

Measuring Green Industry Employment

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Abstract

The Bureau of Labor Statistics (BLS) intends to publish detailed economic statistics on industry employment in the green goods and services sector in the United States. This paper discusses the methodology used by BLS to develop this new survey. The research methodology involved feasibility interviews, forms design, panel testing of the forms, follow-up interviews with panel respondents, and subsequent sample frame enrichment. The panels focused on the respondent burden when providing requested data items on the forms, the respondents' understanding of the BLS definition of green goods and services, response rates, prevalence of green activity at establishments, and an assessment of potential survey costs associated with the need for address refinement and potential non-response prompting. The outcome of this research was a proposed collection methodology, timing for the collection, the need for survey sample frame enrichment and survey collection instrument for the live data collection.

Introduction

BLS intends to produce detailed statistics on employment in the green goods and services (GGS) sector in the U.S. The green goods and services sector, according to the BLS definition, includes jobs in categories that produce goods or provide services that benefit the environment or conserve natural resources. The categories are as follows:

1. Energy from renewable sources. Example: Producing energy from wind farms or solar panels.
2. Energy efficiency. Example: Manufacturing, installing, or maintaining energy-efficient equipment or the weatherization of buildings.
3. Pollution reduction and removal, greenhouse gas reduction, and recycling and reuse. Example: Manufacturing or installing scrubbers, producing nuclear energy, or collecting trash and recyclables.
4. Natural resources conservation. Example: Growing certified organic crops.
5. Environmental compliance, education and training, and public awareness. Example: Enforcing environmental regulations or publishing environmental education materials.

In readying to undertake a full survey, BLS performed several months of field research to understand potential respondents' comprehension of the GGS definition. Important issues, such as what questions to ask establishments in order to collect the data needed to count green jobs and which collection methodology would yield the highest response rates, needed to be explored to ensure the data collection effort will be successful. BLS began its research to develop a form for the GGS collection in early 2010 by contacting establishments for feasibility interviews followed by several rounds of forms design and testing.

Because an establishment may produce or provide multiple products, it is possible that only a portion of an establishment's products would meet the BLS green definition. During the feasibility interviews, BLS wanted to learn how establishments maintained records on their various products or services and determine what kind of data an establishment would be able to provide for a particular product or service. Using the

results of the feasibility interviews, BLS developed a survey form that was tested on a sample set of establishments. The survey form was revised and tested through 4 different panels, with the fourth panel testing the final survey instrument to be used in the actual collection. In addition to testing the survey instrument, follow-up interviews with panel respondents were done to provide information on the respondents understanding of this BLS initiative, the burden imposed by the survey on the respondent, expected response rates, and the prevalence of GGS activity among establishments. This paper will address these various phases of the research process.

Feasibility interviews

A sample of 200 establishments from various states and industrial supersectors (based on NAICS, the North American Industrial Classification System) was solicited for the feasibility interviews. Each unit was mailed a letter outlining the topics to be discussed prior to being contacted by phone for an interview. The feasibility interviews focused on getting answers to a handful of key questions to help guide the design and testing protocols of the forms. Over a two week period, this sample was contacted to complete the feasibility interviews. The response rate for the feasibility interviews was low (around 15 percent). This was due to the short time frame (2 weeks) for the interviews and the difficulty of navigating through a company to reach the person able and willing to respond to the survey questions.

The questions, the reasoning behind the questions, and the responses are outlined below:

- *Were respondents able to provide employment (including administrative and support staff) associated with a particular product or service line?* Because the BLS GGS definition may only apply to a portion of an establishment's products or services, BLS only intends to count the employment associated with those products as green. For example, if an establishment manufactures 2 products, scrubbers to reduce a manufacturing plant's emissions and ball point pens, BLS only considers the employment associated with the scrubbers as green. During the interviews, respondents indicated it would be difficult to provide employment associated with a particular product or service. The most common reason behind the difficulty in allocating employment to a particular product was that many employees, particularly support and administrative staff, are not dedicated to one particular product.
- *Were respondents able to provide the share of total revenue for a particular product or service?* BLS anticipated that it may be less burdensome on respondents to provide revenue share data by product line. BLS would use the revenue share for the green product and apply that percentage to the establishment's total employment. If the manufacturing plant above employed 100 people and 65 percent of its revenue was from scrubbers and the remaining revenue was from ball point pens, then BLS would say 65 jobs at that plant would be considered green, since scrubbers are considered a green good and ball point pens are not. Responses during the interviews indicated that establishments are easily able to provide revenue by product and/or service line.
- *Did an establishment believe a product's revenue would be a reasonable proxy for employment associated with that product?* The response to this question was mixed with some respondents indicating using a product's revenue to apportion employment associated with that product seemed reasonable while others did not believe it was a reasonable proxy. Those that

