

## Information Collection Challenges in Electric Power and Natural Gas

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### I. Introduction

Regulatory reform of the natural gas and electricity industries has brought changes to the Energy Information Administration's (EIA) data collection programs. This is true both in the kinds of information collected and the methods used to collect it. Table 1 shows the major differences in these industries before and after regulatory reform.

Table 1. Electricity and Natural Gas Industries Before and After Regulatory Reform

<b>Regulated</b>	<b>Regulatory Reform</b>
Vertical integration	Vertical integration greatly reduced
Physical flows linked to financial flows	Physical flows not linked to financial flows
Stable frames – easily developed and maintained	Volatile frames – difficult to develop and maintain
Regulated prices	Prices not regulated
One-stop shopping for data	Data not available from a single source

Prior to regulatory reform, the natural gas and electricity industries were vertically integrated, highly regulated and relatively stable. Utilities purchased energy, arranged and paid for its transportation to its distribution facility, and then resold the energy to the end-users. Customers were captives of the companies that owned these local distribution systems. State and Federal regulators regulated these transactions, and the physical flow of energy was very closely tied to financial transactions.

Regulatory reform has opened up the sale of electricity and natural gas by any company interested in selling energy to end-users. End-use

sales are no longer restricted to local utilities. These new market players are commonly known as energy marketers. Utilities still deliver energy to customers, but they are no longer the exclusive sellers. As a result, financial transactions are no longer tied to the physical flows.

This has implications for how establishments keep their books and on how EIA collects electricity from production to consumption. This introduces potential problems of double counting or missing components, especially in price.

This paper describes the methodologies EIA used to address the data collection issues raised as a result of regulatory reform. These techniques are not new to survey methodologists, although some were new to EIA. What was unique was EIA applying these techniques in a systematic way to design surveys for business establishments. Regulatory reform provided EIA with the opportunity to reassess what data are needed by our users, and to design and test establishment surveys that are meaningful to businesses that are still undergoing major changes. The methods are organized within three stages described in Table 2.

Table 2. EIA's Testing and Design Program

<b>Design Step</b>	<b>Method</b>
Data Requirements	Focus Groups Subject Matter Expert Review
Survey Design	Pre-survey Design Visits Data Models
Testing	Cognitive Testing

## II. Data Requirements

Determining survey requirements is the first step in EIA's collection design process. It is designed to identify:

- What new data are needed to describe and analyze the industry
- What existing data will be kept
- What new or different respondent frames will need to be constructed

EIA used two methods to determine data requirements for the restructured natural gas and electricity industries. They were focus groups and subject matter experts.

### A. Focus Groups

EIA conducted focus groups for the electricity and natural gas redesign efforts with data users and data providers both inside and outside of government. The focus groups provided a way to solicit input from important stakeholders.

The most difficult part of implementing the focus groups was recruiting participants. For electricity, our approach was to organize participants by group membership. For data providers, we organized groups of investor-owned utilities, municipal utilities, and non-utilities. For data users we organized panels of EIA staff, Federal government agencies, State government agencies, Congressional staff, Media, researchers and consultants, investors, and consumer organizations. One difficulty was finding enough qualified invitees who could, for scheduling or financial reasons, attend sessions in Washington. For the most part, EIA got knowledgeable participants for the electricity focus groups, but several of the eleven panels only had four or five attendees, much less than the desired ten to thirteen per panel. Also, because of scheduling problems, EIA conducted executive interviews with two data user constituencies at their places of business. With the participants' permission, the focus groups were audio taped to make writing final reports on findings easier. The entire process of recruitment, scheduling, and conducting the focus groups took about 16 weeks.

With the electricity experience in mind, EIA approached natural gas focus groups somewhat differently. We believed it would be more efficient to take advantage of pre-planned

gatherings of natural gas industry participants. We set up focus groups at energy conferences, and professional meetings in order to obtain a suitable number of attendees to participate in the focus groups.

