

## Changes for the 2012 CBECS

The proposed design, procedures, and forms for the 2012 CBECS reflect a number of changes from the 2007 CBECS. These changes include:

- The sample size for the 2012 CBECS will be 50 percent larger relative to the previous CBECS. The increase in sample size will allow for:
  - Fewer suppressed cells in published tables,
  - Better capture of emerging energy phenomena, such as new technologies for on-site electricity generation,
  - Lower relative standard errors for key statistics for publishable sample domains,
  - More publishable data for more principal building activities, and
  - More releasable microdata on the public use dataset.
- A portion of the 2012 CBECS interviews will be conducted by telephone. Previous CBECS designs have relied on in-person interviews for data collection. In 2007, field interviewers needed an average of six contacts to complete a building interview; this process can be time-consuming and costly when done in-person. For 2012, certain respondents (large buildings for which contact information is usually available) will be initially contacted by telephone. After the initial contact, all respondents will be given the option to complete the interview by phone.
- Approximately 200 buildings will be visited by a building energy professional to collect objective information about certain energy-consuming equipment and building characteristics in addition to the traditional CBECS interview. In 2010, EIA commissioned the National Academy of Sciences to convene a panel on improving the CBECS and the RECS; one of the early recommendations from the panel was to explore the value of using these professionals. The purpose of this post interview assessment is to validate key instrument questions and assess the overall validity of the building's energy characteristics as captured on the survey instrument.
- Based on review of the 2007 CBECS and consultation with many CBECS stakeholders, there have been changes, additions, and deletions within the 2012 CBECS questionnaire.

The following bullets detail the substantive changes that were made to the 2012 CBECS questionnaire. In addition to these listed changes, there were other minor wording changes, additions of clarifying definitions, and modification to edits within the survey instrument to help preclude call-backs to respondents. The goal of all changes to the questionnaire was either to clarify questions in order to decrease cognitive burden on the respondents or to accommodate the requests of key CBECS stakeholders. All stakeholder requests were evaluated to ensure that any additions would not add undue burden and would improve the value of the CBECS data.

- A short series of follow-up questions was added following the collection of the building's gross square footage, a key indicator for calculating energy intensities. The purpose of the new questions is to verify which portions of the building are covered in the square footage value given by the respondent. The first question asks whether any parking area is included in the square footage figure and then, if so, whether the included parking areas are completely enclosed or open to the outside. If the included parking areas are open to the outside or are enclosed but not attached to the building, the square footage of the parking area is requested. The last question in this new series asks whether the square footage includes all the common areas, such as hallways, stairways, and lobbies; the intent of this question is to ensure that the respondent has provided the gross area and not just the leasable area. (Stakeholder request)
- A question was added to detect the presence of a "cool roof" (a roof that is designed to reduce solar heat gain). (Stakeholder request)
- A question was added to collect the typical floor-to-ceiling height. The information will provide another dimension for estimating the heating and cooling requirements of the buildings. (Stakeholder request)
- For office buildings, enclosed malls, and strip malls, a question was added to collect the percent of floorspace occupied during the year. (Stakeholder request)
- For hotels, motels, inns, and retirement homes, a question was added to collect the average percent of lodging rooms occupied during the year. This information will also help EIA reconcile data discrepancies after the field collection. (Stakeholder request)
- For social or meeting public assembly buildings, a question was added to collect the number of events held during the reference year. This information will help define the usage levels within the building. (Stakeholder request)
- For restaurants, a question was added to collect the number of meals served during the reference year. This information will help define the usage levels within the building. (Stakeholder request)
- Leading into the series of questions on the hours of operation and number of workers in the building, a question was added that asks whether the building is a seasonal building. If so, the respondent is asked to provide the number of months of "high use." The screener question helps frame questions about the hours of operation and number of workers, alleviating confusion and reducing burden for seasonal building respondents. Seasonal buildings are also asked for a categorization of hours for their "off season."

