2012 Commercial Buildings Energy Consumption Survey (CBECS)

Mall Building Questionnaire – *Form EIA-871I*

HOW TO USE THIS QUESTIONNAIRE

The 2012 Commercial Buildings Energy Consumption Survey (CBECS) will be conducted using a *computer-assisted interview* programmed using a software called Blaise. A professional interviewer will administer the questionnaire to the building respondent using a laptop computer. The purpose of this paper representation of the questionnaire is to document the question text, fills, and skip patterns within the 2012 CBECS questionnaire.

PLEASE NOTE: All the question fills and skip patterns will be handled automatically by the software and will be transparent to the interviewer, so this document appears much more complex that the actual CBECS instrument.

Each question is formatted as follows:

A1	Question name	SASVAR
ASK		
FILL		
Question text		
RANGE		
NEXT		

The **black box** (A1 here) contains a question number, followed by the **Question name** and the *SAS variable* (if applicable) in the same row. If the SAS variable area says "*see below,*" the variables are found within the Question text box.

The **ASK** line describes what needs to be true for a question to be asked.

The **FILL** line describes any question fills and the conditions under which each appears. If the fill appears as something such as "A6 [Square footage]" this means that the figure given in question A1 will be filled in.

The **Question text** box shows the question text, and any other elements for each question, such as Show Card indicators or instructions, and the answer choices for each question.

The **RANGE** line is only applicable to numeric questions. It shows the range of answers that will be accepted by Blaise.

The **NEXT** line details the routing for the next question. Follow these instructions in order. Once a true statement is reached, go to the question indicated by the arrow (�).

WORKSHEET AND RESPONDENT QUESTIONS

R1	Consent	
ASK	All Mall Buildings	

[F1]-Help

Some parts of this interview will be recorded for quality control purposes. I'd like to continue now unless you have any questions.

◆ For FAQs, press [F1] - Help

    1   Gives consent to record interview
    2   Does <u>not </u>give consent to record interview

| **NEXT** | IF First time case started ➔ R2 [Worksheet 1]
IF Restart ➔ R4 [Respondent function] |

R2	Worksheet 1	*R1WS1 – RXWS1*
ASK	All Mall Buildings	

Do you have Worksheet 1 with you and completed?

    1   Yes
    2   No

| **NEXT** | IF First time case started ➔ R3 [Respondent function]
IF Restart ➔ R4 [Respondent function] |

R3	Respondent function	R1JOB

ASK	All cases on first start

SHOW CARD 1

◆ Take out the Show Card booklet or make sure the respondent
has access to them. It is <u>very important</u> to use
these cards, as some of them contain more information
than can be found on your CAPI screens.

Before we get started, we need to make sure that we have Show Cards available for some of the questions.
Please turn to Show Card 1.

Looking at this list, please tell me which of these best describes your job function.

1 Operations, maintenance, or engineering
2 Property management
3 Store management
4 Mall management
5 Administration or company management
6 Energy or environmental management
7 Building owner
8 Business owner
9 Accounting, finances, or payroll
10 Executive official
11 School official
12 Religious official
13 Support staff
14 Other

NEXT	IF Other ➔ R5 [Other job function] Anything but Other ➔ R6 [Building boundaries]

R4	Respondent function	R2JOB – RXJOB
ASK	All restarted cases	

◆ ASK if interview is with a new respondent

◆ If interview is with same respondent as previous interview, ENTER "0"

⬜⬜SHOW CARD 1

Before we get started, we need to make sure that we have Show Cards available for some of the questions. Please turn to Show Card 1.

Looking at this list, please tell me which of these best describes your job function.

    0   Same respondent as previous interview
    1   Operations, maintenance, or engineering
    2   Property management
    3   Store management
    4   Mall management
    5   Administration or company management
    6   Energy or environmental management
    7   Building owner
    8   Business owner
    9   Accounting, finances, or payroll
  10   Executive official
  11   School official
  12   Religious official
  13   Support staff
  14   Other

NEXT	IF Other ➔ R5 [Other job function] Anything but Other ➔ R6 [Building boundaries]

R5	Other job function	R1JOBX – RXJOBX
ASK	IF R3 [Respondent function] = Other OR R4 [Respondent function] = Other	

What is your job function?

NEXT	➔ R6 [Building boundaries]

R6	Building boundaries
ASK	All Buildings

The building that we're going to be talking about today is…

◆ EXP: [Describe the boundaries of the building as described in
      the header. The amount of detail necessary will vary by the situation.]

◆ ENTER "1" to continue

| **NEXT** | ➔ A1 [Strip mall name] |

SECTION A: <u>BUILDING SIZE AND AGE</u>

A1	Strip mall name	BLDGNAM
ASK	All Mall Buildings	
What is the name of this shopping center?		
NEXT	➔ A2 [Street address]	

A2	Street address	ADDRESS
ASK	All Mall Buildings	
Please tell me the address of the building, beginning with the street address.		
NEXT	➔ A3 [City]	

A3	City	CITY
ASK	All Mall Buildings	
What is the city?		
NEXT	➔ A4 [State]	

A4	State	STATE
ASK	All Mall Buildings	
		[F1]-HELP
What is the state? ◆ ENTER the two letter abbreviation		
NEXT	➔ A5 [ZIP code]	

A5	ZIP code	*ZIP*
ASK	All Mall Buildings	

And what is the ZIP code?

NEXT	➔ A6 [Square footage]

A6	Square footage	*SQFT*
ASK	All Mall Buildings	
FILL	**{Worksheet1Intro}** IF R has Worksheet 1 = "Please refer to Worksheet 1 for some of these next questions on general characteristics." OTHERWISE = BLANK	

[F1]-HELP

{Worksheet1Intro}

What is the gross or total square footage of all the space in this building both finished and unfinished, including basements, hallways, lobbies, stairways, elevator shafts, and indoor parking levels?

◆ DEF: [Total square footage = Length of building multiplied by width of building multiplied by the number of floors.]

◆ VERIFY number <u>digit by digit</u>

RANGE	1 to 999,999,999
NEXT	IF DK/RF ➔ A8 [Square footage category] IF 1,000 square feet or less ➔ A7 [End of interview] OTHERWISE ➔ A9 [Wall construction material]

A7	End of interview
ASK	IF A6 [Square footage] ≤ 1000
FILL	**{CollectWorksheet}** IF R has Worksheet 1 = "However, I would like to collect Worksheet 1 and any other worksheets that you may have completed."

Thank you, that's all the questions that I have at this time, since we are only interviewing buildings that are larger than one thousand square feet. {CollectWorksheet}

Thank you for your time and help.

◆ [F10]-Exit

NEXT	TERMINATE

A8	Square footage category	SQFTC
ASK	IF A6 [Square footage] = DK/RF	

[F1]-HELP

SHOW CARD A1

I understand that it may be difficult to give an exact figure for square footage. However, the size of your building is very important in helping understand its use of energy.

Please look at Show Card A1 and tell me which category best describes the total gross square footage in this building. There are examples provided to help you estimate.

◆ If respondent gives the category code,
   VERIFY the response by reading the full answer

1	1,000 square feet or less
2	1,001 to 5,000 square feet
3	5,001 to 10,000 square feet
4	10,001 to 25,000 square feet
5	25,001 to 50,000 square feet
6	50,001 to 100,000 square feet
7	100,001 to 200,000 square feet
8	200,001 to 500,000 square feet
9	500,001 to 1 million square feet
10	Over 1 million square feet

NEXT	➔ A9 [Wall construction material]

A9	Wall construction material	WLCNS
ASK	All Mall Buildings	

[F1]-HELP

SHOW CARD A2

Please look at Show Card A2 for a list of different types of construction materials. Which of these best describes the major type of exterior wall construction material used on this building?

1	Brick, stone, or stucco
2	Pre-cast concrete panels
3	Concrete block or poured concrete (above grade)
4	Aluminum, asbestos, plastic, or wood siding, shingles, tiles, or shakes
5	Sheet metal panels
6	Window or vision glass (glass that can be seen through)
7	Decorative or construction glass
8	IF VOLUNTEERED: No one major type
9	IF VOLUNTEERED: Other

NEXT	➔ A10 [Roof construction material]

A10	Roof construction material	RFCNS
ASK	All Mall Buildings	

[F1]-HELP

⬜SHOW CARD A3

Please look at Show Card A3 for a list of different types of roofing materials. Which of these best describes the building's predominant exterior roof surface?

     1   Built-up (tar, felts, or fiberglass and a ballast, such as stone)
     2   Slate or tile shingles
     3   Wood shingles, shakes, or other wooden materials
     4   Asphalt, fiberglass, or other shingles
     5   Metal surfacing
     6   Plastic, rubber, or synthetic sheeting (single or multiple ply)
     7   Concrete
     8   IF VOLUNTEERED: No one major type
     9   IF VOLUNTEERED: Other

NEXT	➔ A11 [Cool roof materials]

A11	Cool roof materials	RFCOOL
ASK	All Mall Buildings	

Is the roof of this building designed to reduce solar heat gain, also known as a "cool roof"?

◆ EXP: [Roofs with a highly reflective surface, a ballasted
     roof system, a vegetated roof system, or any combination of these
     technologies should be considered a "cool roof".]

     1   Yes
     2   No

NEXT	➔ A12 [Roof tilt]

A12	Roof tilt	RFTILT
ASK	All Mall Buildings	

⬜SHOW CARD A4

Looking at Show Card A4, please tell me which best describes the tilt or pitch of the roof of this building.

     1   Flat
     2   Shallow pitch
     3   Steeper pitch

NEXT	➔ A13 [Building shape]

A13	Building shape	BLDSHP
ASK	All Mall Buildings	

SHOW CARD A5

Looking at Show Card A5, which of these shapes most resembles the floorplan of this building at ground level? This is sometimes called the "footprint" of the building.

- 1 Square
- 2 Wide rectangle
- 3 Narrow rectangle
- 4 Rectangle or square with an interior courtyard
- 5 "H" shaped
- 6 "U" shaped
- 7 "E" shaped
- 8 "T" shaped
- 9 "L" shaped
- 10 "+" or cross shaped
- 11 Other shape

NEXT	➜ A14 [Percent exterior glass]

A14	Percent exterior glass	GLSSPC
ASK	All Mall Buildings	

SHOW CARD A6

Which of the ranges on Show Card A6 best describes the percent of the exterior wall surface of this building that is covered with window glass or glass doors?

- 1 1 percent or less
- 2 2 to 10 percent
- 3 11 to 25 percent
- 4 26 to 50 percent
- 5 51 to 75 percent
- 6 76 to 100 percent

NEXT	➜ A15 [Equal glass on all sides]

A15	Equal glass on all sides	EQGLSS
ASK	All Mall Buildings	

Is the amount of glass about the same for all sides of the building?

- 1 Yes
- 2 No

NEXT	IF Yes ➜ A17 [Number of floors] IF No OR DK/RF ➜ A16 [Glass sides most sunlight]

A16	**Glass sides most sunlight**	*SUNGLS*
ASK	IF A15 [Equal glass on all sides] = No OR DK/RF	

Do the sides receiving direct sunlight have more or less glass area than the sides that do not receive direct sunlight?

    1   More glass area
    2   Less glass area
    3   IF VOLUNTEERED: About the same amount

NEXT	➔ A17 [Number of floors]

A17	**Number of floors**	*NFLOOR*
ASK	All Mall Buildings	

[F1]-HELP

How many floors are in the tallest section of the building, including basements, parking levels, or any other floors below ground level, but excluding half-floors, mezzanines, balconies, and lofts?

◆ PROBE for estimate if DK

RANGE	1 to 999
NEXT	➔ A18 [Floor-to-ceiling height]

A18	**Floor-to-ceiling height**	*FLCEILHT*
ASK	All Mall Buildings	

What is the typical floor-to-ceiling height in this building?

◆ DEF: [Floor-to-ceiling height is the distance, in feet, from the floor to the ceiling surface.]

◆ EXP: [If it varies by establishment, ask for the height of the majority of the establishments.]

RANGE	5 to 500
NEXT	IF A17 [Number of floors] = 1 ➔ A23 [Year of construction] IF More than one floor OR DK/RF ➔ A19 [Elevators]

A19	Elevators	ELEVTR

ASK	IF A17 [Number of floors] >1 OR DK/RF

Are there any elevators in this building?

    1   Yes
    2   No

NEXT	IF Yes ➔ A11 [Number of elevators] IF No OR DK/RF ➔ A21 [Escalators]

A20	Number of elevators	NELVTR

ASK	IF A19 [Elevators] = Yes

How many elevators are there?

◆ PROBE for estimate if DK

RANGE	1 to 999
NEXT	➔ A21 [Escalators]

A21	Escalators	ESCLTR

ASK	IF A17 [Number of floors] >1 OR DK/RF

Are there any escalators in this building?

◆ EXP: ["Moving sidewalks" should be included as escalators.]

    1   Yes
    2   No

NEXT	IF Yes ➔ A22 [Number of escalators] IF No OR DK/RF ➔ A23 [Year of construction]

A22	**Number of escalators**	*NESLTR*

ASK	IF A21 [Escalators] = Yes

How many escalators are there? Count <u>each</u> one, for example, a pair of up and down escalators should be counted as two.

◆ EXP: ["Moving sidewalks" should be counted as escalators.]

◆ PROBE for estimate if DK

RANGE	1 to 99
NEXT	➔ A23 [Year of construction]

A23	**Year of construction**	*YRCON*

ASK	All Mall Buildings

[F1]-HELP

What year was this building constructed? If there have been major additions, give the year the <u>largest portion</u> of the building was completed.

RANGE	1600 to 2013
NEXT	IF DK/RF ➔ A24 [Year of construction category] IF 2012 ➔ A26 [Month ready for occupancy] IF 2013 ➔ A25 [End of interview] IF 1999 or earlier ➔ A27 [Renovations] IF 2000 or later ➔ B1 [On a multibuilding complex]

A24	Year of construction category	*YRCONC*
ASK	IF A23 [Year of construction] = DK/RF	

[F1]-HELP

☐SHOW CARD A7

Please look at Show Card A7 and tell me which range best describes when this building was constructed.

   1   Before 1920
   2   1920 to 1945
   3   1946 to 1959
   4   1960 to 1969
   5   1970 to 1979
   6   1980 to 1989
   7   1990 to 1999
   8   2000 to 2003
   9   2004 to 2007
  10   2008 to 2012
  11   IF VOLUNTEERED: 2013

NEXT	IF 2013 ➔ A25 [End of interview] IF Before 1999 ➔ A27 [Renovations] IF 2000 to 2012 ➔ B1 [On a multibuilding complex]

A25	End of interview
ASK	IF A23 [Year of construction] = 2013 OR A24 [Year of construction category] = 2013
FILL	**{CollectWorksheet}** IF R has Worksheet 1 = "However, I would like to collect Worksheet 1 and any other worksheets that you may have completed."

Thank you, that's all the questions that I have at this time, since we are only interviewing structures that were ready for occupancy before January 1, 2008. {CollectWorksheet}

Thank you for your time and help.

◆ [F10] - Exit

NEXT	TERMINATE

A26	**Month ready for occupancy**	*MONCON*
ASK	IF A23 [Year of construction] = 2012	

[F1]-HELP

In what month of 2012 was this building first ready for occupancy?

    1   January
    2   February
    3   March
    4   April
    5   May
    6   June
    7   July
    8   August
    9   September
  10   October
  11   November
  12   December

NEXT	➔ B1 [On a multibuilding complex]

A27	Renovations	RENOV

ASK	IF A23 [Year of construction] = 2007 or earlier OR A24 [Year of construction category] = Any category (OR DK/RF) except 2008 to 2012
FILL	**{Since1990orConstructed}** IF A23 [Year of construction] = 1990 or later OR A24 [Year of construction category] = 1990 to 1999, 2000 to 2003, OR 2004 to 2007 = "since it was constructed" OTHERWISE = "since 1990"

Has any portion of this building undergone renovations {Since1990orConstructed}?