- disagreed indicated the variability of input costs or the development of a new product made revenue an unreliable approximation of employment.
- *What time frame would employment or revenue data be available?* In order to know what reference period to use to ask for employment or revenue shares associated with a green product, BLS needed to know what timeframes establishments used to track this data. Most establishments track revenue data by fiscal year and in many cases by month and by quarter.
 - *Who at the establishment would be able to provide the requested revenue data?* The controller or other financial accounting staff member would have access to this data and would be able to provide it to BLS on a survey form.
 - *Would the respondent be willing to share product line data with BLS?* Many establishments were willing to share revenue data since BLS was only asking for a percent and not an actual dollar figure.
 - *Were respondents familiar with the use of environmental standards at their establishment?* In many cases, a product has some versions that may be considered green and other versions that are not considered green. For example, a television that meets the EnergyStar requirements is considered a green product because it uses less energy than a television not meeting the EnergyStar standard. BLS only wants to include the green versions of these products and intends to rely on federal or other national environmental standards to determine which versions of a product or service are green. Respondents need to be familiar with these standards and be able to provide data by these standards to make them useful for the BLS GGS survey. The interview's showed that if the respondent's industry had environmental standards, the respondent was familiar with them and if they produced products or services meeting those standards they would be able to provide revenue for just those products or services.

As a result of the feasibility interviews, the questions on the forms asked for revenue (or employment from establishments in non-revenue based industries like government) associated with GGS. BLS decided to ask for revenue shares for the fiscal year since all respondents indicated they had data for that time frame. To ensure establishments with different fiscal years had some overlap in the requested reference period, the forms asked respondents to provide data for their fiscal year that included a particular date (in the research, April 15, 2009 was used). These questions were developed into a form and then field tested in order to finalize the question phrasing and design of the GGS form.

Forms testing

BLS conducted 4 panels of forms testing on approximately 350 sample units in each sample over a 4 month period (about 6 weeks per panel). The initial protocol for each panel was to mail the form to the survey recipients and then begin telephone non-response prompting about 1 week after the mailing was completed. Telephone follow-up interviews assessing respondents understanding and perception of the forms and questions were conducted about 3-4 weeks after the survey mailing. The results from the returned surveys and follow-up interviews were intended to guide changes to the form for the subsequent panel.

Panel 1

The initial approach to the forms design was for each six-digit North American Industry Classification System (NAICS) code to have a unique data collection form. Forms would have each respondent verify their industry and then provide revenue or employment

shares for a specific list of green products or for products that met a certain environmental standard. BLS developed 19 different forms to test on 348 sample units. The key green question on the 19 forms asked what percent of the establishment’s revenue came from the listed green products or services or from the products or services the met an environmental standard. An example of this question from the NAICS 335224 (*Household laundry equipment manufacturing*) form is below:

Figure 1. Example of panel 1 form green question: question 5

<p>5 What is your percent revenue from specific product lines? In Columns 1 and 3, please estimate the percent of total revenue at the location listed in Item 1 from the following <i>EnergyStar certified</i> products. Please base your estimate on total revenue for your fiscal year from Item 3. The sum of Columns 1 and 3 may not equal 100%.</p> <p>Note: This section may best be completed by someone at your firm with access to financial data.</p>			
Percent of total revenue for fiscal year listed in Item 3			
1	2	3	4
Percent of total revenue from EnergyStar certified products	Product line	Percent of total revenue from EnergyStar certified products	Product line
	Dry cleaning and laundry machines, household-type		Laundry equipment (e.g., dryers, washers), household-type
	Dryers, clothes, household-type, gas and electric		Washing machines, household-type
	Dryers, household-type		Other (please specify):
	Ironers and mangles, household-type (except portable irons)		Other (please specify):

Of the 348 units, 66 returned the form by mail and an additional 55 completed the form over the phone during the non-response calls. Overall 121 completed the survey for a response rate of 34.8%. Smaller units had higher response rates than larger units and single unit establishments had a higher response rate than establishments that were part of a multi-unit company. During the non-response prompting, interviewers found it difficult to locate the right respondent or a respondent with the knowledge needed to respond to the questions. This was particularly true with multi-unit establishments, confirming the same finding from the feasibility interviews. See Table 1. Of the 121 responses, item non-response was not an issue for the green question; however, many provided percentages that added up to greater than 100 while others provided dollar amounts and other inaccurate responses.