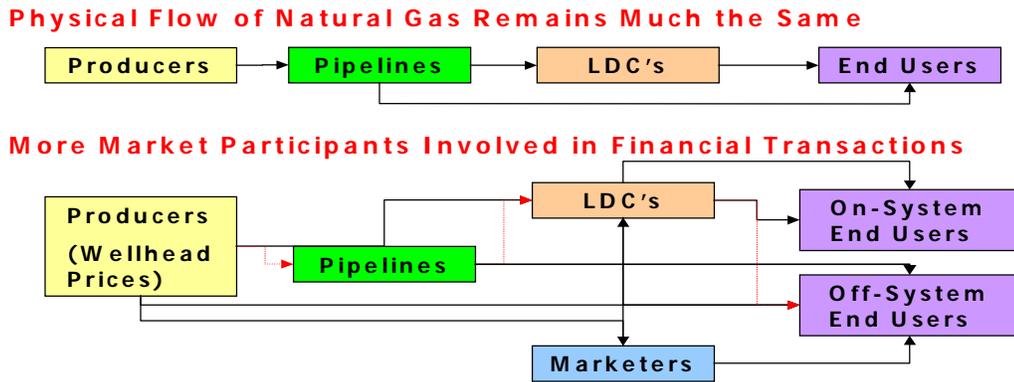
Recruiting at industry meetings, conferences and seminars had its drawbacks. As with many professional conferences and meetings, attendees represent a range of professions and interests. This necessitated the use of heterogeneous panels. For example, the Gas Industry Standards Board meeting had participants from local distribution companies, gas marketers, Federal agencies, and others. These groups were harder to facilitate and summarize. EIA found out, though, that heterogeneous panels led to more lively discussions since diverse groups will have more widely differing opinions on important issues. For the natural gas focus groups, the best discussions occurred during the heterogeneous group sessions.

Presenting the results of focus groups is also particularly challenging. It is challenging and tedious to listen to hours of audiotapes and systematically summarize all the major points that were discussed.

To synthesize and organize the information, we took two approaches. One was to have the focus group facilitator prepare a summary of key points from each session. This was done for both electricity and natural gas. The second, implemented for the natural gas panels, was to have several EIA staff review the individual session reports and develop a data requirements database. We basically did a content analysis of the reports, culling requirements by category – e.g., price, pipeline transportation, deliveries to consumers. It was an attempt to quantify what were basically qualitative results. The effort proved successful, but not in a way we had anticipated.

The process of going through the reports to extract data elements helped to focus subsequent discussions of requirements among EIA staff. Also, it is important to note that EIA did not uncover any major new themes in the focus groups. The results were largely confirmatory, but the input proved very useful during the public comment period associated with the clearance of these forms through the Office of Management and Budget.

Figure 2 – Industry Conceptual Design – Natural Gas



### B. Industry Experts

EIA also used industry experts as a complement to focus groups in developing data requirements. These experts included both in-house staff and knowledgeable subject matter people outside of EIA. We used a series of brainstorming sessions to get opinions on how the industries had changed and what new data requirements that might generate. We also explored how the “new data” might be used and presented to the public. These same experts helped to develop industry conceptual designs and match these designs against data requirements.

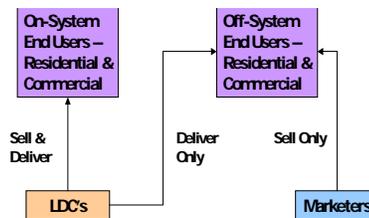
The brainstorming sessions were very time consuming, but yielded substantial results. Once they were completed, EIA had a preliminary list of data requirements. That served as a basis for the next stage of survey development – developing an industry conceptual design.

### C. Conceptual Design

The next step in the process was to map out a schematic of the industry and use it as a guide to analyze data requirements and later assist in forms design. Figure 2 is a level 1 conceptual design of a segment of the natural gas industry. At Level 1, the major components of the industry were mapped out. At the next level, each of the major components was further broken down into subcomponents. Requirements were linked to the components and subcomponents so that at the end, EIA had a very clear picture of what it would collect, and what it would not.

Figure 3 illustrates how EIA “drilled down” from a first level component of the conceptual design to address a specific problem caused by regulatory reform. One of the major effects of regulatory reform on EIA’s natural gas collections has been a loss in coverage of price data in all customer sectors – residential, commercial, and industrial. Figure 3 shows the industry conceptual design that describes the reason for the gap in price data. LDC’s no longer sell all the gas that is consumed by end-users.