    1   Yes
    2   No

NEXT	IF Yes ➔ A28 [What renovations] IF No OR DK/RF ➔ B1 [On a multibuilding complex]

A28	What renovations	see below

ASK	IF A27 [Renovations] = Yes
FILL	**{Since1990orConstructed}** IF A23 [Year of construction] = 1990 or later OR A24 [Year of construction category] = 1990 to 1999, 2000 to 2003, OR 2004 to 2007 = "since it was constructed" OTHERWISE = "since 1990"

⬜SHOW CARD A8

Please look at Show Card A8 and tell me which types of renovations have been done
{Since1990orConstructed}.

◆ PROBE for any others

◆ ENTER all that apply

1	Addition or annex	RENADD
2	Reduction of enclosed floorspace	RENRDC
3	Interior or exterior cosmetic improvements	RENCOS
4	Interior wall re-configuration	RENINT
5	Roof replacement	RENRFF
6	Exterior wall replacement	RENWLL
7	Window replacement	RENWIN
8	HVAC equipment upgrade	RENHVC
9	Lighting upgrade	RENLGT
10	Plumbing system upgrade	RENPLB
11	Electrical upgrade	RENELC
12	Insulation upgrade	RENINS
13	Fire, safety, or security upgrade	RENSAF
14	Structural upgrade	RENSTR
15	Other	RENOTH

NEXT	IF Other ⇨ A29 [Other renovation] OTHERWISE ➔ B1 [On a multibuilding complex]

A29	Other renovation
ASK	IF A28 [What renovations] = Other

Please describe the other type of renovation.

◆ RECORD in open box

NEXT	➔ B1 [On a multibuilding complex]

SECTION B: <u>BUILDING ACTIVITY</u>

B1	**On a multibuilding complex**	*FACIL*

ASK	All Mall Buildings

[F1]-HELP

Is this building part of a multibuilding campus or complex?

◆ DEF: [A campus or complex is a group of two or more buildings on the
       same site that are owned or operated by a single organization or individual.
       It may also be referred to as a multibuilding facility.]

    1   Yes
    2   No

NEXT	IF Yes ➔ B2 [Federal complex] IF No OR DK/RF ➔ C1 [Government owned]

B2	**Federal complex**	*FEDFAC*

ASK	IF B1 [On a multibuilding complex] = Yes

[F1]-HELP

Is this <u>campus or complex</u> owned by the Federal government?

    1   Yes
    2   No

NEXT	➔ B3 [Type of complex]

B3	Type of complex	FACACT

ASK	IF B1 [On a multibuilding complex] = Yes

[F1]-HELP

 SHOW CARD B16

Looking at the list on Show Card B16, what is the primary business or function of this group of buildings as a whole?

     1   College, university, or junior college
     2   Primary or secondary school [GRADES K-12]
     3   Other type of school
     4   Office complex
     5   Retail complex
     6   Storage complex
     7   Religious campus or complex
     8   Hospital or other health care complex
     9   Lodging or resort complex
    10   Post office complex
    11   Prison or correctional facility
    12   Other type of government complex
    13   Industrial complex
    14   Transportation complex such as a terminal, depot, or airport
    15   Other type of campus or complex

NEXT	IF Industrial complex ➔ B4 [Manufacturing industrial] IF Any other type ➔ C1 [Government owned]

B4	Manufacturing industrial	MANIND

ASK	IF B3 [Type of complex] = Industrial complex

[F1]-HELP

Is it a <u>manufacturing</u> industrial complex?

◆ DEF: [Manufacturing industrial complexes involve the production
     or processing of goods, merchandise, raw materials, or food.]

     1   Yes
     2   No

NEXT	IF Yes ➔ B5 [Same owner as manufacturing] IF No OR DK/RF ➔ C1 [Government owned]

B5	Same owner as manufacturing	*MANFAC*
ASK	IF B4 [Manufacturing industrial] = Yes	

[F1]-HELP

Does this building have the same owner and operator as the manufacturing campus or complex?

    1   Yes
    2   No

NEXT	IF Yes ➜ B6 [End of interview] IF No OR DK/RF ➜ C1 [Government owned]

B6	End of interview
ASK	IF B5 [Same owner as manufacturing] = Yes
FILL	**{CollectWorksheet}** IF R has Worksheet 1 = "However, I would like to collect Worksheet 1 and any other worksheets that you may have completed."

Thank you, that's all the questions that I have at this time, since this study does not include buildings on manufacturing facilities. {CollectWorksheet}

Thank you for your time and help.

◆ [F10]-Exit

NEXT	TERMINATE

SECTION C. OCCUPANCY AND OPERATING HOURS

C1	Government owned	GOVOWN

ASK	All Mall Buildings
FILL	**{BldgIntro}** IF B1 [On a multibuilding complex] = Yes = "For the rest of this survey, I will be asking you only about the <u>building</u>, not the entire campus or complex." OTHERWISE = BLANK

[F1]-HELP

{BldgIntro}

Is this building owned by a government agency?

     1   Yes
     2   No

NEXT	IF Yes ➔ C2 [Type of government] IF No OR DK/RF ➔ C3 [Owner]

C2	Type of government	GOVTYP

ASK	IF C1 [Government owned] = Yes

[F1]-HELP

Is it owned by the Federal government, a State government, or a local government?

     1   Federal
     2   State
     3   Local

NEXT	➔ C5 [Number of businesses]

C3	Owner	OWNER
ASK	IF C1 [Government owned] ≠ Yes	

⬚SHOW CARD C1

Looking at Show Card C1, please tell me which category best describes the owner of this building.

     1   Real estate investment trust (REIT)
     2   Other public or private corporation, partnership, LLC, or LLP
     3   Individual owner(s)
     4   Religious organization
     5   Non-profit organization (other than religious or government)
     6   Private academic institution
     7   Other

NEXT	IF Anything except Other ➔ C5 [Number of businesses] IF Other ➔ C4 [Other owner]

C4	Other owner
ASK	IF C3 [Owner] = Other

Please describe this other owner.

◆ RECORD in open box

NEXT	➔ C5 [Number of businesses]

C5	Number of businesses	NOCC
ASK	All Mall Buildings	

[F1]-HELP

How many tenant spaces are there in this building, including vacant spaces?

RANGE	1 to 9,999
NEXT	IF DK/RF ➔ C6 [Number of businesses category] IF C1 [Government owned] = DK/RF & C3 [Owner] = DK/RF ➔ C15 [Months in use] OTHERWISE ➔ C7 [Owner occupies]

C6	**Number of businesses category**	*NOCCAT*

ASK	IF C5 [Number of businesses] = DK/RF

[F1]-HELP

☐SHOW CARD C2

Please look at Show Card C2 and tell me which category best describes the number of tenant spaces in this building?

    1   One
    2   2 to 5
    3   6 to 10
    4   11 to 20
    5   21 to 50
    6   51 to 100
    7   More than 100

NEXT	IF C1 [Government owned] = DK/RF & C3 [Owner] = DK/RF ➔ C15 [Months in use] OTHERWISE ➔ C7 [Owner occupies]

C7	**Owner occupies**	*OWNOCC*

ASK	IF **NOT** (C1 [Government owned] = DK/RF & C3 [Owner] = DK/RF)

Is the space in this building occupied by the owner, leased to tenants, or a combination of both?

    1   Owner occupies
    2   Leased to tenants
    3   Combination of occupied and leased

NEXT	➔ C8 [Owner operates]

C8	**Owner operates**	*OWNOPR*

ASK	IF **NOT** (C1 [Government owned] = DK/RF & C3 [Owner] = DK/RF)

Is the building owner responsible for the operation and maintenance of the energy systems?

    1   Yes
    2   No

NEXT	IF Yes ➔ C9 [Owner has purchasing power] IF No ➔ C11 [Nonowner operator] IF DK/RF ➔ C15 [Months in use]

C9	**Owner has purchasing power**	*OWNPPR*

ASK	IF C8 [Owner operates] = Yes

Does the building owner also have direct input on decisions regarding purchases of energy-related equipment?

    1   Yes
    2   No

NEXT	IF Yes OR DK/RF ➔ C15 [Months in use] IF No ➔ C10 [Nonowner has purchasing power]

C10	**Nonowner has purchasing power**	*NWNPPR*

ASK	IF C9 [Owner has purchasing power] = No

☐SHOW CARD C3

Looking at Show Card C3, please tell me who <u>does</u> have direct input (on decisions regarding purchases of energy-related equipment).

    1   Property management company or leasing agent
    2   Business owner or tenant
    3   Facilities personnel employed directly by the building owner
    4   Facilities or energy management consultant
    5   Volunteer member of the organization
    6   Manager with general supervisory duties
    7   Other

NEXT	IF Other ➔ C14 [Other with purchasing power] OTHERWISE ➔ C15 [Months in use]

C11	**Nonowner operator**	*NWNOPR*

ASK	IF C8 [Owner operates] = No

☐SHOW CARD C3

Looking at Show Card C3, please tell me who <u>is</u> responsible for the operation and maintenance of the energy systems.

    1   Property management company or leasing agent
    2   Business owner or tenant
    3   Facilities personnel employed directly by the building owner
    4   Facilities or energy management consultant
    5   Volunteer member of the organization
    6   Manager with general supervisory duties
    7   Other

NEXT	IF Other ➔ C12 [Other operator] OTHERWISE ➔ C13 [Who has purchasing power]

C12	**Other operator**

ASK	IF C11 [Nonowner operator] = Other

Please describe who is responsible for the operation and maintenance of the energy systems.

◆ RECORD in open box

NEXT	➔ C13 [Who has purchasing power]

C13	**Who has purchasing power**	*WHOPPR*
ASK	IF C8 [Owner operates] = No	

Who has the most direct input on decisions regarding purchases of energy-related equipment - the building owner or the party who is responsible for the energy systems?

    1   Building owner
    2   Party responsible for building operations
    3   IF VOLUNTEERED: Both (either they have equal input, or are the same person)
    4   IF VOLUNTEERED: Other

NEXT	IF Other ➔ C14 [Other with purchasing power] OTHERWISE ➔C15 [Months in use]

C14	**Other with purchasing power**
ASK	IF C13 [Who has purchasing power] = Other

Please describe who has the most direct input on decisions regarding purchases of energy-related equipment.

◆ RECORD in open box

NEXT	➔C15 [Months in use]

C15	**Months in use**	*MONUSE*
ASK	All Mall Buildings	

<div align="right">[F1]-HELP</div>

Thinking of calendar year 2012, for how many months was this building in use?

RANGE	0 to 12
NEXT	IF Zero ➔ D1 [Heating] IF 1-12 months OR DK/RF ➔ C16 [Percent occupancy]

C16	Percent occupancy	*OCCUPYP*
ASK	IF C15 [Months in use] ≠ Zero	
FILL	**{MonthsInUse}** IF C18 [Months in use] < 12 = "Thinking about the months that this building was in use in 2012, about " OTHERWISE = 'In 2012, about '	
	{MonthsInUse} what percent of the total floorspace of this building was <u>occupied</u>? If occupancy varied, please provide an average percent occupancy."	
RANGE	0 to 100	
NEXT	➔ D1 [Heating]	

SECTION D. <u>ENERGY USE AND EQUIPMENT</u>

D1	Heating	*HT1*

ASK	All Buildings

FILL	**{Worksheet1Intro}** IF R has Worksheet 1 = "Please continue to refer to Worksheet 1 for some of these next questions on energy sources, uses, and equipment." OTHERWISE = BLANK

[F1]-HELP

{Worksheet1Intro}

For the next five questions, please tell me if energy was used in this building for any of these purposes during calendar year 2012.

Was any energy used for heating the building?

    1   Yes
    2   No

NEXT	➔ D2 [Cooling]

D2	Cooling	*COOL*

ASK	All Buildings

[F1]-HELP

(Was any energy used...)

For air conditioning?

    1   Yes
    2   No

NEXT	➔ D3 [Water heating]

D3	Water heating	*WATR*

ASK	All Buildings

[F1]-HELP

(Was any energy used...)

For heating water for purposes such as washing hands, dishes, or clothes?

    1   Yes
    2   No

NEXT	➔ D4 [Cooking]

D4	**Cooking**	*COOK*
ASK	All Buildings	

[F1]-HELP

(Was any energy used...)

For cooking?

◆ EXP: [If there is only minimal cooking, such as
   microwaves, hot plates, or toaster ovens, answer "No."]

     1   Yes
     2   No

NEXT	IF D1 [Heating] = DK/RF & D2 [Cooling] = DK/RF & D3 [Water heating] = DK/RF & D4 [Cooking] = DK/RF ➔ D5 [Missing end uses] OTHERWISE ➔ D6 [Manufacturing]

D5	**Missing end uses**
SHOW	IF D1 [Heating] = DK/RF & D2 [Cooling] = DK/RF & D3 [Water heating] = DK/RF & D4 [Cooking] = DK/RF

◆ INTERVIEWER: You have entered DK or RF for the four major end use questions.
   This information is important for understanding how energy is used in this building.
   You may need to find a new respondent at this point. Explain to the current respondent
   that the remainder of the questionnaire contains technical information about energy use
   and equipment and ask whether the respondent would want us to consult someone else in
   the building for these questions.

◆ ENTER "1" when you are ready to continue

NEXT	➔ D6 [Manufacturing]

D6	**Manufacturing**	*MANU*
ASK	All Buildings	

[F1]-HELP

(Was any energy used...)

For manufacturing?

     1   Yes
     2   No

NEXT	IF No & D1 [Heating] = No & D2 [Cooling] = No & D3 [Water heating] = No & D4 [Cooking] = No ➔ D7 [Any energy used] OTHERWISE ➔ D8 [Electricity generation capability]

D7	Any energy used	ANYEGY
ASK	IF D1 [Heating] = No & D2 [Cooling] = No & D3 [Water heating] = No & D4 [Cooking] = No & D6 [Manufacturing] = No	

I did not record any uses of energy for this building. Did this building use <u>any</u> energy in 2012 for other purposes, such as lighting or appliances?

    1   Yes, some energy was used in 2012
    2   No, no energy was used

NEXT	IF Yes, some energy was used OR DK/RF ⇨ D8 [Electricity generation capability] IF No, no energy was used ⇨ INTERVIEW COMPLETE

D8	Electricity generation capability	CAPGEN
ASK	IF D1 [Heating] = Yes OR D2 [Cooling] = Yes OR D3 [Water heating] = Yes OR D4 [Cooking] = Yes OR D6 [Manufacturing] = Yes OR D7 [Any energy used] = Yes, some energy was used OR DK/RF	

[F1]-HELP

Does this building have the ability to generate electricity, including for emergency backup?

    1   Yes
    2   No

NEXT	⇨ D9 [Energy sources used]

D9	**Energy sources used**	*see below*
ASK	IF D1 [Heating] = Yes OR D2 [Cooling] = Yes OR D3 [Water heating] = Yes OR D4 [Cooking] = Yes OR D6 [Manufacturing] = Yes OR D7 [Any energy used] = Yes, some energy was used OR DK/RF	

[F1]-HELP

SHOW CARD D1

Looking at this list of energy sources on Show Card D1, please tell me which ones were used in this building for any purpose in 2012.

◆ EXP: [Include fuel oil, diesel, or kerosene if it was purchased or delivered in 2012, even if it was not used during that time.]

◆ EXP: [Do not include any fuels used in vehicles outside the building.]

