCKLAND ELECTRIC & GAS CO.	ONE BLUEHILL PLAZA	PEARL RIVER	NY	10965

5. DATA FILE ELEMENTS

This section provides a detailed description of the data in the files which comprised the Solar Data Base. These data are available on tape from the National Technical Information Service (see page 59).

GRANT FILE ELEMENTS

These data were requested by HUD from organizations or individuals applying for grants for building homes with solar energy systems. Subsequently, data concerning applicants who received grants were stored in a file on the NBS computer. There were 668 grants awarded during the Residential Demonstration Program (1975-1980).

Description of Data

Grant ID*

Grantee Information:
- Name, type and address of grantee contact person(s)
- Total solar energy system cost ($)
- Portion of solar system cost requested by grantee ($)

Project Information:
- Project location address

Model Information:
- Housing type
- Number of dwelling units
- Number of buildings
- Number of solar systems
- Total conditioned area per building
- State economic area code

Solar Energy System Information:
- System type (heating, cooling or water)
- System kind (active, passive or hybrid)
- Transfer media (air or liquid)
- Solar collector - manufacturer code, type, aperture area in square feet
- Auxiliary fuel type
- Total cost for each solar system ($)
- Storage medium
- Cost to government for each solar system ($)
- Total load in Btu x 10^6
- Solar energy used in Btu x 10^6

*The Grant File uses a different numbering scheme from the other files in order to comply with Federal privacy requirements.

GRANTEE FILE ELEMENTS

These data were received via three separate input forms. Grantee Reports 1, 3, and 4 were completed by grantees during different phases of the solar project. Grantee Report 1 was filed after the grant was awarded. Grantee Report 3 was filed after the construction was completed. Grantee Report 4 was filed after the building(s) or unit(s) was sold or rented.

Description of Data

Grantee Report #1

- Project ID
- Project Information:
  - Address
  - Grant award date
  - Report #1 date
  - Instrumented or non-instrumented data (yes or no)
  - New or retrofit
- Construction Financing:
  - Financing arrangements (yes, no, pending)
  - Experience/problems

Grantee Report #3

- Dates:
  - Date Grantee Report #2 submitted (see Technical Description file)
  - Date Grantee Report #3 submitted
  - Final design completion date
  - Begin solar installation date
  - Solar test completion date
  - Construction completion date
- Building Permit Data:
  - Approval date
  - Approving authority
  - Address
  - Experience/problems
- Occupancy Permit Data:
  - Approval date
  - Approving authority
  - Address
  - Experience/problems
- Building Codes:
  - National code models, if any
  - Local codes
  - Experience/problems
- Construction Financing Data:
  - Confirmed approval date
  - Mortgage type

GRANTEE FILE ELEMENTS (CONTINUED)

- Period (months)
- Interest rate
- Amount ($)
- Financing organization
- Address

Rental/Sales Agreement:

- Sales/rental terms
- HUD access terms

Construction Problems:

- Equipment delivery problems
- Equipment breakdown problems
- Labor problems
- Building interface problems
- Other construction problems

Solar Oriented Events:

- Warranty on file
- Owner's manual on file
- Auxiliary energy type

Grantee Report #4

Sale Price and Mortgage Data:

- Final sale price ($)
- Final rental rate ($)
- Mortgage amount ($)
- Period (months)
- Interest rate
- Mortgage approval date
- Mortgage type (FHA, VA, private, etc.)
- Points/fees
- Mortgagor
- Address
- Unit status (model, sold, rental)
- Report date
- Initial sales price ($)
- Initial rental rate ($)
- Instrumentation (unit)
- Mortgage arranged by (purchaser, builder, grantee)
- Problems obtaining mortgage

Marketing Data:

- Marketing period (weeks)
- Date house first offered
- Sales contract date
- Occupancy date
- Number of visitors
- Number of prospective buyers
- Marketing problems
- General reaction by public

TECHNICAL DESCRIPTION FILE ELEMENTS

Two sets of technical data were collected. The first was collected on about 25 percent of all non-instrumented systems and all of the instrumented systems. It contained a brief description of the solar energy system which was to be installed and information concerning predicted system performance. These data were basically extracted from Grantee Report #2, a report submitted by the grantee when the design of his system was completed and approved by HUD.