Figure 3. The Gap in Natural Gas Price Data



This schematic illustrates EIA’s problem. Before regulatory reform, LDC’s both sold and delivered natural gas, and charged for both. Price and volume were available from one source. Now, LDC’s can still sell and deliver gas, but in some cases they only deliver gas while the end-user buys the commodity from someone else – a marketer. The conceptual design shows that EIA now has to combine data from two source to get a price.

## II. Survey Design

### A. Pre-survey Design Visits

#### *What They Are and What We Look For*

Pre-survey design visits are meetings with respondents or potential respondents to determine if they can provide data to meet requirements. They are conducted once an initial cut of the data requirements is made, but before a questionnaire is actually developed or revised. They are conducted at the respondent's place of business. Pre-survey design visits focus on:

- Data availability
- Record keeping practices
- Timing; and
- Data sensitivity

The very first thing that must be ascertained is whether the company actually has the data that for which EIA is asking. This has become especially important in an era of regulatory reform as companies' business lines evolve. For example, local gas distribution companies cannot provide price data on gas sold by marketers to customers in their service territories.

Record keeping practices of respondents are examined during the pre-survey design visits as well. What EIA looks for is what goes into the numbers that a respondent would report. For example, EIA might ask for volumetric data in thousand cubic feet of gas, but a local distribution company might keep its records in heat units, such as British Thermal Units (Btu's) and the company must do a conversion to meet EIA's reporting requirements.

Of particular interest to EIA at the present time is how respondents count their customers and define their customer classes. For both electricity and natural gas, EIA asks for number of customers served, but some distribution companies count meters or accounts as opposed to actual customers served. In the residential sector this can be a problem for master metered apartments. Also, electric utilities and local gas distribution companies base their charges to consumers on tariffs or rate categories. These categories do not always correspond to economic end-use sectors – e.g., residential, commercial, and industrial – as used by EIA. Pre-survey design visits are meant to identify these and other similar issues.

Issues of reporting periods and the timely reporting of data are a third area covered in the pre-survey design visits. EIA must be cognizant if a company's bookkeeping month corresponds to EIA's report month as well as how soon after the books are closed are the data considered ready for release by the company. These have to be taken into account when designing a data collection.

Finally, it is important to understand the sensitivity a company places on its information. Because of regulatory reform, many companies feel that their information is even more sensitive than prior to restructuring, and are less inclined to release it to government agencies, even with guarantees that the information will be kept confidential. Gathering this information during a site visit helps EIA to determine its policy on confidentiality and the disclosure of company identifiable data.

#### *Conducting and Arranging the Visits*

EIA turned to the American Statistical Association (ASA) Advisory Committee on Energy Statistics to seek their advice and expertise on conducting visits with establishments. At its Spring 1999 meeting, the Committee provided EIA with several suggestions. They were:

- Spend time "recruiting" the right person (or persons), those who fill out the surveys and know their company's data.
- Sell to the establishment that part of the purpose of the visit is to reduce respondent burden by improving the survey.
- Concentrate on the larger companies. They may be more expensive to visit, but they are the bulk of the coverage.
- Use a stratified approach for smaller companies.
- Find out about the organizational structure of the establishment. How do they may organize and keep their records? Do all the data reside in one department or do they have to go to several sources in the company to get the information? There may be more than one right person to talk to. When setting up appointments ask the establishment to have all the departments who do (or will) fill out

EIA forms attend the meeting. This relates back to the first bullet.

- Determine what terminology do they use for the concepts you're interested in? What units of measure to they use, and where along the physical or financial flow to the measure or record the data?

*Lessons Learned*

Pre-survey design visits have proven very useful to EIA. From our experience and advice from the ASA Committee, we formulated these general rules:

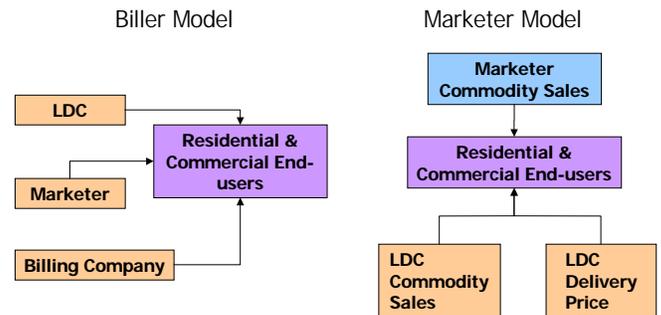
- It is necessary to have a clearly articulated picture of what data the agency wants to collect. General discussions with respondents about how their industry has changed are enlightening, but will not provide useful information for questionnaire wording and content.
- Pre-survey design visits should not be as structured as cognitive interviews. While it is important to have a protocol or script to follow, the respondents need to be able to expand upon their answers, and deviate somewhat from the topic in order to get a fuller understanding of their ability to provide needed data.
- Use these visits as an opportunity to solicit advice from respondents on how the data should be collected.
- EIA found the visits most useful when both survey methodologists and subject matter experts attended the visits. Subject matter experts can add substantive content to the discussions. Also, when they see first hand the difficulties respondents have in providing data, they are more likely to accept the findings from the interviews and make decisions based upon them.

**B. Instrument Design**

Nowhere was the complexity of collecting data in a deregulated environment more evident than in EIA's effort to maintain price coverage in states that have active customer choice programs. In the spring of 2000, EIA began to design a new survey that would fill this potential gap. Prior to regulatory reform, local distributions companies could provide complete price data for the

residential and commercial sectors. With customer choice, local distribution companies could provide information only on distribution charges and taxes for the commodity they delivered and for the commodity that they sold. The challenge was to collect information on the price of natural gas that was delivered by local distribution companies, but sold to end-users by marketers. EIA explored two models for solving this problem; the biller model and the marketer model. These are pictured in Figure 4.

Figure 4 – Natural Gas Data Models



Some of the strengths and weaknesses of each model are outlined in Table 3.

Table 3. Natural Gas Data Models

	<b>Biller</b>	<b>Marketer</b>
Capture Point for the data	Unified Bills	Sale of Commodity
Respondents	Billers	Marketers
Data	Volume, price, and price components	Commodity price from marketer and volume and price components from LDC's
Advantages	One-stop shopping	Smaller survey
Disadvantages	Verifying data quality	Double counting and piecing data together
Frame	Billers have to be linked to the marketers they serve	Volatile

EIA designed and developed the Form EIA-905, “Monthly Natural Gas Biller Survey” to test the biller model. We assumed that there would be unified billing; that is one source would have all the data for a set of consumers. We hoped that we could design a simple form. We also assumed that these billing entities could be easily identified; that they would represent a relatively stable frame. We finally assumed that these entities could provide the data and would be willing to provide them to EIA.

#### **IV. Cognitive Testing**

##### *What We Did*

Traditional cognitive testing of surveys focuses on a respondent’s ability to understand concepts, answer questions, follow survey instructions, and navigate through the form. The technique can be either a concurrent think-aloud protocol or a retrospective interview, but the emphasis is on the respondent’s interaction with the survey instrument.

Business surveys have another important aspect to them not covered in traditional cognitive interviewing. A person is responding not for themselves, but as the representative of a company. They are a “middle-man” between the questionnaire and a company’s records. As such, it is important for them to understand the correspondence between what EIA is asking, and a company’s business records.

EIA borrowed from its experience with the pre-survey design visits and expanded the cognitive interviews to include a review of record keeping practices and discussions about a company’s business practices. We wanted to focus on the correspondence between how establishments organize their records and the data for which EIA are asking. We also solicited suggestions from the interviewees on changes to the survey instruments.

We conducted most of the interviews at the respondent’s place of business. A few were done over the phone. The recruitment process was straight forward, but time consuming. Because we were testing a brand new survey, we identified ourselves and asked to speak to the person in the company who was responsible for completing surveys or the person who was responsible for producing company reports on the items of interest to EIA. We asked our

contact to bring to the interview any business records they would use in completing the survey and anyone in the company who might be involved in completing the survey.

There were three aspects to EIA’s on-site interviews. The first was a formal “think aloud” interview with a structured protocol and probes. The object was to test cognitive aspects of the question wording, the instructions and the concepts to be measured. The respondents were asked to go through the questionnaire and describe how they would complete the survey form. The respondents often had questions such as “What does EIA mean here” or “What is it that you want us to report in this section.” We responded with the standard, “What do you think EIA is asking for?” At the start of the interview we promised to answer any of these questions once the “formal” part of the interview was completed.