◆ PROBE for any others

◆ ENTER all that apply

11	Electricity	*ELUSED*
12	Natural gas	*NGUSED*
13	Fuel oil, diesel, or kerosene	*FKUSED*
14	Bottled gas, also known as LPG or propane	*PRUSED*
15	District steam piped in from a separate building or utility	*STUSED*
16	District hot water piped in from a separate building or utility	*HWUSED*
17	District chilled water piped in from a separate building or utility	*CWUSED*
18	Wood, coal, or solar	
24	Other source or sources	*OTUSED*

NEXT	IF Fuel, oil, diesel, or kerosene ⇨ D10 [Fuel oil, diesel, or kerosene]
	IF Wood, coal, or solar ⇨ D11 [Wood, coal, or solar]
	IF Other source or sources ⇨ D12 [Other energy source 1]
	IF District steam, District hot water, OR District chilled water
	   & B1 [On a multibuilding complex] = Yes ⇨ D15 [From central plant]
	IF District steam, District hot water, OR District chilled water
	   & B1 [On a multibuilding complex] ≠ Yes ⇨ D20 [Purchase from offsite]
	IF DK/RF:
	   IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	   IF D8 [Electricity generation capability] ≠ Yes ➜ INTERVIEW COMPLETE
	OTHERWISE:
	   IF D1 [Heating] = Yes ⇨ D21 [Source for main heating]
	   IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
	   IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	   IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	   IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	   IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	   OTHERWISE ⇨ D87 [Any other sources]

D10	Fuel oil, diesel, or kerosene	*FKTYPE*

ASK	IF Fuel oil, diesel, or kerosene IN D9 [Energy sources used]

[F1]-HELP

◆ VERIFY if volunteered in previous question

You mentioned fuel oil, diesel, or kerosene. Which of these were used (in this building in 2012)?

◆ ENTER all that apply

    1   Fuel oil
    2   Diesel
    3   Kerosene

NEXT	IF Wood, coal, or solar IN D9 [Energy sources used] ⇨ D11 [Wood, coal, or solar]
	IF Other source or sources IN D9 [Energy sources used] ⇨ D12 [Other energy source 1]
	IF District steam, District hot water, OR District chilled water
	  & B1 [On a multibuilding complex] = Yes ⇨ D15 [From central plant]
	IF District steam, District hot water, OR District chilled water
	  & B1 [On a multibuilding complex] ≠ Yes ⇨ D20 [Purchase from offsite]
	OTHERWISE:
	  IF D1 [Heating] = Yes ⇨ D21 [Source for main heating]
	  IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
	  IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	  IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	  IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	  IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	  OTHERWISE ⇨ D87 [Any other sources]

D11	**Wood, coal, or solar**	*see below*
ASK	IF Wood, coal, or solar IN D9 [Energy sources used]	

◆ VERIFY if volunteered in previous question

You mentioned wood, coal, or solar. Which of these were used (in this building in 2012)?

◆ ENTER all that apply

1	Wood	*WOUSED*
2	Coal	*COUSED*
3	Solar	*SOUSED*

NEXT	IF Other source or sources IN D9 [Energy sources used] ⇨ D12 [Other energy source 1]
	 IF District steam, District hot water, OR District chilled water
	  & B1 [On a multibuilding complex] = Yes ⇨ D15 [From central plant]
	 IF District steam, District hot water, OR District chilled water
	  & B1 [On a multibuilding complex] ≠ Yes ⇨ D20 [Purchase from offsite]
	 OTHERWISE:
	  IF D1 [Heating] = Yes ⇨ D21 [Source for main heating]
	  IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
	  IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	  IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	  IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	  IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	  OTHERWISE ⇨ D87 [Any other sources]

D12	**Other energy source 1**	*OTUSDX1*
ASK	IF Other source or sources IN D9 [Energy sources used]	

What was the first other energy source used (in this building in 2012)?

◆ ENTER the first energy source used

NEXT	⇨ D13 [Other energy source 2]

D13	**Other energy source 2**	*OTUSDX2*
ASK	IF Other source or sources IN D9 [Energy sources used]	

Were there any other energy sources used (in this building in 2012)?

◆ ENTER the next energy source

◆ [ENTER] if no others

| **NEXT** | IF Source entered here ⇨ D14 [Other energy source 3]
IF No source entered here:
    IF District steam, District hot water, OR District chilled water
      & B1 [On a multibuilding complex] = Yes ⇨ D15 [From central plant]
    IF District steam, District hot water, OR District chilled water
      & B1 [On a multibuilding complex] ≠ Yes ⇨ D20 [Purchase from offsite]
    OTHERWISE:
      IF D1 [Heating] = Yes ⇨ D21 [Source for main heating]
      IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
      IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
      IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
      IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
      IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
      OTHERWISE ⇨ D87 [Any other sources] |

D14	**Other energy source 3**	*OTUSDX3*
ASK	IF Source was entered in D13 [Other energy source 2]	

Were there any other energy sources used (in this building in 2012)?

◆ ENTER the next energy source

◆ [ENTER] if no others

| **NEXT** | IF District steam, District hot water, OR District chilled water
      & B1 [On a multibuilding complex] = Yes ⇨ D15 [From central plant]
IF District steam, District hot water, OR District chilled water
      & B1 [On a multibuilding complex] ≠ Yes ⇨ D20 [Purchase from offsite]
OTHERWISE:
    IF D1 [Heating] = Yes ⇨ D21 [Source for main heating]
    IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
    IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
    IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
    IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
    IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
    OTHERWISE ⇨ D87 [Any other sources] |

D15	**From central plant**	*DHFRPL*

ASK	IF District steam, District hot water, OR District chilled water IN D9 [Energy sources used] & B1 [On a multibuilding facility] =Yes

[F1]-HELP

Is the district steam, district hot water, or district chilled water piped in from a central plant that is part of the same campus or complex as your building?

    1   Yes
    2   No

NEXT	IF No OR DK/RF ⇨ D20 [Purchase from offsite]
	IF Yes:
	   IF NOT District steam IN D9 [Energy sources used] ➜ D16 [Plant produces district steam]
	   IF District steam IN D9 [Energy sources used]:
	     IF NOT District hot water IN D9 [Energy sources used] ⇨ D17 [Plant produces district hot water]
	     IF NOT District chilled water IN D9 [Energy sources used]
	       ⇨ D18 [Plant produces district chilled water]
	     OTHERWISE ➜ D19 [Plant produces electricity]

D16	**Plant produces district steam**	*FACDST*

ASK	IF D15 [From central plant] = Yes & NOT District steam IN D9 [Energy sources used]

[F1]-HELP

Does the central physical plant produce...

District steam?

    1   Yes
    2   No

NEXT	IF NOT District hot water IN D9 [Energy sources used] ⇨ D17 [Plant produces district hot water] IF NOT District chilled water IN D9 [Energy sources used] ⇨ D18 [Plant produces district chilled water] OTHERWISE ➜ D19 [Plant produces electricity]

D17	**Plant produces district hot water**	*FACDHW*

ASK	IF D15 [From central plant] = Yes & NOT District hot water IN D9 [Energy sources used]

[F1]-HELP

(Does the central physical plant produce...)

District hot water?

    1   Yes
    2   No

NEXT	IF District chilled water IN D9 [Energy sources used] ⇨ D19 [Plant produces electricity] OTHERWISE ⇨ D18 [Plant produces district chilled water]

D18	**Plant produces district chilled water**	*FACDCW*

ASK	IF D15 [From central plant] = Yes & NOT District chilled water IN D9 [Energy sources used]

[F1]-HELP

(Does the central physical plant produce...)

District chilled water?

    1   Yes
    2   No

NEXT	➔ D19 [Plant produces electricity]

D19	**Plant produces electricity**	*FACELC*

ASK	IF D15 [From central plant] = Yes

[F1]-HELP

(Does the central physical plant produce...)

Electricity?

    1   Yes
    2   No

NEXT	IF D1 [Heating] = Yes ⇨ D21 [Source for main heating] IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling] IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating] IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking] IF D5 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing] IF D7 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation] OTHERWISE ⇨ D87 [Any other sources]

D20	**Purchase from offsite**	*DHOFF*

ASK	IF (District steam, District hot water, or District chilled water IN D9 [Energy sources used] & B1 [On a multibuilding facility] ≠ Yes) OR D15 [From central plant] = No OR DK/RF

Is the district steam, hot water, or chilled water purchased from somewhere off-site, such as a commercial or municipal plant?

    1   Yes
    2   No

NEXT	IF D1 [Heating] = Yes ⇨ D21 [Source for main heating] IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling] IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating] IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking] IF D5 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing] IF D7 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation] OTHERWISE ⇨ D87 [Any other sources]

D21	**Source for main heating**	*see below*

ASK	IF D1 [Heating] = Yes
FILL	**{Ht1SourcesList}** = List of all energy sources used **{Electricity} – {Other3}** = If a source is used, it appears in this list; if not, the line is blank **{FuelOilType}** = Type or types specified in D10 [Fuel oil, diesel, or kerosene] **{Other1} – {Other3}** = Sources specified in D12 [Other energy source 1] – D14 [Other energy source 3]

What was the <u>main</u> energy source for heating? (Was it {Ht1SourcesList}?)

◆ DEF: [The main energy source for heating is the energy source used
    to heat most of the square footage in this building most of the time.]

◆ EXP: [Do not include electricity if it is used only to run fan motors.]

◆ Only sources already selected are shown here

11	{Electricity}	*ELHT1*
12	{Natural gas}	*NGHT1*
13	{FuelOilType}	*FKHT1*
14	{Bottled gas}	*PRHT1*
15	{District steam}	*STHT1*
16	{District hot water}	*HWHT1*
18	{Wood}	*WOHT1*
19	{Coal}	*COHT1*
20	{Solar}	*SOHT1*
21	{Other1}	*OTHT1*
22	{Other2}	*OTHT1*
23	{Other3}	*OTHT1*
24	Some other energy source	

NEXT	IF Some other energy source ⇨ D22 [Other source for main heating]
	IF Anything but Some other energy source OR DK/RF:
	   IF More than one energy source used ⇨ D23 [Which other sources for heating]
	   IF Only one energy source used ⇨ D24 [Any other sources for heating]

D22	**Other source for main heating**	*see below*
ASK	IF D21 [Source for main heating] = Some other energy source	

What was the other energy source used for <u>main</u> space heating?

11	Electricity	*ELHT1*
12	Natural gas	*NGHT1*
13	Fuel oil/Diesel/Kerosene	*FKHT1*
14	Bottled gas	*PRHT1*
15	District steam	*STHT1*
16	District hot water	*HWHT1*
18	Wood	*WOHT1*
19	Coal	*COHT1*
20	Solar	*SOHT1*
24	Some other energy source	*OTHT1*

NEXT	⇨ D23 [Which other sources for heating]

D23	**Which other sources for heating**	*HT2 & see below*

ASK	IF D1 [Heating] = Yes & More than one energy source used
FILL	**{Ht2SourcesList}** = List of all energy sources used, minus the one used for main heating **{Electricity} – {Other3}** = If a source is used (other than for main space heating), it appears in this list; if not, the line is blank **{FuelOilType}** = Type or types specified in D10 [Fuel oil, diesel, or kerosene] **{Other1} – {Other3}** = Sources specified in D12 [Other energy source 1] – D14 [Other energy source 3]

Which other energy sources, if any, were used for heating? ({Ht2SourcesList})

◆ EXP: [Do not include electricity if it is used only to run fan motors.]

◆ Only sources already selected are shown here

◆ PROBE for any others

◆ ENTER all that apply

11	{Electricity}	*ELHT2*
12	{Natural gas}	*NGHT2*
13	{FuelOilType}	*FKHT2*
14	{Bottled gas}	*PRHT2*
15	{District steam}	*STHT2*
16	{District hot water}	*HWHT2*
18	{Wood}	*WOHT2*
19	{Coal}	*COHT2*
20	{Solar}	*SOHT2*
21	{Other1}	*OTHT2*
22	{Other2}	*OTHT2*
23	{Other3}	*OTHT2*
24	Some other energy source	
99	No other sources for heating	

NEXT	IF Some other energy source ⇨ D25 [Other source for heating] IF Anything but Some other energy source OR DK/RF ⇨ D26 [Percent heated]

D24	**Any other sources for heating**	*HT2*
ASK	IF D1 [Heating] = Yes & Only one energy source used	

Were there any other energy sources used for heating?

    1   Yes
    2   No

NEXT	IF Yes ⇨ D25 [Other source for heating] IF No OR DK/RF ⇨ D26 [Percent heated]

D25	Other source for heating
ASK	IF D24 [Any other sources for heating] = Some other energy source OR D24 [Any other sources for heating] = Yes

What was the other energy source used for secondary space heating?

11	Electricity	*ELHT2*
12	Natural gas	*NGHT2*
13	Fuel oil/Diesel/Kerosene	*FKHT2*
14	Bottled gas	*PRHT2*
15	District steam	*STHT2*
16	District hot water	*HWHT2*
18	Wood	*WOHT2*
19	Coal	*COHT2*
20	Solar	*SOHT2*
24	Some other energy source	*OTHT2*

NEXT	⇨ D26 [Percent heated]

NOTE ON ENERGY SOURCES:

Throughout the rest of this questionnaire, there will be references such as "Electricity used" or "Natural gas used." In addition to the energy sources that were given in D9 [Energy sources used], if sources are added along the way, such as in D22 [Other source for main heating] OR D25 [Other source for heating], those sources are then also considered to be used.

D26	Percent heated	HEATP
ASK	IF D1 [Heating] = Yes	
FILL	**{SqFt}** IF A6 [Square footage] known = "A6 [Square footage]" IF A6 [Square footage] = DK/RF = "floorspace"	

[F1]-HELP

What percent of the {SqFt} in this building was heated to at least 50 degrees Fahrenheit during 2012, including basements and indoor parking levels if they were heated to at least 50 degrees?

◆ If heated square footage is known, but not the percent,
    RECORD square footage in comments, then code DK

◆ PROBE for estimate if DK

RANGE	0 to 100
NEXT	IF Zero ⇨ D27 [Heated to less than 50 degrees] IF Anything else ⇨ D28 [Heating equipment types]

D27	Heated to less than 50 degrees	HTLS50
ASK	IF D26 [Percent heated] = Zero	

Was any of this building heated to less than 50 degrees Fahrenheit?

◆ EXP: [Areas may be heated to less than 50 degrees to prevent pipes from freezing.]

    1   Yes
    2   No

NEXT	IF Yes OR DK/RF ⇨ D28 [Heating equipment types]
	IF No:
	    IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
	    IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	    IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	    IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	    IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	    OTHERWISE ⇨ D87 [Any other sources]

D28	**Heating equipment types**	*see below*
ASK	IF D26 [Percent heated] > 0 OR D27 [Heated to less than 50 degrees] = Yes OR DK/RF	

[F1]-HELP

SHOW CARD D2

Looking at the list of heating equipment types on Show Card D2, please tell me which types are used in this building.

◆ PROBE for any others

◆ ENTER all that apply

1	Furnaces that heat air directly, without using steam or hot water	*FURNAC*
2	Packaged central unit (roof mounted)	*PKGHT*
3	Boilers inside (or adjacent to) the building that produce steam or hot water	*BOILER*
4	District steam or hot water piped in from outside the building	*STHW*
5	Heat pumps (other than components of a packaged unit)	*HTPMPH*
6	Individual space heaters, other than heat pumps	*SLFCON*
7	Other heating equipment	*OTHTEQ*

NEXT	IF Furnaces ⇨ D29 [Type of furnace]
	IF Boilers ⇨ D32 [Type of boiler system]
	IF District steam or hot water ⇨ D33 [Type of district heat system]
	IF Other heating equipment ⇨ D34 [Other heating components]
	IF Packaged central unit ⇨ D40 [Type of packaged heating]
	IF Heat pumps ⇨ D42 [Heat pump heating system]
	IF Individual space heaters ⇨ D45 [Type of individual heater]
	IF DK/RF:
	   IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
	   IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	   IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	   IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	   IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	   OTHERWISE ⇨ D87 [Any other sources]

D29	Type of furnace
ASK	IF Furnaces IN D28 [Heating equipment types]

[F1]-HELP

⬜SHOW CARD D3

Looking at Show Card D3, please tell me the type or types of furnace systems used in the building.