All respondents who returned their form by mail were contacted for a follow-up interview. The follow-up interviews indicated respondents found the forms too detailed and too specific. Some respondents did not finish completing the form because the detailed product and service listings in the industry verification question and the green question did not match the precise details of what they produced. The responses indicated some respondents did not read the entire green question leading to errors in response such as reporting revenue shares that added up to greater than 100 percent. Establishments also wanted to report on internal green projects, such as a recycling program or use of renewable energy, which are activities BLS is interested in collecting on a separate survey.

Panel 2

The forms for panel 2 did not ask for industry verification and did not rely on detailed industry descriptions or product lists to avoid non-response, item non-response, or erroneous responses seen in the green question on the detailed industry forms in panel 1. Instead, the panel 2 green question asked respondents to record what percent of their revenue came from goods or services they produced that fell into one of the green categories, as defined by BLS, or met an environmental standards listed on the form (e.g.,

EnergyStar, USDA certified organic; see Figure 2 for an example)¹. The forms simply listed the green categories and environmental standards but did not give any examples of what was included in the categories. Three forms were developed (one form used only the BLS green categories, one form used only the environmental standards, and the third form combined both the BLS green categories and the standards into one questions) for use in panel 2 as opposed to the 19 different detailed industry forms used in panel 1.

Figure 2. Example of panel 2 form green question: question 4

4 What percentage of your revenue comes from specific activities at your worksite?
Note: This section may best be completed by someone at your firm with access to financial data.

% of total revenue for your worksite in Item 1 from producing or selling products or services where the primary purpose falls into at least one of the following categories listed below. If you have products or services that meet multiple criteria, please include their revenue once in the percentage. Please estimate using revenue from the fiscal year listed in Item 2:

Environmental Categories: Please check all that apply	Environmental Standards or Programs: Please check all that apply			Other: Please check all that apply
<input type="checkbox"/> Renewable energy: research on and development, production, storage, and distribution of energy from renewable sources	<input type="checkbox"/> DOE EnergyStar	<input type="checkbox"/> EPA BumWise	<input type="checkbox"/> NSF/ANSI 140: Sustainability Assessment for Carpet	<input type="checkbox"/> Products contain > 50% recycled, recovered, or reused content
<input type="checkbox"/> Energy efficiency: research on and development and implementation of energy conservation technologies and practices	<input type="checkbox"/> USDA certified organic	<input type="checkbox"/> EPA environmentally preferable purchasing program	<input type="checkbox"/> NSF/ANSI 332: Sustainability Assessment Standard for Resilient Floor Covering	<input type="checkbox"/> Biofuels , ethanol for alternative fuels
<input type="checkbox"/> Greenhouse gas reduction: research on and development and implementation of technologies and practices to reduce greenhouse gas emissions through approaches other than renewable energy generation and conservation	<input type="checkbox"/> USDA BioPreferred listed products	<input type="checkbox"/> Leadership in Energy & Environmental Design (LEED) projects and eligible products	<input type="checkbox"/> ANSI/BIFMA X7.1 standards for low-emitting office furniture	<input type="checkbox"/> Weatherizing buildings/homes
<input type="checkbox"/> Pollution reduction and cleanup: research on and development and implementation of technologies and practices to reduce the emission of pollutants and remove pollutants/hazardous waste from the environment	<input type="checkbox"/> EPA Design for the Environment	<input type="checkbox"/> EPEAT/IEEE (IEEE 1680)	<input type="checkbox"/> BIFMA e3-2008 Furniture Sustainability Standard	<input type="checkbox"/> Other (please specify):
<input type="checkbox"/> Recycling and waste reduction: research on and development and implementation of technologies and practices to collect and recycle materials and waste water	<input type="checkbox"/> EPA WaterSense	<input type="checkbox"/> ISO 21930:2007: Environmental declaration of building products	<input type="checkbox"/> UL Environment	<input type="checkbox"/> Other (please specify):
<input type="checkbox"/> Education, compliance, public awareness, and training for the above categories.	<input type="checkbox"/> EPA SmartWay	<input type="checkbox"/> ISO/IEC 24700:2005: Quality and performance of office equipment containing reused components	<input type="checkbox"/> Other (please specify):	<input type="checkbox"/> Other (please specify):