- A few new questions were added specifically for fire stations: whether the personnel are career or volunteer; whether the station contains living quarters, whether space is used for non-fire station activities (e.g. hall rental) and if so, the percentage of the total floorspace for these activities. Fire stations vary widely in their energy use patterns and these questions will help explain differences between types fire stations. (Stakeholder request)
- Substantial changes were made to the heating and cooling equipment sections. New follow-up questions were added and others were deleted, and specific types of equipment within the follow-up categories were modified, added and deleted. The changes should not add any additional questions and should make it easier for respondents to map their systems onto improved response sets in the redesigned questions.
- A question was added to collect the presence of a “building automation system” or BAS. In recent CBECS cycles, the presence of these systems were embedded within the response set for how heating and cooling is reduced, and based on the data collected, it appears that this approach may have underestimated the presence of these systems. BAS systems are of interest to many stakeholders, so their presence will be collected in a standalone question, reducing any inadvertent downward response bias.
- A question was added to determine whether there is a formal energy management plan for the building, in which energy targets are set and consistently monitored. This question provides a simple measure of behavior that could explain consumption differences between similar buildings. (DOE stakeholder request)
- For certain types of buildings (restaurants, Laundromats, hospitals, and car washes) that report having a point-of-use water heater, a question was added to collect the number of these that are “booster” water heaters (used to raise the water temperature, usually for sterilizing). (EIA stakeholder request)
- There were a few additions to the response set for energy generation technologies: wind turbines, large turbines, and reciprocating engines were added to the question which already included microturbines, fuel cells, and photovoltaic cells. (EIA stakeholder request)
- A question was added for buildings that use electricity asking whether they have advanced metering infrastructure (AMI), also known as “smart metering.” Smart metering is a relatively new technology and is of interest to many in the energy community. (Stakeholder request)

- Modifications were made to the food preparation area questions which should provide improved question flow. To preclude redundancy, food service buildings will no longer be asked whether they have space for food preparation. The lead-in question about whether there is any space for food preparation has been eliminated. In the 2012 CBECS, all buildings (except food service) that reported cooking as an end use will now be shown a list of special food areas and asked which ones they have. Buildings that report a snack bar/concession stand, small restaurant, large restaurant/cafeteria, or commercial kitchen will be asked to report the square footage of the food service area. This extra information will be useful as an explanatory variable for energy use. (Stakeholder request)
- For hotels and motels, a question was added to find out if any space is used for conferences and/or social events, and if so, its percent of the total floorspace.
- A series of questions about the use of high-intensity medical equipment was added. The number of X-ray machines, CT scan machines, MRI machines, and linear accelerators will be collected in all inpatient health care buildings and outpatient health care buildings that report having any diagnostic medical equipment. These types of equipment use significant amounts of energy and accounting for them should improve accuracy for end use estimates.
- For hospitals, the percent of floorspace used for outpatient care will be collected. There are significant differences in energy use for hospitals with large areas for outpatient care versus those that are mainly inpatient.
- For outpatient health care, a question was added to determine if there is an outpatient surgery center. Outpatient buildings with operating rooms are more intensive energy users than those without. (Stakeholder request)
- For hotels and food sales buildings, a question was added to capture the presence of a waste heat recovery system as part of the refrigeration system, and if present, whether it is used for space heating or water heating. Data editing in past cycles has shown that respondents for buildings with these systems have trouble determining where to classify these systems within the existing CBECS questions.
- Buildings with very few computers will no longer be asked if they have separate specialized computer areas. The separate computer areas question was also revised so that it only asks about a few specific areas (data centers, trading floors, computer-based training rooms, and student or public access computing centers) and does not ask the respondent to specify any other areas. For buildings that report data centers and/or trading floors, the square footage of these areas will be collected. (Stakeholder request)

- For education and office buildings, a question was added about the presence and number of interactive whiteboards. The penetration of this energy-intensive technology is increasing and should be tracked. (Stakeholder request)
- A question was added about the presence and number of televisions or video displays. Such displays are becoming ubiquitous in certain building types and they should be accounted for in helping to explain energy use. (Stakeholder request)
- The question asking how often the computers and other office equipment were turned off when the building was not normally open (always, sometimes, or never) was eliminated. Considering the wide range of office equipment types and the varying degrees of how they can be “turned off,” the question added little value.
- The two questions asking about specular reflectors and electronic ballasts as part of the lighting equipment were removed. Stakeholders indicated that most all modern lights now have these features.
- A question was added to collect information on lighting controls, such as occupancy sensors, daylight harvesting, dimming, and plug load control. A couple of these categories were removed from the existing daylighting features question because they are not daylighting features but more appropriately part of the lighting controls question. These changes will bring the lighting section more up-to-date with current technologies. (Stakeholder request)
- For buildings that generate electricity whenever electricity is used (as opposed to emergency backup only), if the respondent provides electricity usage information for the building, a question was added to determine if electricity consumption includes the electricity generated on-site or if it is all purchased electricity.
- In the electricity usage section, if the respondent reports that other major uses outside the building were included in the usage figures, a question was added to find out what these uses are: parking lot lights, exterior lights, signs or billboards, large pumps, swimming pools, or other. The addition of this question eliminates a separate question that was asked in the 2007 CBECS about whether parking lot lights were included in the electricity consumption figures.
- In the natural gas usage section, if the respondent reports that other major uses outside the building were included in the usage figures, a new question asks whether these uses are kilns, gas space heaters, exterior or decorative lighting, compressed natural gas vehicles, pumps not used in the building, or other.