◆ ENTER all that apply

    1   Packaged central unit (roof mounted)
    2   Split system (residential-type furnace with DX cooling unit)
    3   Duct furnace (installed in air distribution duct)
    4   Individual room furnace (freestanding or floor-mounted)

| **NEXT** | IF Packaged central unit OR Duct furnace ⇨ D30 [Classify furnace as packaged]
IF Individual room furnace ⇨ D31 [Classify furnace as space heater]
OTHERWISE:
   IF Boilers IN D28 [Heating equipment types] ⇨ D32 [Type of boiler system]
   IF District steam or hot water IN D28 [Heating equipment types] ⇨ D33 [Type of district heat system]
   IF Other heating equipment IN D28 [Heating equipment types] ⇨ D34 [Other heating components]
   IF Packaged central unit IN D28 [Heating equipment types] ⇨ D40 [Type of packaged heating]
   IF Heat pumps IN D28 [Heating equipment types] ⇨ D42 [Heat pump heating system]
   IF Individual space heaters ⇨ D45 [Type of individual heater]
   OTHERWISE:
     IF More than one energy source used for heating ⇨ D46 [Explain sources for heating]
     OTHERWISE ⇨ D47 [Heating ventilation types] |

D30	Classify furnace as packaged
ASK	IF Packaged central unit OR Duct furnace IN D29 [Type of furnace]

For the purposes of this study, I am going to refer to the packaged central furnace as a "packaged unit."

◆ ENTER "1" to continue

| **NEXT** | IF Individual room furnace IN D29 [Type of furnace] ⇨ D31 [Classify furnace as space heater]
OTHERWISE:
   IF Boilers IN D28 [Heating equipment types] ⇨ D32 [Type of boiler system]
   IF District steam or hot water IN D28 [Heating equipment types] ⇨ D33 [Type of district heat system]
   IF Other heating equipment IN D28 [Heating equipment types] ⇨ D34 [Other heating components]
   OTHERWISE ⇨ D40 [Type of packaged heating] |

D31	Classify furnace as space heater
ASK	IF D29 [Type of furnace] = Individual room furnace

For the purposes of this study, I am going to refer to the individual room furnace as an "individual space heater."

◆ ENTER "1" to continue

| **NEXT** | IF Boilers IN D28 [Heating equipment types] ⇨ D32 [Type of boiler system]
IF District steam or hot water IN D28 [Heating equipment types] ⇨ D33 [Type of district heat system]
IF Other heating equipment IN D28 [Heating equipment types] ⇨ D34 [Other heating components]
IF Packaged central unit IN D28 [Heating equipment types] ⇨ D40 [Type of packaged heating]
IF Heat pumps IN D28 [Heating equipment types] ⇨ D42 [Heat pump heating system]
IF Individual space heaters ⇨ D45 [Type of individual heater]
OTHERWISE:
  IF More than one heating equipment ⇨ D49 [Percent heated by each type]
  IF Only one equipment, assign it as Main heating equipment, THEN
    IF Main heating equipment ≠ District steam or hot water & (A23 [Year of construction] < 1990 OR
    A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012)
    ⇨ D51 [Main heating replaced]
    OTHERWISE:
      IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
      IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
      IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
      IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
      IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
      OTHERWISE ⇨ D87 [Any other sources] |

D32	Type of boiler system

ASK	IF Boilers IN D28 [Heating equipment types]

[F1]-HELP

⬚SHOW CARD D4

Looking at Show Card D4, please tell me the type or types of distribution systems used with the boiler.

◆ ENTER all that apply

1	Radiators	*BLRRAD*
2	Fan coil units in rooms (or areas)	*BLRFNCL*
3	Induction units	*BLRINDC*
4	Water loop heat pump	*BLRWATR*
5	Central air handler (hydronic/steam coils)	*BLRAIR*
6	Packaged unit (hydronic/steam coils)	*BLRPKG*
7	Duct reheat (hydronic/steam coils)	*BLRDUCT*

NEXT	IF District steam or hot water IN D28 [Heating equipment types] ⇨ D33 [Type of district heat system]
	IF Other heating equipment IN D28 [Heating equipment types] ⇨ D34 [Other heating components]
	IF Packaged central unit IN D28 [Heating equipment types] ⇨ D40 [Type of packaged heating]
	IF Heat pumps IN D28 [Heating equipment types] ⇨ D42 [Heat pump heating system]
	IF Individual space heaters ⇨ D45 [Type of individual heater]
	OTHERWISE:
	IF Water loop, Central air handler, Packaged unit, OR Duct reheat given here
	OR Any type except Individual room furnace IN D29 [Type of furnace]
	OR Packaged central unit IN D28 [Heating equipment types]
	⇨ D47 [Heating ventilation types]
	IF More than one heating equipment ⇨ D49 [Percent heated by each type]
	IF Only one equipment, assign it as Main heating equipment, THEN
	IF Main heating equipment ≠ District steam or hot water & (A23 [Year of construction] < 1990 OR
	A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012)
	⇨ D51 [Main heating replaced]
	OTHERWISE:
	IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
	IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	OTHERWISE ⇨ D87 [Any other sources]

D33	Type of district heat system
ASK	IF District steam or hot water IN D28 [Heating equipment types]

[F1]-HELP

☐SHOW CARD D4

Looking at Show Card D4, please tell me the type or types of distribution systems used with the district steam or hot water.

◆ ENTER all that apply

1	Radiators	*DHRAD*
2	Fan coil units in rooms (or areas)	*DHFNCL*
3	Induction units	*DHINDC*
4	Water loop heat pump	*DHWATR*
5	Central air handler (hydronic/steam coils)	*DHAIR*
6	Packaged unit (hydronic/steam coils)	*DHPKG*
7	Duct reheat (hydronic/steam coils)	*DHDUCT*

NEXT	IF Other heating equipment IN D28 [Heating equipment types] ⇨ D34 [Other heating components]
	IF Packaged central unit IN D28 [Heating equipment types] ⇨ D40 [Type of packaged heating]
	IF Heat pumps IN D28 [Heating equipment types] ⇨ D42 [Heat pump heating system]
	IF Individual space heaters ⇨ D45 [Type of individual heater]
	OTHERWISE:
	  IF Water loop, Central air handler, Packaged unit, OR Duct reheat given here
	    OR Any type except Individual room furnace IN D29 [Type of furnace]
	    OR Packaged central unit IN D28 [Heating equipment types]
	    ⇨ D47 [Heating ventilation types]
	  IF More than one heating equipment ⇨ D49 [Percent heated by each type]
	  IF Only one equipment, assign it as Main heating equipment, THEN
	    IF Main heating equipment ≠ District steam or hot water & (A23 [Year of construction] < 1990 OR
	    A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012)
	    ⇨ D51 [Main heating replaced]
	    OTHERWISE:
	      IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
	      IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	      IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	      IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	      IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	      OTHERWISE ⇨ D87 [Any other sources]

D34	Other heating components
ASK	IF Other heating equipment IN D28 [Heating equipment types]

⬚SHOW CARD D5

Looking at Show Card D5, please tell me if the other heating equipment includes any of these components.

◆ ENTER all that apply

1	Heating coil or electric heat strip	*OTSTRP*
2	Duct reheat or electric reheat	*OTDUCT*
3	Powered induction units (PIU)	*OTPIU*
4	None of these components	

NEXT	IF Any components:
	    IF Packaged central unit IN D28 [Heating equipment types] OR
	        Packaged central unit OR Duct furnace IN D29 [Type of furnace])
	            ⇨ D35 [Classify other as part of packaged]
	    IF Boiler IN D28 [Heating equipment types] ⇨ D36 [Classify other as part of boiler]
	    IF District steam or hot water IN D28 [Heating equipment types]
	        ⇨ D37 [Classify other as part of district]
	    OTHERWISE ⇨ D38 [Classify other as packaged]
	IF None of these components OR DK/RF ⇨ D39 [Other heat specify]

D35	Classify other as part of packaged

ASK	IF Any components given in D34 [Other heating components] &
	    Packaged central unit IN D28 [Heating equipment types] OR
	    Packaged central unit OR Duct furnace IN D29 [Type of furnace]

For the purposes of this study, I am going to consider the other heating equipment to be part of the packaged unit.

◆ ENTER "1" to continue

NEXT	⇨ D40 [Type of packaged heating]

D36	Classify other as part of boiler
ASK	IF Any components given in D34 [Other heating components] & Boiler IN D28 [Heating equipment types]

For the purposes of this study, I am going to consider the other heating equipment to be part of the boiler system.

◆ ENTER "1" to continue

| **NEXT** | IF Packaged central unit IN D28 [Heating equipment types] ⇨ D40 [Type of packaged heating]
IF Heat pumps IN D28 [Heating equipment types] ⇨ D42 [Heat pump heating system]
IF Individual space heaters ⇨ D45 [Type of individual heater]
OTHERWISE:
    IF Any type except Individual room furnace IN D29 [Type of furnace]
        OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D32 [Type of boiler system]
        OR Water loop, Central air handler, Packaged unit, OR Duct reheat
        IN D33 [Type of district heat system]
        OR Any components given in D34 [Other heating components]
        OR Packaged central unit IN D28 [Heating equipment types]
        ⇨ D47 [Heating ventilation types]
    IF More than one heating equipment ⇨ D49 [Percent heated by each type]
    IF Only one equipment, assign it as Main heating equipment, THEN
        IF Main heating equipment ≠ District steam or hot water & (A23 [Year of construction] < 1990 OR
        A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012)
        ⇨ D51 [Main heating replaced]
        OTHERWISE:
            IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
            IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
            IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
            IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
            IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
            OTHERWISE ⇨ D87 [Any other sources] |

D37	Classify other as part of district
ASK	IF Any components given in D34 [Other heating components] & District steam or hot water IN D28 [Heating equipment types]

For the purposes of this study, I am going to consider the other heating equipment to be part of the district heating system.

◆ ENTER "1" to continue

| **NEXT** | IF Packaged central unit IN D28 [Heating equipment types] ⇨ D40 [Type of packaged heating]
IF Heat pumps IN D28 [Heating equipment types] ⇨ D42 [Heat pump heating system]
IF Individual space heaters ⇨ D45 [Type of individual heater]
OTHERWISE:
    IF Any type except Individual room furnace IN D29 [Type of furnace]
        OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D32 [Type of boiler system]
        OR Water loop, Central air handler, Packaged unit, OR Duct reheat
        IN D33 [Type of district heat system]
        OR Any components given in D34 [Other heating components]
        OR Packaged central unit IN D28 [Heating equipment types]
        ⇨ D47 [Heating ventilation types]
    IF More than one heating equipment ⇨ D49 [Percent heated by each type]
    IF Only one equipment, assign it as Main heating equipment, THEN
        IF Main heating equipment ≠ District steam or hot water & (A23 [Year of construction] < 1990 OR
        A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012)
        ⇨ D51 [Main heating replaced]
        OTHERWISE:
            IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
            IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
            IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
            IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
            IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
            OTHERWISE ⇨ D87 [Any other sources] |

D38	Classify other as packaged

ASK	IF Any components given in D34 [Other heating components] &
	    NOT(Packaged central unit IN D28 [Heating equipment types] OR
	    Packaged central unit OR Duct furnace IN D29 [Type of furnace]
	    OR Boiler IN D28 [Heating equipment types]
	    OR District steam or hot water IN D28 [Heating equipment types])

For the purposes of this study, I am going to refer to the other heating equipment as a "packaged unit." In the next couple questions I just need to verify some of the components of the packaged system.

◆ ENTER "1" to continue

| **NEXT** | ⇨ D40 [Type of packaged heating] |

D39	Other heat specify
ASK	IF Other heating equipment IN D28 [Heating equipment types] & D34 [Other heating components] = None of these components

Please describe the other type of heating equipment.

◆ RECORD in open box

| **NEXT** | IF Packaged central unit IN D28 [Heating equipment types] ⇨ D40 [Type of packaged heating]
IF Heat pumps IN D28 [Heating equipment types] ⇨ D42 [Heat pump heating system]
IF Individual space heaters ⇨ D45 [Type of individual heater]
OTHERWISE:
    IF Any type except Individual room furnace IN D29 [Type of furnace]
        OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D32 [Type of boiler system]
        OR Water loop, Central air handler, Packaged unit, OR Duct reheat
        IN D33 [Type of district heat system]
        OR Any components given in D34 [Other heating components]
        OR Packaged central unit IN D28 [Heating equipment types]
        ⇨ D47 [Heating ventilation types]
    IF More than one heating equipment ⇨ D49 [Percent heated by each type]
    IF Only one equipment, assign it as Main heating equipment, THEN
        IF Main heating equipment ≠ District steam or hot water & (A23 [Year of construction] < 1990 OR
        A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012)
        ⇨ D51 [Main heating replaced]
        OTHERWISE:
            IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
            IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
            IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
            IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
            IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
            OTHERWISE ⇨ D87 [Any other sources] |

D40	Type of packaged heating	PKGHTTYP

ASK	IF Packaged central unit IN D28 [Heating equipment types]
	    OR Packaged central unit OR Duct furnace IN D29 [Type of furnace]
	    OR Any components given in D34 [Other heating components] &
	    NOT(Packaged central unit IN D28 [Heating equipment types] OR
	    Packaged central unit OR Duct furnace IN D29 [Type of furnace]
	    OR Boiler IN D28 [Heating equipment types]
	    OR District steam or hot water IN D28 [Heating equipment types])

[F1]-HELP

SHOW CARD D6

Please look at Show Card D6 and tell me if the packaged unit is a factory-assembled unitary packaged unit or a custom built-up unit?

    1   Factory-assembled unitary packaged unit
    2   Custom built-up packaged unit
    3   IF VOLUNTEERED: Both factory-assembled and custom built-up packaged units

NEXT	IF Any type given ⇨ D41 [Packaged heating components]
	IF DK/RF:
	    IF Heat pumps IN D28 [Heating equipment types] ⇨ D42 [Heat pump heating system]
	    IF Individual space heaters ⇨ D45 [Type of individual heater]
	    OTHERWISE ⇨ D47 [Heating ventilation types]

D41	Packaged heating components

ASK	IF Any type given in D40 [Type of packaged heating]

[F1]-HELP

SHOW CARD D6

Looking at the second list on Show Card D6, please tell me which heating components are part of this packaged system.

◆ ENTER all that apply

1	Furnace	PKGFURN
2	Heat pump	PKGHTP
3	Heating coil	PKGCOIL
4	Powered induction unit (PIU)	PKGPIU
5	Duct reheat	PKGDUCT

NEXT	IF Heat pumps IN D28 [Heating equipment types] ⇨ D42 [Heat pump heating system] IF Individual space heaters ⇨ D45 [Type of individual heater] OTHERWISE ⇨ D47 [Heating ventilation types]

D42	Heat pump heating system	*see below*

ASK	IF Heat pumps IN D28 [Heating equipment types]

[F1]-HELP

SHOW CARD D7

Please look at the first list on Show Card D7 and tell me which heat pump systems are used for heating in this building.