In addition to the redesigned forms, half of the panel 2 sample units were mailed an advance letter explaining the purpose of the survey and what questions were to be asked on the survey form. Since finding the right respondent within an establishment was an issue in both the feasibility interviews and panel 1, the goal of the advance letter was to give respondents extra time to determine who at their establishment was best able to complete the survey. The other half of the panel 2 sample units received no advance letter but was mailed the survey using express mail. BLS wanted to understand if recipients paid more attention to mail arriving in an express mail format compared to regular mail.

Panel 2 had 356 sample units and the overall response rate was higher than in panel 1 (43% compared to 34.8%). Of the total responses, 20% came by mail and 23% came through the non-response prompting call. Respondents receiving the advance letter had a 10% higher response rate than those receiving the form using express mail. Similarly to

¹ A “green category” a broad category, defined by BLS, to capture a variety of products and services that fall into that category. For example, “renewable energy” is a green category and might include energy production from wind or solar or the research into a new renewable fuel source. An environmental standard is defined by a federal agency or other private organization is attached to a product that meets certain product standards, such as EnergyStar.

panel 1, larger establishments tended to have lower response rates than smaller establishments and single units had a higher response rate than multi-units. See Table 1. Item non-response for the green question was very small; however, while nearly all respondents provided a percentage of revenue, only a few respondents with positive green revenues checked off the green category or the environmental standard their products or services met.

The follow-up interviews, completed with 50 of the 78 mail respondents, indicated respondents found the questions easy to understand and completely contrary to the first panel where respondents found the form and questions difficult to understand. Respondents said the time it took them to complete the form was reasonable (70% said it took them 10 minutes or less). Seventy percent of the respondents to the follow-up interviews said the green categories and environmental standards in question 4 did not apply to their business. Many said additional instructions or a cheat sheet of examples of what was included in the BLS green categories would have been helpful. Again, as in panel 1, establishments wanted credit for internal green projects, such as a recycling program or use of renewable energy, and wanted to report on them.

Panel 3

Using the results from panel 2, BLS developed a single form that combined all the elements from the 3 forms used in panel 2. In panel 2, many respondents indicated they had positive green revenue but did not flag the category or standard the revenue came from. Therefore in panel 3, the green question was divided into 3 questions. The first green question asked the respondent to check yes if they had any products or services that fell into the green categories. The next green question asked the respondent to check yes or no for each environmental standard to indicate if any products or services they provided met those standards. Finally, the last green question asked respondents to provide the share of revenue or employment from those green products or services marked yes in the prior 2 questions. (See Figure 3). In response to requests from panel 2 respondents for a cheat sheet or list of examples, BLS developed a single instruction sheet to be used for all industries providing examples of products and services that fell into each of the BLS green categories. For example, natural resources conservation included examples such as wetlands restoration and sustainability planning services. The instruction sheet also listed things that should not be included to avoid respondents reporting on internal green activity, such as the use of water conservation practices at the workplace.

Figure 3. Example of panel 3 form green questions: questions 3-5

3 Does this worksite produce products or services that meet one or more of the following green goods and services categories?

Note: This section may best be completed by someone at your firm with access to financial data.
Examples of activities included in the green goods and services categories are on the back of the cover letter.