The second aspect was a discussion of the establishment’s business records. We discussed if there is a good fit between business records and survey concepts, operational definitions of terms, timing i.e., billing cycle versus calendar month, meeting submission deadlines, and units of measures. If this discussion came up during the formal part of the interview, we allowed it to continue. If it did not, EIA initiated it at the end of the interview.

Finally we conducted a respondent debriefing, where we answered questions the respondents had about the survey form. We discussed the purpose of the survey and the data model from which it was constructed. We also took the opportunity to learn more about their business processes and record keeping practices. The debriefing part of the interview yielded as much useful information about how the respondents would complete the survey as the formal cognitive interview.

##### *Lessons Learned from Cognitive Interviews*

The first lesson we learned from these interviews that survey respondents are not always the most knowledgeable people in a company about their data. Often they are not familiar with details of the data, how they are developed, what decisions were made in classifying data into categories, or how accurate the numbers really are. “I get it from the folks in sales or operations” is something we often heard when probing during

the interviews. Data typically funnels into the data reporter from a variety of sources, each putting their own interpretation on what is required. The example of end-use sector information was a leading example. A respondent may be unaware of how their company takes rate categories and breaks them into end-use sectors.

A second important lesson learned was that data often come from diverse sources in a company, and record-keeping practices may not be consistent with the company. Often data from different departments with different functions must be combined to produce the data that EIA is requesting. An example of this is when EIA asks for both volume and revenue data to compute a volume-weighted price. The accounts receivable department might provide financial data based on contracts, while the operations department might provide information on physical flows. When these data need to be combined, the reconciliation process can be difficult and time consuming for the respondent.

The final lesson learned was that respondent debriefings are a good source of information. This was especially true if the respondent had trouble completing the survey. These debriefings also provided an excellent opportunity for respondents to make suggestions on how to clarify terminology, forms and instructions.

#### *Results of Testing the Marketer's Survey*

As EIA tested the survey, we realized that the survey would not work well for several reasons. They were:

- Billing for natural gas was not consistent between states or even between jurisdictions within a single state. The survey had to take into account many combinations and permutations for billing options for residential and commercial customers. This made the survey overly complex with intricate navigation and skip patterns.
- Billers did not, in many cases, have commodity price data by end-use sector.
- Utilities who billed for marketers did not have price data by end-use sector.

In short, there was not a good match between respondents' business records and the data for which EIA was asking. The relationships between utilities and marketers were not straightforward, and billing practices were not consistent across most of the potential respondent population.

Based on these findings, EIA decided to abandon the EIA-905, before it was fielded. We chose instead to redesign the instrument. The result was the EIA-910, Monthly Natural Gas Marketer Survey. This survey would go to marketers, and collect from marketers two pieces of revenue data for the gas that they sold, commodity revenue and revenue from all other components, if they received that revenue. The components would be integrated with EIA's existing monthly survey to local distribution companies.

#### **V. Where the Methods Adequate to Meet the Challenges?**

Regulatory reform in the natural gas and electricity industries has brought changes and challenges to the Energy Information Administration's data collection programs. These industry changes not only provided EIA with the opportunity to reassess what data are needed by our users, but to implement a program to design and test our establishment surveys. This paper described the methodologies that EIA used to address the data collection issues raised as a result of regulatory reform.

From our experience, the program worked well. Specifically:

##### Data Requirements

- **Focus Groups** – Good at capturing requirements, not too good at prioritizing requirements or considering costs in obtaining the data.
- **Expert Reviews** (EIA and Outside) – Good at prioritizing and useful for developing industry conceptual designs
- **Industry Conceptual Design** – Good for matching requirements with industry structure. Very helpful for structuring industry visits and design surveys

##### Survey Design

- **Pre-survey Design Visits** – What data did respondents actually have and did that correspond to what EIA needed.

When industry was changing rapidly information gathered become dated.

- **Data Collection Models** – Useful tools for decision makers and survey designers.

### **Cognitive Testing**

- Invaluable for testing draft instruments and fixing errors in design, instructions, and terminology.
- New respondents did not have a history of completing EIA surveys. The testing was particularly useful for that group of respondents.

Even more important than the value of each survey methods on its own, was the use of an integrated approach to design and testing. Combining data requirements, expert review, conceptual designs and models, pre-survey design visits and testing made each of the methods more effective than if they had been applied separately.