◆ ENTER all that apply

1	Packaged unit	*HPHPKG*
2	Split system (residential-type)	*HPHSPLT*
3	Individual room heat pump (packaged terminal heat pump or PTHP)	*HPHROOM*
4	Ductless mini-split system	*HPHMINI*
5	Variable refrigerant flow (VRF) system	*HPHVRF*

NEXT	⇨ D43 [Heat pump heating type]

D43	**Heat pump heating type**	*see below*

ASK	IF Heat pumps IN D28 [Heating equipment types]

[F1]-HELP

⬛SHOW CARD D7

Looking at the second list on Show Card D7, which types of heat pumps are these?

◆ ENTER all that apply

1	Air source heat pump	*HPHAIR*
2	Ground source or ground water heat pump (geothermal)	*HPHGRD*
3	Dual source heat pump (combination air source and geothermal)	*HPHDUAL*
4	Water loop heat pump	*HPHWTR*

NEXT	IF Air source heat pump & Natural gas OR Bottled gas used for heating ⇨ D44 [Heat pump backup]
	IF Individual space heaters ⇨ D45 [Type of individual heater]
	   OTHERWISE:
	   IF Any type except Individual room furnace IN D29 [Type of furnace]
	    OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D32 [Type of boiler system]
	    OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D33 [Type of district heat system]
	    OR Any components given in D34 [Other heating components]
	    OR Packaged central unit IN D28 [Heating equipment types]
	    OR Packaged unit OR Split system IN D42 [Heat pump heating system]
	     ⇨ D47 [Heating ventilation types]
	   IF More than one heating equipment ⇨ D49 [Percent heated by each type]
	   IF Only one equipment, assign it as Main heating equipment, THEN
	    IF Main heating equipment ≠ District steam or hot water & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012)
	     ⇨ D51 [Main heating replaced]
	    OTHERWISE:
	      IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
	      IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	      IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	      IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	      IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	      OTHERWISE ⇨ D87 [Any other sources]

D44	Heat pump backup	*HPHBKUP*

ASK	IF D43 [Heat pump heating type] = Air source heat pump
	& Natural gas OR Bottled gas used for heating

FILL	**{NatGasBotGas}**
	IF Natural gas but not bottled gas for heating = "natural gas"
	IF Bottled gas but not natural gas for heating = "bottled gas"
	IF Both natural gas and bottled gas for heating = "natural gas or bottled gas"
	{ NatGasBotGasList}
	IF Natural gas but not bottled gas for heating = "Natural gas"
	IF Bottled gas but not natural gas for heating = "Bottled gas"
	IF Both natural gas and bottled gas for heating = "Natural gas or bottled gas"

Does the air source heat pump have electric resistance backup, is it a dual fuel heat pump with {NatGasBotGas} backup, or is there no backup source for the heat pump?

◆   DEF: [Air source heat pumps do not operate efficiently when outside
       temperatures are sub-freezing for extended periods of time. An air source
       heat pump may use electric resistance coils to provide supplemental heat.
       Other air source heat pumps may use a natural gas or bottled gas furnace that
       operates at colder temperatures (these are also known as duel fuel heat pumps)]

   1   Electric resistance backup
   2   {NatGasBotGasList} backup (dual fuel)
   3   No backup source

NEXT	IF Individual space heaters ⇨ D45 [Type of individual heater]
	OTHERWISE:
	IF Any type except Individual room furnace IN D29 [Type of furnace]
	OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D32 [Type of boiler system]
	OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D33 [Type of district heat system]
	OR Any components given in D34 [Other heating components]
	OR Packaged central unit IN D28 [Heating equipment types]
	OR Packaged unit OR Split system IN D42 [Heat pump heating system]
	⇨ D47 [Heating ventilation types]
	IF More than one heating equipment ⇨ D49 [Percent heated by each type]
	IF Only one equipment, assign it as Main heating equipment, THEN
	IF Main heating equipment ≠ District steam or hot water & (A23 [Year of construction] < 1990 OR
	A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012)
	⇨ D51 [Main heating replaced]
	OTHERWISE:
	IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
	IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	OTHERWISE ⇨ D87 [Any other sources]

D45	**Type of individual heater**
ASK	IF Individual space heaters IN D28 [Heating equipment types]

[F1]-HELP

SHOW CARD D8

Looking at Show Card D8, please tell me the type or types of individual heaters used in the building.

◆ ENTER all that apply

1	Infrared radiant heater (permanent)	*SHRDNT*
2	Baseboard heater (permanent)	*SHBBRD*
3	Portable space heater	*SHPORT*
4	Wall heater	*SHWALL*
5	Individual furnace	*SHFURN*
6	Unit heater	*SHUNIT*
7	Heating element in package terminal air conditioner (PTAC)	*SHPTAC*

NEXT	IF Any type except Individual room furnace IN D29 [Type of furnace]
	    OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D32 [Type of boiler system]
	    OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D33 [Type of district heat system]
	    OR Any components given in D34 [Other heating components]
	    OR Packaged central unit IN D28 [Heating equipment types]
	    OR Packaged unit OR Split system IN D42 [Heat pump heating system]
	    ⇨ D47 [Heating ventilation types]
	IF More than one heating equipment ⇨ D49 [Percent heated by each type]
	IF Only one equipment, assign it as Main heating equipment, THEN
	    IF Main heating equipment ≠ District steam or hot water & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012)
	    ⇨ D51 [Main heating replaced]
	    OTHERWISE:
	       IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
	          IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	          IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	          IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	          IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	          OTHERWISE ⇨ D87 [Any other sources]

D46	Explain sources for heating
ASK	IF ONLY Boiler, Furnace, OR District heat as heating equipment but more than one energy source used for heating
FILL	**{HeatEquip}** IF Boilers = "boiler" IF Furnace = "furnace" IF District heat = "district heating system" **{HeatSources}** = list of the energy sources given for heating

I've recorded just one type of heating equipment - a {HeatEquip} - but more than one energy source – {HeatSources} - for heating. For clarification, will you please briefly explain how these sources are used for operating the {HeatEquip}.

◆ RECORD in open box

| **NEXT** | IF Any type except Individual room furnace IN D29 [Type of furnace]
    OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D32 [Type of boiler system]
    OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D33 [Type of district heat system]
    OR Any components given in D34 [Other heating components]
    OR Packaged central unit IN D28 [Heating equipment types]
    OR Packaged unit OR Split system IN D42 [Heat pump heating system]
    ⇨ D47 [Heating ventilation types]
OTHERWISE:
IF More than one heating equipment ⇨ D49 [Percent heated by each type]
IF Only one equipment, assign it as Main heating equipment, THEN
    IF Main heating equipment ≠ District steam or hot water & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012)
    ⇨ D51 [Main heating replaced]
    OTHERWISE:
       IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
       IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
       IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
       IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
       IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
       OTHERWISE ⇨ D87 [Any other sources] |

D47	Heating ventilation types

ASK	IF Any type except Individual room furnace IN D29 [Type of furnace] OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D32 [Type of boiler system] OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D33 [Type of district heat system] OR Any components given in D34 [Other heating components] OR Packaged central unit IN D28 [Heating equipment types] OR Packaged unit OR Split system IN D42 [Heat pump heating system]

[F1]-HELP

SHOW CARD D9

Show Card D9 provides a list of mechanical ventilation equipment types. Please tell me which types are used with the heating system.

◆ PROBE for any others

◆ ENTER all that apply

1	Central air handling unit(s) with constant air volume (CAV) control	*HTVCAV*
2	Central air handling unit(s) with variable air volume (VAV) control	*HTVVAV*
3	Underfloor air distribution	*HTVFLR*
4	Dedicated outside air system (DOAS)	*HTVOAS*
5	Demand controlled ventilation	*HTVDEM*
6	None of these types	*HTVNON*

NEXT	IF None of these types ⇨ D48 [Heating ventilation specify] OTHERWISE: IF More than one heating equipment ⇨ D49 [Percent heated by each type] IF Only one equipment, assign it as Main heating equipment, THEN IF Main heating equipment ≠ District steam or hot water & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012) ⇨ D51 [Main heating replaced] OTHERWISE: IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling] IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating] IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking] IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing] IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation] OTHERWISE ⇨ D87 [Any other sources]

D48	Heating ventilation specify
ASK	IF D47 [Heating ventilation types] = None of these types

Please describe the ventilation system that is used with the heating system.

◆ RECORD in open box

| **NEXT** | IF More than one heating equipment ⇨ D49 [Percent heated by each type]
IF Only one equipment, assign it as Main heating equipment, THEN
 IF Main heating equipment ≠ District steam or hot water & (A23 [Year of construction] < 1990 OR
 A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012)
 ⇨ D51 [Main heating replaced]
 OTHERWISE:
 IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
 IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
 IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
 IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
 IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
 OTHERWISE ⇨ D87 [Any other sources] |

D49	**Percent heated by each type**	*FURNP, PKGHP, BOILP, STHWP, HTPHP, SLFCNP, OTHTP*

ASK	For each equipment type given in D28 [Heating equipment types]
FILL	**{Introduction}** IF First equipment = "The next questions are about the percent of floorspace heated by the equipment you just mentioned. Please keep in mind:" OTHERWISE = BLANK **{Explanation}** IF First equipment and D26 [Percent heated] ≠ 100 = "We are talking only about the <u>heated portion</u> of the floorspace, so these percents must add up to at least 100, but since more than one type of equipment can heat the same area, it is also possible for them to add up to <u>more</u> than 100." IF First equipment and D26 [Percent heated] = 100 = "These percents must add up to at least 100, but since more than one type of equipment can heat the same area, it is also possible for them to add up to <u>more</u> than 100." OTHERWISE = BLANK **{Equipment}** IF Furnaces that heat air directly IN D28 [Heating equipment types] = "furnace" IF Packaged heating units IN D28 [Heating equipment types] = "packaged heating" IF Boilers inside the building IN D28 [Heating equipment types] = "boiler" IF District steam or hot water IN D28 [Heating equipment types] = "district steam or hot water" IF Heat pumps IN D28 [Heating equipment types] = "heat pump" IF Individual space heaters IN D28 [Heating equipment types] = "space heater" IF Other heating equipment IN D28 [Heating equipment types] = "other heating equipment"

SHOW CARD D10

{Introduction}

{Explanation}

What percent of the heated area in this building is served by the {Equipment}?

◆ PROBE for estimate if DK

RANGE	0 to 100
NEXT	IF There are equal maximum percents OR DK/RF ⇨ D50 [Main heating equipment] IF There is an equipment with a maximum percent, assign that equipment as the Main heating equipment [*MAINHT*]. THEN: IF Main heating equipment ≠ District steam or hot water & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012) ⇨ D51 [Main heating replaced] OTHERWISE: IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling] IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating] IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking] IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing] IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation] OTHERWISE ⇨ D87 [Any other sources]

D50	Main heating equipment	MNHTEQ
ASK	IF D49 [Percent heated by each type] has equal maximum percents OR DK/RF	
FILL	**{EquipmentList}** = List of the equipments with equal maximum percents **{Furnace} – {Other heating equipment}** = Each equipment with an equal maximum percent appears on this list; otherwise the line is blank	

Which do you consider to be your main heating equipment – {EquipmentList} ?

◆ Only equipment types with equal percentages are shown here

   1   {Furnace}
   2   {Packaged heating}
   3   {Boiler}
   4   {District steam or hot water}
   5   {Heat pump}
   6   {Space heater}
   7   {Other heating equipment}

| **NEXT** | IF Main equipment NOT (District steam or hot water OR DK/RF) & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012)
   ⇨ D51 [Main heating replaced]
OTHERWISE:
   IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling]
   IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
   IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
   IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
   IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
   OTHERWISE ⇨ D87 [Any other sources] | |

D51	Main heating replaced	NWMNHT

ASK	IF Main heating equipment known & NOT District steam or hot water
	    & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003 OR
	    2004 to 2007 OR 2008 to 2012)

FILL	**{MainHeatEquip}** IF Main heating equipment = Furnace = "Has the furnace" IF Main heating equipment = Boiler = "Has the boiler" IF Main heating equipment = Packaged heating = "Has the packaged heating unit" IF Main heating equipment = Individual space heater = "Have any of the individual space heaters" IF Main heating equipment = Heat pump = "Has the heat pump" IF Main heating equipment = Other = "Has the other type of heating equipment"

{MainHeatEquip} been replaced since 1990?

◆ EXP: [If there is more than one of this equipment type and
    at least one has been replaced, answer "Yes."]

    1   Yes
    2   No

NEXT	IF D2 [Cooling] = Yes ⇨ D52 [Sources for cooling] IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating] IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking] IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing] IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation] OTHERWISE ⇨ D87 [Any other sources]

D52	Sources for cooling	*see below*

ASK	IF D2 [Cooling] = Yes

FILL	**{CoolSourcesList}** = List of all possible air conditioning energy sources used **{Electricity} – {Other3}** = If a source is used, it appears in this list; if not, the line is blank **{FuelOilType}** = Type or types specified in D10 [Fuel oil, diesel, or kerosene] **{Other1} – {Other3}** = Sources specified in D12 [Other energy source 1] – D14 [Other energy source 3]

Which energy sources were used for air conditioning? ({CoolSourcesList})

◆ Only sources already selected are shown here

◆ PROBE for any others

◆ ENTER all that apply

11	{Electricity}	*ELCOOL*
12	{Natural gas}	*NGCOOL*
13	{FuelOilType}	*FKCOOL*
14	{Bottled gas}	*PRCOOL*
15	{District steam}	*STCOOL*
16	{District hot water}	*HWCOOL*
17	{District chilled water}	*CWCOOL*
21	{Other1}	*OTCOOL*
22	{Other2}	*OTCOOL*
23	{Other3}	*OTCOOL*
24	Some other energy source	

NEXT	IF Some other energy source selected ⇨ D53 [Other source for cooling] OTHERWISE ⇨ D54 [Percent cooled]

D53	Other source for cooling	*see below*

ASK	IF Some other energy source IN D52 [Sources for cooling]

What was the other energy source used for air conditioning?

11	Electricity	*ELCOOL*
12	Natural gas	*NGCOOL*
13	Fuel oil/Diesel/Kerosene	*FKCOOL*
14	Bottled gas	*PRCOOL*
15	District steam	*STCOOL*
16	District hot water	*HWCOOL*
17	District chilled water	*CWCOOL*
24	Some other energy source	*OTCOOL*

NEXT	⇨ D54 [Percent cooled]

D54	Percent cooled	COOLP

ASK	IF D1 [Cooling] = Yes

FILL	**{SqFtIn}** IF A6 [Square footage] known = A6 [Square footage] IF A6 [Square footage] = DK/RF = "floorspace"

[F1]-HELP

What percent of the {SqFt} in this building was cooled by air conditioning equipment during 2012?

◆ If cooled square footage is known, but not the percent,
   RECORD square footage in comments, then code DK

◆ PROBE for estimate if DK

RANGE	0 to 100

NEXT	IF 1-100, DK/RF ⇨ D55 [Cooling equipment types] IF Zero: IF More than just Individual space heaters IN D28 [Heating equipment types] ➜ D73 [Regular HVAC maintenance] IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating] IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking] IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing] IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation] OTHERWISE ⇨ D87 [Any other sources]

D55	Cooling equipment types	*see below*

ASK	IF D54 [Percent cooled] = 1 to 100 OR DK/RF

[F1]-HELP

⬛SHOW CARD D11

Looking at the list of cooling equipment types on Show Card D11, please tell me which types are used in this building.