Description of Data

Project ID
Collector/Absorber Information:
- Azimuth angle
- Tilt angle
- Net area - collector
- Cover plate material information
- Cover plate thickness
- Number of cover plates
- Absorber coating
- Absorber substrate material
- Fluid passage material
- Material back insulation
- Overall R-value of back insulation
- Panel intercept (collector performance curve)
- Panel slope (collector performance curve)
- Incidence angle modifier
- Freeze protection

Storage and Transport Information:
- Main tank storage volume (heat)
- Main tank storage volume (DHW)
- Main tank storage medium (heat)
- Main tank storage medium (DHW)
- Pre-heat tank storage volume (heat)
- Pre-heat tank storage volume (DHW)
- Auxiliary tank storage volume (heat)
- Auxiliary tank storage volume (DHW)
- Storage temperature in main tank - upper
- Storage temperature in main tank - lower
- Thermal capacitance
- Storage capacity
- Combined heat exchanger efficiency: Collector-to-storage
- Combined heat exchanger efficiency: Storage-to-load
- Transport medium
- Water (percent by volume)
- Density
- Specific heat
- Flow rate

TECHNICAL DESCRIPTION FILE ELEMENTS (CONTINUED)

Air flow correction factor
Liquid load correction factor

Backup, Heat Pump, and DHW Information:
- Backup energy type - heat
- Backup energy type - cooling
- Backup energy type - DHW
- Backup capacity - heat
- Backup efficiency
- Heat pump type
- Heat pump - nominal capacity
- Backup capacity - DHW
- DHW usage
- DHW set temperature
- Monthly DHW inlet temperature

Miscellaneous Information:
- FR-prime-tau-alpha (system performance curve)
- FR-prime-UL (system performance curve)
- Ventilation
- Total heat loss factor - UA
- CD (correction factor to be used with the degree day calculation method)
- Internal heat gain
- City code (reference number for local weather and insolation data)
- System type

Solar Energy System Performance Information:
- Available insolation - monthly
- Solar contribution - monthly
- Auxiliary contribution - monthly
- Cooling load - monthly
- Heating load - monthly
- DHW load - monthly
- Total load - monthly
- Solar fraction - monthly
- Degree days - monthly
- Solar contribution - yearly
- Auxiliary contribution - yearly
- Cooling load - yearly
- Heating load - yearly
- DHW load - yearly
- Total load - yearly
- Solar fraction - yearly
- Degree days - yearly

The second set of technical data was collected on the components of the solar energy system to be instrumented. Predicted performance data,

schematics of the system and a site drawing were also included. These data were recorded on microfilm or microfiche.

Description of Data

System Schematics and Site Drawings

Project ID

Building and Site Description:
- Project location
- Building designer
- Mechanical designer
- Solar system designer
- General contractor
- Mechanical contractor
- Solar contractor
- Other participants (if any)
- Design integration monitor
- Type of solar system integration
- Regulatory codes
- Name and year of state or local code/regulation
- Model codes which are the basis for regulations
- General Characteristics:
  - Building type
  - Planned type of ownership
  - Planned type of occupancy
  - Development type

Site:
- Latitude
- Longitude
- Altitude
- Average summer temperature
- Average winter temperature

Heating Design Temperatures:
- Outdoor
- Indoor

Cooling Design Temperatures:
- Outdoor
- Indoor

Building:
- Front of building faces (direction)
- Average number of stories above ground
- Average number of stories below ground

TECHNICAL DESCRIPTION FILE ELEMENTS (CONTINUED)

- Total height above grade
- Total conditioned floor area
- Roof type

Design Heat Loss/Load and Related Building Data:

- Design heat loss/load to design conditions
- Heat loss/load calculation method
- Attic
- Design shaded glass areas
- Building ventilation rates
- Internal heat gain assumptions

Site:

- Heating degree days per month
- Insolation per month
- Heating degree days per year

Solar System Description:

- System ID:
  - Firm
  - Model name/number
- Type of system:
  - Air, active
  - Air, passive
  - Liquid, active
  - Liquid, passive
- System and component summary:
  - Number of collector types
  - Number of circulation loops
  - Number of thermal storage units
  - Number of operational modes
  - Number of pumps
  - Number of valves
  - Number of blowers
  - Number of dampers
  - Number of sensors
  - Number of flow regulators
  - Number of pressure regulators
  - Number of subsystem fail-safe controls