Green Goods and services are goods and services produced by a firm that benefit the environment or conserve natural resources. Green goods and services categories are below:

- **Renewable energy:** includes research and development, and the production, installation, operation, and maintenance of energy from renewable sources
- **Energy efficiency:** includes research and development, and the production, installation, operation, and maintenance of goods and services that improve energy efficiency
- **Pollution and greenhouse gas reduction, pollution clean-up, and recycling and reuse:** includes research and development, and the production, installation, operation, and maintenance of goods and services that reduce or eliminate the creation, emission, or environmental release of toxic compounds or pollutants, or remove pollutants or hazardous waste from the environment
- **Natural resources conservation:** includes research and development, and the production, installation, operation, and maintenance of goods and services that conserve natural resources
- **Education, compliance, public awareness, and training:** products and services to develop, implement, and enforce environmental regulations; to provide education and training in the development or application of "green" technologies and practices; and to increase public awareness of environmental issues

Do any of this worksite's products or services meet any of these categories?

Yes

No

4 Does this worksite produce products or services that meet one or more of the following environmental standards or are listed in any of the following environmental programs?

Please indicate yes or no for each item

Environmental Standards or Programs:	Yes	No	Environmental Standards or Programs:	Yes	No	Environmental Standards or Programs:	Yes	No
EnergyStar			BurnWise			NSF/ANSI 140: Sustainability Assessment for Carpet		
USDA certified organic			EPA environmentally preferable purchasing program			NSF/ANSI 332: Sustainability Assessment Standard for Resilient Floor Covering		
USDA BioPreferred listed products			Leadership in Energy and Environmental Design (LEED) projects and eligible products			ANSI/BIFMA X7.1 standards for low-emitting office furniture		
Design for the Environment			EPEAT/IEEE (IEEE 1680)			BIFMA e3-2008 Furniture Sustainability Standard		
WaterSense			ISO 21930:2007: Environmental declaration of building products			UL Environment		
SmartWay			ISO/IEC 24700:2005: Quality and performance of office equipment containing reused components			Other (please specify):		

5 What percent of this worksite's total revenue comes from products or services where the primary purpose falls into the categories checked 'yes' in question 3 and/or question 4? → %

Estimate Percent of Total Revenue for:

- Your worksite in Item 1 and fiscal year listed in Item 2.
- If none, enter "0" and return the survey.
- **Exclude** internal environmental improvements or programs (for example, do not include an internal recycling program)
- **For government, education, and non-profits, please provide** the percent of the worksite's total expenditures.

Panel 3 was divided into 2 sub-panels. On one sub-panel BLS tested the impact of doing a second mailing of the survey before starting the non-response calls. The second mailing was mailed about two weeks after the first mailing and was then followed by the non-response calls. The other sub-panel focused on units that do not have revenue such as government, non-profit, and educational establishments. This group received the same form as the first sub-panel but with an insert of instructions telling them to provide a share of employment associated with production of green goods or services in place of revenue. Both sub-panels received the advance letter. BLS also altered the outgoing and return envelopes for all units in panel 3. The font was changed to more closely match that

used on other government mailings and the return address was changed to read “Department of Labor” as opposed to “Bureau of Labor Statistics.”

The increased mail response time allowed for the sub-panel that received a second form in the mail had a positive impact on the overall response rate as did the change in envelope font and department (54% response rate, 35% returned by mail and 18% from non-response prompting). The response rate for the non-revenue based establishments was 32%, seeming to indicate these establishments would most likely require more telephone prompting than revenue-based establishments. Similarly to panel 1 and 2, larger and multi-unit establishments tended to have lower response rates than smaller and single unit establishments. See Table 1. Again as in panel 2, while nearly all respondents provided a percentage of revenue, some respondents with positive green revenues did not check off the green category or the environmental standard their products or services met in the first 2 green questions.

The follow-up interviews, completed with 51 of the 126 mail respondents, indicated the questions were easy to understand and complete in panel 3, similar to the response in panel 2. Respondents said the time it took them to complete the form was reasonable. Sixty-four percent of the respondents to the follow-up interviews said the green categories did not apply to their business while 87% said the green categories were hard to understand even with the instruction sheet. Some did find the cheat sheet to be helpful in explaining the green categories but said more industry specific examples would help clarify the categories. Respondents were asked about the reasonableness of using revenue as a proxy for employment and 71% responded it seemed like a reasonable alternative. Finally, respondents were asked about their reaction to the term green. BLS wanted to know if the term green had any negative connotations thus reducing response rates. Respondents did not have strong positive or negative feelings about the use of “green”.