◆ PROBE for any others

◆ ENTER all that apply

   1   Residential-type central air conditioners, other than heat pumps, that
       cool air directly and circulate it without using chilled water   *RCAC*
   2   Packaged air conditioning units, other than heat pumps   *PKGCL*
   3   Central chillers inside (or adjacent to)
       the building that chill water for air conditioning   *CHILLR*
   4   District chilled water piped in from outside the building   *CHWT*
   5   Heat pumps for cooling   *HTPMPC*
   6   Individual room air conditioners, other than heat pumps   *ACWNWL*
   7   "Swamp" coolers or evaporative coolers   *EVAPCL*
   8   Other cooling equipment   *OTCLEQ*

NEXT	IF Packaged air conditioning units ⇨ D56 [Type of packaged cooling]
	IF Central chillers ⇨ D57 [Type of chiller]
	IF District chilled water ⇨ D60 [Type of district chilled water system]
	IF Heat pumps for cooling AND NOT Heat pumps for heating ⇨ D61 [Heat pump cooling system]
	IF Other cooling equipment ⇨ D63 [Other cool specify]
	IF DK/RF:
	IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	OTHERWISE ⇨ D87 [Any other sources]
	OTHERWISE:
	IF Any source(s) other than electricity or chilled water reported in D52 [Sources for cooling] OR
	D53 [Other source for cooling] ⇨ D64 [Cool source explanation]
	IF Residential-type central air & D1 [Heating] = Yes & D47 [Heating ventilation types] ≠DK/RF
	⇨ D65 [Cooling ventilation same as heating]
	IF Residential-type central air & (D1 [Heating] ≠ Yes OR D47 [Heating ventilation types] =DK/RF)
	⇨ D66 [Cooling ventilation types]
	OTHERWISE:
	IF More than one selected ⇨ D67 [Percent cooled by each type]
	IF Only one selected, assign as Main cooling equipment. THEN:
	IF (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003
	OR 2004 to 2007 OR 2008 to 2012) ⇨ D69 [Main cooling replaced]
	OTHERWISE:
	IF More than just Individual room air conditioners IN D55 [Cooling equipment types]
	➔ D70 [Economizer cycle]
	OTHERWISE:
	IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	OTHERWISE ⇨ D87 [Any other sources]

D56	Type of packaged cooling	PKGCLTYP

ASK	IF Packaged central unit IN D28 [Heating equipment types]
	OR Packaged central unit OR Duct furnace IN D29 [Type of furnace]
	OR Any components given in D34 [Other heating components] &
	NOT(Packaged central unit IN D28 [Heating equipment types] OR
	Packaged central unit OR Duct furnace IN D29 [Type of furnace]
	OR Boiler IN D28 [Heating equipment types]
	OR District steam or hot water IN D28 [Heating equipment types])

[F1]-HELP

SHOW CARD D6

Please look at Show Card D6 and tell me if the packaged unit for cooling is a factory-assembled unitary packaged unit or a custom built-up unit?

    1   Factory-assembled unitary packaged unit
    2   Custom built-up packaged unit
    3   IF VOLUNTEERED: Both factory-assembled and custom built-up packaged units

NEXT	IF Central chillers ⇨ D57 [Type of chiller]
	IF District chilled water ⇨ D60 [Type of district chilled water system]
	IF Heat pumps for cooling & NOT Heat pumps for heating ⇨ D61 [Heat pump cooling system]
	IF Other cooling equipment ⇨ D63 [Other cool specify]
	OTHERWISE:
	IF Any source(s) other than electricity or chilled water reported in D52 [Sources for cooling] OR
	D53 [Other source for cooling] & Central chillers NOT IN D55 [Cooling equipment types]
	⇨ D64 [Cool source explanation]
	OTHERWISE:
	IF D1 [Heating] = Yes & D47 [Heating ventilation types] ≠DK/RF
	⇨ D65 [Cooling ventilation same as heating]
	IF D1 [Heating] ≠ Yes OR D47 [Heating ventilation types] =DK/RF
	⇨ D66 [Cooling ventilation types]

D57	**Type of chiller**	*see below*
ASK	IF Central chillers IN D55 [Cooling equipment types]	

[F1]-HELP

⬜SHOW CARD D12

Please look at Show Card D12 and tell me whether the chiller is air-cooled, water cooled, or an absorption chiller?

◆ ENTER all that apply

    1   Air-cooled   *CHLAIRCL*
    2   Water cooled   *CHLWTRCL*
    3   Absorption   *CHLABSRP*

NEXT	IF Absorption ⇨ D58 [Heater chiller] OTHERWISE ⇨ D59 [Type of chiller system]

D58	**Heater chiller**	*HTRCHLR*
ASK	IF Absorption IN D57 [Type of chiller]	

A "heater chiller" is a type of absorption chiller that can produce both chilled and hot water and can provide both cooling and heating. Does this absorption chiller have this capability?

    1   Yes
    2   No

NEXT	⇨ D59 [Type of chiller system]

D59	Type of chiller system	*see below*
ASK	IF Central chillers IN D55 [Cooling equipment types]	

[F1]-HELP

⬛SHOW CARD D13

Please look at Show Card D13 and tell me which system or systems are used for distributing the water from the chiller.

◆ ENTER all that apply

1	Central air handler (hydronic coils)	*CHLAIR*
2	Fan coil units in rooms (or areas)	*CHLFNCL*
3	Induction units	*CHLINDC*
4	Water loop heat pump	*CHLWATR*
5	Chilled beam	*CHLBEAM*
6	Packaged unit (hydronic coils)	*CHLPKG*
7	Duct reheat	*CHLDUCT*

NEXT
IF District chilled water ⇨ D60 [Type of district chilled water system]
IF Heat pumps for cooling AND NOT Heat pumps for heating ⇨ D61 [Heat pump cooling system]
IF Other cooling equipment ⇨ D63 [Other cool specify]
OTHERWISE:
  IF D1 [Heating] = Yes & D47 [Heating ventilation types] ≠ DK/RF &
    Residential-type central air IN D55 [Cooling equipment types]
    OR Packaged unit IN D55 [Cooling equipment types]
    OR Water loop, Central air handler, Packaged unit, OR Duct reheat
      IN D59 [Type of chiller system]
    OR Water loop, Central air handler, Packaged unit, OR Duct reheat
      IN D60 [Type of district chilled water system]
    OR Packaged unit OR Split system IN D61 [Heat pump cooling system]
      ⇨ D65 [Cooling ventilation same as heating]
  IF D1 [Heating] ≠ Yes OR D47 [Heating ventilation types] = DK/RF &
    Residential-type central air IN D55 [Cooling equipment types]
    OR Packaged unit IN D55 [Cooling equipment types]
    OR Water loop, Central air handler, Packaged unit, OR Duct reheat
      IN D59 [Type of chiller system]
    OR Water loop, Central air handler, Packaged unit, OR Duct reheat
      IN D60 [Type of district chilled water system]
      ⇨ D66 [Cooling ventilation types]
  OTHERWISE:
    IF More than one selected ⇨ D67 [Percent cooled by each type]
    IF Only one selected, assign as Main cooling equipment. THEN:
    IF (Main equipment NOT District chilled water OR DK/RF) & (Main cooling equipment
      NOT Packaged cooling if the Main heating equipment was Packaged heating)
      & (Main cooling equipment NOT Heat pump if the main heating equipment was Heat pump)
      & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003
      OR 2004 to 2007 OR 2008 to 2012) ⇨ D69 [Main cooling replaced]
    OTHERWISE:
      IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
      IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
      IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
      IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
      OTHERWISE ⇨ D87 [Any other sources]

D60	Type of district chilled water system	*see below*
ASK	IF District chilled water IN D55 [Cooling equipment types]	

[F1]-HELP

SHOW CARD D13

Please look at Show Card D13 and tell me which system or systems are used for distributing the district chilled water.

◆ ENTER all that apply

1	Central air handler (hydronic coils)	*DCWAIR*
2	Fan coil units in rooms (or areas)	*DCWFNCL*
3	Induction units	*DCWINDC*
4	Water loop heat pump	*DCWWATR*
5	Chilled beam	*DCWBEAM*
6	Packaged unit (hydronic coils)	*DCWPKG*
7	Duct reheat	*DCWDUCT*

NEXT	IF Heat pumps for cooling AND NOT Heat pumps for heating ⇨ D61 [Heat pump cooling system]
	IF Other cooling equipment ⇨ D63 [Other cool specify]
	OTHERWISE:
	   IF Any source(s) other than electricity or chilled water reported in D52 [Sources for cooling] OR
	     D53 [Other source for cooling] & Central chillers NOT IN D55 [Cooling equipment types]
	     ⇨ D64 [Cool source explanation]
	   IF D1 [Heating] = Yes & D47 [Heating ventilation types] ≠ DK/RF &
	     Residential-type central air IN D55 [Cooling equipment types]
	     OR Packaged unit IN D55 [Cooling equipment types]
	     OR Water loop, Central air handler, Packaged unit, OR Duct reheat
	       IN D59 [Type of chiller system]
	     OR Water loop, Central air handler, Packaged unit, OR Duct reheat
	       IN D60 [Type of district chilled water system]
	       ⇨ D65 [Cooling ventilation same as heating]
	   IF D1 [Heating] ≠ Yes OR D47 [Heating ventilation types] = DK/RF &
	     Residential-type central air IN D55 [Cooling equipment types]
	     OR Packaged unit IN D55 [Cooling equipment types]
	     OR Water loop, Central air handler, Packaged unit, OR Duct reheat
	       IN D59 [Type of chiller system]
	     OR Water loop, Central air handler, Packaged unit, OR Duct reheat
	       IN D60 [Type of district chilled water system]
	       ⇨ D66 [Cooling ventilation types]
	   OTHERWISE:
	     IF More than one selected ⇨ D67 [Percent cooled by each type]
	     IF Only one selected, assign as Main cooling equipment. THEN:
	     IF (Main equipment NOT District chilled water OR DK/RF) & (Main cooling equipment
	       NOT Packaged cooling if the Main heating equipment was Packaged heating)
	       & (Main cooling equipment NOT Heat pump if the main heating equipment was Heat pump)
	       & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003
	       OR 2004 to 2007 OR 2008 to 2012) ⇨ D69 [Main cooling replaced]
	     OTHERWISE:
	       IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	       IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	       IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	       IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	       OTHERWISE ⇨ D87 [Any other sources]

D61	Heat pump cooling system	*see below*

ASK	IF Heat pumps IN D55 [Cooling equipment types] & Heat pumps NOT IN D28 [Heating equipment types]

[F1]-HELP

⬜SHOW CARD D7

Please look at the first list on Show Card D7 and tell me which heat pump systems are used for cooling in this building.

◆ ENTER all that apply

1	Packaged unit	*HPCPKG*
2	Split system (residential-type)	*HPCSPLT*
3	Individual room heat pump (packaged terminal heat pump or PTHP)	*HPCROOM*
4	Ductless mini-split system	*HPCMINI*
5	Variable refrigerant flow (VRF) system	*HPCVRF*

NEXT	⇨ D62 [Heat pump cooling type]

D62	Heat pump cooling type	*see below*

ASK	IF Heat pumps IN D55 [Cooling equipment types] & Heat pumps NOT IN D28 [Heating equipment types]

[F1]-HELP

⬜SHOW CARD D7

Looking at the second list on Show Card D7, which types of heat pumps are these?

◆ ENTER all that apply

1	Air source heat pump	*HPCAIR*
2	Ground source or ground water heat pump (geothermal)	*HPCGRD*
3	Dual source heat pump (combination air source and geothermal)	*HPCDUAL*
3	Water loop heat pump	*HPCWTR*

NEXT	IF Other cooling equipment ⇨ D63 [Other cool specify]
	OTHERWISE:
	  IF Any source(s) other than electricity or chilled water reported in D52 [Sources for cooling] OR
	    D53 [Other source for cooling] & Central chillers NOT IN D55 [Cooling equipment types]
	    ⇨ D64 [Cool source explanation]
	  IF D1 [Heating] = Yes & D47 [Heating ventilation types] ≠ DK/RF &
	    Residential-type central air IN D55 [Cooling equipment types]
	    OR Packaged unit IN D55 [Cooling equipment types]
	    OR Water loop, Central air handler, Packaged unit, OR Duct reheat
	      IN D59 [Type of chiller system]
	    OR Water loop, Central air handler, Packaged unit, OR Duct reheat
	      IN D60 [Type of district chilled water system]
	    OR Packaged unit OR Split system IN D61 [Heat pump cooling system]
	      ⇨ D65 [Cooling ventilation same as heating]
	  IF D1 [Heating] ≠ Yes OR D47 [Heating ventilation types] = DK/RF &
	    Residential-type central air IN D55 [Cooling equipment types]
	    OR Packaged unit IN D55 [Cooling equipment types]
	    OR Water loop, Central air handler, Packaged unit, OR Duct reheat
	      IN D59 [Type of chiller system]
	    OR Water loop, Central air handler, Packaged unit, OR Duct reheat
	      IN D60 [Type of district chilled water system]
	    OR Packaged unit OR Split system IN D61 [Heat pump cooling system]
	      ⇨ D66 [Cooling ventilation types]
	  OTHERWISE:
	    IF More than one selected ⇨ D67 [Percent cooled by each type]
	    IF Only one selected, assign as Main cooling equipment. THEN:
	    IF (Main equipment NOT District chilled water OR DK/RF) & (Main cooling equipment
	      NOT Packaged cooling if the Main heating equipment was Packaged heating)
	      & (Main cooling equipment NOT Heat pump if the main heating equipment was Heat pump)
	      & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003
	      OR 2004 to 2007 OR 2008 to 2012) ⇨ D69 [Main cooling replaced]
	    OTHERWISE:
	      IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	      IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	      IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	      IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	      OTHERWISE ⇨ D87 [Any other sources]

D63	Other cool specify
ASK	IF Other cooling equipment in D55 [Cooling equipment types]

Please describe the other type of cooling equipment.

◆ RECORD in open box

| **NEXT** | IF Any source(s) other than electricity or chilled water reported in D52 [Sources for cooling] OR D53 [Other source for cooling] & Central chillers NOT IN D55 [Cooling equipment types] ⇨ D64 [Cool source explanation]
IF D1 [Heating] = Yes & D47 [Heating ventilation types] ≠ DK/RF &
  Residential-type central air IN D55 [Cooling equipment types]
  OR Packaged unit IN D55 [Cooling equipment types]
  OR Water loop, Central air handler, Packaged unit, OR Duct reheat
    IN D59 [Type of chiller system]
  OR Water loop, Central air handler, Packaged unit, OR Duct reheat
    IN D60 [Type of district chilled water system]
  OR Packaged unit OR Split system IN D61 [Heat pump cooling system]
    ⇨ D65 [Cooling ventilation same as heating]
IF D1 [Heating] ≠ Yes OR D47 [Heating ventilation types] = DK/RF &
  Residential-type central air IN D55 [Cooling equipment types]
  OR Packaged unit IN D55 [Cooling equipment types]
  OR Water loop, Central air handler, Packaged unit, OR Duct reheat
    IN D59 [Type of chiller system]
  OR Water loop, Central air handler, Packaged unit, OR Duct reheat
    IN D60 [Type of district chilled water system]
  OR Packaged unit OR Split system IN D61 [Heat pump cooling system]
    ⇨ D66 [Cooling ventilation types]
OTHERWISE:
  IF More than one selected ⇨ D67 [Percent cooled by each type]
  IF Only one selected, assign as Main cooling equipment. THEN:
  IF (Main equipment NOT District chilled water OR DK/RF) & (Main cooling equipment
    NOT Packaged cooling if the Main heating equipment was Packaged heating)
    & (Main cooling equipment NOT Heat pump if the main heating equipment was Heat pump)
    & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003
    OR 2004 to 2007 OR 2008 to 2012) ⇨ D69 [Main cooling replaced]
  OTHERWISE:
    IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
    IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
    IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
    IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
    OTHERWISE ⇨ D87 [Any other sources] |

D64	Cool source explanation
ASK	IF Any source(s) other than electricity or chilled water reported in D52 [Sources for cooling] OR D53 [Other source for cooling] & Central chillers NOT IN D55 [Cooling equipment types]
FILL	**{CoolSources}** = List of the energy sources given for cooling, other than electricity or chilled water **{IsAre}** = IF Only one cooling source in list = "is" IF More than one cooling source in list = "are"

Among the sources for cooling, I have recorded that {CoolSources} {IsAre} used. Because it is somewhat unusual to use sources other than electricity or chilled water for cooling, will you please briefly describe how the {CoolSources} {IsAre} used with the cooling equipment.