Solar System Cost and Lifetime Estimates:

- System design life
- Design life collector #1
- Design life collector #2

Equipment Costs:

- Collectors ($)
- Storage units ($)
- Distributon and controls ($)

TECHNICAL DESCRIPTION FILE ELEMENTS (CONTINUED)

Other Costs:
- Installation costs ($)
- Other ($)

Collector:
- Identification (manufacturer, address)
- Model name/number
- Type
- Location, orientation, tilt
- Array and collector characteristics
- Collector shading

Cover Plates:
- Number of cover plates
- Location
- Manufacturer
- Product name/number
- Material
- Physical dimensions
- Optical properties
- Edge or surface treatment

Absorber:
- Identification
- Material
- Number of absorbers per collector
- Coating
- Heat transfer fluid passages

Insulation:
- Layer one - sides
- Layer two - sides
- Layer one - back
- Layer two - back

Gaskets and Sealants:
- Location
- Material (sealants)
- Material (gaskets)

Frame:
- Identification
- Material
- Protective coating
- Standoffs
- Number of structural attachment points
- Built-in collector

TECHNICAL DESCRIPTION FILE ELEMENTS (CONTINUED)

Reflector:
- Identification
- Number of reflectors
- Substrate material
- Reflective coating
- Protective coating
- Physical dimensions

Other Information:
- Desiccant
- Freeze protection
- Overheating protection
- Passive collector heat transfer control

Collector Performance

Thermal Storage Unit

Sensible Heat Solid:
- Container information
- Storage medium
- Heat transport to and from medium
- Container materials
- Interior lining
- Container location
- Insulation types
- Exterior finish types
- Filters

Sensible Heat Liquid:
- Container information
- Storage medium
- Heat transport to and from medium
- Container construction
- Container materials
- Interior lining
- Container location
- Auxiliary heaters
- Container insulation
- Exterior finish types
- Filters
- Getters

Latent Storage Medium:
- Container information
- Storage medium
- Materials
- Additives
- Properties of medium

- Module for latent medium
- Heat transport to and from medium
- Auxiliary heaters
- Container construction
- Container materials
- Interior lining
- Container location
- Exterior insulation types
- Exterior finish types
- Getters
- Auxiliary heaters

Circulation Loop:

- Air:
  - Flow rate
  - Components within circulation loop
- Ducting:
  - Duct types
  - Location types
  - Joint types
  - Internal duct insulation
  - Internal finish
  - External duct insulation
  - External finish
  - Filters
- Liquid:
  - Flow rate
  - Heat transfer medium
- Piping:
  - Rigid piping type
  - Interior coating type
  - Flexible coupling type
  - Coupling reinforcement type
  - Piping and coupling connection type
  - Piping insulation type
  - Location
  - Exterior finish types
  - Finish and insulation - joint type
  - Filter types
  - Strainer types
  - Getters

Distribution:

- Pump (Circulator):
  - Pump information
  - Design conditions
- Valve

TECHNICAL DESCRIPTION FILE ELEMENTS (CONTINUED)

- Blower:
  - Blower information
  - Design conditions
- Damper

- Heat Exchanger:
  - Air to air
  - Air to liquid:
    - Material types
    - Heating
    - Cooling
  - Liquid to liquid:
    - Material types
    - Heating
    - Cooling
  - Air to refrigerant
  - Liquid to refrigerant

- Controls:
  - Control mode selector information
  - Sensors
  - Subsystem fail-safe controls
  - Tracking mount drive controls

- Auxiliary Energy:
  - Domestic water heater:
    - Energy source
    - Burner ignition method
    - Automatic flue vent
  - Furnace:
    - Energy source
    - Burner ignition method
    - Automatic flue vent
  - Electric resistance heaters
  - Boiler:
    - Energy source
    - Burner ignition method
    - Automatic flue vent
  - Air conditioning:
    - Air conditioning information
    - Refrigeration machine:
      - Description
      - Operating characteristics
      - Burner ignition method
      - Automatic flue vent
    - Heat rejection device
  - Dehumidifiers:
    - Description
    - Operating conditions

TECHNICAL DESCRIPTION FILE ELEMENTS (CONTINUED)