Panel 4

Because respondents liked the cheat sheet but found it and the green questions too generic and sometimes difficult to understand in panel 3, BLS developed 14 industry specific forms for panel 4 that provided industry specific examples in the green question itself. The format and questions on each of the 14 forms were identical but the question concerning the BLS green categories along with concrete examples of what products and services were included in each green category varied across the 14 forms (see Figure 4 for an example). Respondents that performed any of the services or produced any of the green products or services listed on the industry specific form were then asked to provide a revenue or employment share associated with that product or service. Respondents who indicated they produced no green products or services were told to check “no” and return the form.

Figure 4. Example of panel 4 form green questions: questions 4-8 (question 5 is not included below but asks for the respondents 2010 fiscal year)

4 Does this worksite produce goods or services that fall into the following green goods and services category? Please indicate yes or no.

- Please consider the goods and services you produce for sale or for transfer within your company.
- Do not consider internal green practices, such as recycling programs, use of renewable energy, use of green office products or cleaning materials, use of energy-efficient or pollution-reducing equipment or practices at the worksite, etc.

Green goods and services categories	Examples (this is not an exhaustive list)	Yes	No
<i>Recycling and reuse:</i> Products and services that: - collect, reuse, remanufacture, or recycle - compost waste materials	Wholesale trade of: - Automotive scrap - Industrial scrap - Recycled materials (bottles, boxes, rubber) Retail trade of used merchandise, including: - Clothing - Appliances		
<i>Other:</i> Does this worksite produce any green goods or services not described above? Green goods or services are those that benefit the environment or conserve natural resources.	If yes, please describe here:		

If any are checked yes, please go to Question 5. ←

If all are checked NO, please stop here and return the survey. Thank you. ←

6 During the fiscal year in Question 5, did this worksite have any revenue from the sales of goods or services in the categories checked 'yes' in Question 4?

Revenue from sales includes:

- Income a worksite receives from the sale of goods and services
- Market value of goods produced and services rendered for transfers within your company

Revenue from sales does not include:

- Royalties, taxes, interest payments, and all other non-operational revenue

No — Go to Question 8

Yes — Go to Question 7

7 (If yes to Question 6) What percent of this worksite's sales revenue came from the sale of goods or services in the categories checked 'yes' in Question 4?
 Estimate the percent of sales revenue for the worksite in Question 1 during the fiscal year shown in Question 5.

→ % Please stop here and return this completed survey. Thank you.

8 (If no to Question 6) What percentage of this worksite's employment listed in Question 3 primarily works on the products or services checked 'yes' in Question 4?
 Estimate for the worksite in Question 1 during the fiscal year shown in Question 5.

→ % Please stop here and return this completed survey. Thank you.

All 400 panel 4 sample units received an advance letter followed a few days later by the survey. Units that did not respond within one week were targeted for non-response calls. Of the 400 units, 31% responded by mail and 26% responded over the phone during the non-response calls for an overall response rate of 57%, higher than all earlier panels. As in prior panels, the response rates were highest among smaller establishments and lowest among the larger establishments. Single unit establishments also continued to have higher response rates than multi-units. State and local governments and private sector establishments had higher response rates than federal government establishments. See Table 1. Item non-response for the green questions on the form was low and almost all respondents with positive green revenue or employment checked off the category that applied to their green products or services which had been an issue in prior panels.

The follow-up interviews, completed with 50 of the 120 mail respondents, indicated the questions were easy to understand and complete. Respondents said the time it took them to complete the form was reasonable (75% said it took less than 10 minutes to complete). In earlier panels upwards of 87% of the follow-up respondents said the green categories were hard to understand; however, in panel 4, only 12% of the follow-up respondents found the green categories and examples hard to understand. Only 4% of the respondents had a negative reaction towards the term “green” and the green goods and services survey.

With one change to the reference period for the fiscal year, the forms used in panel 4 are the forms used in the actual GGS data collection effort. The panel 4 forms asked for the fiscal year that included a specific date, the final forms are asking simply for an establishment's fiscal year 2010. This change allows newly created establishments who may have employment or revenue for a fiscal year 2010 but may not have revenue or employment for the fiscal year that includes the specific date listed on the form to provide a usable response. The results from all 4 panels indicated the need for 2 maybe 3 mailings with heavy telephone non-response, particularly with multi-unit firms, larger firms, and federal government establishments where it seems finding the correct respondent is more difficult.