◆ RECORD in open box

| **NEXT** | IF D1 [Heating] = Yes & D47 [Heating ventilation types] ≠ DK/RF &
   Residential-type central air IN D55 [Cooling equipment types]
   OR Packaged unit IN D55 [Cooling equipment types]
   OR Water loop, Central air handler, Packaged unit, OR Duct reheat
     IN D59 [Type of chiller system]
   OR Water loop, Central air handler, Packaged unit, OR Duct reheat
     IN D60 [Type of district chilled water system]
   OR Packaged unit OR Split system IN D61 [Heat pump cooling system]
     ⇨ D65 [Cooling ventilation same as heating]
IF D1 [Heating] ≠ Yes OR D47 [Heating ventilation types] = DK/RF &
   Residential-type central air IN D55 [Cooling equipment types]
   OR Packaged unit IN D55 [Cooling equipment types]
   OR Water loop, Central air handler, Packaged unit, OR Duct reheat
     IN D59 [Type of chiller system]
   OR Water loop, Central air handler, Packaged unit, OR Duct reheat
     IN D60 [Type of district chilled water system]
   OR Packaged unit OR Split system IN D61 [Heat pump cooling system]
     ⇨ D66 [Cooling ventilation types]
OTHERWISE:
   IF More than one cooling equipment ⇨ D67 [Percent cooled by each type]
   IF Only one equipment, assign as Main cooling equipment. THEN:
   IF (Main equipment NOT District chilled water OR DK/RF) & (Main cooling equipment
     NOT Packaged cooling if the Main heating equipment was Packaged heating)
     & (Main cooling equipment NOT Heat pump if the main heating equipment was Heat pump)
     & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003
     OR 2004 to 2007 OR 2008 to 2012) ⇨ D69 [Main cooling replaced]
   OTHERWISE:
     IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
     IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
     IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
     IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
     OTHERWISE ⇨ D87 [Any other sources] |

D65	Cooling ventilation same as heating
ASK	IF D1 [Heating] = Yes & D47 [Heating ventilation types] ≠ (No ventilation or DK/RF) & Residential-type central air IN D55 [Cooling equipment types] OR Packaged unit IN D55 [Cooling equipment types] OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D59 [Type of chiller system] OR Water loop, Central air handler, Packaged unit, OR Duct reheat IN D60 [Type of district chilled water system] OR Packaged unit OR Split system IN D61 [Heat pump cooling system]

Is the ventilation system for cooling the same as the one for heating?

    1   Yes
    2   No

NEXT	IF No ⇨ D66 [Cooling ventilation types] OTHERWISE: IF More than one cooling equipment ⇨ D67 [Percent cooled by each type] IF Only one equipment, assign as Main cooling equipment. THEN: IF (Main equipment NOT District chilled water OR DK/RF) & (Main cooling equipment NOT Packaged cooling if the Main heating equipment was Packaged heating) & (Main cooling equipment NOT Heat pump if the main heating equipment was Heat pump) & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012) ⇨ D69 [Main cooling replaced] OTHERWISE: IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating] IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking] IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing] IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation] OTHERWISE ⇨ D87 [Any other sources]

D66	Cooling ventilation types
ASK	IF D65 [Cooling ventilation same as heating] = No

[F1]-HELP

⬚SHOW CARD D9

Show Card D9 provides a list of mechanical ventilation equipment types. Please tell me which types are used with the cooling system.

◆ PROBE for any others

◆ ENTER all that apply

   1   Central air handling unit(s) with constant air volume (CAV) control   *CLVCAV*
   2   Central air handling unit(s) with variable air volume (VAV) control   *CLVVAV*
   3   Underfloor air distribution   *CLVFLR*
   4   Dedicated outside air system (DOAS)   *CLVOAS*
   5   Demand controlled ventilation   *CLVDEM*
   6   None of these types   *CLVNON*

| **NEXT** | IF None of these types ⇨ D66a [Cooling ventilation specify]
OTHERWISE:
   IF More than one cooling equipment ⇨ D67 [Percent cooled by each type]
   IF Only one equipment, assign as Main cooling equipment. THEN:
   IF (Main equipment NOT District chilled water OR DK/RF) & (Main cooling equipment
      NOT Packaged cooling if the Main heating equipment was Packaged heating)
      & (Main cooling equipment NOT Heat pump if the main heating equipment was Heat pump)
      & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003
   OR 2004 to 2007 OR 2008 to 2012) ⇨ D69 [Main cooling replaced]
   OTHERWISE:
     IF More than just Individual room air conditioners IN D55 [Cooling equipment types]
      ➔ D70 [Economizer cycle]
     OTHERWISE:
       IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
       IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
       IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
       IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
       OTHERWISE ⇨ D87 [Any other sources] |

D66a	Cooling ventilation specify
ASK	IF D66 [Cooling ventilation types] = None of these types

Please describe the ventilation system that is used with the cooling system.

◆ RECORD in open box

NEXT	IF More than one cooling equipment ⇨ D67 [Percent cooled by each type]
	IF Only one equipment, assign as Main cooling equipment. THEN:
	IF (Main equipment NOT District chilled water OR DK/RF) & (Main cooling equipment
	NOT Packaged cooling if the Main heating equipment was Packaged heating)
	& (Main cooling equipment NOT Heat pump if the main heating equipment was Heat pump)
	& (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003
	OR 2004 to 2007 OR 2008 to 2012) ⇨ D69 [Main cooling replaced]
	OTHERWISE:
	IF More than just Individual room air conditioners IN D55 [Cooling equipment types]
	➜ D70 [Economizer cycle]
	OTHERWISE:
	IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	OTHERWISE ⇨ D87 [Any other sources]

D67	Percent cooled by each type	RCACP, PKGCP, CHILP, CHWTP, HTPCP, ACWNWP, EVAPP, OTCLP

ASK	For each equipment type given in D55 [Cooling equipment types]
FILL	**{Introduction}** IF First equipment = "The next questions are about the percent of floorspace cooled by the equipment you just mentioned. Please keep in mind:" OTHERWISE = BLANK **{Explanation}** IF First equipment and D54 [Percent cooled] ≠ 100 = "We are talking only about the <u>cooled portion</u> of the floorspace, so these percents must add up to at least 100, but since more than one type of equipment can cool the same area, it is also possible for them to add up to <u>more</u> than 100." IF First equipment and D54 [Percent cooled] = 100 = "These percents must add up to at least 100, but since more than one type of equipment can cool the same area, it is also possible for them to add up to <u>more</u> than 100." OTHERWISE = BLANK **{Equipment}** IF Residential-type central air conditioners IN D55 [Cooling equipment types] = "central air conditioner" IF Packaged air conditioning units IN D55 [Cooling equipment types] = "packaged cooling" IF Central chillers inside the building IN D55 [Cooling equipment types] = "central chiller" IF District chilled water IN D55 [Cooling equipment types] = "district chilled water" IF Heat pumps for cooling IN D55 [Cooling equipment types] = "heat pump" IF Individual room air conditioners IN D55 [Cooling equipment types] = "room air conditioner" IF "Swamp" coolers or evaporative coolers IN D55 [Cooling equipment types] = "swamp cooler" IF Other cooling equipment IN D55 [Cooling equipment types] = "other cooling equipment"

⬜SHOW CARD D15

{Introduction}

{Explanation}

Please look at Show Card D15. What percent of the cooled area in this building is served by the {Equipment}?

◆ PROBE for estimate if DK

RANGE	0 to 100

NEXT	IF there are equal maximum percents OR DK/RF ⇨ D68 [Main cooling equipment]
	IF there is an equipment with a maximum percent, assign that equipment as the Main cooling equipment [*MAINCL9*]. THEN:
	  IF (Main equipment NOT District chilled water OR DK/RF) & (Main cooling equipment
	  NOT Packaged cooling if the Main heating equipment was Packaged heating)
	  & (Main cooling equipment NOT Heat pump if the main heating equipment was Heat pump)
	  & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003 OR
	  2004 to 2007 OR 2008 to 2012) ⇨ D69 [Main cooling replaced]
	OTHERWISE:
	  IF More than just Individual room air conditioners IN D55 [Cooling equipment types]
	    ➜ D70 [Economizer cycle]
	  OTHERWISE:
	    IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	    IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	    IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	    IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	    OTHERWISE ⇨ D87 [Any other sources]

D68	**Main cooling equipment**	*MNCLEQ*

ASK	IF D67 [Percent cooled by each type] has equal maximum percents OR DK/RF

FILL	**{EquipmentList}** = List of the equipments with equal maximum percents **{Packaged cooling} – {Other cooling equipment}** = Each equipment with an equal maximum percent appears on this list; otherwise the line is blank

Which do you consider to be your main cooling equipment – {EquipmentList} ?

◆ Only equipment types with equal percentages are shown here

   1   {Central air conditioner}
   2   {Packaged cooling}
   3   {Central chiller}
   4   {District chilled water}
   5   {Heat pump}
   6   {Room air conditioner}
   7   {Swamp coolers}
   8   {Other cooling equipment}

NEXT	IF (Main equipment NOT District chilled water OR DK/RF) & (Main cooling equipment NOT Packaged cooling if the Main heating equipment was Packaged heating) & (Main cooling equipment NOT Heat pump if the main heating equipment was Heat pump) & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012) ⇨ D69 [Main cooling replaced] OTHERWISE: IF More than just Individual room air conditioners IN D55 [Cooling equipment types] ➔ D70 [Economizer cycle] OTHERWISE: IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating] IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking] IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing] IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation] OTHERWISE ⇨ D87 [Any other sources]

D69	Main cooling replaced	NWMNCL

ASK	IF Main cooling equipment known & NOT District chilled water & (Main cooling equipment NOT Packaged cooling if the Main heating equipment was Packaged heating) & (Main cooling equipment NOT Heat pump if the main heating equipment was Heat pump) & (A23 [Year of construction] < 1990 OR A24 [Year of construction category] ≠ 2000 to 2003 OR 2004 to 2007 OR 2008 to 2012)

FILL	**{MainCoolEquip}** IF Main cooling equipment = Packaged cooling = "Has the packaged air conditioning unit" IF Main cooling equipment = Central air conditioner = "Has the central air conditioner" IF Main cooling equipment = Room air conditioner = "Have any of the room air conditioners" IF Main cooling equipment = Heat pump = "Has the heat pump" IF Main cooling equipment = Central chiller = "Has the central chiller" IF Main cooling equipment = Swamp coolers = "Has the swamp cooler" IF Main cooling equipment = Other cooling equipment = "Has the other type of cooling equipment"

{MainCoolEquip} been replaced since 1990?

◆ EXP: [If there is more than one of this equipment type and
at least one has been replaced, the answer is "Yes."]

    1   Yes
    2   No

NEXT	IF More than just Individual room air conditioners IN D55 [Cooling equipment types]
	   ➔ D70 [Economizer cycle]
	OTHERWISE:
	   IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating]
	   IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	   IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	   IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	   OTHERWISE ⇨ D87 [Any other sources]

D70	Economizer cycle	ECN

ASK	IF More than just Individual room air conditioners IN D55 [Cooling equipment types]

[F1]-HELP

Does this building have any equipment that uses outside air for cooling, often called an "economizer cycle"?

    1   Yes
    2   No

NEXT	IF Yes ➔ D71 [Type of economizer cycle]
	OTHERWISE:
	   IF Packaged air conditioning units OR Central chillers OR Heat pumps for cooling
	     IN D55 [Cooling equipment types] ➔ D72 [Cooling tower]
	   OTHERWISE ➔ D73 [Regular HVAC maintenance]

D71	Type of economizer cycle	ECNTYPE

ASK	IF D70 [Economizer cycle] = Yes

⬚SHOW CARD D14

Looking at Show Card D14, is this an air-side economizer or a water-side economizer?

    1   Air-side economizer
    2   Water-side economizer

NEXT	IF Packaged air conditioning units OR Central chillers OR Heat pumps for cooling IN D55 [Cooling equipment types] ➜ D72 [Cooling tower] OTHERWISE ➜ D73 [Regular HVAC maintenance]

D72	Cooling tower	CTOWER

ASK	IF Packaged air conditioning units OR Central chillers OR Heat pumps for cooling IN D55 [Cooling equipment types]

Does this building have a cooling tower for the cooling equipment?

◆ DEF: [A cooling tower is used to dispose of unwanted heat from
    the cooling equipment.]

    1   Yes
    2   No

NEXT	➜ D73 [Regular HVAC maintenance]

D73	Regular HVAC maintenance	MAINT

ASK	IF More than just Individual space heaters IN D28 [Heating equipment types] OR More than just Individual room air conditioners IN D55 [Cooling equipment types]
FILL	**{HeatCool}** IF Heating only = "heating" IF Cooling only = "cooling" IF Heating & Cooling = "heating and cooling"

[F1]-HELP

Is there any regularly scheduled maintenance and repair for the {HeatCool} system?

    1   Yes
    2   No

NEXT	IF D3 [Water heating] = Yes ⇨ D74 [Sources for water heating] IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking] IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing] IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation] OTHERWISE ⇨ D87 [Any other sources]

D74	Sources for water heating	*see below*
ASK	IF D3 [Water heating] = Yes	
FILL	**{WatrSourcesList}** = List of all energy sources used **{Electricity} – {Other3}** = If a source is used, it appears in this list; if not, the line is blank **{FuelOilType}** = Type or types specified in D10 [Fuel oil, diesel, or kerosene] **{Other1} – {Other3}** = Sources specified in D12 [Other energy source 1] – D14 [Other energy source 3]	

Which energy sources were used for water heating? ({WatrSourcesList})

◆ Only sources already selected are shown here

◆ PROBE for any others

◆ ENTER all that apply

11	{Electricity}	*ELWATR*
12	{Natural gas}	*NGWATR*
13	{FuelOilType}	*FKWATR*
14	{Bottled gas}	*PRWATR*
15	{District steam}	*STWATR*
16	{District hot water}	*HWWATR*
18	{Wood}	*WOWATR*
19	{Coal}	*COWATR*
20	{Solar}	*SOWATR*
21	{Other1}	*OTWATR*
22	{Other2}	*OTWATR*
23	{Other3}	*OTWATR*
24	Some other energy source	

NEXT	IF Some other energy source selected ⇨ D75 [Other water heating source] OTHERWISE ⇨ D76 [Water heating equipment]

D75	Other water heating source	*see below*
ASK	IF Some other energy source IN D74 [Sources for water heating]	

What was the other energy source used for water heating?

11	Electricity	*ELWATR*
12	Natural gas	*NGWATR*
13	Fuel oil/Diesel/Kerosene	*FKWATR*
14	Bottled gas	*PRWATR*
15	District steam	*STWATR*
16	District hot water	*HWWATR*
18	Wood	*WOWATR*
19	Coal	*COWATR*
20	Solar	*SOWATR*
24	Some other energy source	*OTWATR*

NEXT	⇨ D76 [Water heating equipment]

D76	Water heating equipment	*WTHTEQ*
ASK	IF D3 [Water heating] = Yes	

[F1]-HELP

Does this building have one or more centralized water heaters, one or more "point-of-use" water heaters, or both of these types (of water heaters)?