- Humidifiers:
  - Description
  - Operating conditions
- Supplemental heater
- Heat pumps (reverse cycle air conditioner):
  - Type
  - Heating mode
  - Cooling mode
- Heat pumps (reverse cycle refrigeration machine):
  - Description
- Heat pump heat exchanger:
  - Liquid to refrigerant
  - Air to refrigerant

Predicted System Performance:

- Space temperature (heating)
- Space temperature (cooling)
- Domestic hot water temperature
- Total demand load (MMBtu)
- Energy supplied by solar system (MMBtu)
- Energy supplied by auxiliary systems (MMBtu)
- Solar system operating energy (kWh)
- Simulation time period

TECHNICAL CONCERNS FILE ELEMENTS

Data for this file were generated when a technical representative made contact with a solar project where technical concerns were being experienced. These technical concerns ranged from minor concerns (such as delivery delays due to weather) to significant concerns (such as outgassing due to faulty material selection). Selected reports documenting technical concerns during design, construction, or operational phase of the project were transcribed and put onto the computer.

Description of Data

Project ID

System Number

Date of Contact

Hardware Element With a Technical Concern

Action Taken (i.e., repair, replace, etc.)

Event(s) Which Caused Technical Concern (i.e., breakage, delivery delay, etc.)

Action Taken by HUD, Grantee, etc.

Direct Cost of Action ($)

Performance Area (thermal, structural, mechanical, etc.)

Project Status (completed or action pending)

Phase (design, construction, operation)

Cycle Number

Type of Failure Which Caused the Technical Concern (catastrophic to questionable)

Frequency of Technical Concern

MARKETING SURVEY FILE ELEMENTS

This file contains survey research data from builders, lenders, zoning officials, solar homebuyers, and other market participants. Data are non-technical and designed to provide marketplace and attitudinal information as well as perceptions of constraints on the entry of solar energy to the residential housing market.

The data were obtained using one or a combination of 26 sets of interview questionnaires. Most collected information was used in several studies and analyses, including studies of building code regulations, economic performance modeling, financial feasibility, consumer attitudes, legal issues, and land use. About 25 percent of all grants were included in this sample. The same set of grants had technical description and utility consumption data collected.

Description of Data

Single Family Builder/Developer
Comparative Single Family Builder/Developer
Multi-Family Builder/Developer
Comparative Multi-Family Builder/Developer
Purchaser
Comparative Purchaser
Prospective Purchaser
Renter
Comparative Renter
Building Management
Participating Construction Lender
Participating Permanent Lender
Non-Participating Lender
Insurance Company
Utility Company (Auxiliary)
Utility Company (Alternative)
Local Planning and Zoning Official
Local Building Code Official
Local Tax Assessor
Purchaser Follow-Up
Comparative Purchaser Follow-Up
Renter Follow-Up
Comparative Renter Follow-Up
Participating Builder Follow-Up
Comparative Builder Follow-Up
Site/House Description

UTILITY CONSUMPTION FILE ELEMENTS

The utility consumption reports contain data solicited from utility companies which supply service to grant units. Information regarding auxiliary (non-solar) fuel consumed by housing units equipped with solar devices was collected along with comparative fuel consumption data on non-solar equipped units of similar size and design. About 25 percent of all grants contained systems for which utility consumption data were collected. This sample corresponded to the Marketing Survey File sample.

Description of Data

Project ID

Supplier:
- Auxiliary energy type
- Meter number
- Supplier code

Billing Information:
- Start of billing period
- End of billing period
- Present meter reading
- Previous meter reading
- Energy consumed
- Billing frequency

Cost Information:
- Rate code
- Energy cost ($)
- Surcharge, if any
- Tax
- Total cost this period ($)

6. INTERACTIVE ACCESS TO SOLAR DATA

Some users of the data which was collected in the Residential Solar Heating and Cooling Demonstration Program (those specifically authorized by HUD to do so) were able to directly access interactive files of the solar data base (see figure 2, page 51) through remotely situated computer terminals which were tied to the main computer at the National Bureau of Standards by telephone lines. The Solar Data Center (SDC) had provided access to the files through MIRADS (Marshall Information Retrieval and Display System).