Presence of green goods and services among establishments

No statistical data or analysis of the survey responses was conducted during the research panels. However, BLS did look at the number of firms providing positive green revenue or employment percentages in the final 2 panels. Panels 3 and 4 showed that green activity, at least according to the BLS research, seems to be a relatively rare event among establishments. In panel 3 around 13% of the total sample indicated having positive green revenue or employment. Panel 4 was just slightly lower with around 10% of the sample units indicating positive revenue from green products or services. To ensure the GGS survey captures the green activity in the U.S., BLS plans to enhance the sample with "known green" establishments. BLS identified these known green establishments using industry lists from environmental organizations and industry associations, green journals, and relevant newspaper articles. This list of known green establishments will be sampled at a slightly higher rate than other establishments on the frame to ensure green businesses are included in the final sample of 120,000 units.

Conclusion

The research results provided answers to the questions posed by BLS early in the development of the GGS survey as well as dictated how best to get respondents to report an accurate green revenue or employment share on the survey forms. During the feasibility interviews and panel follow-up interviews, respondents indicated it would be easier to provide revenue by product or service line as opposed to employment. However, the response to whether revenue was a reasonable proxy for employment was mixed with some respondents saying the variability of input costs or the development of a new product made revenue an unreliable approximation of employment. Therefore, the final forms to be used in the GGS collection allow respondents to provide shares of either revenue or employment. In addition to a green revenue or employment share, BLS wanted to capture the category the green product or service the establishment provides falls into. The earlier panels attempted to capture this information but the formatting of the questions resulted in item non-response for this information. The forms tested in panel 4, and ultimately used as the final data collection forms, used a question that forced respondents to read and identify which, if any, categories applied to them before providing a revenue or employment share. Finally, the forms testing guided the collection methodology. Response rates from larger and multi-unit establishments were low indicating those groups will need heavy non-response follow-up. The testing also uncovered that the green activity BLS wants to collect seems to be a relatively rare event among establishments. This led BLS to develop a frame of "known green" establishments to be used to enhance the sample frame to ensure green activity is captured in the survey.

Table 1
Summary of research panel response rates

	Panel 1	Panel 2	Panel 3	Panel 4
Total sample units	348	356	354	400
Response rates				
Mail response rate	19%	20%	36%	31%
Response rate during NRP	16%	23%	19%	26%
Overall response rate	35%	43%	55%	57%
Size class (response rate within each size class)				
1-19	37%	40%	54%	55%
20-49	45%	43%	64%	66%
50-99	28%	27%	61%	56%
100-499	25%	33%	39%	59%
500+	22%	38%	52%	46%
Single or Multi-unit				
Single units	37%	42%	58%	57%
Multi units	16%	23%	41%	45%
Ownership (response rates within each ownership category)				
Private sector	n.a.	n.a.	53%	55%
Local government	n.a.	n.a.	68%	64%
State government	n.a.	n.a.	52%	68%
Federal government	n.a.	n.a.	n.a.	8%
Industry (response rates within each industry)				
Agriculture, forestry, fishing and hunting (11)	n.a.	47%	69%	43%
Utilities (22)	n.a.	n.a.	40%	44%
Construction (23)	n.a.	39%	52%	56%
Manufacturing (31)	n.a.	17%	n.a.	0%
Manufacturing (32)	n.a.	50%	54%	57%
Manufacturing (33)	n.a.	33%	69%	55%
Wholesale trade (42)	n.a.	39%	67%	75%
Retail trade (45)	n.a.	38%	25%	n.a.
Transportation and warehousing (48)	n.a.	n.a.	50%	31%
Information (51)	n.a.	22%	45%	32%
Finance and insurance (52)	n.a.	13%	70%	67%
Professional and technical services (54)	n.a.	37%	48%	66%
Management of companies and enterprises (55)	n.a.	50%	33%	60%
Administrative and waste services (56)	n.a.	36%	67%	40%
Educational services (61)	n.a.	47%	62%	59%
Health care and social assistance (62)	n.a.	n.a.	n.a.	0%
Arts, entertainment, and recreation (71)	n.a.	47%	50%	63%
Other services, except public administration (81)	n.a.	46%	60%	61%
Public administration (92)	n.a.	n.a.	50%	62%