    1   One or more centralized water heaters
    2   One or more "point-of-use" water heaters
    3   Both types

NEXT	IF D4 [Cooking] = Yes ⇨ D77 [Sources for cooking]
	IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	OTHERWISE ⇨ D87 [Any other sources]

D77	Sources for cooking	*see below*
ASK	IF D4 [Cooking] = Yes	
FILL	**{CookSourcesList}** = List of all energy sources used **{Electricity} – {Other3}** = If a source is used, it appears in this list; if not, the line is blank **{FuelOilType}** = Type or types specified in D10 [Fuel oil, diesel, or kerosene] **{Other1} – {Other3}** = Sources specified in D12 [Other energy source 1] – D14 [Other energy source 3]	

Which energy sources were used for cooking? [{CookSourcesList}]

◆ Only sources already selected are shown here

◆   PROBE for any others

◆ ENTER all that apply

11	{Electricity}	*ELCOOK*
12	{Natural gas}	*NGCOOK*
13	{FuelOilType}	*FKCOOK*
14	{Bottled gas}	*PRCOOK*
15	{District steam}	*STCOOK*
16	{District hot water}	*HWCOOK*
18	{Wood}	*WOCOOK*
19	{Coal}	*COCOOK*
20	{Solar}	*SOCOOK*
21	{Other1}	*OTCOOK*
22	{Other2}	*OTCOOK*
23	{Other3}	*OTCOOK*
24	Some other energy source	

NEXT	IF Some other energy source selected ⇨ D78 [Other cooking source]
	OTHERWISE:
	IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing]
	IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation]
	OTHERWISE ⇨ D87 [Any other sources]

D78	Other cooking source
ASK	IF Some other energy source IN D77 [Sources for cooking]

What was the other energy source used for cooking?

11	Electricity	*ELCOOK*
12	Natural gas	*NGCOOK*
13	Fuel oil/Diesel/Kerosene	*FKCOOK*
14	Bottled gas	*PRCOOK*
15	District steam	*STCOOK*
16	District hot water	*HWCOOK*
18	Wood	*WOCOOK*
19	Coal	*COCOOK*
20	Solar	*SOCOOK*
24	Some other energy source	*OTCOOK*

NEXT	IF D6 [Manufacturing] = Yes ⇨ D79 [Sources for manufacturing] IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation] OTHERWISE ⇨ D87 [Any other sources]

D79	Sources for manufacturing	*see below*
ASK	IF D6 [Manufacturing] = Yes	
FILL	**{ManuSourcesList}** = List of all energy sources used **{Electricity} – {Other3}** = If a source is used, it appears in this list; if not, the line is blank **{FuelOilType}** = Type or types specified in D10 [Fuel oil, diesel, or kerosene] **{Other1} – {Other3}** = Sources specified in D12 [Other energy source 1] – D14 [Other energy source 3]	

Which energy sources were used for manufacturing? [{ManuSourcesList}]

◆ Only sources already selected are shown here

◆   PROBE for any others

◆ ENTER all that apply

11	{Electricity}	*ELMANU*
12	{Natural gas}	*NGMANU*
13	{FuelOilType}	*FKMANU*
14	{Bottled gas}	*PRMANU*
15	{District steam}	*STMANU*
16	{District hot water}	*HWMANU*
18	{Wood}	*WOMANU*
19	{Coal}	*COMANU*
20	{Solar}	*SOMANU*
21	{Other1}	*OTMANU*
22	{Other2}	*OTMANU*
23	{Other3}	*OTMANU*
24	Some other energy source	

NEXT	IF Some other energy source selected ⇨ D80 [Other manufacturing source] OTHERWISE: 　IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation] 　IF D8 [Electricity generation capability] ≠ Yes ⇨ D87 [Any other sources]

D80	Other manufacturing source	*see below*

ASK	IF Some other energy source IN D79 [Sources for manufacturing]

What was the other energy source used for manufacturing?

11	Electricity	*ELMANU*
12	Natural gas	*NGMANU*
13	Fuel oil/Diesel/Kerosene	*FKMANU*
14	Bottled gas	*PRMANU*
15	District steam	*STMANU*
16	District hot water	*HWMANU*
18	Wood	*WOMANU*
19	Coal	*COMANU*
20	Solar	*SOMANU*
24	Some other energy source	*OTMANU*

NEXT	IF D8 [Electricity generation capability] = Yes ⇨ D81 [Energy for generation] IF D8 [Electricity generation capability] ≠ Yes ⇨ D87 [Any other sources]

D81	Energy for generation	*GENR*

ASK	IF D8 [Electricity generation capability] = Yes

Was any energy actually <u>used</u> for generating electricity in this building during 2012, even if just a small amount was used for emergency backup or for testing generators?

1	Yes
2	No

NEXT	IF Yes ⇨ D82 [Sources for electricity generation]
	IF No OR DK/RF:
	    IF D9 [Energy sources used] = DK/RF ⇨ INTERVIEW COMPLETE
	    OTHERWISE ⇨ D87 [Any other sources]

D82	**Sources for electricity generation**	*see below*
ASK	IF D81 [Energy for generation] = Yes	
FILL	**{Other1} – {Other3}** = Sources specified in D12 [Other energy source 1] – D14 [Other energy source 3]	

SHOW CARD D16

Looking at Show Card D16, please tell me which energy sources were used for electricity generation.

◆   PROBE for any others

◆ ENTER all that apply

12	Natural gas	*NGGENR*
13	Fuel oil/Diesel/Kerosene	*FKGENR*
14	Bottled gas/LPG/Propane	*PRGENR*
18	Wood	*WOGENR*
19	Coal	*COGENR*
20	Solar	*SOGENR*
21	{Other1}	*OTGENR*
22	{Other2}	*OTGENR*
23	{Other3}	*OTGENR*
24	Some other energy source	*OTGENR*

NEXT	⇨ D83 [Generation technologies]

D83	**Generation technologies**	*see below*
ASK	IF D81 [Energy for generation] = Yes	

SHOW CARD D17

Looking at Show Card D17, were any of the technologies on this list used on-site for generating electricity?

◆   PROBE for any others

◆ ENTER all that apply

1	Photovoltaic cells	*PVC*
2	Fuel cells	*FUELCL*
5	Large turbines	*LRGTRB*
3	Microturbines	*MCROTB*
4	Wind turbines	*WNDTRB*
6	Reciprocating engines	*ENGINE*
7	IF VOLUNTEERED: None of these	

NEXT	⇨ D84 [Use of generated electricity]

D84	**Use of generated electricity**	*GENUSE*

ASK	IF D81 [Energy for generation] = Yes

[F1]-HELP

During 2012, was the electricity generated in this building used: primarily for emergency back-up or testing, during periods of high electricity demand, or whenever electricity was used?

    1   Primarily for emergency back-up or testing
    2   During periods of high electricity demand
    3   Whenever electricity was used

NEXT	IF Primarily for emergency back-up or testing OR DK/RF ⇨ D87 [Any other sources] IF During periods of high electricity demand OR Whenever electricity was used ⇨ D85 [Cogeneration system]

D85	**Cogeneration system**	*COGEN*

ASK	IF D84 [Use of generated electricity] = During periods of high electricity demand OR Whenever electricity was used

[F1]-HELP

Is the electric power generating system also a cogeneration system? That is, in addition to producing electric power, does the same system simultaneously produce heat that is used in this or another building for space heating, water heating, or industrial processes?

    1   Yes
    2   No

NEXT	⇨ D86 [Deliver electricity to grid]

D86	**Deliver electricity to grid**	*TOGRID*

ASK	IF D84 [Use of generated electricity] = During periods of high electricity demand OR Whenever electricity was used

Is the generation system interconnected with an electric utility so that it is able to deliver or sell electricity to the grid?

    1   Yes
    2   No

NEXT	⇨ D87 [Any other sources]

D87	Any other sources
ASK	IF D9 [Energy sources used] was answered
FILL	**{SourcesList}** = List of all energy sources used

As a final check, were there any energy sources used in this building other than {Sources List} ?

    1   Yes
    2   No

| **NEXT** | IF Yes ⇨ D88 [Other sources]
IF No OR DK/RF:
   Check that every energy source given in D9 [Energy sources used] (other than electricity or district
   chilled water) was assigned an end use. THEN:
   IF Yes:
     IF Electricity used ⇨ D91 [AMI smart metering]
       OTHERWISE:
       IF Heating OR Cooling ➔ D92 [Energy management plan]
       OTHERWISE ➔ L1 [Response effort]
   IF No ➔ D90 [Missed {energy source} use] |

D88	Other sources	*see below*
ASK	IF D87 [Any other sources] =Yes	
FILL	**{Electricity} – {Solar}** = If a source has NOT been mentioned, it appears in this list; if it has, the line is blank	

What other sources were used?

◆   PROBE for any others

◆ ENTER all that apply

11	{Electricity}	*ELUSED*
12	{Natural gas}	*NGUSED*
13	{Fuel/Diesel/Kerosene}	*FKUSED*
14	{Bottled gas}	*PRUSED*
15	{District steam}	*STUSED*
16	{District hot water}	*HWUSED*
17	{District chilled water}	*CWUSED*
18	{Wood}	*WOUSED*
19	{Coal}	*COUSED*
20	{Solar}	*SOUSED*
24	Other	*OTUSED*

NEXT	⇨ D89 [{Energy source} use]

D89	**{Energy source} use**	*see below where {XX} is the energy source abbreviation*

ASK	For each source selected in D88 [Other sources]
FILL	**{EnergySource}** IF Electricity IN D88 [Other sources] = "electricity" IF Natural gas IN D88 [Other sources] = "natural gas" IF Fuel oil/Diesel/Kerosene IN D88 [Other sources] = "fuel oil/diesel/kerosene" IF Bottled gas IN D88 [Other sources] = "bottled gas" IF District steam IN D88 [Other sources] = "district steam" IF District hot water IN D88 [Other sources] = "district hot water" IF Wood IN D88 [Other sources] = "wood" IF Coal IN D88 [Other sources] = "coal" IF Solar IN D88 [Other sources] = "solar energy" IF Other IN D88 [Other sources] = "other fuel" **{Cooling}** Does not appear as a choice for Wood use, Coal use, OR Solar use **{Electricity generation}** Does not appear as a choice for Electricity use, District steam use, OR District hot water use

What was the {EnergySource} used for?

1	Heating	*{XX}HT1/HT2*
2	{Cooling}	*{XX}COOL*
3	Water heating	*{XX}WATR*
4	Cooking	*{XX}COOK*
5	Manufacturing	*{XX}MANU*
6	{Electricity generation}	*{XX}GENR*
7	Some other use	*{XX}OTH*
8	Incorrectly recorded--source not used	

NEXT	Check that every energy source given in D9 [Energy sources used] (other than electricity or district chilled water) was assigned an end use: IF Yes: IF Electricity used ⇨ D91 [AMI smart metering] OTHERWISE: IF Heating OR Cooling ➜ D92 [Energy management plan] OTHERWISE ➜ L1 [Response effort] IF No ⇨ D90 [Missed {energy source} use]

D90	Missed {energy source} use	*see below where {XX} is the energy source abbreviation*

ASK	For every energy source given in D9 [Energy sources used] that was not assigned an end use (other than electricity)
FILL	**{EnergySource}** IF No end use for Natural gas = "natural gas" IF No end use for Fuel oil = Type or types specified in D10 [Fuel oil, diesel, or kerosene] IF No end use for Bottled gas = "bottled gas" IF No end use for District steam = "district steam" IF No end use for District hot water = "district hot water" IF No end use for District chilled water = "district chilled water" IF No end use for Wood = "wood" IF No end use for Coal = "coal" IF No end use for Solar = "solar energy" IF No end use for Other = "another energy source" (second fill = "other energy source") **{Heating}, {Water heating}, {Cooking}, {Manufacturing}** Do not appear as a choice for District chilled water use **{Cooling}** Does not appear as a choice for Wood use, Coal use, OR Solar use **{Electricity generation}** Does not appear as a choice for District chilled water use, District steam use OR District hot water use

I have recorded that {EnergySource} was used in this building but not how it was used. What was the {EnergySource} used for?

1	{Heating}	*{XX}HT1/HT2*
2	{Cooling}	*{XX}COOL*
3	{Water heating}	*{XX}WATR*
4	{Cooking}	*{XX}COOK*
5	{Manufacturing}	*{XX}MANU*
6	{Electricity generation}	*{XX}GENR*
7	Some other use	*{XX}OTH*
8	Incorrectly recorded--source not used	

NEXT	IF Electricity used ⇨ D91 [AMI smart metering] OTHERWISE: IF Heating OR Cooling ➜ D92 [Energy management plan] OTHERWISE ➜ L1 [Response effort]

D91	**AMI smart metering**	*AMIMETER*

ASK	IF Electricity used

Does this building have advanced metering infrastructure, sometimes referred to as AMI or "smart metering"?

◆ DEF: [An AMI or "smart meter" is a meter that records electricity
consumption in intervals of one hour or less. Daily data
are available to both the energy company and the consumer
through a web portal, display device, or other form of
communication.]

    1   Yes
    2   No

NEXT	IF Heating OR Cooling ➔ D92 [Energy management plan] OTHERWISE ➔ L1 [Response effort]

D92	**Energy management plan**	*ENRGYPLN*

ASK	IF Heating OR Cooling

Does this building have a formal energy management plan in which energy targets are set and consistently monitored?

    1   Yes
    2   No

NEXT	➔ L1 [Response effort]

DRAFT (9/5/12)

SECTION L. <u>COLLECT MATERIALS</u>

L1	Response effort	*REFFORT*
ASK	All Mall Buildings	

Just a few last questions before we finish. Including yourself, please tell me how many people were needed to compile the information for this interview.

RANGE	1 to 99
NEXT	➜ L2 [Green building certification]

L2	Green building certification	*GRNCRT*
ASK	All Mall Buildings	

In the past 3 years, has this building been certified as a "green building," such as Energy Star, LEED, or Green Globes?

    1   Yes
    2   No

NEXT	IF Yes ➜ L3 [Type of green certification] OTHERWISE: IF R2 [Worksheet 1] = Yes ➜ L5 [Collect Worksheet 1] IF R2 [Worksheet 1] ≠ Yes ➜ L6 [Thank you]

L3	Type of green certification	*see below*
ASK	IF L2 [Green building certification] = Yes	

Which type of certification did the building receive? Was it Energy Star, LEED, Green Globes, or did it receive some other green building recognition?

◆ ENTER all that apply

1	Energy Star	*ENGYSTR*
2	LEED	*LEED*
3	Green Globes	*GRNGLBS*
4	Other	*OTCERT*

NEXT	IF Other selected ➜ L4 [Other certification] OTHERWISE: IF R2 [Worksheet 1] = Yes ➜ L5 [Collect Worksheet 1] IF R2 [Worksheet 1] ≠ Yes ➜ L6 [Thank you]

L4	Other certification	GRNCRTX
ASK	IF Other IN L3 [Type of green certification]	

What was the other type of recognition received by this building?

◆ ENTER the type of certification

NEXT	IF R2 [Worksheet 1] = Yes ➜ L5 [Collect Worksheet 1] IF R2 [Worksheet 1] ≠ Yes ➜ L6 [Thank you]

L5	**Collect Worksheet 1**
ASK	IF R2 [Worksheet 1] = Yes

That completes our interview. Before I leave, may I please collect Worksheet 1? [This is the "Characteristics, Energy Sources, and Equipment" worksheet that you filled out before the interview.]

◆ ENTER "1" to continue

NEXT	INTERVIEW COMPLETE

L6	**Thank you**
ASK	If R2 [Worksheet 1] ≠ Yes

That completes our interview. Thank you so much for your time and help.

◆ ENTER "1" to continue

NEXT	INTERVIEW COMPLETE