- For enclosed malls, in the electricity and natural gas usage sections, a follow-up question was added to determine which areas of the mall have been included in the consumption figures (the anchor stores, food court, common areas, individual stores, or any other areas). For areas that were not included, the respondent is asked to provide the square footage.
- Two questions have been removed in the fuel oil usage section; introduced in the 2007 CBECS, they asked about the amount of fuel oil actually used, as opposed to purchased. Upon review of the 2007 data, EIA concluded that the question about the amount of fuel oil consumed did not add much, if any, value to the fuel oil data. Careful review of the question wording across the survey cycles indicated possible ambiguities in the past wording of the fuel oil purchasing questions. The questions have been revised to again ask only about fuel oil purchased, but improvements have been made to the wording to eliminate past ambiguities.
- For buildings that report using district chilled water, a few questions were added to explore the feasibility of collecting chilled water consumption data in future CBECS. If the chilled water is provided from a central plant on the same campus as the building, the respondent is asked whether the usage is metered and if so, to have a copy of the records scanned. If the chilled water comes from a utility, a scan of the bill is requested. Reviewing the scanned records or bills will help EIA determine if there are standard units in which chilled water is metered and help to frame questions for the next CBECS if collecting the data proves feasible. There is currently a piece missing in the total energy consumption collected by the CBECS for buildings that use district chilled water, and there are indications that central district chilled water systems are becoming more prevalent in the U.S. (EIA stakeholder request)
- Water usage questions introduced in the 2007 were improved and remain in the 2012 CBECS. The Office of Wastewater Management within the U.S. Environmental Protection Agency (EPA) sponsored questions related to water use on the 2007 CBECS. Getting better information on how water is used by commercial buildings is the first step toward understanding commercial water use and the energy impact of that use. The CBECS data collection instrument is already well-suited to collect this information.

The revisions to the water questions were based on extensive review by EIA of the data collected in 2007. The changes will smooth the interview process on the water questions and result in cleaner data. Details of these changes are provided here:

- A lead-in question asks whether the building uses water. This will allow buildings that don't use water at all (e.g. vacant buildings, warehouses) to skip the section entirely.
  - A question was added to collect the units in which the volume of water is provided (e.g. gallons, million gallons, or hundred cubic feet). This will preclude the interviewer and respondent from having either having to convert to gallons themselves, or enter a note. It will also result in cleaner data; inspection of the 2007 data revealed that in many cases the data were not provided in gallons, but there was nothing explicit in the data to provide this essential piece of information.
  - A new question asks whether any water was used outside the building (for irrigation) and, if so, whether it is metered separately and, if so, the volume of water used outside. The 2007 questions simply asked for the amount of water used outside, and the data were difficult to interpret without the leading questions (for example, there was no way to differentiate whether zero mean that no outside water was used or that it wasn't metered).
  - If the cooling equipment includes a central chiller, packaged unit, or heat pumps, a question was added that asks if there is a cooling tower. If there is a cooling tower, another question asks if the water for the cooling tower is metered, and if so, the volume of water used for the cooling tower. The 2007 CBECS question simply asked for the cooling tower consumption and, as with the outside water question, the data were difficult to interpret.
  - A question was added to determine if reported water consumption includes water usage for any other buildings besides the sampled building. This will allow EIA to effectively disaggregate the data and make consumption estimates just for the sampled building.
  - A question was added requesting that the interviewer scan a sample water bill. In 2007, energy bills were scanned but water bills were not directly requested. However, in many cases respondents spontaneously provided a water bill, too. The water bills proved to be valuable during data editing, so requesting them outright in 2012 will enable EIA to make fuller use of bills, for example, to validate extreme values in reported data.
  - Water data collection was extended to establishments in strip malls so that an estimate of water consumption for the entire stock of commercial buildings can be estimated.
- o A question was added to determine whether the building has any type of green building certification (Energy Star, LEED, Green Globes, or Other) and if so, which type. (Stakeholder request)