MIRADS is an online storage and retrieval system generally used for retrieval of non-technical data, such as Grant File data. Under MIRADS, in response to the issuance of four basic commands: QUERY, SORT, COMPUTE, and PRINT; the system searches the data base (based on the selection criteria in the query command), sorts and retrieves selected data as specified, performs any computations requested, and prints the results.

The SDC had written the MIRADS User's Guide [6] for users of the interactive solar files. It contains the basic MIRADS language rules, examples of use, and a step-by-step walk-through of a typical interactive session.

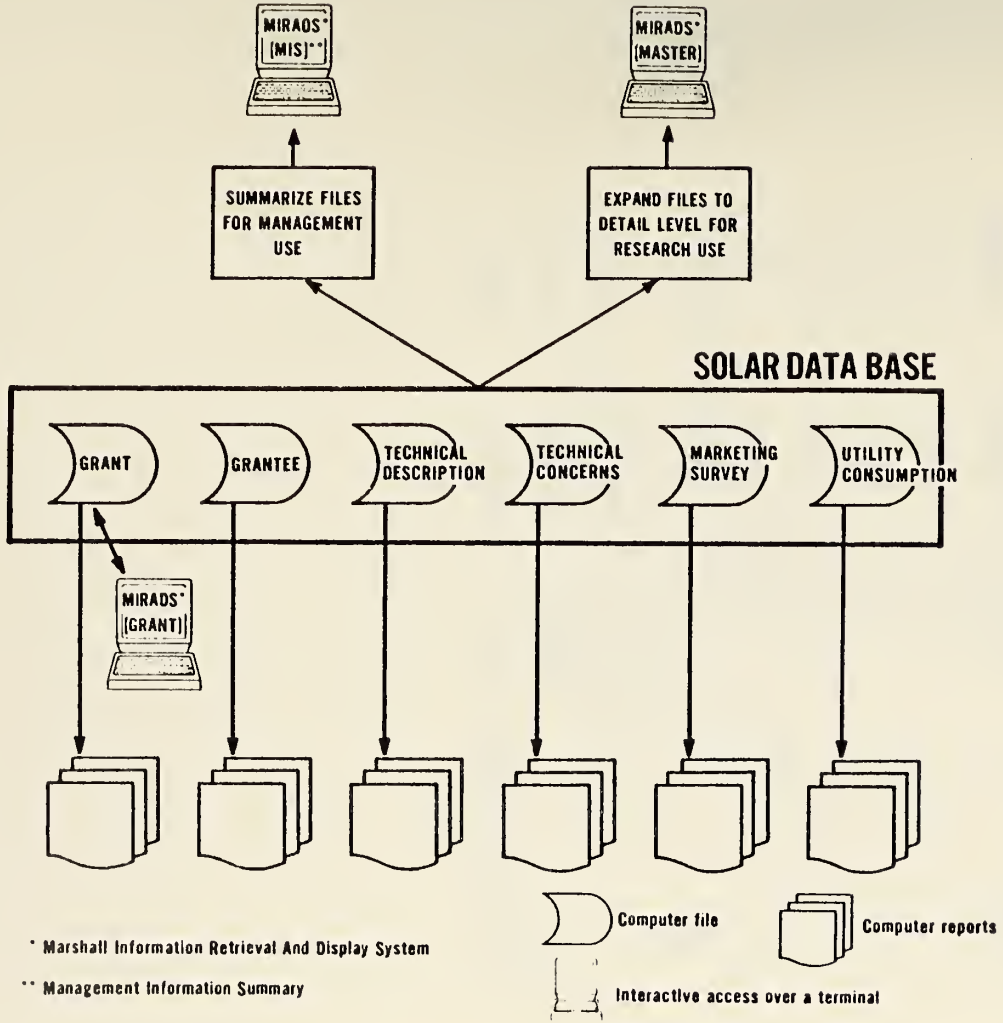

Figure 2. Solar data system.

7. AMOUNT OF DATA COLLECTED

The tables in this section show the amount of data collected during the Residential Solar Demonstration Program from 1975-1981.

Table 7. Summary of Grant File Data

Cycle	Grants	Dwelling Units	Systems
1	50	135	113
2	70	1290	253
3	145	3093	415
4	36	1709	58
4A	75	3617	236
5	130	175	101
P1	162	79	79
TOTAL ALL CYCLES:	668	10,098	1255

Table 8. Summary of Grantee File Data

Cycle	Grants	Dwelling Units	Systems*
1	50	88	
2	70	206	
3	145	262	
4	36	44	
4A	75	87	
5	130	31	
P1	162	61	
TOTAL ALL CYCLES:	668	779	

*Data not collected at this level.

Table 9. Summary of Technical Description File Data

Non-instrumented Systems

Cycle	Grants	Dwelling* Units	Systems
1	26		43
2	44		168
3	60		154
4	9		30
4A	12		33
TOTAL ALL CYCLES:	151		428

Instrumented Systems

Cycle	Grants	Dwelling* Units	Systems
1	6		10
2	26		31
3	19		26
4	2		3
4A	4		5
P1	4		5
TOTAL ALL CYCLES:	61		80

*Data not collected at this level.

Table 10. Summary of Technical Concerns File Data

Cycle	Grants	Dwelling* Units	Systems
1	36		70
2	57		171
3	99		217
4	13		14
4A	33		80
5	2		2
P1	2		2
TOTAL ALL CYCLES:	242		556

*Data not collected at this level.

Table 11. Summary of Marketing Survey File Data

Reference	Questionnaire Administered To:	Sample Size
RA	Single-Family (SF) Builder or Developer	138
RB	Comparative SF Builder or Developer	260
RC*	Multi-family (MF) Builder or Developer	
RE	Purchaser	276
RF	Comparative Purchaser	252
RG	Prospective Purchaser	52
RH*	Renter	
RJ*	Comparative Renter	
RL	Participating Construction Lender	105
RM	Participating Permanent Lender	
RN	Non-participating Lender	129
RO	Insurance Company/Agency	112
RP	Auxiliary Utility Company	92
RQ	Alternative Utility Company	43
RR	Local Planning/Zoning Official	105
RS	Local Building Code Official	104
RT	Local Tax Assessor	68
RU	Follow-up Builder	121
RV*	Follow-up Comparative Builder	137
RX*	Follow-up Comparative Purchaser	28
RW	Follow-up Purchaser	173
RW2	Second Follow-up Purchaser	117
RW3	Third Follow-up Purchaser	51
SI**	House/Site Description	531

* This data is available from RERC only in hard-copy files.
** The house/site description sample is approximately 80% of all possible single family, for-sale grants.

Table 12. Summary of Utility File Data

Cycle	Grants	Dwelling Units	Comparative Dwelling Units	Systems*
1	26	65	26	
2	32	105	30	
3	41	64	36	
4	6	9	4	
4A	4	9	0	
5	2	2	0	
P1	28	29		
TOTAL ALL CYCLES:	139	283	96	

*Data not collected at this level.

8. ACKNOWLEDGMENTS

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*Will be available from: National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

NBS-114A (REV. 2-8C)

U.S. DEPT. OF COMM. BIBLIOGRAPHIC DATA SHEET (See instructions)	1. PUBLICATION OR REPORT NO. NBSIR 81-2369	2. Performing Organ. Report No.	3. Publication Date October 1981

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5. AUTHOR(S)

Patricia M. Christopher and Audrey O. Houser

6. PERFORMING ORGANIZATION (If joint or other than NBS, see instructions)

NATIONAL BUREAU OF STANDARDS
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WASHINGTON, D.C. 20234

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8. Type of Report & Period Covered
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Department of Housing and Urban Development
Office of the Assistant Secretary for Policy Development and Research
Division of Energy, Building Technology and Standards
Washington, D.C. 20410

10. SUPPLEMENTARY NOTES

Supersedes NBSIR 79-1762, Residential Solar Data Center: Data Resources and Reports

Document describes a computer program; SF-185, FIPS Software Summary, is attached.

11. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here)

The Residential Solar Data Center (SDC) was responsible for the establishment and operation of a computerized data base containing non-instrumented residential data collected from the DoE/HUD Solar Heating and Cooling Demonstration Program. This document includes a summary of the history and background of the SDC and its role in the demonstration program, a list of the final computer reports which are available, sample pages of representative reports, and a description of the data files which comprised the solar data base.

12. KEY WORDS (Six to twelve entries; alphabetical order; capitalize only proper names; and separate key words by semicolons)

Automatic data processing; data base; residential buildings; solar data base; solar heating and cooling; solar energy systems.

13. AVAILABILITY

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